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# VERIFICATION OF COLDWORKING AND INTERFERENCE LEVELS AT FASTENER HOLES

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TEC developed a measurement and assessment capability to quantitatively determine the structural integrity around cold-worked fastener holes in various locations on aircraft, thereby assessing the aircraft's overall health, targeting necessary maintenance, improving aircraft readiness and air worthiness, and reducing its life-cycle cost. This capability will enable the Air Force to improve its aircraft life cycle management by a reliable, quantifiable, nondestructive means, instead of using other unreliable methods or overly conservative estimates that result in higher inspection and repair costs.

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## Introduction

The purpose of SBIR AF04-241 was for Technology for Energy Corporation (TEC), as prime contractor, to develop a structural health assessment system for cold-worked holes. TEC modified an existing x-ray diffraction system (XRD), developed under recent SBIRs (Contract Numbers F09650-01-M0955 and F09650-02-C0517), to determine the residual stresses at cold-worked fastener holes. TEC then joined this XRD measurement capability with material-based life prediction technology developed by VEXTEC Corporation acting as a subcontractor to TEC.

TEC developed a measurement and assessment capability to quantitatively determine the structural integrity around cold-worked fastener holes in various locations on aircraft, thereby assessing the aircraft's overall health, targeting necessary maintenance, improving the aircraft readiness and air worthiness, and reducing its life-cycle cost. This capability will enable the Air Force to improve its aircraft life cycle management by a reliable, quantifiable, nondestructive means, instead of using other unreliable methods or overly conservative estimates that result in higher inspection and repair costs. Extending the operating life cycles of a large number of aircraft would result in substantial savings for the Department of Defense.

The purpose of SBIR Phase I Topic AF04-241 was to show proof of principle for a prototype stress measurement system that would be coupled with a life assessment model to conceptualize a health assessment system for aircraft. Specifically, the work concentrated on differentiating levels of cold-working in and around fastener holes which are subjected to fatigue loading in aircraft structures.

This effort was divided into six major tasks as summarized below.

Task 1: Establish validity of advanced x-ray diffraction techniques
Task 2: Establish measurement parameters based on USAF needs
Task 3: Establish differentiation criteria
Task 4: Blind-test measurements
Task 5: Conceptualize a prototype health assessment system for use on and around aircraft
Task 6: Write the Phase I final report

The SBIR Phase I successfully proved the concept feasibility of using the TEC XRD approach to distinguish between varying degrees of cold-working at fastener holes. We have also analyzed the measurement results and found they can provide the experimental data necessary to assess the component microstructure nondestructively. The Phase II effort will provide the AF with a structural heath assessment system as originally proposed.

The program started with a kick-off meeting at Wright-Patterson Air Force Base to discuss the proposed work and gather important feedback from representatives for various aircraft platforms and programs. Based on the feedback, the work plan was adjusted to target the primary Air Force needs for this program. The project work plan and results are discussed in this paper.

## Work Plan

A kick-off meeting was held at Wright-Patterson AFB on June 28, 2004. Representatives from several areas at Wright-Patterson and from Warner-Robins participated in discussions pertinent to the program's success. Specifically, alloy selection and the most common hole sizes were established for this study. The applicability of this program to new and aging aircraft was noted and discussed.

Based on feedback from the kick-off meeting, standard cold-worked hole samples were ordered from Stress Wave. Aluminum 2024-T3 and 7075-T6 alloys were selected. Hole sizes selected were 1/4" and 5/6". Each standard had 7 holes in it. Hole 0 was not cold worked. Holes 1 through 6 had increasing amounts of cold working imparted by the split sleeve mandrel technique. Appendix A contains the documentation for the Stress Wave standard. In addition to these documented standards, the Air Force supplied 20 standards, each with a single 1/4" hole in the center of the standard. The documentation for these standards was not provided to TEC; thus, these standards represented a blind test to see if x-ray diffraction (XRD) techniques could distinguish between non cold-worked holes and holes that had been cold worked to various levels.

As proposed, TEC started the program by verifying x-ray diffraction techniques on aluminum alloy samples. Accurate measurement of residual stresses in textured materials such as wrought aluminum has been difficult with some commonly available techniques. Traditionally, many laboratories use chromium radiation at $142^0$ $2\theta$. These parameters work satisfactorily on fine-grained aluminum alloys with random grain orientation. Chromium radiation, due to shallow penetration compared to copper radiation, does not give the volume of diffraction to overcome large grain size and preferred orientation effects associated with wrought aluminum. Higher precision is accomplished by measuring diffraction peaks at high back-reflection angles. Thus, measurements at $160^0$ $2\theta$ are more precise than those at $142^0$ $2\theta$.

TEC verified measurements on stress-free aluminum powder and 2024, 6061 and 7075 aluminum alloy plates using copper radiation at $160^0$ $2\theta$. These measurements were made using a TEC Model 1630 X-ray Diffraction System and are contained in Appendix B.

The ultimate goal of this work was to conceptualize a health assessment system that would use XRD data gathered by a portable system along with other material properties, usage profiles etc. The next step in the program was to establish the XRD measurement parameters based on Air Force needs. MAX, Miniature Advanced X-ray System, is a portable XRD system developed under a DoD SBIR (Contract Numbers F09650-01-M0955 and F09650-02-C0517). This system was designed to make measurements in hard-to-access locations on aircraft. It consists of a 3W miniature copper x-ray tube and two miniature position-sensitive proportional counter detectors incorporated in a fixed head design. This system was used to make measurements on the Stress Wave and Air Force standards to determine if valid measurements comparable to data from the 1630 system could be obtained.

MAX was carried to Tinker Air Force Base to encourage discussions about how this system could be used on aircraft at the depot and to obtain more information about Air Force needs. It is probable that the system could be easily implemented as a data acquisition and analysis tool on aircraft in hangers and on the flight line. Data acquisition times of 2-3 minutes were deemed acceptable. The existing positioning plate coupled with tape could be used to gather data at a large number of measurement sites. Line power for the system was also considered acceptable.

The third task this program was to establish differentiation criteria for non cold- work holes and holes cold-worked to varying levels. The majority of the XRD measurements were made during this task. Baseline measurements were made on a 1630 system and duplicated with MAX. The measurements were made on the Stress Wave standards first followed by measurements on the Air Force standards.

Initial measurements were made varying collimator size, acquisition time, and measurement location. Based on these results, the optimum collimator sizes of 4-5 mm in diameter were selected. Smaller-sized collimators could show a higher degree of stress gradient separation along the radial distance from the hole edge; however, the 3-W MAX system could provide data quicker using the larger collimator.

The measurement times used for the 1630 system ranged from 4-6 minutes per measurement. MAX measurement times were generally 5 minutes for the standard measurement. Enhanced MAX software has dropped the required measurement time to 2-4 minutes.

Measurement locations concentrated on positions along a radial line from the hole edge. Initial measurements were made on both sides of the standards at different points around the hole diameter. In all cases, measurements were made in a circumferential direction with respect to the hole. Consistent data were obtained on the front side of the standards at radial positions in the transverse direction of the standard. Subsequent data were also obtained on the Air Force standards along a radial line in the longitudinal direction of the standard. The radial positions used were 0.05", 0.10" and 0.15" from the hole edge.

The final analysis task was to conceptualize a prototype health assessment system for use on and around aircraft. TEC teamed with VEXTEC to implement this task. Data from the 1630 system were sent to Richard Holmes of VEXTEC for analysis of how measurement components could be used in existing VEXTEC models. VEXTEC identified residual stress, diffraction peak integrated intensity, and diffraction peak width as parameters related to microstructural properties. The existing models use microstructural properties to characterize fatigue capability and in turn, provide a significant predictor of structural health.

Results and Discussion

The residual stress and diffraction peak data are presented in Tables 1-3. These data are also shown graphically in Figures 1-10. Data from the 1630 system were used primarily in analyzing the condition around the holes and ranking the Air Force standards. In about half the cases, MAX data compared favorably to the 1630 data. For the cases where the comparison was not favorable, two factors attributed to the differences. First, MAX was initially set up with the center of the detector set at $162^0$ $2\theta$. On the MAX system, many of the peak positions were registering at approximately $163^0$ $2\theta$. A new head was designed with the center of the detectors set at $163^0$ $2\theta$. The second reason for differences in results related to the data analysis software for MAX. TEC has been able to reanalyze these data with software developed for a TEC 4000 system. The reanalysis shows much better comparison in the data to the 1630 system. Work is currently underway to upgrade the MAX analysis routines.

Residual stresses coupled with the diffraction peak widths were used to rank the samples from minimal or no cold working to maximum cold working. Residual stresses are the stresses that remain in a body after all external loads are removed. These stresses can be harmful or beneficial in the service life of a part since they combine directly with loading stresses for a total stress in the part. In fatigue environments, compressive residual stresses are usually beneficial and help prevent crack initiation and growth. The diffraction peak width is a qualitative indication of plastic strain in a part. As work hardening increases, the peak width broadens. The introduction of plastic strain or deformation in turn changes the levels of residual stresses, which are related to elastic strains. By comparing the magnitudes of the residual stresses and peak widths along a radial line from the hole edge, it is possible to distinguish non cold-worked holes from cold-worked holes.

Baseline measurements were made on both the Stress Wave and Air Force standards. These measurements played an important part in characterizing the stresses around the cold-worked holes. For the Stress Wave standards, the baseline residual stresses were compressive, −13.4 ±7.2 ksi for the 7075-T651 standard and −25.4 ±4.4 ksi for the 2024-T351 standard. In contrast, the baseline stresses for the Air Force standards were low, ranging from −0.3 ±1.4 ksi to −5.1 ±2.4 ksi in the transverse direction. When baseline measurements were made in the longitudinal direction, however, stresses ranged from −1.2 ±1.0 ksi to −22.2 ±3.0 ksi. These differences indicate that the Stress Wave and Air Force standards were probably processed differently prior to drilling and/or cold-working the holes. Additionally, the baseline peak width was higher than some of the peak widths for the cold-worked holes in both sets of standards. These factors made it difficult to apply any set rules for ordering the Air Force standards based on the Stress Wave results. These results indicate that baseline measurements are useful in determining if a hole has been cold-worked.

The amount of cold working for the Stress Wave standards ranged from 0 to 5.33% for the 7075-T651 standard and 0 to 5.38% for the 2024-T351 standard. Based on a general comparison of the Stress Wave and Air Force standards, it is expected that the Air Force standards had a similar range of cold-working.

Measurements from the Air Force standards in the transverse direction with respect to the bars were ordered as follows from no or minimal cold working to the maximum amount of cold working:
AF2, AF1, AF3, AF4, AF5,
AF17, AF10, AF11, AF8, AF19,
AF9, AF7, AF14, AF16, AF20,
AF6, AF18, AF15, AF13, AF12.

The measurements were repeated on the Air Force standards. This time the measurements were made $90^0$ from the first set so the direction was longitudinal with respect to the bar. The results were used to again order the samples from minimal cold-working to maximum cold working. In this case it was convenient to group the samples in four groups.

AF5, AF2, AF4, AF3, AF1 (no or minimal cold-working)
AF9, AF6, AF8, AF7, AF10
AF13, AF12, AF15, AF11, AF14
AF16, AF18, AF17, AF19, AF20 (maximum cold-working)

Both sets of measurements identified the first five samples as having no or minimal cold working. Differences in the ordering suggest that measurements should be made along radial lines that are $90^0$ apart. The differences in the stresses and peak widths for these measurements were attributed to directionality of the cold-working process and/or effects of the sample geometry. The residual stress data were sent to VEXTEC for analysis and an assessment of how these results could be incorporated in their fatigue life model. The VEXTEC summary is provided in Appendix C. VEXTEC identified the residual stress, peak width, and the diffraction peak integrated intensity as pertinent data that could be related to microstructural properties. The residual stress and peak width were emphasized in this study for cold-working analysis. The integrated intensity data are related to grain size and preferred orientation of the grains, or texture. Grain size, texture and cold-working are factors that affect the microstructure. These microstructural properties are used in VEXTEC 's existing models for life prediction.

Residual stresses measured by x-ray diffraction are a measure of surface stresses only. Stresses in the outer fibers of a component can differ from stresses measured by other techniques and from analytically derived stresses. Surface stresses can be altered by any action that results in plastic flow. The final stress state results from the combinations of loadings that occur during processing and service history. Because beneficial stresses can come from different processes, the final stress state is a better indicator of useful life than the processes used to affect the stress state.

## Conclusions

TEC proved the validity of using the XRD technique to distinguish non cold-worked from cold-worked holes. Baseline measurements made on a TEC 1630 were generally verified using MAX. MAX is a miniaturized, portable XRD system developed for the Air Force under separate SBIR programs. In cases where there were differences in the data, the differences were identified and corrected through enhanced data analysis routines.

The XRD data were supplied to VEXTEC for analysis. VEXTEC assessed the validity of using these data in their life prediction models. VEXTEC identified residual stress, diffraction peak width, and diffraction peak integrated intensities as pertinent information for inclusion in their models. These factors are related to the amount of cold working and to microstructural features such as grain size and preferred orientation (texture). Microstructural information is currently used by VEXTEC in their life prediction models.

This SBIR shows that the elements exist to develop a health assessment system that will enable the Air Force to improve its aircraft life cycle management. These elements include a portable, nondestructive XRD system that can safely provide reliable results quickly, data which indicate amounts of cold working and microstructural information and a life-prediction model that uses these data. TEC and VEXTEC are ready to develop this health monitoring system as a Phase II effort.

TABLE 1.
USAF COLD-WORKED HOLES STANDARDS

| Standard | System | Circumferential Residual Stress, ksi (Peak Width, $^0$) | | | |
|---|---|---|---|---|---|
| | | .05" from Edge of Hole | .10" from Edge of Hole | .15" from Edge of Hole | Baseline |
| AF1 | 1630, trans.<br>1630, long. | −4.4 ±1.5 (3.00)<br>−22.5 ±1.8 (4.29) | −4.6 ±1.8 (2.88)<br>−17.1 ±1.8 (4.23) | −4.4 ±1.2 (2.76)<br>−19.7 ±1.8 (4.18) | −2.2 ±1.9 (3.61)<br>−19.4 ±2.6 (4.06) |
| | MAX | −17.4 ±3.3 (2.74) | −14.5 ±2.7 (2.41) | −16.6 ±1.3 (1.80) | |
| AF2 | 1630, trans.<br>1630, long. | −2.3 ±2.4 (3.28)<br>−9.5 ±1.2 (4.55) | −0.3 ±1.2 (3.30)<br>−6.2 ±1.5 (4.42) | −1.1 ±1.6 (2.99)<br>−6.8 ±1.5 (4.28) | −1.4 ±1.9 (3.59)<br>−5.9 ±2.0 (3.91) |
| | MAX | −25.2 ±1.6 (1.79) | +7.5 ±4.1 (1.76) | −6.6 ±1.1 (1.63) | |
| AF3 | 1630, trans.<br>1630, long. | −11.6 ±3.7 (3.03)<br>−20.5 ±2.0 (4.52) | −2.8 ±2.1 (3.10)<br>−19.1 ±1.9 (4.73) | −2.3 ±0.9 (3.12)<br>−18.7 ±2.3 (4.21) | −0.3 ±1.4 (3.98)<br>−18.3 ±1.7 (4.18) |
| | MAX | −12.8 ±1.7 (2.25) | −4.4 ±1.6 (2.40) | +3.5 ±7.6 (2.14) | |
| AF4 | 1630, trans.<br>1630, long. | −5.8 ±1.7 (3.24)<br>−17.2 ±2.0 (4.20) | −4.5 ±2.0 (3.33)<br>−16.8 ±2.2 (4.51) | −3.6 ±1.6 (3.03)<br>−18.7 ±2.2 (4.19) | −1.0 ±1.2 (3.60)<br>−22.2 ±3.0 (3.95) |
| | MAX | −2.7 ±3.9 (2.04) | −7.6 ±4.2 (2.54) | −10.2 ±* (2.53) | |
| AF5 | 1630, trans.<br>1630, long. | −9.9 ±1.8 (3.25)<br>−4.8 ±1.1 (4.32) | −5.5 ±1.7 (3.07)<br>−2.8 ±1.4 (4.37) | −3.8 ±1.5 (3.07)<br>−1.2 ±1.4 (4.23) | −1.0 ±1.3 (3.84)<br>−6.6 ±1.7 (4.25) |
| | MAX | −1.8 ±1.3 (1.64) | 0.4 ±1.0 (2.02) | −1.0 ±1.4 (2.87) | |
| AF6 | 1630, trans.<br>1630, long. | −40.1 ±1.4 (3.67)<br>−31.6 ±1.9 (4.41) | −23.8 ±2.9 (3.33)<br>−16.4 ±1.8 (4.41) | −0.7 ±2.5 (2.90)<br>−5.7 ±1.8(4.65) | −4.0 ±1.4 (3.63)<br>−2.0 ±1.3 (3.75) |
| | MAX | −40.7 ±1.7 (1.93) | −33.1 ±2.4 (1.76) | −8.6 ±5.6 (1.42) | |
| AF7 | 1630, trans.<br>1630, long. | −30.9 ±2.3 (3.14)<br>−34.5 ±2.0 (4.67) | −17.7 ±2.8 (3.53)<br>−22.8 ±2.0 (4.48) | −6.8 ±2.1 (3.35)<br>−13.7 ±1.8 (4.42) | −5.1 ±1.1 (3.90)<br>−19.9 ±1.3 (4.04) |
| | MAX | −33.1 ±1.4 (1.61) | −15.4 ±1.3 (1.61) | 0.9 ±1.3 (1.54) | |
| AF8 | 1630, trans.<br>1630, long. | −27.6 ±2.6 (3.23)<br>−31.8 ±1.4 (4.20) | −17.1 ±1.4 (3.32)<br>−26.1 ±2.1 (4.10) | −6.9 ±1.4 (2.75)<br>−13.7 ±1.2 (4.12) | −1.5 ±0.6 (3.13)<br>−17.6 ±1.5 (4.16) |
| | MAX | −27.5 ±1.9 (1.68) | −11.1 ±1.6 (2.09) | −0.5 ±2.3 (1.38) | |

* Uncertainty indeterminate

TABLE 1.
USAF COLD-WORKED HOLES STANDARDS

| Standard | System | Circumferential Residual Stress, ksi (Peak Width, $^0$) | | | |
|---|---|---|---|---|---|
| | | .05" from Edge of Hole | .10" from Edge of Hole | .15" from Edge of Hole | Baseline |
| AF9 | 1630, trans.<br>1630, long. | −30.7 ±1.8 (3.27)<br>−23.9 ±2.3 (4.60) | −17.3 ±2.3 (3.46)<br>−9.3 ±2.1 (4.56) | −6.6 ±2.2 (3.15)<br>−2.0 ±1.8 (4.04) | −1.8 ±1.3 (3.38)<br>−4.9 ±2.3 (4.44) |
| | MAX | −30.6 ±1.9 (1.52) | −15.6 ±2.2 (1.83) | −25.4 ±1.7 (2.06) | |
| AF10 | 1630, trans.<br>1630, long. | −28.6 ±2.5 (3.39)<br>−39.3 ±3.0 (4.69) | −17.0 ±1.9 (2.99)<br>−22.2 ±1.7 (4.65) | −1.4 ±1.6 (3.07)<br>−14.7 ±1.1 (4.43) | −4.1 ±2.6 (2.89)<br>−17.0 ±2.4 (3.92) |
| | MAX | −23.5 ±1.8 (1.49) | −25.6 ±1.6 (1.47) | −39.5 ±1.6 (1.48) | |
| AF11 | 1630, trans.<br>1630, long. | −27.6 ±1.2 (3.07)<br>−41.6 ±3.4 (5.04) | −16.8 ±1.5 (3.35)<br>−31.1 ±1.8 (4.85) | −4.5 ±2.2 (3.13)<br>−14.6 ±3.1 (4.50) | −1.2 ±1.0 (3.63)<br>−3.9 ±1.4 (4.07) |
| | MAX | −31.8 ±2.1 (1.87) | −15.9 ±1.8 (0.53) | −6.2 ±1.6 (2.16) | |
| AF12 | 1630, trans.<br>1630, long. | −42.6 ±2.9 (2.76)<br>−41.4 ±2.4 (5.03) | −22.8 ±2.3 (3.27)<br>−31.6 ±2.1 (4.65) | −14.4 ±3.1 (3.12)<br>−25.8 ±2.4 (4.38) | −5.1 ±2.4 (3.63)<br>−17.2 ±1.3 (4.26) |
| | MAX | −21.9 ±1.5 (1.49) | −18.2 ±1.9 (0.53) | −29.4 ±2.4 (1.07) | |
| AF13 | 1630, trans.<br>1630, long. | −40.1 ±1.8 (3.43)<br>−29.7 ±2.3 (4.78) | −23.3 ±2.9 (3.40)<br>−17.5 ±2.0 (4.77) | −4.7 ±1.6 (3.16)<br>−4.8 ±1.8 (4.70) | −4.2 ±1.3 (2.86)<br>−2.6 ±1.4 (4.15) |
| | MAX | −18.7 ±2.6 (0.46) | −28.6 ±2.1 (1.80) | −2.7 ±1.1 (1.96) | |
| AF 14 | 1630, trans.<br>1630, long. | −34.7 ±3.1 (3.04)<br>−46.2 ±2.6 (4.66) | −18.3 ±2.6 (2.96)<br>−30.3 ±2.3 (4.53) | −8.6 ±2.0 (2.88)<br>−18.7 ±2.3 (4.59) | −3.9 ±1.3 (3.45)<br>−18.8 ±1.9 (3.98) |
| | MAX | −32.1 ±2.6 (1.78) | −23.0 ±2.2 (1.68) | −20.7 ±1.4 (2.05) | |
| AF15 | 1630, trans.<br>1630, long. | −35.3 ±5.3 (3.47)<br>−35.3 ±1.7 (5.09) | −24.5 ±2.5 (3.59)<br>−27.7 ±1.2 (4.79) | −7.8 ±3.3 (3.21)<br>−16.1 ±1.0 (4.31) | −3.4 ±1.7 (3.31)<br>−17.1 ±2.0 (3.96) |
| | MAX | −20.0 ±1.9 (1.67) | −27.0 ±3.1 (1.75) | 3.6 ±2.1 (2.08) | |

TABLE 1.
USAF COLD-WORKED HOLES STANDARDS

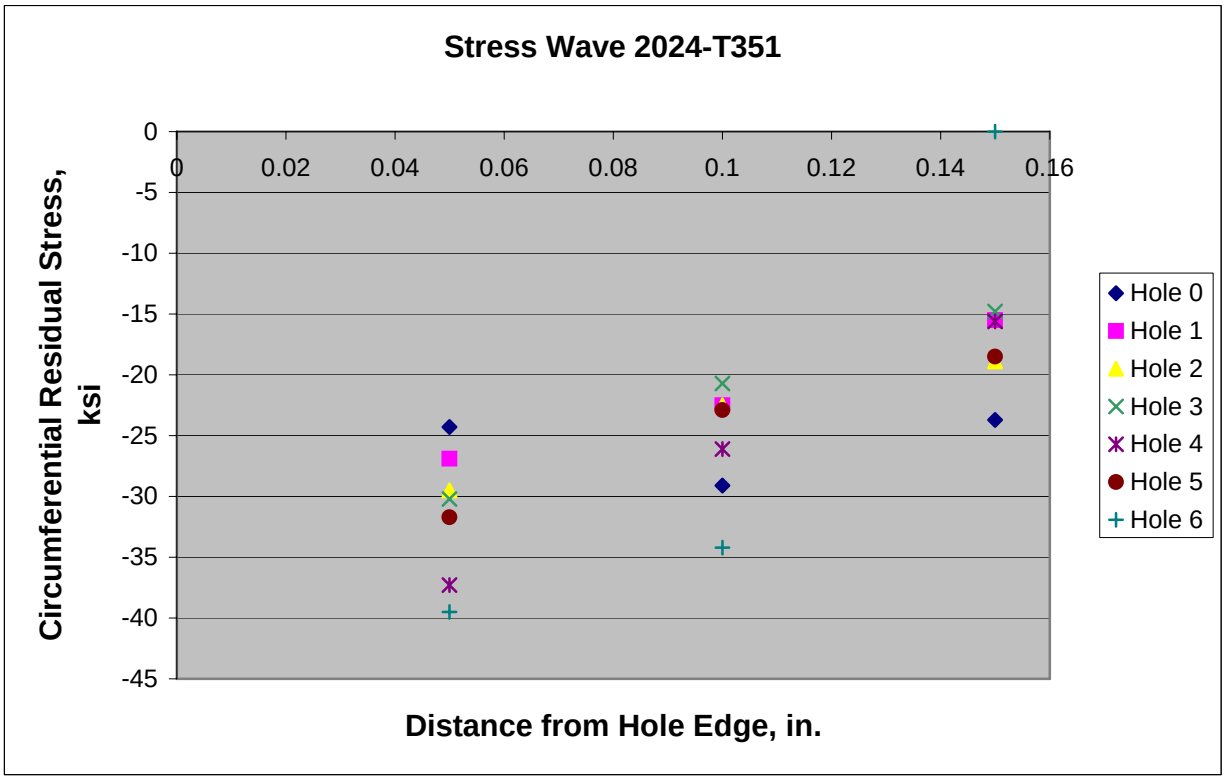
| Standard | System | Circumferential Residual Stress, ksi (Peak Width, $^0$) | | | |
|---|---|---|---|---|---|
| | | .05" from Edge of Hole | .10" from Edge of Hole | .15" from Edge of Hole | Baseline |
| AF16 | 1630, trans.<br>1630, long. | −34.7 ±3.1 (3.11)<br>−38.4 ±2.2 (4.67) | −22.4 ±2.7 (3.31)<br>−30.2 ±1.4 (4.45) | −9.9 ±3.1 (3.19)<br>−19.6 ±1.3 (4.35) | −2.0 ±1.5 (3.77)<br>−19.0 ±2.4 (3.94) |
| | MAX | −31.2 ±1.6 (1.51) | −31.7 ±1.1 (1.60) | −12.4 ±1.9 (1.84) | |
| AF17 | 1630, trans.<br>1630, long. | −27.7 ±2.0 (3.55)<br>−35.7 ±2.4 (4.85) | −10.8 ±2.0 (3.34)<br>−22.3 ±1.9 (4.64) | 1.5 ±1.8 (3.14)<br>−10.0 ±2.2 (4.67) | −3.2 ±1.5 (3.30)<br>−1.2 ±1.0 (3.87) |
| | MAX | −39.0 ±1.3 (1.36) | −6.9 ±1.9 (1.66) | 6.7 ±1.2 (2.09) | |
| AF18 | 1630, trans.<br>1630, long. | −39.3 ±2.4 (3.22)<br>−41.9 ±2.7 (4.68) | −22.7 ±1.7 (3.33)<br>−24.3 ±4.1 (4.57) | −7.8 ±2.5 (3.22)<br>−9.8 ±1.7 (4.28) | −1.3 ±2.3 (3.51)<br>−6.8 ±1.3 (4.08) |
| | MAX | −43.9 ±4.4 (1.38) | −23.6 ±13.3 (1.91) | −6.0 ±1.6 (1.96) | |
| AF19 | 1630, trans.<br>1630, long. | −32.9 ±2.0 (3.34)<br>−39.5 ±2.4 (4.96) | −15.7 ±3.0 (2.99)<br>−29.2 ±2.5 (4.71) | −3.9 ±2.2 (2.90)<br>−16.7 ±2.8 (4.54) | −3.9 ±1.3 (3.69)<br>−21.6 ±1.9 (3.95) |
| | MAX | −26.4 ±2.4 (1.47) | −30.8 ±1.9 (0.53) | 2.1 ±1.9 (2.09) | |
| AF20 | 1630, trans.<br>1630, long. | −34.7 ±3.2 (3.67)<br>−33.6 ±3.2 (5.24) | −22.5 ±1.9 (3.52)<br>−32.3 ±3.3 (5.00) | −4.6 ±2.4 (3.48)<br>−22.0 ±3.7 (4.97) | −3.5 ±1.2 (3.49)<br>−4.7 ±1.5 (3.77) |
| | MAX | −25.2 ±6.3 (1.93) | −13.8 ±1.4 (2.03) | −9.6 ±1.1 (1.85) | |

TABLE 2.
COLD WORKED HOLES STANDARDS

| Location | System | Circumferential Residual Stress, ksi (Peak Width,$^0$) | | |
|---|---|---|---|---|
| | | .05" from Edge of Hole | .10" from Edge of Hole | .15" from Edge of Hole |
| Standard 7320-001 2024-T351 1/4" Hole | | | | |
| Baseline | 1630 | −25.4 ±4.4 (3.60) | | |
| | MAX | −21.1 ±1.3 (1.96) | | |
| Hole 0 | 1630 | −24.3 ±3.5 (3.33) | −29.1 ±3.3 (3.50) | −23.7 ±2.2 (3.32) |
| | MAX | −25.9 ±2.4 (1.47) | −45.8 ±3.6 (1.42) | −22.4 ±4.5 (2.31) |
| Hole 1 | 1630 | −26.9 ±3.0 (3.01) | −22.5 ±3.0 (2.98) | −15.5 ±2.4 (3.33) |
| | MAX | −20.2 ±1.6 (2.44) | −36.8 ±3.3 (0.91) | −32.7 ±1.7 (0.73) |
| Hole 2 | 1630 | −29.5 ±1.1 (2.98) | −22.5 ±1.8 (3.05) | −18.9 ±2.9 (2.93) |
| | MAX | −22.8 ±2.8 (3.00) | −26.8 ±2.1 (0.80) | −15.9 ±1.9 (0.68) |
| Hole 3 | 1630 | −30.2 ±4.3 (3.04) | −20.7 ±2.4 (2.89) | −14.8 ±3.1 (2.96) |
| | MAX | −77.4 ±3.2 (1.04) | −52.9 ±1.4 (0.65) | −12.6 ±1.1 (1.96) |
| Hole 4 | 1630 | −37.3 ±3.7 (3.05) | −26.1 ±2.3 (2.91) | −15.6 ±2.1 (3.18) |
| | MAX | −38.9 ±2.3 (0.91) | −20.7 ±4.2 (0.53) | −16.8 ±2.1 (0.86) |
| Hole 5 | 1630 | −31.7 ±2.2 (3.70) | −22.9 ±2.7 (2.95) | −18.5 ±2.6 (2.84) |
| | MAX | −38.7 ±3.7 (0.82) | −20.0 ±3.1 (0.99) | −48.4 ±6.4 (1.18) |
| Hole 6 | 1630 | −39.5 ±2.3 (2.85) | −34.2 ±.2.2 (3.10) | −21.5 ±2.6 (2.79) |

TABLE 3.
COLD WORKED HOLES STANDARDS

| Location | System | Circumferential Residual Stress, ksi (Peak Width,$^{0}$) | | |
|---|---|---|---|---|
| | | .05" from Edge of Hole | .10" from Edge of Hole | .15" from Edge of Hole |
| Standard 7320-003 7075-T651 1/4" Hole | | | | |
| Baseline | 1630 | −13.4 ±7.2 (3.28) | | |
| Hole 0 | 1630 | −14.9 ±7.2 (3.89) | −7.4 ±7.1 (3.79) | −10.7 ±7.7 (4.05) |
| Hole 1 | 1630 | −32.2 ±6.7 (2.66) | −22.2 ±8.9 (2.90) | −14.3 ±7.8 (3.11) |
| Hole 2 | 1630 | −32.0 ±7.5 (3.19) | −26.4 ±7.9 (3.08) | −22.4 ±6.9 (3.13) |
| Hole 3 | 1630 | −46.6 ±7.9 (4.06) | −31.2 ±7.5 (3.75) | −17.1 ±8.8 (3.74) |
| Hole 4 | 1630 | −43.2 ±5.7 (3.43) | −33.8 ±6.6 (3.12) | −15.6 ±6.1 (3.19) |
| Hole 5 | 1630 | −43.3 ±5.8 (3.54) | −40.1 ±6.6 (3.20) | −13.0 ±5.5 (2.90) |
| Hole 6 | 1630 | −51.6 ±4.0 (3.83) | −33.1 ±5.0 (3.24) | −22.0 ±6.1 (3.15) |



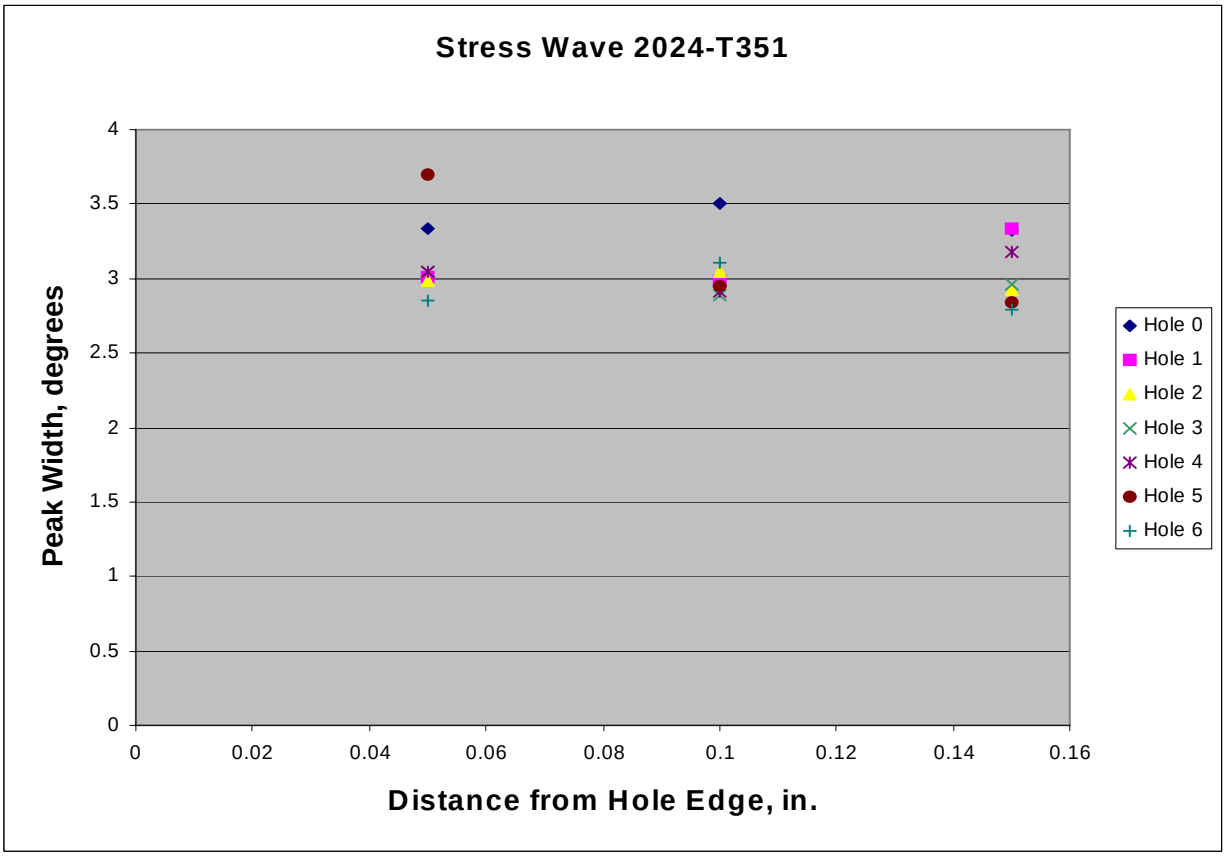
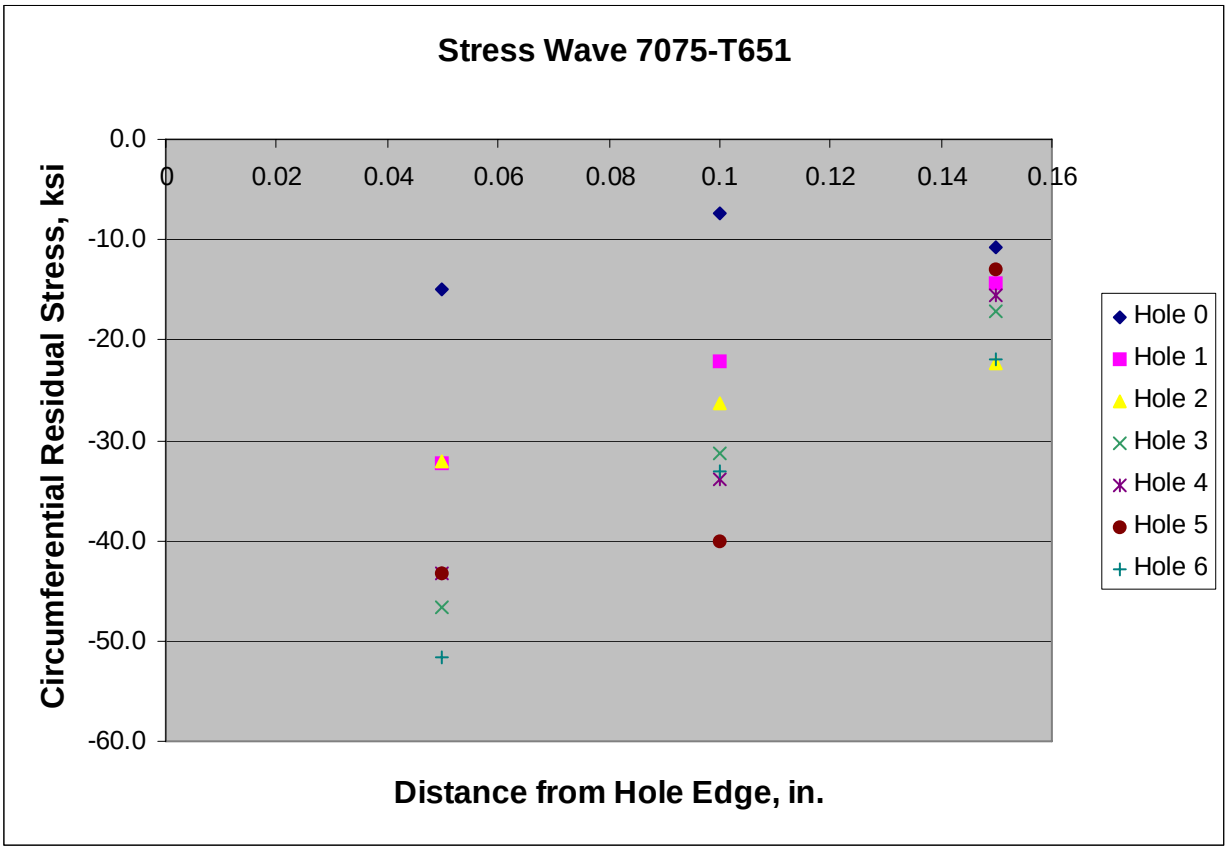




Figure 1. Stress Wave 2024-T351 Standard



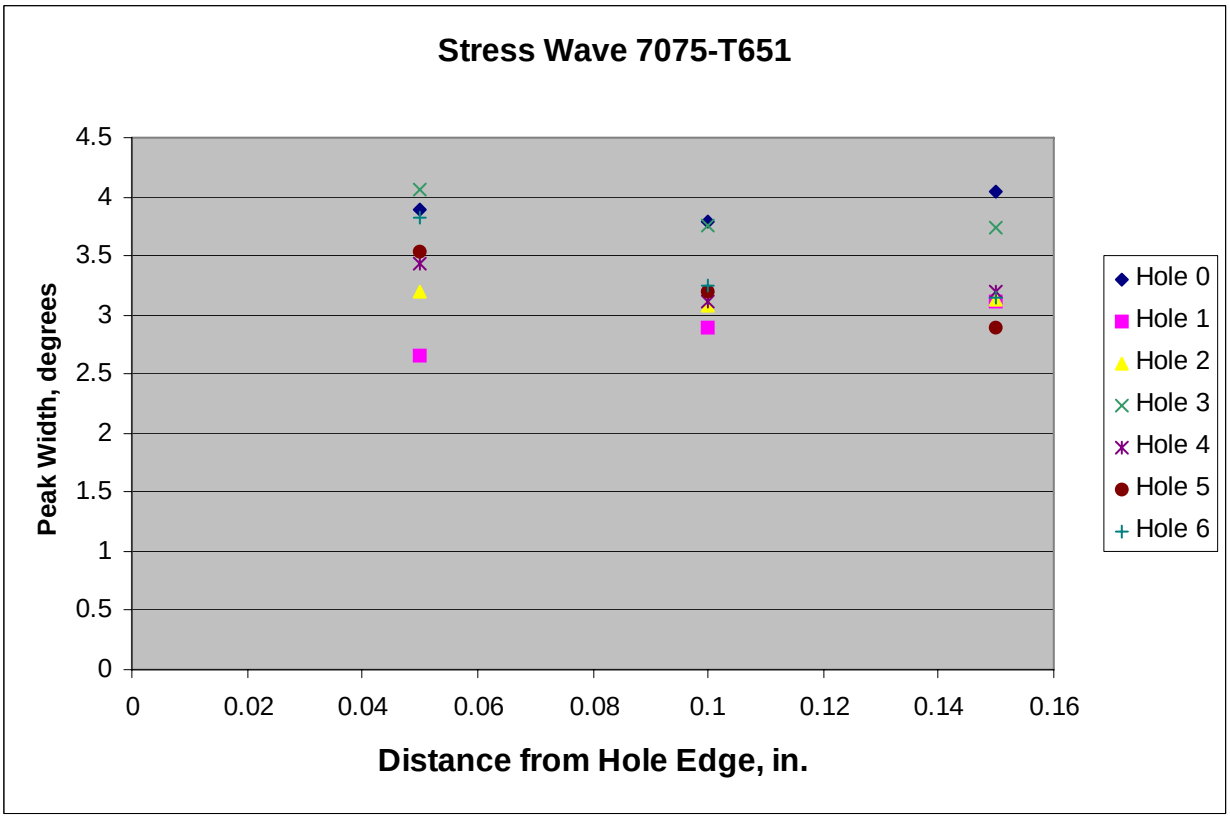
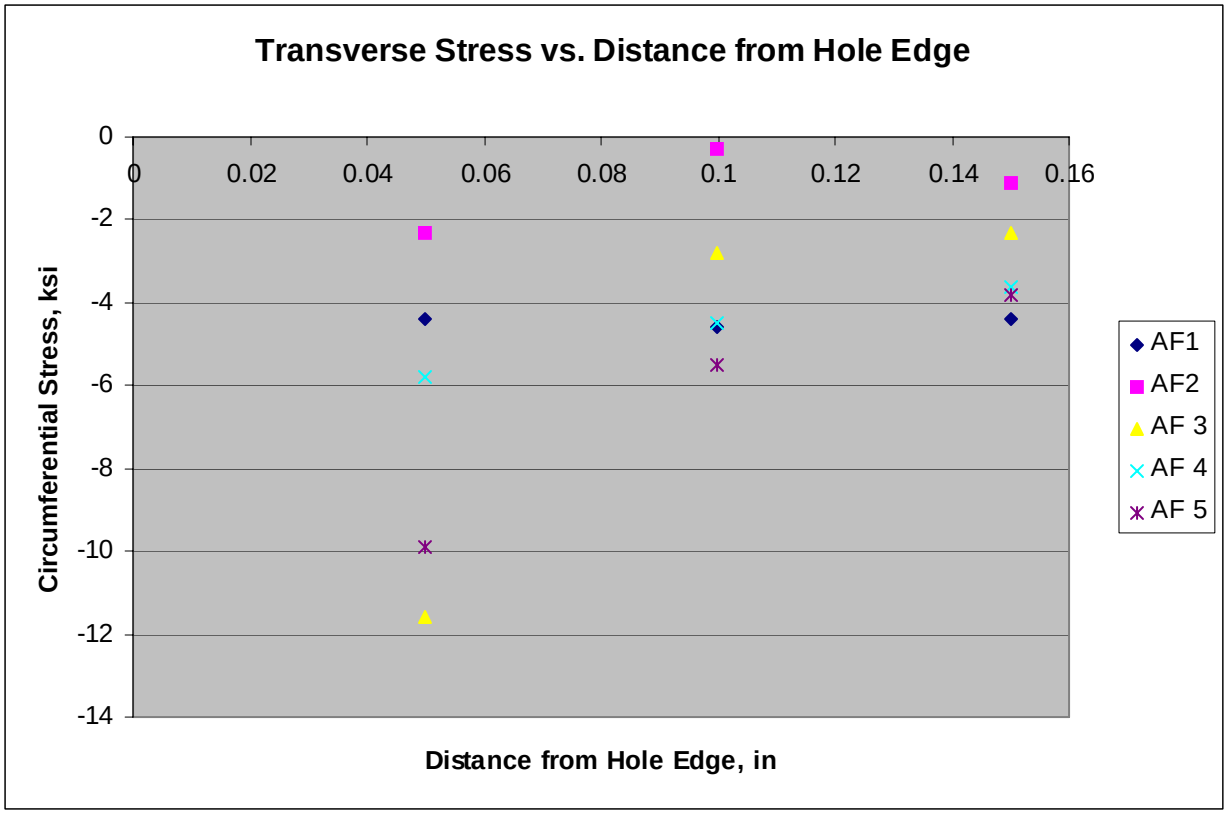




Figure 2. Stress Wave 7075-T651 Standard



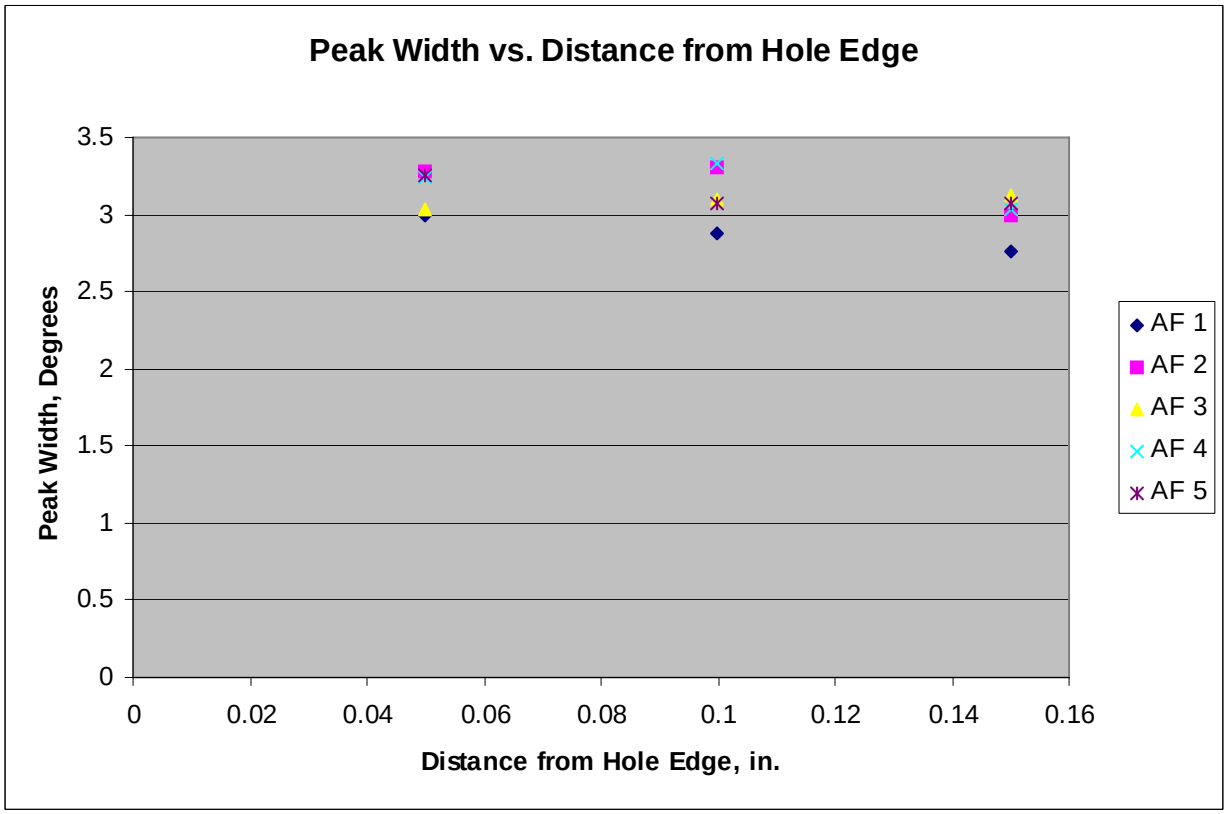




Figure 3. AF Standards Measured in the Transverse Direction

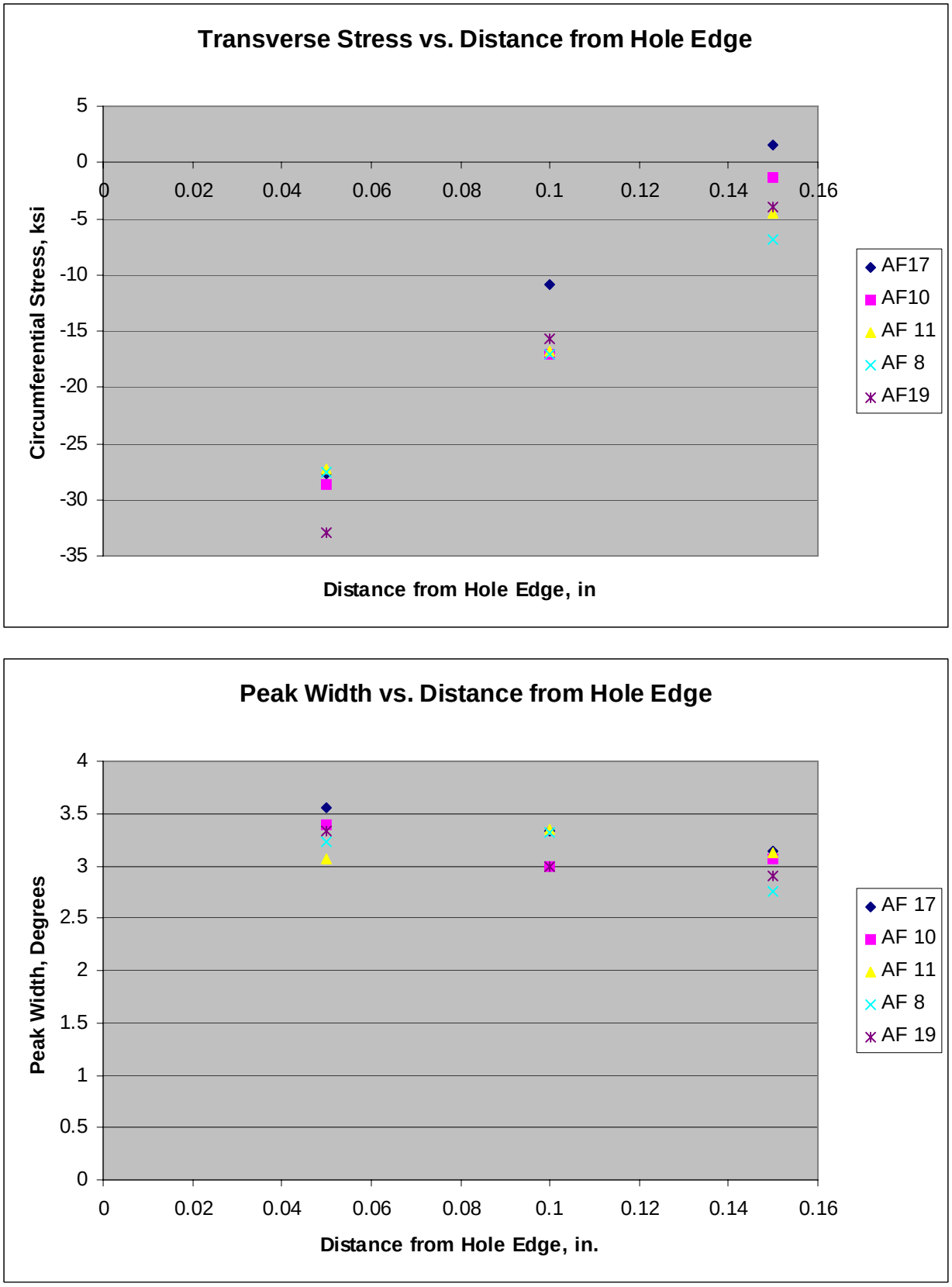



Figure 4. AF Standards Measured in the Transverse Direction

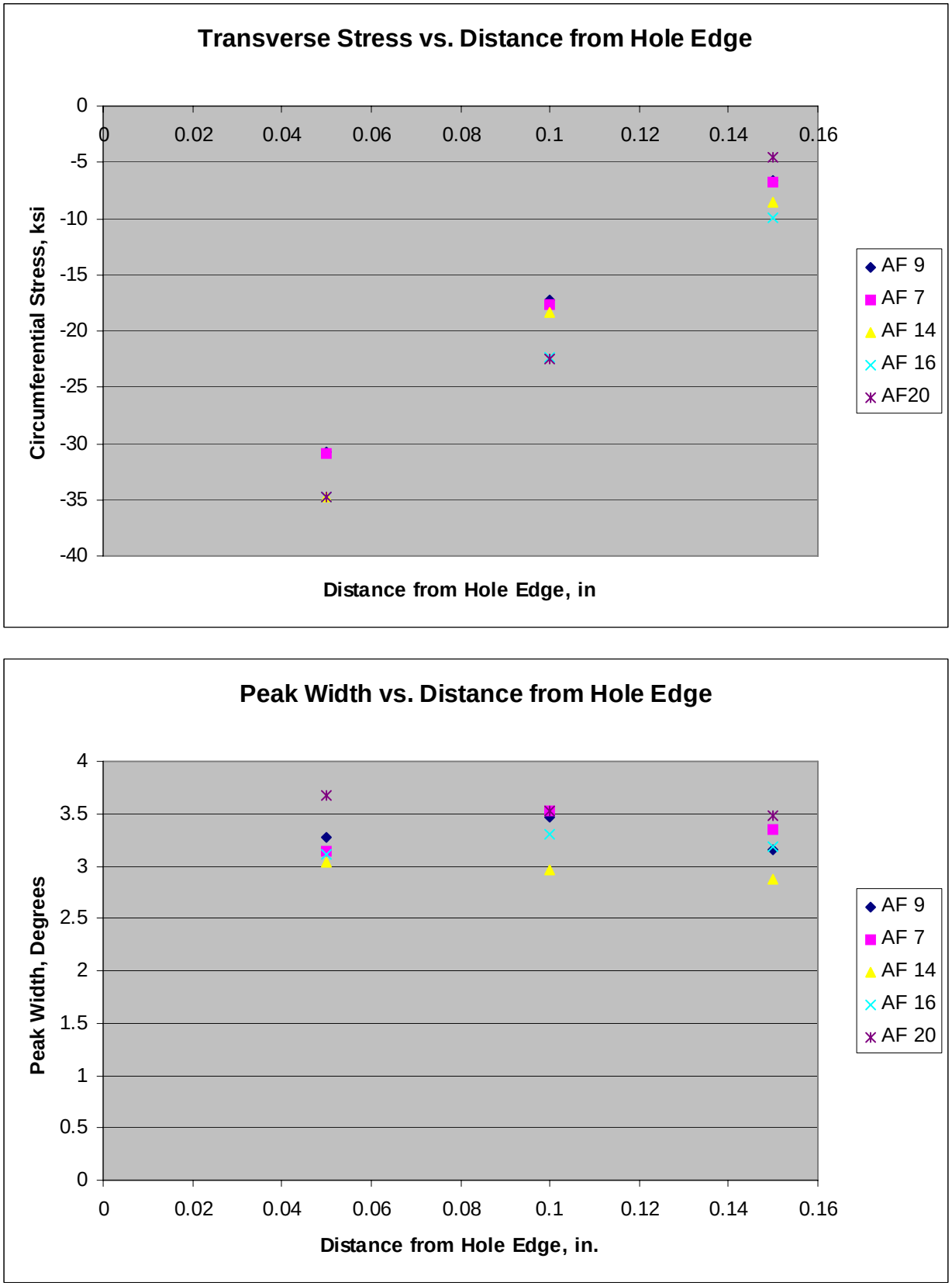



Figure 5. AF Standards Measured in the Transverse Direction

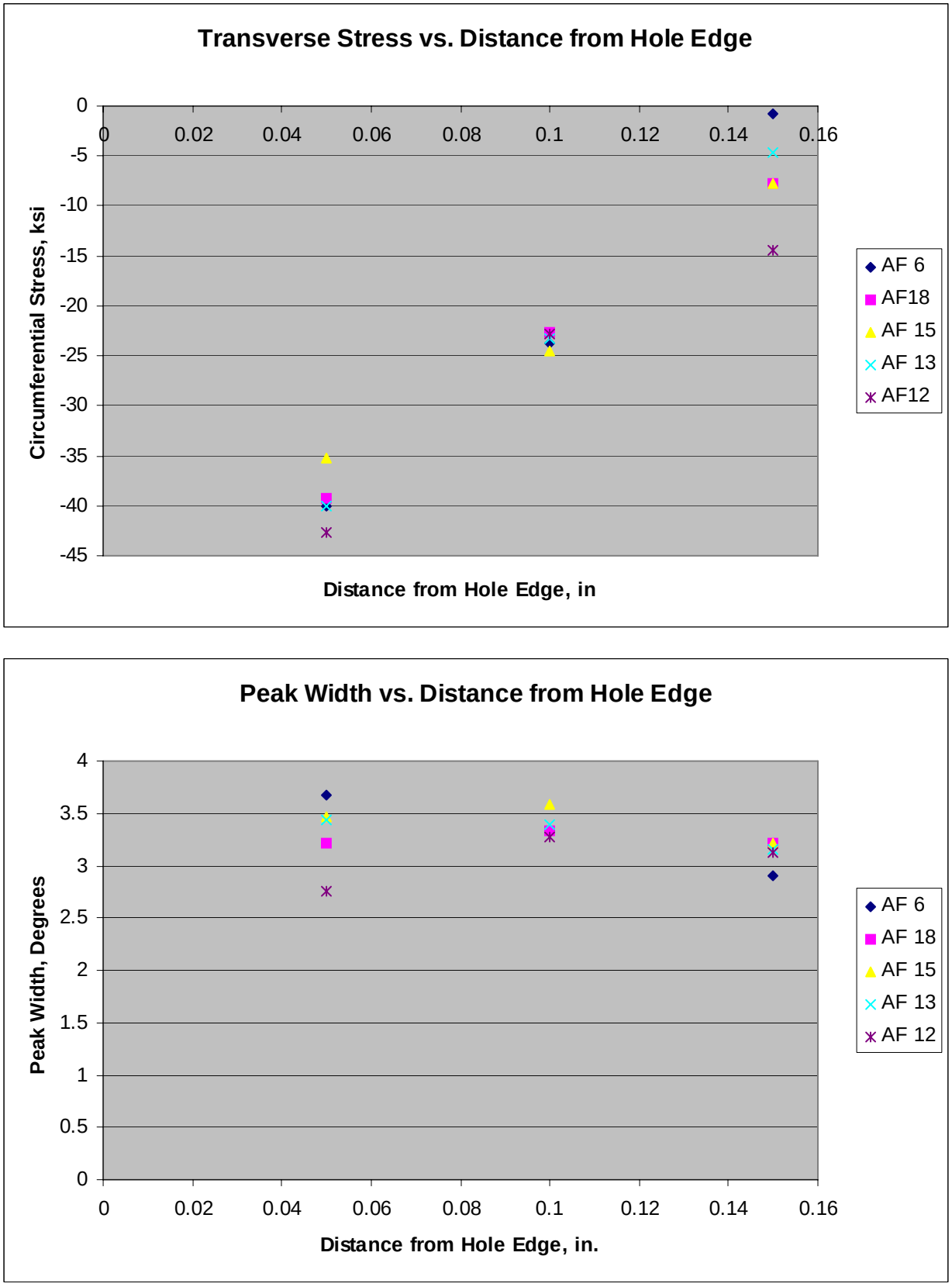



Figure 6. AF Standards Measured in the Transverse Direction

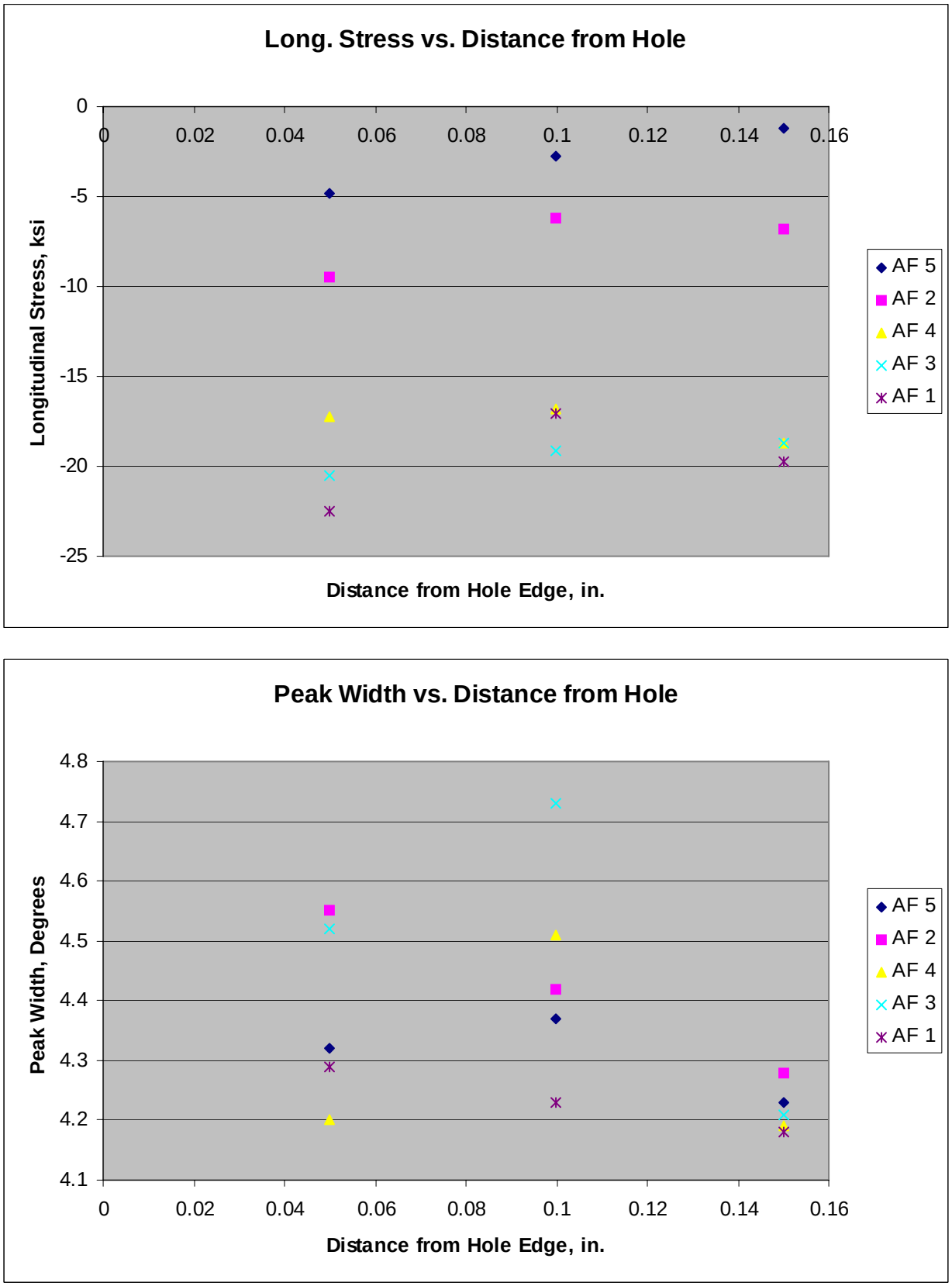
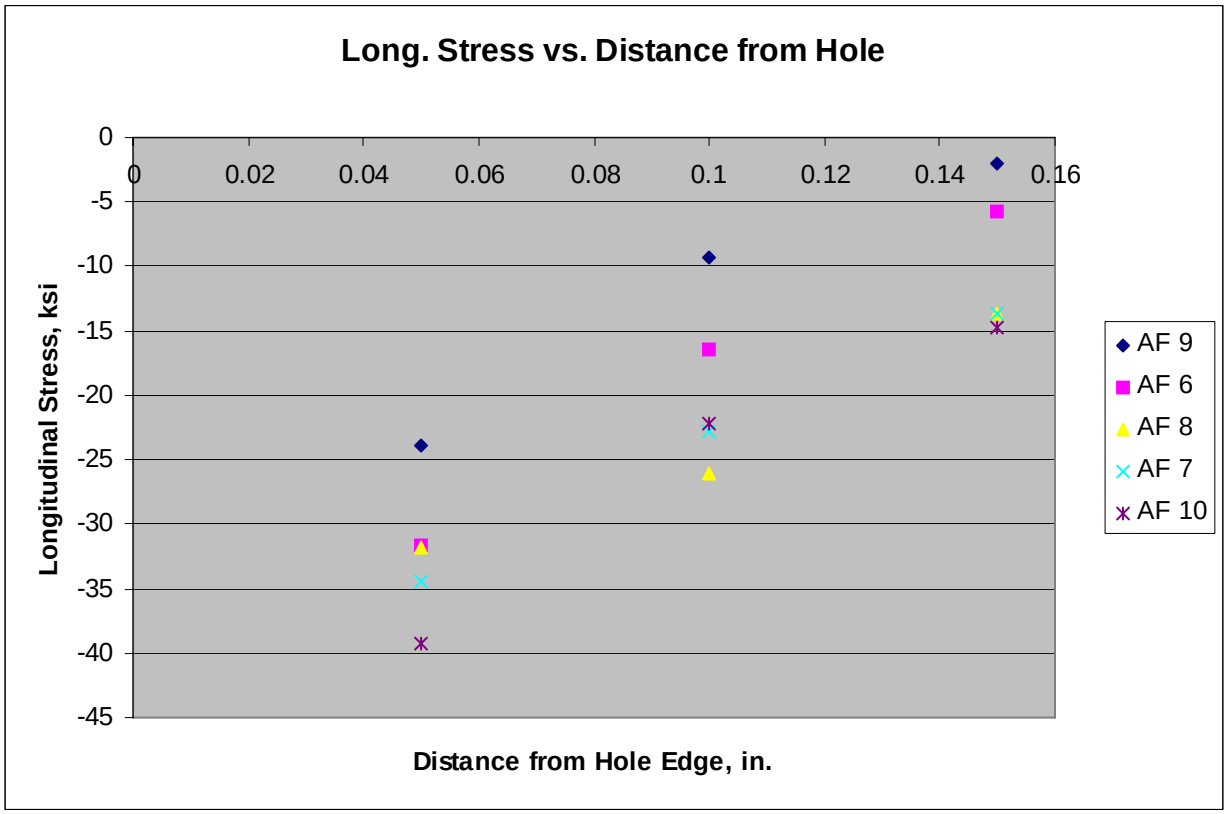



Figure 7. AF Standards Measured in the Longitudinal Direction



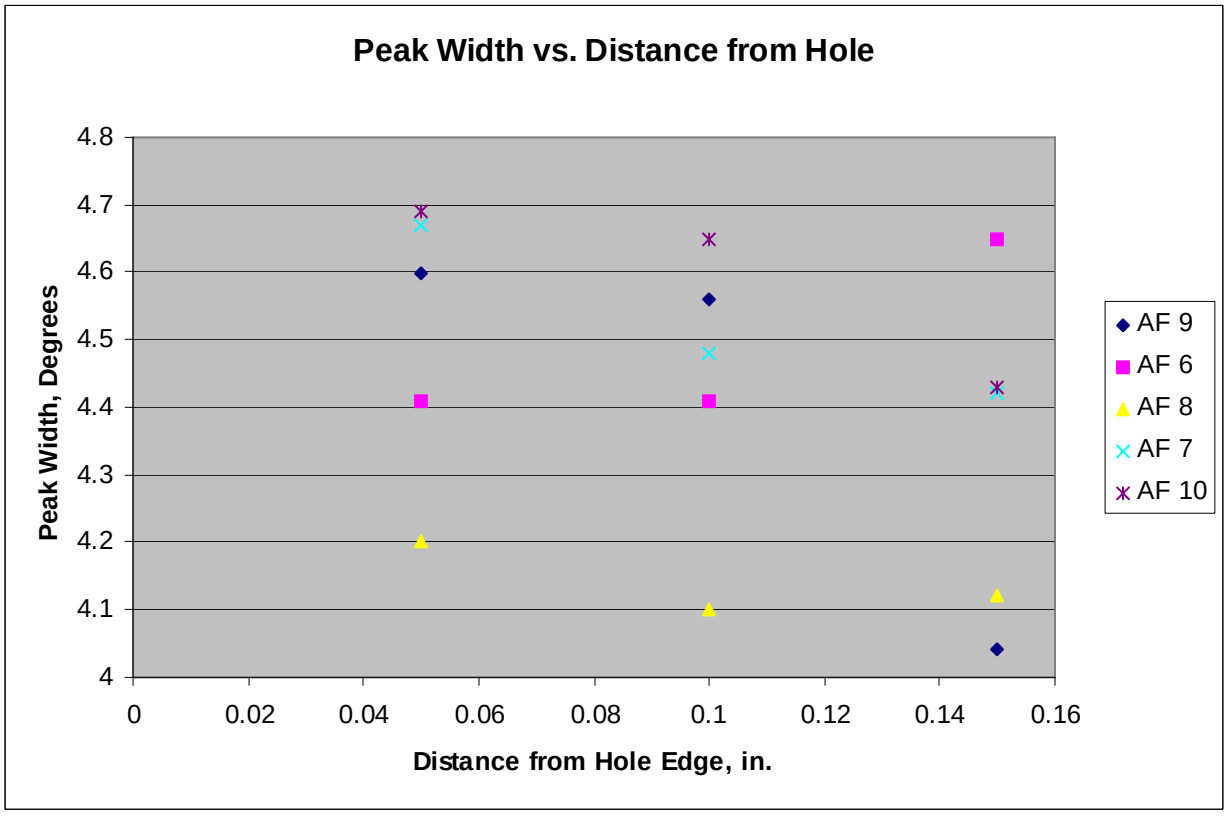




Figure 8. AF Standards Measured in the Longitudinal Direction

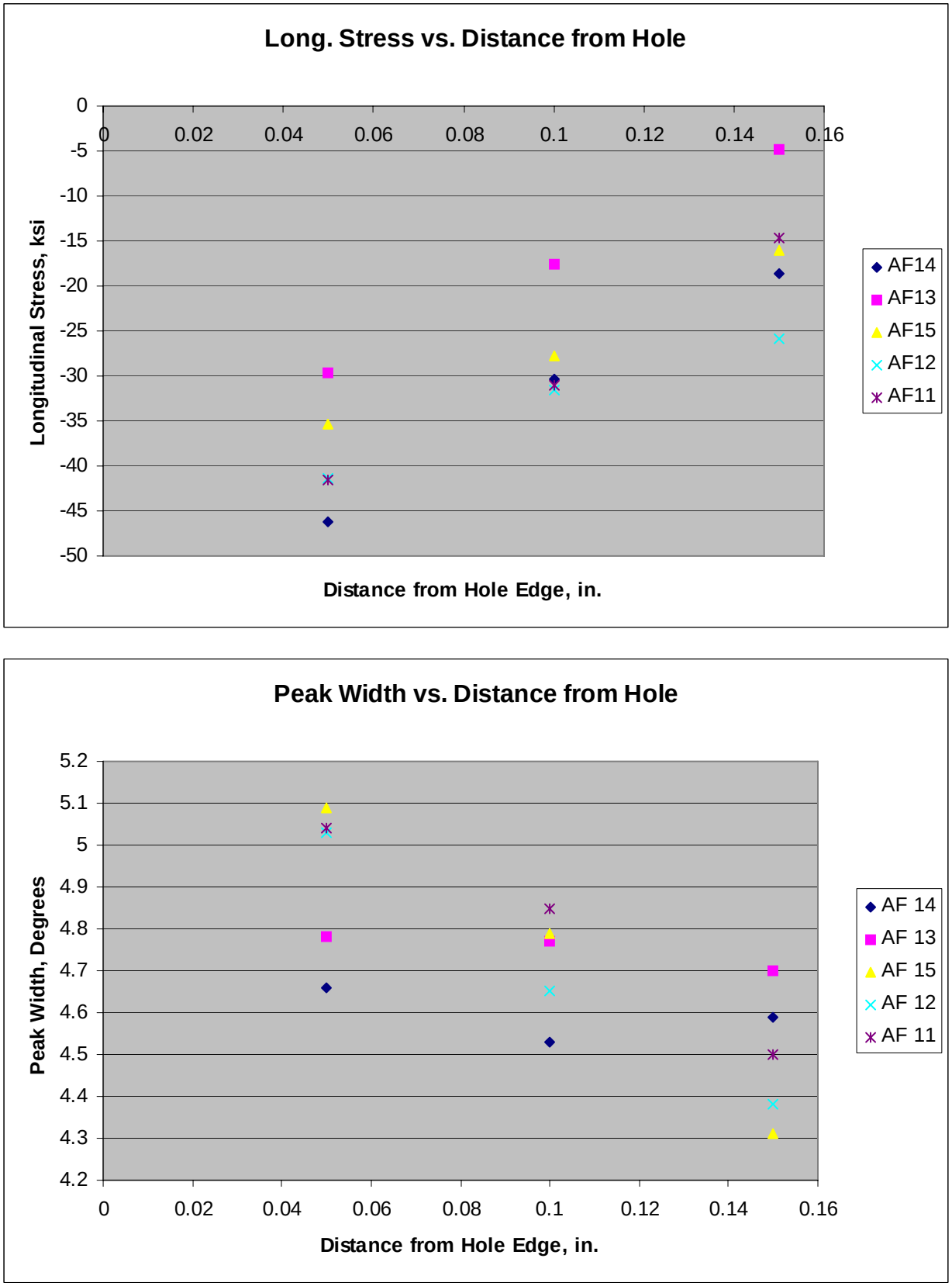
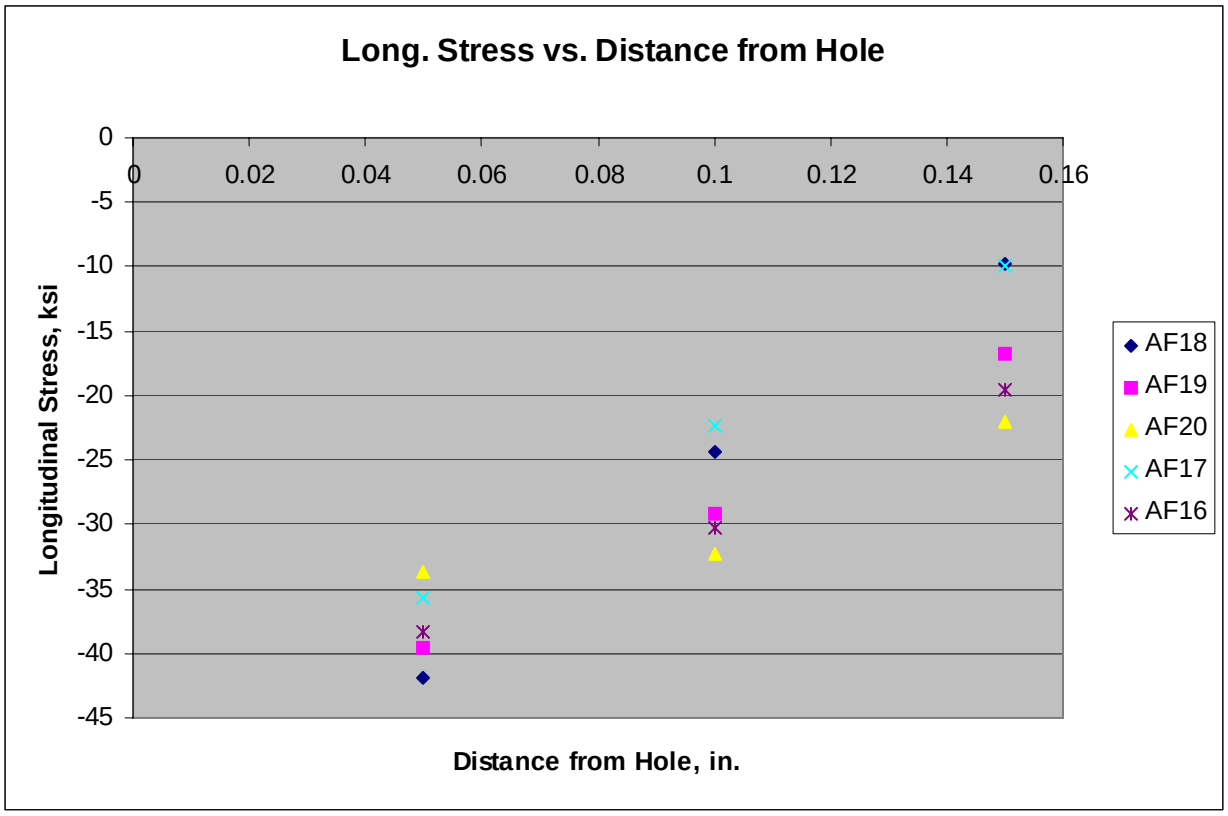



Figure 9. AF Standards Measured in the Longitudinal Direction



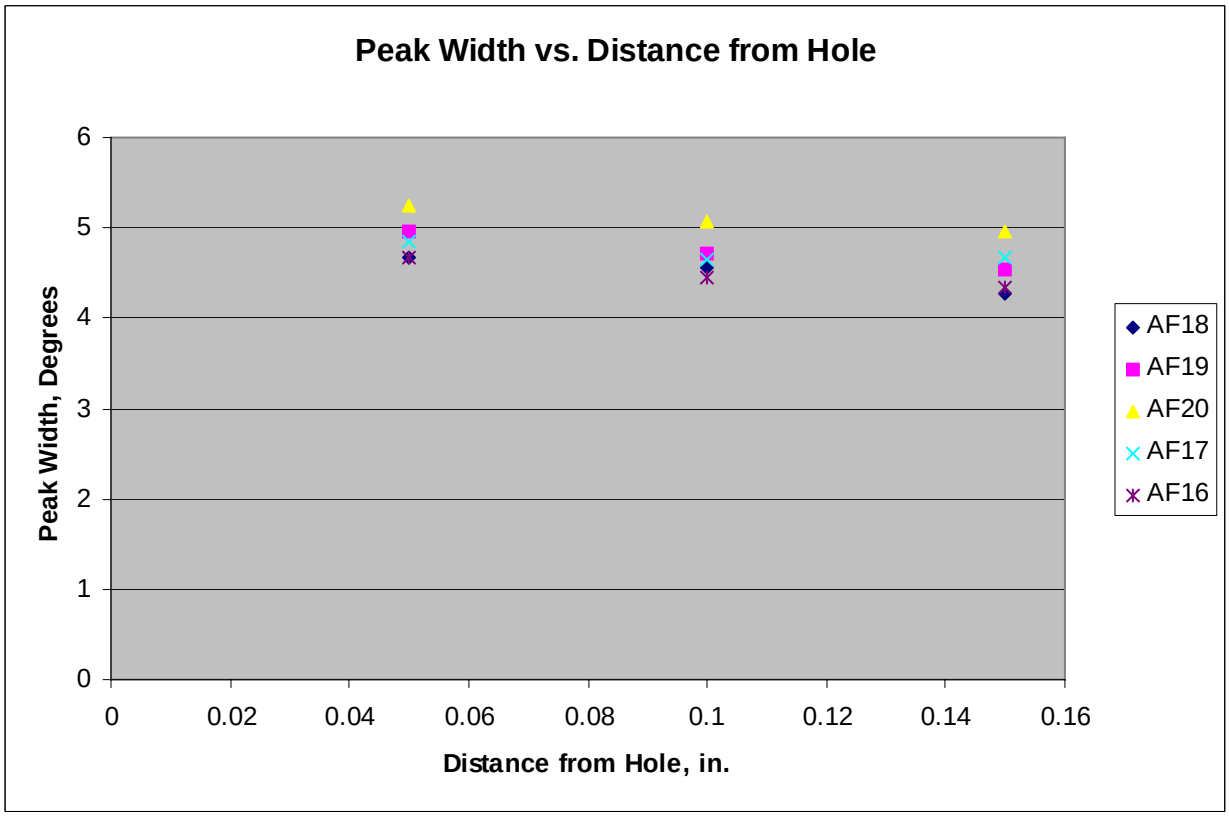



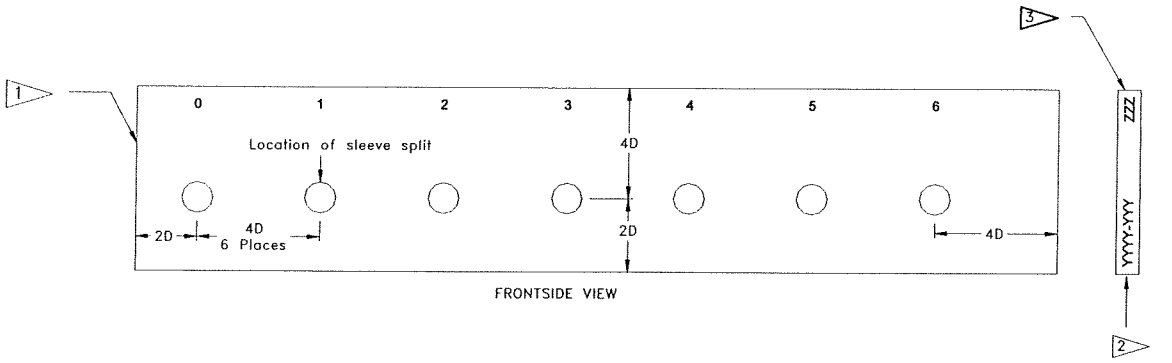

Figure 10. AF Standards Measured in the Longitudinal Direction

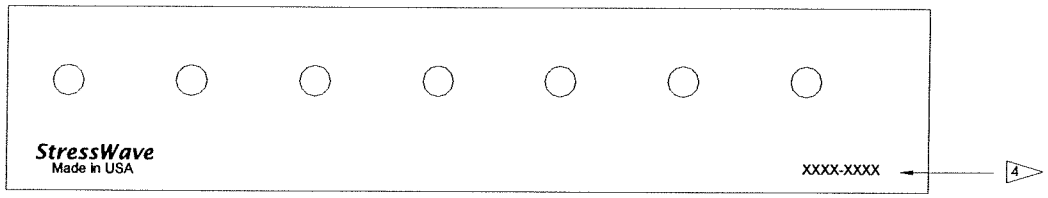
# APPENDIX A

# STRESS WAVE DOCUMENTATION

| StressWave® | HOLE STANDARD |
|---|---|
| Split Sleeve Cold Working | |

- Best machining practice was used to create relatively stress-free surfaces.
- Material and fastener certifications on file at StressWave, Inc.
- Standard Marking (D = nominal hole size)




1 = Standard Blank Number (manufacturing purposes only)
2 = Standard Model Number
3 = Serial Number
4 = Material Type

- Split sleeve cold working performed with nosecap against front side of standard.
- Hole #6 is maximum possible applied expansion – the smallest starting hole was used that mandrel major diameter, or mandrel minor diameter plus twice the sleeve thickness, will pass through.

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| StressWave® | HOLE STANDARD | | | | | | |
|---|---|---|---|---|---|---|---|
| Split Sleeve Cold Worked - 1/4 inch Straight Holes – 7075 | | | | | | | |
| **Standard Number** | 7320-003 | | **Serial Number** | | | 001 | |
| **Material** | 7075-T651 per AMS QQ-A-250/12 | | | **Thickness** | | 0.25 | |
| **Grain Direction** | **Length** | L | **Width** | LT | **Thickness** | | ST |
| **Cold Working Tooling** | STDN 6-3-N | | | | | | |
| **SW Control Numbers** | **Material** | 1002 | | **Fastener** | | 1077 | |

## HOLE PREPARATION INFORMATION

| Hole Number | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Starting Hole Dia. | 0.2475 | 0.2322 | 0.2304 | 0.2281 | 0.2256 | 0.2235 | 0.2231 |
| Mandrel Diameter | N/A | 0.2230 | 0.2230 | 0.2230 | 0.2230 | 0.2230 | 0.2230 |
| Sleeve Thickness | N/A | 0.0060 | 0.0060 | 0.0060 | 0.0060 | 0.0060 | 0.0060 |
| Applied Expansion, % | N/A | 1.21 | 2.00 | 3.02 | 4.17 | 5.15 | 5.33 |
| Cold Worked Hole Dia. | N/A | 0.2331 | 0.2319 | 0.2311 | 0.2309 | 0.2308 | 0.2304 |
| Retained Exp. Ratio | N/A | 0.32 | 0.33 | 0.43 | 0.56 | 0.63 | 0.61 |
| Final Hole Dia. | 0.2477 | 0.2474 | 0.2477 | 0.2475 | 0.2478 | 0.2475 | 0.2476 |

NOTES: All dimensions in inches unless noted
Other information on back

**CERTIFIED BY:**

Eric T. Easterbrook
Vice President/Technology

**DATE:** 8/24/2004

| StressWave® | HOLE STANDARD | | | | | | |
|---|---|---|---|---|---|---|---|
| Split Sleeve Cold Worked - 1/4 inch Straight Holes – 2024 | | | | | | | |
| **Standard Number** | 7320-001 | | **Serial Number** | | | 001 | |
| **Material** | 2024-T351 per AMS QQ-A-250/4 | | | **Thickness** | | 0.25 | |
| **Grain Direction** | **Length** | L | **Width** | LT | **Thickness** | | ST |
| **Cold Working Tooling** | STDN 6-3-N | | | | | | |
| **SW Control Numbers** | **Material** | 1002 | | **Fastener** | | 1077 | |

## HOLE PREPARATION INFORMATION

| Hole Number | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Starting Hole Dia. | 0.2479 | 0.2324 | 0.2302 | 0.2282 | 0.2257 | 0.2237 | 0.2230 |
| Mandrel Diameter | N/A | .2230 | .2230 | .2230 | .2230 | .2230 | .2230 |
| Sleeve Thickness | N/A | .006 | .006 | .006 | .006 | .006 | .006 |
| Applied Expansion, % | N/A | 1.12 | 2.09 | 2.98 | 4.12 | 5.05 | 5.38 |
| Cold Worked Hole Dia. | N/A | 0.2333 | 0.2328 | 0.2326 | 0.2319 | 0.2316 | 0.2317 |
| Retained Exp. Ratio | N/A | 0.35 | 0.54 | 0.65 | 0.67 | 0.70 | 0.72 |
| Final Hole Dia. | 0.2479 | 0.2476 | 0.2475 | 0.2475 | 0.2475 | 0.2480 | 0.2476 |

NOTES: All dimensions in inches unless noted
Other information on back

**CERTIFIED BY:**

Eric T. Easterbrook
Vice President/Technology

**DATE:**

8/24/2004

## APPENDIX B

## 1630 VERIFICATION MEASUREMENTS

========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: A:\1005-244\SBIR\45944\9579.STR
Sample Description:
SBIR Project / 2024-T3 Al Panel
At Location Marked / Direction: Parallel with the Grain

Acquisition date & time: 1/16/2002 5:49pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_5mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 45.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.00
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.34839E-07 B 0.00013162 C 0.0478522 D 148.3499

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00046 | 171.21 | 1186.1 | 2.91 | 0.27151 | 162.45 | 0.779405 | 0.000019 |
| 3.0 | 0.00106 | 168.38 | 1229.7 | 2.77 | 0.26634 | 162.27 | 0.779590 | 0.000019 |
| 6.0 | 0.00693 | 171.24 | 1209.9 | 2.92 | 0.27165 | 162.45 | 0.779403 | 0.000021 |
| 9.0 | 0.01848 | 169.98 | 1332.8 | 2.88 | 0.26986 | 162.37 | 0.779486 | 0.000018 |
| 12.0 | 0.03510 | 170.45 | 1416.2 | 2.82 | 0.26891 | 162.40 | 0.779453 | 0.000018 |
| 15.0 | 0.05620 | 173.22 | 1184.2 | 3.01 | 0.27510 | 162.57 | 0.779276 | 0.000020 |
| 18.0 | 0.08396 | 168.94 | 1201.2 | 2.65 | 0.26286 | 162.31 | 0.779548 | 0.000020 |
| 21.0 | 0.11425 | 171.81 | 1214.1 | 2.83 | 0.27005 | 162.49 | 0.779364 | 0.000019 |
| 24.0 | 0.15059 | 169.31 | 1210.9 | 2.77 | 0.26677 | 162.33 | 0.779527 | 0.000019 |
| 27.0 | 0.18962 | 169.88 | 1403.3 | 2.68 | 0.26432 | 162.37 | 0.779487 | 0.000012 |
| 30.0 | 0.23220 | 170.06 | 1558.5 | 2.64 | 0.26313 | 162.38 | 0.779473 | 0.000013 |
| 33.0 | 0.27684 | 172.09 | 1685.5 | 2.75 | 0.26809 | 162.51 | 0.779343 | 0.000011 |
| 36.0 | 0.32521 | 171.34 | 1612.9 | 2.73 | 0.26715 | 162.46 | 0.779392 | 0.000015 |
| 39.0 | 0.37374 | 174.03 | 1346.8 | 2.87 | 0.27262 | 162.63 | 0.779219 | 0.000014 |
| 42.0 | 0.42574 | 172.71 | 992.2 | 2.97 | 0.27389 | 162.54 | 0.779308 | 0.000022 |
| 45.0 | 0.47759 | 173.13 | 876.5 | 2.92 | 0.27304 | 162.57 | 0.779279 | 0.000019 |

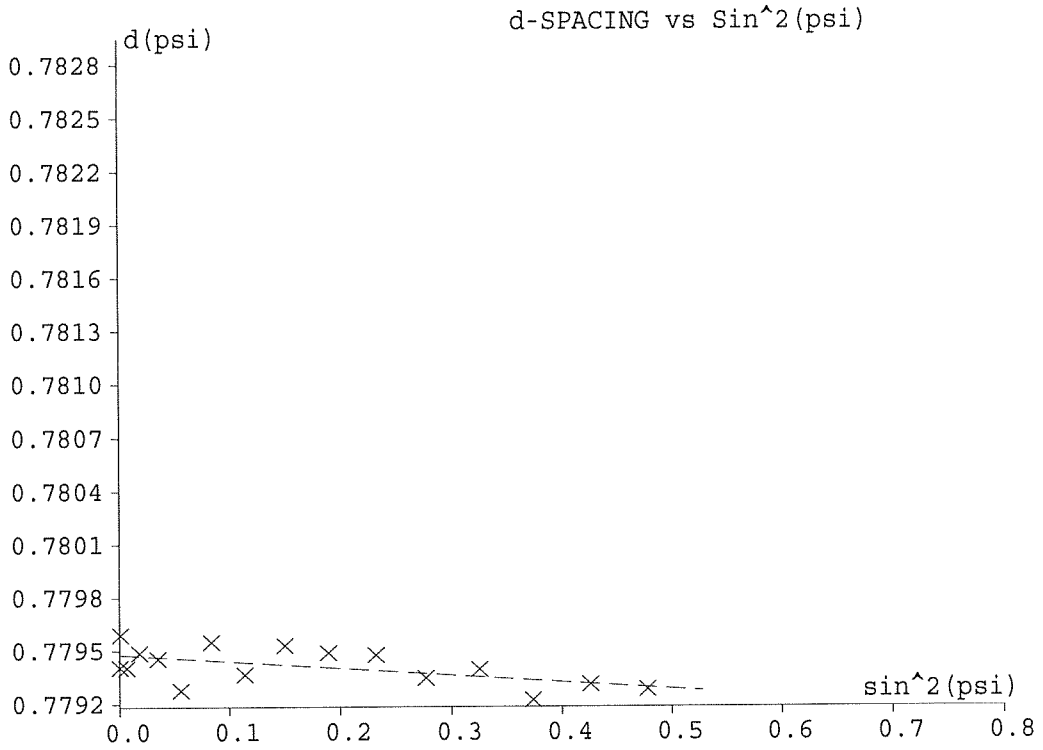
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.779477
Slope of Fitted Line.....: -0.0003892
Material Stress Constant.....: 1.255E-07

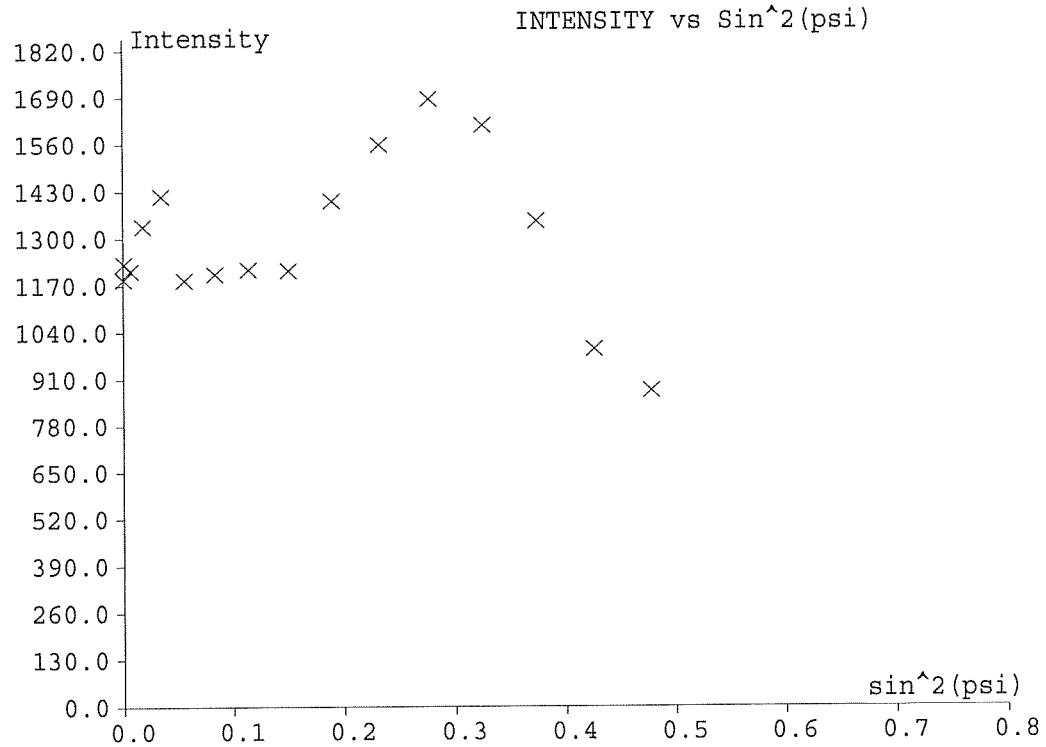
*Residual Stress.....: -4.0 KSI -27.4 MPa

Counting Statistics Stress Error (+/-): 0.3 KSI 2.1 MPa
Probable error.....(+/-): 1.5 KSI 10.1 MPa

File: A:\1005-244\SBIR\45944\9579.STR
Sample Description:
SBIR Project / 2024-T3 Al Panel
At Location Marked / Direction: Parallel with the Grain

| | | |
|---|---|---|
| *Residual Stress.....: | -4.0 KSI | -27.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.3 KSI | 2.1 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.1 MPa |



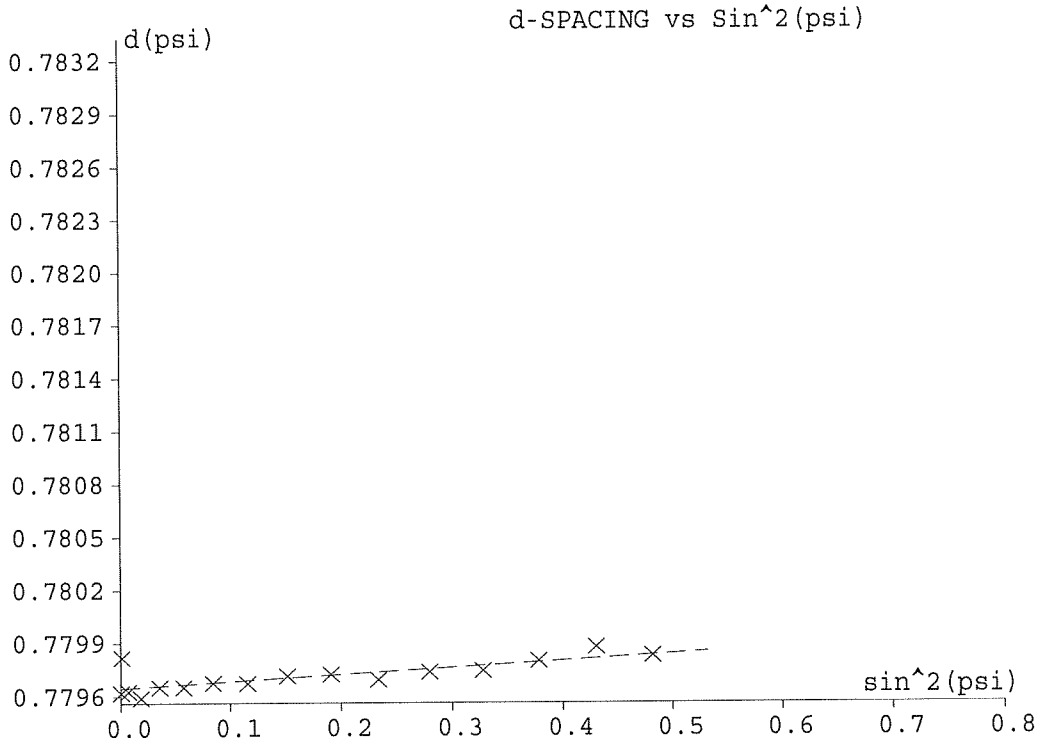
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  A:\1005-244\SBIR\45944\9581.STR
Sample Description:
SBIR Project / 6061 T6 Al Panel
At Location Marked / Direction: Parallel with the Grain

Acquisition date & time:   1/17/2002   10:31am

Material [hkl].....................: Al 5083-H23    [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_5mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper      1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  45.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.34839E-07   B    0.00013162   C  0.0478522      D   148.3499
```

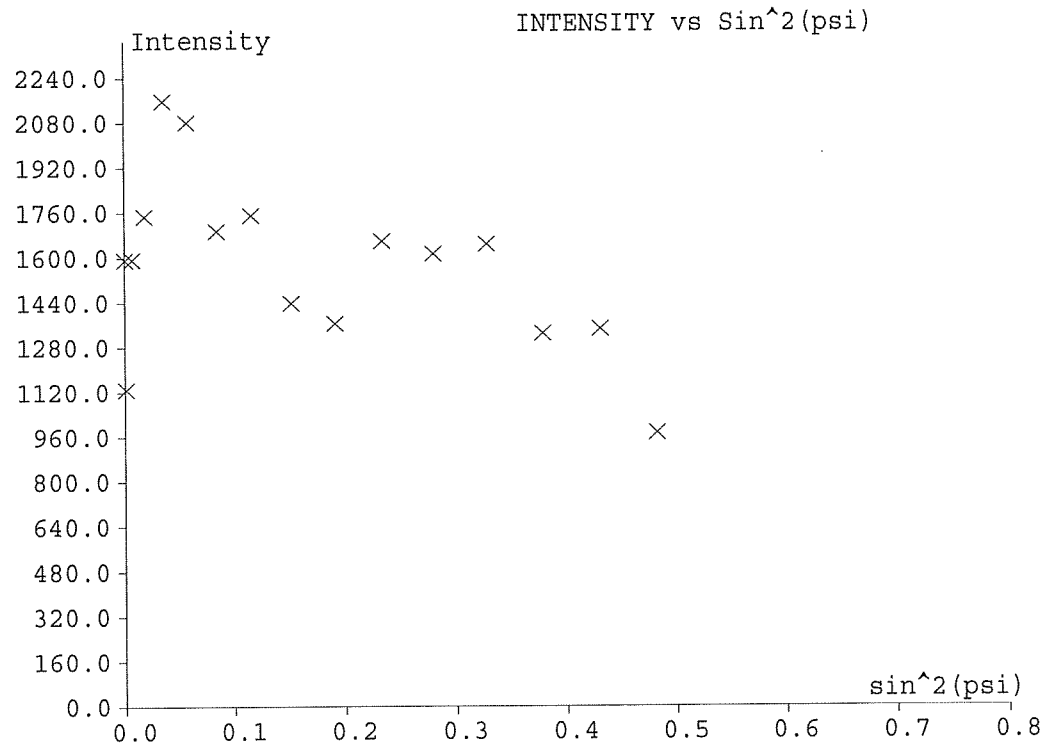
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00038 | 164.20 | 1592.3 | 1.26 | 0.02723 | 162.25 | 0.779619 | 0.000007 |
| 3.0 | 0.00118 | 164.82 | 1129.2 | 2.44 | 0.25241 | 162.06 | 0.779818 | 0.000008 |
| 6.0 | 0.00724 | 164.13 | 1592.7 | 1.28 | 0.02974 | 162.24 | 0.779626 | 0.000007 |
| 9.0 | 0.01872 | 164.78 | 1746.8 | 1.35 | 0.03831 | 162.27 | 0.779591 | 0.000007 |
| 12.0 | 0.03570 | 163.68 | 2157.3 | 1.19 | 0.02299 | 162.22 | 0.779650 | 0.000005 |
| 15.0 | 0.05764 | 163.76 | 2081.1 | 1.27 | 0.02797 | 162.22 | 0.779650 | 0.000006 |
| 18.0 | 0.08454 | 163.36 | 1695.0 | 1.25 | 0.02555 | 162.19 | 0.779674 | 0.000007 |
| 21.0 | 0.11588 | 163.52 | 1750.4 | 1.31 | 0.03320 | 162.20 | 0.779672 | 0.000006 |
| 24.0 | 0.15168 | 162.75 | 1437.4 | 1.20 | 0.02319 | 162.16 | 0.779714 | 0.000007 |
| 27.0 | 0.19115 | 162.61 | 1364.4 | 1.21 | 0.02341 | 162.15 | 0.779724 | 0.000008 |
| 30.0 | 0.23372 | 163.13 | 1658.6 | 1.26 | 0.02666 | 162.18 | 0.779691 | 0.000007 |
| 33.0 | 0.27974 | 162.42 | 1612.8 | 1.20 | 0.02312 | 162.14 | 0.779736 | 0.000007 |
| 36.0 | 0.32791 | 162.32 | 1646.8 | 1.17 | 0.02211 | 162.13 | 0.779742 | 0.000006 |
| 39.0 | 0.37838 | 161.52 | 1327.9 | 1.23 | 0.02413 | 162.08 | 0.779799 | 0.000006 |
| 42.0 | 0.43036 | 160.35 | 1343.7 | 1.11 | 0.02011 | 162.01 | 0.779875 | 0.000007 |
| 45.0 | 0.48211 | 161.10 | 972.1 | 1.23 | 0.02393 | 162.05 | 0.779828 | 0.000009 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.779645
Slope of Fitted Line...............:     0.0003869
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:      4.0 KSI      27.3 MPa

Counting Statistics Stress Error (+/-):      0.1 KSI       0.8 MPa
Probable error.................(+/-):      0.9 KSI       6.2 MPa
```

File: A:\1005-244\SBIR\45944\9581.STR
Sample Description:
SBIR Project / 6061 T6 Al Panel
At Location Marked / Direction: Parallel with the Grain

| | | |
|---|---|---|
| *Residual Stress.....: | 4.0 KSI | 27.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.1 KSI | 0.8 MPa |
| Probable error.....(+/-): | 0.9 KSI | 6.2 MPa |

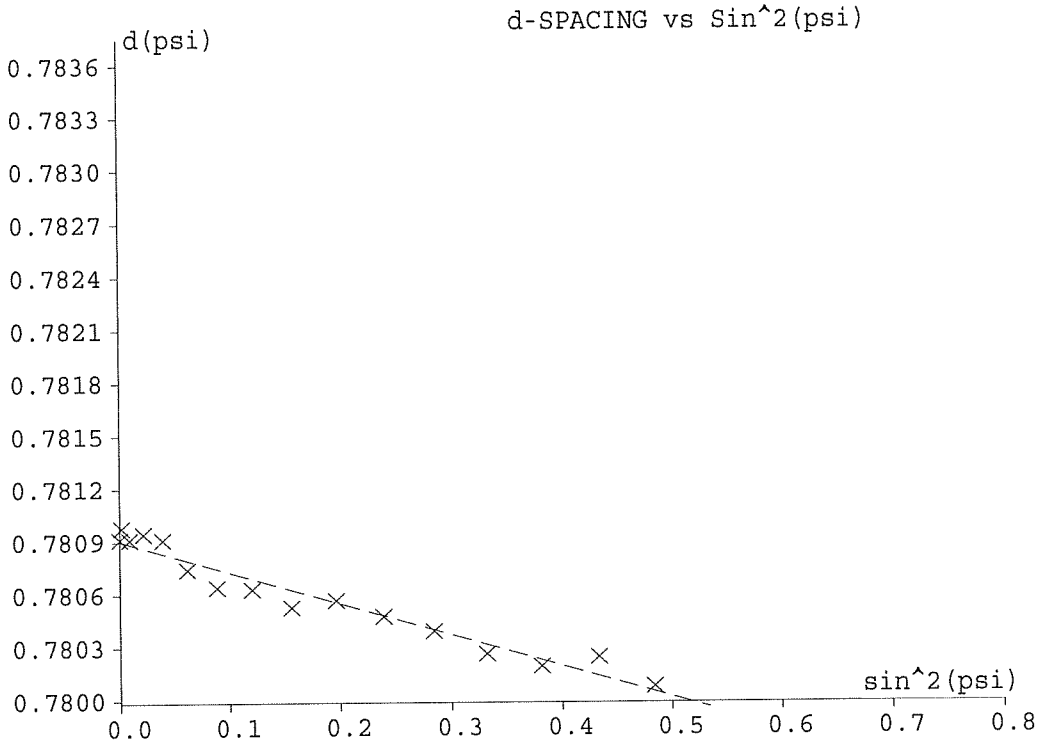


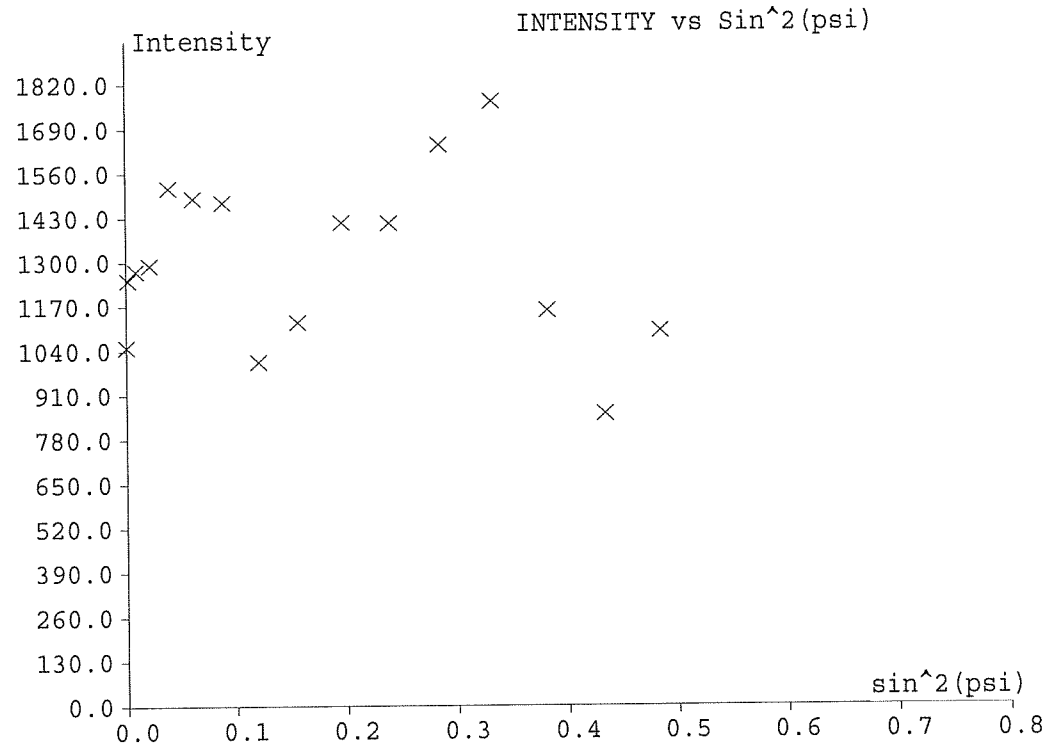



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  A:\1005-244\SBIR\45944\9580.STR
Sample Description:
SBIR Project / 7075 T6 Al Panel
At Location Marked / Direction: Parallel with the Grain

Acquisition date & time:   1/17/2002   10:14am

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_5mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  45.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.34839E-07   B    0.00013162   C  0.0478522      D   148.3499


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00009   149.26   1049.8   2.36  0.24112    161.07  0.780912  0.000013
  3.0  0.00189   148.34   1245.5   2.29  0.23807    161.01  0.780977  0.000011
  6.0  0.00907   149.30   1272.9   2.42  0.24312    161.07  0.780911  0.000013
  9.0  0.02174   148.81   1289.5   2.33  0.23999    161.04  0.780944  0.000013
 12.0  0.03950   149.22   1516.9   2.26  0.23668    161.07  0.780910  0.000011
 15.0  0.06175   151.60   1486.9   2.31  0.24053    161.22  0.780740  0.000010
 18.0  0.08887   152.99   1474.2   2.31  0.24096    161.31  0.780640  0.000009
 21.0  0.12082   153.23   1006.0   2.47  0.24723    161.32  0.780629  0.000013
 24.0  0.15637   154.54   1121.5   2.27  0.23956    161.41  0.780526  0.000011
 27.0  0.19647   153.79   1414.4   2.08  0.22698    161.38  0.780566  0.000009
 30.0  0.23905   155.35   1412.7   2.38  0.24512    161.46  0.780474  0.000010
 33.0  0.28447   156.32   1642.7   2.14  0.23252    161.54  0.780390  0.000009
 36.0  0.33184   158.38   1769.0   2.40  0.24749    161.65  0.780261  0.000009
 39.0  0.38144   159.42   1155.0   2.46  0.25030    161.72  0.780191  0.000010
 42.0  0.43327   158.69    853.3   2.49  0.25100    161.67  0.780243  0.000014
 45.0  0.48411   161.06   1094.7   2.45  0.25089    161.82  0.780076  0.000010

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780903
Slope of Fitted Line...............:     -0.001775
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -18.1 KSI    -124.9 MPa

Counting Statistics Stress Error (+/-):      0.2 KSI       1.3 MPa
Probable error.................(+/-):      1.1 KSI       7.5 MPa
```

File: A:\1005-244\SBIR\45944\9580.STR
Sample Description:
SBIR Project / 7075 T6 Al Panel
At Location Marked / Direction: Parallel with the Grain

| | | |
|---|---|---|
| *Residual Stress.....: | -18.1 KSI | -124.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.2 KSI | 1.3 MPa |
| Probable error.....(+/-): | 1.1 KSI | 7.5 MPa |

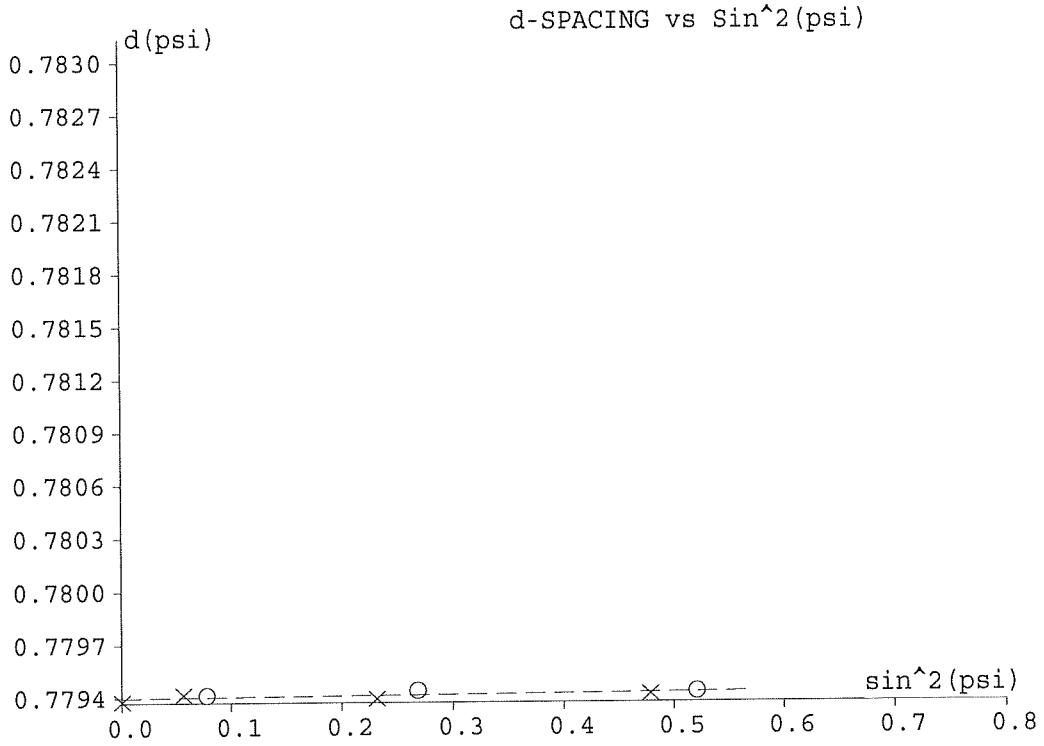


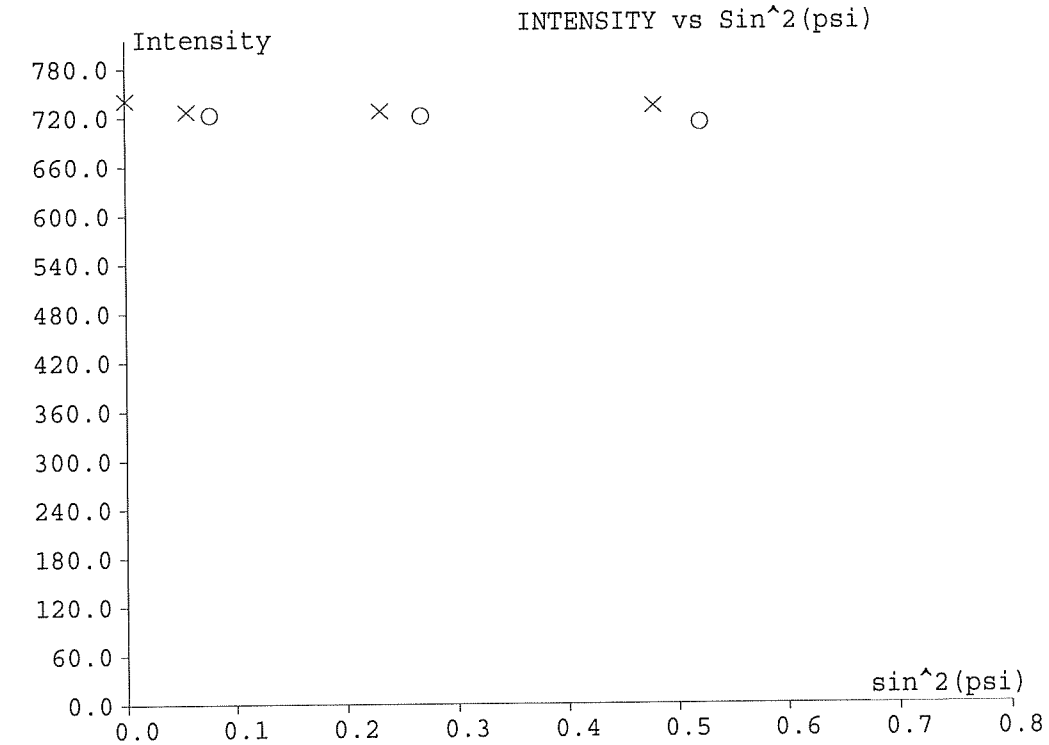



```
================================== TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\1005\2005\WRAFB\52838\19392.STR
Sample Description:
Stress Free Al Sample  /  S/N 01008
TEC P/N: 10-100-0475 / TEJ

Acquisition date & time:   8/23/2005   1:44pm

Material [hkl].....................: Al 5083-H23    [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  60.0
High Voltage(kV) and Beam Current(mA)..: 45.00    0.80
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
-45.0  0.52115   168.94    712.2   1.25  0.02628    162.42  0.779431  0.000008
-30.0  0.26849   168.86    720.9   1.26  0.02747    162.42  0.779437  0.000009
-15.0  0.07803   169.22    722.7   1.25  0.02630    162.44  0.779413  0.000010
  0.0  0.00047   169.83    740.8   1.29  0.03003    162.47  0.779378  0.000010
 15.0  0.05675   169.32    727.3   1.34  0.03590    162.44  0.779417  0.000010
 30.0  0.23164   169.70    727.4   1.35  0.03642    162.46  0.779392  0.000009
 45.0  0.47873   169.65    733.2   1.43  0.05575    162.44  0.779416  0.000009

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.779399
Slope of Fitted Line...............:     5.645E-05
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:      0.6 KSI       4.0 MPa

Counting Statistics Stress Error (+/-):      0.2 KSI       1.3 MPa
Probable error.................(+/-):      0.4 KSI       2.6 MPa
```

File: C:\STRESS\DATA\1005\2005\WRAFB\52838\19392.STR
Sample Description:
Stress Free Al Sample / S/N 01008
TEC P/N: 10-100-0475 / TEJ

| | | |
|---|---|---|
| *Residual Stress.....: | 0.6 KSI | 4.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.2 KSI | 1.3 MPa |
| Probable error.....(+/-): | 0.4 KSI | 2.6 MPa |



## APPENDIX C

## VEXTEC REPORT

## Introduction

Since the 1940's the fatigue life of aerospace components has been improved by inducing a surface layer of compressive residual stress using surface treatment finishing. The compressive layer resists both crack initiation and crack propagation. The most commonly used methods of surface finishing develop a layer of compressive residual stress following mechanical tensile deformation. The methods differ primarily in how the surface is deformed and in the magnitude and form of the resulting residual stress and cold work (plastic deformation) distributions developed in the surface layers. For example, conventional air-blast shot peening is routinely applied to steel, titanium, and nickel alloy turbine engine components. High velocity impact of each particle of shot produces a dimple with a region of compression in the center. The magnitude of compression achieved depends primarily upon the mechanical properties of the alloy. The depth of the compressive layer and the degree of cold working depend upon the peening parameters including shot size, velocity, coverage, impingement angle, etc. Similar issues regarding resulting residual stress variability can be described for other treatment processes such as gravity shot peening, laser shock peening and other surface finishing methods.

Currently no comprehensive design tool exists to predict the fatigue behavior of metallic systems in the presence of deep compressive residual stresses induced by surface treatments (i.e., shot peen, laser shock processing and low plasticity burnishing). Aerospace companies typically use a quasi-empirical method of specimen/component testing and data evaluation to determine the component life capability. The reliance on testing requires significant time and money to validate an approach.

The life prediction methodologies currently available are limited to traditional long crack growth modeling with no consideration of crack nucleation or short crack growth phases. That is:

- The durability benefit is limited to the depth of the residual stress induced. Large crack growth is not effected by the residual stress.
- The durability benefit is realized in the crack nucleation and short crack growth regions. This region is on the order of a few grains and is typically less than 0.010 inches deep into the component.
- Crack nucleation and small crack growth are highly variable affected by the local microstructure, making the modeling/prediction process difficult
- VEXTEC has developed a microstructural methodology that has demonstrated ability to predict the microstructural influence on durability for a number of aerospace materials.

It has been thoroughly established by VEXTEC (and others) under the DoD High Cycle Fatigue (HCF) Science and Technology (S&T) Program that long crack growth (such as conventional linear elastic fracture mechanics) is only valid when the crack length is many times the material grain size. This is certainly not the case for surface treatment influences where the grain size is large relative to the residual stress field. For example, in the case of a large grain material where the grain diameter is .005 to .010 in., the material is not within the linear elastic guidelines and the only accurate means for life prediction must be based on crack nucleation and short crack growth modeling. In addition, cast structures typically have very large grains (.025 in and greater) where the residual stress profile of all forms of surface treatment will likely lie completely within one grain, thus emphasizing the need for surface treatment lifing capabilities that are nonexistent today.

## State of the Art Lifing Assessment

Under previous NAVAIR and AFRL SBIR contracts, VEXTEC has developed a micromechanics-based, probabilistic simulation software, VPS-MICRO™, for fatigue crack nucleation and small crack growth prediction.

Pratt & Whitney (P&W) provided a 3rd party assessment of the fatigue simulation software (VPS-MICRO™). VEXTEC, given only monotonic test data (i.e., stress/strain curves), micrographs and a single fatigue test (life) point for each of 5 P&W proprietary heat treatments, predicted Ti-6Al-4V material fatigue life curves with 95%+ confidence (see Figure 1). The solid symbols are experimental test results, the open symbols are VPS-MICRO™ predictions for 50 test bars at each stress level. This was a blind prediction, VEXTEC performed the simulation at the conditions specified by Pratt & Whitney and then provided the predictions to Pratt & Whitney for comparison to their experimental test results without knowing the actual results. Figure 1 shows excellent correlation between the VEXTEC predictions and the observed fatigue capability.

This microstructural analysis tool was developed knowing that most design engineers are not trained in material science. Hence a strategy for obtaining the required material-specific microstructural input parameters had to be created such that engineers accustomed to normally working in a finite element method (FEM) software environment could use VPS-MICRO™. This issue was resolved through the incorporation of a scroll-down menu of available material reference libraries. The data for which these libraries would be populated through built-in reference databases. Within a conventional aerospace organizational structure, the material development experts would be responsible for the construction and maintenance of these reference databases, thus allowing the designer to use VPS-MICRO™ for component analysis in everyday applications.

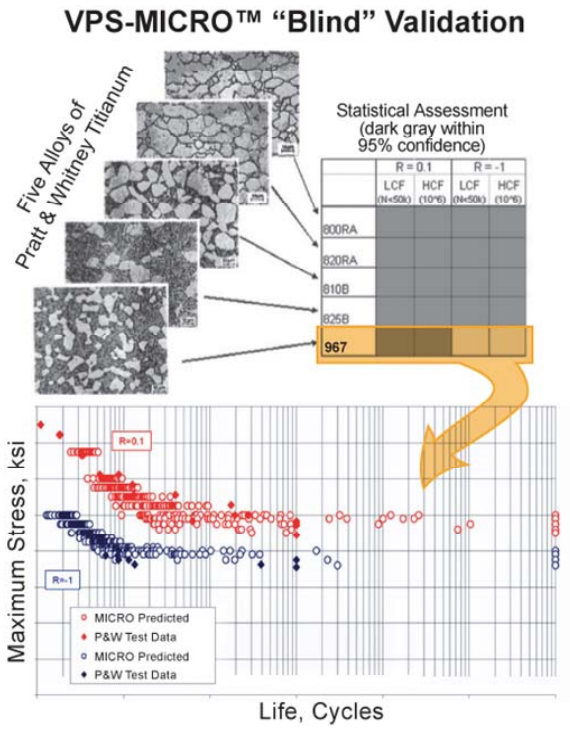



**Figure 1: Validation of VEXTEC SBIR Technology**

Conventional FEM can be used to predict the global stress distribution for a complex component. VEXTEC's innovative software technique translates these global stresses to the grain microstructural level. "Microstress" is predicted using a Voronoi geometry generation algorithm written for use by commercially available FEM software. Microstresses buildup within a grain and eventually result in the nucleation of a crack. Such a crack grows as a short crack through the immediately neighboring grains. Whether or not a crack continues to grow or arrests depends on the amount of energy buildup within the grains as well as the geometric and simulated properties for these grains. A Monte Carlo approach is used to ensure that the simulation matches the previously identified microstructural characteristics established during reference database development.

Aerospace systems consist of large, geometrically complex components. Although the initial VPS-MICRO™ validation was conducted on small, simple specimen samples, VEXTEC demonstrated that VPS-MICRO™ can account for both size and geometric complexity. VPS-MICRO™ uses the typical outputs from FEM analysis to find the elastic global or *macro-stress* at each node of the FEM model. A representative volume element (RVE) is determined for each FEM node. Each RVE is then modeled as a simple test specimen in VPS-MICRO™. Each element can have different microstructures, loadings, failure mechanisms, surface area and volume. Uniquely, VPS-MICRO™ predicts fatigue for a large complex component by modeling

an appropriate number of RVE assemblages. Although a large aerostructure, such as a high-pressure turbine disk, can easily be 12 inches in radius and contain more than $10^{10}$ surface grains, VPS-MICRO$^{TM}$ can conduct this grain-level simulation in computer computation times comparable to commercial FEM software. Although prediction of fleet reliability may have to consider thousands of disks to achieve the desired confidence, VPS-MICRO$^{TM}$ used probabilistic and extreme value statistical techniques for computational efficiency.

The fatigue models can be combined with the x-ray diffraction measurements to address two key aspects of life assessment; 1) prediction of the effect of surface treatment on fatigue life enhancement and 2) prediction of the effect of microstructural variability on statistical scatter in fatigue life.

A key aspect of accurate life prediction using VPS-MICRO™ is the ability to incorporate the residual stress field and its influence on fatigue life. The x-ray diffraction technique is a nondestructive technique that provides absolute values for surface residual stresses. The residual stress profile into the surface is used directly in the micromechanical fatigue model.

Recently performed research by VEXTEC in cooperation with Ohio State and DaimlerChrysler has investigated the residual stress state at the microstructural level. Generally, surface residual stress models assume that the material is homogeneous; however at the crack initiation scale this assumption is not correct. Because each grain acts as an anisotropic single crystal that yields along well defined crystallographic planes, microstructural residual stress predictions based on crystal plasticity will be a function of the anisotropic plastic deformation of the grains that compose the structure. **Figure 2** shows the statistical distribution of the residual stress of each grain for a HSLA-50 steel microstructure with 1700 grains. This distribution was predicted using crystal plasticity in a FEA model. The model assumes that the average residual stress is uniformly 30 ksi throughout i.e., the process to produce the residual stress is assumed to be perfect. The variation in the stresses is due solely to the discontinuous nature of the grains and the slip system available for plastic deformation. Notice the wide variation in the distribution. The coefficient of variation is about 30%. For every thousand grains (not a large area), it is expected that several grains will have residual stresses less than 5 ksi even though the residual stress at a global level is a perfectly uniform 30 ksi. It is very important to consider the microstructural residual stress field when considering fatigue reliability because the variation in micro residual stress has far reaching effect. Not only does it influence the stress results due to an additionally applied fatigue load, but each grain has a unique cyclic load ratio. Hence, the corrected modeling of the residual stress field will further improve the life prediction accuracy.

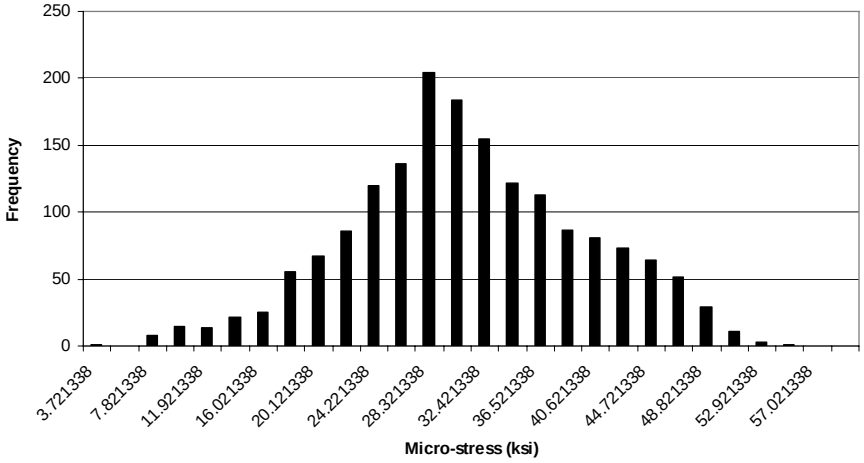



**Figure 2: Statistical distribution of the residual stress field at the microstructural level for HSLA-50 steel.**

The x-ray diffraction technique is of significant interest to VEXTEC not only for its ability to determine surface residuals, but the diagnostic information it can provide on the component microstructural configuration. Information obtained from the x-ray diffraction technique can provide d-spacing versus $\sin^2\psi$, intensity versus $\sin^2\psi$, and diffraction peak breadth. These data can be used to nondestructively determine the grain size and grain orientation, both key inputs to a micromechanical based fatigue life prediction system. The methods and techniques required to determine grain size and orientation have been noted and described in literature, however, a practical implementation has not yet been implemented. The benefit of a system which can nondestructively incorporate grain size and orientation is shown in Figure 3. This example, is based on Ti 6Al-4V (a common aerospace material), shows that the manufacturers typically utilize a minimum material specification which allows significant variation in grain size and orientation. These data generated from this specification are grouped together and a fatigue capability curve is generated. Through the use of VPS-MICRO™, variations in grain size, orientation and $\alpha/\beta$ volume fraction can be evaluated and used to segregate the "pooled" data based on the microstructural classification. Therefore, if a nondestructive method for microstructural evaluation existed, the component could be "fingerprinted" and its actual fatigue capability determined much more accurately. This would permit greatly extending a components useful life if it was determined to possess "good" microstructure.

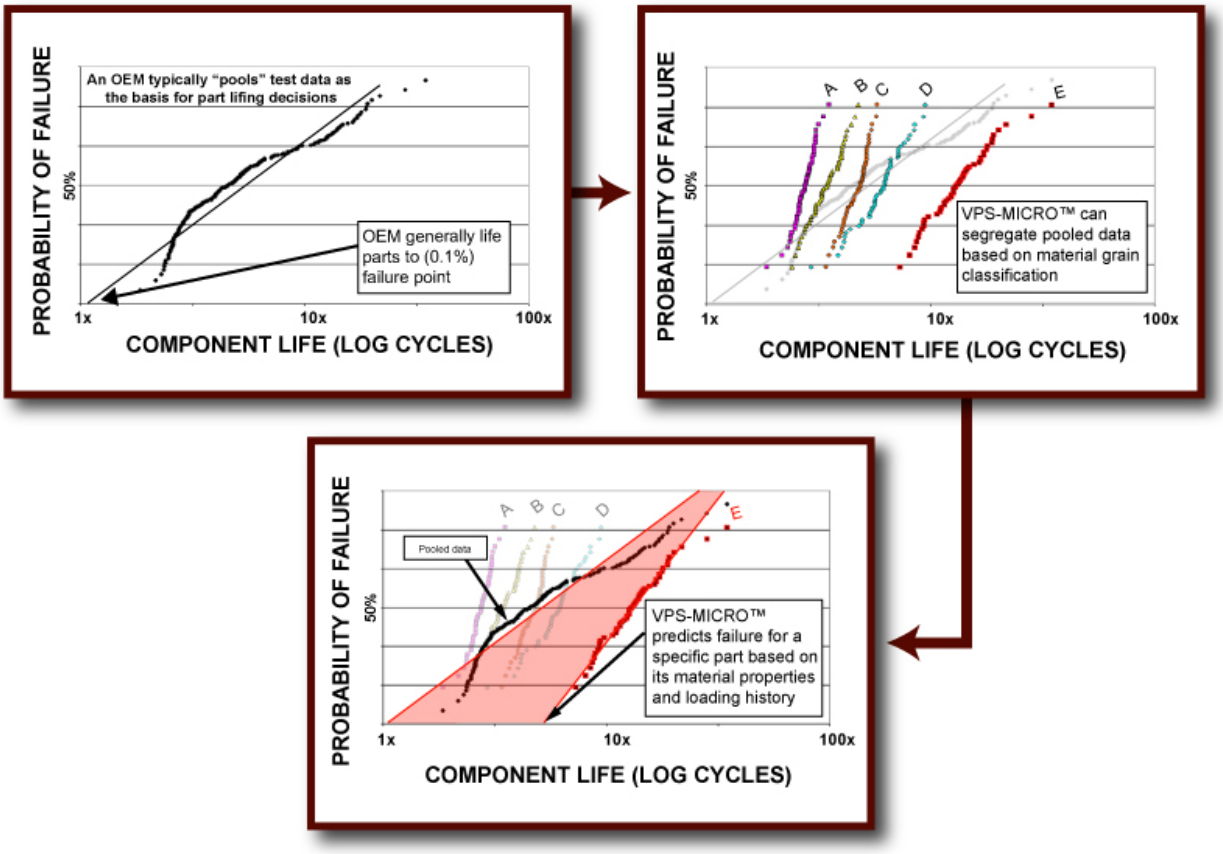



**Figure 3: Fatigue life is strongly influenced by microstructural variations**

Based on the results provided by TEC under the Phase I program, the TEC systems (TEC 1600, and TEC MAX) can provide the experimental data necessary to assess the component microstructure nondestructively. This evaluation, physics based and statistical in nature will provide the grain size as well as orientation distributions necessary for an accurate micromechanical based durability prediction This approach, integrated with the concept of microstructural “fingerprinting” can provide a significant life extension to both existing and future weapons systems.

## APPENDIX D

## RESIDUAL STRESS DATA

========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18403.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 1 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time: 5/31/2005 0:37pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 60.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00017 | 154.71 | 1008.3 | 3.00 | 0.26179 | 161.49 | 0.780439 | 0.000017 |
| 5.0 | 0.00552 | 154.55 | 1071.1 | 2.99 | 0.26152 | 161.48 | 0.780451 | 0.000020 |
| 10.0 | 0.02566 | 155.84 | 1018.1 | 3.08 | 0.26380 | 161.56 | 0.780358 | 0.000021 |
| 15.0 | 0.05985 | 157.60 | 1069.4 | 3.15 | 0.26621 | 161.68 | 0.780232 | 0.000027 |
| 20.0 | 0.10856 | 155.29 | 1116.0 | 3.37 | 0.26671 | 161.52 | 0.780402 | 0.000019 |
| 25.0 | 0.16865 | 154.99 | 1045.1 | 3.30 | 0.26582 | 161.51 | 0.780422 | 0.000020 |
| 30.0 | 0.23822 | 155.95 | 1023.5 | 3.10 | 0.26412 | 161.57 | 0.780350 | 0.000016 |
| 35.0 | 0.31525 | 157.67 | 1051.2 | 3.05 | 0.26482 | 161.68 | 0.780226 | 0.000017 |
| 40.0 | 0.39825 | 158.54 | 1311.3 | 3.01 | 0.26498 | 161.74 | 0.780163 | 0.000015 |
| 45.0 | 0.48541 | 157.45 | 1118.6 | 2.96 | 0.26327 | 161.67 | 0.780240 | 0.000013 |

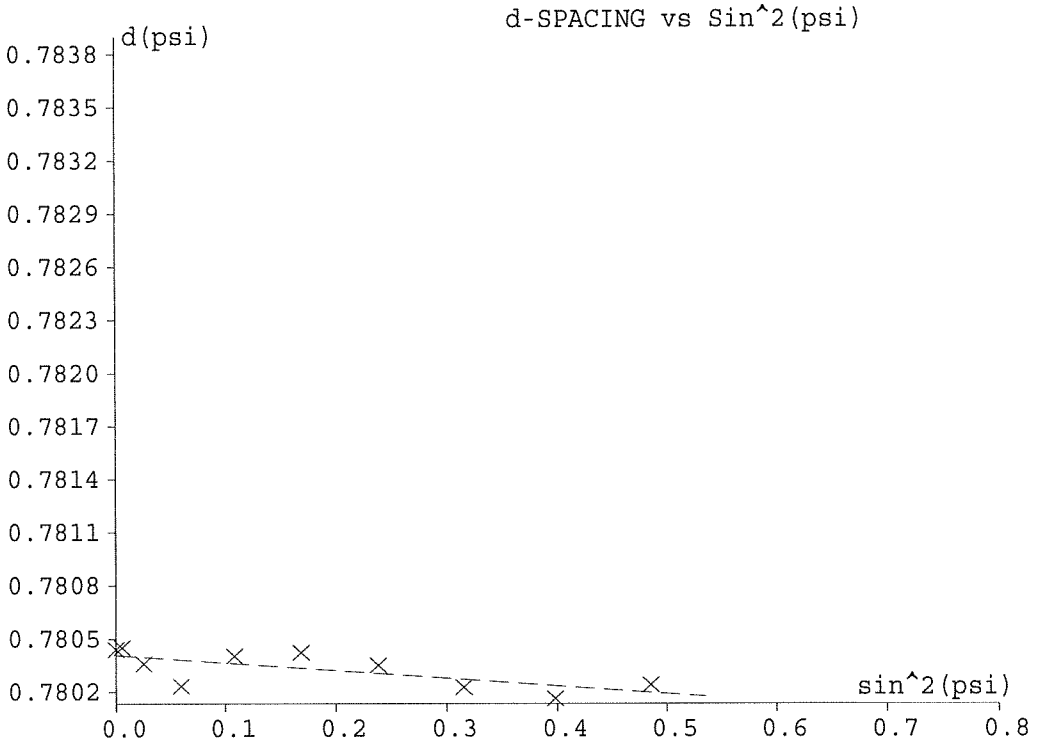
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780406
Slope of Fitted Line.....: -0.0004332
Material Stress Constant.....: 1.255E-07

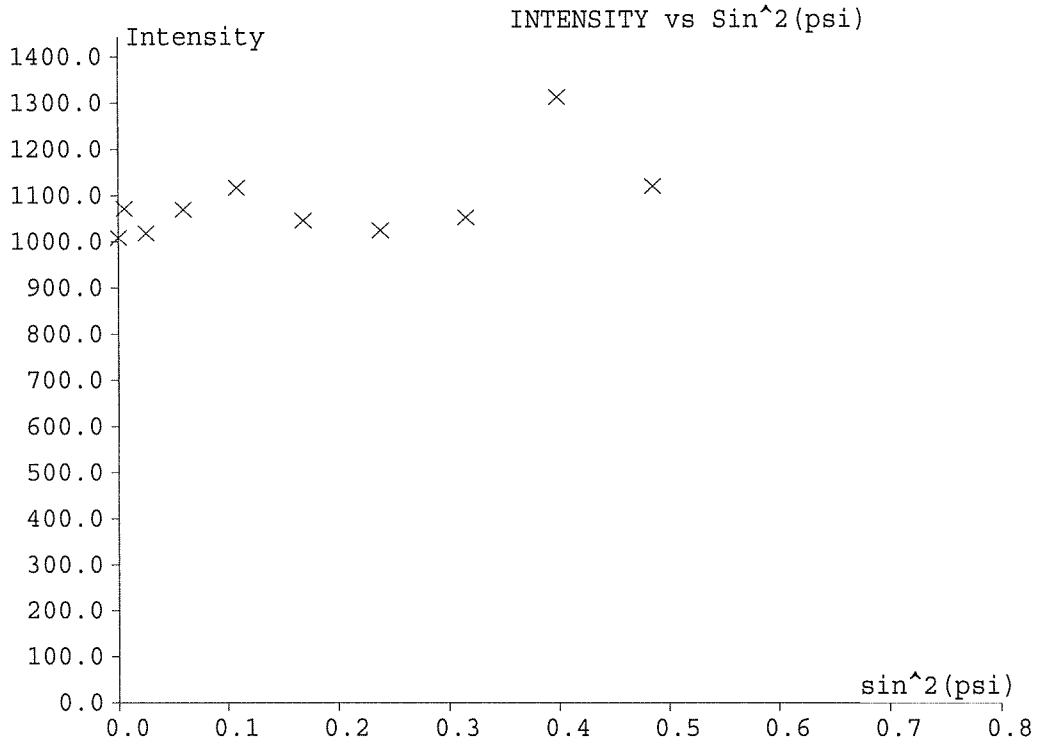
*Residual Stress.....: -4.4 KSI -30.5 MPa

Counting Statistics Stress Error (+/-): 0.3 KSI 2.3 MPa
Probable error.....(+/-): 1.5 KSI 10.5 MPa

File: S:\1005\2005\SBIR\50632\18403.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 1 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.4 KSI | -30.5 MPa |
| Counting Statistics Stress Error (+/-): | 0.3 KSI | 2.3 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.5 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18404.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 1 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time: 5/31/2005 1:29pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 60.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00016 | 154.36 | 1300.5 | 2.88 | 0.25933 | 161.47 | 0.780462 | 0.000015 |
| 5.0 | 0.00554 | 154.19 | 1162.8 | 2.88 | 0.25930 | 161.46 | 0.780474 | 0.000015 |
| 10.0 | 0.02565 | 155.92 | 1189.3 | 3.08 | 0.26383 | 161.57 | 0.780352 | 0.000017 |
| 15.0 | 0.06013 | 156.49 | 1192.4 | 2.88 | 0.26105 | 161.61 | 0.780308 | 0.000014 |
| 20.0 | 0.10846 | 155.49 | 1191.9 | 2.98 | 0.26212 | 161.54 | 0.780382 | 0.000018 |
| 25.0 | 0.16781 | 156.94 | 1026.3 | 3.23 | 0.26687 | 161.63 | 0.780281 | 0.000031 |
| 30.0 | 0.23838 | 155.54 | 1052.3 | 2.79 | 0.25866 | 161.55 | 0.780375 | 0.000014 |
| 35.0 | 0.31495 | 158.13 | 1203.6 | 2.71 | 0.25869 | 161.72 | 0.780185 | 0.000013 |
| 40.0 | 0.39772 | 159.42 | 1045.2 | 2.79 | 0.26153 | 161.80 | 0.780096 | 0.000015 |
| 45.0 | 0.48615 | 156.11 | 1178.8 | 2.75 | 0.25826 | 161.59 | 0.780332 | 0.000012 |

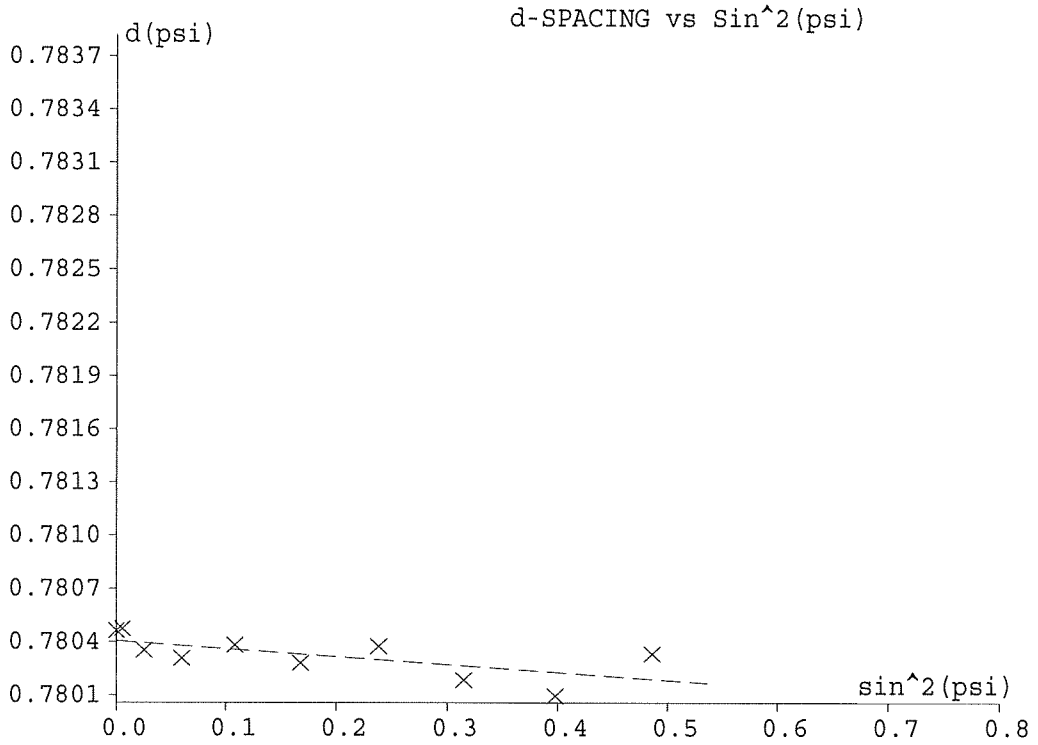
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780405
Slope of Fitted Line.....: -0.000446
Material Stress Constant.....: 1.255E-07

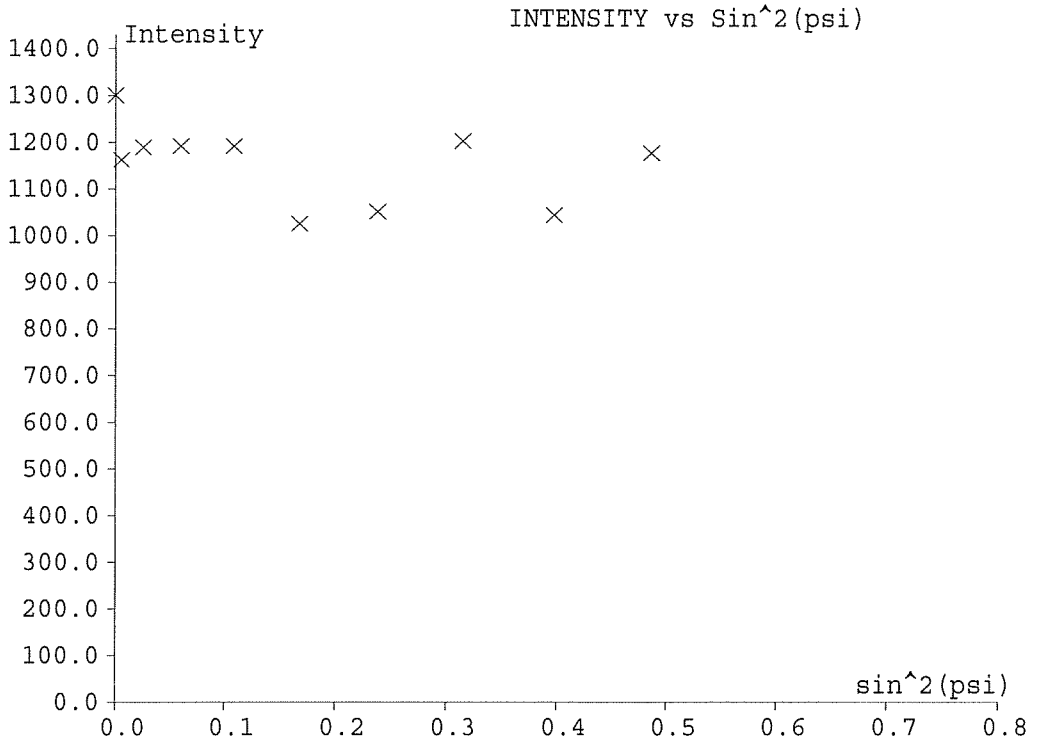
*Residual Stress.....: -4.6 KSI -31.4 MPa

Counting Statistics Stress Error (+/-): 0.3 KSI 1.9 MPa
Probable error.....(+/-): 1.8 KSI 12.6 MPa

File: S:\1005\2005\SBIR\50632\18404.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 1 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.6 KSI | -31.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.3 KSI | 1.9 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.6 MPa |



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================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18405.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 1 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   2:06pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  60.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00017   154.41   1328.3   2.76  0.25722    161.48  0.780456  0.000013
  5.0  0.00548   154.85   1151.8   2.58  0.25235    161.51  0.780418  0.000013
 10.0  0.02584   154.87   1307.4   3.07  0.26288    161.50  0.780428  0.000016
 15.0  0.06012   156.53   1197.2   2.85  0.26054    161.61  0.780304  0.000016
 20.0  0.10846   155.46   1188.0   2.86  0.25979    161.54  0.780381  0.000016
 25.0  0.16778   156.99   1041.2   3.13  0.26541    161.64  0.780276  0.000017
 30.0  0.23845   155.40   1098.8   2.79  0.25839    161.54  0.780385  0.000013
 35.0  0.31501   158.05   1290.1   2.74  0.25955    161.71  0.780192  0.000014
 40.0  0.39856   157.96   1052.2   2.95  0.26349    161.71  0.780203  0.000024
 45.0  0.48561   157.08   1196.1   2.86  0.26112    161.65  0.780264  0.000014

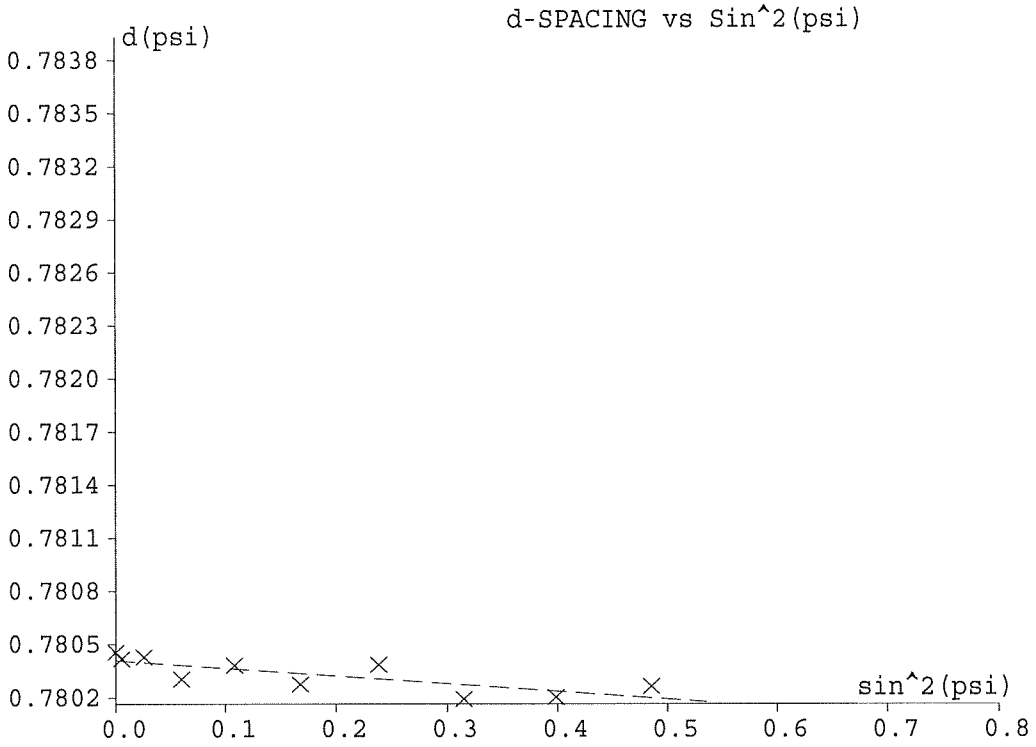
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780409
Slope of Fitted Line...............:    -0.0004323
Material Stress Constant...........:     1.255E-07

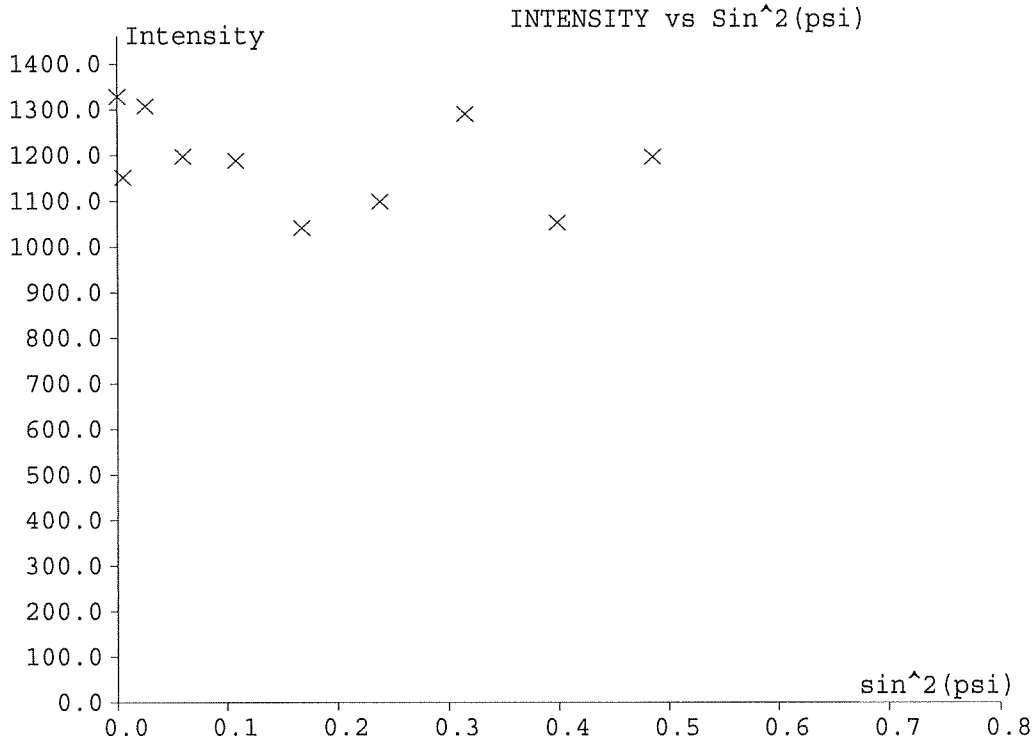
*Residual Stress...................:     -4.4 KSI     -30.4 MPa

Counting Statistics Stress Error (+/-):      0.3 KSI       2.2 MPa
Probable error.................(+/-):      1.2 KSI       8.5 MPa
```

File: S:\1005\2005\SBIR\50632\18405.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 1 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.4 KSI | -30.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.3 KSI | 2.2 MPa |
| Probable error.....(+/-): | 1.2 KSI | 8.5 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18406.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 2 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time: 5/31/2005 2:15pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00025 | 159.53 | 953.0 | 3.28 | 0.26960 | 161.80 | 0.780096 | 0.000023 |
| 5.0 | 0.00466 | 165.22 | 1003.8 | 3.25 | 0.27405 | 162.17 | 0.779697 | 0.000034 |
| 10.0 | 0.02476 | 160.90 | 985.9 | 3.16 | 0.26913 | 161.89 | 0.779998 | 0.000027 |
| 15.0 | 0.05915 | 160.24 | 985.0 | 3.29 | 0.27032 | 161.85 | 0.780046 | 0.000024 |
| 20.0 | 0.10631 | 161.70 | 960.0 | 3.46 | 0.27346 | 161.94 | 0.779945 | 0.000043 |
| 25.0 | 0.16540 | 162.70 | 744.2 | 3.58 | 0.27556 | 162.01 | 0.779877 | 0.000480 |
| 30.0 | 0.23498 | 162.70 | 928.5 | 3.33 | 0.27292 | 162.01 | 0.779873 | 0.000025 |
| 35.0 | 0.31242 | 163.07 | 920.8 | 3.22 | 0.27190 | 162.03 | 0.779846 | 0.000029 |
| 40.0 | 0.39665 | 161.42 | 1094.3 | 3.02 | 0.26745 | 161.93 | 0.779959 | 0.000023 |
| 45.0 | 0.48195 | 163.56 | 1029.8 | 3.01 | 0.26896 | 162.07 | 0.779808 | 0.000021 |

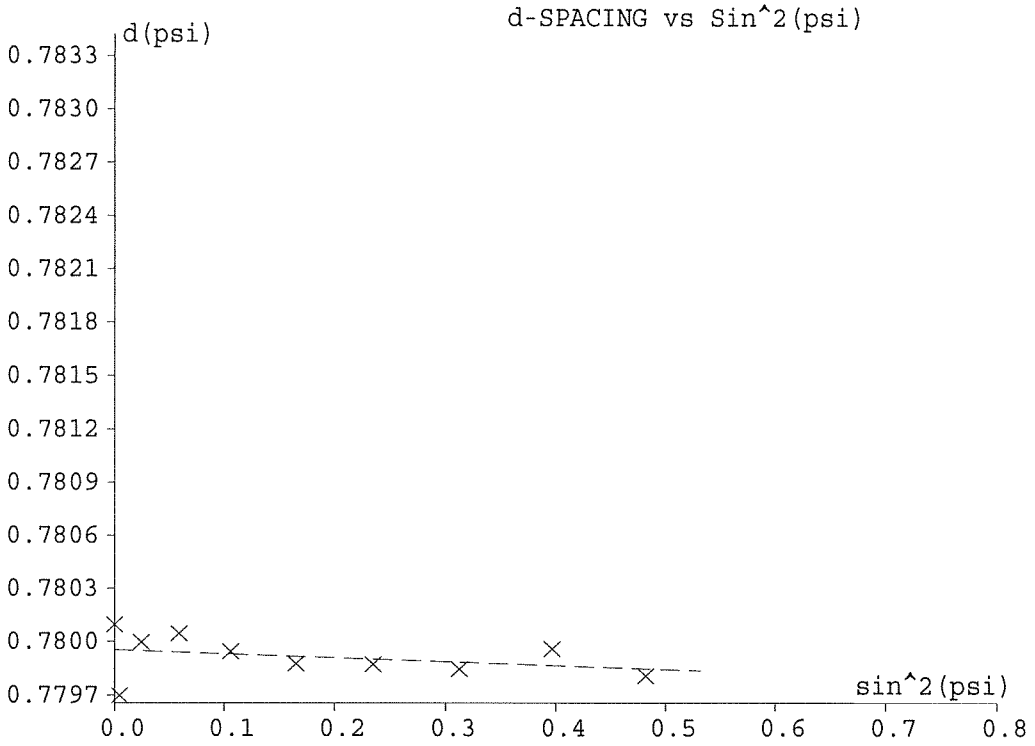
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.779954
Slope of Fitted Line.....: -0.0002212
Material Stress Constant.....: 1.255E-07

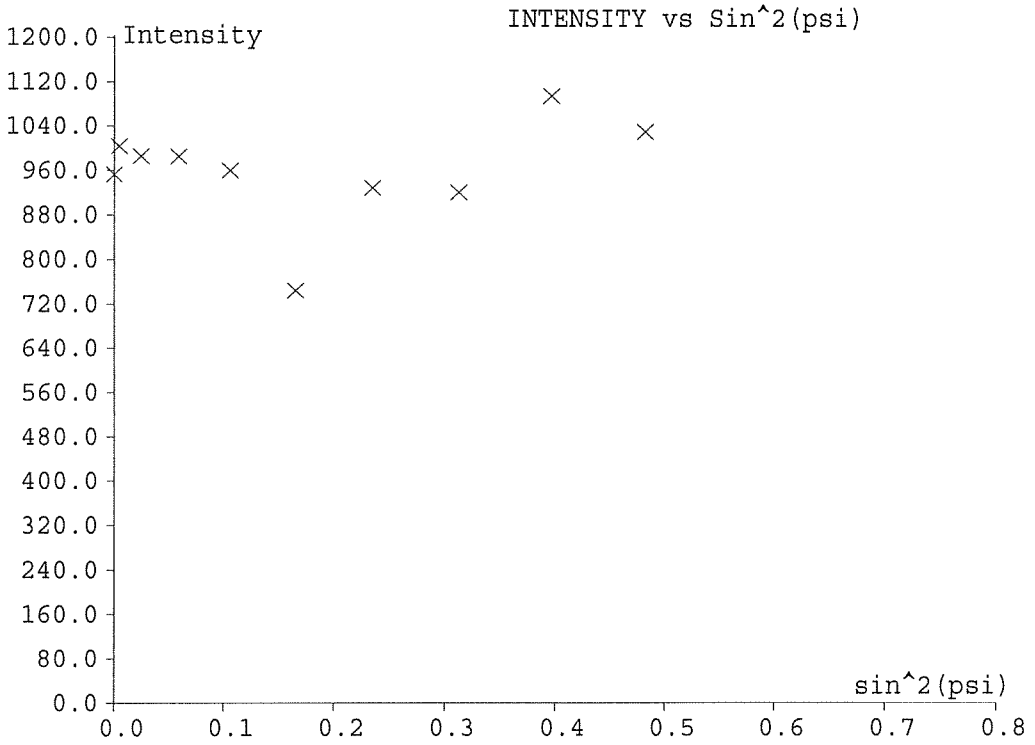
*Residual Stress.....: -2.3 KSI -15.6 MPa

Counting Statistics Stress Error (+/-): 0.6 KSI 3.8 MPa
Probable error.....(+/-): 2.4 KSI 16.3 MPa

File: S:\1005\2005\SBIR\50632\18406.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 2 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -2.3 KSI | -15.6 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 3.8 MPa |
| Probable error.....(+/-): | 2.4 KSI | 16.3 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18407.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 2 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time: 5/31/2005 2:25pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00025 | 159.65 | 1158.1 | 3.30 | 0.26986 | 161.81 | 0.780088 | 0.000023 |
| 5.0 | 0.00495 | 161.50 | 1138.5 | 3.10 | 0.26877 | 161.93 | 0.779955 | 0.000028 |
| 10.0 | 0.02464 | 161.53 | 1099.1 | 2.97 | 0.26679 | 161.94 | 0.779950 | 0.000029 |
| 15.0 | 0.05862 | 162.16 | 1104.3 | 3.12 | 0.26951 | 161.98 | 0.779908 | 0.000023 |
| 20.0 | 0.10684 | 160.05 | 1136.0 | 2.86 | 0.26327 | 161.84 | 0.780052 | 0.000022 |
| 25.0 | 0.16556 | 162.29 | 1234.2 | 3.43 | 0.27368 | 161.98 | 0.779903 | 0.000047 |
| 30.0 | 0.23576 | 161.06 | 1203.1 | 3.21 | 0.27010 | 161.90 | 0.779987 | 0.000026 |
| 35.0 | 0.31347 | 161.04 | 1168.3 | 3.10 | 0.26834 | 161.90 | 0.779987 | 0.000021 |
| 40.0 | 0.39656 | 161.54 | 1063.6 | 2.92 | 0.26578 | 161.94 | 0.779948 | 0.000019 |
| 45.0 | 0.48343 | 160.67 | 1139.9 | 2.38 | 0.24864 | 161.90 | 0.779992 | 0.000019 |

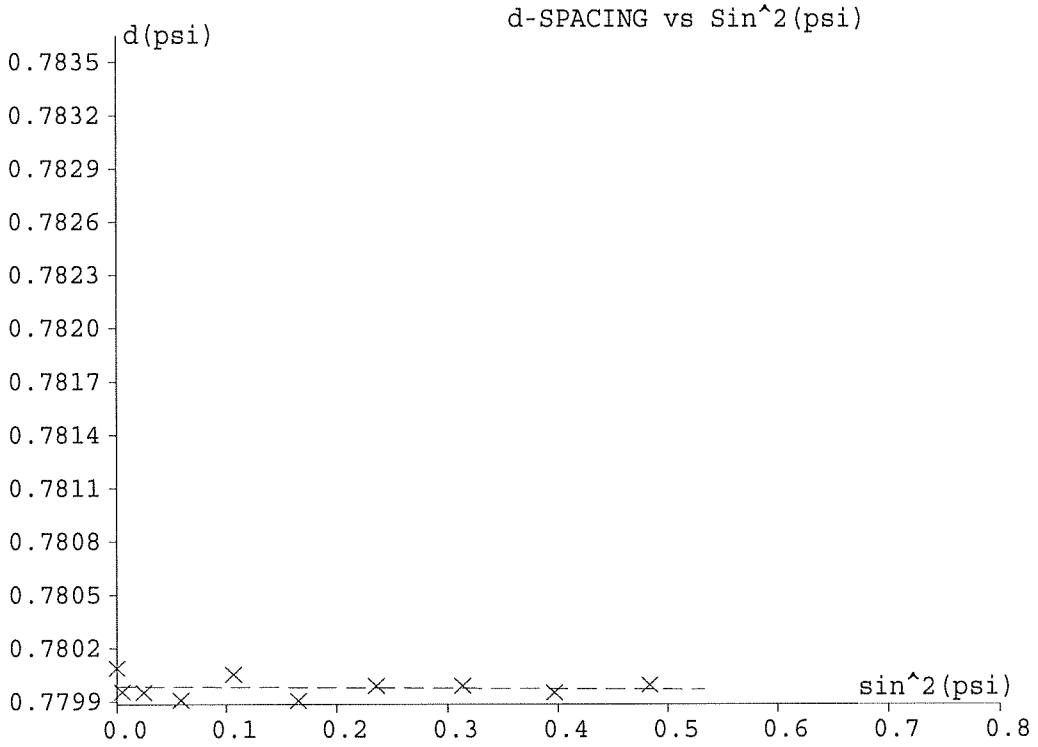
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.779982
Slope of Fitted Line.....: -2.951E-05
Material Stress Constant.....: 1.255E-07

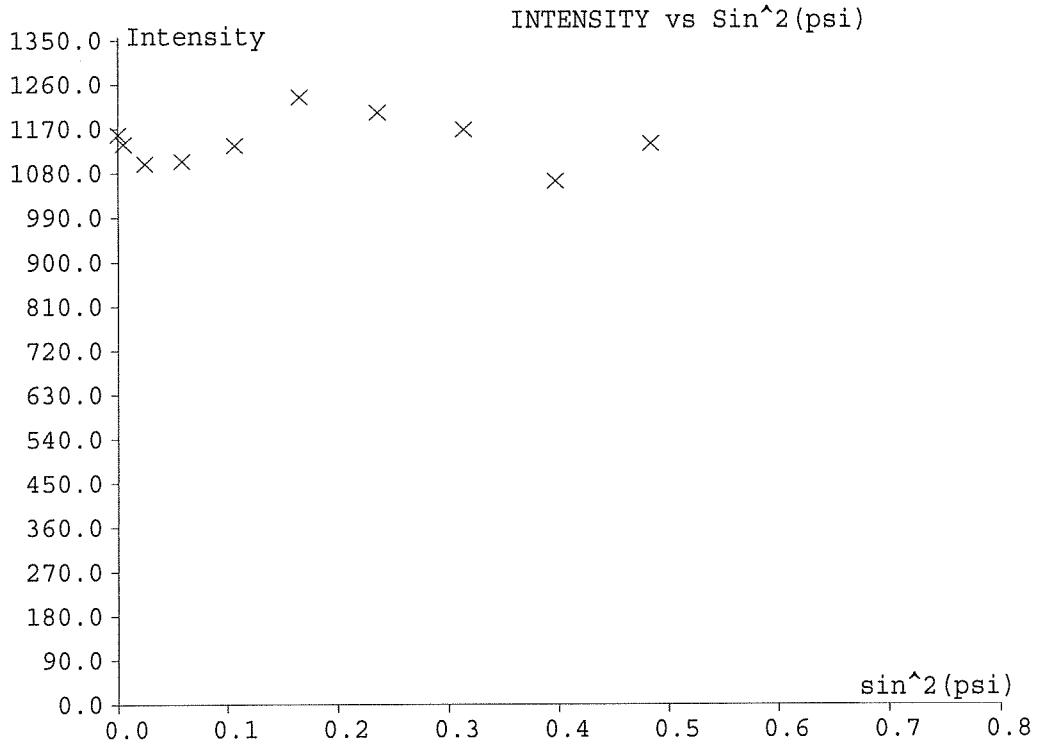
*Residual Stress.....: -0.3 KSI -2.1 MPa

Counting Statistics Stress Error (+/-): 0.4 KSI 3.0 MPa
Probable error.....(+/-): 1.2 KSI 8.4 MPa

File: S:\1005\2005\SBIR\50632\18407.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 2 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -0.3 KSI | -2.1 MPa |
| Counting Statistics Stress Error (+/-): | 0.4 KSI | 3.0 MPa |
| Probable error.....(+/-): | 1.2 KSI | 8.4 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18408.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 2 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time: 5/31/2005 2:32pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00024 | 158.83 | 1218.1 | 2.99 | 0.26497 | 161.76 | 0.780142 | 0.000021 |
| 5.0 | 0.00508 | 159.80 | 1311.3 | 2.99 | 0.26577 | 161.82 | 0.780073 | 0.000018 |
| 10.0 | 0.02493 | 159.96 | 1080.5 | 3.20 | 0.26898 | 161.83 | 0.780065 | 0.000022 |
| 15.0 | 0.05848 | 162.69 | 1190.3 | 3.09 | 0.26945 | 162.01 | 0.779870 | 0.000023 |
| 20.0 | 0.10680 | 160.14 | 1067.3 | 2.82 | 0.26253 | 161.85 | 0.780045 | 0.000018 |
| 25.0 | 0.16638 | 160.29 | 953.0 | 3.16 | 0.26860 | 161.85 | 0.780041 | 0.000021 |
| 30.0 | 0.23556 | 161.52 | 1259.3 | 3.49 | 0.27367 | 161.93 | 0.779958 | 0.000021 |
| 35.0 | 0.31373 | 160.53 | 1209.1 | 3.00 | 0.26638 | 161.87 | 0.780021 | 0.000022 |
| 40.0 | 0.39647 | 161.76 | 1039.1 | 3.12 | 0.26922 | 161.95 | 0.779936 | 0.000025 |
| 45.0 | 0.48403 | 159.82 | 1262.4 | 2.79 | 0.26174 | 161.83 | 0.780067 | 0.000016 |

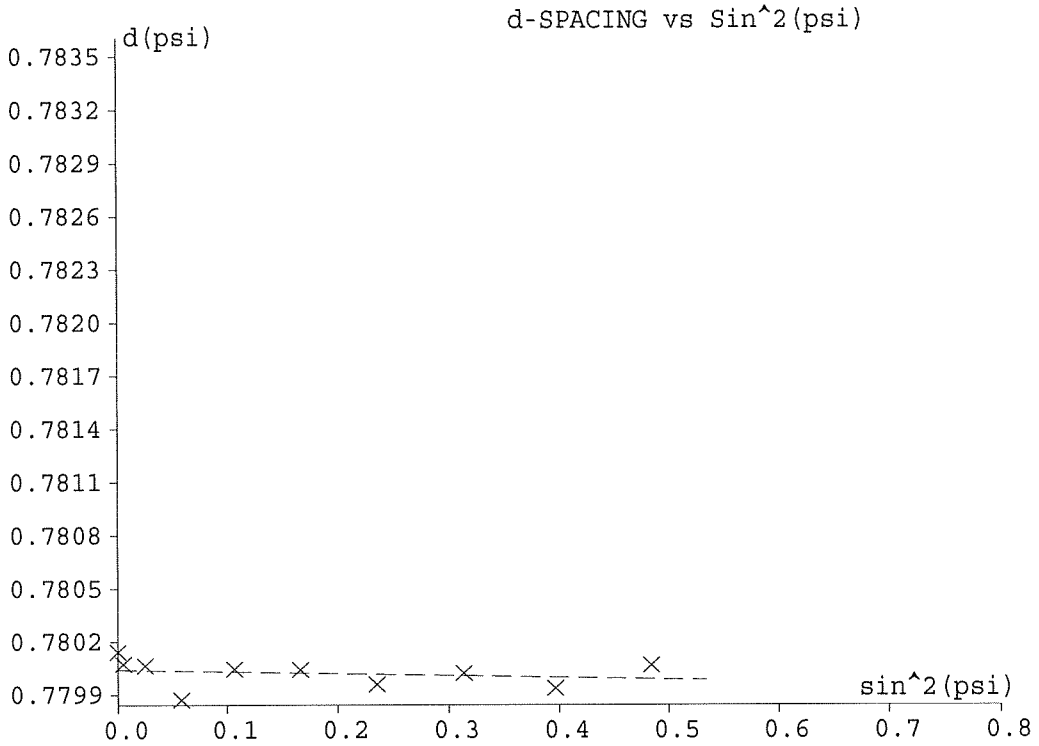
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780042
Slope of Fitted Line.....: -0.0001094
Material Stress Constant.....: 1.255E-07

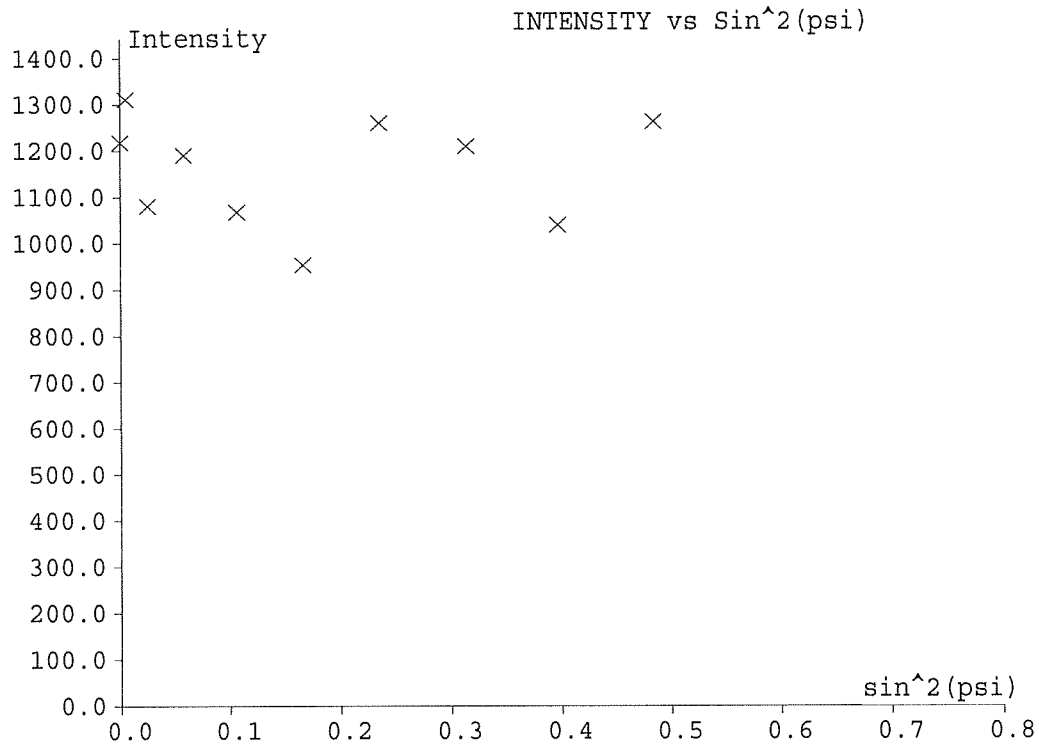
*Residual Stress.....: -1.1 KSI -7.7 MPa

Counting Statistics Stress Error (+/-): 0.4 KSI 2.8 MPa
Probable error.....(+/-): 1.6 KSI 11.1 MPa

File: S:\1005\2005\SBIR\50632\18408.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 2 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -1.1 KSI | -7.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.4 KSI | 2.8 MPa |
| Probable error.....(+/-): | 1.6 KSI | 11.1 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18409.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 3 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time: 5/31/2005 2:41pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00017 | 154.85 | 974.2 | 3.03 | 0.26227 | 161.50 | 0.780429 | 0.000037 |
| 5.0 | 0.00535 | 156.55 | 1023.4 | 3.14 | 0.26526 | 161.61 | 0.780308 | 0.000025 |
| 10.0 | 0.02567 | 155.77 | 974.3 | 3.09 | 0.26395 | 161.56 | 0.780363 | 0.000021 |
| 15.0 | 0.06010 | 156.68 | 949.3 | 3.12 | 0.26507 | 161.62 | 0.780298 | 0.000030 |
| 20.0 | 0.10732 | 158.77 | 936.4 | 3.24 | 0.26853 | 161.75 | 0.780150 | 0.000038 |
| 25.0 | 0.16773 | 157.13 | 880.0 | 3.15 | 0.26591 | 161.65 | 0.780266 | 0.000036 |
| 30.0 | 0.23756 | 157.37 | 857.2 | 3.37 | 0.26855 | 161.66 | 0.780252 | 0.000044 |
| 35.0 | 0.31071 | 166.44 | 826.5 | 3.77 | 0.28084 | 162.25 | 0.779619 | 0.000058 |
| 40.0 | 0.39838 | 158.30 | 1119.5 | 3.02 | 0.26500 | 161.73 | 0.780180 | 0.000020 |
| 45.0 | 0.48165 | 164.19 | 932.5 | 3.49 | 0.27620 | 162.10 | 0.779772 | 0.000038 |

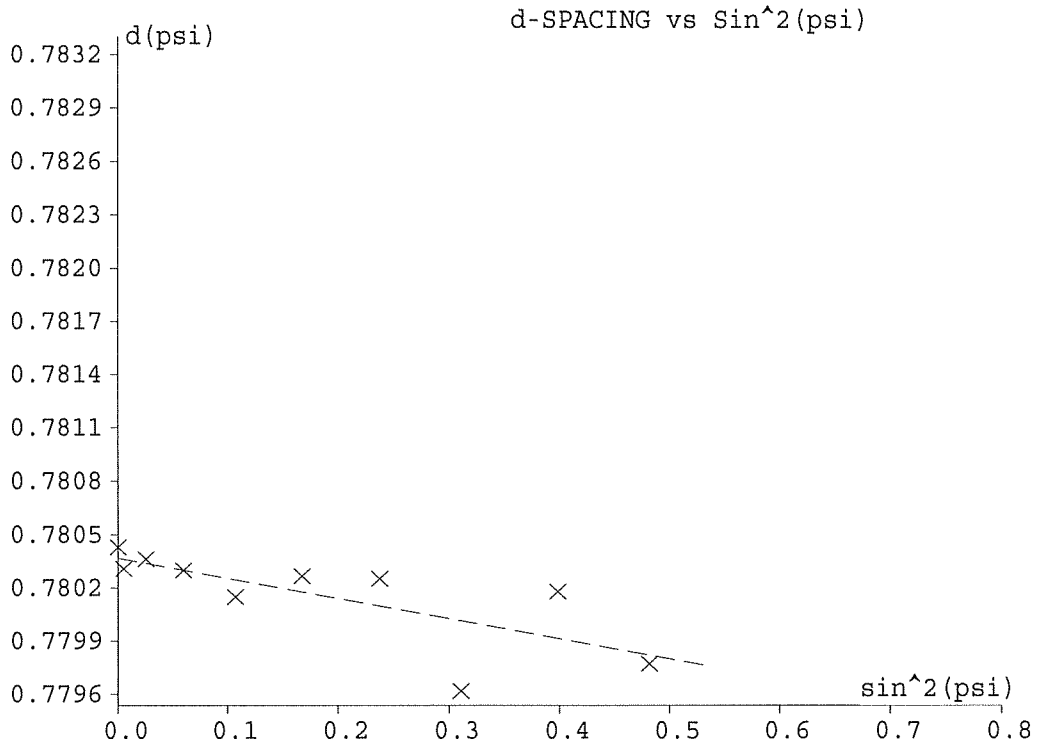
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780367
Slope of Fitted Line.....: -0.001133
Material Stress Constant.....: 1.255E-07

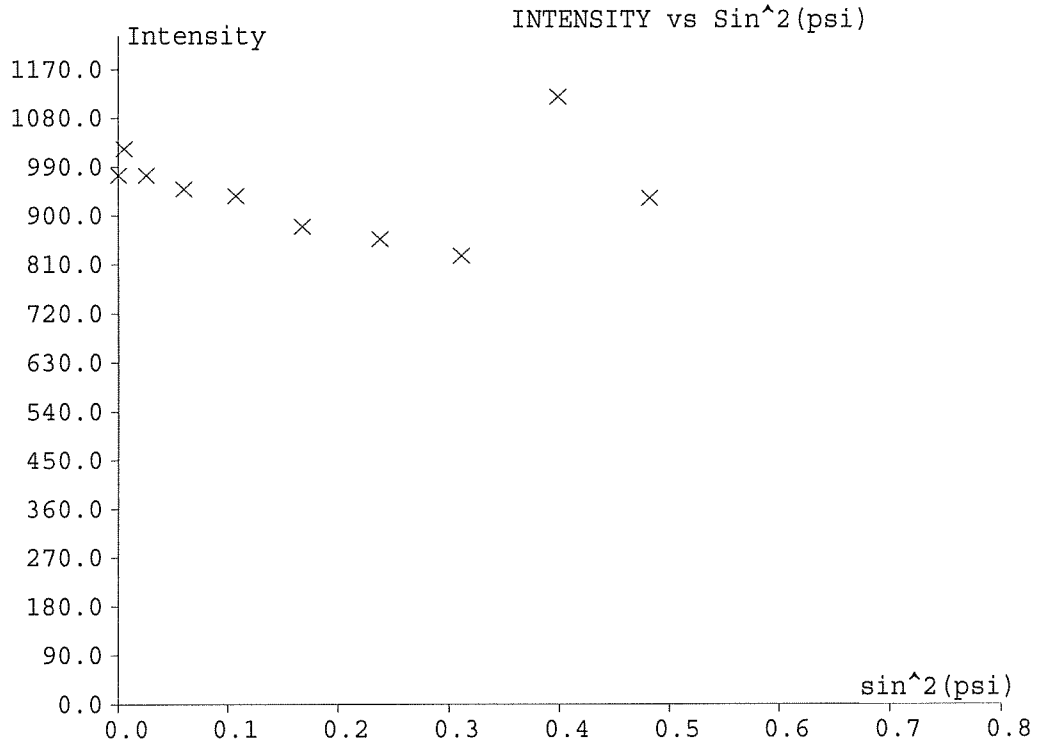
*Residual Stress.....: -11.6 KSI -79.7 MPa

Counting Statistics Stress Error (+/-): 0.7 KSI 4.6 MPa
Probable error.....(+/-): 3.7 KSI 25.4 MPa

File: S:\1005\2005\SBIR\50632\18409.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 3 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -11.6 KSI | -79.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.6 MPa |
| Probable error.....(+/-): | 3.7 KSI | 25.4 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18410.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 3 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time: 5/31/2005 2:49pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | - | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00022 | 157.90 | 1175.9 | 3.10 | 0.26572 | | 161.70 | 0.780210 | 0.000032 |
| 5.0 | 0.00533 | 156.79 | 1206.7 | 3.09 | 0.26473 | | 161.63 | 0.780290 | 0.000023 |
| 10.0 | 0.02564 | 155.91 | 1215.4 | 2.82 | 0.25936 | | 161.57 | 0.780348 | 0.000022 |
| 15.0 | 0.05994 | 157.21 | 1184.1 | 2.95 | 0.26298 | | 161.66 | 0.780257 | 0.000024 |
| 20.0 | 0.10784 | 157.26 | 1163.5 | 3.06 | 0.26471 | | 161.66 | 0.780255 | 0.000030 |
| 25.0 | 0.16826 | 155.77 | 1293.9 | 2.75 | 0.25791 | | 161.57 | 0.780357 | 0.000023 |
| 30.0 | 0.23893 | 154.49 | 1032.1 | 3.08 | 0.26273 | | 161.48 | 0.780456 | 0.000022 |
| 35.0 | 0.31410 | 159.90 | 1003.7 | 3.26 | 0.26968 | | 161.83 | 0.780070 | 0.000034 |
| 40.0 | 0.39848 | 158.07 | 1086.2 | 2.83 | 0.26121 | | 161.71 | 0.780193 | 0.000022 |
| 45.0 | 0.48466 | 158.80 | 1025.6 | 3.05 | 0.26586 | | 161.76 | 0.780145 | 0.000018 |

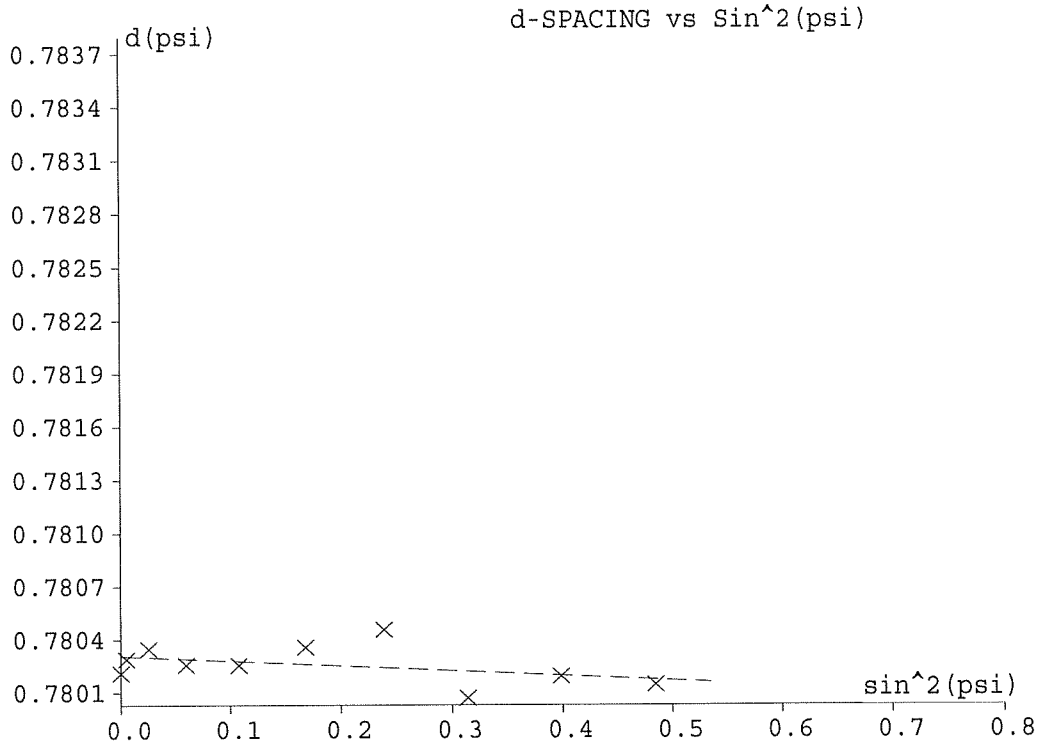
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780308
Slope of Fitted Line.....: -0.0002749
Material Stress Constant.....: 1.255E-07

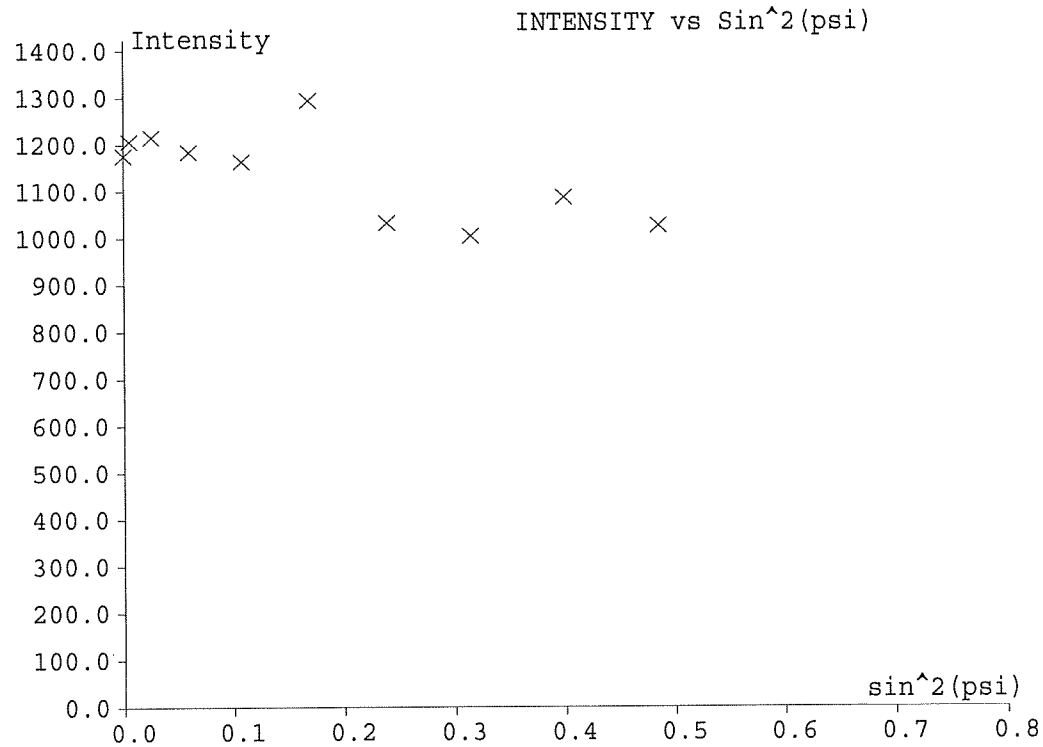
*Residual Stress.....: -2.8 KSI -19.4 MPa

Counting Statistics Stress Error (+/-): 0.5 KSI 3.2 MPa
Probable error.....(+/-): 2.1 KSI 14.6 MPa

File: S:\1005\2005\SBIR\50632\18410.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 3 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -2.8 KSI | -19.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.2 MPa |
| Probable error.....(+/-): | 2.1 KSI | 14.6 MPa |



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18411.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 3 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   3:01pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00019   156.20   1148.1   3.12  0.26464    161.59  0.780332  0.000024
  5.0  0.00546   155.21   1238.3   2.97  0.26175    161.52  0.780402  0.000023
 10.0  0.02583   154.90   1192.9   2.99  0.26171    161.50  0.780425  0.000022
 15.0  0.06047   155.33   1115.5   3.14  0.26422    161.53  0.780396  0.000025
 20.0  0.10867   154.85   1236.0   2.78  0.25792    161.50  0.780425  0.000017
 25.0  0.16798   156.54   1278.0   3.19  0.26599    161.61  0.780309  0.000025
 30.0  0.23834   155.69   1169.5   2.99  0.26247    161.56  0.780368  0.000035
 35.0  0.31635   155.58   1045.0   2.97  0.26200    161.55  0.780375  0.000021
 40.0  0.39886   157.44   1211.2   3.00  0.26402    161.67  0.780241  0.000024
 45.0  0.48595   156.51    944.4   2.98  0.26291    161.61  0.780308  0.000021

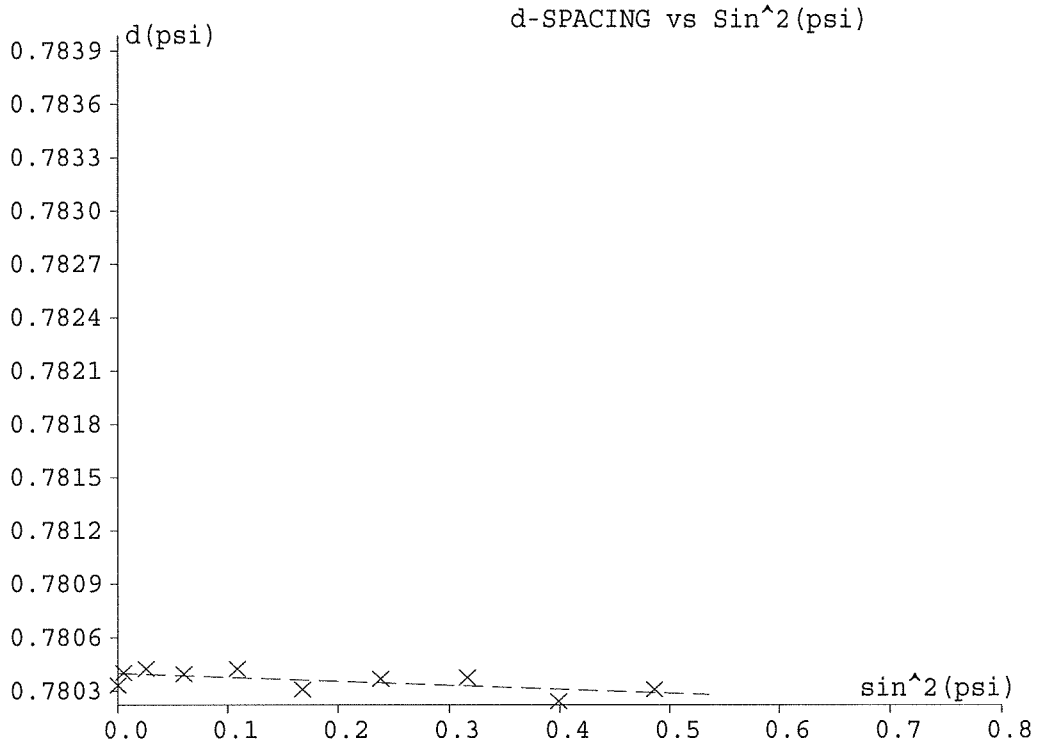
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780398
Slope of Fitted Line...............:    -0.0002227
Material Stress Constant...........:     1.255E-07

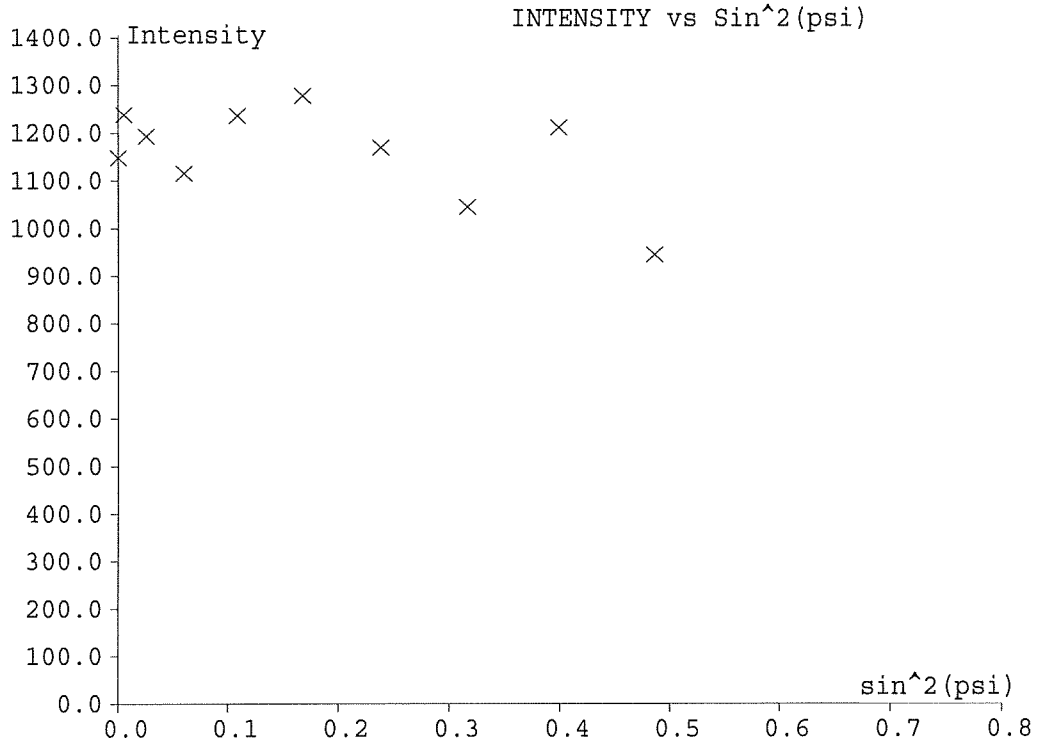
*Residual Stress...................:     -2.3 KSI     -15.7 MPa

Counting Statistics Stress Error (+/-):      0.4 KSI       3.0 MPa
Probable error.................(+/-):      0.9 KSI       6.5 MPa
```

File: S:\1005\2005\SBIR\50632\18411.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 3 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -2.3 KSI | -15.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.4 KSI | 3.0 MPa |
| Probable error.....(+/-): | 0.9 KSI | 6.5 MPa |



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18412.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 4 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   3:09pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00019   156.33    951.6   3.24  0.26640    161.59  0.780325  0.000040
  5.0  0.00543   155.59   1046.4   2.96  0.26184    161.55  0.780374  0.000026
 10.0  0.02546   156.99   1134.4   3.24  0.26694    161.64  0.780278  0.000021
 15.0  0.06008   156.80    869.3   3.48  0.26911    161.62  0.780294  0.000036
 20.0  0.10711   159.38    967.8   3.33  0.26991    161.79  0.780108  0.000044
 25.0  0.16722   158.40    808.0   3.71  0.27234    161.73  0.780181  0.000099
 30.0  0.23627   160.01    791.5   3.26  0.26971    161.83  0.780062  0.000039
 35.0  0.31511   157.95   1083.9   3.16  0.26673    161.70  0.780207  0.000025
 40.0  0.39835   158.38   1146.6   3.12  0.26644    161.73  0.780176  0.000029
 45.0  0.48326   161.27   1017.3   3.09  0.26845    161.92  0.779971  0.000022

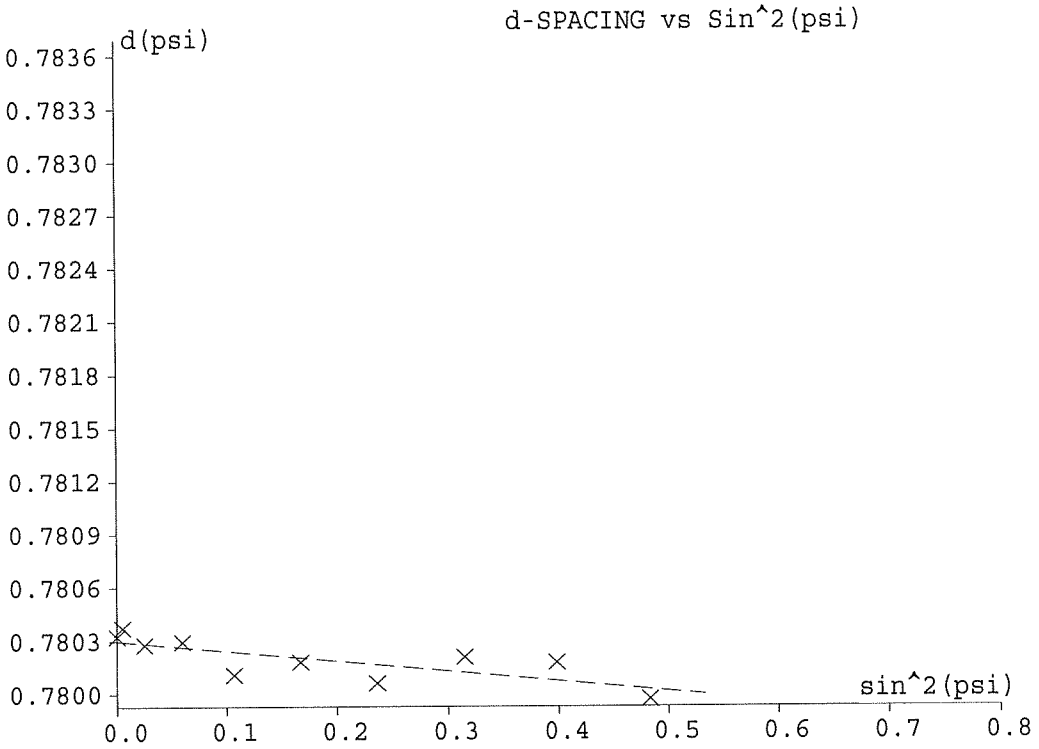
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780299
Slope of Fitted Line...............:    -0.0005637
Material Stress Constant...........:     1.255E-07

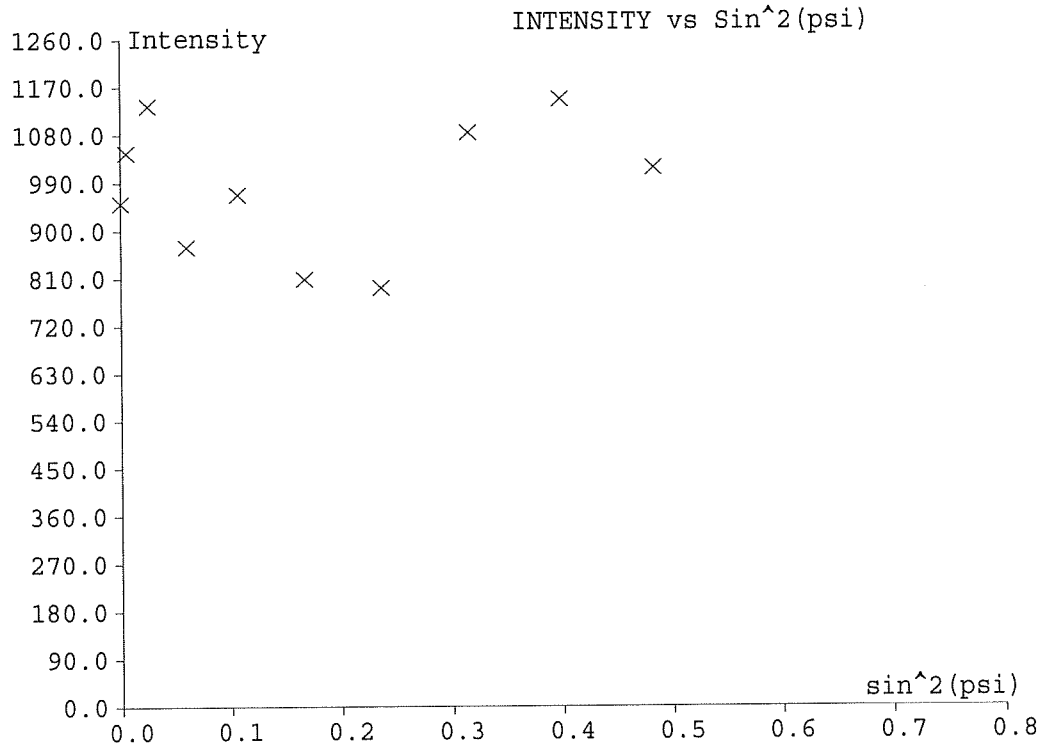
*Residual Stress...................:     -5.8 KSI     -39.7 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       3.9 MPa
Probable error.................(+/-):      1.7 KSI      11.5 MPa
```

File: S:\1005\2005\SBIR\50632\18412.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 4 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -5.8 KSI | -39.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 3.9 MPa |
| Probable error.....(+/-): | 1.7 KSI | 11.5 MPa |



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================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18413.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 4 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   3:18pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00017   154.87   1241.7   3.33  0.26601    161.50  0.780432  0.000027
  5.0  0.00534   156.67   1167.8   2.88  0.26110    161.62  0.780294  0.000029
 10.0  0.02560   156.13   1177.8   2.90  0.26118    161.59  0.780334  0.000020
 15.0  0.06053   155.17   1226.5   3.54  0.26826    161.52  0.780412  0.000031
 20.0  0.10703   159.57   1035.3   3.08  0.26684    161.81  0.780090  0.000037
 25.0  0.16709   158.59    885.8   2.98  0.26457    161.75  0.780159  0.000031
 30.0  0.23697   158.50   1016.6   3.00  0.26488    161.74  0.780166  0.000026
 35.0  0.31514   157.84   1136.7   2.90  0.26255    161.70  0.780211  0.000023
 40.0  0.39883   157.44   1135.0   2.78  0.25975    161.67  0.780237  0.000022
 45.0  0.48433   159.29   1060.8   2.72  0.25975    161.80  0.780103  0.000023

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780323
Slope of Fitted Line...............:    -0.0004373
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -4.5 KSI     -30.8 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.4 MPa
Probable error.................(+/-):      2.0 KSI      13.7 MPa
```
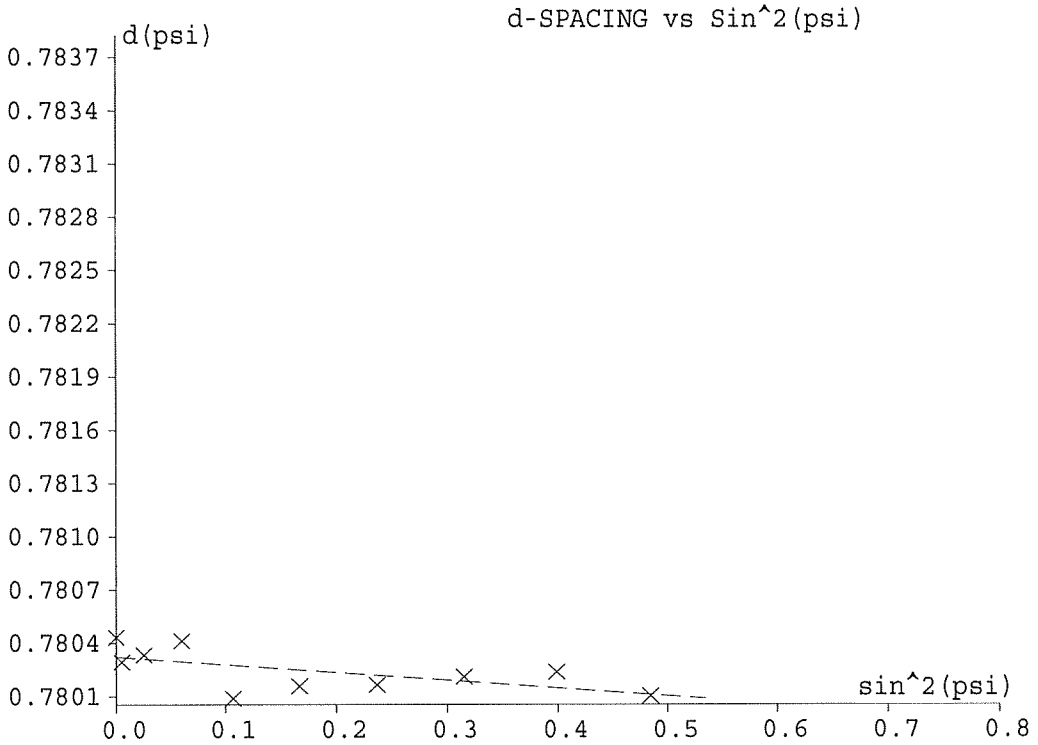
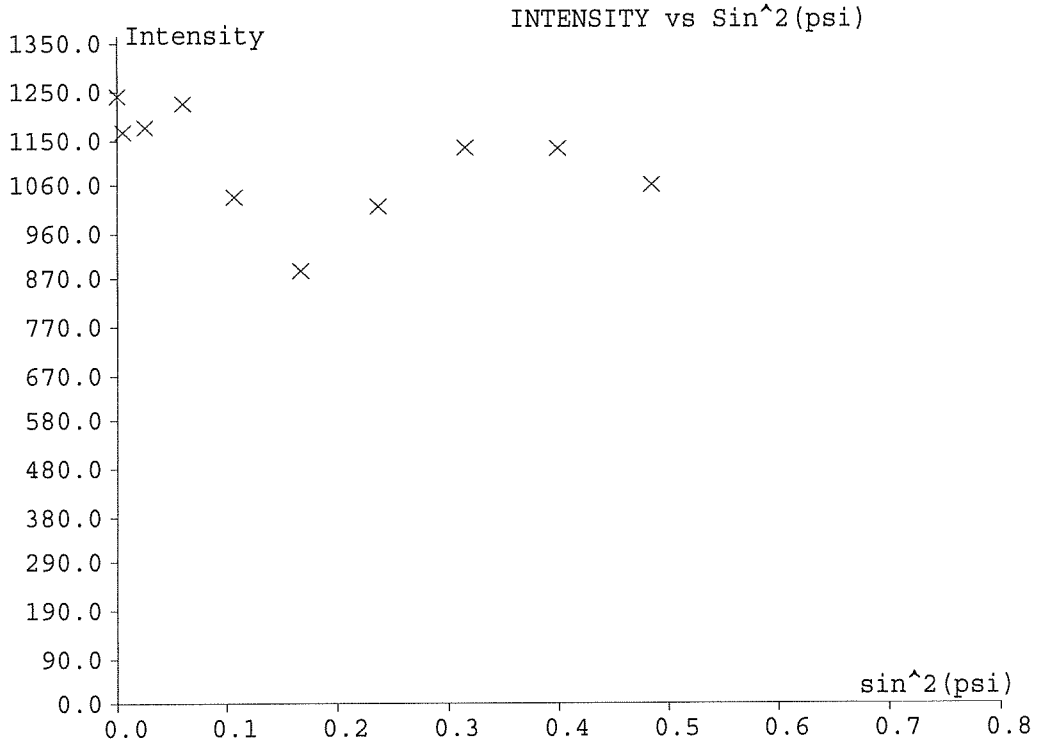

File: S:\1005\2005\SBIR\50632\18413.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 4 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.5 KSI | -30.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.4 MPa |
| Probable error.....(+/-): | 2.0 KSI | 13.7 MPa |

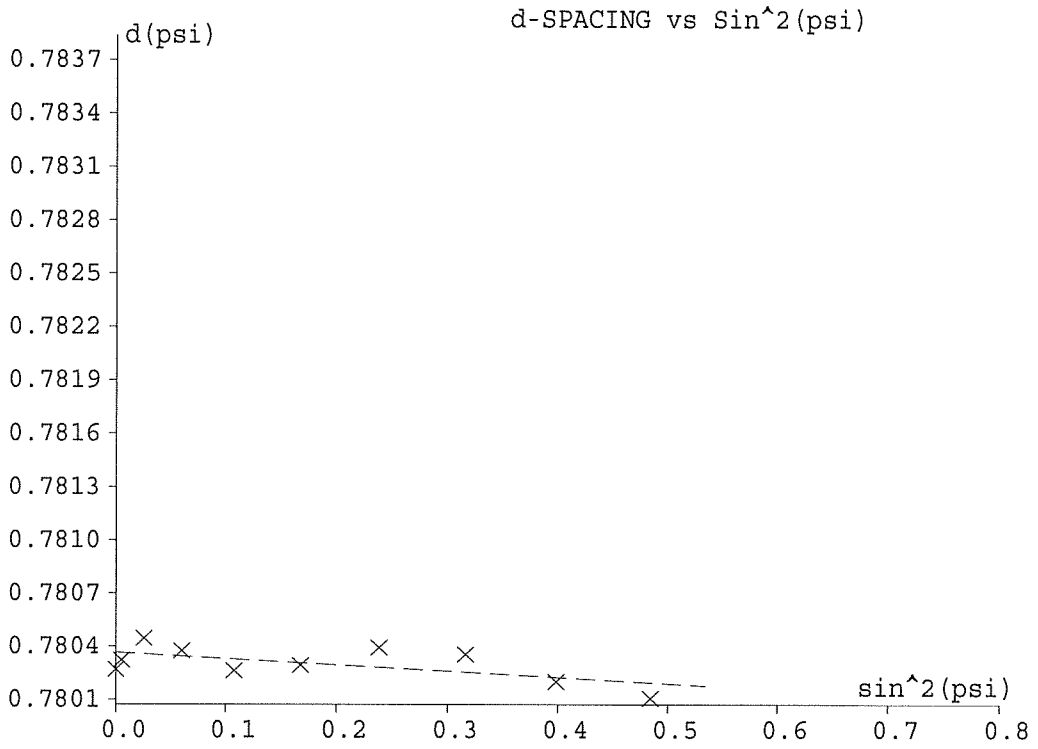


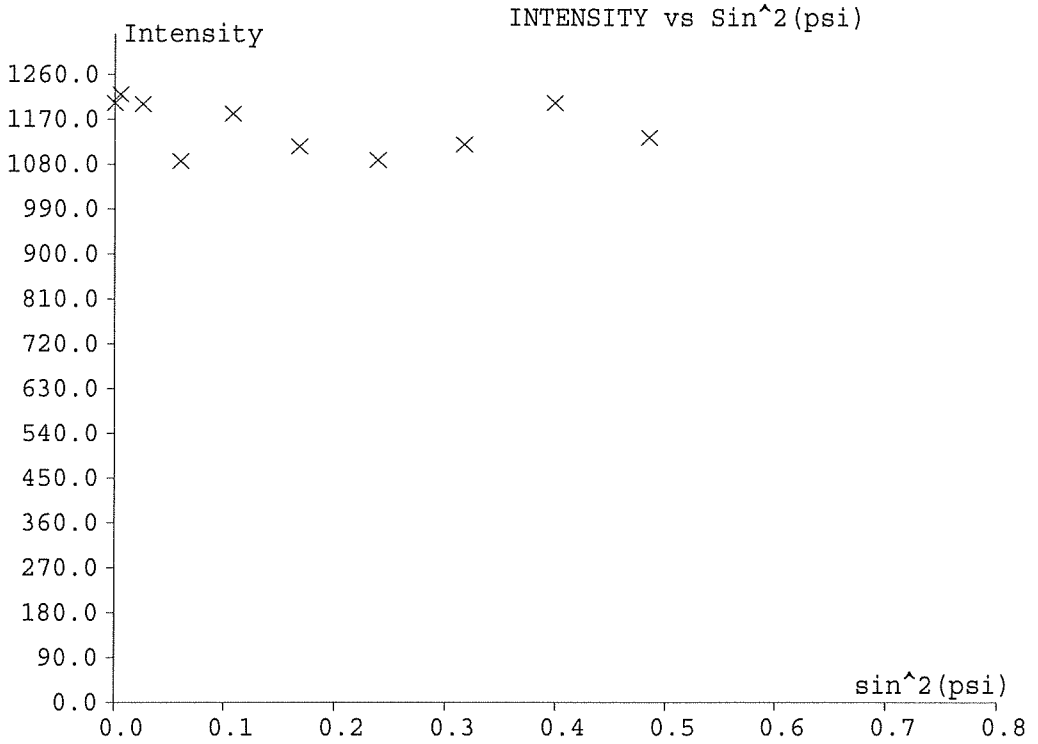



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18414.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 4 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   3:31pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00021   157.03   1202.3   3.03  0.26410    161.64  0.780271  0.000028
  5.0  0.00537   156.22   1219.9   2.73  0.25782    161.60  0.780323  0.000022
 10.0  0.02588   154.63   1200.5   3.08  0.26276    161.49  0.780446  0.000019
 15.0  0.06038   155.67   1085.9   3.36  0.26701    161.55  0.780374  0.000032
 20.0  0.10788   157.18   1181.3   3.25  0.26721    161.65  0.780264  0.000050
 25.0  0.16789   156.73   1115.8   3.06  0.26421    161.62  0.780293  0.000027
 30.0  0.23851   155.36   1088.6   3.09  0.26348    161.53  0.780393  0.000018
 35.0  0.31620   155.81   1120.2   2.81  0.25913    161.57  0.780355  0.000021
 40.0  0.39855   157.90   1203.7   2.71  0.25835    161.71  0.780202  0.000019
 45.0  0.48437   159.25   1134.6   2.83  0.26219    161.79  0.780108  0.000018

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780367
Slope of Fitted Line...............:    -0.0003516
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -3.6 KSI     -24.8 MPa

Counting Statistics Stress Error (+/-):      0.4 KSI       3.0 MPa
Probable error.................(+/-):      1.6 KSI      11.2 MPa
```

File: S:\1005\2005\SBIR\50632\18414.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 4 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -3.6 KSI | -24.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.4 KSI | 3.0 MPa |
| Probable error.....(+/-): | 1.6 KSI | 11.2 MPa |

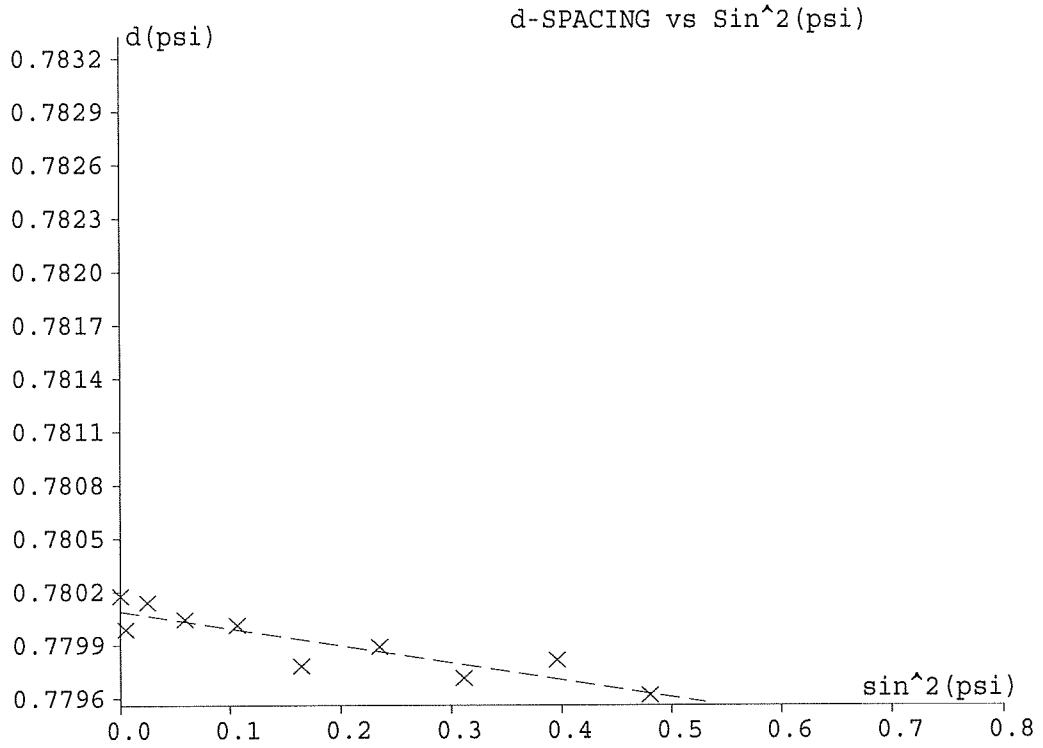


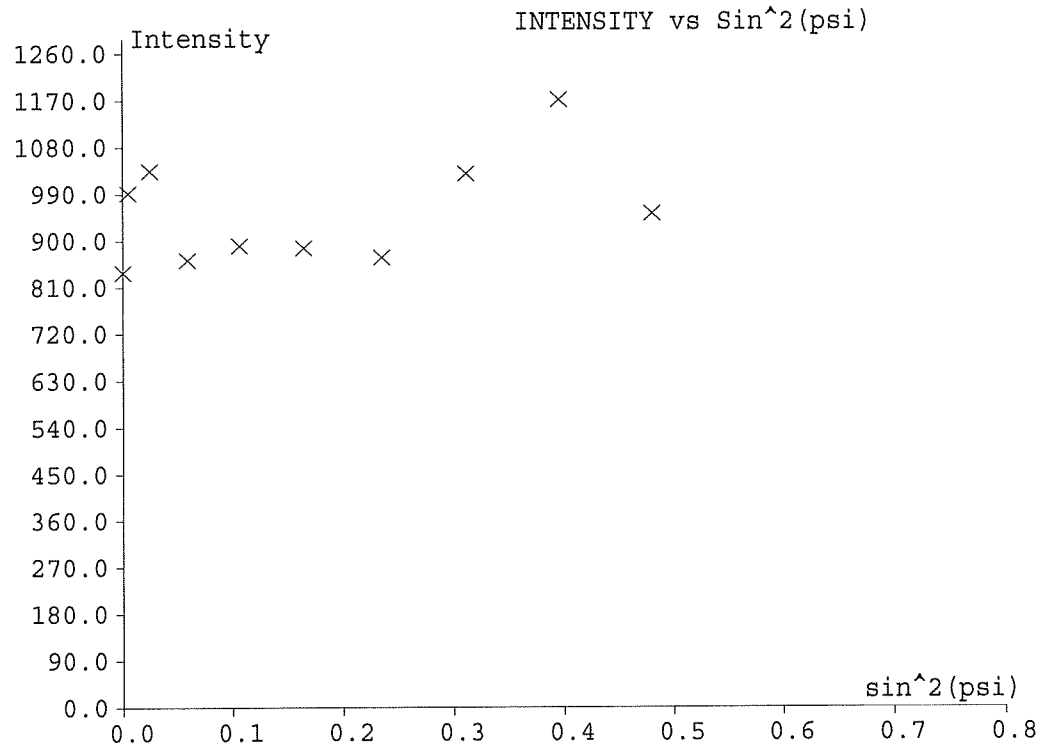



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18415.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 5 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   3:40pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00023   158.41    838.2   3.25  0.26832    161.73  0.780176  0.000029
  5.0  0.00499   161.04    991.8   3.25  0.27055    161.90  0.779989  0.000030
 10.0  0.02512   158.82   1034.2   2.93  0.26384    161.76  0.780141  0.000025
 15.0  0.05914   160.22    862.3   3.07  0.26729    161.85  0.780044  0.000024
 20.0  0.10664   160.76    890.3   3.55  0.27344    161.88  0.780012  0.000025
 25.0  0.16482   164.09    885.7   3.68  0.27778    162.09  0.779781  0.000051
 30.0  0.23508   162.46    867.2   3.21  0.27118    161.99  0.779889  0.000038
 35.0  0.31142   164.97   1028.9   3.16  0.27252    162.16  0.779713  0.000026
 40.0  0.39551   163.41   1170.9   2.84  0.26550    162.06  0.779815  0.000018
 45.0  0.48038   166.41    951.7   3.34  0.27633    162.25  0.779616  0.000042

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780090
Slope of Fitted Line...............:    -0.0009647
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -9.9 KSI     -67.9 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       4.4 MPa
Probable error.................(+/-):      1.8 KSI      12.2 MPa
```

File: S:\1005\2005\SBIR\50632\18415.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 5 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -9.9 KSI | -67.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.4 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.2 MPa |

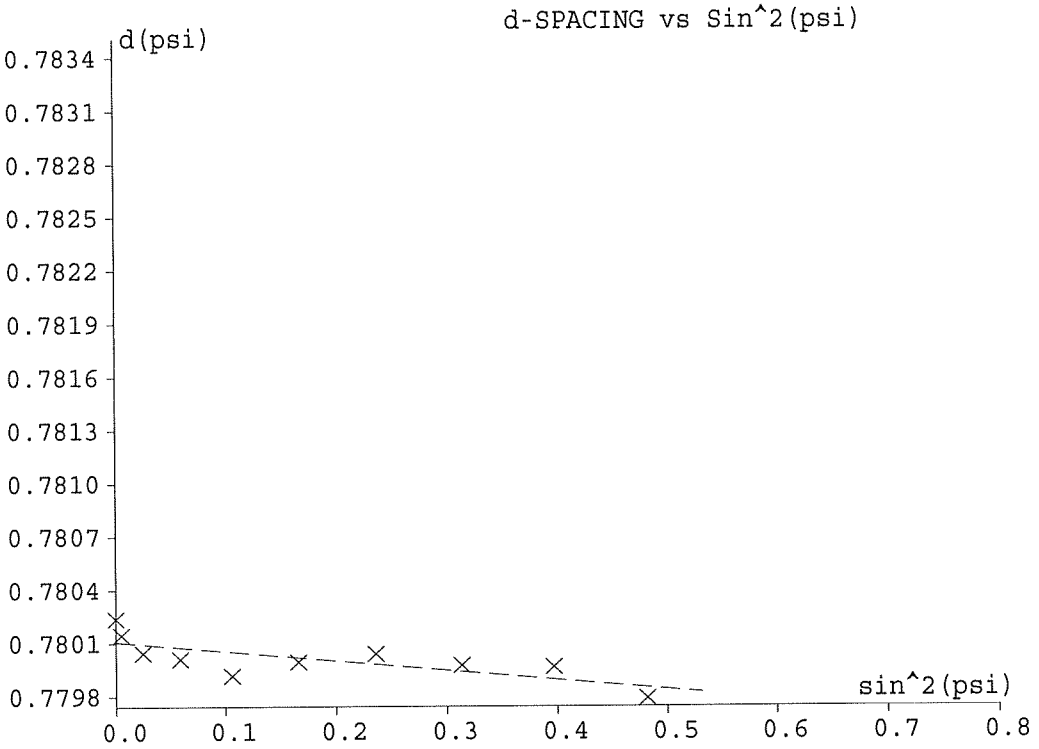


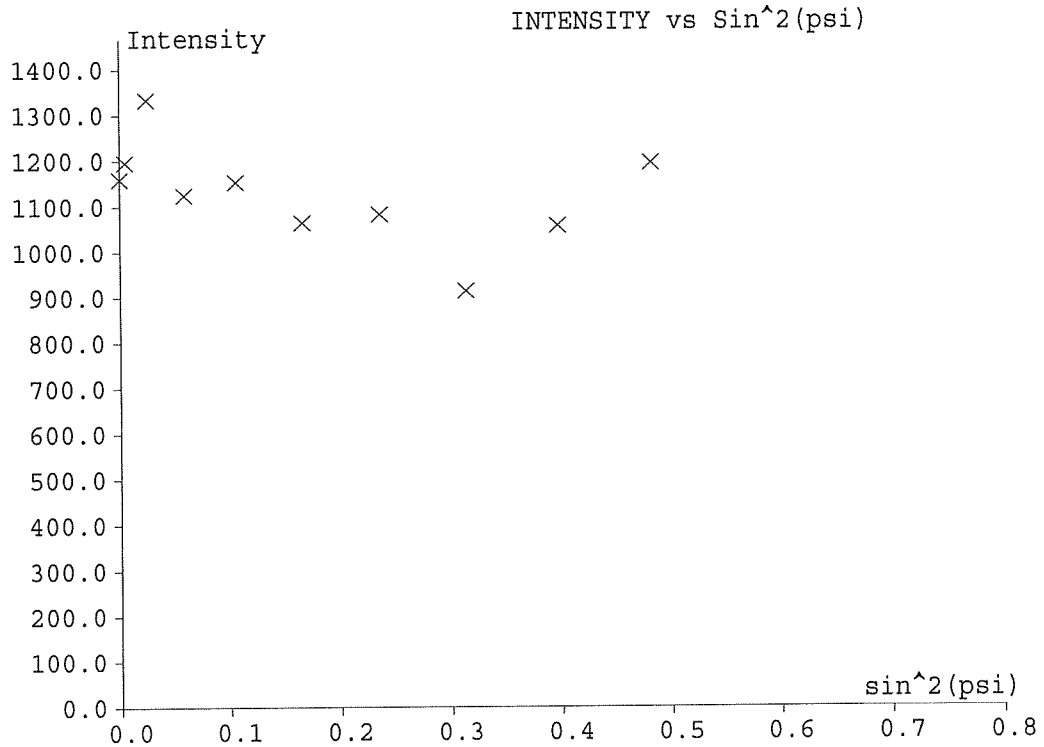



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18416.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 5 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   3:48pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00021   157.52   1159.3   3.07  0.26504    161.67  0.780237  0.000019
  5.0  0.00516   158.71   1195.9   2.76  0.26038    161.76  0.780146  0.000022
 10.0  0.02488   160.19   1333.0   2.95  0.26535    161.85  0.780044  0.000025
 15.0  0.05901   160.70   1124.1   3.05  0.26727    161.88  0.780010  0.000023
 20.0  0.10616   162.12   1153.5   3.38  0.27290    161.97  0.779915  0.000047
 25.0  0.16610   160.97   1063.6   3.15  0.26912    161.90  0.779993  0.000026
 30.0  0.23610   160.33   1082.0   3.18  0.26902    161.86  0.780038  0.000029
 35.0  0.31338   161.24    913.8   3.20  0.26999    161.92  0.779974  0.000026
 40.0  0.39670   161.27   1057.2   2.83  0.26365    161.92  0.779965  0.000021
 45.0  0.48178   163.86   1194.1   3.05  0.26984    162.09  0.779788  0.000022

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780107
Slope of Fitted Line...............:    -0.0005349
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -5.5 KSI     -37.7 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.1 MPa
Probable error.................(+/-):      1.7 KSI      11.6 MPa
```

File: S:\1005\2005\SBIR\50632\18416.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 5 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -5.5 KSI | -37.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.1 MPa |
| Probable error.....(+/-): | 1.7 KSI | 11.6 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18417.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 5 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time: 5/31/2005 3:55pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00025 | 159.85 | 1136.4 | 3.07 | 0.26697 | 161.83 | 0.780071 | 0.000025 |
| 5.0 | 0.00515 | 158.95 | 1213.7 | 2.79 | 0.26108 | 161.77 | 0.780129 | 0.000021 |
| 10.0 | 0.02517 | 158.55 | 1278.9 | 3.07 | 0.26584 | 161.74 | 0.780163 | 0.000026 |
| 15.0 | 0.05960 | 158.43 | 1041.5 | 2.85 | 0.26197 | 161.74 | 0.780167 | 0.000028 |
| 20.0 | 0.10697 | 159.79 | 998.5 | 3.40 | 0.27101 | 161.82 | 0.780080 | 0.000028 |
| 25.0 | 0.16566 | 162.06 | 915.2 | 3.44 | 0.27356 | 161.97 | 0.779920 | 0.000023 |
| 30.0 | 0.23598 | 160.56 | 1166.1 | 3.00 | 0.26641 | 161.87 | 0.780019 | 0.000023 |
| 35.0 | 0.31346 | 161.08 | 1023.2 | 3.11 | 0.26857 | 161.91 | 0.779984 | 0.000020 |
| 40.0 | 0.39773 | 159.35 | 1023.6 | 2.66 | 0.25772 | 161.80 | 0.780096 | 0.000023 |
| 45.0 | 0.48256 | 162.49 | 1172.7 | 3.03 | 0.26849 | 162.00 | 0.779883 | 0.000015 |

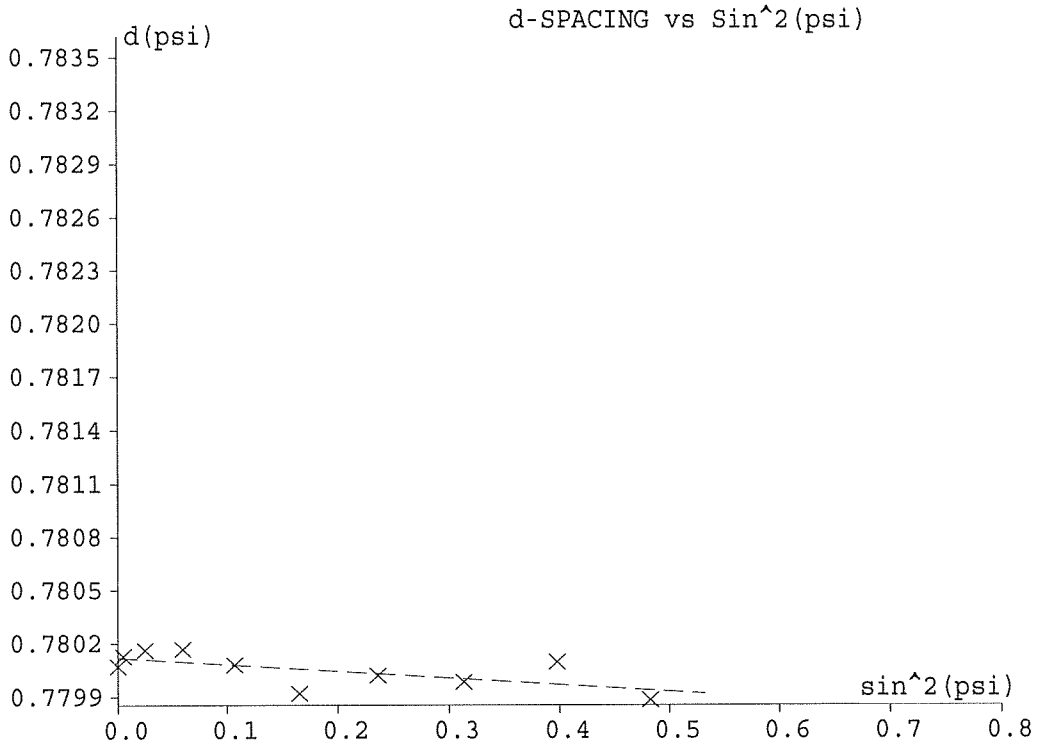
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780119
Slope of Fitted Line.....: -0.0003757
Material Stress Constant.....: 1.255E-07

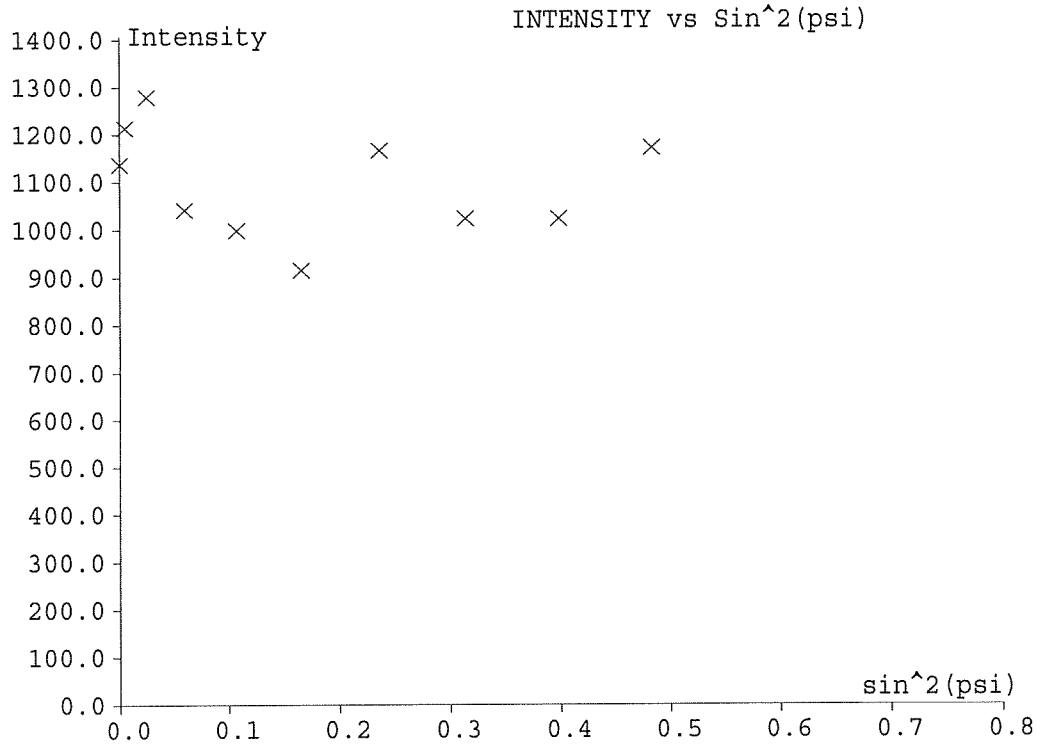
*Residual Stress.....: -3.8 KSI -26.5 MPa

Counting Statistics Stress Error (+/-): 0.4 KSI 2.9 MPa
Probable error.....(+/-): 1.5 KSI 10.6 MPa

File: S:\1005\2005\SBIR\50632\18417.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 5 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -3.8 KSI | -26.5 MPa |
| Counting Statistics Stress Error (+/-): | 0.4 KSI | 2.9 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.6 MPa |

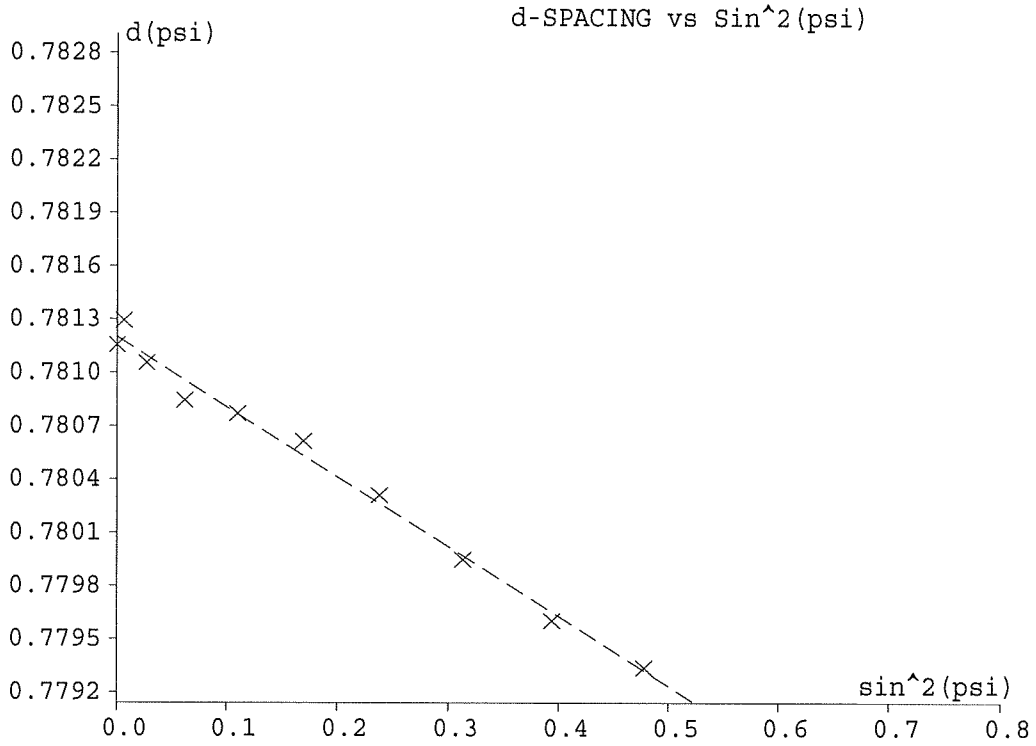


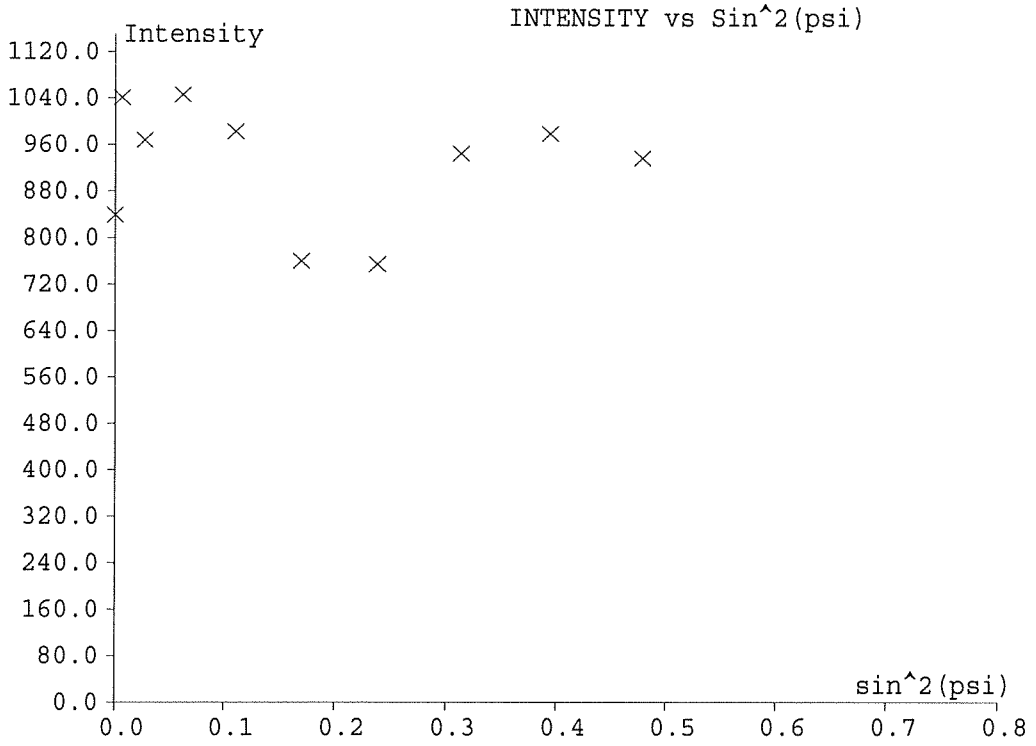



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18418.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 6 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   4:04pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00006   145.18    839.4   3.67  0.26051    160.86  0.781155  0.000040
  5.0  0.00652   143.32   1041.3   3.33  0.25586    160.74  0.781293  0.000029
 10.0  0.02740   146.47    967.7   3.38  0.25909    160.95  0.781054  0.000047
 15.0  0.06215   149.28   1045.9   3.60  0.26349    161.13  0.780845  0.000029
 20.0  0.11036   150.26    982.7   3.44  0.26299    161.19  0.780771  0.000034
 25.0  0.16978   152.42    760.5   3.92  0.26853    161.33  0.780616  0.000086
 30.0  0.23796   156.61    754.8   4.03  0.27264    161.61  0.780311  0.000095
 35.0  0.31318   161.65    945.2   3.40  0.27269    161.94  0.779948  0.000037
 40.0  0.39381   166.62    979.3   3.41  0.27735    162.26  0.779603  0.000035
 45.0  0.47807   170.61    937.3   3.89  0.28588    162.51  0.779337  0.000034

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781201
Slope of Fitted Line...............:     -0.003933
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -40.1 KSI    -276.6 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       5.2 MPa
Probable error.................(+/-):      1.4 KSI      10.0 MPa
Warning: Counting statistics may be the controlling error!
```

File: S:\1005\2005\SBIR\50632\18418.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 6 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -40.1 KSI | -276.6 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 5.2 MPa |
| Probable error.....(+/-): | 1.4 KSI | 10.0 MPa |



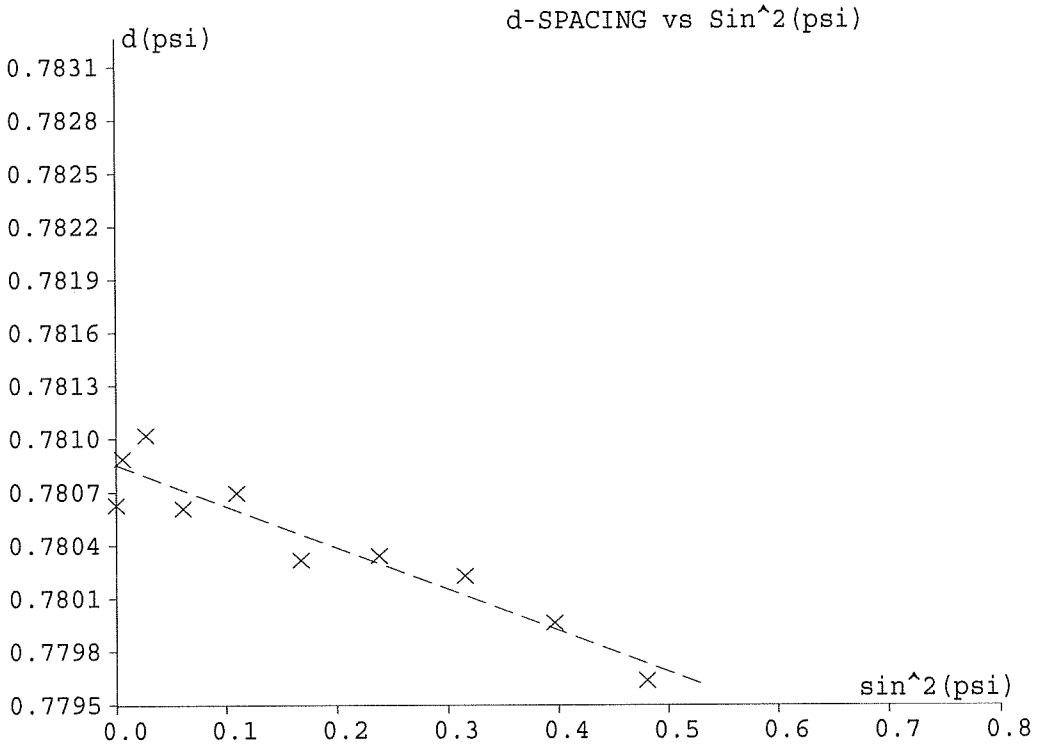
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18419.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 6 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   4:15pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227
```

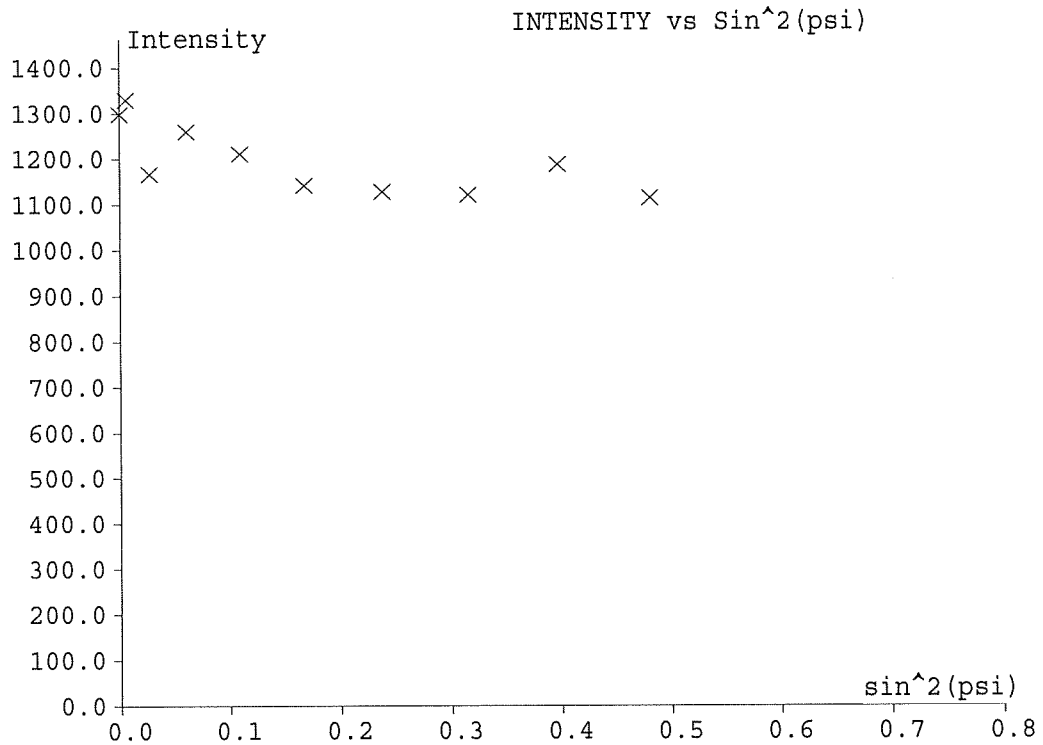
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00013 | 152.19 | 1298.1 | 3.33 | 0.26367 | 161.32 | 0.780628 | 0.000025 |
| 5.0 | 0.00603 | 148.73 | 1329.7 | 3.57 | 0.26273 | 161.09 | 0.780887 | 0.000030 |
| 10.0 | 0.02731 | 146.95 | 1166.1 | 3.46 | 0.26014 | 160.98 | 0.781019 | 0.000032 |
| 15.0 | 0.06126 | 152.47 | 1259.9 | 3.31 | 0.26369 | 161.34 | 0.780607 | 0.000025 |
| 20.0 | 0.10999 | 151.29 | 1210.8 | 3.42 | 0.26370 | 161.26 | 0.780695 | 0.000027 |
| 25.0 | 0.16802 | 156.50 | 1141.1 | 3.63 | 0.27011 | 161.60 | 0.780317 | 0.000036 |
| 30.0 | 0.23815 | 156.15 | 1127.5 | 3.43 | 0.26808 | 161.58 | 0.780340 | 0.000034 |
| 35.0 | 0.31526 | 157.66 | 1120.2 | 3.02 | 0.26445 | 161.68 | 0.780226 | 0.000022 |
| 40.0 | 0.39666 | 161.45 | 1186.9 | 3.31 | 0.27157 | 161.93 | 0.779961 | 0.000029 |
| 45.0 | 0.48053 | 166.18 | 1113.4 | 3.54 | 0.27870 | 162.23 | 0.779635 | 0.000036 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780852
Slope of Fitted Line...............:     -0.002335
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -23.8 KSI    -164.3 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       4.2 MPa
Probable error.................(+/-):      2.9 KSI      20.0 MPa
```

File: S:\1005\2005\SBIR\50632\18419.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 6 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -23.8 KSI | -164.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.2 MPa |
| Probable error.....(+/-): | 2.9 KSI | 20.0 MPa |

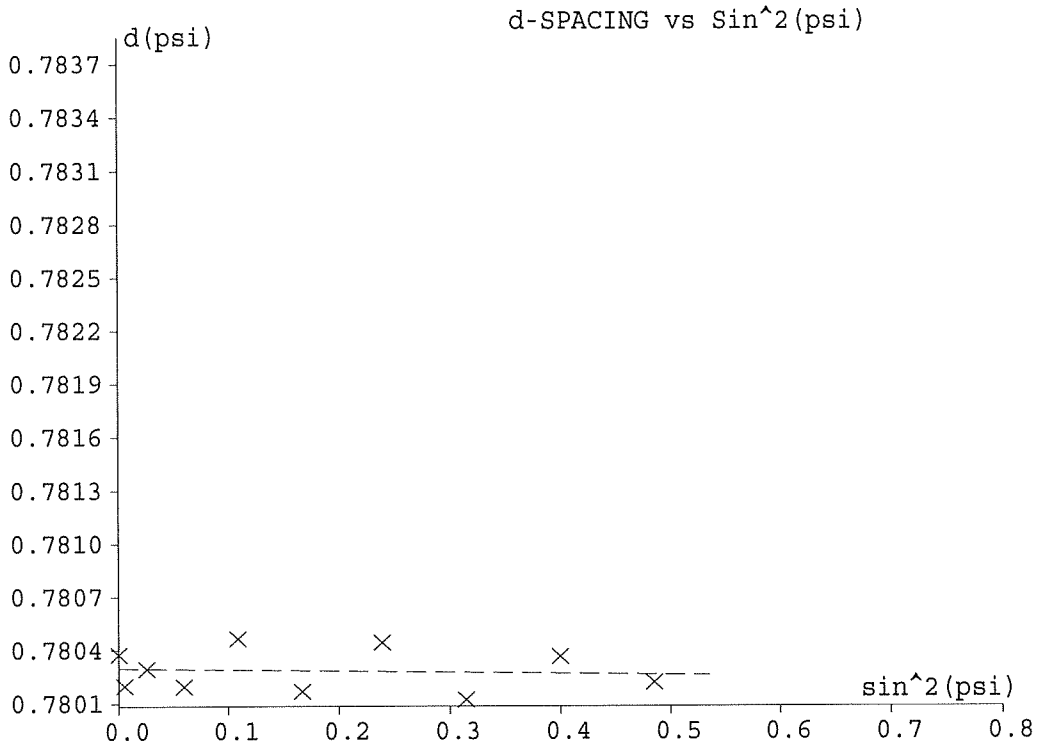


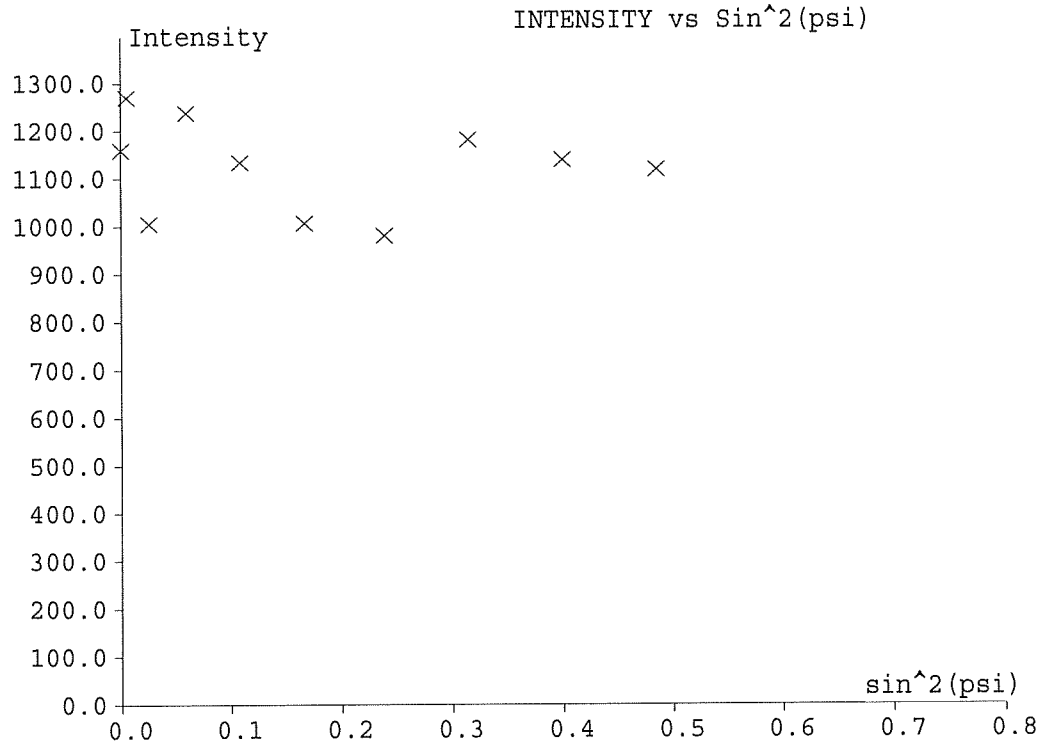



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18420.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 6 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   4:23pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00018   155.56   1158.9   2.90  0.26071    161.55  0.780376  0.000024
  5.0  0.00523   158.12   1269.5   3.50  0.27052    161.71  0.780199  0.000039
 10.0  0.02550   156.77   1005.3   3.31  0.26747    161.62  0.780294  0.000034
 15.0  0.05971   158.17   1237.3   3.40  0.26962    161.71  0.780194  0.000031
 20.0  0.10887   154.38   1133.8   3.20  0.26428    161.47  0.780466  0.000024
 25.0  0.16714   158.52   1006.7   3.20  0.26776    161.74  0.780167  0.000045
 30.0  0.23885   154.62    980.1   2.91  0.26014    161.49  0.780444  0.000035
 35.0  0.31447   159.13   1181.5   2.97  0.26484    161.78  0.780120  0.000025
 40.0  0.39981   155.74   1139.2   3.00  0.26265    161.56  0.780364  0.000022
 45.0  0.48524   157.82   1118.7   3.29  0.26821    161.69  0.780218  0.000021

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780297
Slope of Fitted Line...............:    -7.035E-05
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -0.7 KSI      -5.0 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.6 MPa
Probable error.................(+/-):      2.5 KSI      17.4 MPa
```

File: S:\1005\2005\SBIR\50632\18420.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 6 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -0.7 KSI | -5.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.6 MPa |
| Probable error.....(+/-): | 2.5 KSI | 17.4 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18421.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 7 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time: 5/31/2005 4:32pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00008 | 147.33 | 960.2 | 3.14 | 0.25747 | 161.00 | 0.780986 | 0.000031 |
| 5.0 | 0.00636 | 145.00 | 861.7 | 3.05 | 0.25446 | 160.85 | 0.781162 | 0.000028 |
| 10.0 | 0.02676 | 149.92 | 904.9 | 3.59 | 0.26395 | 161.17 | 0.780798 | 0.000041 |
| 15.0 | 0.06213 | 149.32 | 900.0 | 3.37 | 0.26153 | 161.13 | 0.780841 | 0.000029 |
| 20.0 | 0.11033 | 150.39 | 854.5 | 3.66 | 0.26492 | 161.20 | 0.780764 | 0.000049 |
| 25.0 | 0.17030 | 151.20 | 910.8 | 3.78 | 0.26667 | 161.25 | 0.780705 | 0.000033 |
| 30.0 | 0.23806 | 156.34 | 856.6 | 3.51 | 0.26905 | 161.59 | 0.780327 | 0.000046 |
| 35.0 | 0.31527 | 157.72 | 977.6 | 3.52 | 0.27033 | 161.68 | 0.780228 | 0.000029 |
| 40.0 | 0.39582 | 162.98 | 1102.8 | 3.36 | 0.27353 | 162.03 | 0.779854 | 0.000033 |
| 45.0 | 0.47938 | 168.18 | 953.9 | 3.27 | 0.27679 | 162.36 | 0.779495 | 0.000032 |

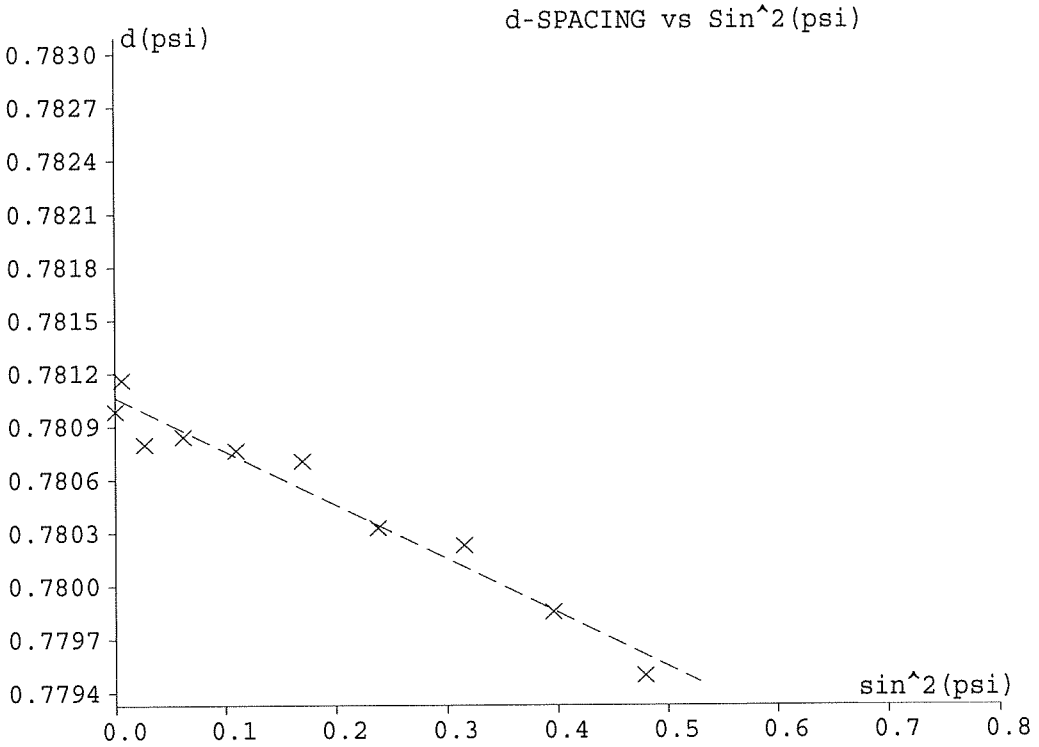
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.781063
Slope of Fitted Line.....: -0.003029
Material Stress Constant.....: 1.255E-07

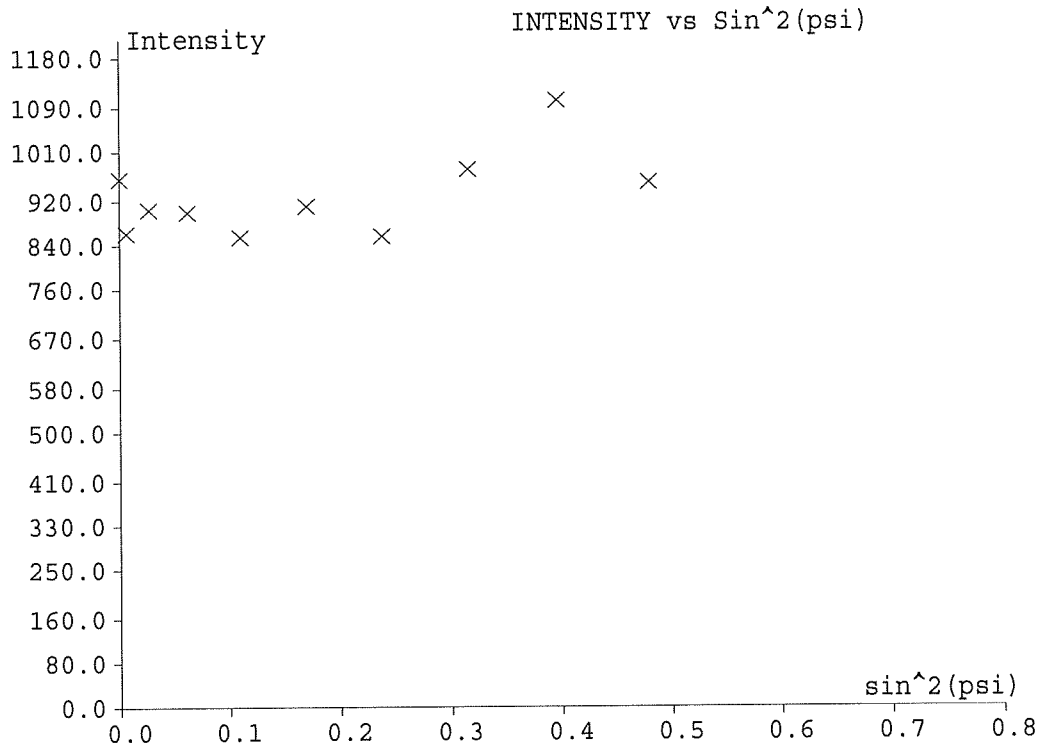
*Residual Stress.....: -30.9 KSI -213.1 MPa

Counting Statistics Stress Error (+/-): 0.6 KSI 4.5 MPa
Probable error.....(+/-): 2.3 KSI 16.0 MPa

File: S:\1005\2005\SBIR\50632\18421.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 7 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -30.9 KSI | -213.1 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.5 MPa |
| Probable error.....(+/-): | 2.3 KSI | 16.0 MPa |



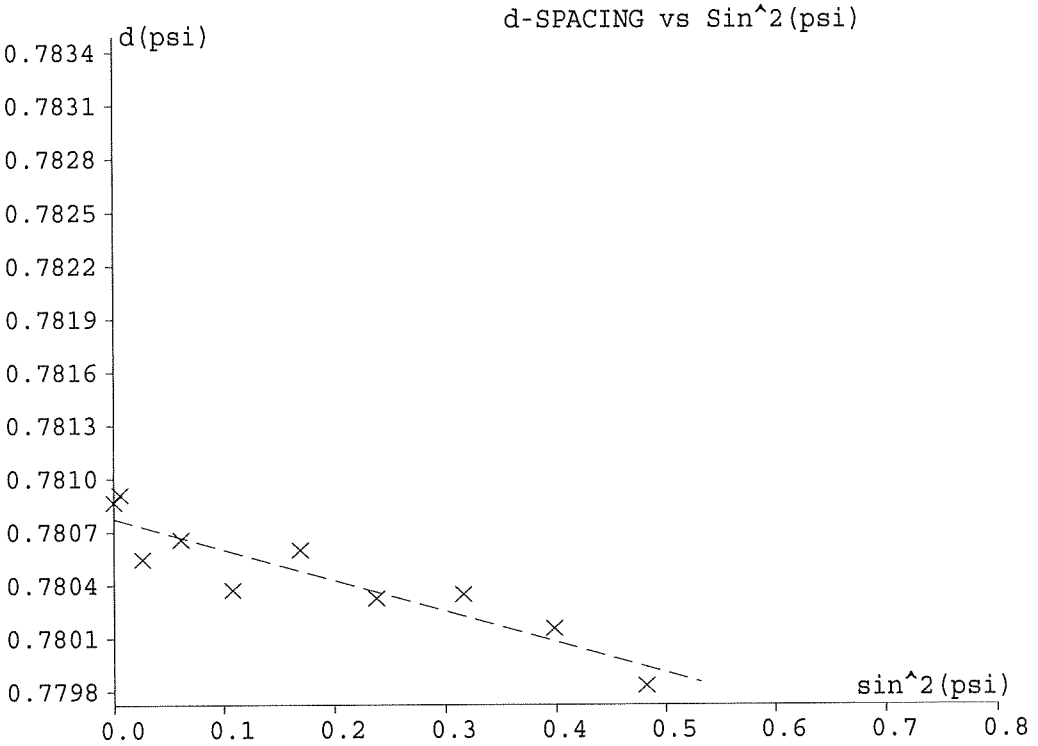
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18422.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 7 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   4:39pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227
```

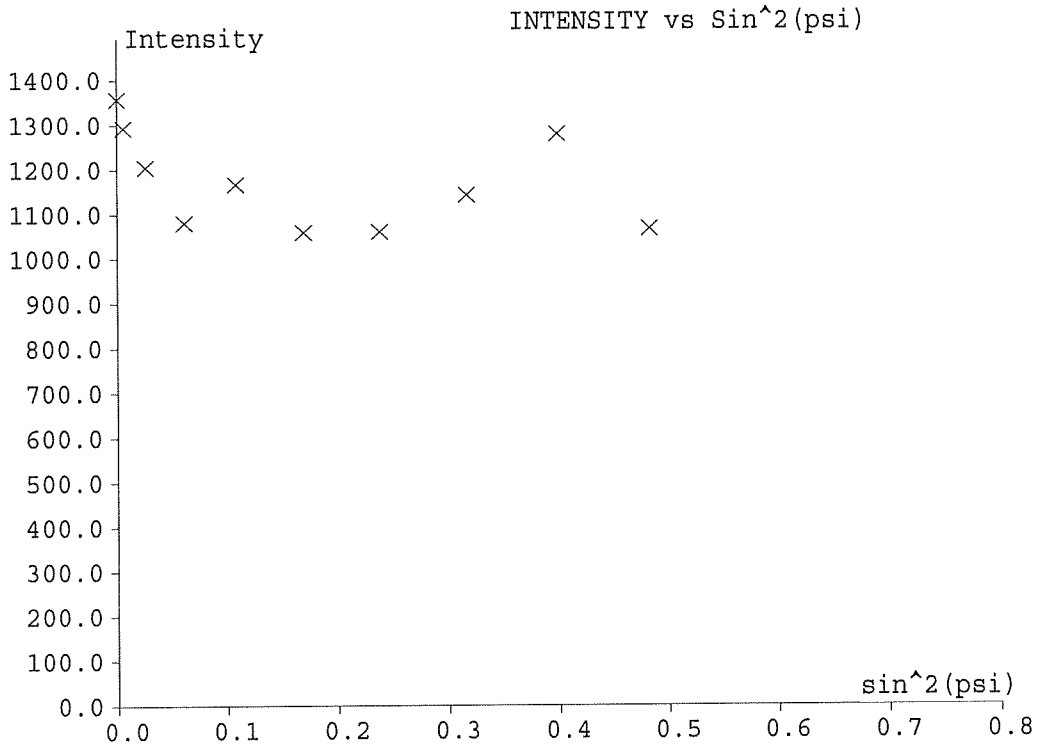
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00009 | 149.00 | 1357.3 | 3.53 | 0.26262 | 161.11 | 0.780866 | 0.000030 |
| 5.0 | 0.00606 | 148.42 | 1293.1 | 3.47 | 0.26155 | 161.07 | 0.780908 | 0.000032 |
| 10.0 | 0.02613 | 153.30 | 1204.7 | 3.35 | 0.26478 | 161.40 | 0.780546 | 0.000036 |
| 15.0 | 0.06144 | 151.73 | 1080.2 | 2.93 | 0.25833 | 161.30 | 0.780656 | 0.000022 |
| 20.0 | 0.10842 | 155.71 | 1166.9 | 3.60 | 0.26914 | 161.55 | 0.780373 | 0.000038 |
| 25.0 | 0.16969 | 152.57 | 1058.7 | 3.28 | 0.26352 | 161.35 | 0.780599 | 0.000030 |
| 30.0 | 0.23806 | 156.30 | 1060.1 | 3.17 | 0.26550 | 161.59 | 0.780326 | 0.000024 |
| 35.0 | 0.31616 | 156.03 | 1142.5 | 3.46 | 0.26828 | 161.57 | 0.780349 | 0.000036 |
| 40.0 | 0.39819 | 158.63 | 1279.6 | 2.97 | 0.26453 | 161.75 | 0.780156 | 0.000019 |
| 45.0 | 0.48215 | 163.24 | 1066.6 | 3.17 | 0.27118 | 162.05 | 0.779833 | 0.000030 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780774
Slope of Fitted Line...............:     -0.001731
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -17.7 KSI    -121.8 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       4.0 MPa
Probable error.................(+/-):      2.8 KSI      19.0 MPa
```

File: S:\1005\2005\SBIR\50632\18422.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 7 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -17.7 KSI | -121.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.0 MPa |
| Probable error.....(+/-): | 2.8 KSI | 19.0 MPa |

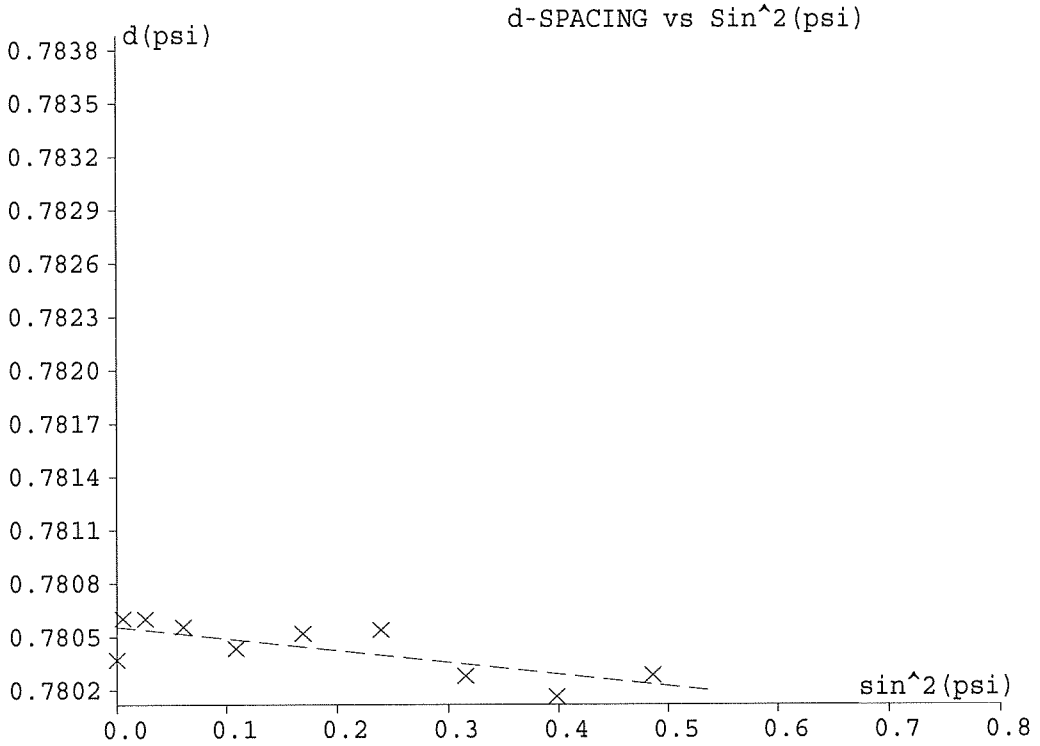


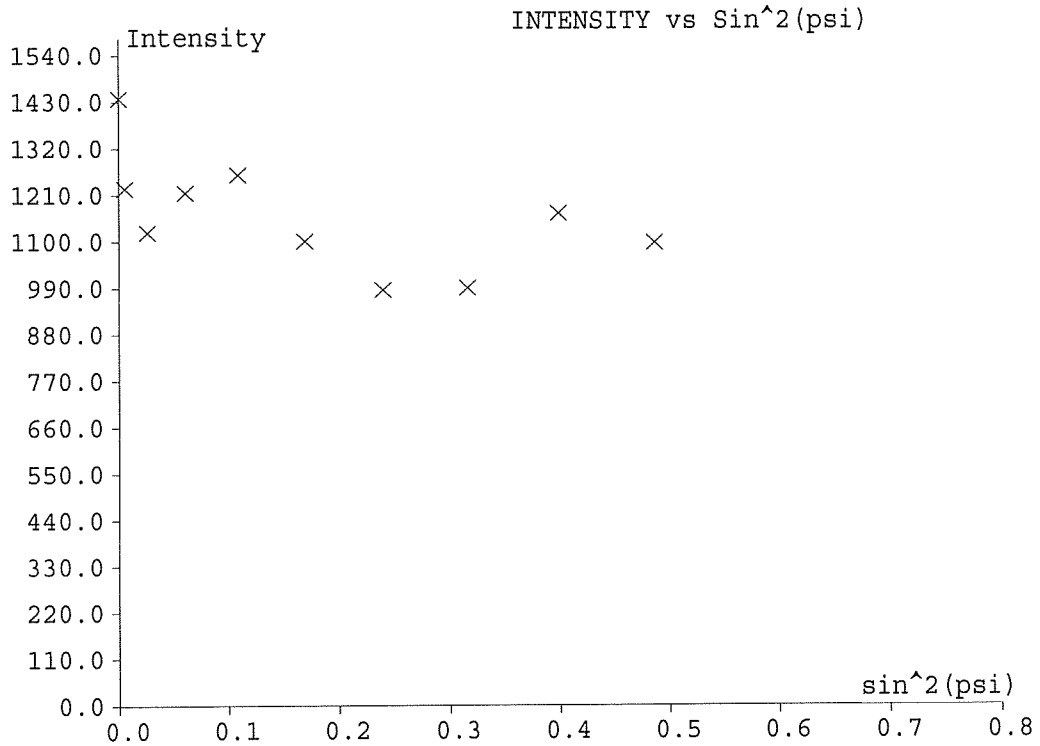



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18423.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 7 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   5/31/2005   4:52pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00018   155.70   1437.6   3.35  0.26690    161.55  0.780372  0.000029
  5.0  0.00570   152.50   1225.7   3.31  0.26373    161.34  0.780604  0.000032
 10.0  0.02627   152.53   1121.5   3.19  0.26257    161.35  0.780601  0.000024
 15.0  0.06107   153.09   1215.6   3.01  0.26051    161.38  0.780557  0.000025
 20.0  0.10872   154.84   1258.3   3.34  0.26610    161.50  0.780434  0.000025
 25.0  0.16922   153.64   1100.9   3.23  0.26394    161.42  0.780520  0.000024
 30.0  0.23949   153.33    985.0   3.02  0.26092    161.40  0.780540  0.000019
 35.0  0.31565   156.96    989.9   3.20  0.26642    161.64  0.780279  0.000031
 40.0  0.39825   158.56   1166.5   3.12  0.26664    161.74  0.780163  0.000024
 45.0  0.48577   156.86   1096.8   3.10  0.26487    161.63  0.780285  0.000029

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780556
Slope of Fitted Line...............:     -0.000667
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -6.8 KSI     -46.9 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.8 MPa
Probable error.................(+/-):      2.1 KSI      14.8 MPa
```

File: S:\1005\2005\SBIR\50632\18423.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 7 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -6.8 KSI | -46.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.8 MPa |
| Probable error.....(+/-): | 2.1 KSI | 14.8 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18424.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 8 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time: 5/31/2005 5:00pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00009 | 148.61 | 1056.9 | 3.23 | 0.25960 | 161.09 | 0.780892 | 0.000029 |
| 5.0 | 0.00609 | 148.00 | 1108.5 | 3.43 | 0.26087 | 161.05 | 0.780940 | 0.000032 |
| 10.0 | 0.02648 | 151.36 | 1024.8 | 3.33 | 0.26297 | 161.27 | 0.780688 | 0.000029 |
| 15.0 | 0.06220 | 149.02 | 918.6 | 3.14 | 0.25892 | 161.12 | 0.780860 | 0.000025 |
| 20.0 | 0.10827 | 156.10 | 885.4 | 3.36 | 0.26739 | 161.58 | 0.780343 | 0.000048 |
| 25.0 | 0.16882 | 154.60 | 1044.7 | 3.41 | 0.26648 | 161.48 | 0.780452 | 0.000029 |
| 30.0 | 0.23826 | 155.94 | 981.8 | 3.52 | 0.26876 | 161.57 | 0.780356 | 0.000038 |
| 35.0 | 0.31273 | 162.52 | 999.6 | 3.44 | 0.27400 | 162.00 | 0.779887 | 0.000033 |
| 40.0 | 0.39576 | 163.10 | 1109.3 | 3.49 | 0.27510 | 162.03 | 0.779847 | 0.000033 |
| 45.0 | 0.48014 | 166.84 | 999.3 | 3.35 | 0.27678 | 162.28 | 0.779587 | 0.000034 |

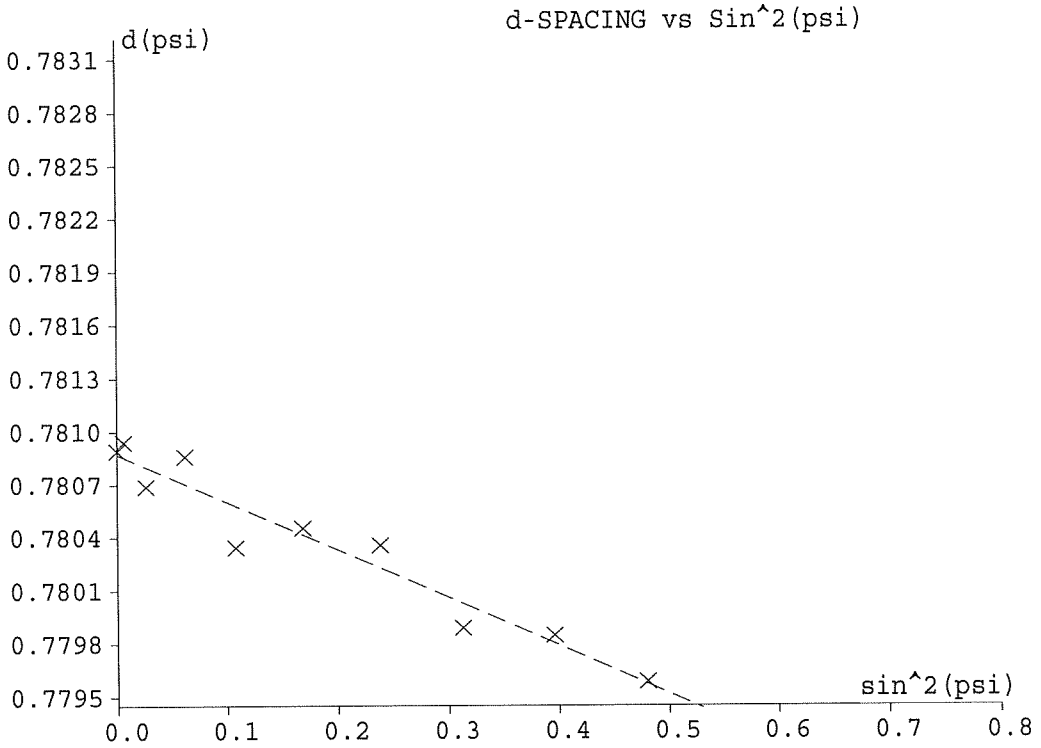
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780872
Slope of Fitted Line.....: -0.002704
Material Stress Constant.....: 1.255E-07

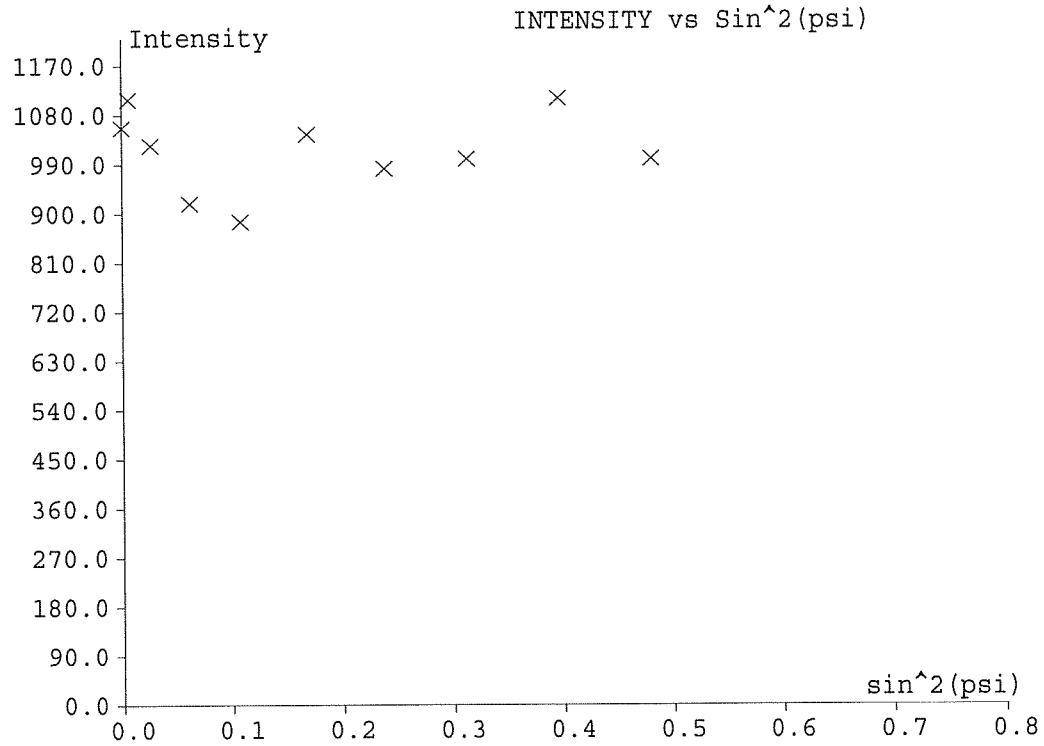
*Residual Stress.....: -27.6 KSI -190.2 MPa

Counting Statistics Stress Error (+/-): 0.6 KSI 4.5 MPa
Probable error.....(+/-): 2.6 KSI 18.1 MPa

File: S:\1005\2005\SBIR\50632\18424.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 8 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -27.6 KSI | -190.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.5 MPa |
| Probable error.....(+/-): | 2.6 KSI | 18.1 MPa |



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================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18425.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 8 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   9:27am

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00012   151.05   1444.1   3.32  0.26258    161.25  0.780711  0.000029
  5.0  0.00585   150.66   1451.4   3.10  0.25972    161.22  0.780738  0.000021
 10.0  0.02653   151.05   1187.3   3.00  0.25878    161.25  0.780707  0.000034
 15.0  0.06135   152.11   1253.7   3.17  0.26196    161.32  0.780632  0.000024
 20.0  0.10883   154.51    995.9   3.27  0.26508    161.48  0.780457  0.000027
 25.0  0.16913   153.86   1032.6   3.21  0.26387    161.43  0.780504  0.000030
 30.0  0.23777   156.91    955.6   3.27  0.26720    161.63  0.780284  0.000033
 35.0  0.31460   158.91   1186.9   3.07  0.26622    161.77  0.780137  0.000032
 40.0  0.39664   161.43   1197.1   3.05  0.26795    161.93  0.779959  0.000031
 45.0  0.48370   160.46   1129.0   2.96  0.26573    161.87  0.780025  0.000028

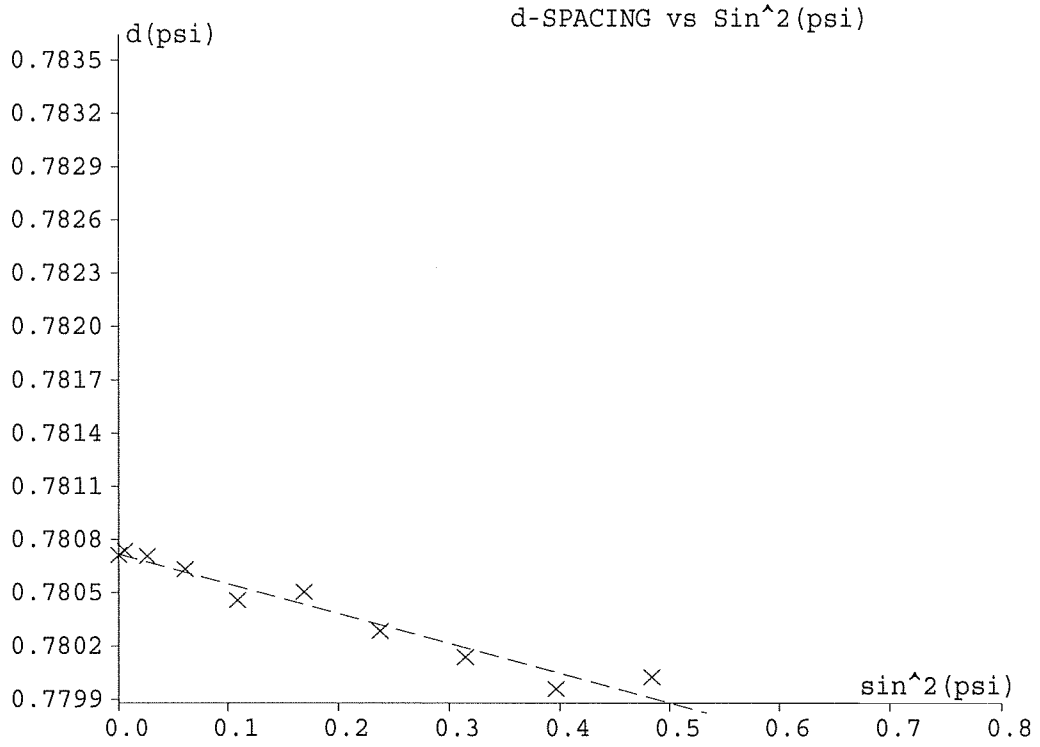
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780718
Slope of Fitted Line...............:     -0.001676
Material Stress Constant...........:     1.255E-07

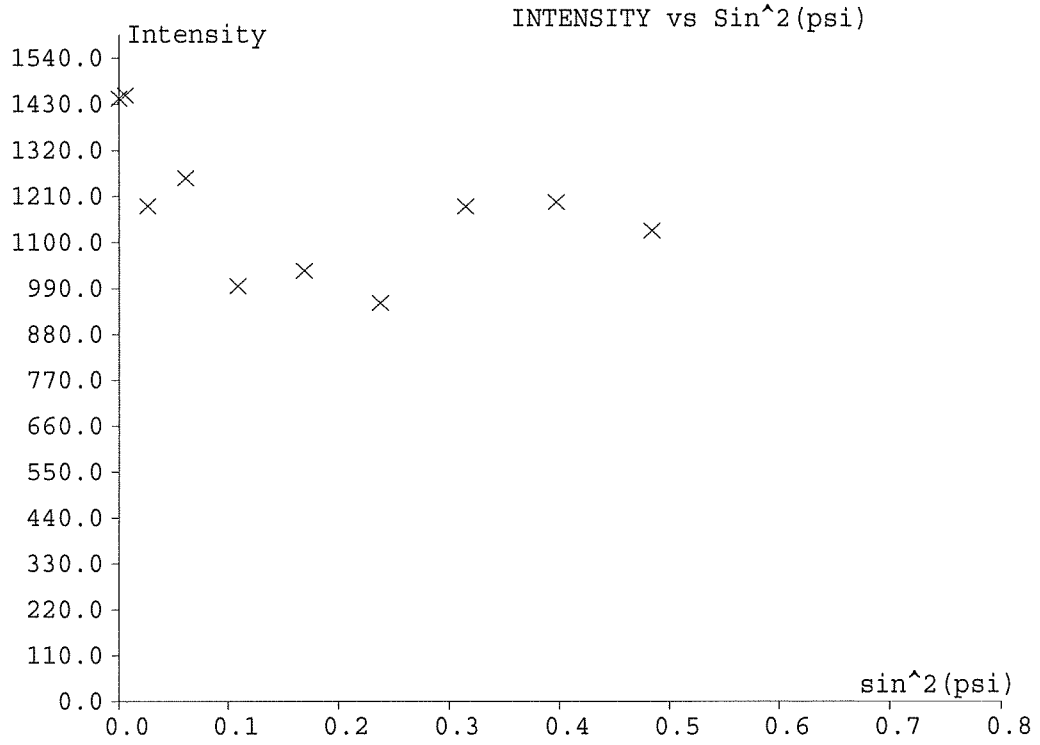
*Residual Stress...................:    -17.1 KSI    -118.0 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       3.9 MPa
Probable error.................(+/-):      1.4 KSI       9.7 MPa
```

File: S:\1005\2005\SBIR\50632\18425.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 8 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -17.1 KSI | -118.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 3.9 MPa |
| Probable error.....(+/-): | 1.4 KSI | 9.7 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18426.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 8 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time: 6/01/2005 10:32am

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00015 | 153.53 | 1261.0 | 2.75 | 0.25634 | 161.42 | 0.780520 | 0.000018 |
| 5.0 | 0.00558 | 153.77 | 1373.0 | 3.06 | 0.26180 | 161.43 | 0.780508 | 0.000025 |
| 10.0 | 0.02600 | 153.89 | 1424.4 | 2.84 | 0.25835 | 161.44 | 0.780495 | 0.000022 |
| 15.0 | 0.06093 | 153.57 | 1157.5 | 2.89 | 0.25897 | 161.42 | 0.780520 | 0.000024 |
| 20.0 | 0.10867 | 154.96 | 1084.9 | 3.27 | 0.26553 | 161.50 | 0.780425 | 0.000027 |
| 25.0 | 0.16872 | 154.82 | 1038.0 | 3.26 | 0.26530 | 161.50 | 0.780435 | 0.000029 |
| 30.0 | 0.23933 | 153.64 | 915.3 | 2.92 | 0.25952 | 161.42 | 0.780515 | 0.000021 |
| 35.0 | 0.31506 | 158.05 | 1160.1 | 3.14 | 0.26653 | 161.71 | 0.780200 | 0.000024 |
| 40.0 | 0.39936 | 156.60 | 1082.0 | 3.25 | 0.26677 | 161.61 | 0.780306 | 0.000023 |
| 45.0 | 0.48491 | 158.35 | 1229.9 | 3.02 | 0.26504 | 161.73 | 0.780176 | 0.000024 |

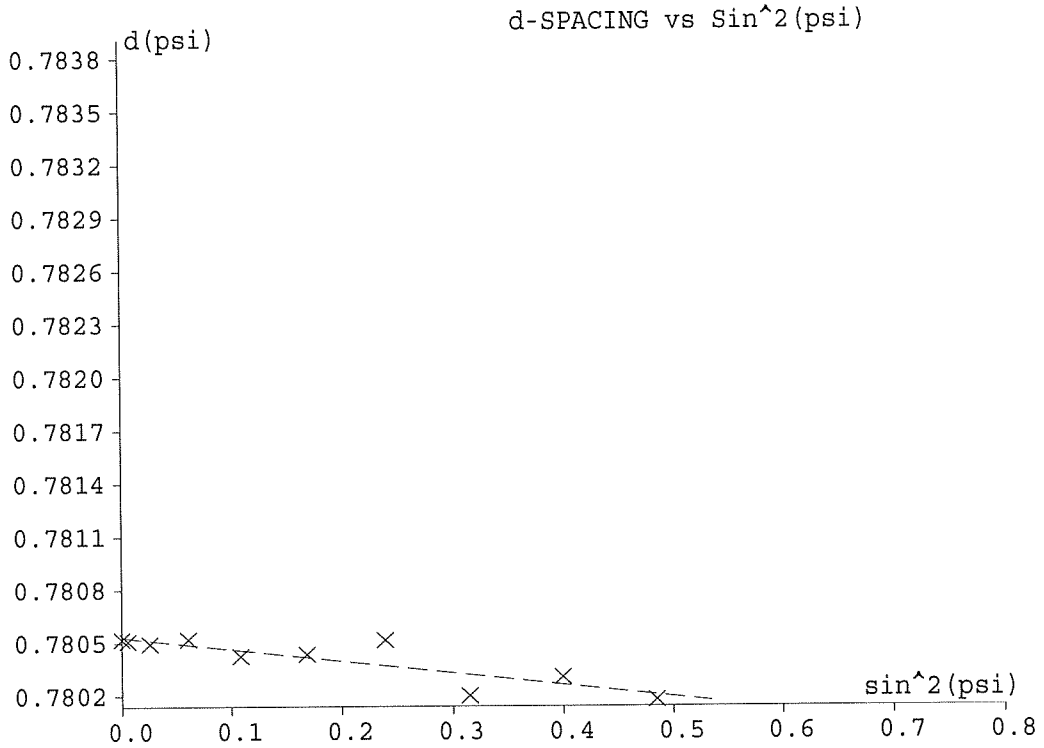
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780532
Slope of Fitted Line.....: -0.0006723
Material Stress Constant.....: 1.255E-07

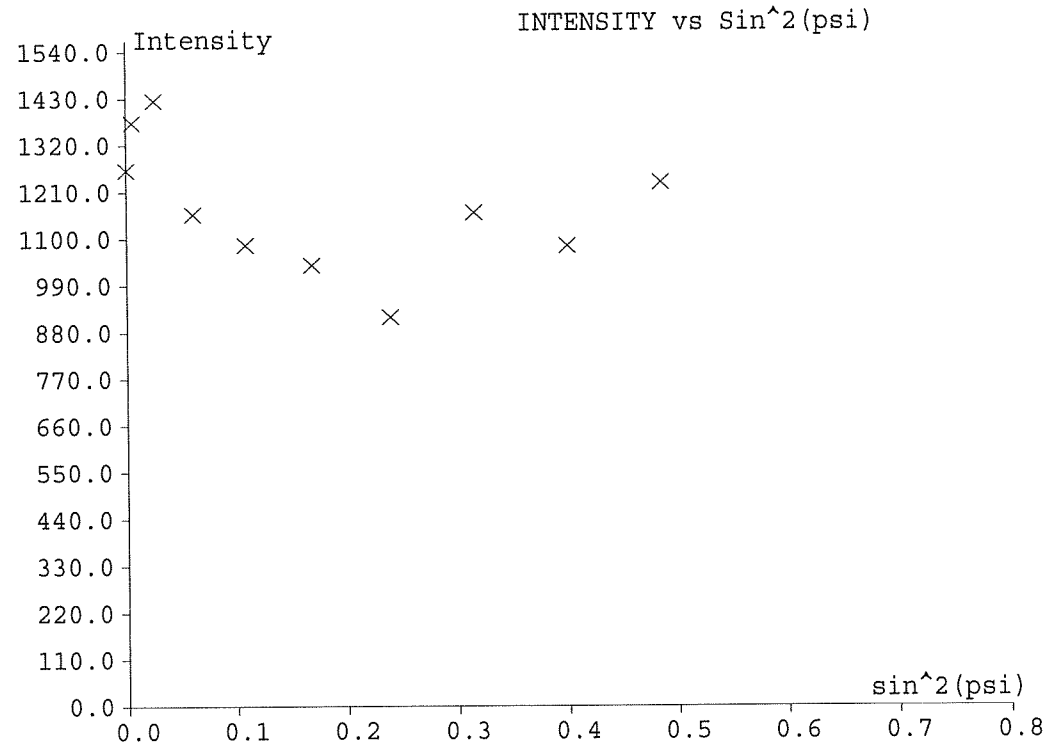
*Residual Stress.....: -6.9 KSI -47.3 MPa

Counting Statistics Stress Error (+/-): 0.5 KSI 3.1 MPa
Probable error.....(+/-): 1.4 KSI 9.7 MPa

File: S:\1005\2005\SBIR\50632\18426.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 8 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -6.9 KSI | -47.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.1 MPa |
| Probable error.....(+/-): | 1.4 KSI | 9.7 MPa |



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================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18427.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 9 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   10:41am

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00009   148.72   1018.3   3.27  0.26009    161.09  0.780884  0.000032
  5.0  0.00606   148.37    978.6   3.40  0.26090    161.07  0.780912  0.000032
 10.0  0.02682   149.46   1016.1   2.90  0.25587    161.15  0.780824  0.000024
 15.0  0.06184   150.38    899.9   3.45  0.26318    161.20  0.780762  0.000038
 20.0  0.10994   151.44    958.0   3.58  0.26527    161.27  0.780685  0.000039
 25.0  0.16864   155.06    921.6   3.65  0.26898    161.51  0.780421  0.000036
 30.0  0.23779   156.86    972.7   3.27  0.26713    161.63  0.780287  0.000029
 35.0  0.31202   163.91    864.0   3.59  0.27685    162.08  0.779792  0.000050
 40.0  0.39467   165.09   1218.5   3.52  0.27737    162.16  0.779710  0.000026
 45.0  0.47999   167.13   1038.2   3.48  0.27884    162.29  0.779569  0.000036

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780926
Slope of Fitted Line...............:     -0.003009
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -30.7 KSI    -211.7 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.6 MPa
Probable error.................(+/-):      1.8 KSI      12.2 MPa
```
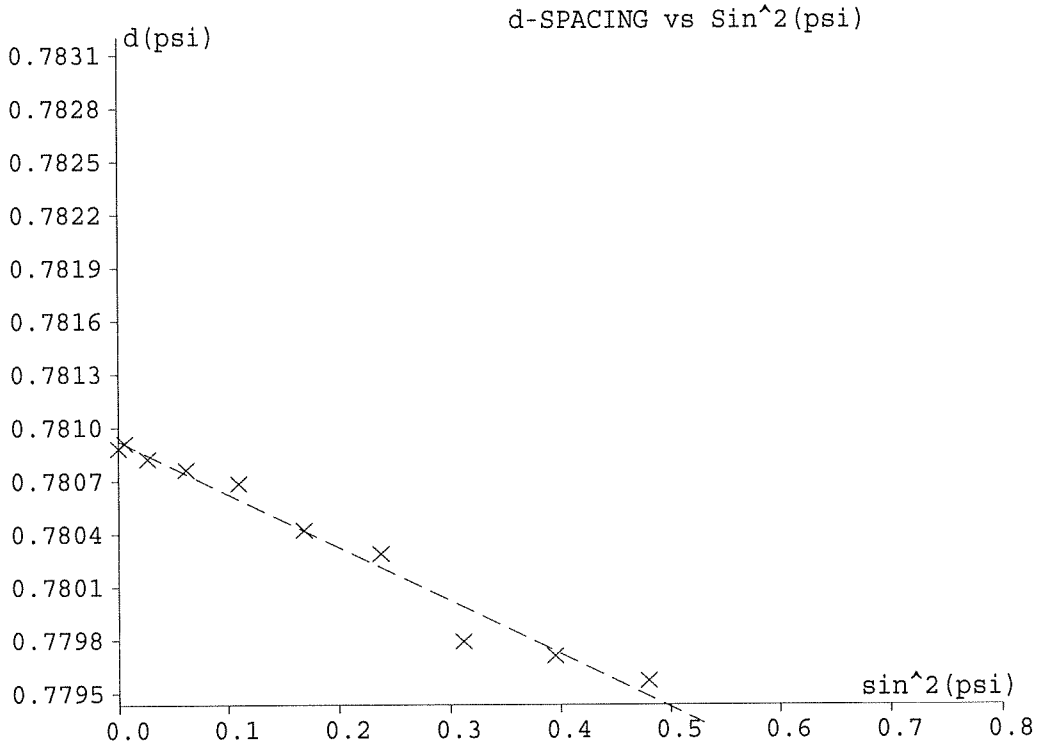
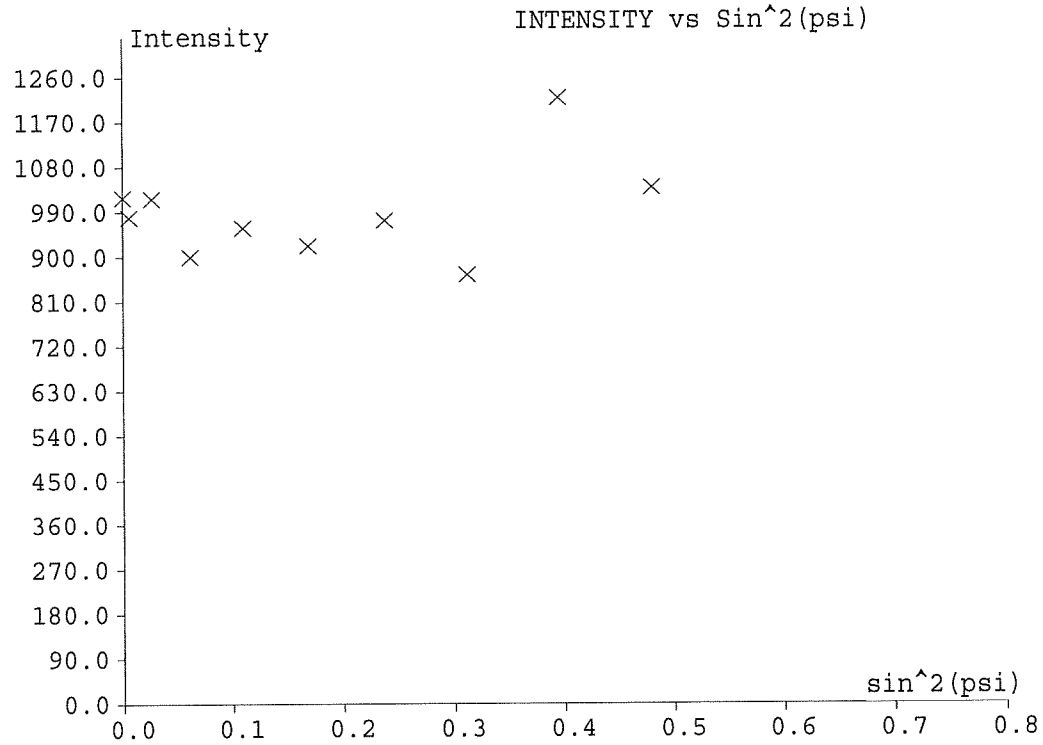

File: S:\1005\2005\SBIR\50632\18427.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 9 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -30.7 KSI | -211.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.6 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.2 MPa |

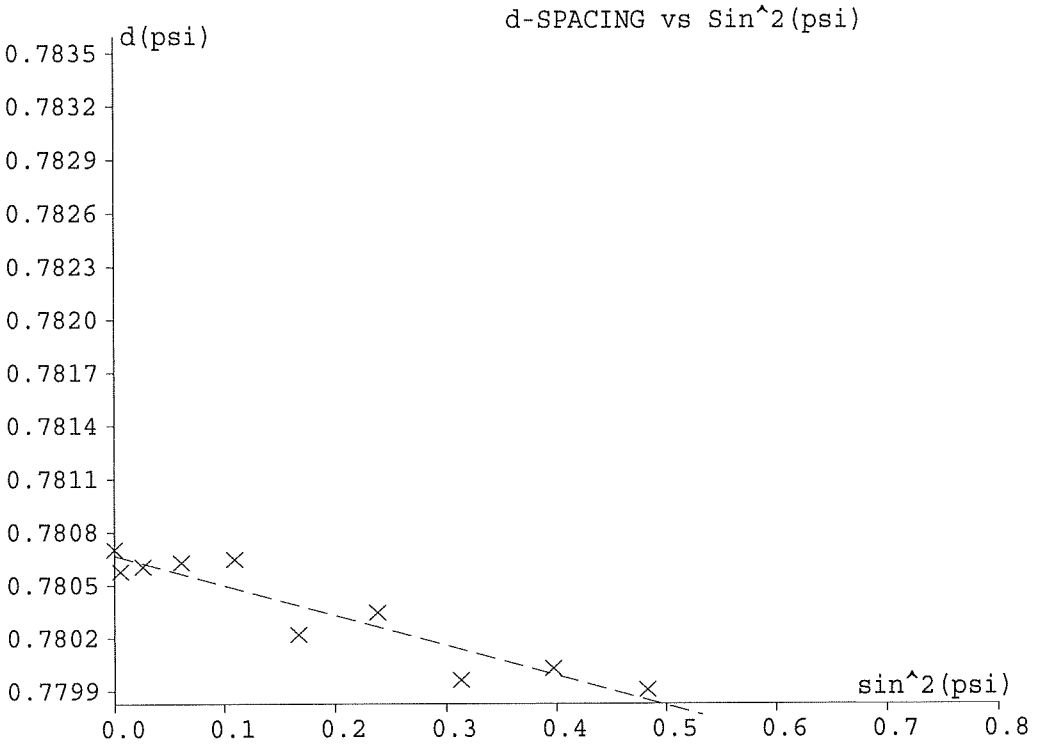


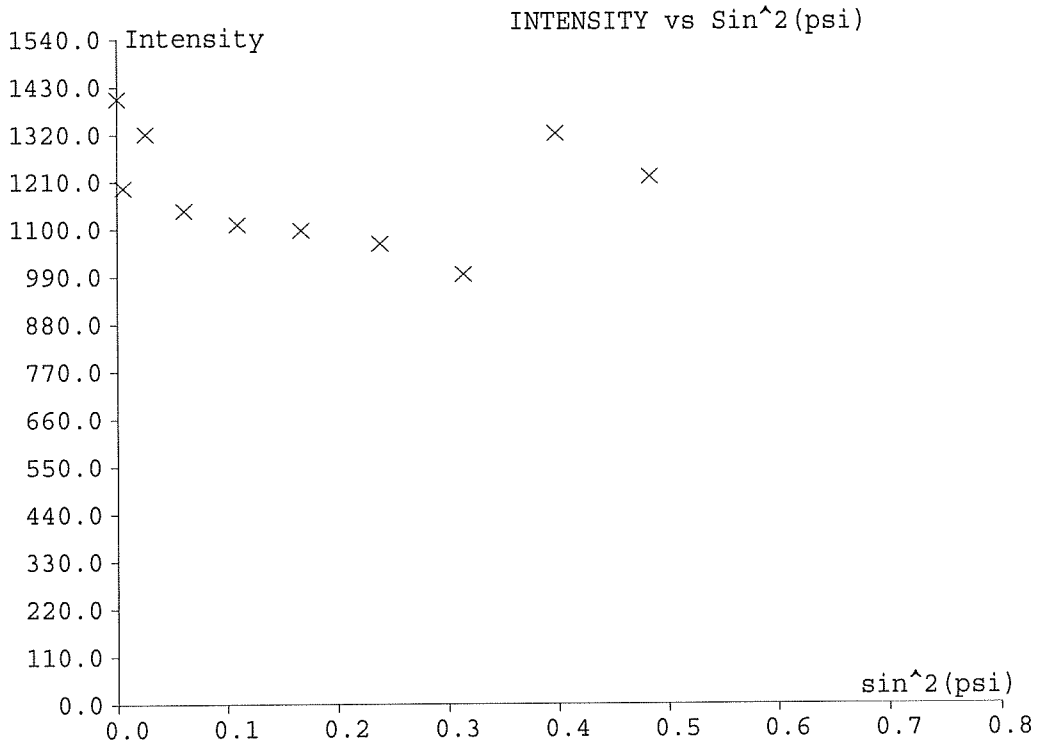



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\18428.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 9 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   11:01am

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00012   151.20   1402.5   3.46  0.26400    161.26  0.780702  0.000026
  5.0  0.00567   152.85   1195.4   3.19  0.26275    161.37  0.780578  0.000025
 10.0  0.02627   152.45   1321.4   2.99  0.25981    161.34  0.780604  0.000022
 15.0  0.06133   152.20   1142.9   3.44  0.26464    161.32  0.780628  0.000025
 20.0  0.10975   151.95   1111.4   3.40  0.26411    161.31  0.780646  0.000028
 25.0  0.16746   157.82   1097.9   3.49  0.27020    161.69  0.780221  0.000031
 30.0  0.23818   156.00   1067.1   2.93  0.26158    161.58  0.780344  0.000022
 35.0  0.31330   161.43    995.7   3.32  0.27160    161.93  0.779963  0.000031
 40.0  0.39720   160.37   1322.4   2.88  0.26409    161.86  0.780030  0.000018
 45.0  0.48276   162.20   1221.9   3.33  0.27243    161.98  0.779909  0.000023

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780667
Slope of Fitted Line...............:     -0.001692
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -17.3 KSI    -119.1 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.2 MPa
Probable error.................(+/-):      2.3 KSI      15.8 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\18428.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 9 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -17.3 KSI | -119.1 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.2 MPa |
| Probable error.....(+/-): | 2.3 KSI | 15.8 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18429.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 9 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time: 6/01/2005 11:12am

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00019 | 156.17 | 1303.6 | 3.15 | 0.26502 | 161.58 | 0.780335 | 0.000022 |
| 5.0 | 0.00534 | 156.79 | 1356.1 | 3.43 | 0.26865 | 161.62 | 0.780294 | 0.000027 |
| 10.0 | 0.02584 | 154.90 | 1338.9 | 3.37 | 0.26638 | 161.50 | 0.780430 | 0.000031 |
| 15.0 | 0.06016 | 156.36 | 1197.3 | 2.81 | 0.25950 | 161.60 | 0.780315 | 0.000023 |
| 20.0 | 0.10846 | 155.46 | 1064.2 | 2.88 | 0.26029 | 161.54 | 0.780382 | 0.000028 |
| 25.0 | 0.16643 | 160.21 | 1003.4 | 3.33 | 0.27069 | 161.85 | 0.780049 | 0.000059 |
| 30.0 | 0.23607 | 160.40 | 912.8 | 3.16 | 0.26868 | 161.86 | 0.780033 | 0.000038 |
| 35.0 | 0.31524 | 157.62 | 1126.2 | 2.76 | 0.25964 | 161.69 | 0.780224 | 0.000018 |
| 40.0 | 0.39719 | 160.36 | 1349.7 | 2.77 | 0.26171 | 161.87 | 0.780028 | 0.000021 |
| 45.0 | 0.48433 | 159.41 | 1239.8 | 3.19 | 0.26837 | 161.80 | 0.780104 | 0.000021 |

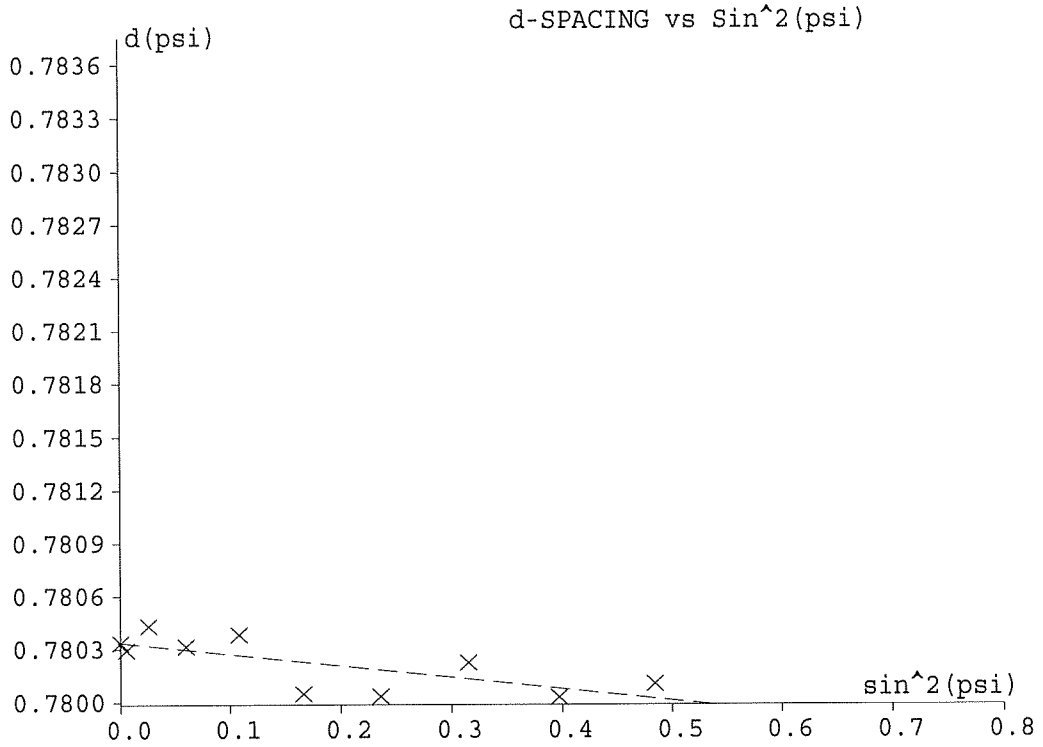
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780336
Slope of Fitted Line.....: -0.0006498
Material Stress Constant.....: 1.255E-07

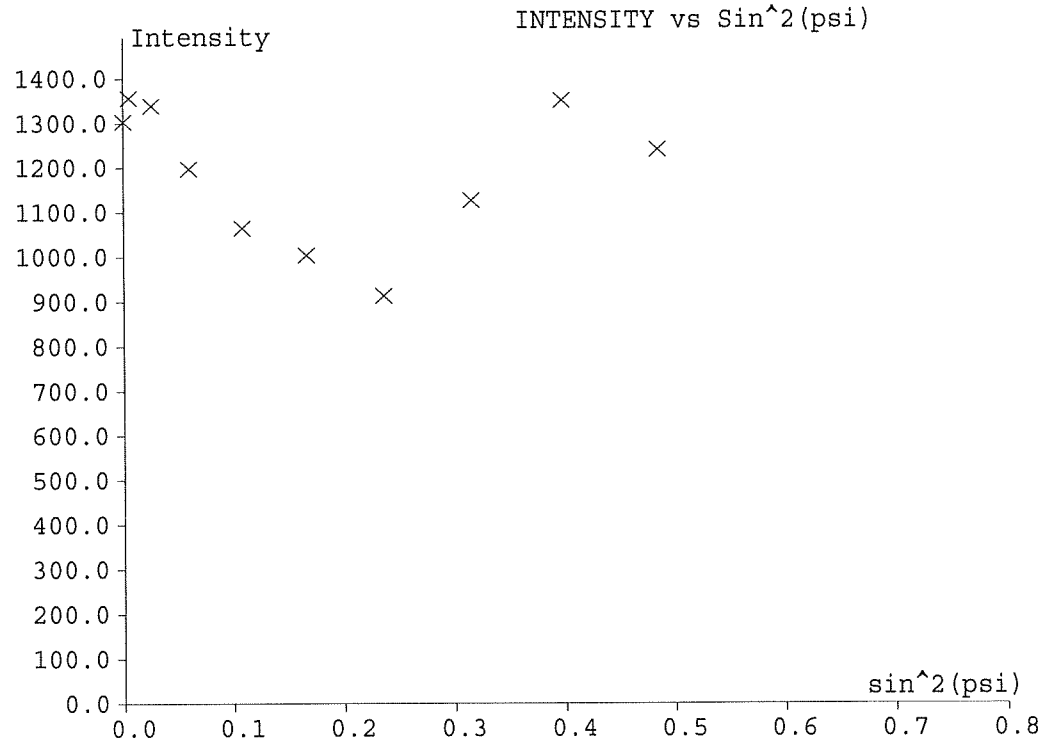
*Residual Stress.....: -6.6 KSI -45.7 MPa

Counting Statistics Stress Error (+/-): 0.5 KSI 3.2 MPa
Probable error.....(+/-): 2.2 KSI 15.2 MPa

File: S:\1005\2005\SBIR\50632\18429.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 9 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -6.6 KSI | -45.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.2 MPa |
| Probable error.....(+/-): | 2.2 KSI | 15.2 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18430.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 10 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time: 6/01/2005 11:36am

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00010 | 149.79 | 861.0 | 3.39 | 0.26205 | 161.16 | 0.780806 | 0.000071 |
| 5.0 | 0.00596 | 149.52 | 922.6 | 3.47 | 0.26260 | 161.15 | 0.780827 | 0.000048 |
| 10.0 | 0.02725 | 147.19 | 939.1 | 3.09 | 0.25674 | 161.00 | 0.780996 | 0.000026 |
| 15.0 | 0.06178 | 150.59 | 846.3 | 3.39 | 0.26280 | 161.22 | 0.780746 | 0.000061 |
| 20.0 | 0.10956 | 152.49 | 929.6 | 3.52 | 0.26567 | 161.34 | 0.780607 | 0.000032 |
| 25.0 | 0.16791 | 156.75 | 803.0 | 3.52 | 0.26948 | 161.62 | 0.780298 | 0.000049 |
| 30.0 | 0.23884 | 154.69 | 888.2 | 3.15 | 0.26382 | 161.49 | 0.780442 | 0.000039 |
| 35.0 | 0.31311 | 161.80 | 1007.1 | 3.41 | 0.27297 | 161.95 | 0.779938 | 0.000040 |
| 40.0 | 0.39467 | 165.02 | 980.5 | 3.17 | 0.27271 | 162.16 | 0.779710 | 0.000028 |
| 45.0 | 0.48035 | 166.45 | 1035.7 | 3.27 | 0.27543 | 162.25 | 0.779612 | 0.000034 |

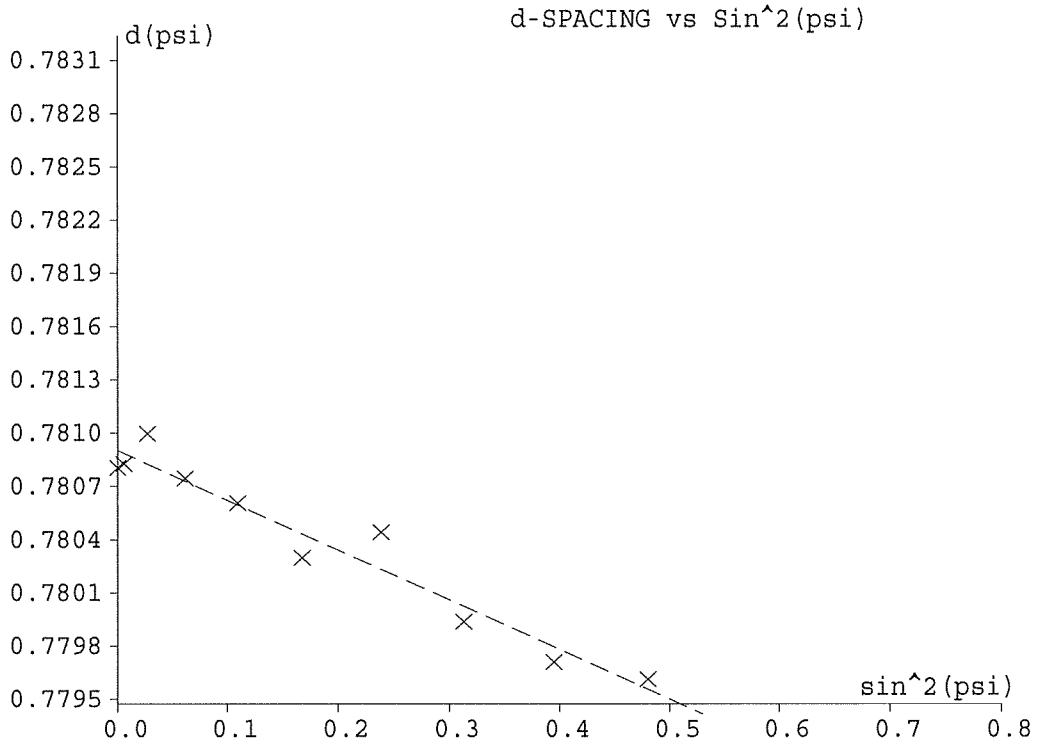
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780903
Slope of Fitted Line.....: -0.002805
Material Stress Constant.....: 1.255E-07

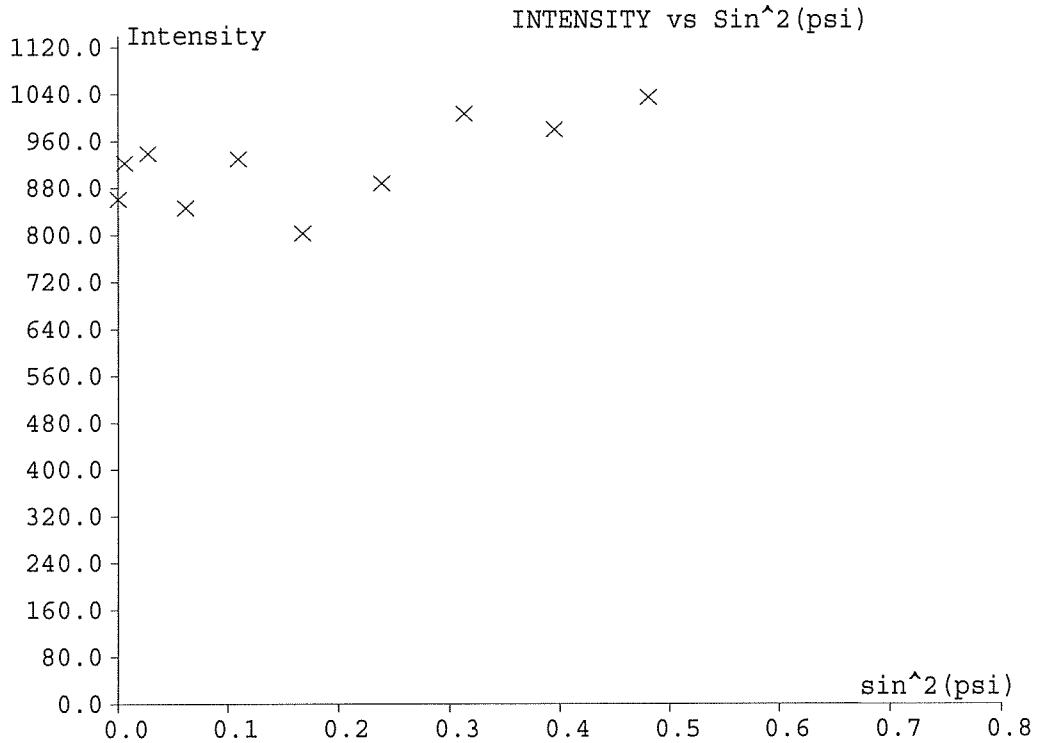
*Residual Stress.....: -28.6 KSI -197.3 MPa

Counting Statistics Stress Error (+/-): 0.9 KSI 5.9 MPa
Probable error.....(+/-): 2.5 KSI 17.0 MPa

File: S:\1005\2005\SBIR\50632\18430.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 10 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -28.6 KSI | -197.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 5.9 MPa |
| Probable error.....(+/-): | 2.5 KSI | 17.0 MPa |



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================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18431.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 10 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   11:44am

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00012   151.30   1098.9   2.99  0.25887    161.27  0.780688  0.000033
  5.0  0.00564   153.18   1265.0   3.34  0.26462    161.39  0.780555  0.000037
 10.0  0.02672   150.07   1397.2   3.15  0.25985    161.19  0.780782  0.000021
 15.0  0.06127   152.35   1080.9   2.97  0.25941    161.34  0.780611  0.000029
 20.0  0.10903   153.94   1145.5   3.18  0.26363    161.44  0.780498  0.000027
 25.0  0.16832   155.74   1245.3   3.13  0.26447    161.56  0.780366  0.000026
 30.0  0.23874   154.91   1147.1   3.25  0.26524    161.50  0.780428  0.000026
 35.0  0.31453   159.08   1007.5   3.23  0.26861    161.77  0.780128  0.000037
 40.0  0.39624   162.23    958.1   3.43  0.27362    161.98  0.779908  0.000034
 45.0  0.48319   161.41   1139.7   3.17  0.26976    161.93  0.779962  0.000035

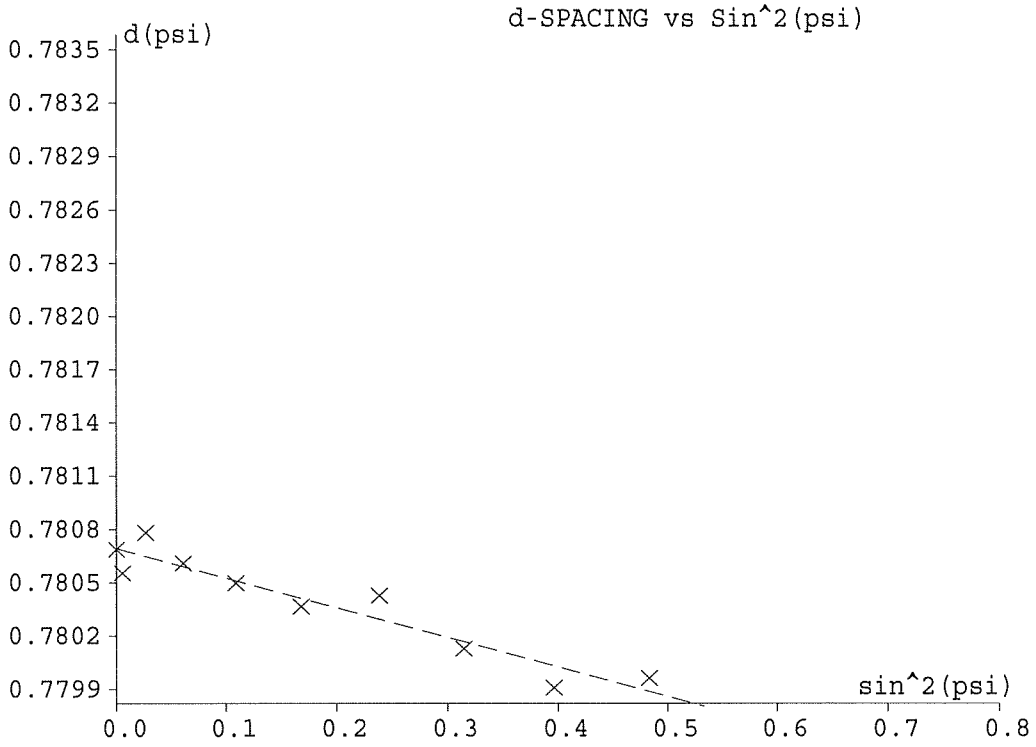
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780693
Slope of Fitted Line...............:     -0.001668
Material Stress Constant...........:     1.255E-07

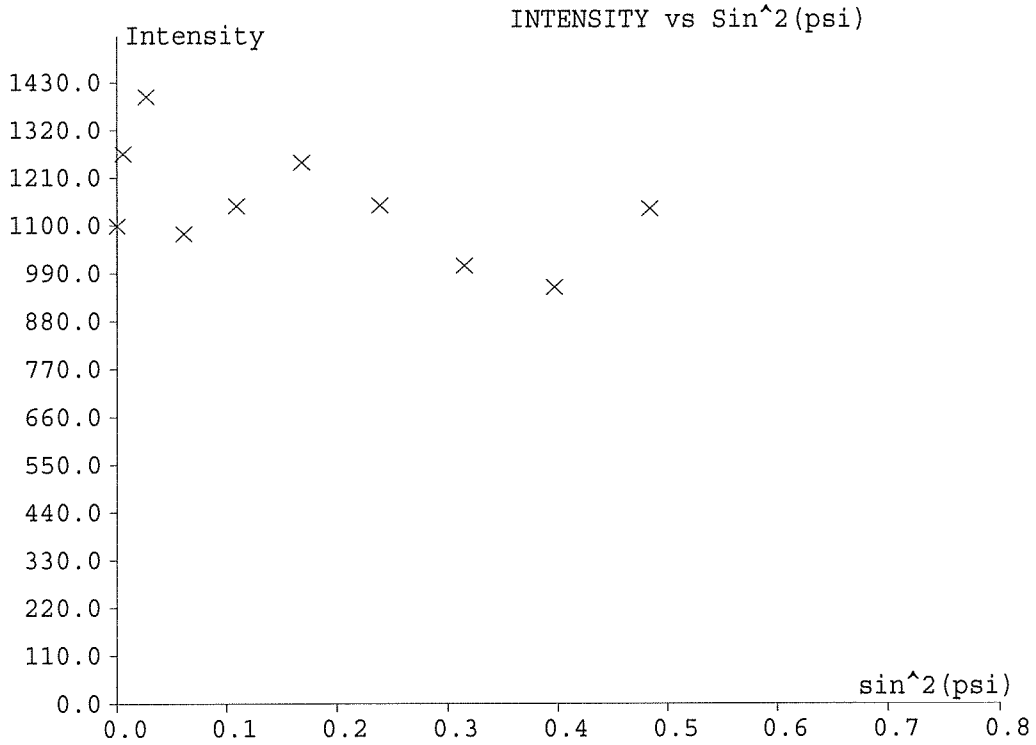
*Residual Stress...................:    -17.0 KSI    -117.4 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.6 MPa
Probable error.................(+/-):      1.9 KSI      13.4 MPa
```

File: S:\1005\2005\SBIR\50632\18431.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 10 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -17.0 KSI | -117.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.6 MPa |
| Probable error.....(+/-): | 1.9 KSI | 13.4 MPa |



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18432.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 10 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   11:55am

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00016   153.79   1276.9   3.07  0.26190    161.43  0.780507  0.000021
  5.0  0.00556   154.02   1173.3   3.12  0.26286    161.44  0.780491  0.000030
 10.0  0.02595   154.23   1256.0   3.02  0.26159    161.46  0.780474  0.000026
 15.0  0.06111   153.00   1056.5   3.25  0.26364    161.38  0.780568  0.000029
 20.0  0.10878   154.63   1132.6   3.06  0.26256    161.49  0.780446  0.000025
 25.0  0.16867   154.85   1136.6   2.87  0.25962    161.50  0.780426  0.000022
 30.0  0.23959   153.11   1062.8   2.93  0.25931    161.39  0.780554  0.000024
 35.0  0.31589   156.48   1213.9   3.14  0.26515    161.61  0.780313  0.000025
 40.0  0.40129   153.17   1028.9   3.32  0.26445    161.39  0.780556  0.000019
 45.0  0.48676   154.97   1088.6   2.61  0.25336    161.52  0.780411  0.000020

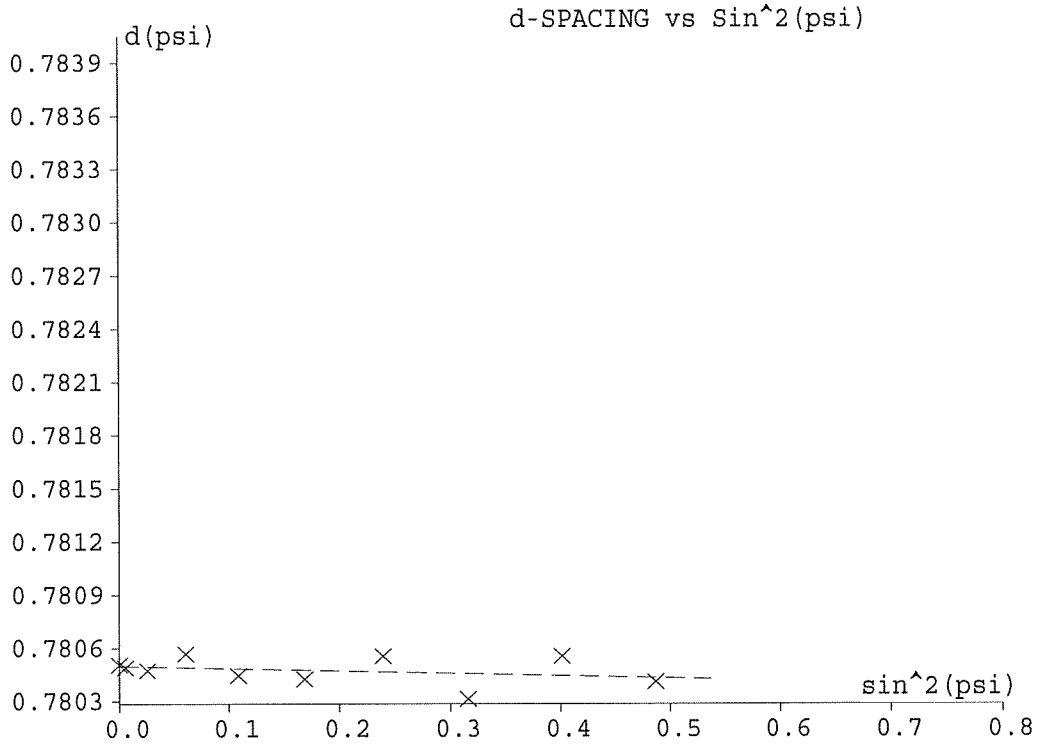
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780499
Slope of Fitted Line...............:    -0.0001327
Material Stress Constant...........:     1.255E-07

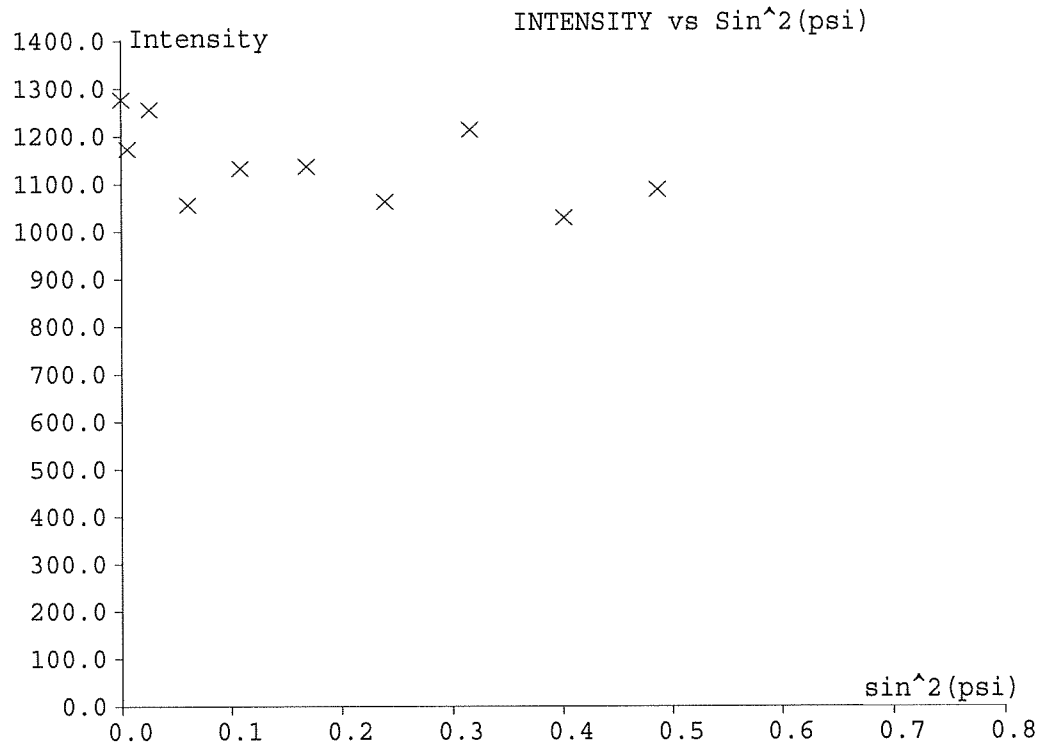
*Residual Stress...................:     -1.4 KSI      -9.3 MPa

Counting Statistics Stress Error (+/-):      0.4 KSI       3.1 MPa
Probable error.................(+/-):      1.6 KSI      10.9 MPa
```

File: S:\1005\2005\SBIR\50632\18432.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 10 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -1.4 KSI | -9.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.4 KSI | 3.1 MPa |
| Probable error.....(+/-): | 1.6 KSI | 10.9 MPa |



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18433.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 11 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   0:03pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00009   148.15   1117.1   3.07  0.25731    161.06  0.780924  0.000026
  5.0  0.00605   148.44    958.5   3.21  0.25930    161.08  0.780904  0.000036
 10.0  0.02690   149.07   1174.4   3.18  0.25940    161.12  0.780857  0.000028
 15.0  0.06185   150.26   1011.4   3.10  0.25949    161.20  0.780767  0.000029
 20.0  0.10923   153.41   1032.7   3.34  0.26477    161.40  0.780538  0.000038
 25.0  0.16867   154.95   1036.5   3.30  0.26577    161.50  0.780425  0.000039
 30.0  0.23832   155.80   1088.6   3.38  0.26732    161.56  0.780365  0.000057
 35.0  0.31478   158.65   1048.7   3.56  0.27145    161.74  0.780162  0.000059
 40.0  0.39536   163.82   1038.3   3.43  0.27504    162.08  0.779797  0.000052
 45.0  0.48019   166.75    944.2   3.37  0.27700    162.27  0.779594  0.000028

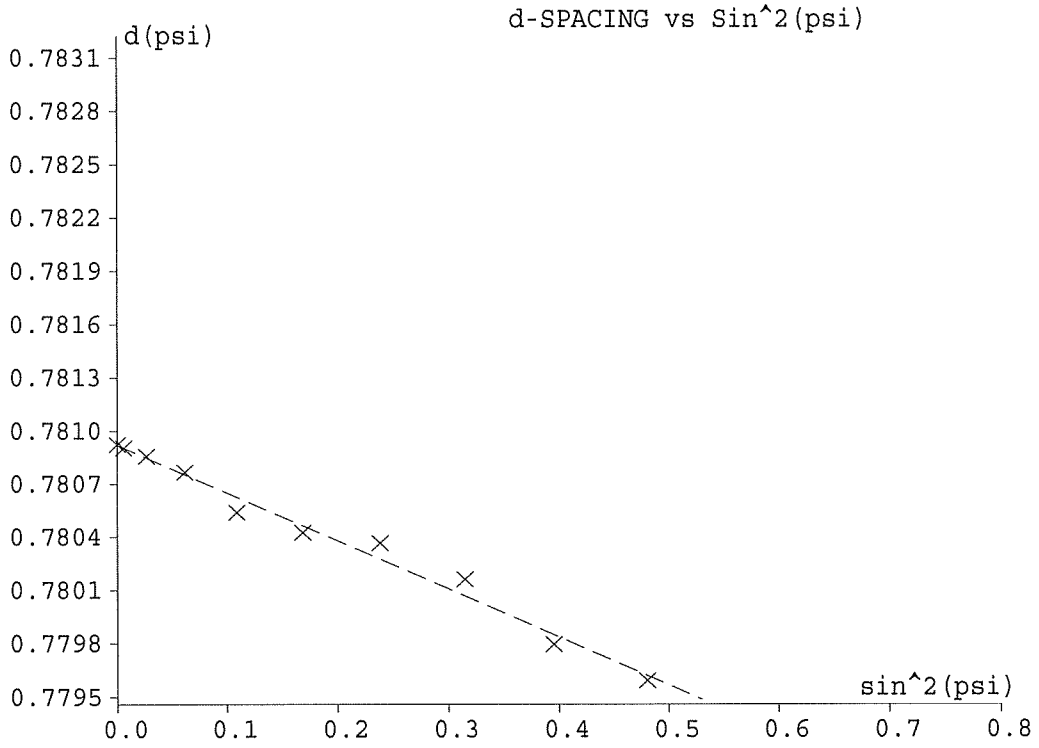
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780920
Slope of Fitted Line...............:     -0.002703
Material Stress Constant...........:     1.255E-07

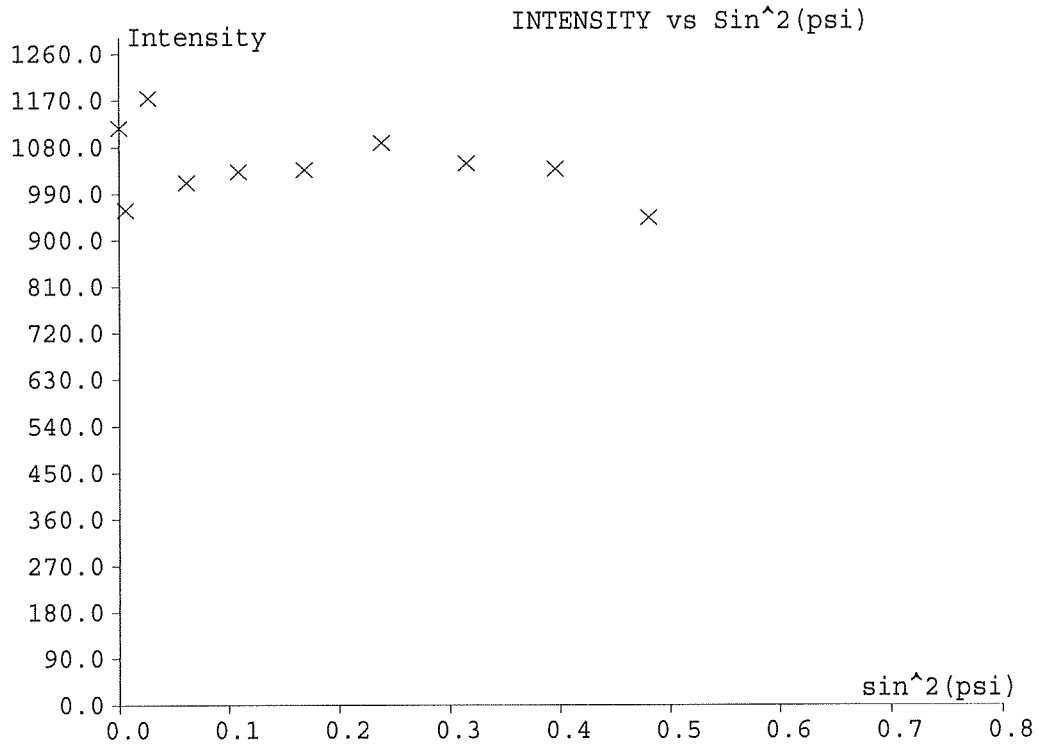
*Residual Stress...................:    -27.6 KSI    -190.2 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       5.2 MPa
Probable error.................(+/-):      1.2 KSI       8.4 MPa
Warning: Counting statistics may be the controlling error!
```

File: S:\1005\2005\SBIR\50632\18433.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 11 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -27.6 KSI | -190.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 5.2 MPa |
| Probable error.....(+/-): | 1.2 KSI | 8.4 MPa |



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18434.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 11 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   0:11pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00012   150.91   1420.7   3.35  0.26268    161.24  0.780722  0.000028
  5.0  0.00564   153.26   1248.0   3.61  0.26710    161.39  0.780552  0.000040
 10.0  0.02619   152.97   1618.6   3.20  0.26302    161.37  0.780569  0.000024
 15.0  0.06132   152.24   1303.0   3.43  0.26464    161.32  0.780625  0.000028
 20.0  0.10883   154.47   1076.0   3.08  0.26270    161.47  0.780458  0.000027
 25.0  0.16930   153.41   1209.6   2.93  0.25966    161.41  0.780533  0.000024
 30.0  0.23768   157.07   1242.5   3.13  0.26548    161.64  0.780270  0.000025
 35.0  0.31454   159.09   1225.2   3.45  0.27094    161.77  0.780129  0.000034
 40.0  0.39734   160.18   1322.6   3.08  0.26739    161.85  0.780048  0.000021
 45.0  0.48209   163.39   1152.3   3.41  0.27446    162.05  0.779826  0.000028

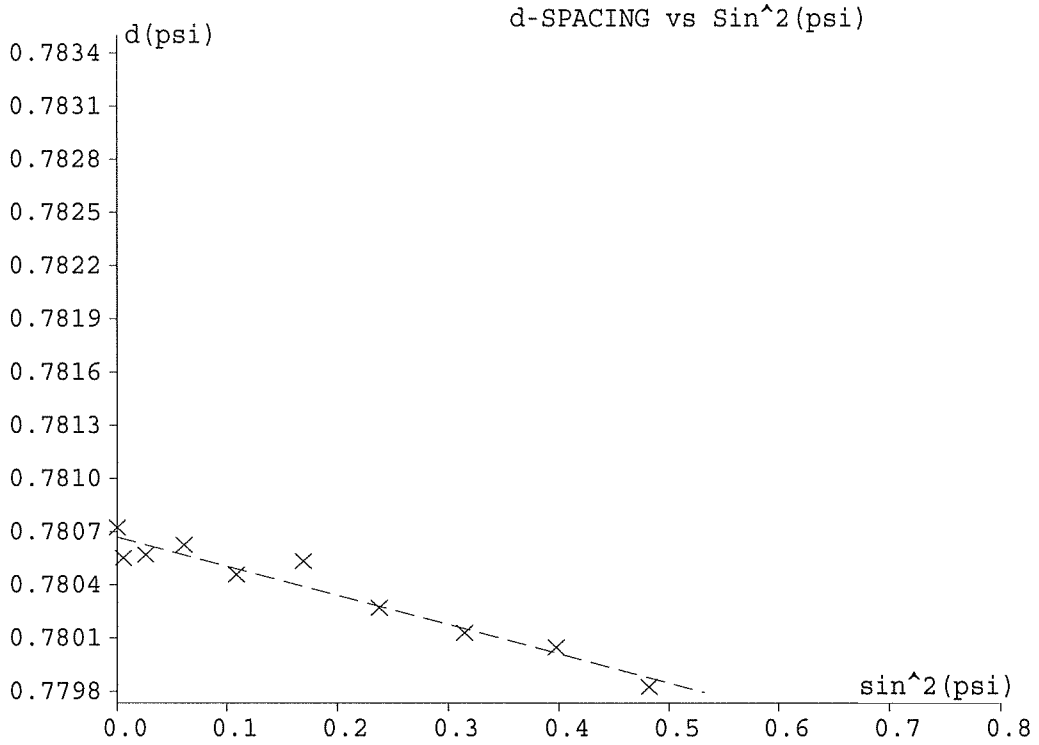
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780669
Slope of Fitted Line...............:     -0.001643
Material Stress Constant...........:     1.255E-07

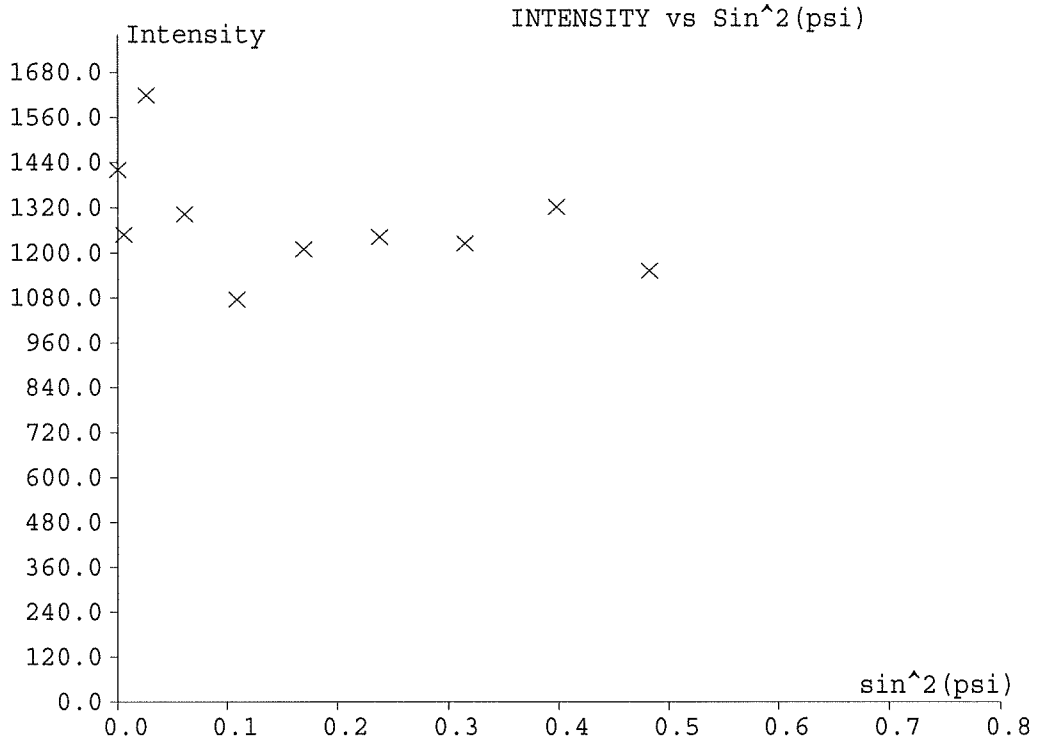
*Residual Stress...................:    -16.8 KSI    -115.6 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       3.9 MPa
Probable error.................(+/-):      1.5 KSI      10.4 MPa
```

File: S:\1005\2005\SBIR\50632\18434.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 11 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -16.8 KSI | -115.6 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 3.9 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.4 MPa |



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18435.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 11 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   0:27pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00021   157.45   1313.6   3.13  0.26585    161.67  0.780243  0.000029
  5.0  0.00511   159.58   1236.8   3.36  0.27047    161.80  0.780094  0.000028
 10.0  0.02543   157.15   1326.3   3.18  0.26626    161.65  0.780265  0.000032
 15.0  0.05973   158.12   1040.9   3.48  0.27033    161.71  0.780199  0.000039
 20.0  0.10787   157.15   1104.0   2.96  0.26312    161.65  0.780261  0.000020
 25.0  0.16861   154.95   1047.1   2.75  0.25742    161.51  0.780417  0.000022
 30.0  0.23688   158.68   1089.4   2.97  0.26455    161.75  0.780152  0.000031
 35.0  0.31409   159.88   1050.9   3.06  0.26684    161.83  0.780069  0.000028
 40.0  0.39796   159.02   1195.0   2.89  0.26312    161.78  0.780126  0.000019
 45.0  0.48311   161.56   1095.3   3.25  0.27093    161.94  0.779952  0.000042

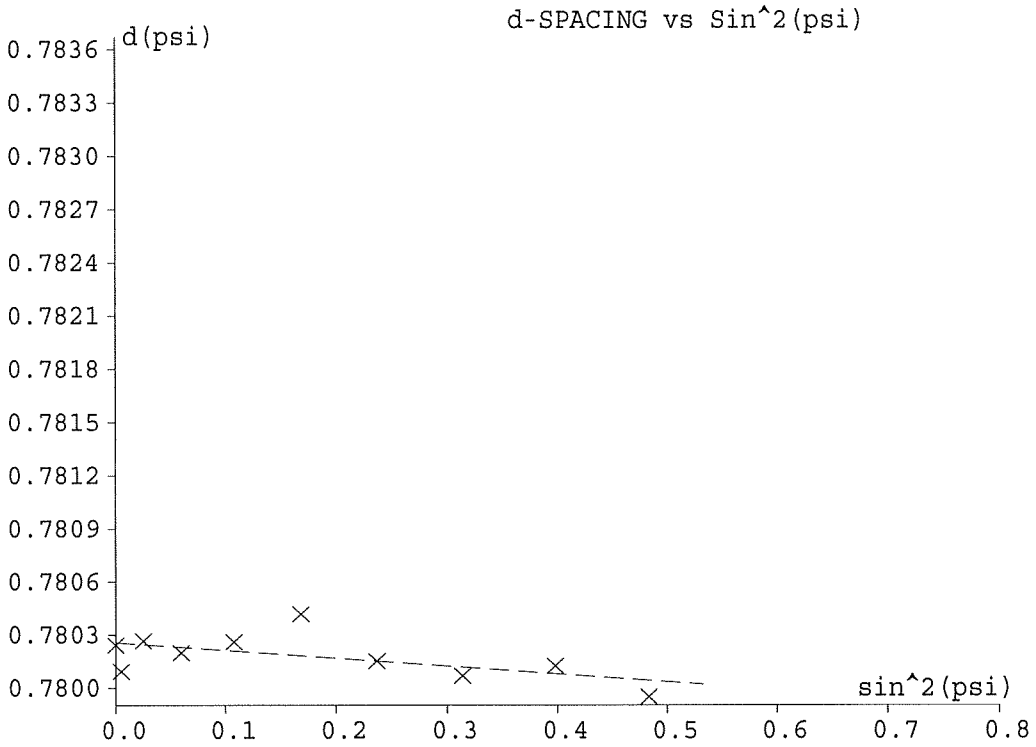
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780257
Slope of Fitted Line...............:    -0.0004407
Material Stress Constant...........:     1.255E-07

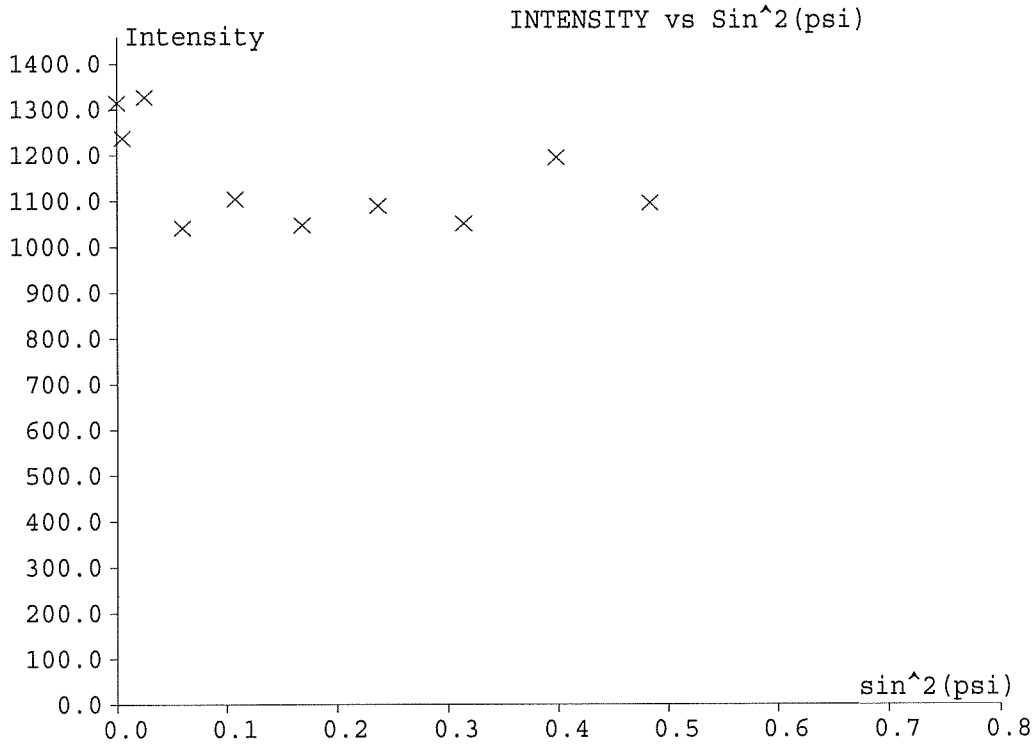
*Residual Stress...................:     -4.5 KSI     -31.0 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.5 MPa
Probable error.................(+/-):      2.2 KSI      15.1 MPa
```

File: S:\1005\2005\SBIR\50632\18435.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 11 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.5 KSI | -31.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.5 MPa |
| Probable error.....(+/-): | 2.2 KSI | 15.1 MPa |



================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File: S:\1005\2005\SBIR\50632\18436.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 12 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time: 6/01/2005 0:36pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00003 | 140.97 | 885.6 | 2.76 | 0.24712 | 160.59 | 0.781465 | 0.000029 |
| 5.0 | 0.00640 | 144.53 | 959.2 | 3.14 | 0.25512 | 160.82 | 0.781198 | 0.000033 |
| 10.0 | 0.02724 | 147.31 | 873.2 | 3.34 | 0.25948 | 161.00 | 0.780990 | 0.000046 |
| 15.0 | 0.06248 | 148.07 | 952.3 | 3.42 | 0.26085 | 161.05 | 0.780934 | 0.000046 |
| 20.0 | 0.11111 | 148.20 | 798.3 | 3.60 | 0.26249 | 161.06 | 0.780926 | 0.000044 |
| 25.0 | 0.16978 | 152.37 | 873.7 | 3.46 | 0.26497 | 161.33 | 0.780616 | 0.000029 |
| 30.0 | 0.23895 | 154.52 | 993.3 | 3.50 | 0.26730 | 161.47 | 0.780459 | 0.000028 |
| 35.0 | 0.31419 | 159.74 | 975.6 | 3.41 | 0.27109 | 161.82 | 0.780083 | 0.000031 |
| 40.0 | 0.39252 | 169.05 | 891.1 | 3.94 | 0.28462 | 162.41 | 0.779442 | 0.000030 |
| 45.0 | 0.47790 | 170.90 | 906.3 | 3.78 | 0.28536 | 162.53 | 0.779317 | 0.000033 |

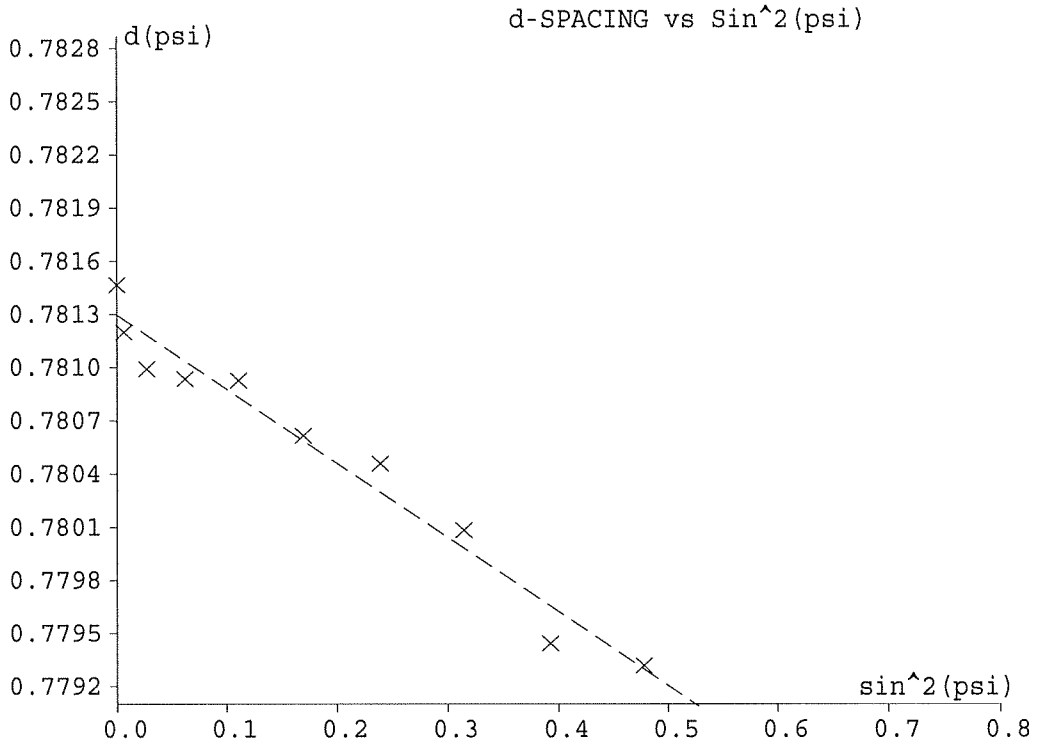
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.781296
Slope of Fitted Line.....: -0.004182
Material Stress Constant.....: 1.255E-07

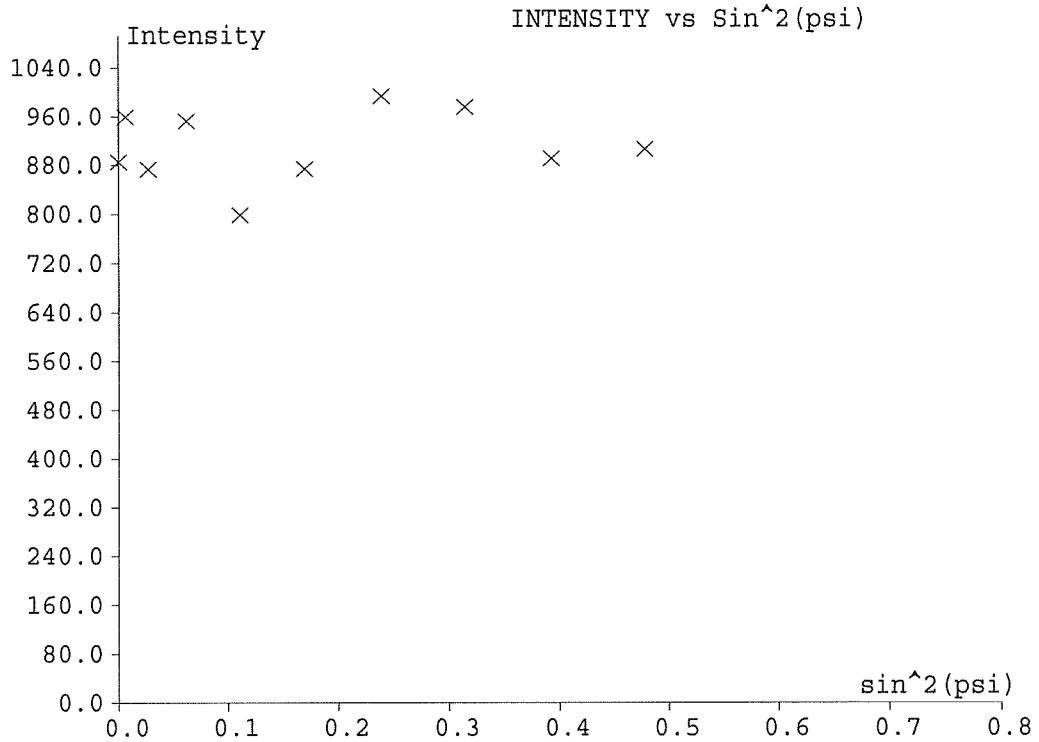
*Residual Stress.....: -42.6 KSI -294.0 MPa

Counting Statistics Stress Error (+/-): 0.7 KSI 4.7 MPa
Probable error.....(+/-): 2.9 KSI 20.2 MPa

File: S:\1005\2005\SBIR\50632\18436.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 12 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -42.6 KSI | -294.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.7 MPa |
| Probable error.....(+/-): | 2.9 KSI | 20.2 MPa |



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================================= TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18437.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 12 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   0:44pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00008   147.59   1210.2   3.27  0.25909    161.02  0.780969  0.000039
  5.0  0.00610   147.89   1318.6   3.37  0.26020    161.04  0.780947  0.000034
 10.0  0.02650   151.29   1321.0   3.41  0.26360    161.26  0.780695  0.000028
 15.0  0.06206   149.55   1156.0   3.24  0.26051    161.15  0.780822  0.000024
 20.0  0.10955   152.50   1088.5   3.32  0.26381    161.34  0.780604  0.000035
 25.0  0.16952   152.84   1135.8   2.75  0.25570    161.37  0.780571  0.000023
 30.0  0.23856   155.23    993.6   2.96  0.26158    161.53  0.780401  0.000029
 35.0  0.31378   160.49   1092.4   3.25  0.27011    161.87  0.780028  0.000036
 40.0  0.39849   158.11   1004.0   3.01  0.26470    161.71  0.780194  0.000021
 45.0  0.48170   164.04   1063.1   3.20  0.27232    162.10  0.779778  0.000032

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780904
Slope of Fitted Line...............:     -0.002232
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -22.8 KSI    -157.0 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       4.2 MPa
Probable error.................(+/-):      2.3 KSI      15.6 MPa
```
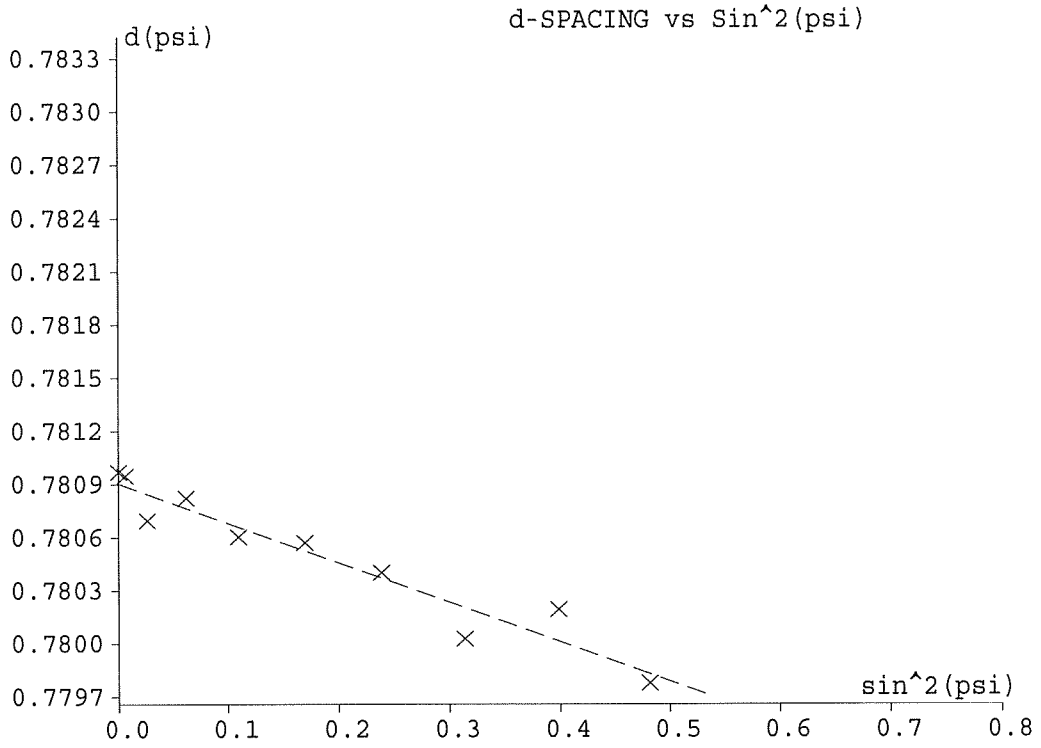
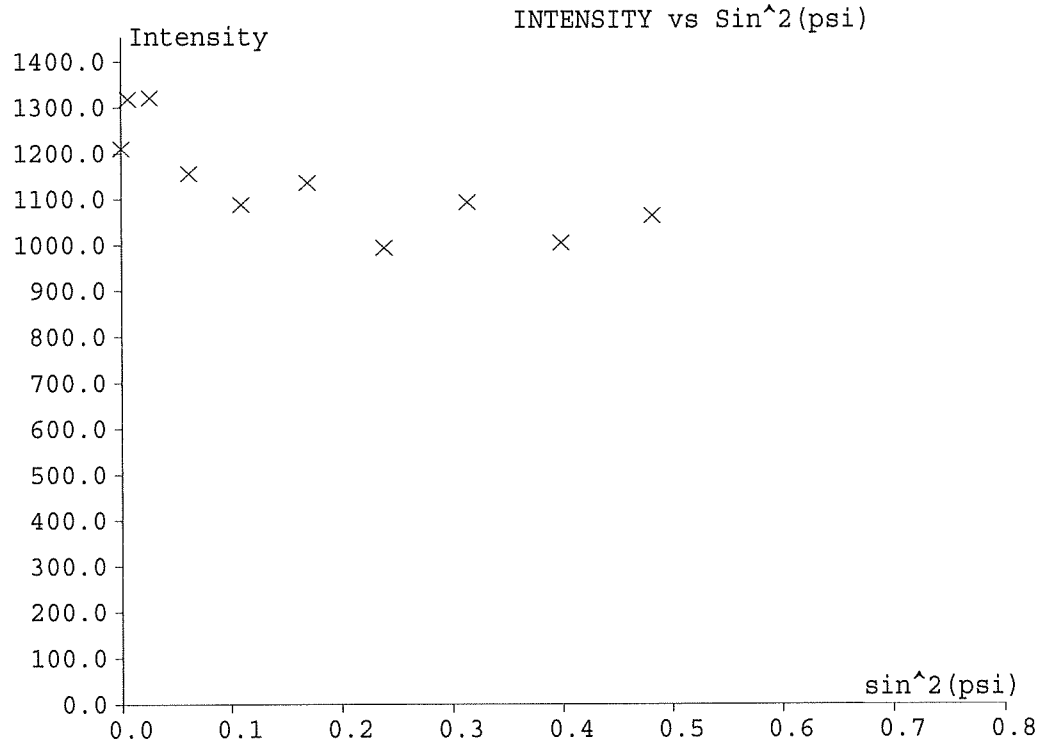

File: S:\1005\2005\SBIR\50632\18437.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 12 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -22.8 KSI | -157.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.2 MPa |
| Probable error.....(+/-): | 2.3 KSI | 15.6 MPa |



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================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18438.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 12 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   0:52pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00010   149.56   1513.9   3.12  0.25911    161.15  0.780820  0.000023
  5.0  0.00583   150.99   1340.7   3.36  0.26288    161.24  0.780717  0.000029
 10.0  0.02599   154.01   1411.4   3.09  0.26238    161.44  0.780491  0.000027
 15.0  0.06149   151.61   1297.1   3.17  0.26147    161.29  0.780668  0.000027
 20.0  0.10960   152.35   1055.3   3.13  0.26161    161.33  0.780614  0.000031
 25.0  0.16996   151.83   1171.1   2.85  0.25684    161.31  0.780647  0.000024
 30.0  0.23795   156.46   1068.2   2.91  0.26151    161.61  0.780310  0.000021
 35.0  0.31347   161.09   1103.8   3.24  0.27047    161.91  0.779985  0.000031
 40.0  0.39953   156.25   1106.0   2.98  0.26272    161.59  0.780327  0.000021
 45.0  0.48390   160.11   1189.0   2.94  0.26502    161.85  0.780050  0.000020

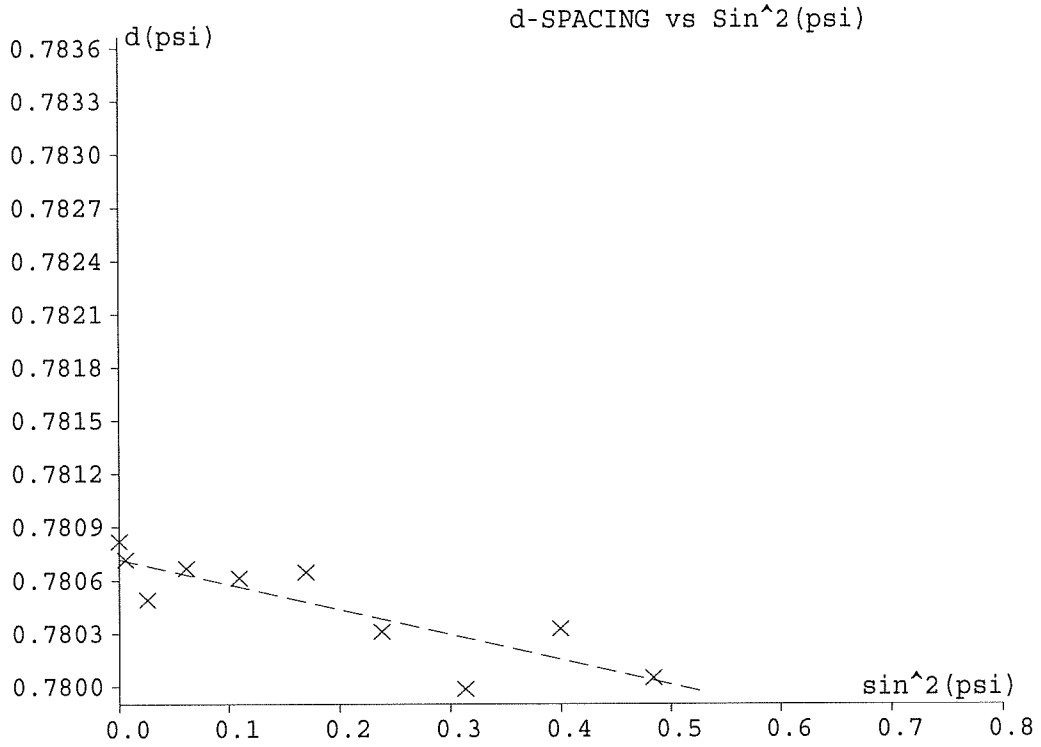
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780718
Slope of Fitted Line...............:     -0.001412
Material Stress Constant...........:     1.255E-07

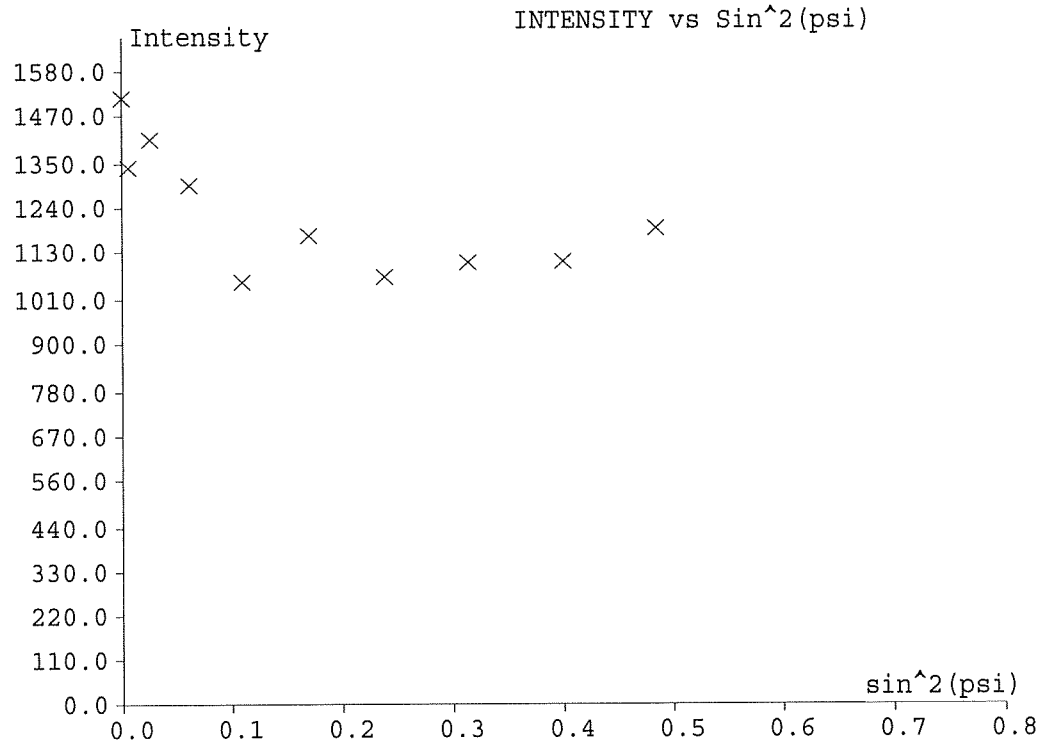
*Residual Stress...................:    -14.4 KSI     -99.4 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.3 MPa
Probable error.................(+/-):      3.1 KSI      21.4 MPa
```

File: S:\1005\2005\SBIR\50632\18438.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 12 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -14.4 KSI | -99.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.3 MPa |
| Probable error.....(+/-): | 3.1 KSI | 21.4 MPa |



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18439.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 13 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   1:07pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00005   144.82    980.3   3.43  0.25805    160.84  0.781179  0.000039
  5.0  0.00621   146.70    935.6   3.47  0.26004    160.96  0.781037  0.000036
 10.0  0.02753   145.83    942.0   3.79  0.26217    160.90  0.781107  0.000039
 15.0  0.06261   147.59   1074.1   3.40  0.26026    161.02  0.780970  0.000035
 20.0  0.10984   151.74    858.7   3.59  0.26555    161.29  0.780664  0.000052
 25.0  0.16919   153.75    910.8   3.46  0.26621    161.42  0.780515  0.000035
 30.0  0.23678   159.02    996.3   3.72  0.27300    161.77  0.780137  0.000041
 35.0  0.31298   162.08   1033.2   3.63  0.27541    161.97  0.779920  0.000038
 40.0  0.39273   168.63   1031.8   3.65  0.28194    162.39  0.779469  0.000033
 45.0  0.47856   169.68    906.2   3.49  0.28135    162.46  0.779396  0.000030

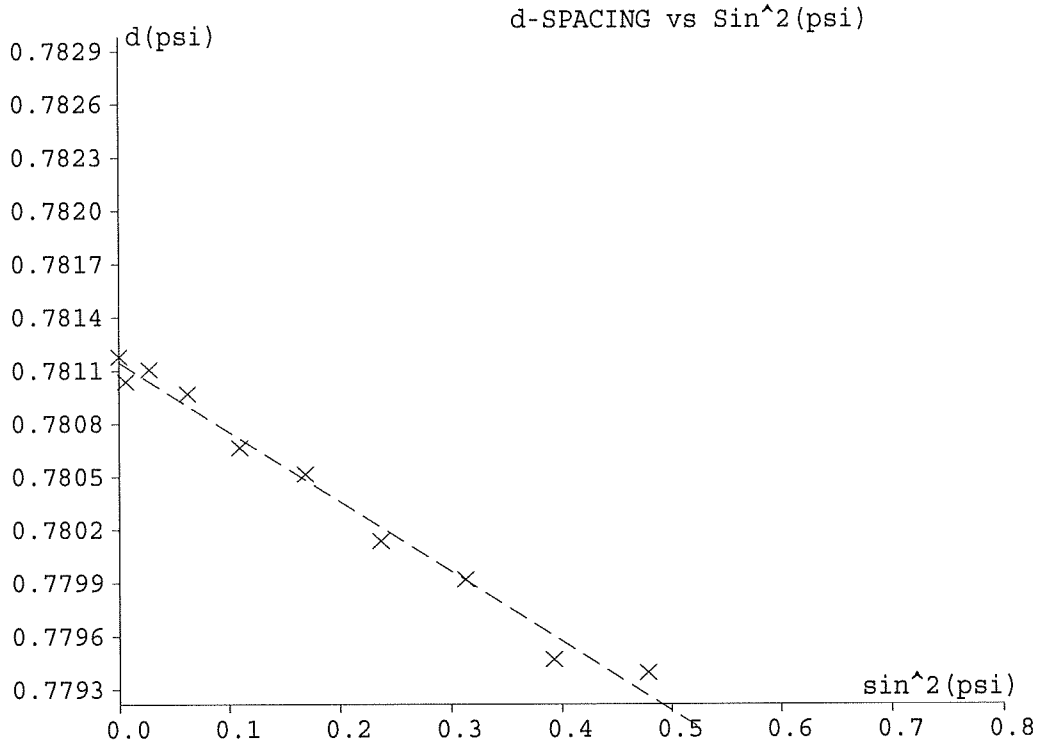
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781146
Slope of Fitted Line...............:     -0.003931
Material Stress Constant...........:     1.255E-07

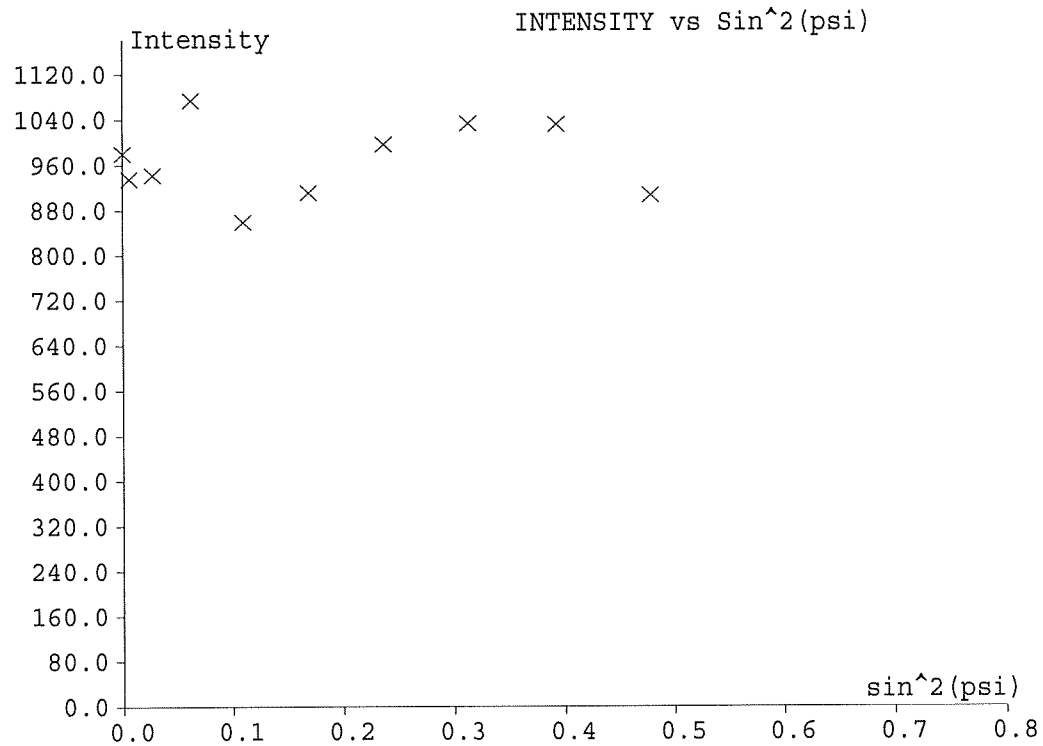
*Residual Stress...................:    -40.1 KSI    -276.5 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.8 MPa
Probable error.................(+/-):      1.8 KSI      12.2 MPa
```

File: S:\1005\2005\SBIR\50632\18439.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 13 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -40.1 KSI | -276.5 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.8 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.2 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18440.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 13 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time: 6/01/2005 1:15pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00009 | 148.76 | 1423.3 | 3.40 | 0.26123 | 161.10 | 0.780882 | 0.000034 |
| 5.0 | 0.00559 | 153.64 | 1460.3 | 3.03 | 0.26128 | 161.42 | 0.780517 | 0.000023 |
| 10.0 | 0.02668 | 150.33 | 1237.0 | 3.44 | 0.26303 | 161.20 | 0.780766 | 0.000027 |
| 15.0 | 0.06058 | 154.97 | 1412.7 | 3.42 | 0.26699 | 161.50 | 0.780425 | 0.000045 |
| 20.0 | 0.10997 | 151.32 | 1260.6 | 3.25 | 0.26220 | 161.27 | 0.780691 | 0.000030 |
| 25.0 | 0.16899 | 154.18 | 1197.0 | 3.22 | 0.26429 | 161.45 | 0.780481 | 0.000027 |
| 30.0 | 0.23807 | 156.31 | 1241.8 | 3.30 | 0.26700 | 161.59 | 0.780327 | 0.000027 |
| 35.0 | 0.31415 | 159.75 | 1181.1 | 3.01 | 0.26602 | 161.82 | 0.780077 | 0.000020 |
| 40.0 | 0.39570 | 163.23 | 1139.7 | 3.61 | 0.27632 | 162.04 | 0.779840 | 0.000039 |
| 45.0 | 0.48007 | 166.93 | 1058.6 | 3.21 | 0.27484 | 162.28 | 0.779578 | 0.000033 |

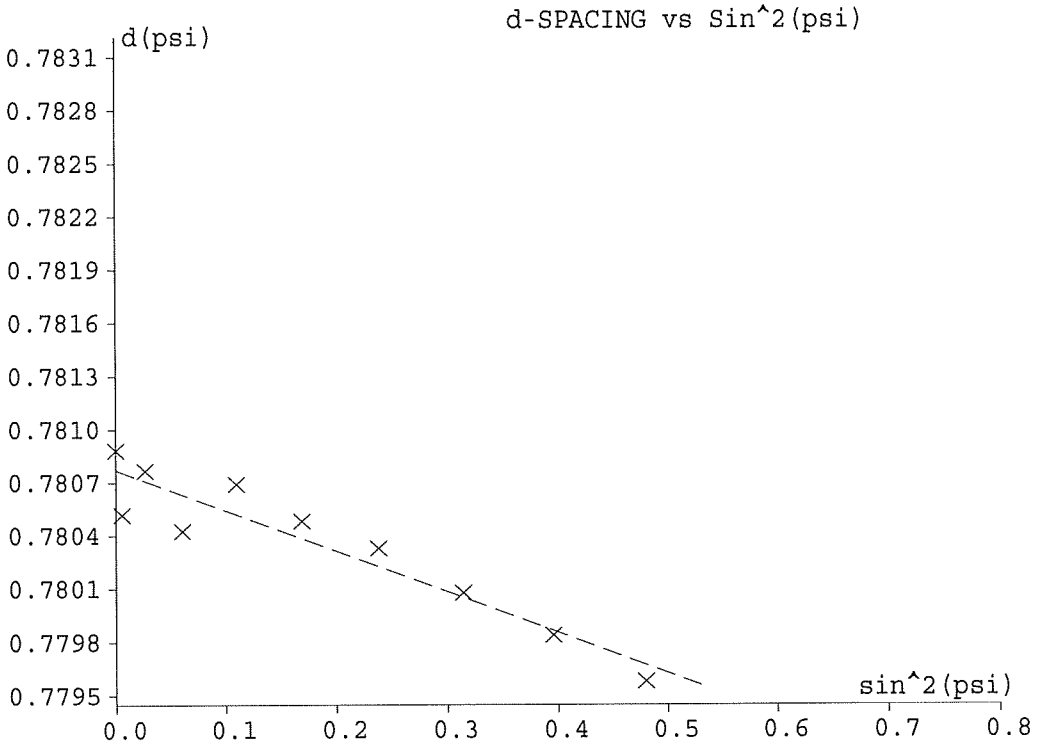
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780770
Slope of Fitted Line.....: -0.002287
Material Stress Constant.....: 1.255E-07

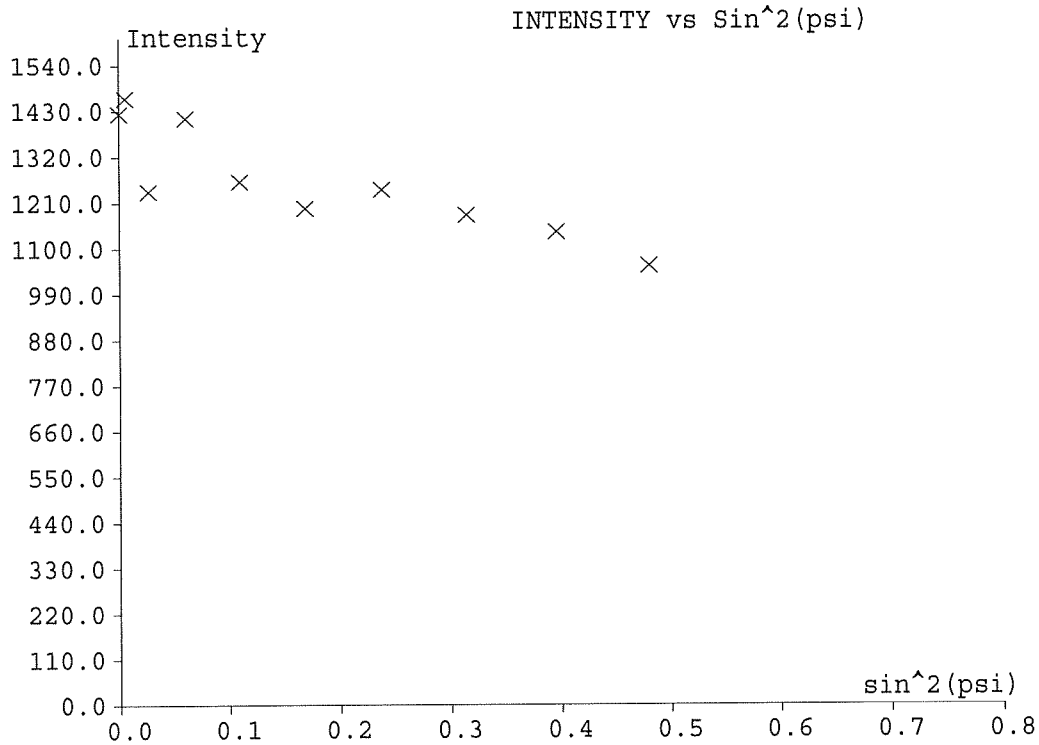
*Residual Stress.....: -23.3 KSI -160.9 MPa

Counting Statistics Stress Error (+/-): 0.7 KSI 4.5 MPa
Probable error.....(+/-): 2.9 KSI 20.3 MPa

File: S:\1005\2005\SBIR\50632\18440.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 13 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -23.3 KSI | -160.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.5 MPa |
| Probable error.....(+/-): | 2.9 KSI | 20.3 MPa |



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18441.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 13 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   1:23pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00021   157.08   1180.3   3.16  0.26594    161.64  0.780269  0.000026
  5.0  0.00529   157.29   1253.8   3.01  0.26397    161.66  0.780253  0.000023
 10.0  0.02526   158.07   1207.6   3.25  0.26798    161.71  0.780200  0.000024
 15.0  0.05994   157.26   1339.5   3.08  0.26494    161.66  0.780255  0.000032
 20.0  0.10800   156.86   1249.5   3.27  0.26713    161.63  0.780287  0.000026
 25.0  0.16825   155.88   1166.2   3.05  0.26344    161.57  0.780355  0.000023
 30.0  0.23799   156.38   1034.8   2.89  0.26116    161.60  0.780316  0.000024
 35.0  0.31430   159.48   1140.6   3.11  0.26727    161.80  0.780097  0.000025
 40.0  0.39767   159.62   1063.5   3.27  0.26954    161.81  0.780090  0.000024
 45.0  0.48364   160.56   1098.2   2.96  0.26577    161.87  0.780018  0.000023

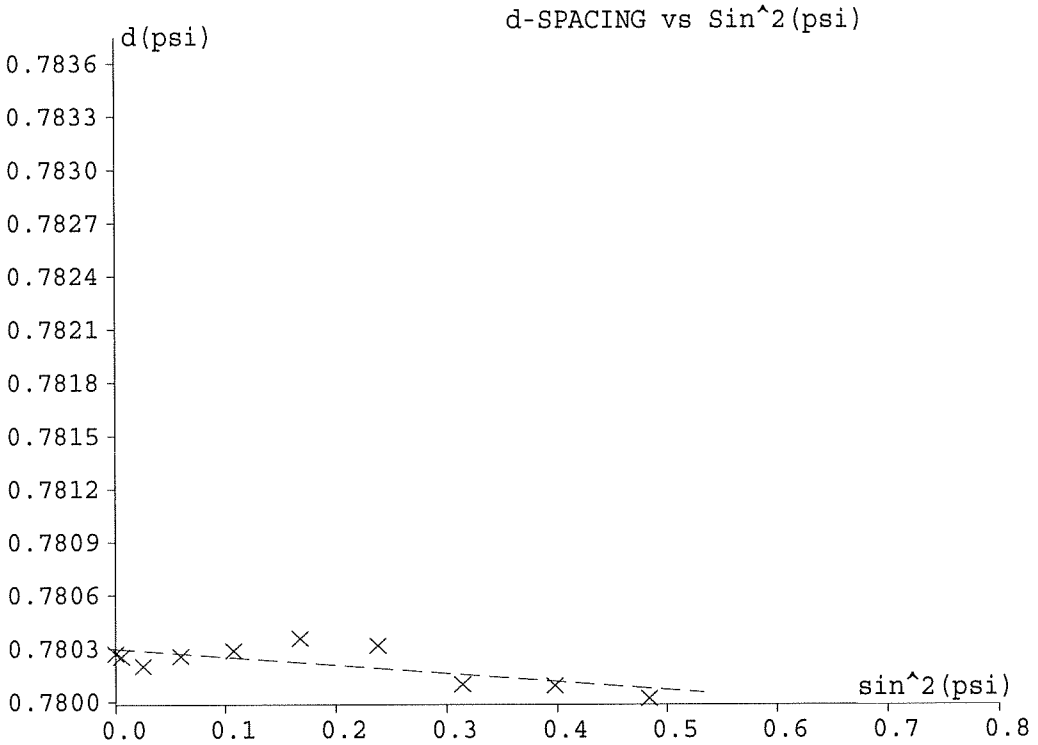
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780297
Slope of Fitted Line...............:    -0.0004591
Material Stress Constant...........:     1.255E-07

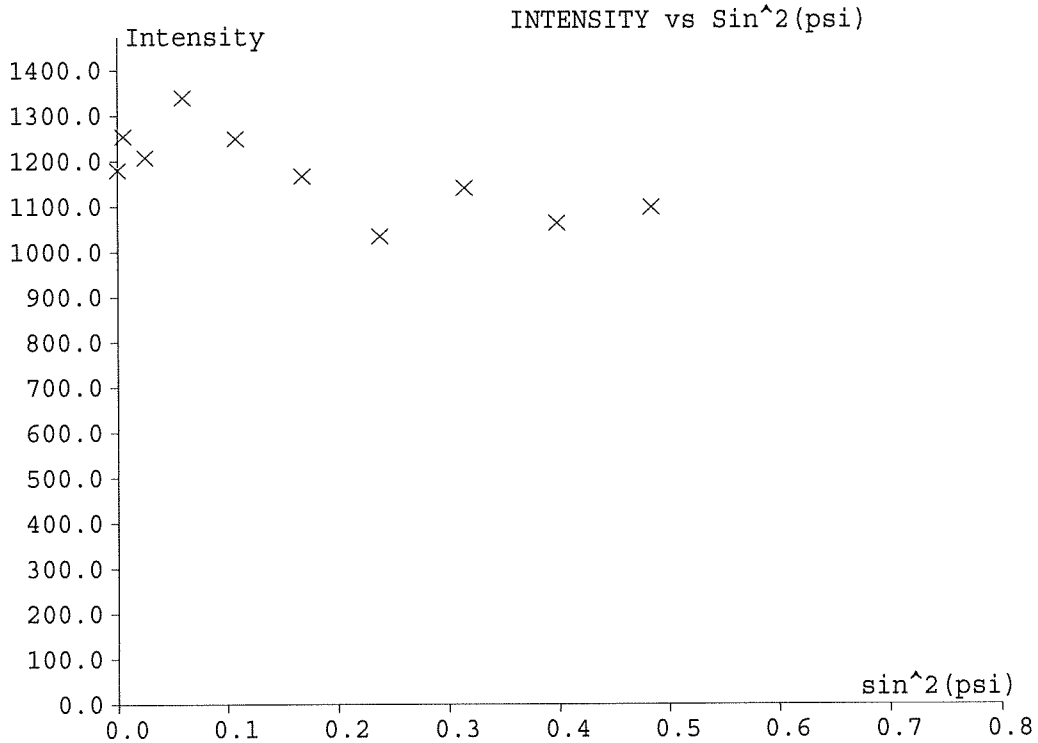
*Residual Stress...................:     -4.7 KSI     -32.3 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.3 MPa
Probable error.................(+/-):      1.6 KSI      11.1 MPa
```

File: S:\1005\2005\SBIR\50632\18441.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 13 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.7 KSI | -32.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.3 MPa |
| Probable error.....(+/-): | 1.6 KSI | 11.1 MPa |



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18442.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 14 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   1:31pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00006   145.36   1117.6   3.04  0.25456    160.88  0.781134  0.000027
  5.0  0.00620   146.81   1044.9   3.33  0.25891    160.97  0.781028  0.000036
 10.0  0.02739   146.51   1154.5   3.27  0.25816    160.95  0.781050  0.000032
 15.0  0.06188   150.22    909.6   3.39  0.26248    161.19  0.780773  0.000036
 20.0  0.11010   151.02   1009.4   3.69  0.26578    161.24  0.780717  0.000032
 25.0  0.16922   153.73    927.8   3.77  0.26876    161.42  0.780519  0.000052
 30.0  0.23705   158.44    917.9   3.54  0.27110    161.73  0.780177  0.000041
 35.0  0.31215   163.63    997.5   3.39  0.27444    162.07  0.779810  0.000037
 40.0  0.39315   167.82    965.9   3.41  0.27842    162.34  0.779521  0.000026
 45.0  0.48122   164.94   1061.9   3.45  0.27636    162.15  0.779719  0.000026

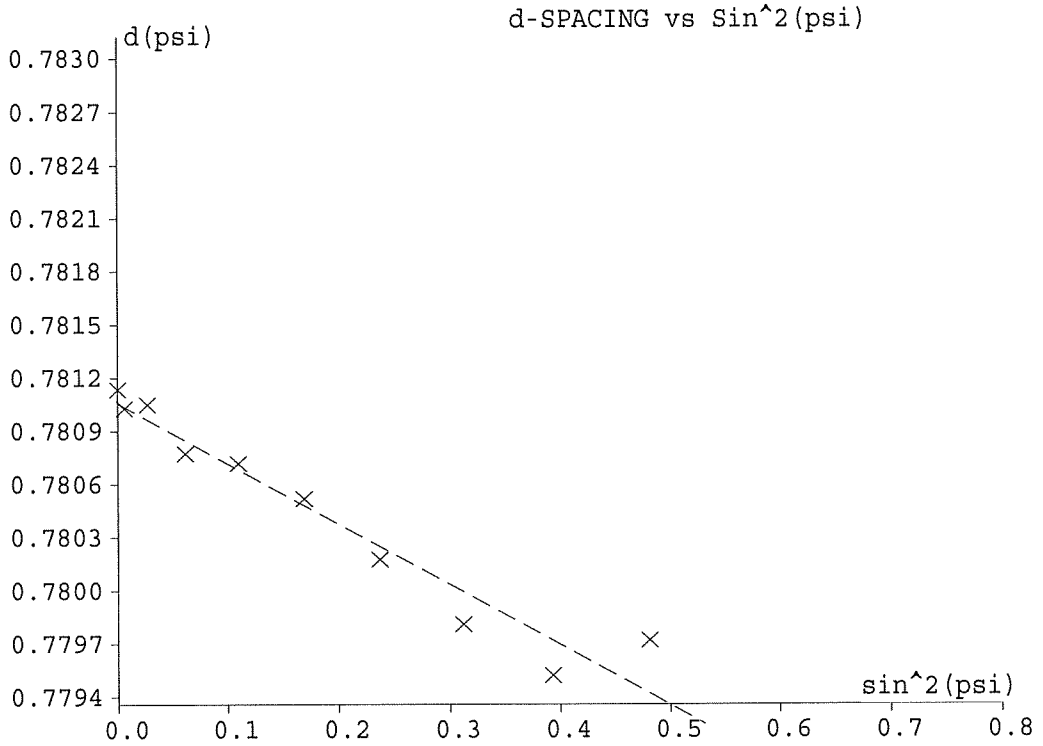
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781057
Slope of Fitted Line...............:     -0.003405
Material Stress Constant...........:     1.255E-07

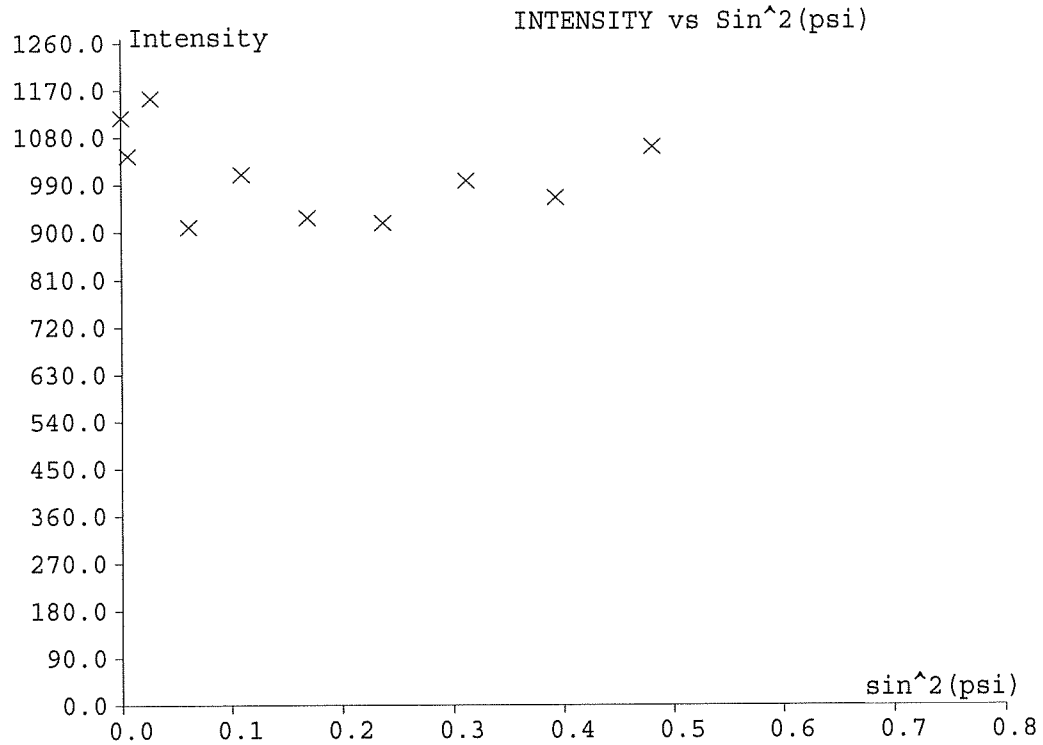
*Residual Stress...................:    -34.7 KSI    -239.5 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       4.1 MPa
Probable error.................(+/-):      3.1 KSI      21.2 MPa
```

File: S:\1005\2005\SBIR\50632\18442.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 14 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -34.7 KSI | -239.5 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.1 MPa |
| Probable error.....(+/-): | 3.1 KSI | 21.2 MPa |



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================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18443.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 14 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   1:39pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00011   150.16   1248.6   2.96  0.25758    161.19  0.780772  0.000024
  5.0  0.00567   152.85   1421.2   3.21  0.26302    161.37  0.780578  0.000028
 10.0  0.02577   155.24   1171.5   3.17  0.26453    161.52  0.780403  0.000030
 15.0  0.06108   153.14   1274.9   3.56  0.26662    161.38  0.780560  0.000034
 20.0  0.11004   151.11   1332.6   3.13  0.26054    161.25  0.780705  0.000024
 25.0  0.16903   154.06   1099.9   3.09  0.26250    161.45  0.780488  0.000026
 30.0  0.23807   156.30   1150.3   3.33  0.26722    161.59  0.780328  0.000036
 35.0  0.31409   159.85   1122.6   2.97  0.26543    161.83  0.780069  0.000030
 40.0  0.39647   161.75   1137.1   3.07  0.26843    161.95  0.779936  0.000033
 45.0  0.48170   164.03   1159.4   3.14  0.27144    162.10  0.779778  0.000022

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780686
Slope of Fitted Line...............:     -0.001798
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -18.3 KSI    -126.5 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.7 MPa
Probable error.................(+/-):      2.6 KSI      18.2 MPa
```
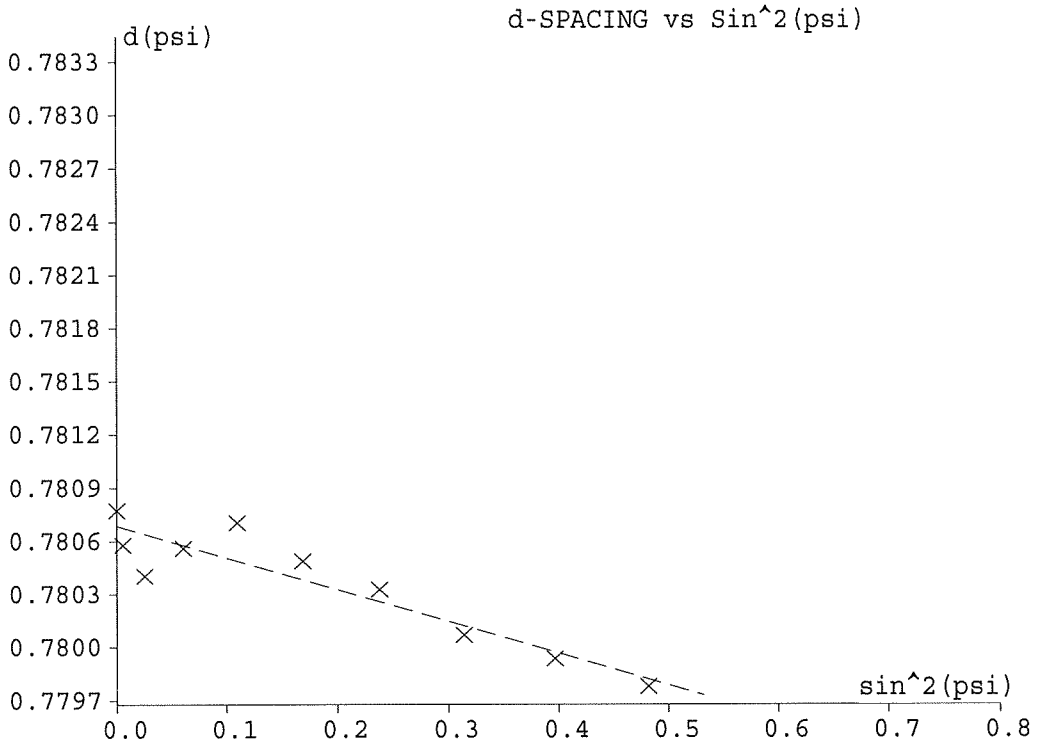
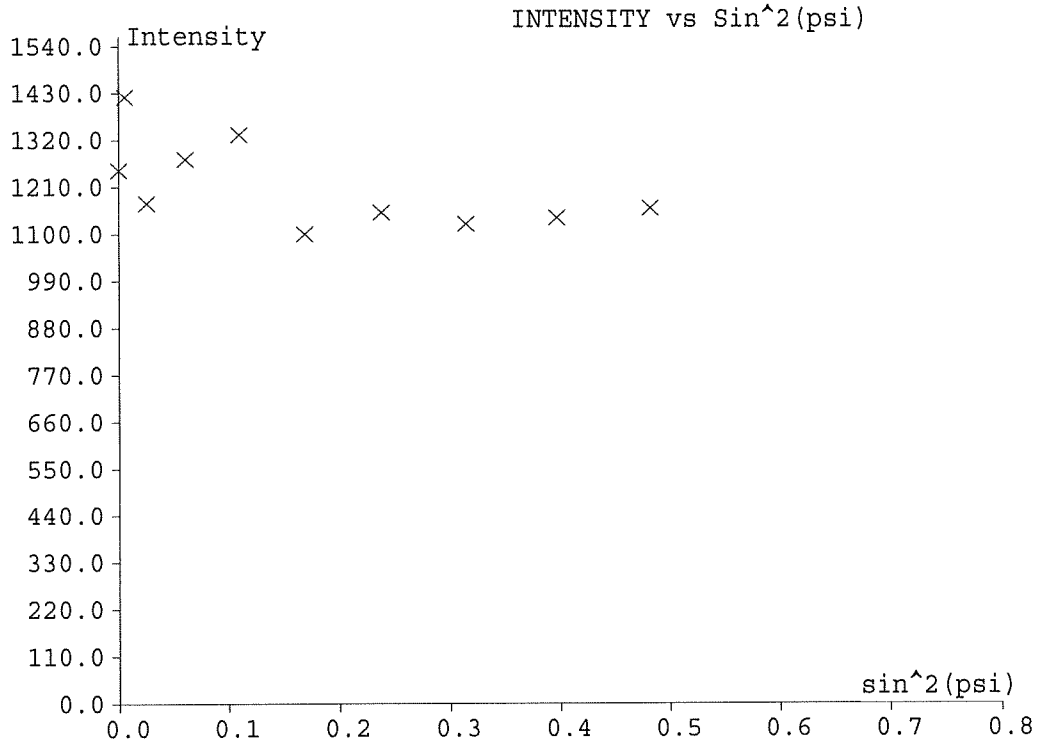

File: S:\1005\2005\SBIR\50632\18443.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 14 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -18.3 KSI | -126.5 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.7 MPa |
| Probable error.....(+/-): | 2.6 KSI | 18.2 MPa |

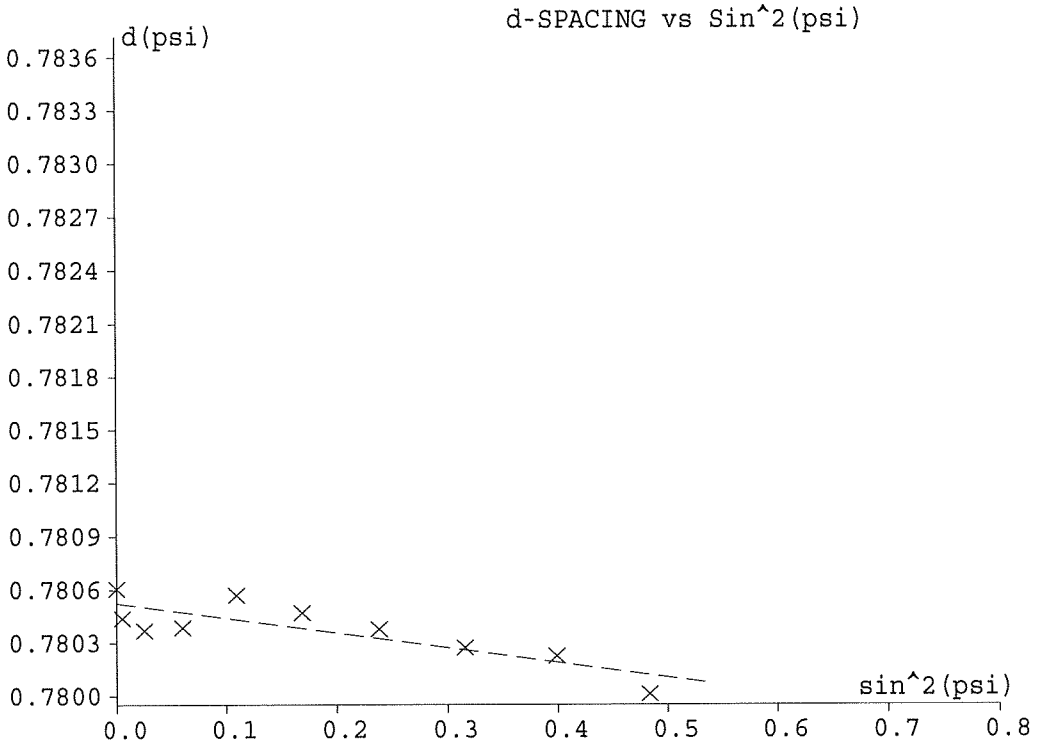


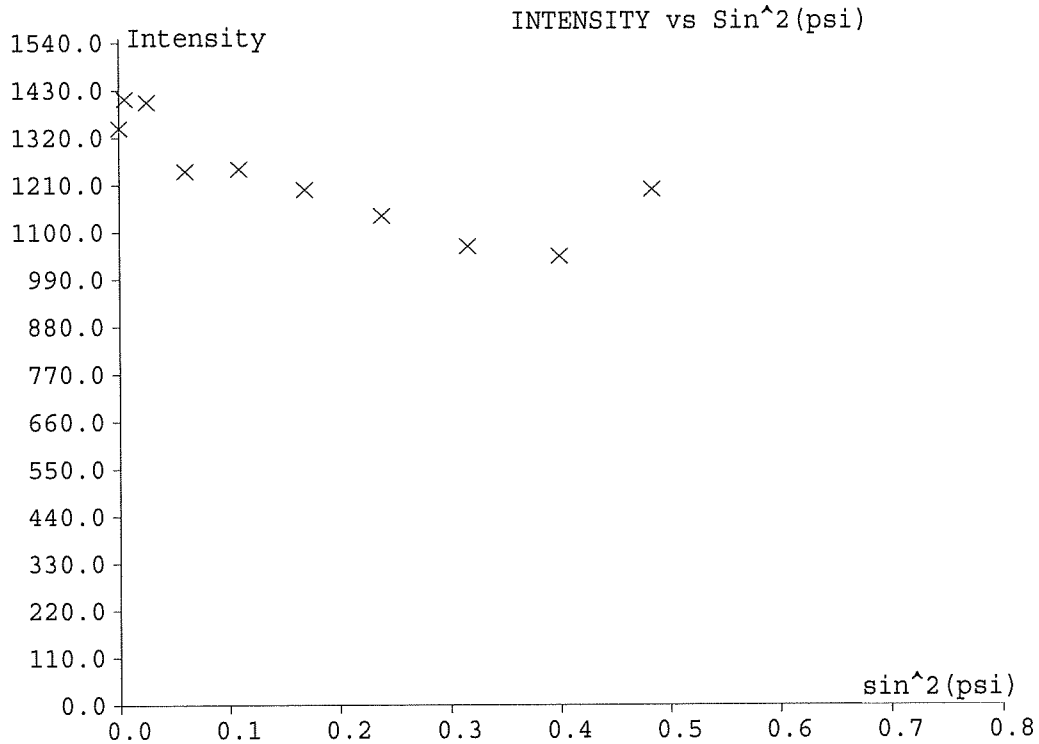



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18444.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 14 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   1:47pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00014   152.41   1341.8   2.88  0.25780    161.34  0.780605  0.000032
  5.0  0.00550   154.72   1409.5   3.08  0.26282    161.49  0.780439  0.000023
 10.0  0.02569   155.68   1402.5   3.16  0.26472    161.55  0.780371  0.000027
 15.0  0.06043   155.48   1241.9   3.25  0.26576    161.54  0.780387  0.000032
 20.0  0.10938   152.91   1247.1   2.92  0.25899    161.37  0.780569  0.000021
 25.0  0.16892   154.35   1198.3   3.28  0.26510    161.46  0.780469  0.000029
 30.0  0.23840   155.58   1137.8   3.09  0.26372    161.55  0.780377  0.000029
 35.0  0.31560   156.94   1066.1   2.79  0.25961    161.64  0.780273  0.000022
 40.0  0.39875   157.64   1043.2   3.00  0.26407    161.68  0.780227  0.000029
 45.0  0.48359   160.65   1198.9   2.96  0.26582    161.88  0.780012  0.000025

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780524
Slope of Fitted Line...............:    -0.0008376
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -8.6 KSI     -59.0 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.6 MPa
Probable error.................(+/-):      2.0 KSI      13.6 MPa
```

File: S:\1005\2005\SBIR\50632\18444.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 14 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -8.6 KSI | -59.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.6 MPa |
| Probable error.....(+/-): | 2.0 KSI | 13.6 MPa |

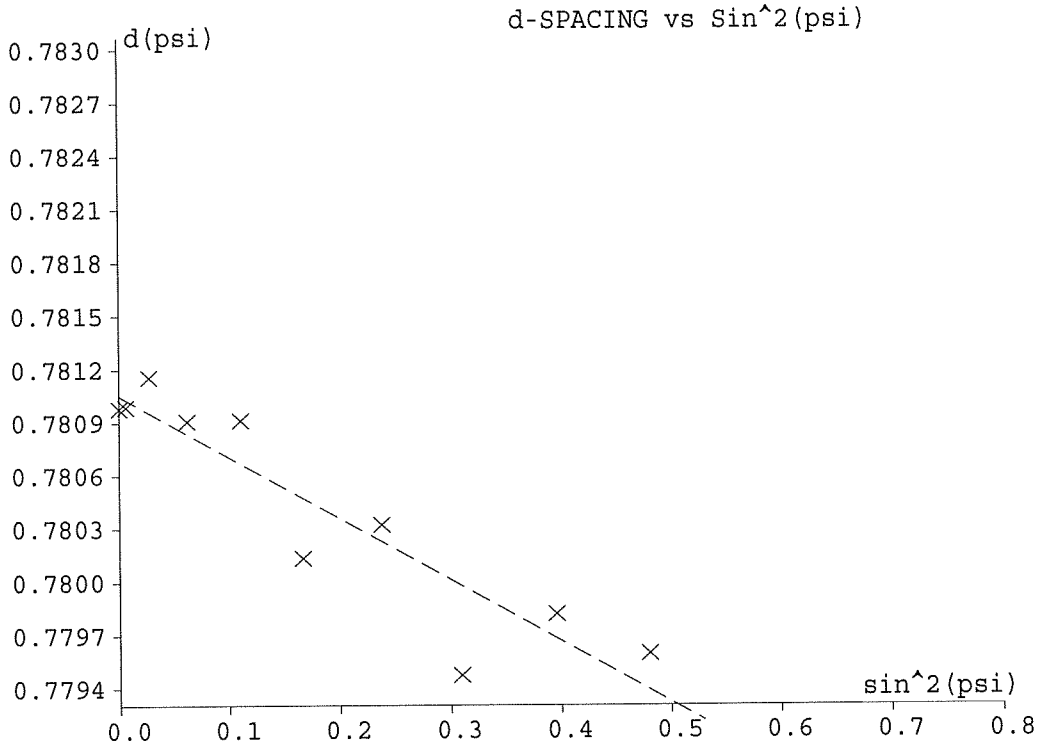


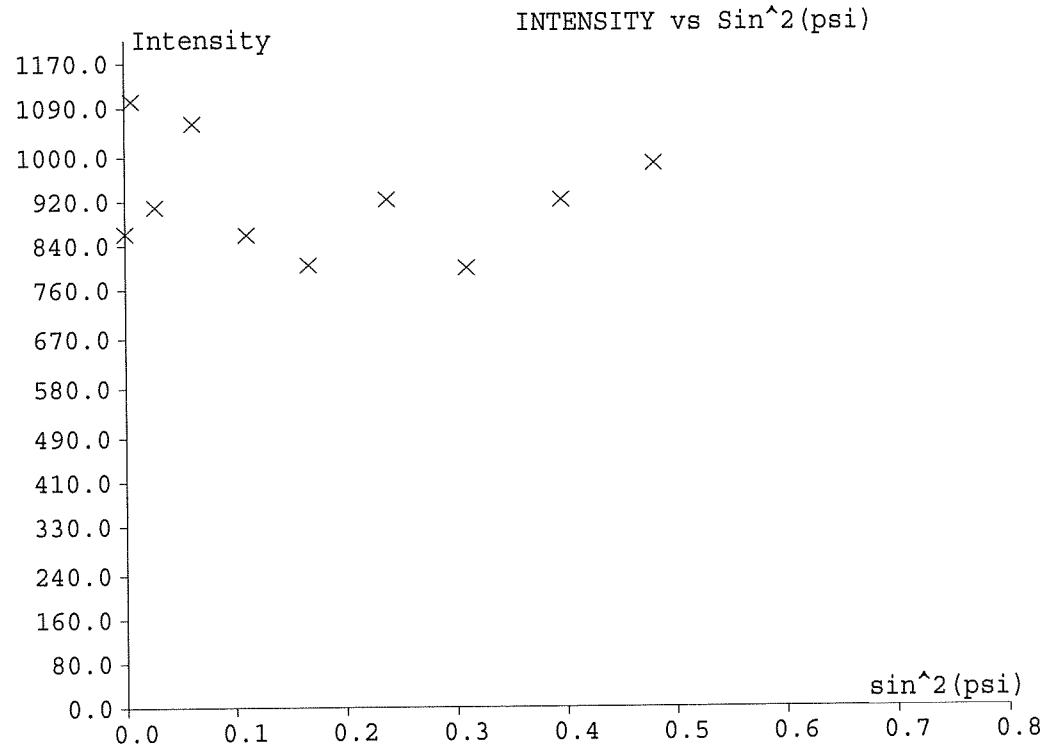



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18445.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 15 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   1:55pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00008   147.47    861.4   3.47  0.26075    161.01  0.780979  0.000034
  5.0  0.00615   147.33   1101.9   3.22  0.25839    161.00  0.780988  0.000031
 10.0  0.02765   145.16    909.8   3.69  0.26066    160.86  0.781156  0.000043
 15.0  0.06237   148.44   1061.5   3.41  0.26103    161.08  0.780906  0.000028
 20.0  0.11105   148.34    859.0   3.25  0.25958    161.07  0.780913  0.000036
 25.0  0.16694   159.07    803.8   3.74  0.27321    161.77  0.780134  0.000041
 30.0  0.23804   156.41    923.1   3.64  0.27007    161.60  0.780323  0.000035
 35.0  0.30959   168.54    798.1   3.51  0.28058    162.38  0.779473  0.000041
 40.0  0.39555   163.50    921.8   3.53  0.27601    162.06  0.779820  0.000042
 45.0  0.48022   166.72    987.6   3.46  0.27814    162.27  0.779597  0.000027

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781051
Slope of Fitted Line...............:     -0.003458
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -35.3 KSI    -243.2 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.7 MPa
Probable error.................(+/-):      5.3 KSI      36.3 MPa
```

File: S:\1005\2005\SBIR\50632\18445.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 15 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -35.3 KSI | -243.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.7 MPa |
| Probable error.....(+/-): | 5.3 KSI | 36.3 MPa |

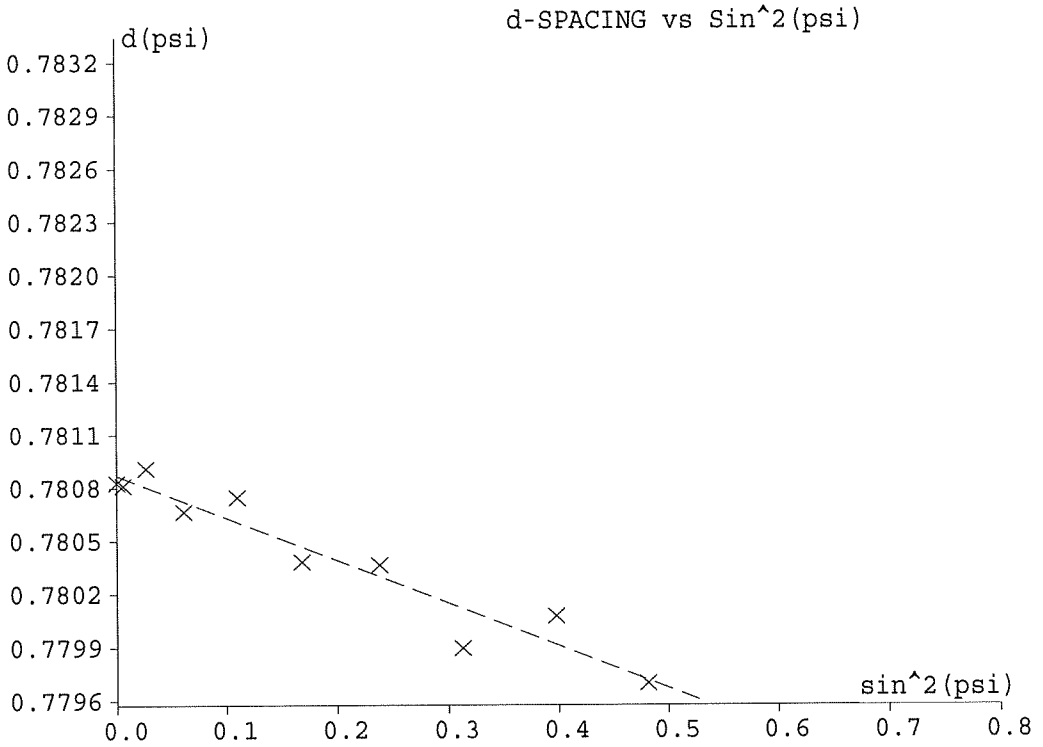


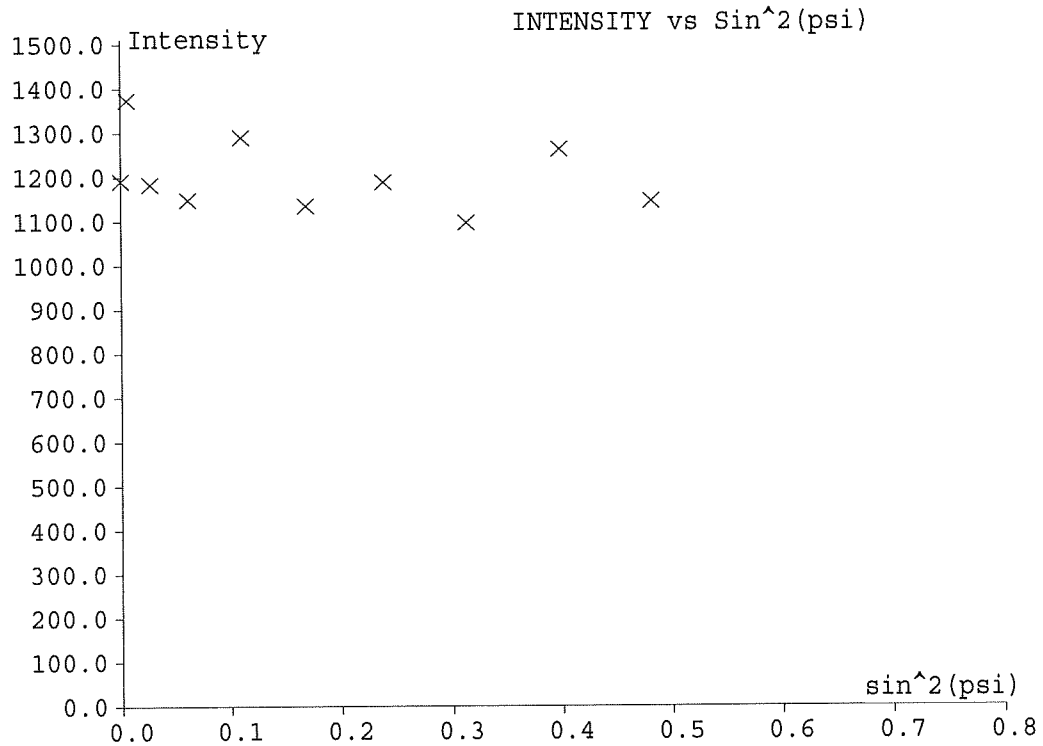



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18446.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 15 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   2:03pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00010   149.49   1191.1   3.59  0.26355    161.14  0.780830  0.000039
  5.0  0.00594   149.68   1373.7   3.35  0.26164    161.16  0.780813  0.000026
 10.0  0.02704   148.42   1183.2   3.56  0.26236    161.07  0.780910  0.000029
 15.0  0.06148   151.67   1148.8   3.28  0.26276    161.29  0.780665  0.000032
 20.0  0.11023   150.58   1289.6   3.22  0.26121    161.22  0.780745  0.000026
 25.0  0.16840   155.59   1134.4   3.42  0.26749    161.54  0.780381  0.000028
 30.0  0.23831   155.81   1188.0   3.30  0.26651    161.56  0.780364  0.000036
 35.0  0.31280   162.42   1096.6   3.56  0.27519    161.99  0.779896  0.000059
 40.0  0.39757   159.85   1262.0   3.56  0.27269    161.82  0.780077  0.000026
 45.0  0.48104   165.25   1144.7   3.35  0.27536    162.17  0.779697  0.000036

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780870
Slope of Fitted Line...............:      -0.0024
Material Stress Constant...........:    1.255E-07

*Residual Stress...................:    -24.5 KSI    -168.8 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.8 MPa
Probable error.................(+/-):      2.5 KSI      17.1 MPa
```

File: S:\1005\2005\SBIR\50632\18446.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 15 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -24.5 KSI | -168.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.8 MPa |
| Probable error.....(+/-): | 2.5 KSI | 17.1 MPa |

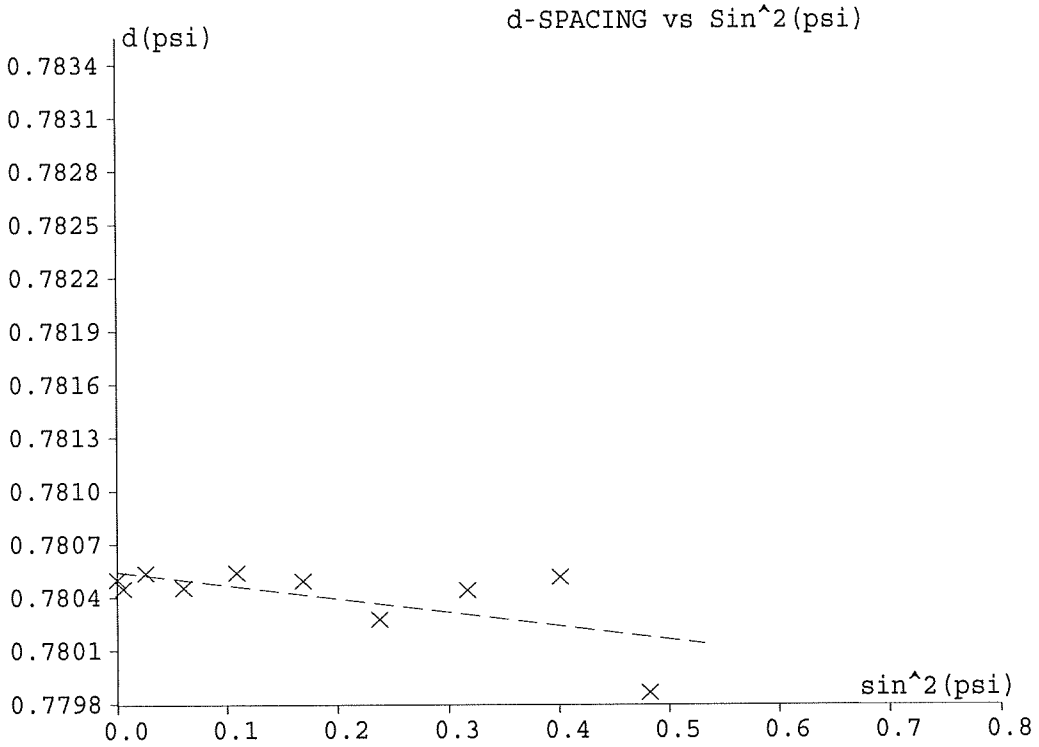


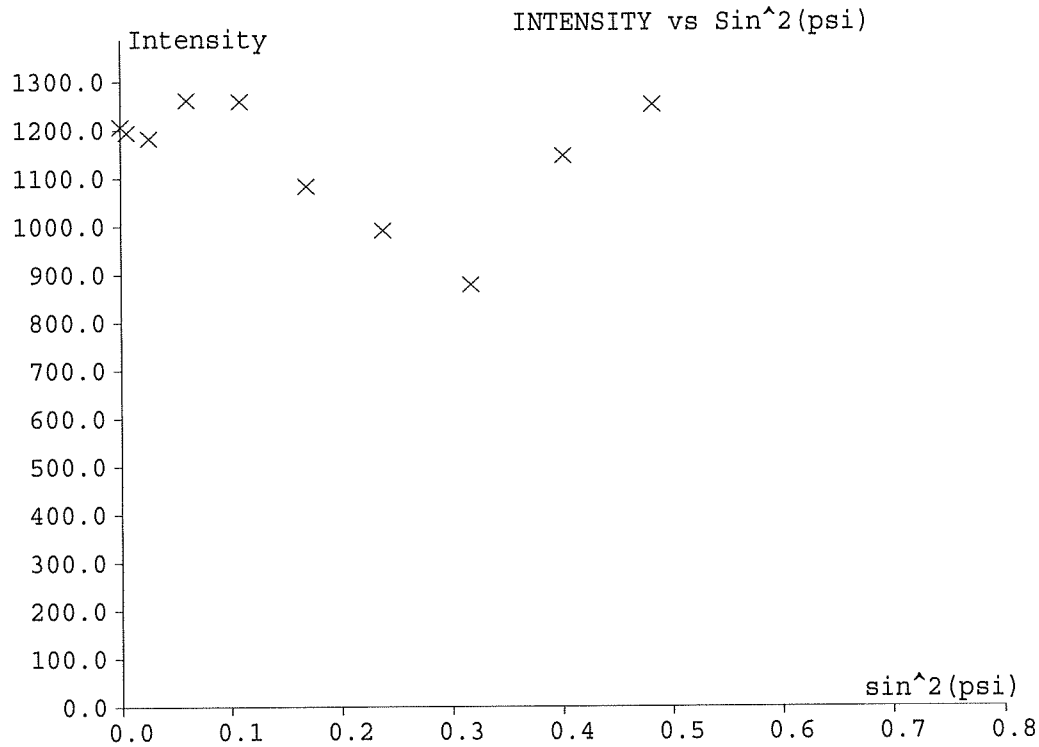



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18447.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 15 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   2:11pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00016   153.92   1206.5   3.21  0.26396    161.44  0.780499  0.000029
  5.0  0.00551   154.60   1194.2   3.11  0.26312    161.48  0.780448  0.000032
 10.0  0.02610   153.40   1182.8   3.12  0.26232    161.40  0.780536  0.000024
 15.0  0.06068   154.52   1261.5   3.03  0.26204    161.48  0.780453  0.000023
 20.0  0.10922   153.39   1258.8   3.11  0.26212    161.40  0.780536  0.000024
 25.0  0.16904   154.01   1083.4   2.98  0.26090    161.45  0.780490  0.000021
 30.0  0.23770   157.01    991.2   3.06  0.26446    161.64  0.780273  0.000027
 35.0  0.31681   154.75    878.4   3.13  0.26360    161.49  0.780438  0.000026
 40.0  0.40095   153.72   1145.7   3.05  0.26167    161.43  0.780512  0.000025
 45.0  0.48237   162.84   1251.6   3.11  0.26989    162.02  0.779860  0.000022

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780543
Slope of Fitted Line...............:    -0.0007637
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -7.8 KSI     -53.7 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.5 MPa
Probable error.................(+/-):      3.3 KSI      22.8 MPa
```

File: S:\1005\2005\SBIR\50632\18447.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 15 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -7.8 KSI | -53.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.5 MPa |
| Probable error.....(+/-): | 3.3 KSI | 22.8 MPa |



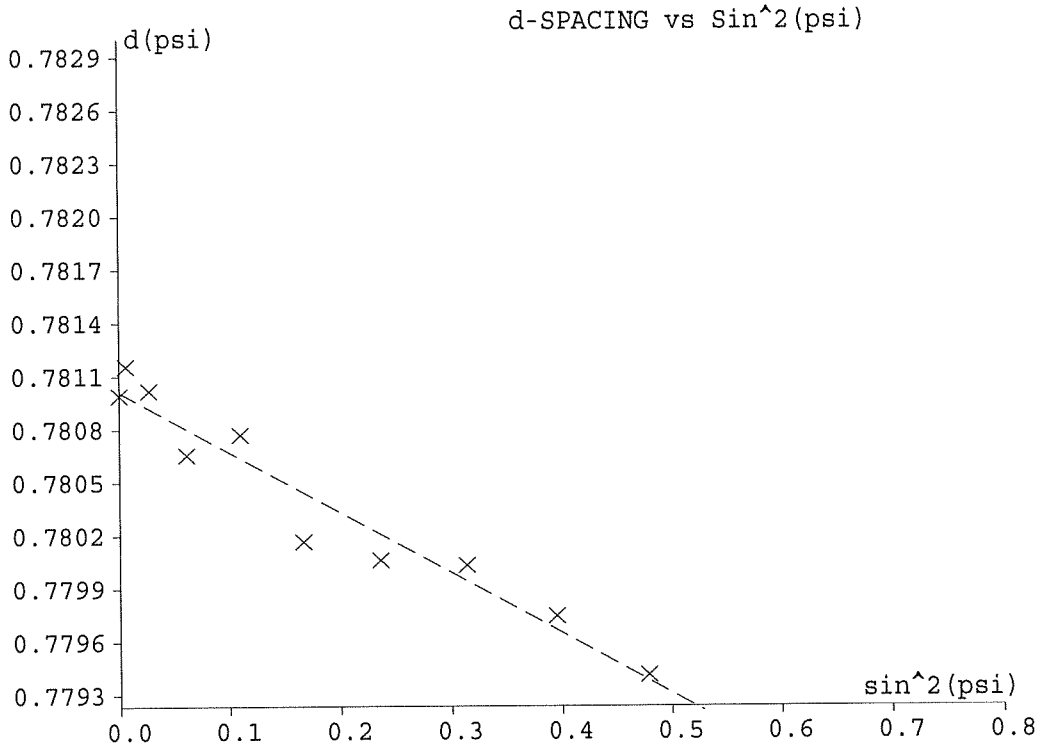
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18448.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 16 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   2:19pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227
```

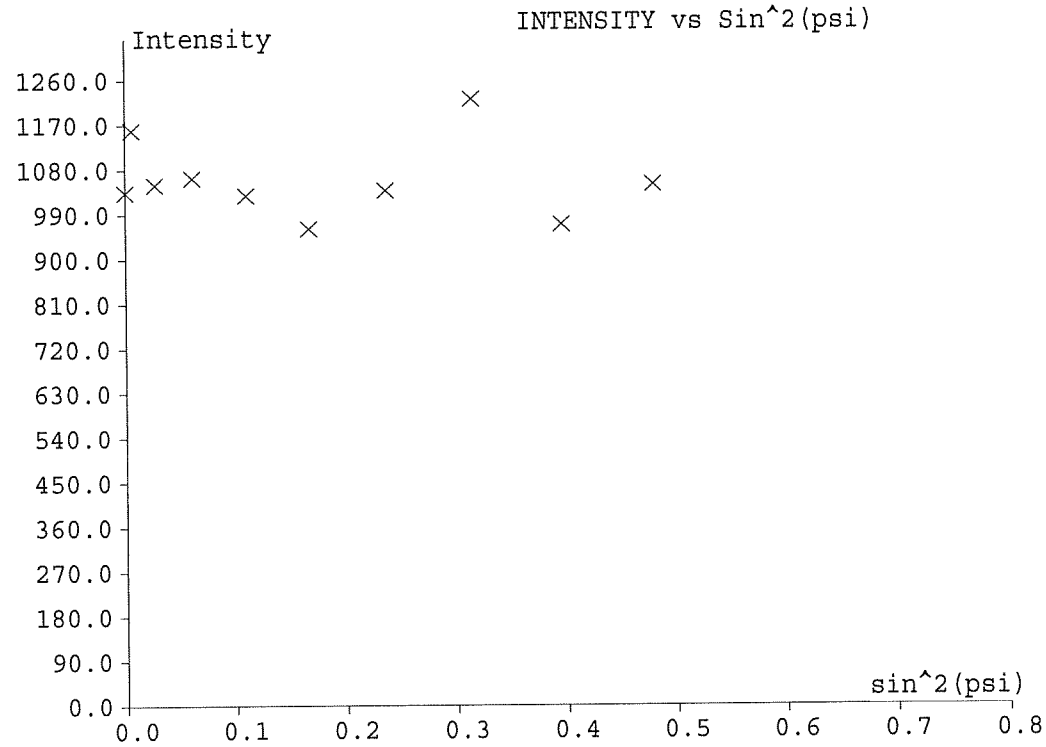
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00008 | 147.27 | 1034.0 | 3.11 | 0.25707 | 161.00 | 0.780991 | 0.000031 |
| 5.0 | 0.00635 | 145.13 | 1158.9 | 3.40 | 0.25802 | 160.86 | 0.781155 | 0.000037 |
| 10.0 | 0.02731 | 146.96 | 1049.8 | 3.58 | 0.26124 | 160.98 | 0.781019 | 0.000042 |
| 15.0 | 0.06144 | 151.81 | 1062.9 | 3.41 | 0.26409 | 161.30 | 0.780656 | 0.000034 |
| 20.0 | 0.11035 | 150.27 | 1028.3 | 3.39 | 0.26252 | 161.20 | 0.780770 | 0.000034 |
| 25.0 | 0.16712 | 158.62 | 961.4 | 3.70 | 0.27251 | 161.74 | 0.780165 | 0.000041 |
| 30.0 | 0.23625 | 160.08 | 1038.0 | 3.43 | 0.27161 | 161.84 | 0.780059 | 0.000037 |
| 35.0 | 0.31380 | 160.47 | 1221.4 | 3.38 | 0.27143 | 161.86 | 0.780031 | 0.000033 |
| 40.0 | 0.39495 | 164.54 | 969.7 | 3.29 | 0.27396 | 162.13 | 0.779745 | 0.000042 |
| 45.0 | 0.47870 | 169.46 | 1049.3 | 3.60 | 0.28233 | 162.44 | 0.779412 | 0.000032 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781012
Slope of Fitted Line...............:     -0.003403
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -34.7 KSI    -239.4 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.9 MPa
Probable error.................(+/-):      3.1 KSI      21.2 MPa
```

File: S:\1005\2005\SBIR\50632\18448.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 16 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -34.7 KSI | -239.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.9 MPa |
| Probable error.....(+/-): | 3.1 KSI | 21.2 MPa |

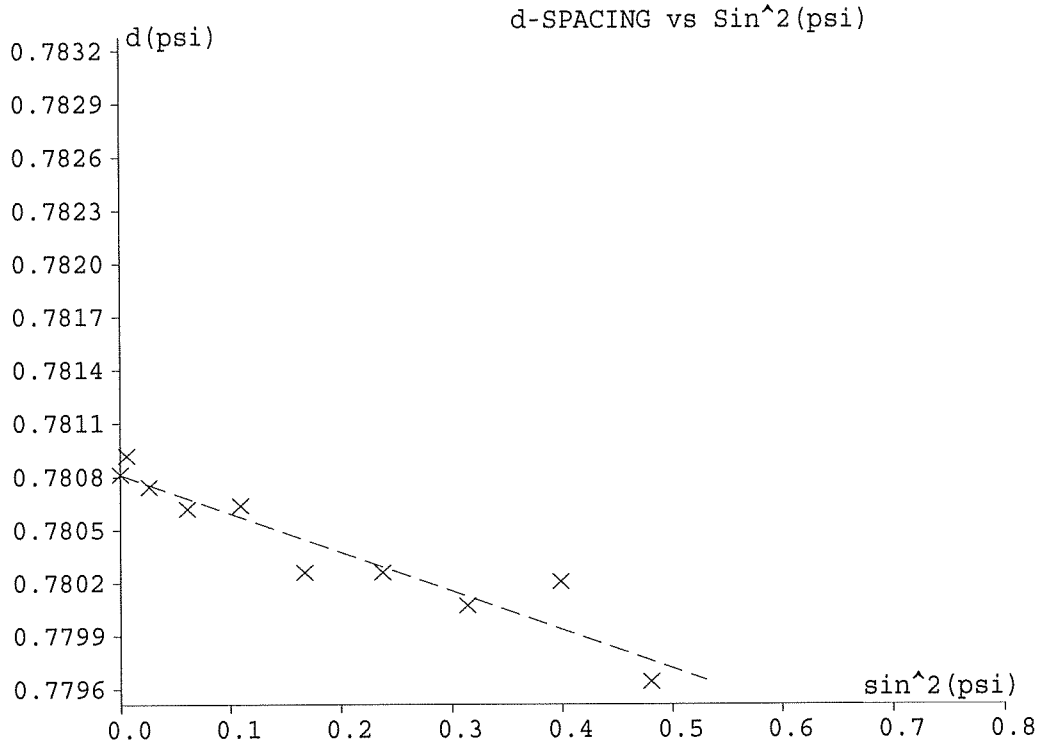


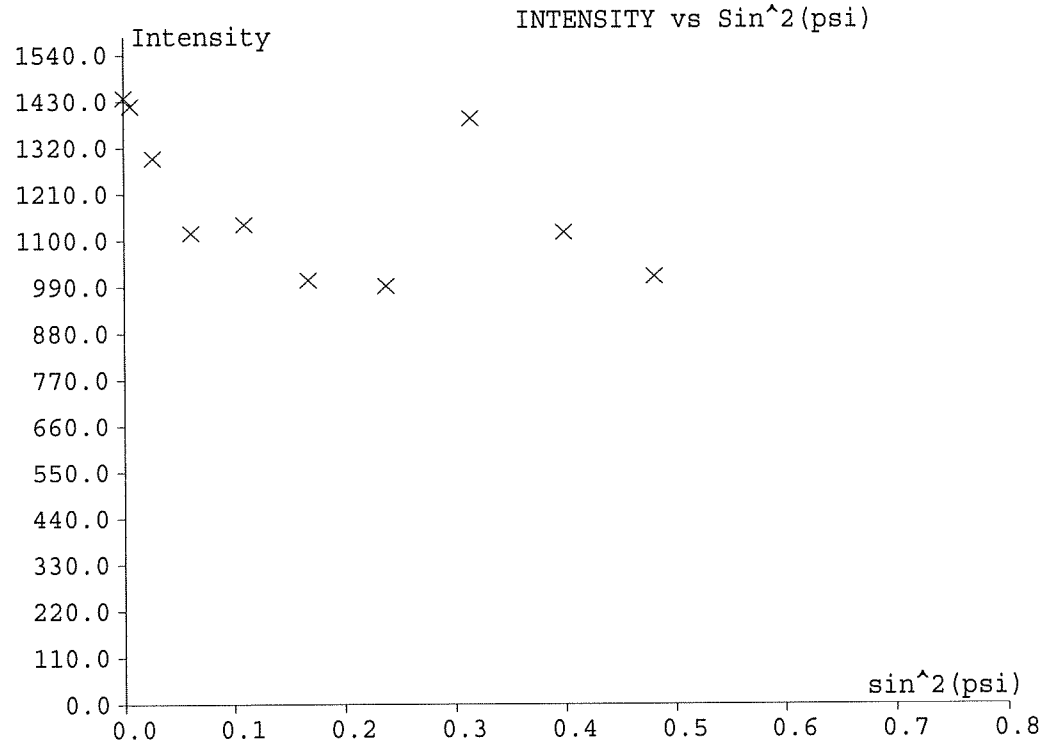



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18449.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 16 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   2:26pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00010   149.67   1438.6   3.31  0.26124    161.16  0.780814  0.000025
  5.0  0.00607   148.26   1419.0   3.24  0.25938    161.06  0.780919  0.000027
 10.0  0.02662   150.63   1295.1   3.32  0.26220    161.22  0.780743  0.000029
 15.0  0.06130   152.29   1117.6   3.24  0.26292    161.33  0.780619  0.000031
 20.0  0.10971   152.06   1138.3   3.36  0.26381    161.31  0.780637  0.000027
 25.0  0.16769   157.27   1006.5   3.48  0.26955    161.65  0.780260  0.000038
 30.0  0.23761   157.23    992.3   3.20  0.26664    161.65  0.780260  0.000029
 35.0  0.31411   159.87   1389.2   3.26  0.26962    161.83  0.780072  0.000026
 40.0  0.39860   157.93   1119.1   3.06  0.26517    161.70  0.780208  0.000032
 45.0  0.48058   166.09   1014.7   3.53  0.27852    162.23  0.779641  0.000033

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780812
Slope of Fitted Line...............:     -0.002193
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -22.4 KSI    -154.3 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       4.1 MPa
Probable error.................(+/-):      2.7 KSI      18.5 MPa
```

File: S:\1005\2005\SBIR\50632\18449.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 16 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -22.4 KSI | -154.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.1 MPa |
| Probable error.....(+/-): | 2.7 KSI | 18.5 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18450.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 16 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time: 6/01/2005 2:34pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00014 | 152.48 | 1415.6 | 3.19 | 0.26247 | 161.34 | 0.780605 | 0.000028 |
| 5.0 | 0.00580 | 151.31 | 1206.3 | 3.08 | 0.25999 | 161.27 | 0.780689 | 0.000024 |
| 10.0 | 0.02606 | 153.67 | 1329.1 | 3.20 | 0.26357 | 161.42 | 0.780518 | 0.000024 |
| 15.0 | 0.06084 | 154.00 | 1376.0 | 3.28 | 0.26482 | 161.44 | 0.780494 | 0.000041 |
| 20.0 | 0.10922 | 153.43 | 1205.1 | 3.25 | 0.26396 | 161.40 | 0.780536 | 0.000029 |
| 25.0 | 0.16745 | 157.81 | 1246.4 | 3.34 | 0.26867 | 161.69 | 0.780220 | 0.000036 |
| 30.0 | 0.23874 | 154.90 | 1198.7 | 3.16 | 0.26411 | 161.50 | 0.780428 | 0.000021 |
| 35.0 | 0.31659 | 155.14 | 1260.9 | 3.00 | 0.26210 | 161.52 | 0.780408 | 0.000019 |
| 40.0 | 0.40060 | 154.33 | 1134.9 | 2.98 | 0.26119 | 161.47 | 0.780466 | 0.000020 |
| 45.0 | 0.48264 | 162.45 | 1288.5 | 3.54 | 0.27507 | 161.99 | 0.779894 | 0.000043 |

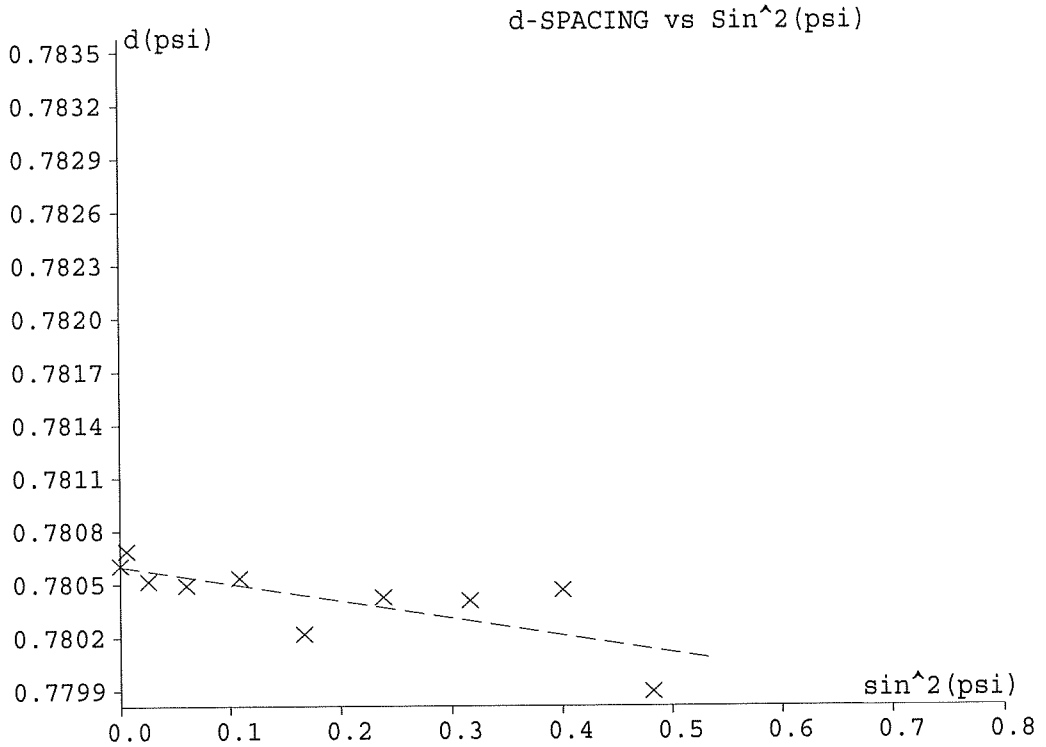
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780601
Slope of Fitted Line.....: -0.0009698
Material Stress Constant.....: 1.255E-07

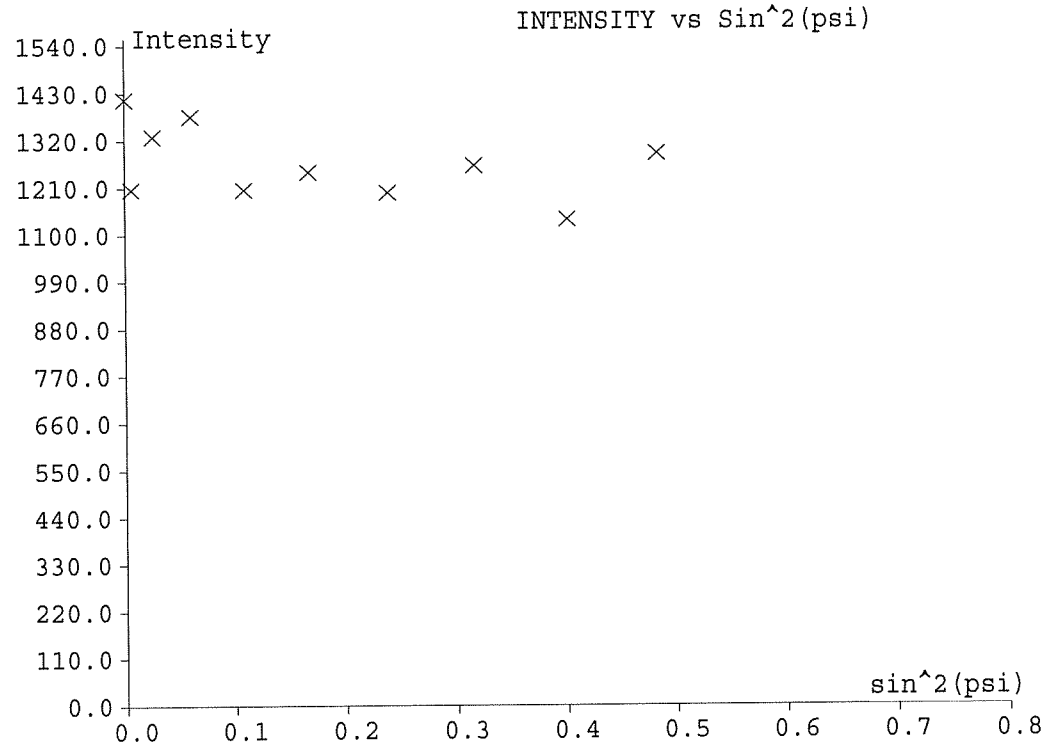
*Residual Stress.....: -9.9 KSI -68.3 MPa

Counting Statistics Stress Error (+/-): 0.6 KSI 4.4 MPa
Probable error.....(+/-): 3.1 KSI 21.6 MPa

File: S:\1005\2005\SBIR\50632\18450.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 16 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -9.9 KSI | -68.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.4 MPa |
| Probable error.....(+/-): | 3.1 KSI | 21.6 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18451.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 17 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time: 6/01/2005 2:41pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00010 | 149.90 | 1002.2 | 3.55 | 0.26359 | 161.17 | 0.780799 | 0.000039 |
| 5.0 | 0.00579 | 151.46 | 1129.4 | 3.36 | 0.26326 | 161.27 | 0.780682 | 0.000029 |
| 10.0 | 0.02673 | 150.05 | 1128.6 | 3.51 | 0.26337 | 161.18 | 0.780788 | 0.000042 |
| 15.0 | 0.06171 | 150.81 | 1074.0 | 3.26 | 0.26179 | 161.23 | 0.780729 | 0.000032 |
| 20.0 | 0.10856 | 155.27 | 1002.8 | 3.29 | 0.26593 | 161.52 | 0.780402 | 0.000034 |
| 25.0 | 0.16794 | 156.70 | 846.3 | 3.73 | 0.27101 | 161.61 | 0.780303 | 0.000039 |
| 30.0 | 0.23774 | 157.04 | 892.4 | 3.79 | 0.27174 | 161.64 | 0.780279 | 0.000035 |
| 35.0 | 0.31387 | 160.36 | 895.2 | 3.40 | 0.27158 | 161.86 | 0.780039 | 0.000035 |
| 40.0 | 0.39368 | 166.91 | 1123.8 | 3.63 | 0.28011 | 162.28 | 0.779586 | 0.000032 |
| 45.0 | 0.47961 | 167.74 | 1110.4 | 3.14 | 0.27440 | 162.34 | 0.779522 | 0.000023 |

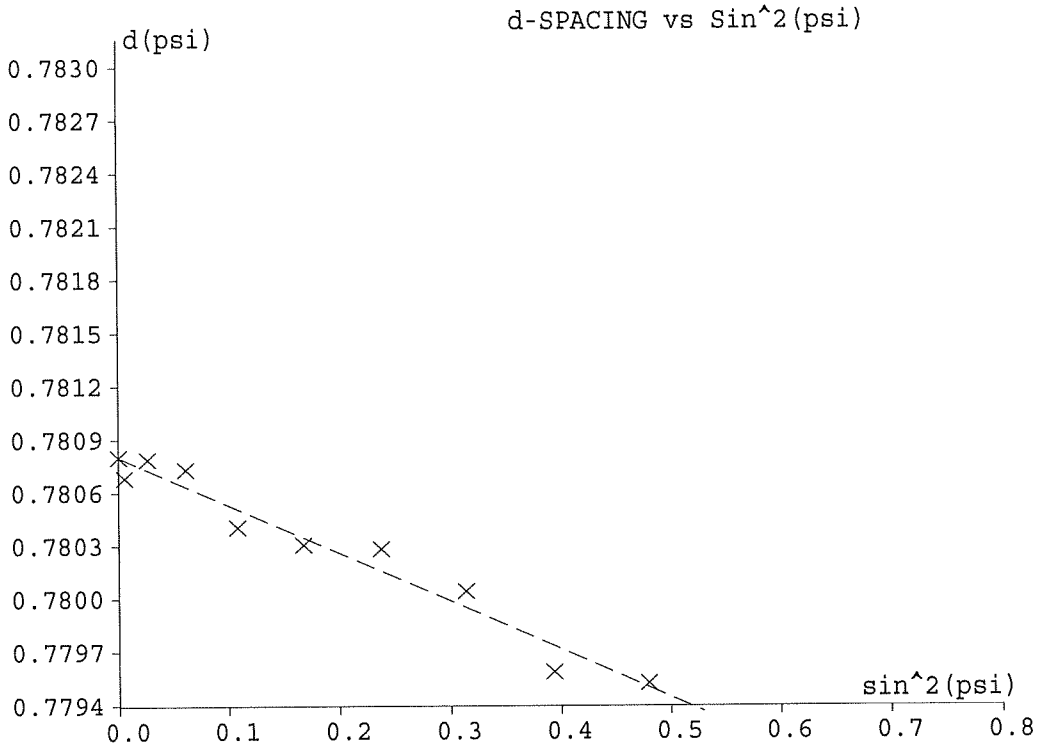
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780800
Slope of Fitted Line.....: -0.002711
Material Stress Constant.....: 1.255E-07

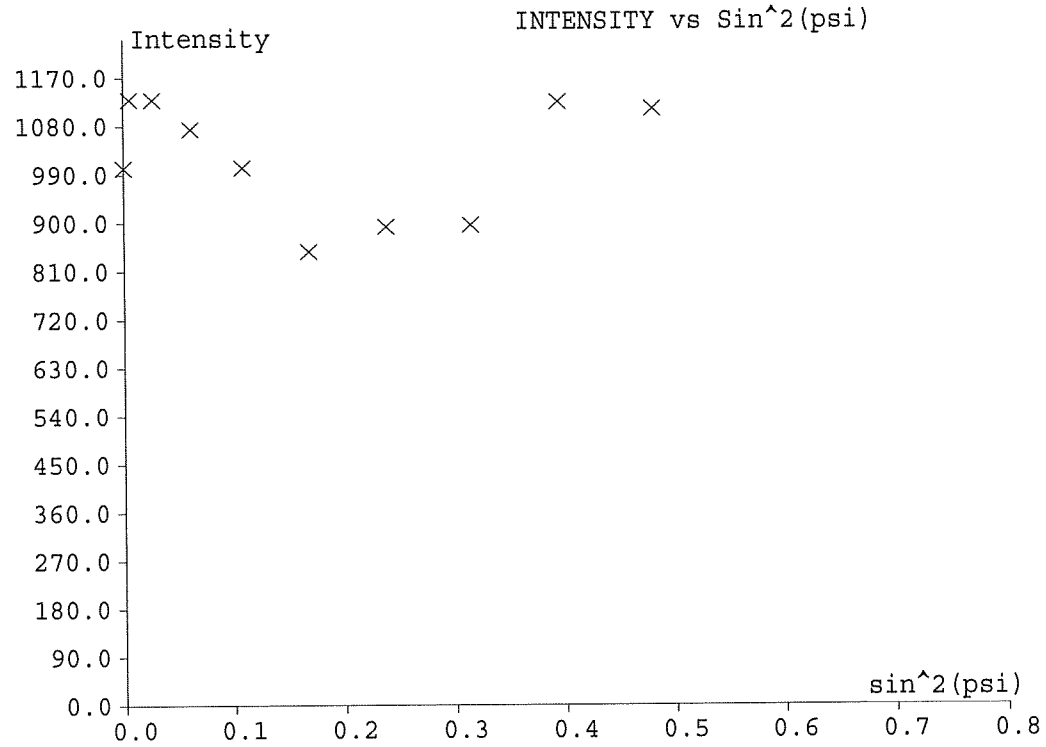
*Residual Stress.....: -27.7 KSI -190.8 MPa

Counting Statistics Stress Error (+/-): 0.6 KSI 4.3 MPa
Probable error.....(+/-): 2.0 KSI 13.9 MPa

File: S:\1005\2005\SBIR\50632\18451.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 17 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -27.7 KSI | -190.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.3 MPa |
| Probable error.....(+/-): | 2.0 KSI | 13.9 MPa |

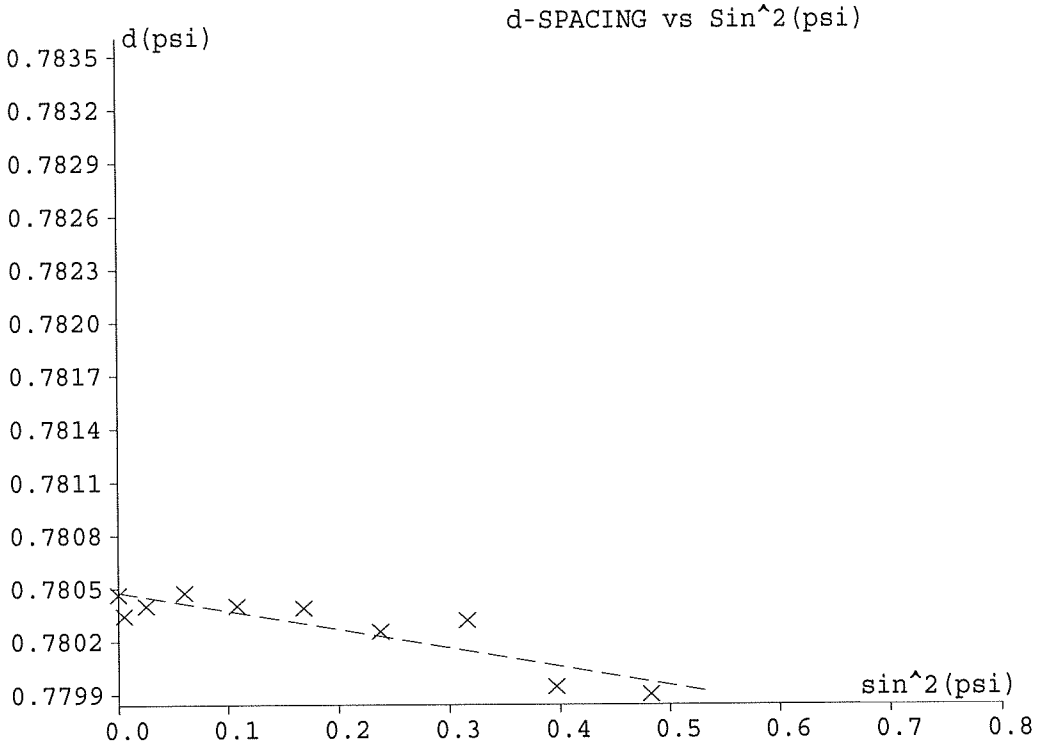


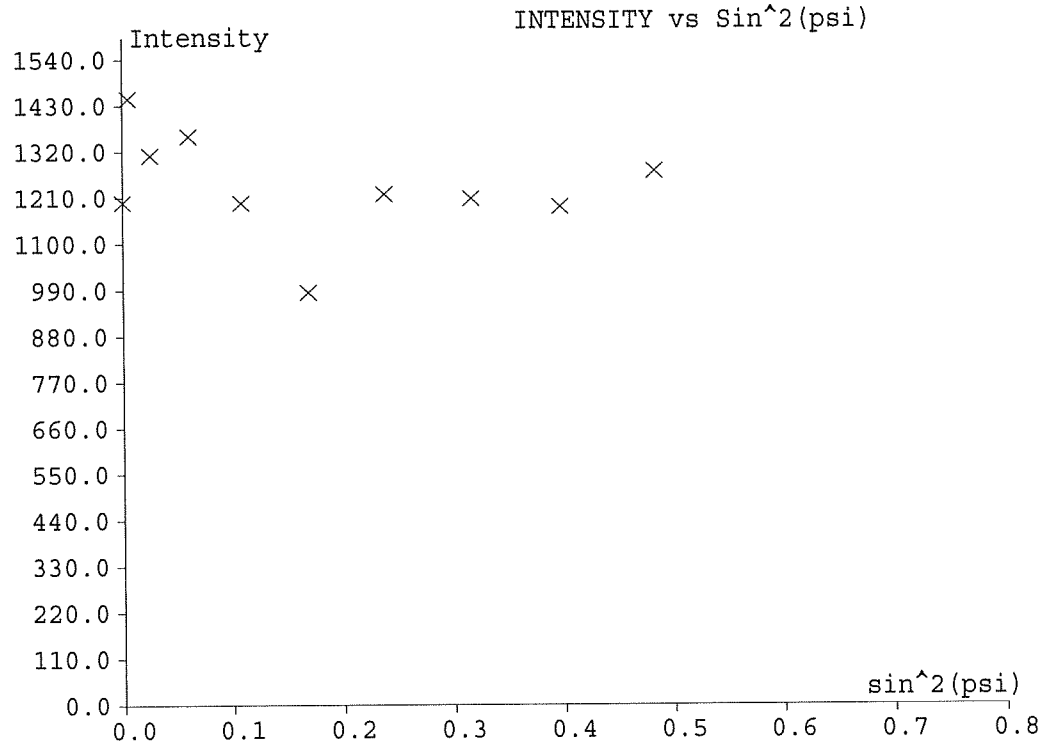



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18452.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 17 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   2:49pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00016   154.39   1198.8   3.34  0.26566    161.47  0.780467  0.000029
  5.0  0.00539   156.07   1446.6   3.28  0.26659    161.58  0.780345  0.000028
 10.0  0.02577   155.29   1311.0   3.25  0.26563    161.53  0.780401  0.000044
 15.0  0.06076   154.26   1356.7   3.23  0.26449    161.46  0.780475  0.000026
 20.0  0.10856   155.24   1197.3   3.09  0.26351    161.53  0.780402  0.000028
 25.0  0.16845   155.46    984.5   3.38  0.26700    161.54  0.780389  0.000041
 30.0  0.23758   157.26   1217.9   3.05  0.26454    161.66  0.780255  0.000022
 35.0  0.31593   156.28   1206.9   2.69  0.25656    161.60  0.780318  0.000019
 40.0  0.39652   161.71   1187.1   3.35  0.27224    161.94  0.779943  0.000034
 45.0  0.48269   162.28   1271.6   3.11  0.26947    161.98  0.779900  0.000028

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780479
Slope of Fitted Line...............:     -0.001055
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -10.8 KSI     -74.2 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       4.2 MPa
Probable error.................(+/-):      2.0 KSI      13.7 MPa
```

File: S:\1005\2005\SBIR\50632\18452.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 17 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -10.8 KSI | -74.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.2 MPa |
| Probable error.....(+/-): | 2.0 KSI | 13.7 MPa |

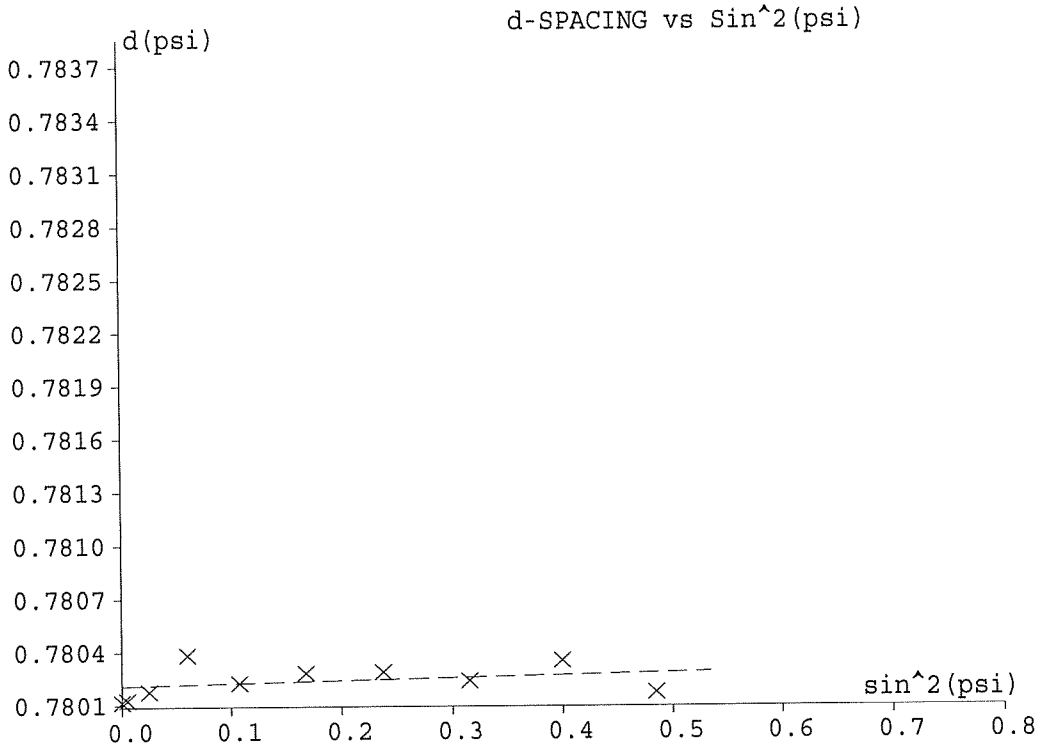


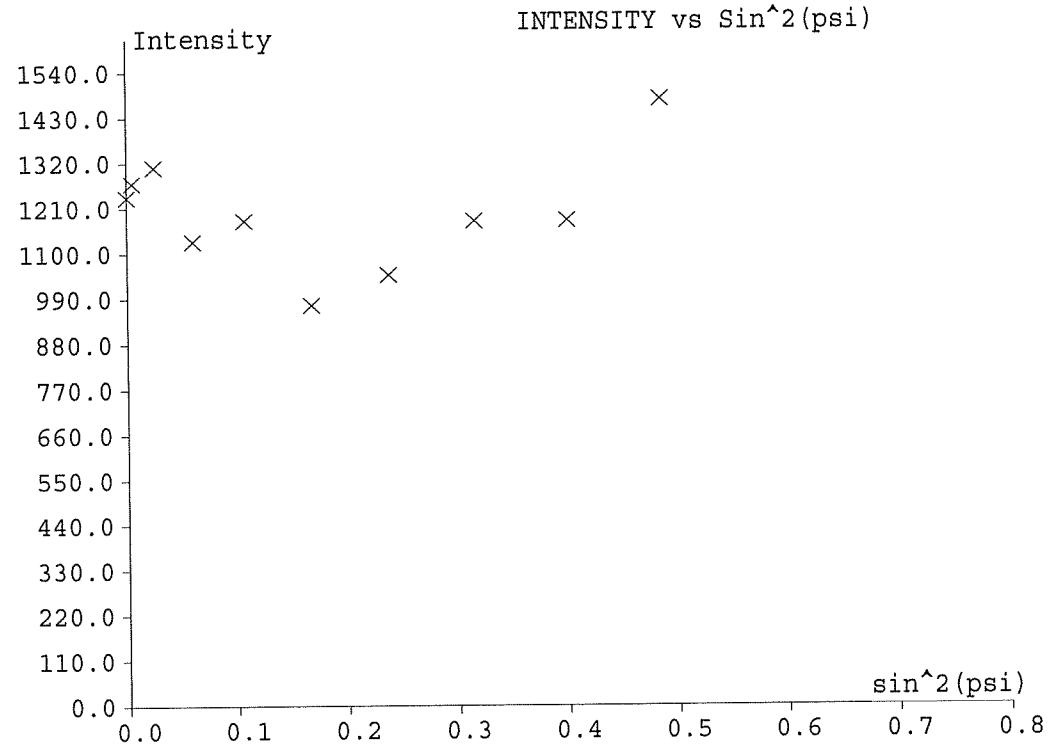



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18453.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 17 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   2:56pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00024   159.21   1236.8   3.14  0.26749    161.78  0.780117  0.000026
  5.0  0.00514   159.06   1270.5   3.09  0.26660    161.77  0.780127  0.000025
 10.0  0.02521   158.37   1309.6   3.13  0.26663    161.73  0.780177  0.000028
 15.0  0.06041   155.51   1128.5   3.12  0.26408    161.54  0.780382  0.000026
 20.0  0.10769   157.70   1179.0   3.08  0.26540    161.69  0.780224  0.000022
 25.0  0.16780   156.98    974.0   3.24  0.26699    161.64  0.780279  0.000033
 30.0  0.23778   156.77   1046.5   2.80  0.25963    161.63  0.780285  0.000025
 35.0  0.31531   157.51   1177.4   2.85  0.26131    161.68  0.780233  0.000020
 40.0  0.39969   155.95   1179.0   2.97  0.26235    161.57  0.780349  0.000022
 45.0  0.48484   158.45   1473.3   2.96  0.26410    161.74  0.780168  0.000019

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780208
Slope of Fitted Line...............:     0.0001447
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:      1.5 KSI      10.2 MPa

Counting Statistics Stress Error (+/-):      0.4 KSI       3.1 MPa
Probable error.................(+/-):      1.8 KSI      12.4 MPa
```

File: S:\1005\2005\SBIR\50632\18453.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 17 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | 1.5 KSI | 10.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.4 KSI | 3.1 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.4 MPa |

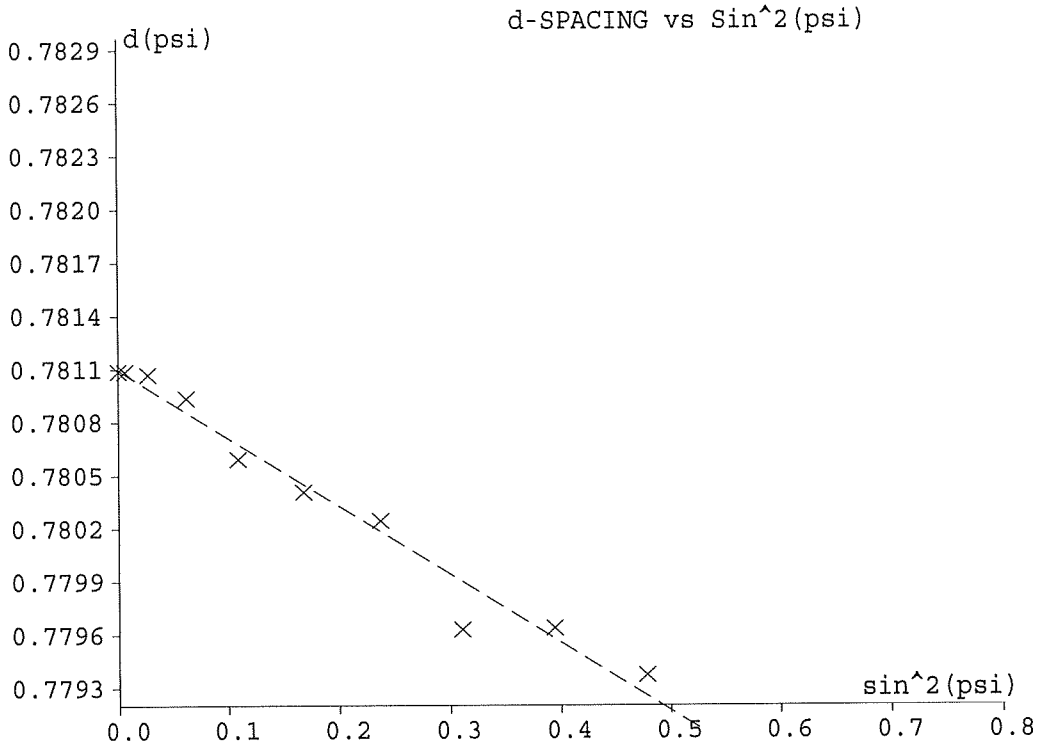


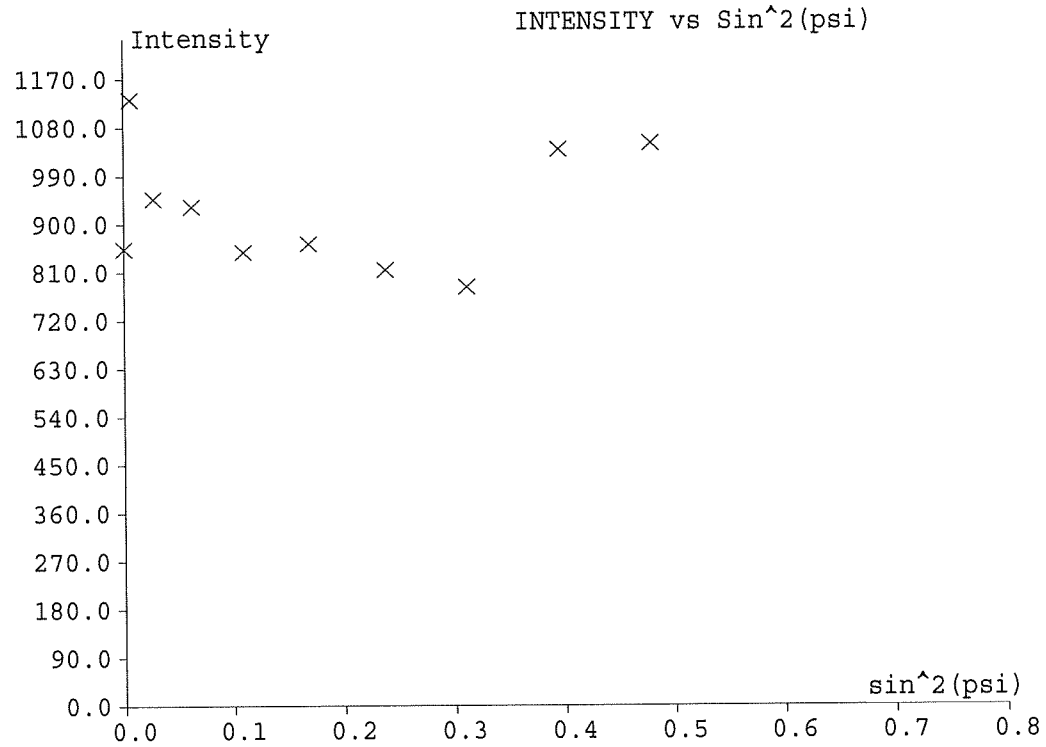



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18454.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 18 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   3:04pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00006   146.01    853.9   3.22  0.25730    160.92  0.781087  0.000044
  5.0  0.00627   146.01   1131.7   3.12  0.25611    160.92  0.781086  0.000027
 10.0  0.02743   146.26    947.1   3.34  0.25851    160.93  0.781069  0.000035
 15.0  0.06248   148.08    932.9   3.67  0.26300    161.05  0.780936  0.000035
 20.0  0.10949   152.71    847.4   3.64  0.26681    161.35  0.780592  0.000052
 25.0  0.16854   155.28    863.1   3.63  0.26901    161.52  0.780405  0.000069
 30.0  0.23749   157.55    814.4   3.78  0.27212    161.67  0.780243  0.000033
 35.0  0.31078   166.32    782.1   4.03  0.28229    162.24  0.779629  0.000044
 40.0  0.39410   166.16   1038.9   3.71  0.28004    162.23  0.779638  0.000040
 45.0  0.47838   170.02   1050.0   3.54  0.28235    162.48  0.779374  0.000027

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781097
Slope of Fitted Line...............:     -0.003849
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -39.3 KSI    -270.7 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.8 MPa
Probable error.................(+/-):      2.4 KSI      16.6 MPa
```

File: S:\1005\2005\SBIR\50632\18454.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 18 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -39.3 KSI | -270.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.8 MPa |
| Probable error.....(+/-): | 2.4 KSI | 16.6 MPa |

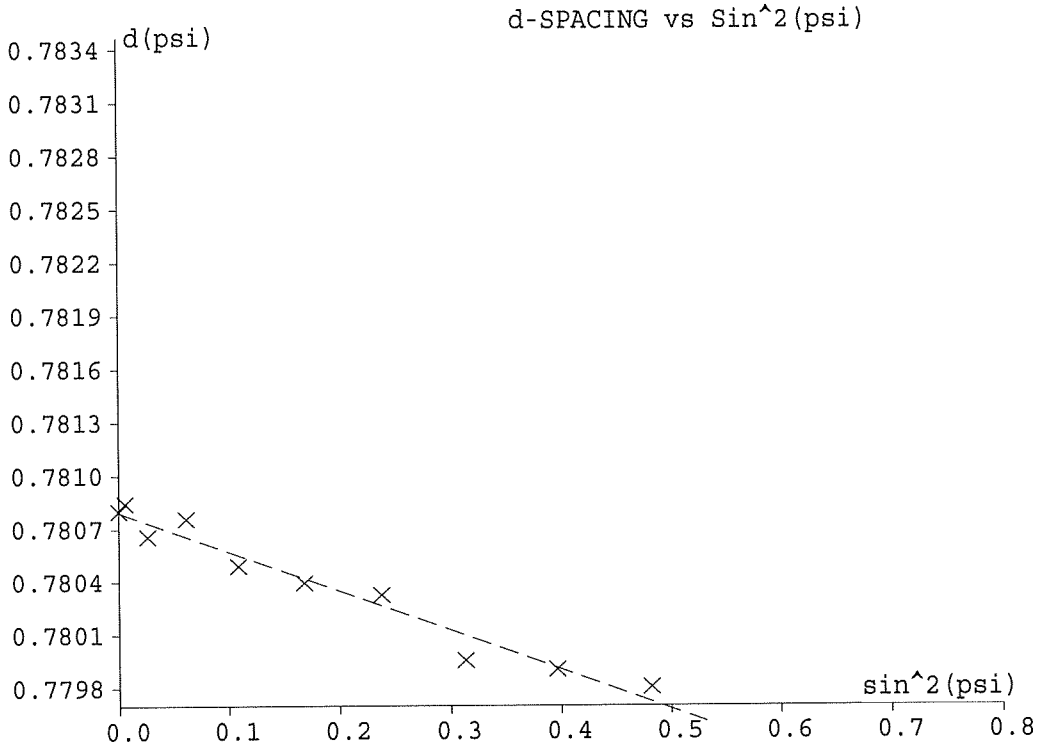


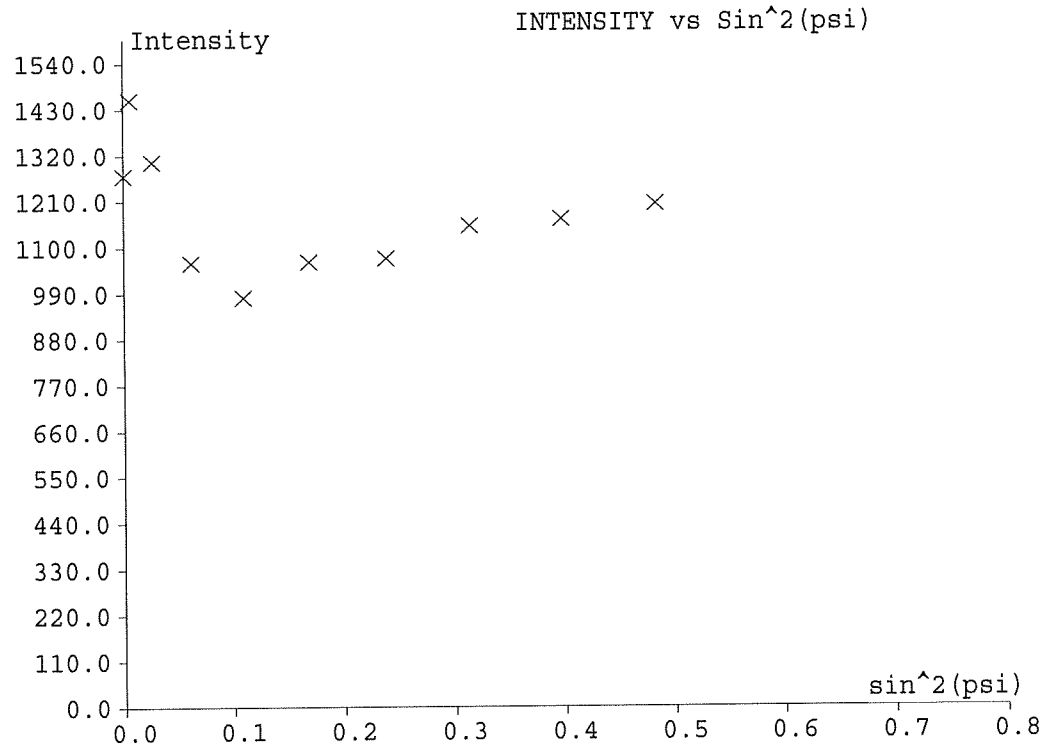



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18455.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 18 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   3:12pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00010   149.85   1271.0   3.33  0.26161    161.17  0.780800  0.000027
  5.0  0.00598   149.25   1452.0   3.19  0.25972    161.13  0.780844  0.000029
 10.0  0.02640   151.80   1304.5   3.28  0.26287    161.30  0.780656  0.000028
 15.0  0.06182   150.47   1063.1   3.53  0.26399    161.21  0.780757  0.000040
 20.0  0.10899   154.04    980.5   3.17  0.26356    161.45  0.780490  0.000027
 25.0  0.16849   155.35   1065.7   3.18  0.26477    161.53  0.780395  0.000035
 30.0  0.23806   156.32   1074.2   3.26  0.26655    161.59  0.780326  0.000034
 35.0  0.31324   161.53   1151.3   3.29  0.27135    161.93  0.779955  0.000033
 40.0  0.39622   162.22   1166.9   3.14  0.26986    161.98  0.779905  0.000029
 45.0  0.48193   163.64   1203.4   3.18  0.27170    162.07  0.779806  0.000023

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780793
Slope of Fitted Line...............:     -0.00222
Material Stress Constant...........:    1.255E-07

*Residual Stress...................:    -22.7 KSI    -156.2 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       3.8 MPa
Probable error.................(+/-):      1.7 KSI      11.4 MPa
```

File: S:\1005\2005\SBIR\50632\18455.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 18 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -22.7 KSI | -156.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 3.8 MPa |
| Probable error.....(+/-): | 1.7 KSI | 11.4 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18456.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 18 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time: 6/01/2005 3:19pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00020 | 156.59 | 1435.2 | 3.32 | 0.26740 | 161.61 | 0.780307 | 0.000026 |
| 5.0 | 0.00562 | 153.34 | 1322.0 | 3.22 | 0.26362 | 161.40 | 0.780542 | 0.000024 |
| 10.0 | 0.02543 | 157.10 | 1204.3 | 2.98 | 0.26347 | 161.65 | 0.780266 | 0.000026 |
| 15.0 | 0.06037 | 155.69 | 1108.8 | 3.11 | 0.26404 | 161.55 | 0.780370 | 0.000027 |
| 20.0 | 0.10802 | 156.70 | 1172.1 | 2.87 | 0.26094 | 161.62 | 0.780292 | 0.000025 |
| 25.0 | 0.16839 | 155.57 | 1077.3 | 3.15 | 0.26456 | 161.55 | 0.780378 | 0.000026 |
| 30.0 | 0.23853 | 155.22 | 1078.5 | 2.77 | 0.25791 | 161.53 | 0.780397 | 0.000022 |
| 35.0 | 0.31336 | 161.30 | 1189.9 | 3.25 | 0.27077 | 161.92 | 0.779971 | 0.000047 |
| 40.0 | 0.39743 | 160.00 | 1282.6 | 2.99 | 0.26582 | 161.84 | 0.780058 | 0.000025 |
| 45.0 | 0.48413 | 159.66 | 1292.0 | 2.79 | 0.26172 | 161.82 | 0.780079 | 0.000018 |

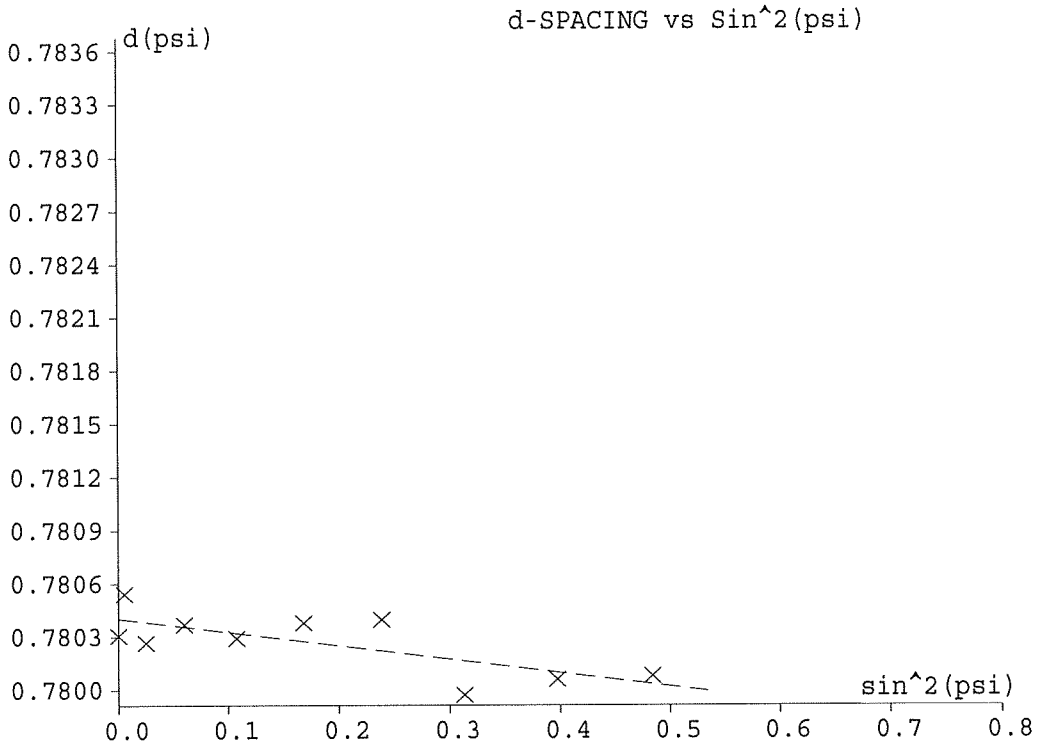
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780404
Slope of Fitted Line.....: -0.0007666
Material Stress Constant.....: 1.255E-07

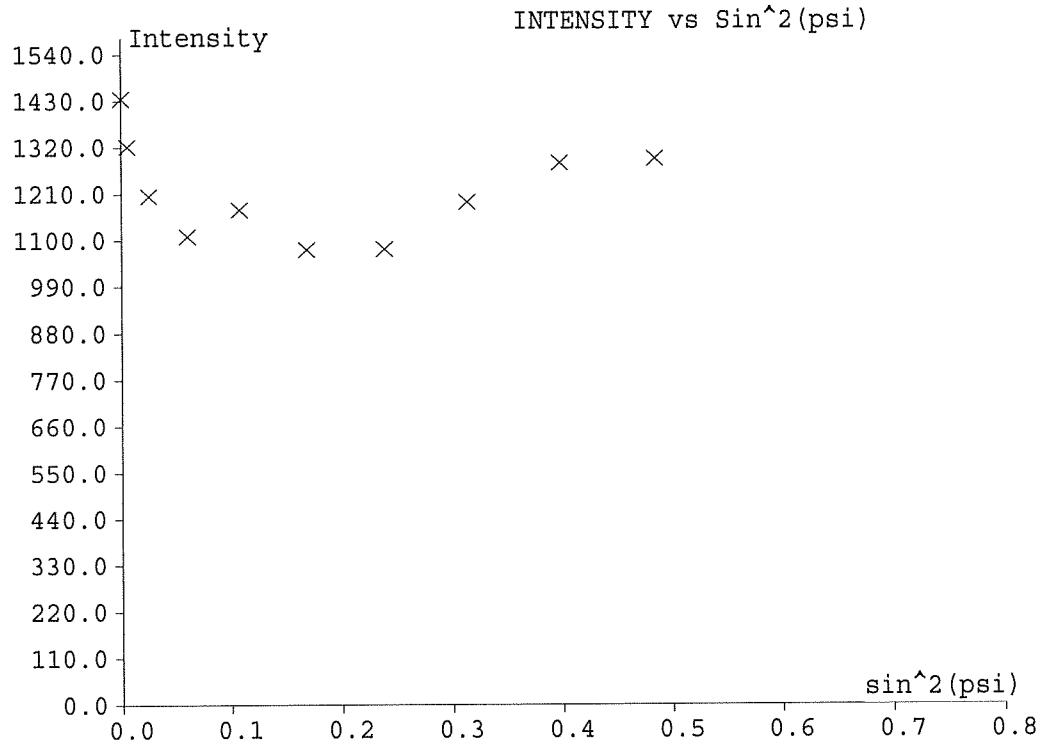
*Residual Stress.....: -7.8 KSI -54.0 MPa

Counting Statistics Stress Error (+/-): 0.5 KSI 3.4 MPa
Probable error.....(+/-): 2.5 KSI 17.2 MPa

File: S:\1005\2005\SBIR\50632\18456.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 18 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -7.8 KSI | -54.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.4 MPa |
| Probable error.....(+/-): | 2.5 KSI | 17.2 MPa |



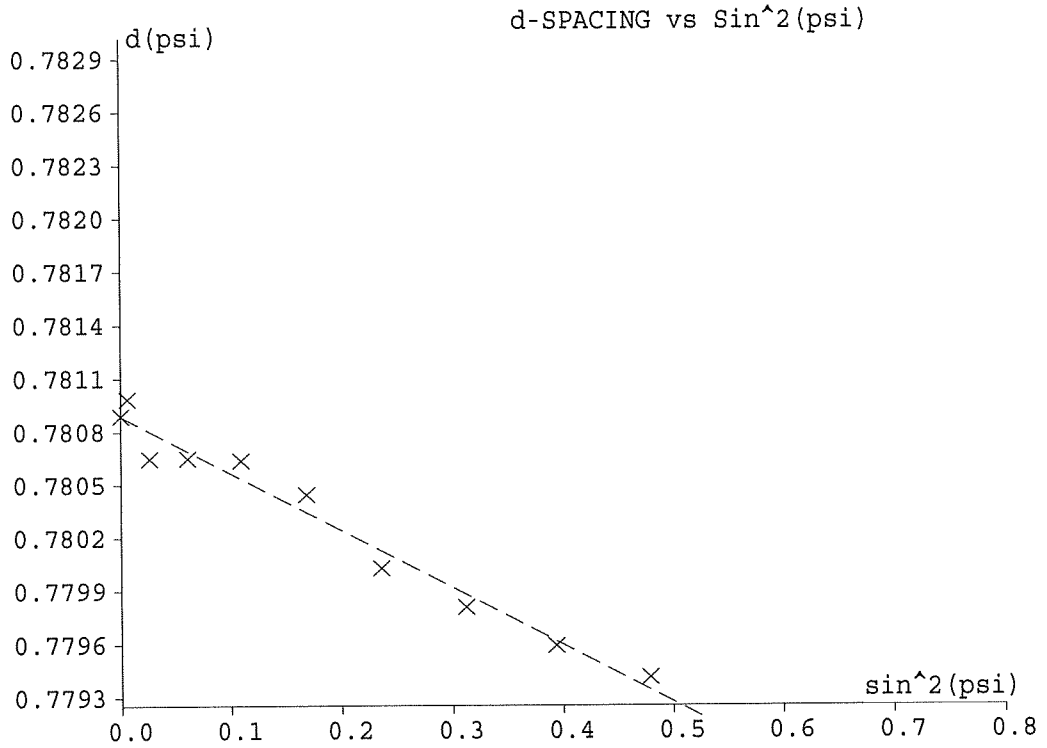
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18457.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 19 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   3:26pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227
```

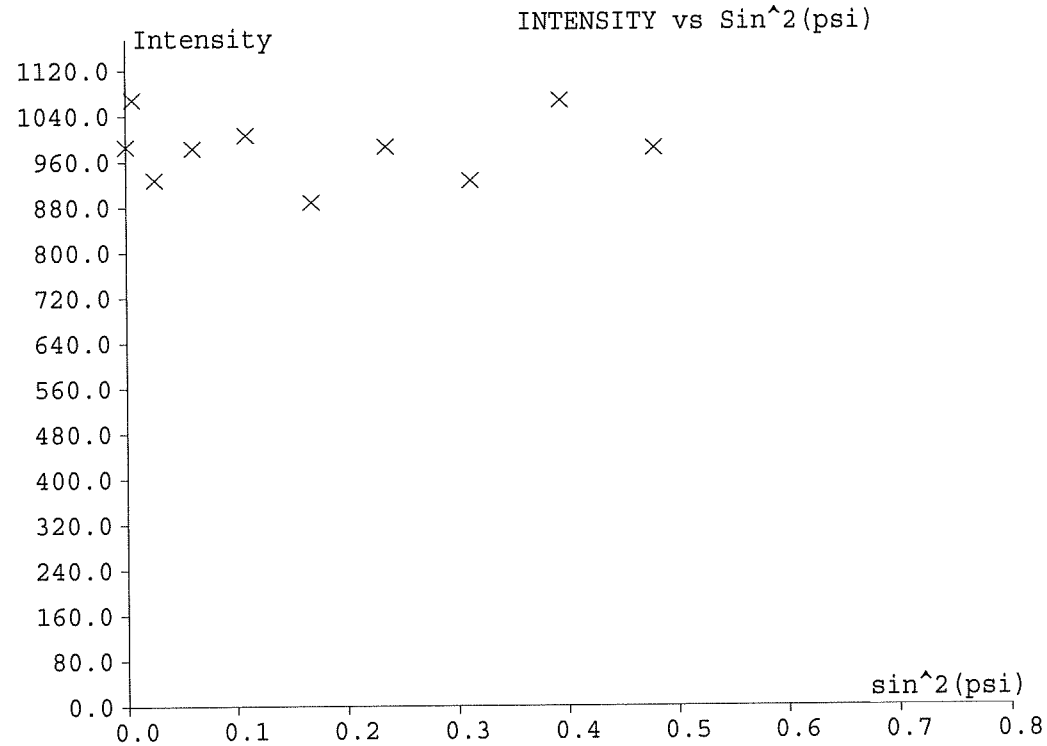
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00009 | 148.66 | 986.0 | 3.34 | 0.26064 | 161.09 | 0.780889 | 0.000035 |
| 5.0 | 0.00615 | 147.36 | 1068.1 | 3.16 | 0.25776 | 161.01 | 0.780985 | 0.000040 |
| 10.0 | 0.02638 | 151.94 | 928.0 | 3.55 | 0.26542 | 161.30 | 0.780648 | 0.000033 |
| 15.0 | 0.06141 | 151.95 | 983.3 | 3.73 | 0.26687 | 161.30 | 0.780649 | 0.000065 |
| 20.0 | 0.10970 | 152.07 | 1006.2 | 3.30 | 0.26327 | 161.31 | 0.780636 | 0.000031 |
| 25.0 | 0.16878 | 154.72 | 888.5 | 3.48 | 0.26733 | 161.49 | 0.780444 | 0.000033 |
| 30.0 | 0.23603 | 160.54 | 986.0 | 3.60 | 0.27361 | 161.87 | 0.780028 | 0.000044 |
| 35.0 | 0.31214 | 163.67 | 926.2 | 3.65 | 0.27707 | 162.07 | 0.779809 | 0.000045 |
| 40.0 | 0.39373 | 166.80 | 1066.5 | 3.52 | 0.27905 | 162.27 | 0.779592 | 0.000037 |
| 45.0 | 0.47870 | 169.43 | 983.1 | 3.46 | 0.28061 | 162.44 | 0.779413 | 0.000027 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780888
Slope of Fitted Line...............:     -0.003227
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -32.9 KSI    -227.0 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       5.0 MPa
Probable error.................(+/-):      2.0 KSI      13.8 MPa
```

File: S:\1005\2005\SBIR\50632\18457.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 19 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -32.9 KSI | -227.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 5.0 MPa |
| Probable error.....(+/-): | 2.0 KSI | 13.8 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: S:\1005\2005\SBIR\50632\18458.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 19 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time: 6/01/2005 3:34pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00011 | 150.20 | 1322.0 | 2.99 | 0.25800 | 161.20 | 0.780770 | 0.000024 |
| 5.0 | 0.00570 | 152.47 | 1570.7 | 3.23 | 0.26302 | 161.34 | 0.780606 | 0.000021 |
| 10.0 | 0.02546 | 157.03 | 1325.0 | 3.40 | 0.26857 | 161.64 | 0.780276 | 0.000040 |
| 15.0 | 0.06111 | 153.00 | 1041.3 | 3.20 | 0.26309 | 161.38 | 0.780566 | 0.000039 |
| 20.0 | 0.10965 | 152.20 | 1128.9 | 3.13 | 0.26142 | 161.32 | 0.780625 | 0.000024 |
| 25.0 | 0.16923 | 153.56 | 1123.5 | 2.90 | 0.25921 | 161.42 | 0.780521 | 0.000022 |
| 30.0 | 0.23701 | 158.51 | 1180.8 | 3.52 | 0.27106 | 161.73 | 0.780172 | 0.000035 |
| 35.0 | 0.31529 | 157.61 | 1132.5 | 3.12 | 0.26585 | 161.68 | 0.780231 | 0.000024 |
| 40.0 | 0.39706 | 160.71 | 1276.2 | 3.16 | 0.26896 | 161.88 | 0.780011 | 0.000026 |
| 45.0 | 0.48223 | 163.14 | 1290.5 | 3.35 | 0.27348 | 162.04 | 0.779843 | 0.000033 |

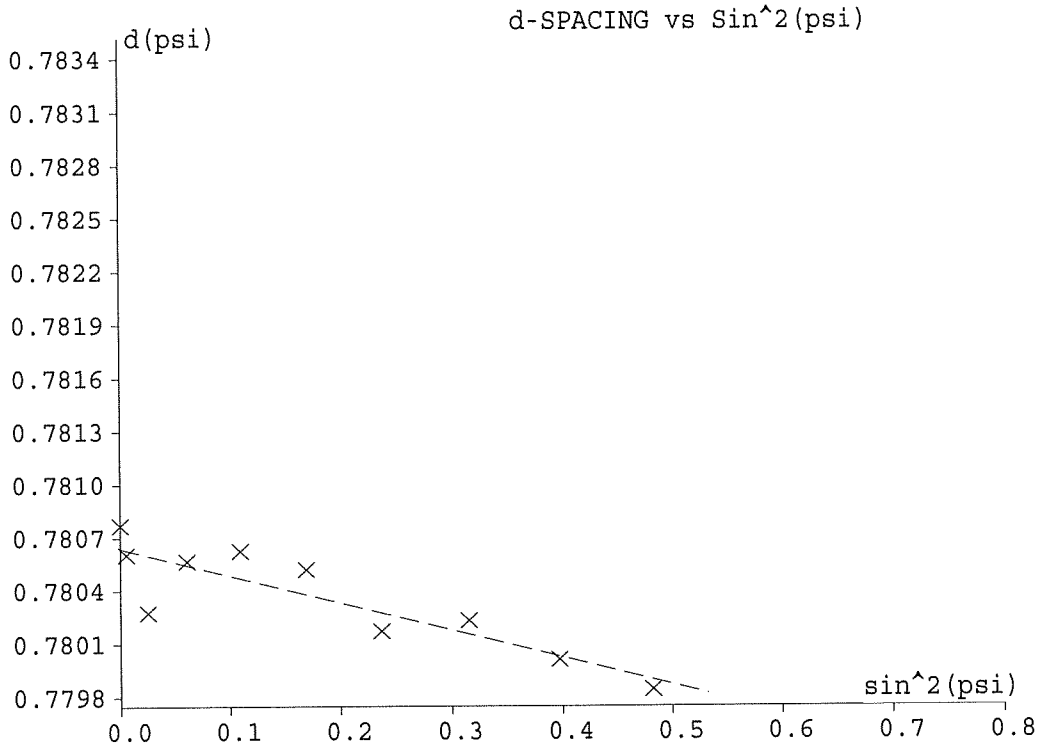
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780639
Slope of Fitted Line.....: -0.001537
Material Stress Constant.....: 1.255E-07

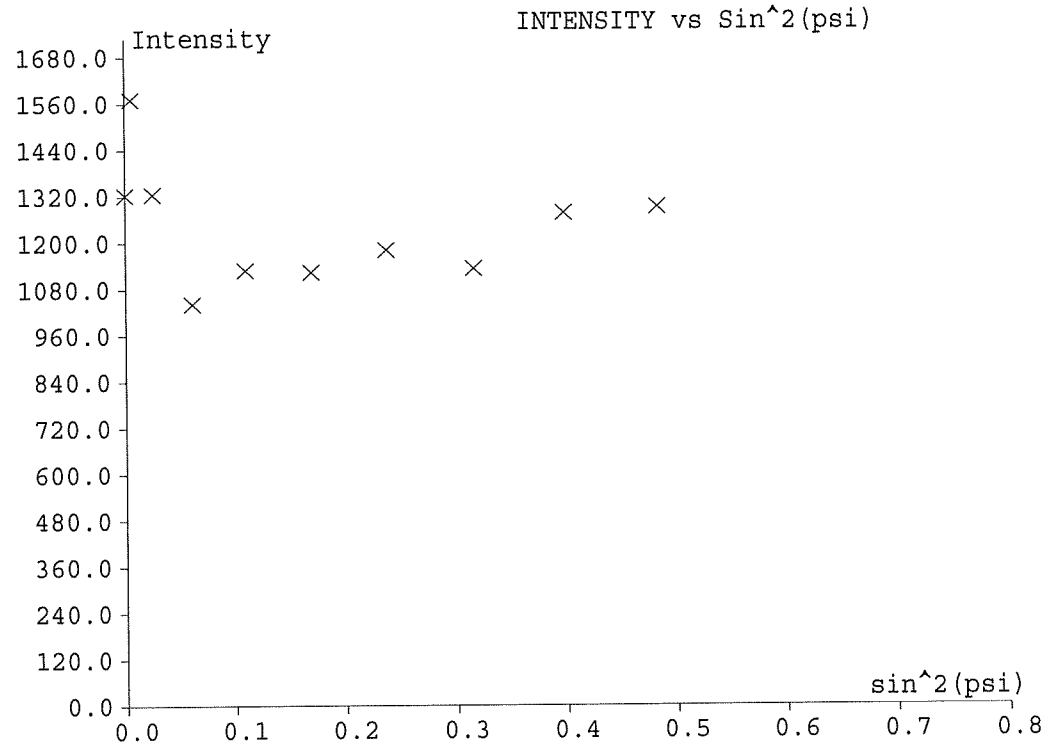
*Residual Stress.....: -15.7 KSI -108.2 MPa

Counting Statistics Stress Error (+/-): 0.6 KSI 4.1 MPa
Probable error.....(+/-): 3.0 KSI 20.9 MPa

File: S:\1005\2005\SBIR\50632\18458.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 19 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -15.7 KSI | -108.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.1 MPa |
| Probable error.....(+/-): | 3.0 KSI | 20.9 MPa |

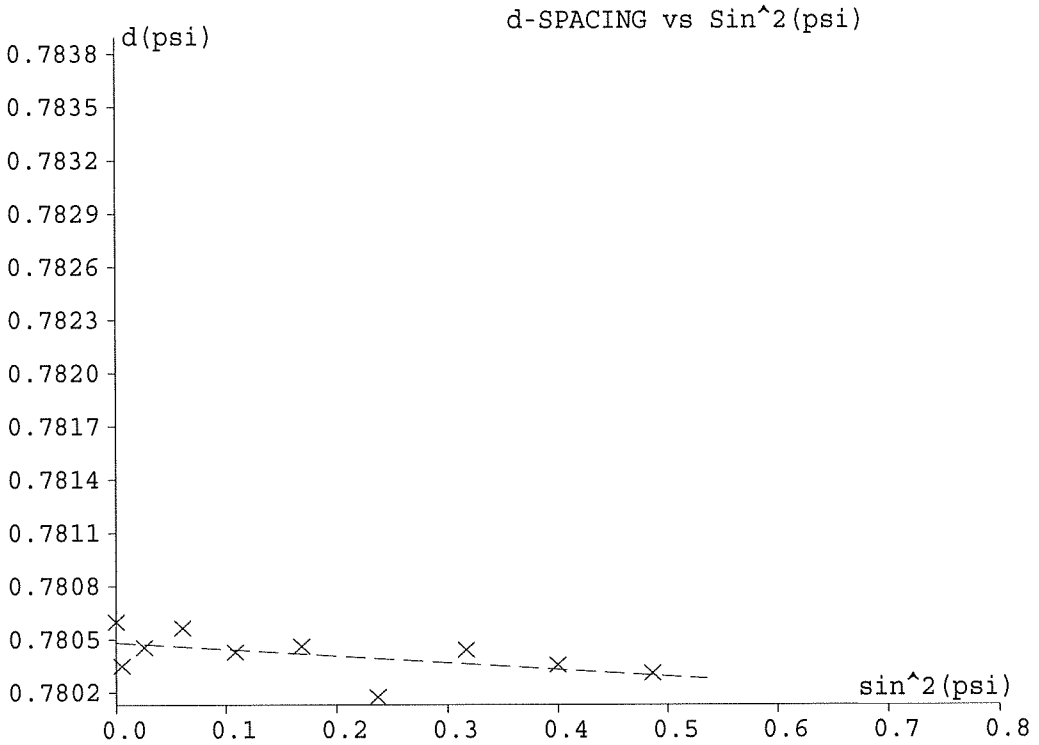


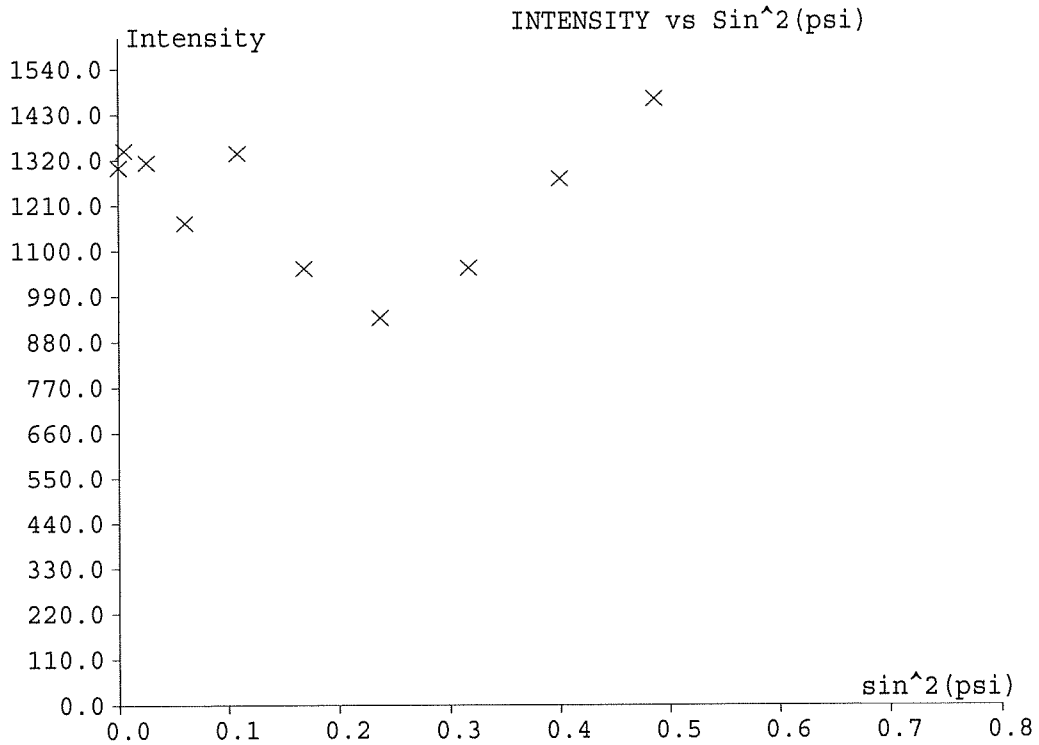



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18459.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 19 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   3:41pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00014   152.50   1301.8   2.90  0.25839    161.35  0.780598  0.000019
  5.0  0.00540   155.97   1342.1   3.11  0.26427    161.57  0.780349  0.000023
 10.0  0.02590   154.54   1313.8   3.16  0.26384    161.48  0.780453  0.000026
 15.0  0.06109   152.98   1167.3   2.93  0.25924    161.38  0.780564  0.000025
 20.0  0.10868   154.93   1336.5   3.28  0.26556    161.50  0.780427  0.000030
 25.0  0.16887   154.42   1057.9   2.99  0.26137    161.47  0.780460  0.000021
 30.0  0.23702   158.42    938.0   3.11  0.26630    161.73  0.780173  0.000032
 35.0  0.31682   154.69   1058.6   2.95  0.26091    161.49  0.780440  0.000020
 40.0  0.39975   155.86   1275.2   3.00  0.26270    161.57  0.780356  0.000022
 45.0  0.48595   156.51   1468.6   2.95  0.26237    161.61  0.780307  0.000019

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780482
Slope of Fitted Line...............:    -0.0003812
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -3.9 KSI     -26.8 MPa

Counting Statistics Stress Error (+/-):      0.4 KSI       2.9 MPa
Probable error.................(+/-):      2.2 KSI      15.1 MPa
```

File: S:\1005\2005\SBIR\50632\18459.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 19 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -3.9 KSI | -26.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.4 KSI | 2.9 MPa |
| Probable error.....(+/-): | 2.2 KSI | 15.1 MPa |

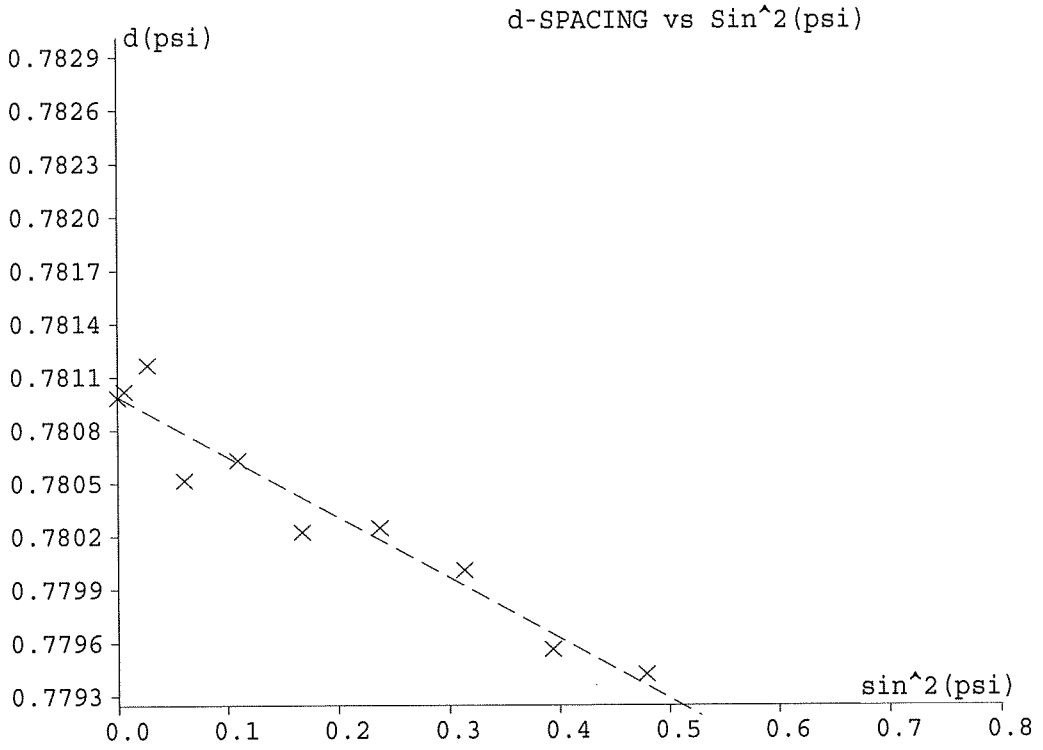


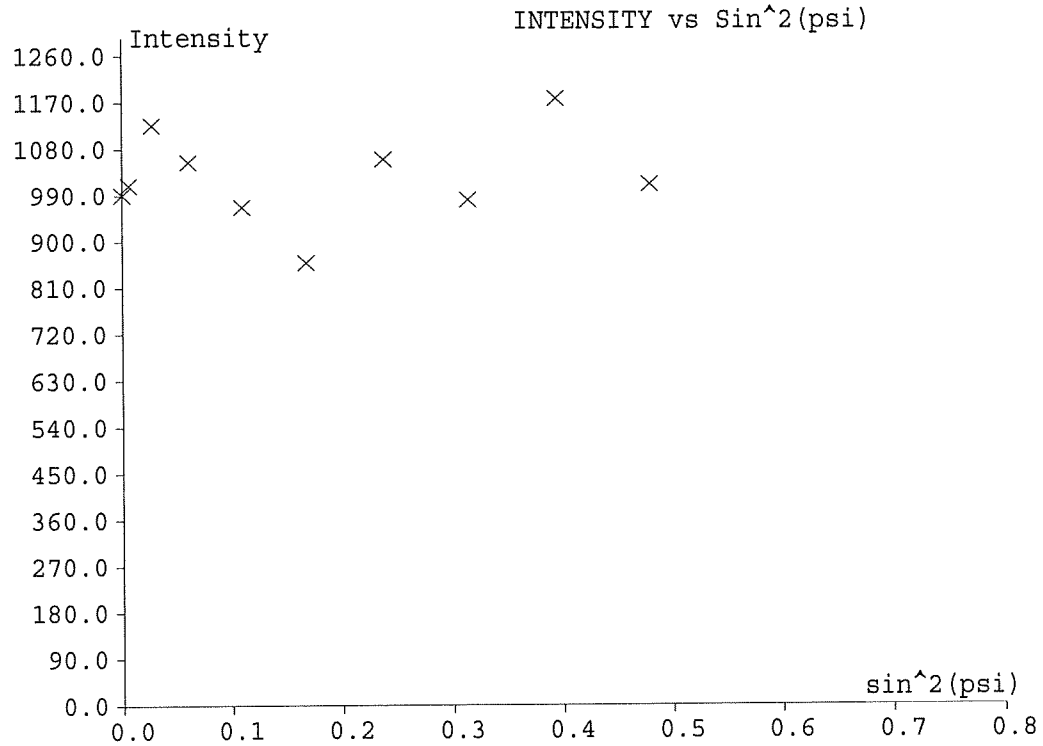



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18460.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 20 / 0.05" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   3:50pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00008   147.44    990.6   3.67  0.26248    161.01  0.780984  0.000039
  5.0  0.00619   146.95   1009.1   3.49  0.26046    160.98  0.781019  0.000030
 10.0  0.02768   144.98   1125.5   3.40  0.25793    160.85  0.781167  0.000028
 15.0  0.06091   153.77   1054.2   3.68  0.26805    161.42  0.780515  0.000037
 20.0  0.10968   152.19    966.6   3.59  0.26599    161.32  0.780630  0.000039
 25.0  0.16748   157.78    858.0   3.62  0.27116    161.69  0.780224  0.000056
 30.0  0.23753   157.46   1059.3   3.66  0.27117    161.66  0.780248  0.000031
 35.0  0.31364   160.80    980.6   3.50  0.27303    161.88  0.780009  0.000033
 40.0  0.39349   167.22   1176.5   3.42  0.27814    162.30  0.779562  0.000026
 45.0  0.47878   169.26   1010.3   3.37  0.27918    162.43  0.779423  0.000027

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780990
Slope of Fitted Line...............:     -0.003406
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -34.7 KSI    -239.6 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       4.2 MPa
Probable error.................(+/-):      3.2 KSI      22.3 MPa
```

File: S:\1005\2005\SBIR\50632\18460.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 20 / 0.05" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -34.7 KSI | -239.6 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.2 MPa |
| Probable error.....(+/-): | 3.2 KSI | 22.3 MPa |

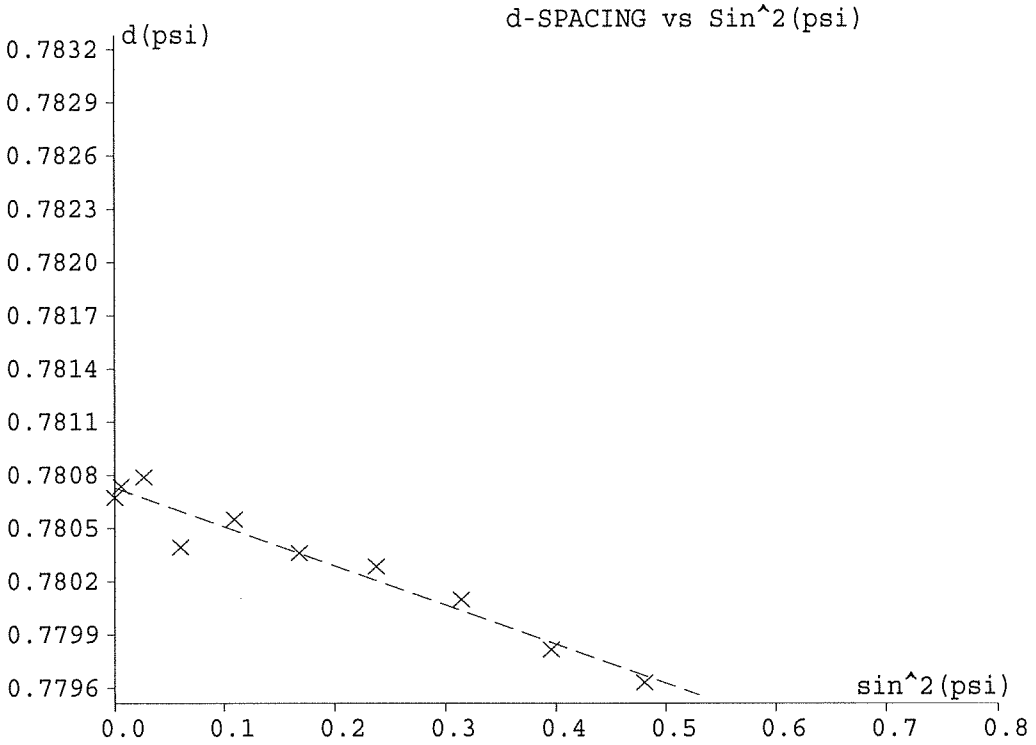


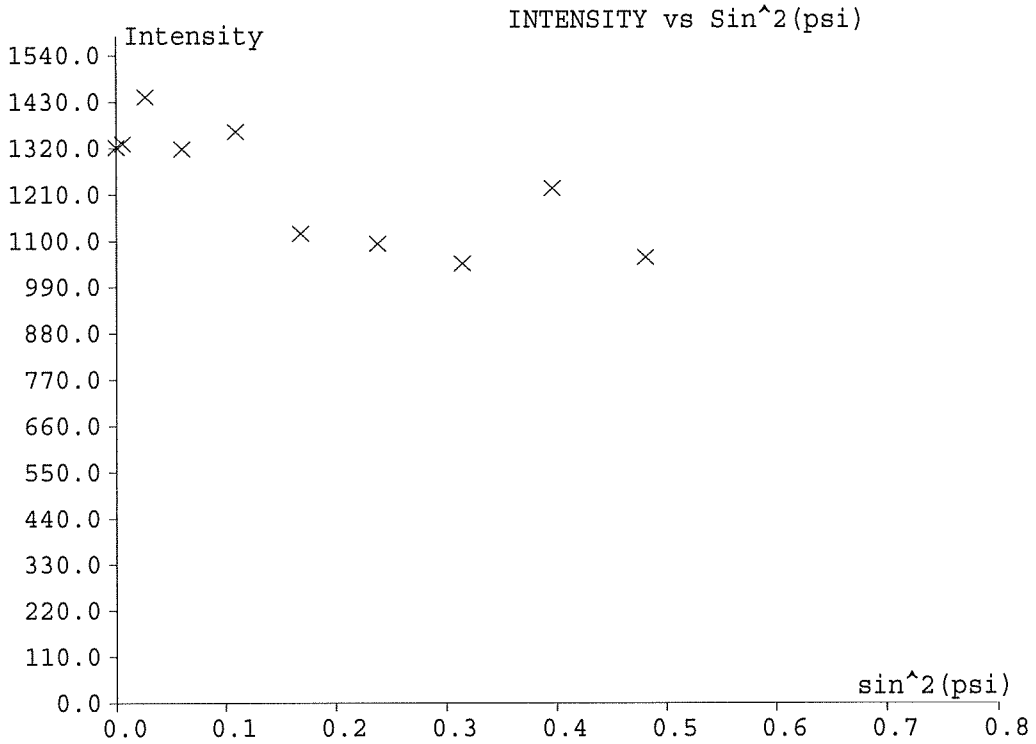



```
================================= TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  S:\1005\2005\SBIR\50632\18461.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 20 / 0.10" from Edge of Hole / Hoop / ebm

Acquisition date & time:   6/01/2005   3:57pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A  -3.15219E-07   B   0.000115735   C  0.0531817      D   147.9227


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00013   151.60   1322.4   3.52  0.26489    161.28  0.780673  0.000027
  5.0  0.00585   150.73   1330.9   3.54  0.26424    161.22  0.780737  0.000030
 10.0  0.02673   150.00   1441.8   3.23  0.26083    161.18  0.780788  0.000023
 15.0  0.06046   155.41   1318.5   3.47  0.26785    161.53  0.780394  0.000033
 20.0  0.10929   153.21   1359.5   3.18  0.26292    161.39  0.780551  0.000026
 25.0  0.16829   155.81   1117.9   3.13  0.26446    161.56  0.780361  0.000032
 30.0  0.23778   156.85   1093.4   3.12  0.26524    161.63  0.780286  0.000031
 35.0  0.31431   159.45   1046.2   3.11  0.26722    161.80  0.780099  0.000026
 40.0  0.39552   163.50   1226.0   3.31  0.27338    162.06  0.779817  0.000028
 45.0  0.48050   166.18   1061.4   3.25  0.27494    162.24  0.779631  0.000028

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780730
Slope of Fitted Line...............:     -0.002202
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -22.5 KSI    -154.9 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       3.8 MPa
Probable error.................(+/-):      1.9 KSI      13.3 MPa
```

File: S:\1005\2005\SBIR\50632\18461.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 20 / 0.10" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -22.5 KSI | -154.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 3.8 MPa |
| Probable error.....(+/-): | 1.9 KSI | 13.3 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: C:\STRESS\DATA\2005\SBIR\50632\18462.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 20 / 0.15" from Edge of Hole / Hoop / ebm

Acquisition date & time: 6/01/2005 4:07pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A -3.15219E-07 B 0.000115735 C 0.0531817 D 147.9227

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00020 | 156.86 | 1292.4 | 3.48 | 0.26920 | 161.63 | 0.780289 | 0.000035 |
| 5.0 | 0.00533 | 156.77 | 1470.9 | 3.27 | 0.26709 | 161.62 | 0.780293 | 0.000030 |
| 10.0 | 0.02612 | 153.32 | 1225.1 | 3.07 | 0.26153 | 161.40 | 0.780541 | 0.000024 |
| 15.0 | 0.05954 | 158.71 | 1200.1 | 2.96 | 0.26444 | 161.75 | 0.780150 | 0.000026 |
| 20.0 | 0.10752 | 158.17 | 1051.7 | 3.12 | 0.26628 | 161.72 | 0.780191 | 0.000024 |
| 25.0 | 0.16740 | 157.85 | 1106.0 | 2.98 | 0.26397 | 161.70 | 0.780212 | 0.000024 |
| 30.0 | 0.23715 | 158.17 | 1079.6 | 3.17 | 0.26708 | 161.72 | 0.780192 | 0.000030 |
| 35.0 | 0.31515 | 157.91 | 1118.6 | 3.24 | 0.26773 | 161.70 | 0.780212 | 0.000055 |
| 40.0 | 0.39920 | 156.81 | 1242.1 | 2.88 | 0.26135 | 161.63 | 0.780285 | 0.000018 |
| 45.0 | 0.48349 | 160.87 | 1143.9 | 3.15 | 0.26896 | 161.89 | 0.779999 | 0.000030 |

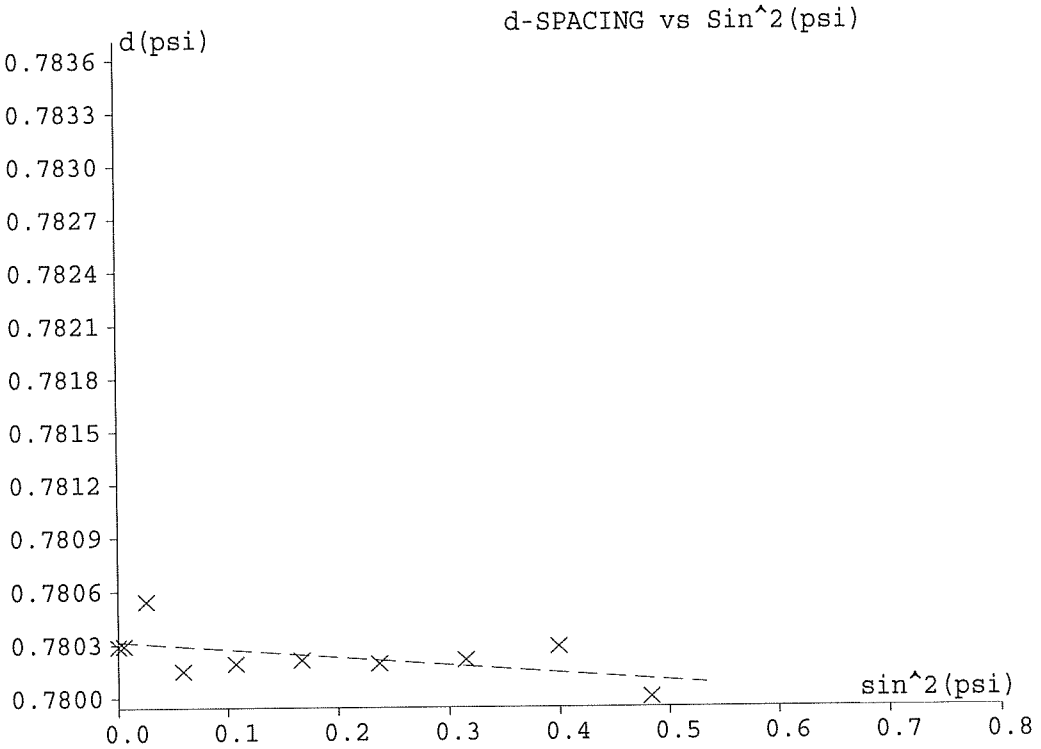
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780317
Slope of Fitted Line.....: -0.0004459
Material Stress Constant.....: 1.255E-07

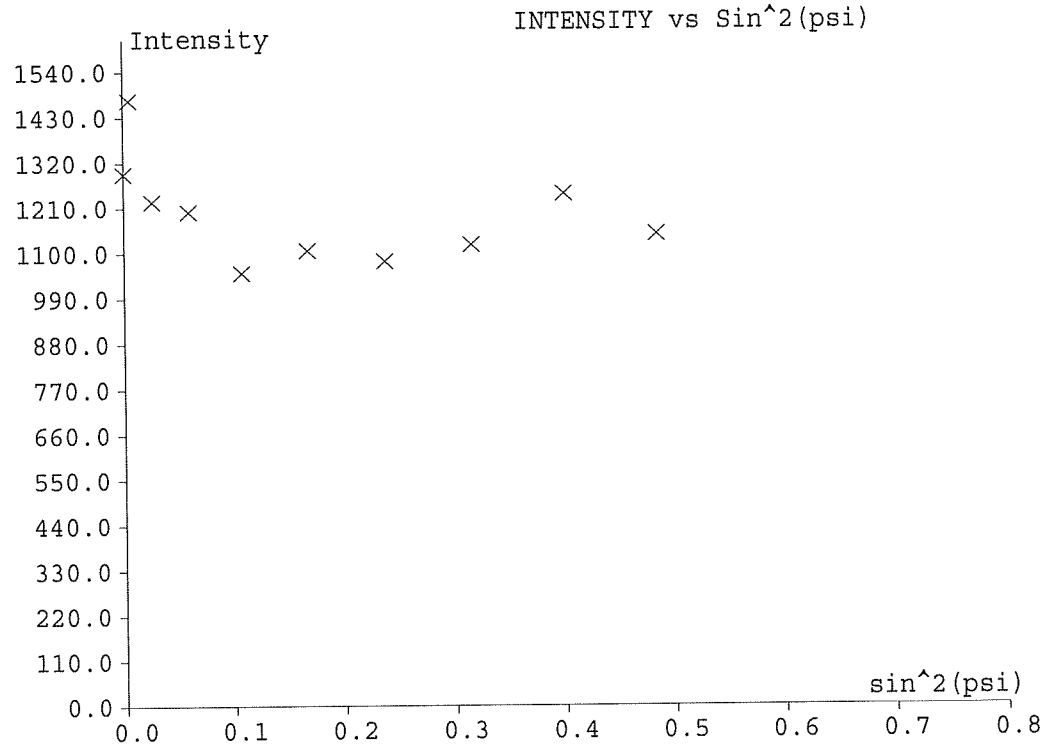
*Residual Stress.....: -4.6 KSI -31.4 MPa

Counting Statistics Stress Error (+/-): 0.6 KSI 4.2 MPa
Probable error.....(+/-): 2.4 KSI 16.4 MPa

File: C:\STRESS\DATA\2005\SBIR\50632\18462.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 20 / 0.15" from Edge of Hole / Hoop / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.6 KSI | -31.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.2 MPa |
| Probable error.....(+/-): | 2.4 KSI | 16.4 MPa |

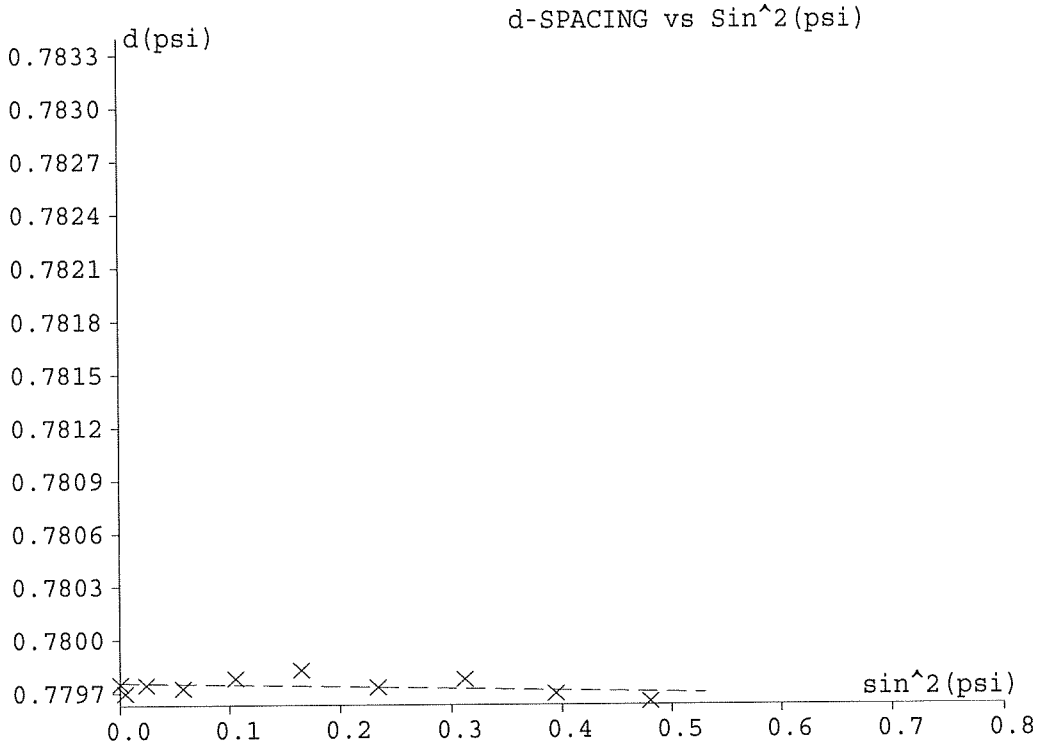


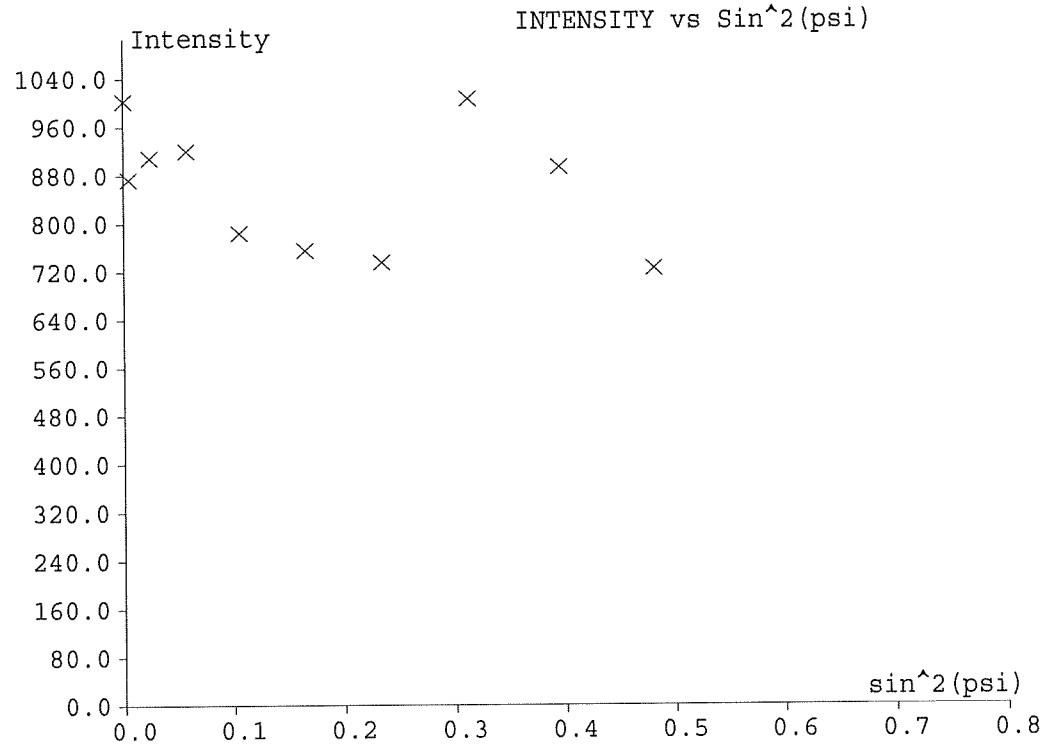



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19378.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 11 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   3:14pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00034   168.13   1002.5   3.63  0.27778    162.12  0.779751  0.000025
  5.0  0.00466   168.91    873.1   3.43  0.27635    162.17  0.779698  0.000022
 10.0  0.02413   168.19    908.5   3.48  0.27640    162.13  0.779745  0.000024
 15.0  0.05793   168.48    920.5   3.41  0.27583    162.15  0.779725  0.000024
 20.0  0.10549   167.66    784.1   3.63  0.27737    162.09  0.779781  0.000030
 25.0  0.16511   166.86    755.2   3.25  0.27250    162.05  0.779828  0.000032
 30.0  0.23400   168.43    734.6   3.62  0.27799    162.14  0.779731  0.000028
 35.0  0.31190   167.51   1005.7   2.76  0.26413    162.10  0.779777  0.000021
 40.0  0.39455   168.95    892.6   3.43  0.27639    162.17  0.779695  0.000027
 45.0  0.48066   169.68    724.2   3.59  0.27884    162.22  0.779650  0.000031

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.779758
Slope of Fitted Line...............:    -0.0001136
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -1.2 KSI      -8.0 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.7 MPa
Probable error.................(+/-):      1.0 KSI       6.8 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2005\SBIR\50632\19378.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 11 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -1.2 KSI | -8.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.7 MPa |
| Probable error.....(+/-): | 1.0 KSI | 6.8 MPa |

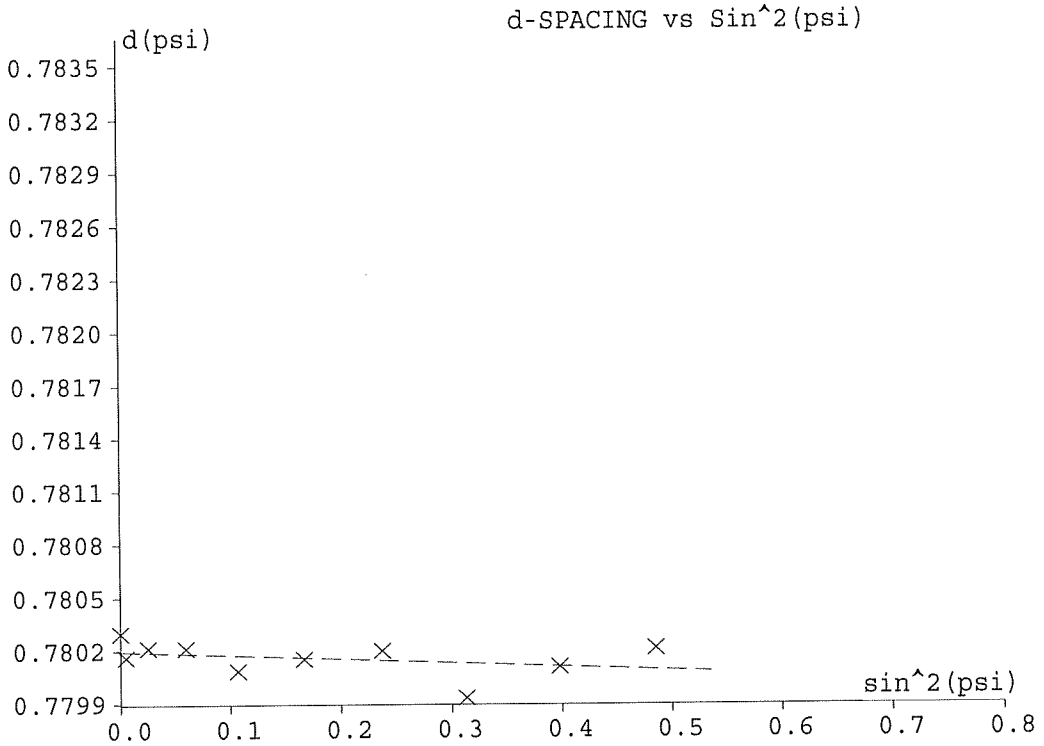


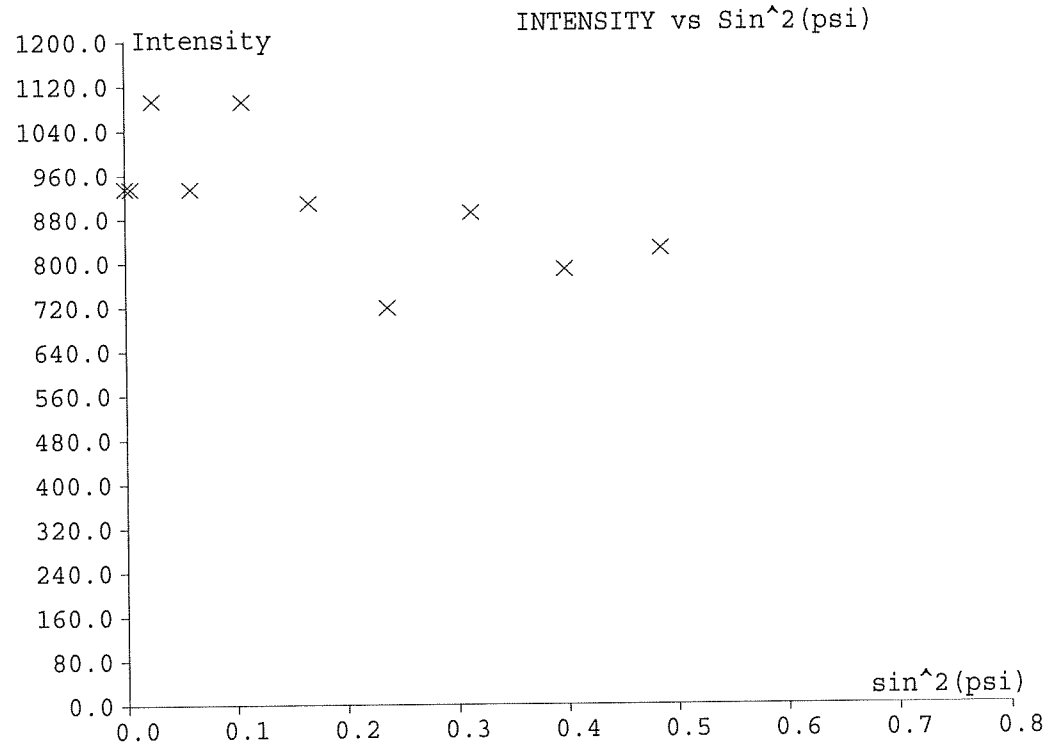



```
================================= TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19368.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 1 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   1:13pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00020   159.81    935.4   3.61  0.27017    161.62  0.780296  0.000025
  5.0  0.00518   161.87    935.2   3.77  0.27302    161.74  0.780161  0.000031
 10.0  0.02530   161.04   1093.5   3.49  0.27025    161.70  0.780214  0.000029
 15.0  0.05978   161.04    934.6   3.40  0.26931    161.70  0.780213  0.000028
 20.0  0.10700   163.00   1092.0   3.51  0.27214    161.81  0.780084  0.000027
 25.0  0.16704   161.96    908.6   3.40  0.27014    161.75  0.780151  0.000034
 30.0  0.23719   161.29    718.3   3.54  0.27086    161.71  0.780197  0.000032
 35.0  0.31305   165.36    890.7   3.55  0.27463    161.96  0.779930  0.000029
 40.0  0.39780   162.63    787.5   3.31  0.26978    161.79  0.780106  0.000021
 45.0  0.48519   161.06    824.7   3.39  0.26923    161.70  0.780211  0.000031

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780195
Slope of Fitted Line...............:     -0.000217
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -2.2 KSI     -15.3 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       3.8 MPa
Probable error.................(+/-):      1.9 KSI      13.3 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19368.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 1 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -2.2 KSI | -15.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 3.8 MPa |
| Probable error.....(+/-): | 1.9 KSI | 13.3 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: C:\STRESS\DATA\2005\SBIR\50632\19369.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 2 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time: 8/22/2005 1:24pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A 1.42245E-08 B -5.2884E-06 C 0.0618978 D 148.0758

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00031 | 166.18 | 945.9 | 3.59 | 0.27570 | 162.01 | 0.779877 | 0.000025 |
| 5.0 | 0.00505 | 163.69 | 972.8 | 3.75 | 0.27461 | 161.85 | 0.780041 | 0.000035 |
| 10.0 | 0.02457 | 165.47 | 834.5 | 3.50 | 0.27427 | 161.96 | 0.779922 | 0.000028 |
| 15.0 | 0.05902 | 164.03 | 1014.9 | 3.22 | 0.26986 | 161.88 | 0.780013 | 0.000026 |
| 20.0 | 0.10538 | 168.00 | 904.0 | 3.78 | 0.27880 | 162.11 | 0.779760 | 0.000029 |
| 25.0 | 0.16569 | 165.42 | 757.7 | 3.44 | 0.27351 | 161.96 | 0.779925 | 0.000030 |
| 30.0 | 0.23477 | 166.70 | 757.4 | 3.71 | 0.27705 | 162.04 | 0.779844 | 0.000029 |
| 35.0 | 0.31184 | 167.83 | 925.5 | 3.46 | 0.27583 | 162.11 | 0.779768 | 0.000025 |
| 40.0 | 0.39686 | 164.40 | 986.1 | 3.03 | 0.26723 | 161.90 | 0.779985 | 0.000019 |
| 45.0 | 0.48253 | 166.11 | 763.4 | 3.51 | 0.27491 | 162.00 | 0.779881 | 0.000024 |

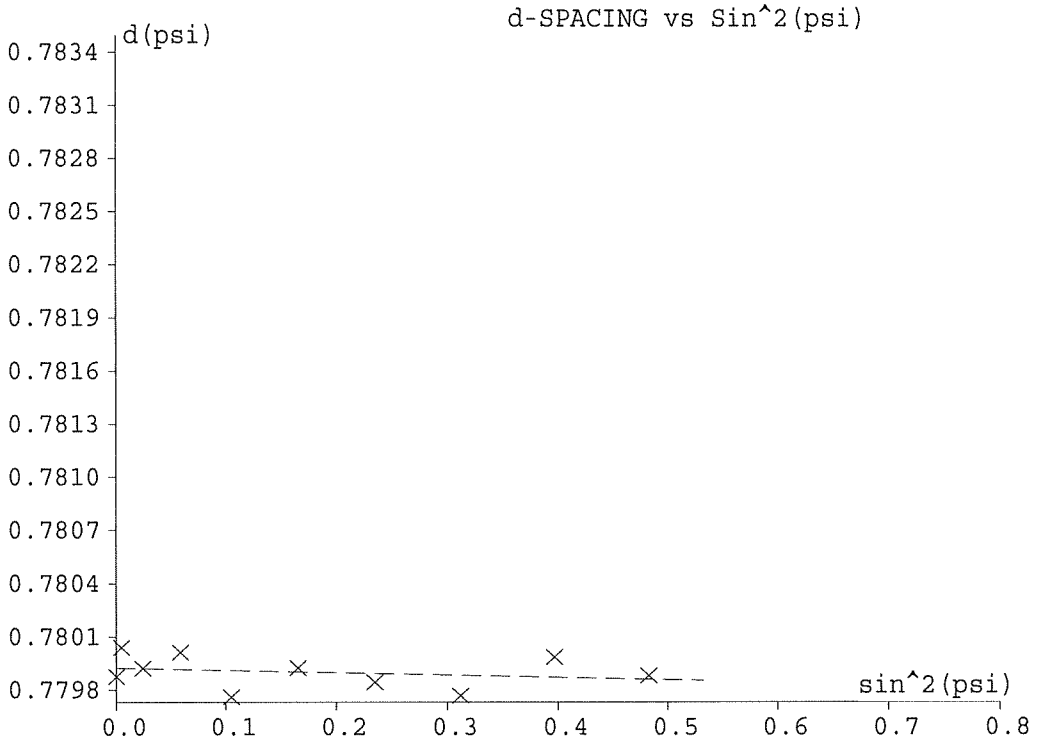
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.779925
Slope of Fitted Line.....: -0.0001323
Material Stress Constant.....: 1.255E-07

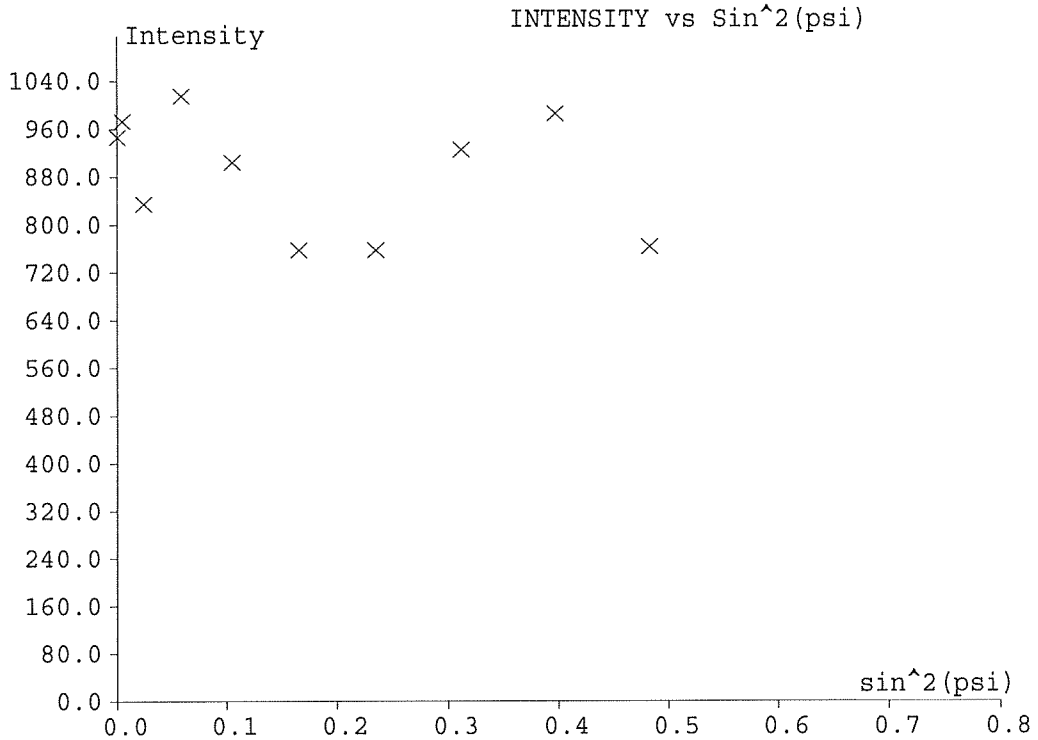
*Residual Stress.....: -1.4 KSI -9.3 MPa

Counting Statistics Stress Error (+/-): 0.5 KSI 3.5 MPa
Probable error.....(+/-): 1.9 KSI 13.4 MPa

File: C:\STRESS\DATA\2005\SBIR\50632\19369.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 2 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -1.4 KSI | -9.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.5 MPa |
| Probable error.....(+/-): | 1.9 KSI | 13.4 MPa |

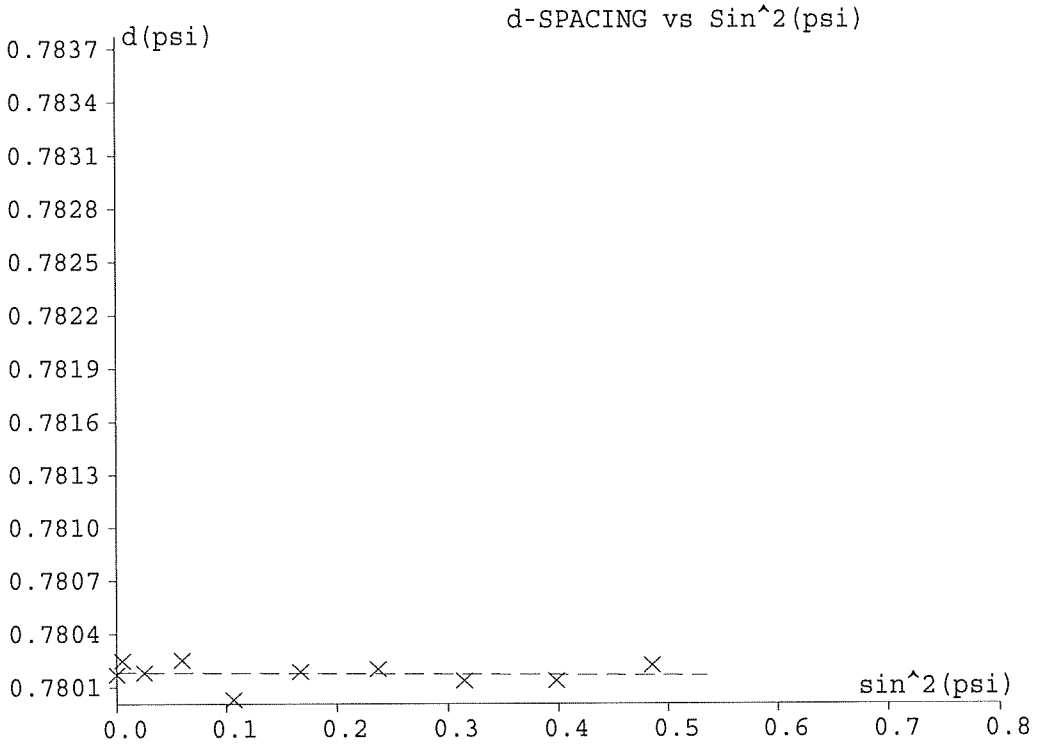


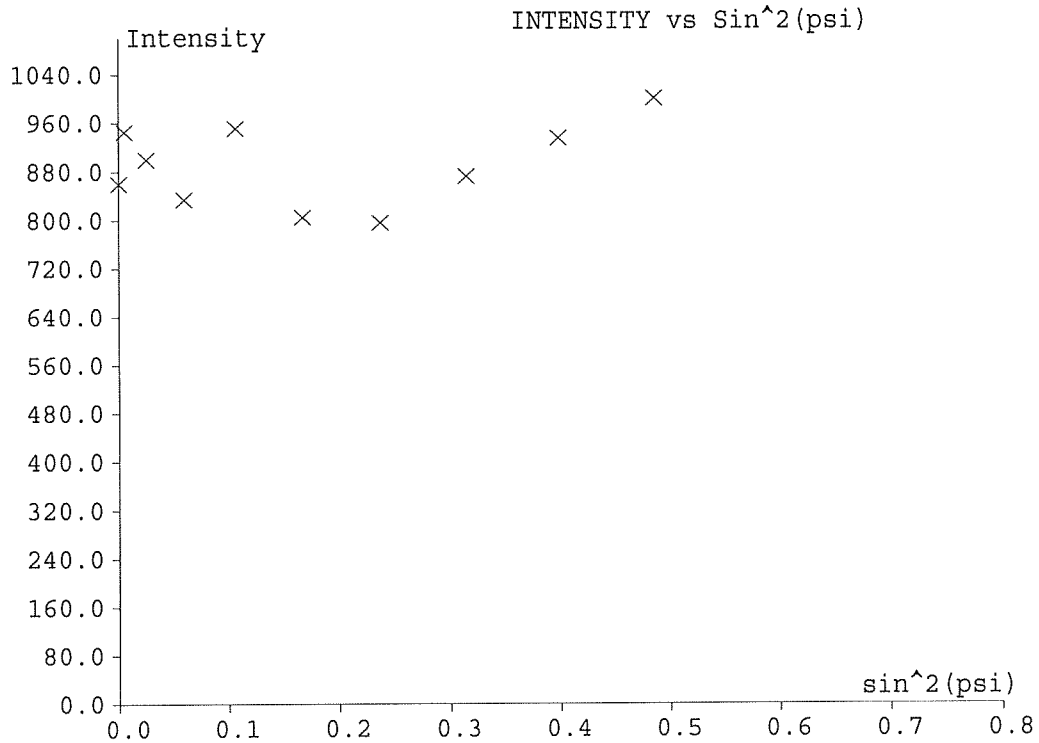



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19370.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 3 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   1:36pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00023   161.75    860.2   3.98  0.27410    161.74  0.780170  0.000039
  5.0  0.00528   160.57    945.4   3.78  0.27202    161.67  0.780247  0.000030
 10.0  0.02522   161.54    900.2   3.65  0.27186    161.72  0.780182  0.000035
 15.0  0.05992   160.49    834.0   3.56  0.27036    161.66  0.780251  0.000037
 20.0  0.10672   163.87    951.3   3.70  0.27438    161.86  0.780029  0.000041
 25.0  0.16725   161.44    804.5   3.47  0.27037    161.72  0.780187  0.000029
 30.0  0.23721   161.24    795.7   3.58  0.27112    161.71  0.780201  0.000031
 35.0  0.31459   162.24    872.2   3.73  0.27311    161.77  0.780136  0.000029
 40.0  0.39804   162.20    934.9   3.47  0.27103    161.77  0.780136  0.000028
 45.0  0.48527   160.87   1000.1   3.22  0.26736    161.69  0.780222  0.000024

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780182
Slope of Fitted Line...............:    -3.418E-05
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -0.3 KSI      -2.4 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       4.1 MPa
Probable error.................(+/-):      1.4 KSI       9.4 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19370.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 3 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -0.3 KSI | -2.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.1 MPa |
| Probable error.....(+/-): | 1.4 KSI | 9.4 MPa |

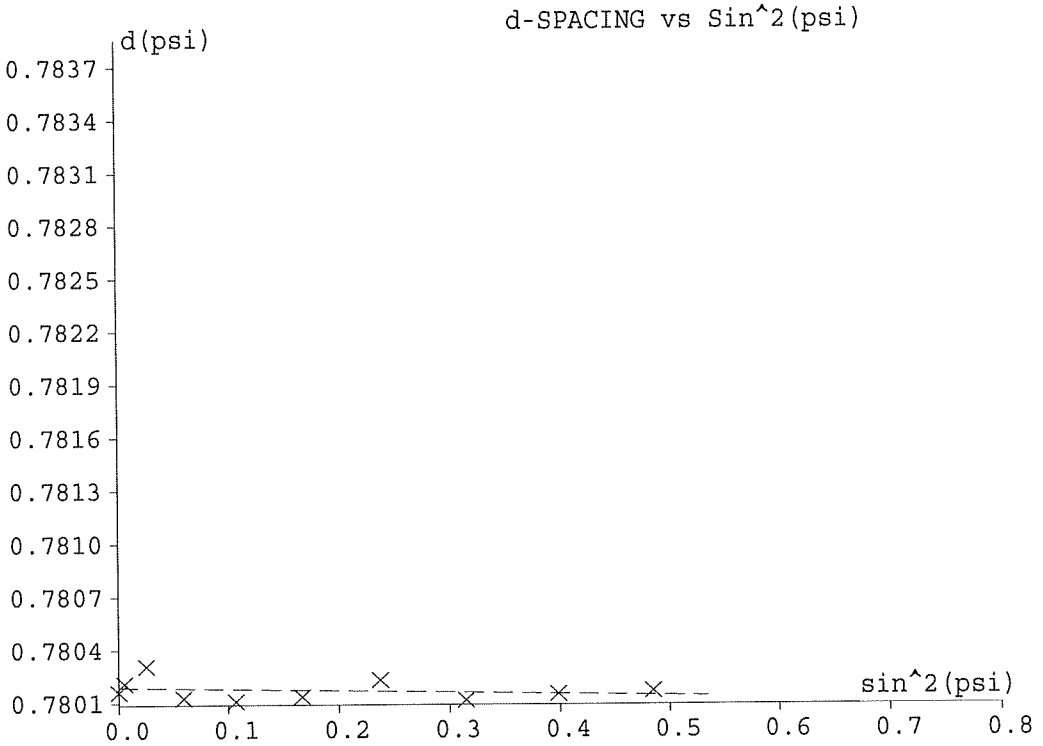


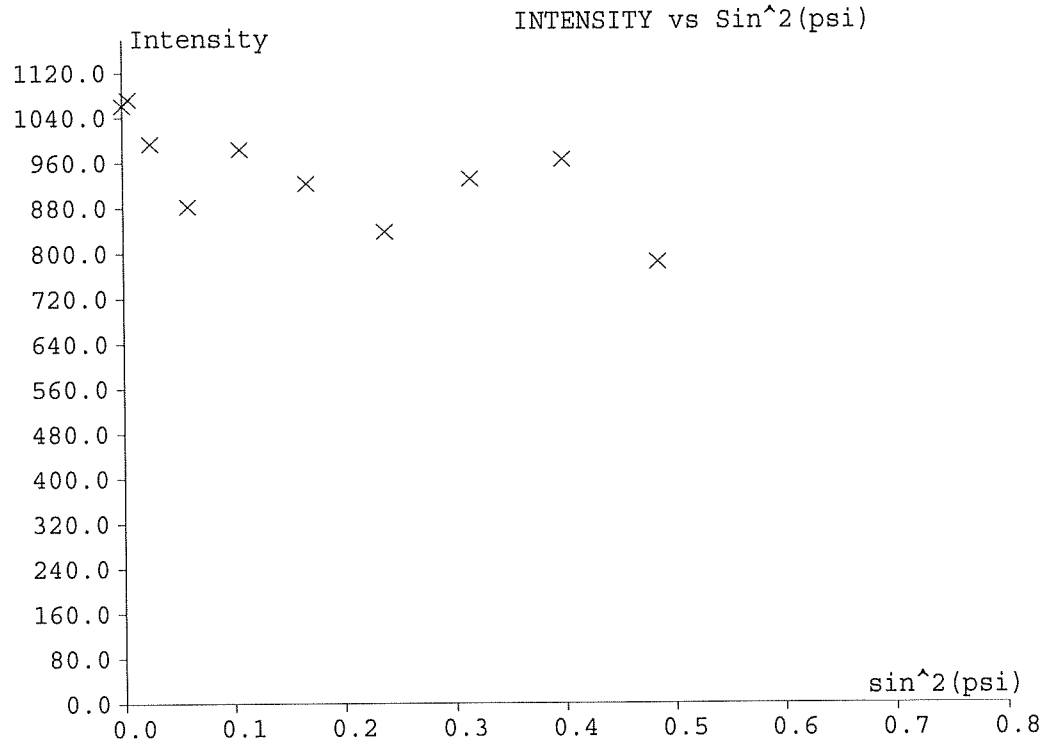



```
================================== TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19371.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 4 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   1:58pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00023   161.84   1061.2   3.60  0.27178    161.74  0.780161  0.000033
  5.0  0.00524   161.06   1072.3   3.30  0.26836    161.70  0.780210  0.000027
 10.0  0.02553   159.64    993.4   3.62  0.27016    161.61  0.780308  0.000023
 15.0  0.05945   162.36    882.4   3.69  0.27295    161.77  0.780128  0.000032
 20.0  0.10712   162.62    983.0   3.63  0.27273    161.79  0.780110  0.000035
 25.0  0.16694   162.21    922.2   3.38  0.27012    161.77  0.780135  0.000033
 30.0  0.23740   160.78    837.3   3.32  0.26837    161.68  0.780229  0.000031
 35.0  0.31444   162.55    929.9   3.76  0.27357    161.79  0.780116  0.000028
 40.0  0.39815   161.98    963.9   3.38  0.26994    161.75  0.780150  0.000029
 45.0  0.48483   161.69    782.6   3.15  0.26709    161.74  0.780166  0.000024

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780189
Slope of Fitted Line...............:     -9.78E-05
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -1.0 KSI      -6.9 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.7 MPa
Probable error.................(+/-):      1.2 KSI       8.5 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19371.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 4 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -1.0 KSI | -6.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.7 MPa |
| Probable error.....(+/-): | 1.2 KSI | 8.5 MPa |

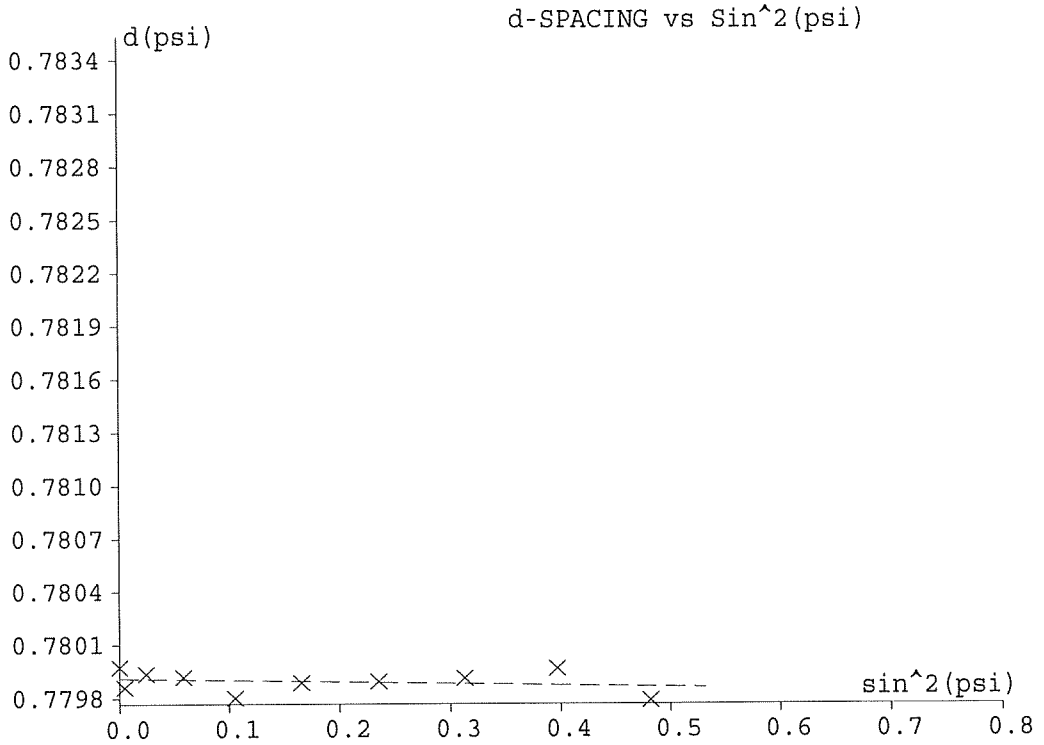


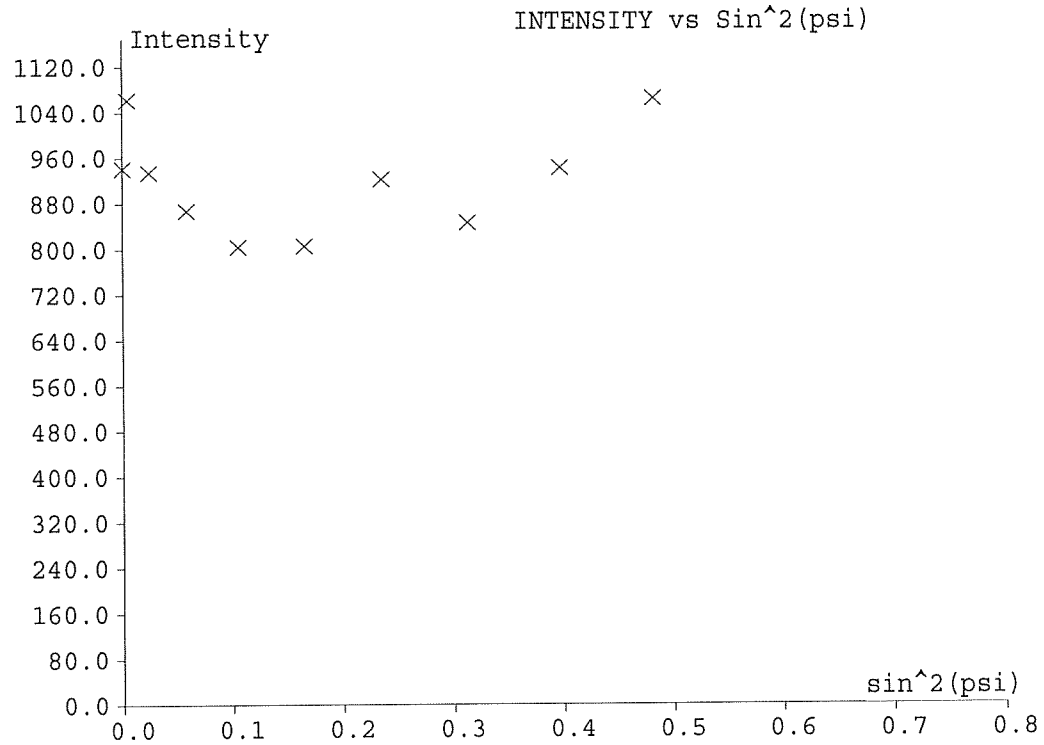



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19372.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 5 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   2:06pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00028   164.73    941.4   3.84  0.27625    161.92  0.779973  0.000035
  5.0  0.00484   166.43   1061.6   3.53  0.27545    162.02  0.779860  0.000031
 10.0  0.02461   165.26    934.2   3.57  0.27469    161.95  0.779936  0.000030
 15.0  0.05866   165.57    867.2   3.72  0.27612    161.97  0.779918  0.000029
 20.0  0.10559   167.38    804.0   3.88  0.27896    162.08  0.779801  0.000034
 25.0  0.16545   166.07    805.6   3.88  0.27771    162.00  0.779886  0.000070
 30.0  0.23511   165.94    921.9   3.70  0.27631    161.99  0.779893  0.000026
 35.0  0.31291   165.66    845.6   3.69  0.27596    161.97  0.779912  0.000025
 40.0  0.39670   164.73    941.7   3.13  0.26907    161.92  0.779966  0.000019
 45.0  0.48177   167.58   1063.3   3.68  0.27763    162.09  0.779786  0.000020

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.779910
Slope of Fitted Line...............:    -9.551E-05
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -1.0 KSI      -6.7 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.5 MPa
Probable error.................(+/-):      1.3 KSI       8.8 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19372.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 5 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -1.0 KSI | -6.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.5 MPa |
| Probable error.....(+/-): | 1.3 KSI | 8.8 MPa |

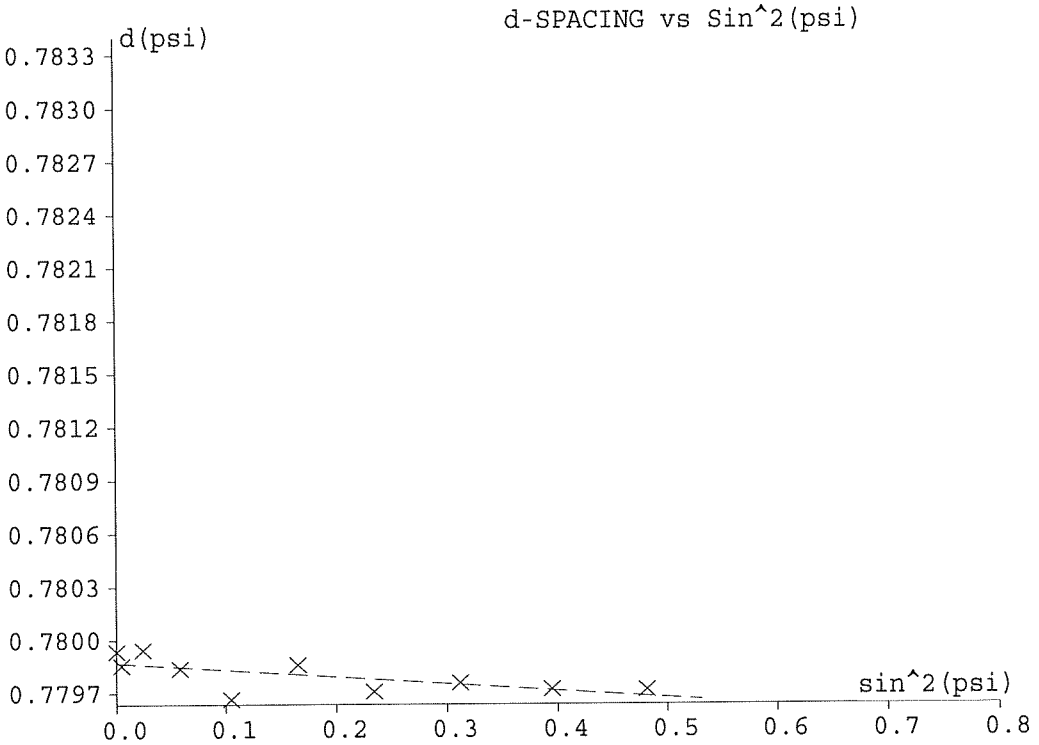


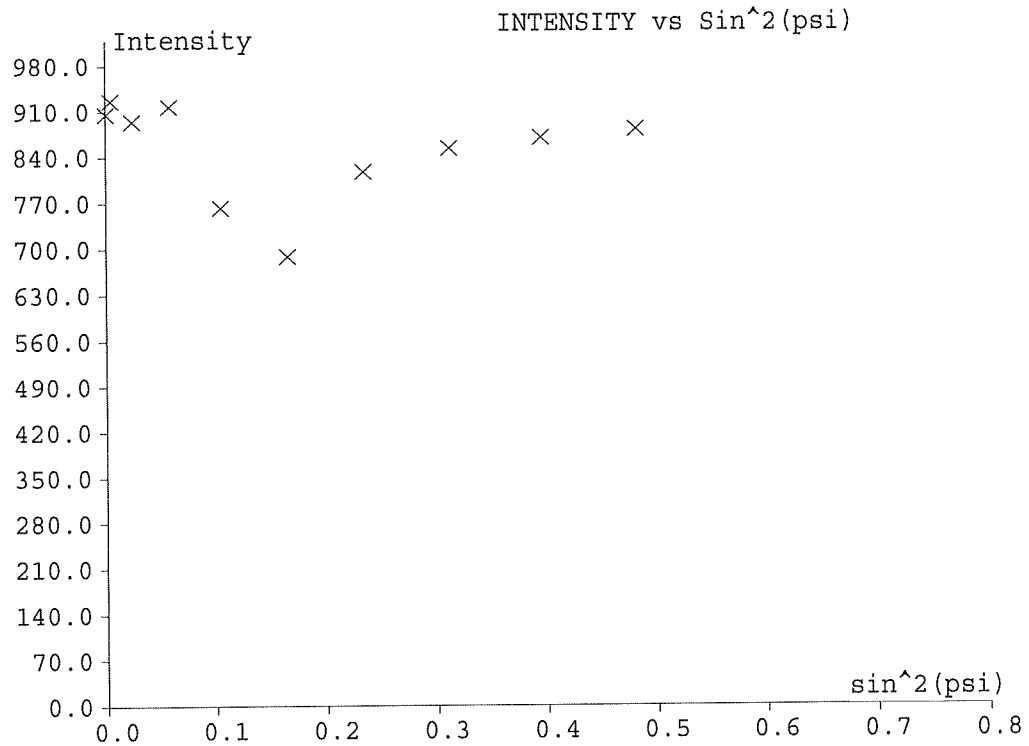



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19373.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 6 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   2:21pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00029   165.29    905.5   3.63  0.27518    161.95  0.779935  0.000024
  5.0  0.00484   166.43    926.1   3.21  0.27157    162.02  0.779856  0.000023
 10.0  0.02463   165.11    894.6   3.35  0.27221    161.94  0.779944  0.000027
 15.0  0.05835   166.82    917.4   3.73  0.27733    162.04  0.779836  0.000029
 20.0  0.10490   169.44    762.4   3.45  0.27706    162.20  0.779664  0.000047
 25.0  0.16529   166.33    688.4   3.00  0.26829    162.02  0.779859  0.000038
 30.0  0.23383   168.82    817.4   3.78  0.27959    162.16  0.779707  0.000042
 35.0  0.31174   168.05    852.9   3.60  0.27747    162.12  0.779755  0.000023
 40.0  0.39475   168.50    869.0   3.18  0.27265    162.15  0.779721  0.000025
 45.0  0.48120   168.62    881.6   3.42  0.27600    162.15  0.779716  0.000021

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.779870
Slope of Fitted Line...............:    -0.0003953
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -4.0 KSI     -27.8 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.4 MPa
Probable error.................(+/-):      1.5 KSI      10.6 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19373.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 6 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.0 KSI | -27.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.4 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.6 MPa |

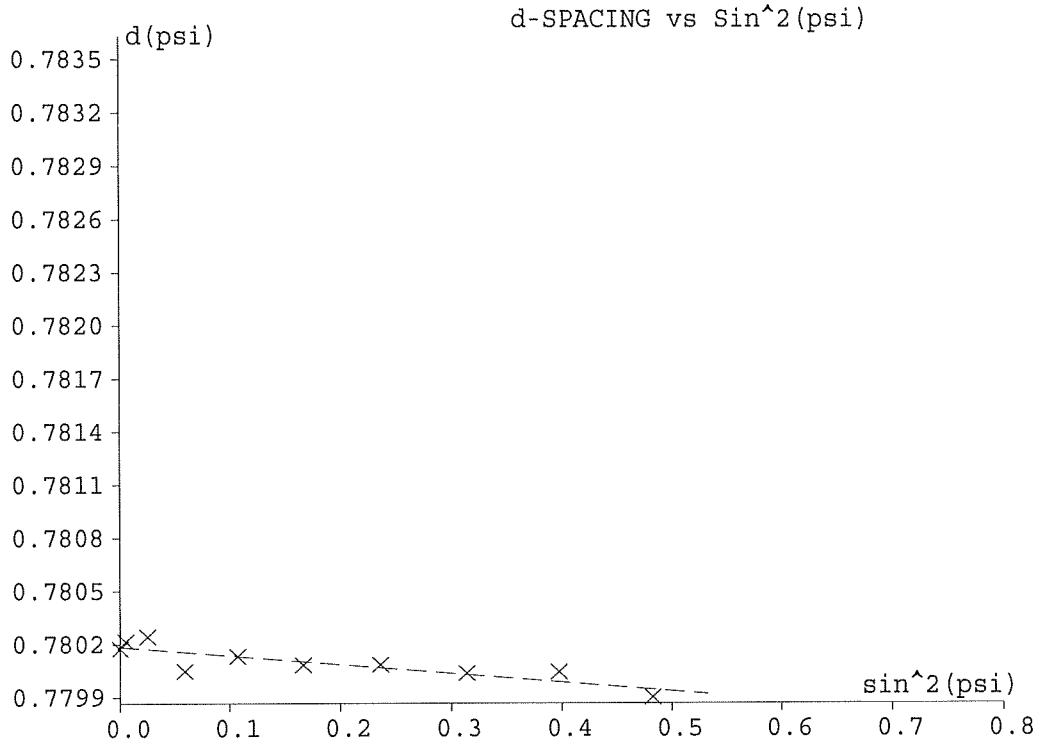


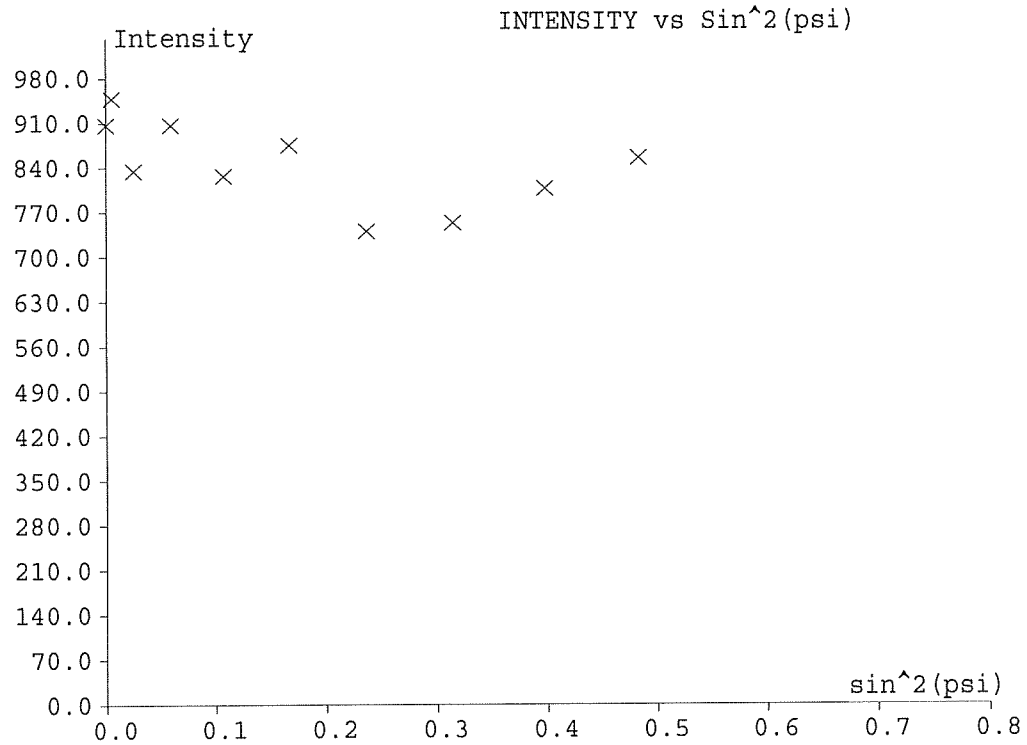



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19374.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 7 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   2:33pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


 Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00023   161.69    906.5   3.90  0.27364    161.73  0.780173  0.000041
  5.0  0.00525   160.97    947.9   3.33  0.26865    161.69  0.780216  0.000025
 10.0  0.02537   160.58    834.5   3.41  0.26908    161.67  0.780243  0.000025
 15.0  0.05916   163.51    906.7   3.35  0.27087    161.85  0.780049  0.000028
 20.0  0.10723   162.24    826.7   3.29  0.26924    161.77  0.780132  0.000031
 25.0  0.16663   163.05    875.0   3.64  0.27319    161.82  0.780082  0.000025
 30.0  0.23642   163.00    739.9   3.51  0.27213    161.81  0.780084  0.000030
 35.0  0.31384   163.70    753.1   3.26  0.27007    161.86  0.780035  0.000027
 40.0  0.39731   163.65    807.2   3.64  0.27370    161.85  0.780043  0.000029
 45.0  0.48270   165.74    855.1   3.19  0.27068    161.98  0.779901  0.000031

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780186
Slope of Fitted Line...............:    -0.0005018
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -5.1 KSI     -35.3 MPa

Counting Statistics Stress Error (+/-):      0.6 KSI       4.2 MPa
Probable error.................(+/-):      1.1 KSI       7.4 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2005\SBIR\50632\19374.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 7 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -5.1 KSI | -35.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.2 MPa |
| Probable error.....(+/-): | 1.1 KSI | 7.4 MPa |

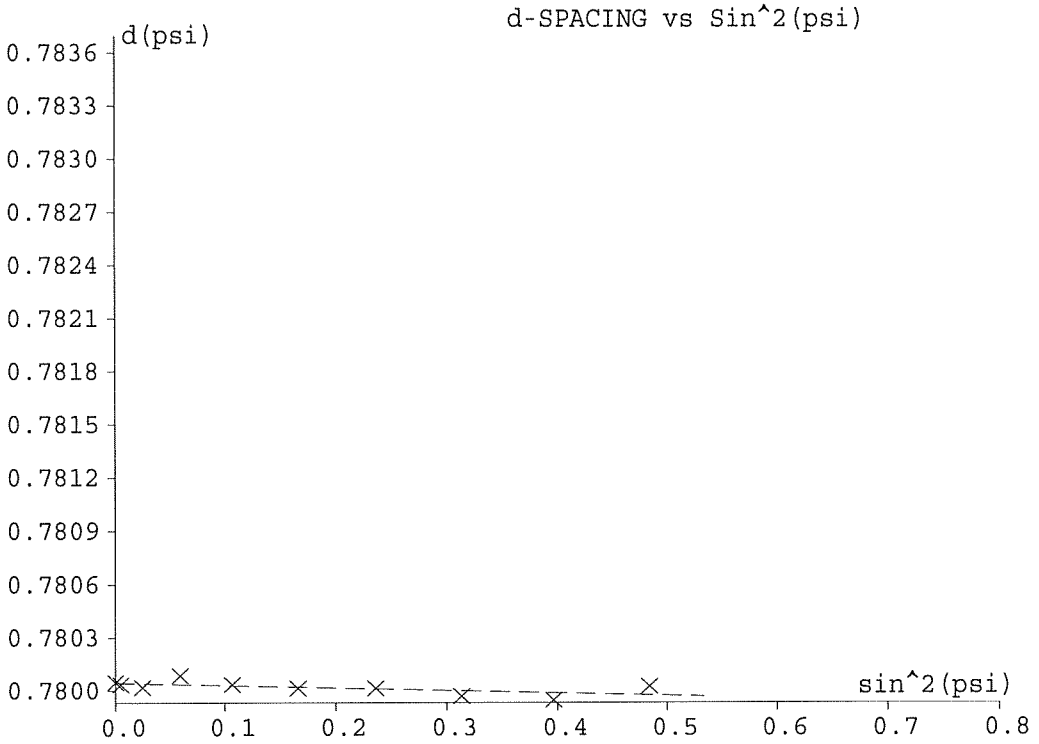


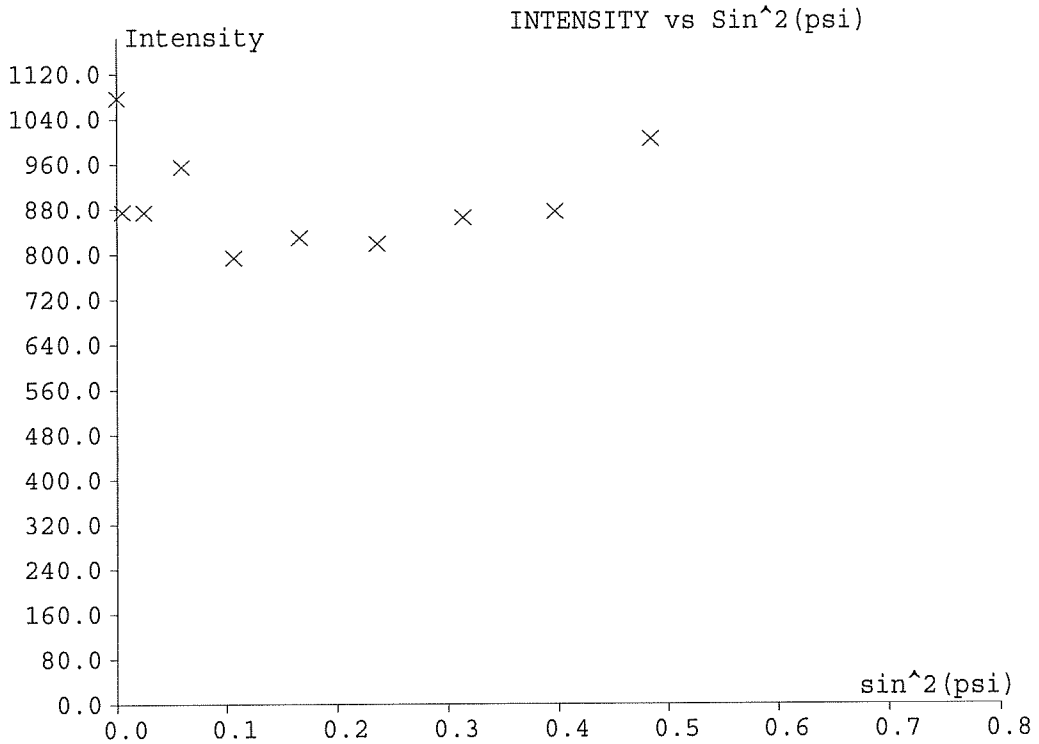



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19375.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 8 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   2:43pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00026   163.49   1076.9   3.13  0.26813    161.85  0.780047  0.000021
  5.0  0.00504   163.78    874.8   3.60  0.27353    161.86  0.780034  0.000034
 10.0  0.02481   164.02    874.3   3.68  0.27438    161.87  0.780019  0.000029
 15.0  0.05930   162.95    954.6   3.38  0.27075    161.81  0.780086  0.000030
 20.0  0.10675   163.77    793.6   3.59  0.27347    161.86  0.780034  0.000034
 25.0  0.16622   164.07    829.6   3.43  0.27225    161.88  0.780013  0.000029
 30.0  0.23594   164.06    818.5   3.44  0.27236    161.88  0.780014  0.000025
 35.0  0.31334   164.75    865.2   3.39  0.27233    161.92  0.779968  0.000030
 40.0  0.39655   165.05    876.0   3.23  0.27085    161.94  0.779946  0.000024
 45.0  0.48368   163.77   1004.7   2.82  0.26292    161.87  0.780023  0.000019

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780044
Slope of Fitted Line...............:    -0.0001435
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -1.5 KSI     -10.1 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.4 MPa
Probable error.................(+/-):      0.6 KSI       4.3 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2005\SBIR\50632\19375.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 8 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -1.5 KSI | -10.1 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.4 MPa |
| Probable error.....(+/-): | 0.6 KSI | 4.3 MPa |

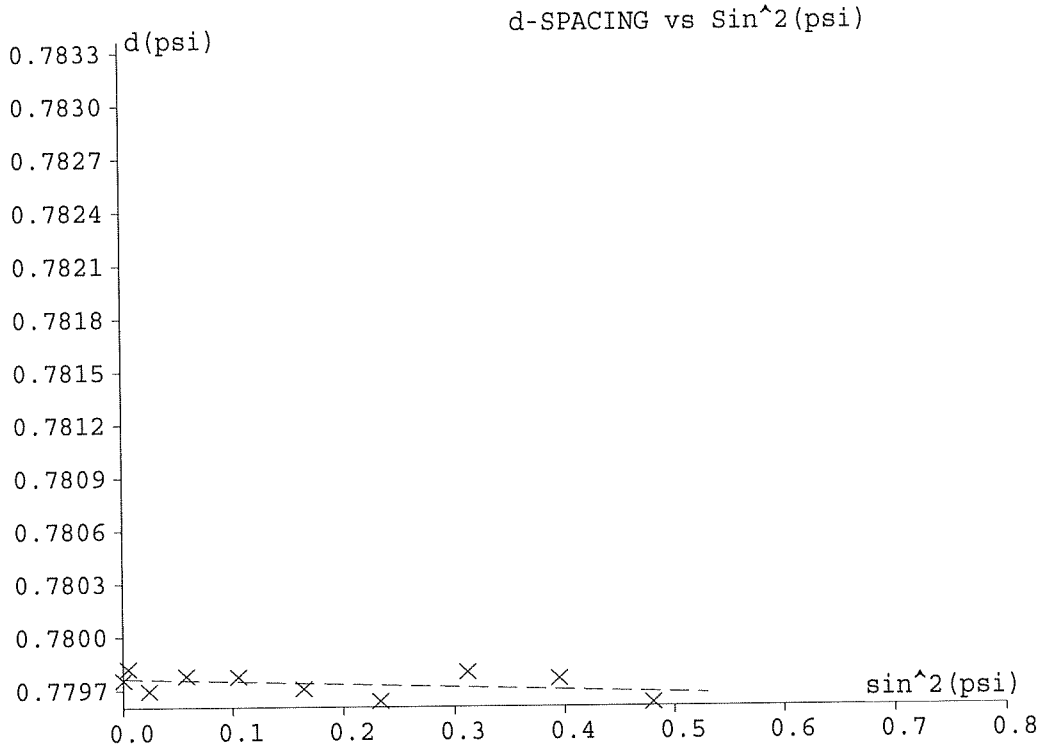


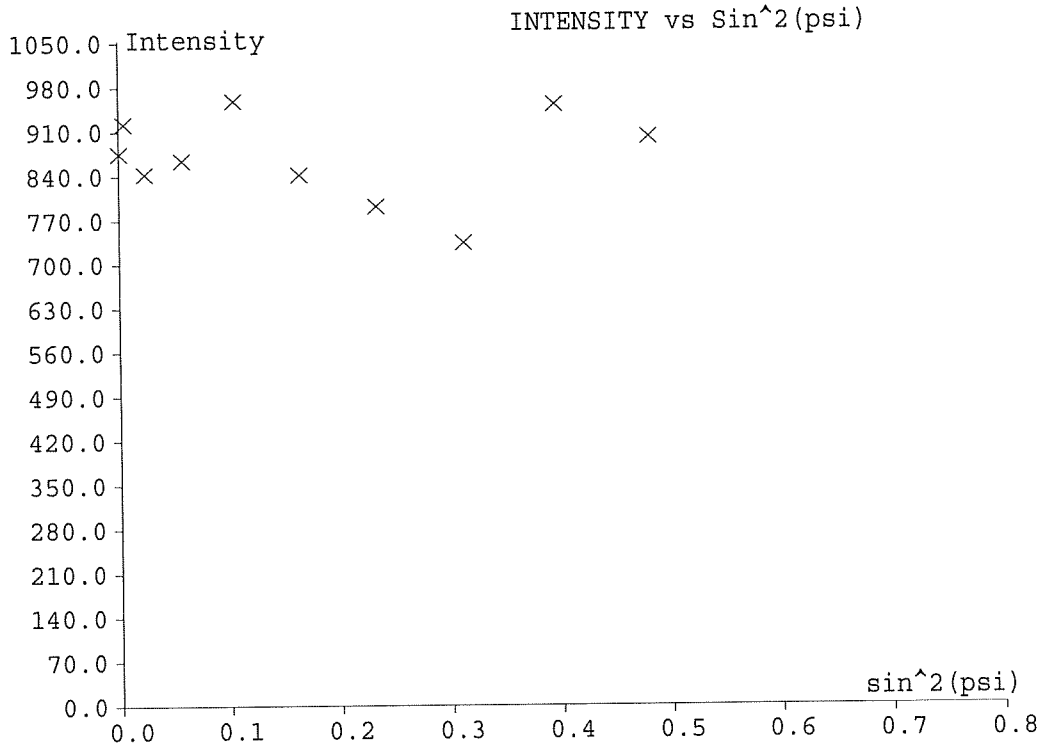



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19376.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 9 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   2:55pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00034   168.01    875.2   3.38  0.27506    162.12  0.779756  0.000035
  5.0  0.00479   167.01    922.4   3.31  0.27330    162.06  0.779819  0.000024
 10.0  0.02400   168.99    842.8   3.56  0.27799    162.18  0.779694  0.000039
 15.0  0.05813   167.58    864.5   3.05  0.27000    162.10  0.779778  0.000023
 20.0  0.10545   167.77    958.2   3.54  0.27674    162.10  0.779773  0.000029
 25.0  0.16436   168.80    841.6   3.45  0.27654    162.17  0.779705  0.000025
 30.0  0.23333   169.92    791.1   3.63  0.27945    162.23  0.779635  0.000022
 35.0  0.31205   167.41    732.7   3.52  0.27619    162.08  0.779796  0.000020
 40.0  0.39506   167.89    951.5   3.13  0.27146    162.11  0.779759  0.000018
 45.0  0.48043   170.06    900.3   3.30  0.27571    162.24  0.779622  0.000019

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.779765
Slope of Fitted Line...............:    -0.0001727
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -1.8 KSI     -12.2 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.4 MPa
Probable error.................(+/-):      1.3 KSI       8.7 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19376.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 9 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -1.8 KSI | -12.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.4 MPa |
| Probable error.....(+/-): | 1.3 KSI | 8.7 MPa |

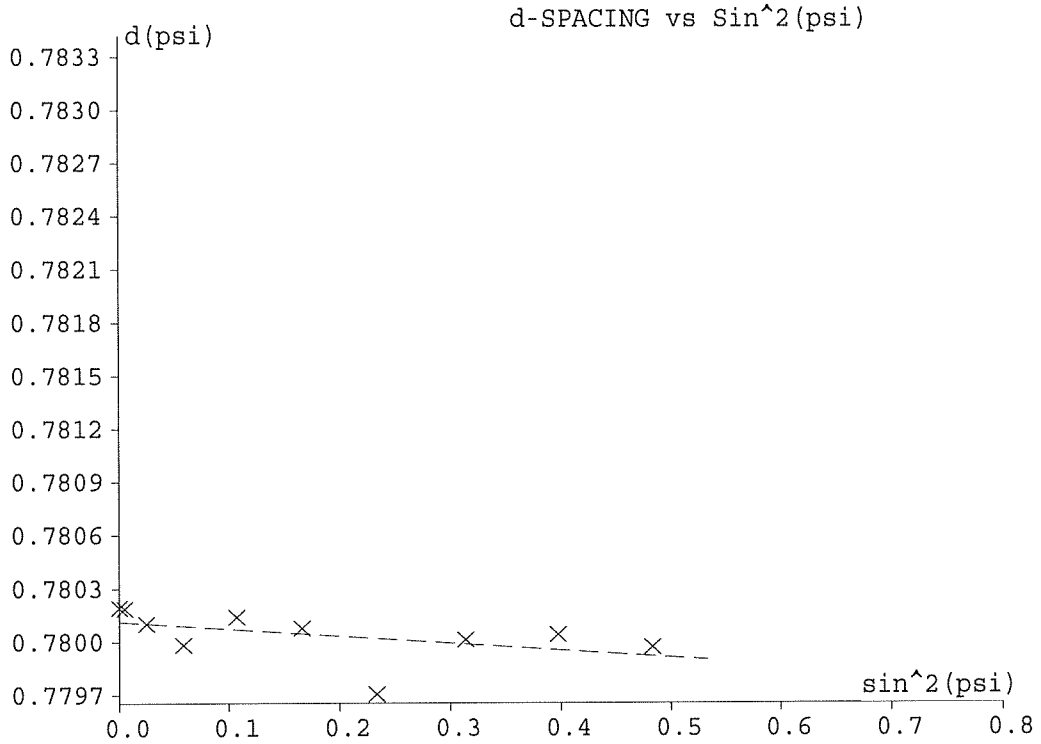


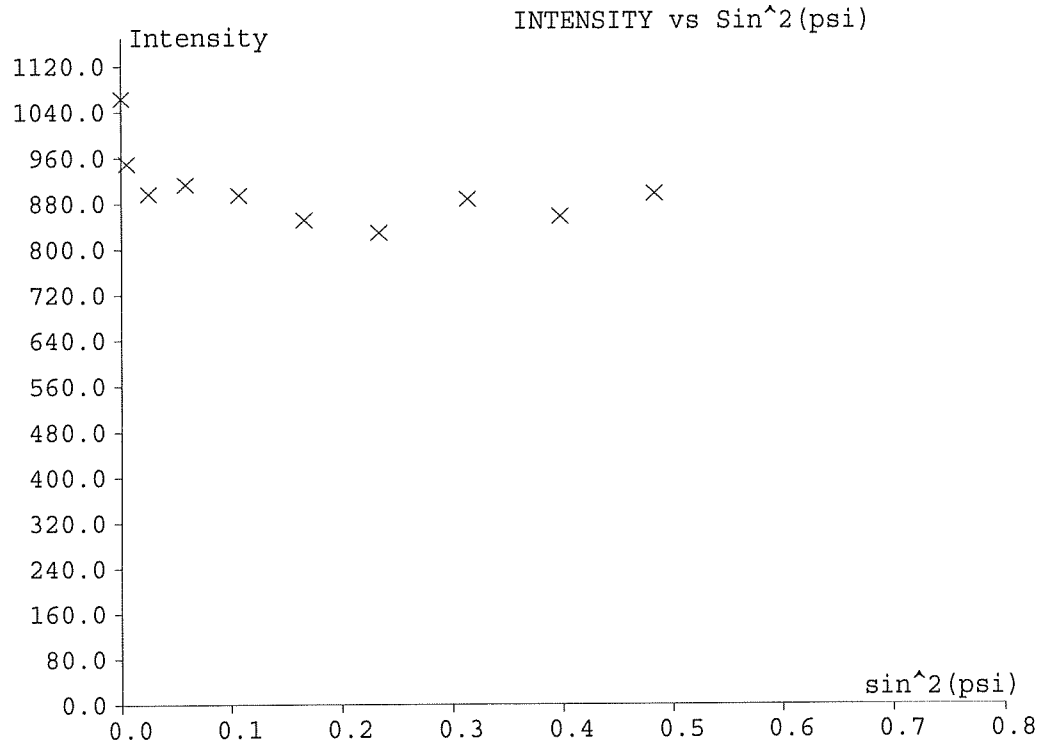



```
================================== TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19377.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 10 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   3:07pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00022   161.21   1063.4   2.89  0.26249    161.71  0.780193  0.000023
  5.0  0.00521   161.43    949.9   3.44  0.27008    161.72  0.780187  0.000033
 10.0  0.02502   162.69    896.8   3.37  0.27039    161.80  0.780103  0.000031
 15.0  0.05891   164.54    913.0   3.66  0.27470    161.91  0.779984  0.000027
 20.0  0.10728   162.10    894.9   3.27  0.26888    161.76  0.780141  0.000025
 25.0  0.16660   163.05    850.9   3.25  0.26944    161.82  0.780078  0.000033
 30.0  0.23381   168.82    828.7   3.52  0.27742    162.17  0.779705  0.000032
 35.0  0.31367   164.08    887.3   3.44  0.27233    161.88  0.780012  0.000026
 40.0  0.39729   163.57    856.9   3.07  0.26721    161.85  0.780040  0.000021
 45.0  0.48327   164.68    896.7   3.28  0.27109    161.92  0.779971  0.000020

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780113
Slope of Fitted Line...............:    -0.0003992
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -4.1 KSI     -28.1 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.3 MPa
Probable error.................(+/-):      2.6 KSI      18.0 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19377.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 10 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.1 KSI | -28.1 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.3 MPa |
| Probable error.....(+/-): | 2.6 KSI | 18.0 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: C:\STRESS\DATA\2005\SBIR\50632\19379.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 12 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time: 8/22/2005 3:22pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 30.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A 1.42245E-08 B -5.2884E-06 C 0.0618978 D 148.0758

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00026 | 163.59 | 1044.5 | 3.63 | 0.27360 | 161.85 | 0.780047 | 0.000028 |
| 5.0 | 0.00517 | 161.97 | 1024.7 | 3.21 | 0.26812 | 161.75 | 0.780149 | 0.000024 |
| 10.0 | 0.02525 | 161.30 | 957.0 | 3.28 | 0.26839 | 161.71 | 0.780194 | 0.000030 |
| 15.0 | 0.05886 | 164.72 | 855.3 | 3.60 | 0.27439 | 161.92 | 0.779972 | 0.000029 |
| 20.0 | 0.10614 | 165.60 | 810.6 | 3.35 | 0.27267 | 161.97 | 0.779912 | 0.000037 |
| 25.0 | 0.16705 | 161.97 | 830.0 | 3.57 | 0.27167 | 161.75 | 0.780153 | 0.000022 |
| 30.0 | 0.23534 | 165.40 | 721.4 | 3.49 | 0.27402 | 161.96 | 0.779926 | 0.000033 |
| 35.0 | 0.31354 | 164.34 | 686.1 | 3.40 | 0.27218 | 161.90 | 0.779995 | 0.000027 |
| 40.0 | 0.39747 | 163.21 | 1042.6 | 3.01 | 0.26613 | 161.83 | 0.780063 | 0.000023 |
| 45.0 | 0.48117 | 168.74 | 883.1 | 3.75 | 0.27928 | 162.16 | 0.779712 | 0.000038 |

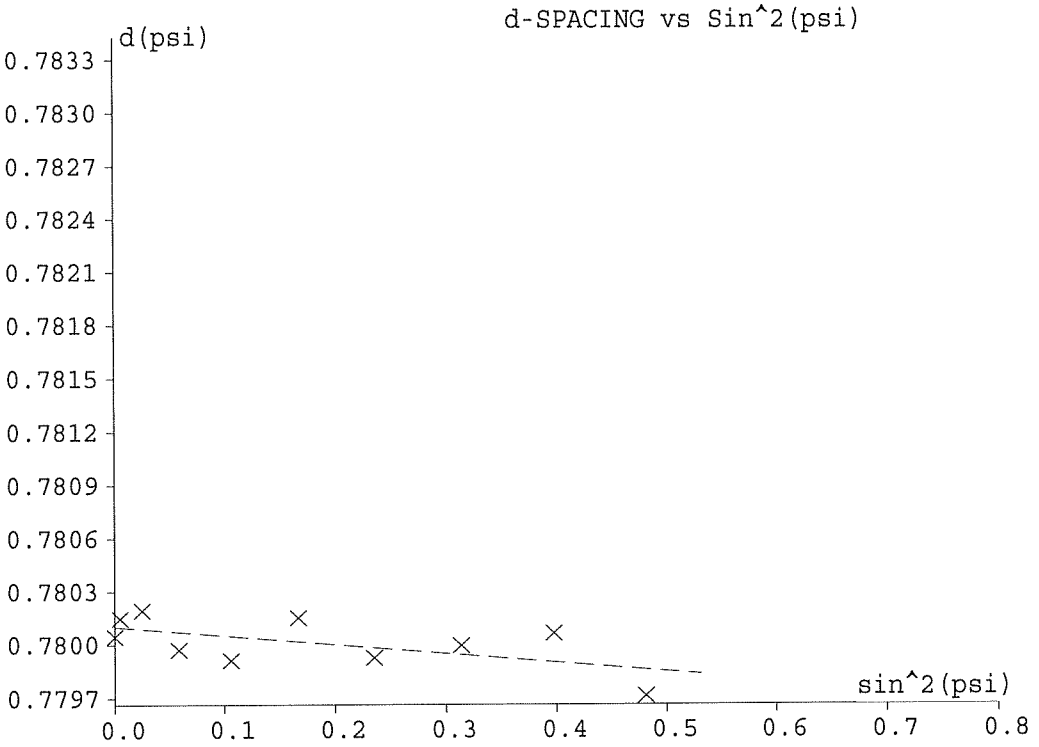
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780102
Slope of Fitted Line.....: -0.0005035
Material Stress Constant.....: 1.255E-07

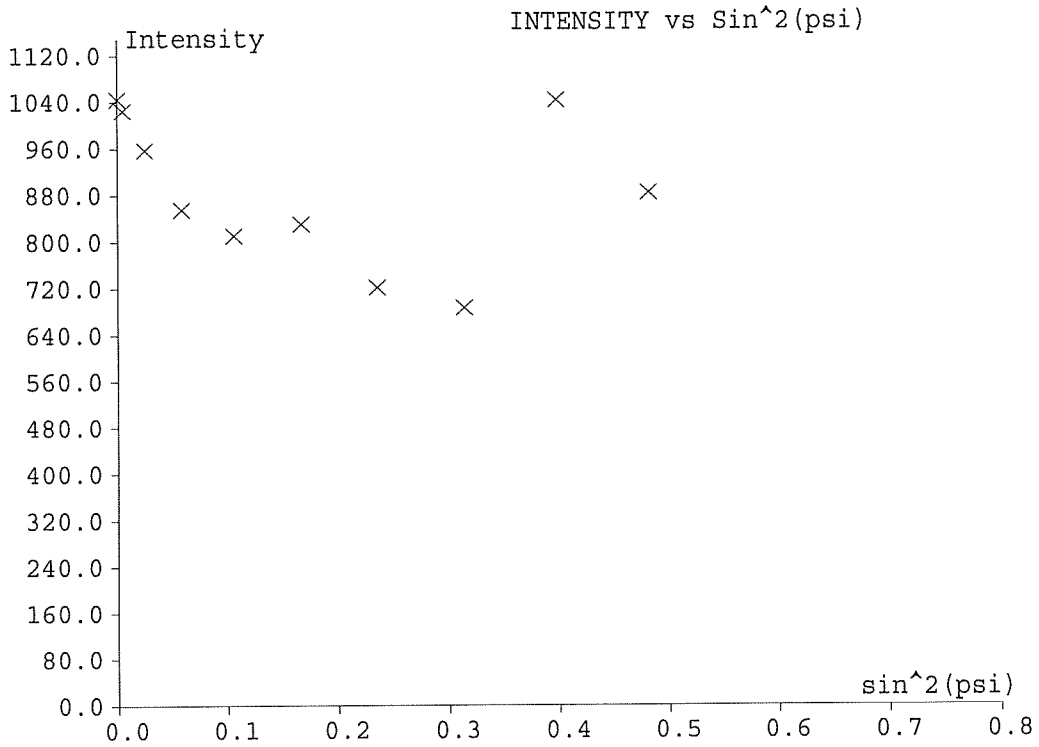
*Residual Stress.....: -5.1 KSI -35.5 MPa

Counting Statistics Stress Error (+/-): 0.6 KSI 4.2 MPa
Probable error.....(+/-): 2.4 KSI 16.5 MPa

File: C:\STRESS\DATA\2005\SBIR\50632\19379.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 12 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -5.1 KSI | -35.5 MPa |
| Counting Statistics Stress Error (+/-): | 0.6 KSI | 4.2 MPa |
| Probable error.....(+/-): | 2.4 KSI | 16.5 MPa |

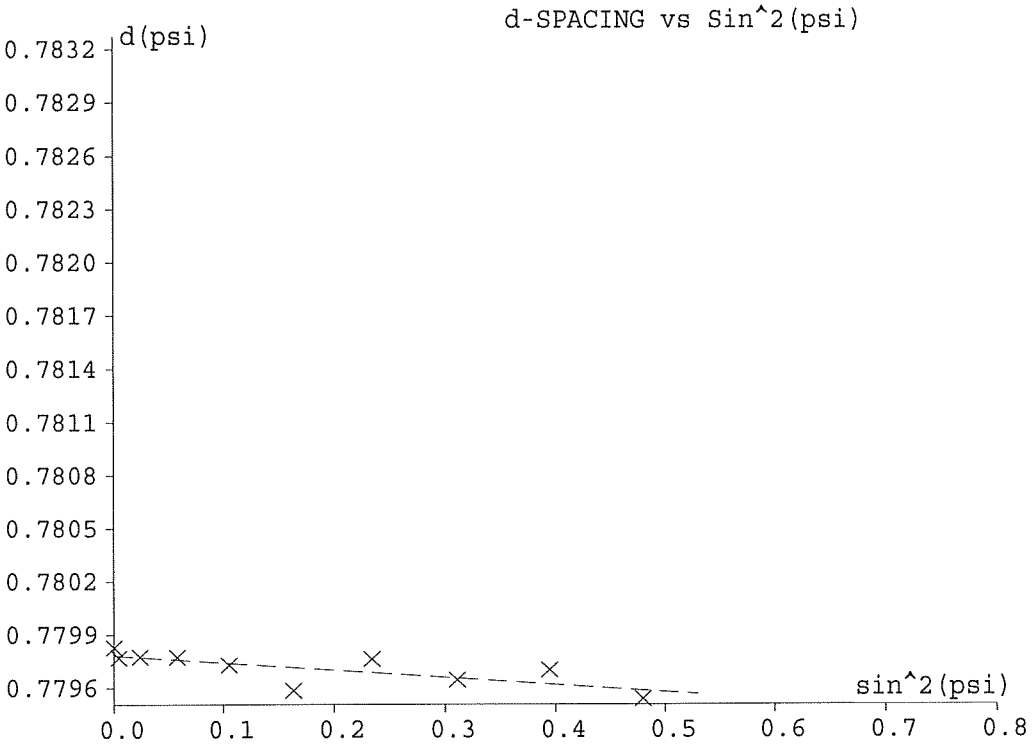


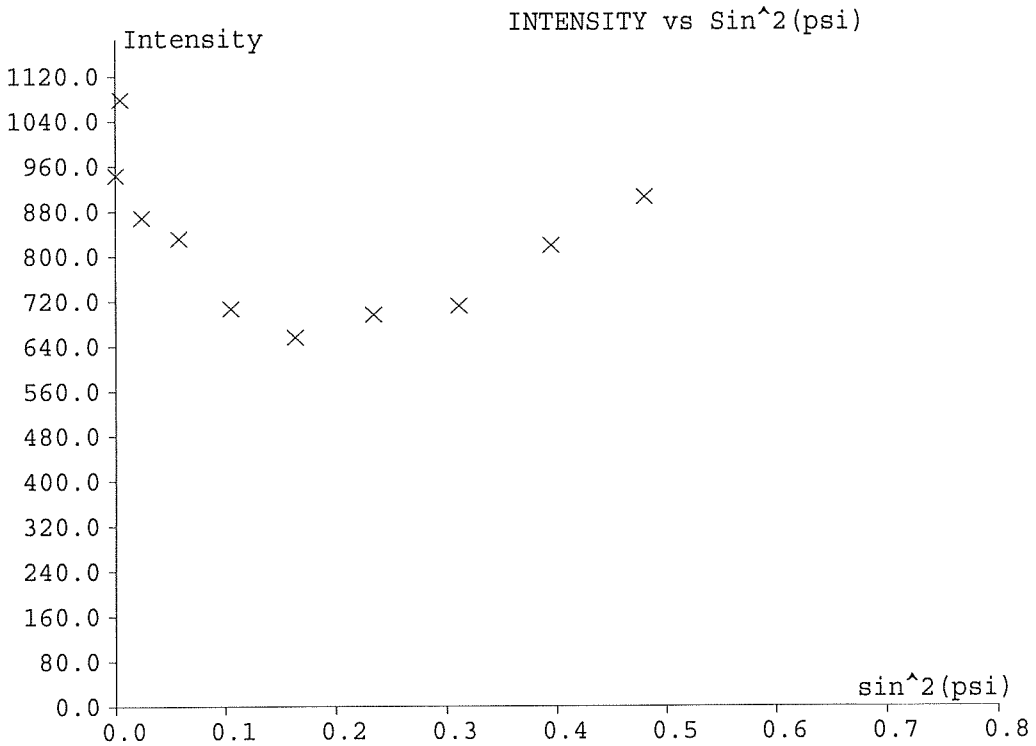



```
================================== TEC Stress Analyzer v1.64 ===================
============================ Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19380.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 13 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   3:30pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00032   166.76    943.7   2.86  0.26576    162.05  0.779828  0.000023
  5.0  0.00474   167.40   1078.2   2.39  0.25064    162.11  0.779770  0.000020
 10.0  0.02420   167.79    868.7   3.74  0.27836    162.10  0.779774  0.000031
 15.0  0.05811   167.76    831.7   3.44  0.27558    162.10  0.779772  0.000029
 20.0  0.10522   168.46    707.0   3.56  0.27748    162.14  0.779728  0.000056
 25.0  0.16363   170.72    656.1   3.75  0.28112    162.28  0.779585  0.000034
 30.0  0.23421   167.97    696.2   3.73  0.27845    162.11  0.779762  0.000028
 35.0  0.31091   169.78    711.5   3.76  0.28033    162.22  0.779646  0.000028
 40.0  0.39459   168.69    818.8   2.78  0.26537    162.17  0.779700  0.000019
 45.0  0.47973   171.33    905.0   3.10  0.27364    162.32  0.779537  0.000019

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.779783
Slope of Fitted Line...............:    -0.0004088
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -4.2 KSI     -28.8 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.2 MPa
Probable error.................(+/-):      1.3 KSI       8.9 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19380.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 13 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.2 KSI | -28.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.2 MPa |
| Probable error.....(+/-): | 1.3 KSI | 8.9 MPa |

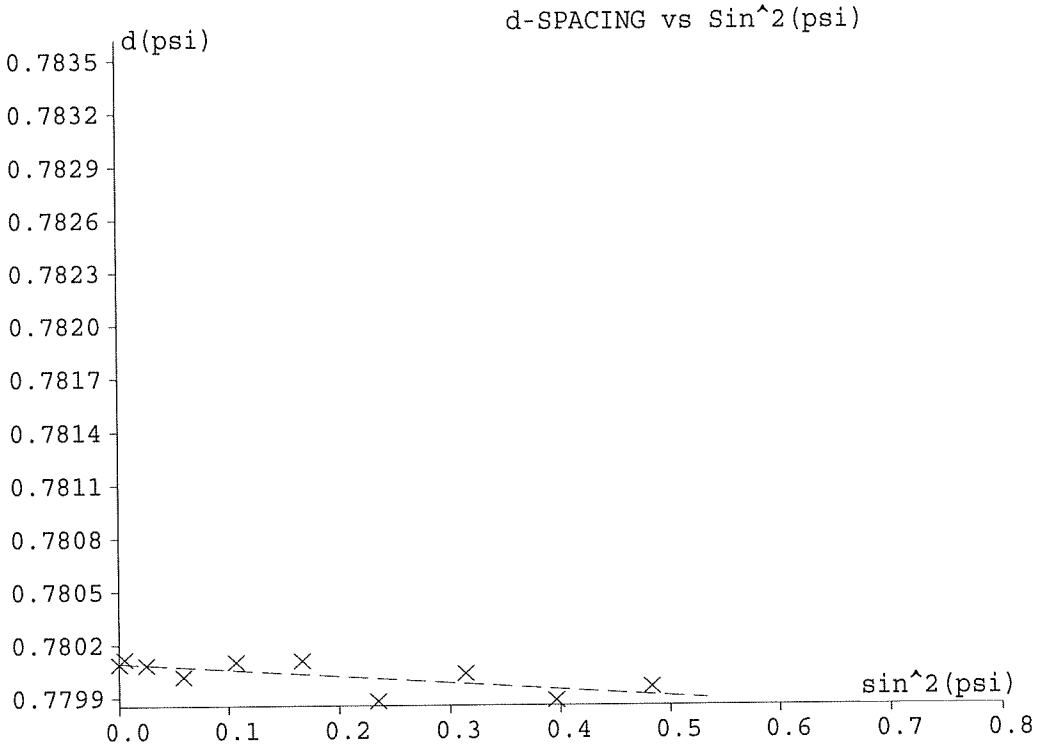


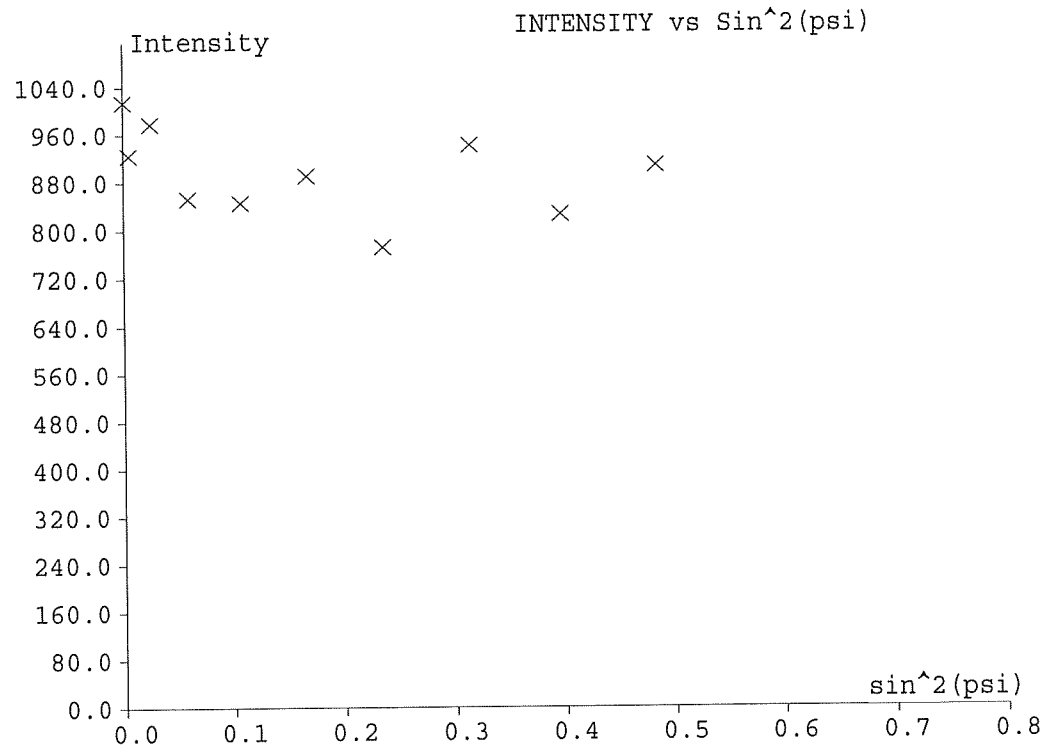



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19381.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 14 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   3:38pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00025   162.91   1014.1   3.45  0.27143    161.81  0.780090  0.000025
  5.0  0.00513   162.52    925.0   3.67  0.27294    161.78  0.780117  0.000028
 10.0  0.02497   162.92    978.0   3.07  0.26676    161.81  0.780084  0.000023
 15.0  0.05904   164.02    852.7   3.51  0.27307    161.88  0.780017  0.000030
 20.0  0.10707   162.75    845.6   3.39  0.27073    161.80  0.780099  0.000033
 25.0  0.16678   162.65    890.6   3.46  0.27133    161.79  0.780107  0.000029
 30.0  0.23500   166.13    771.2   3.36  0.27324    162.00  0.779877  0.000030
 35.0  0.31382   163.70    941.7   3.14  0.26836    161.86  0.780033  0.000020
 40.0  0.39603   166.12    825.8   3.69  0.27641    162.00  0.779881  0.000029
 45.0  0.48315   164.86    907.1   3.12  0.26901    161.93  0.779957  0.000024

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780094
Slope of Fitted Line...............:    -0.0003794
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -3.9 KSI     -26.7 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.5 MPa
Probable error.................(+/-):      1.3 KSI       9.3 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19381.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 14 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -3.9 KSI | -26.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.5 MPa |
| Probable error.....(+/-): | 1.3 KSI | 9.3 MPa |

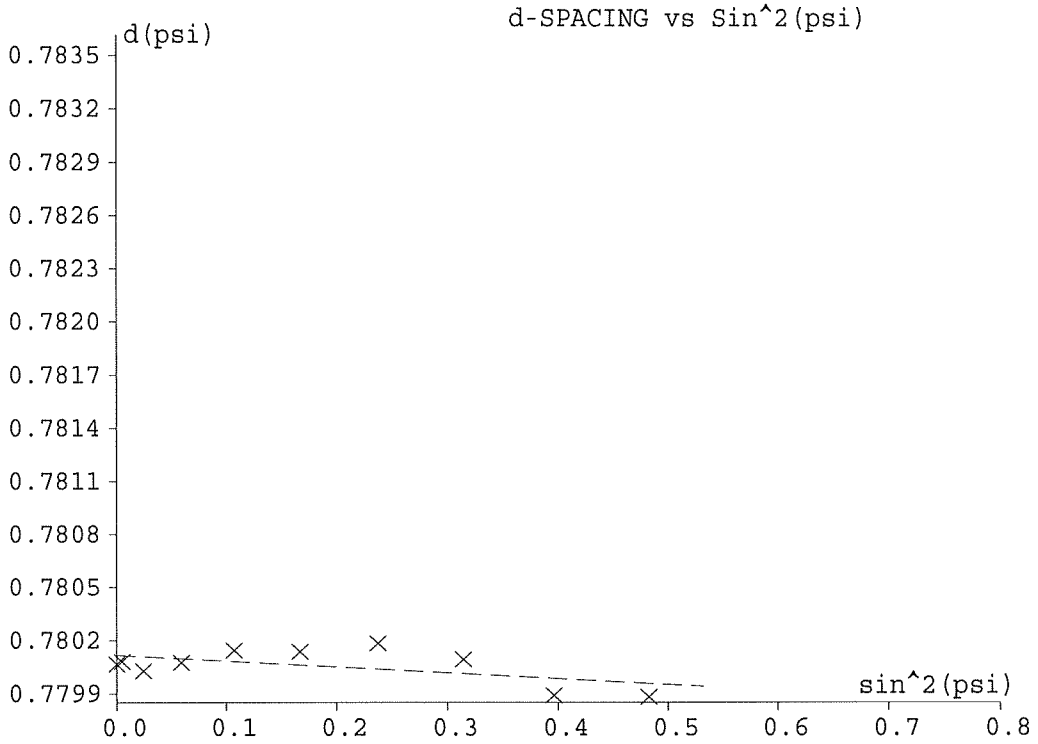


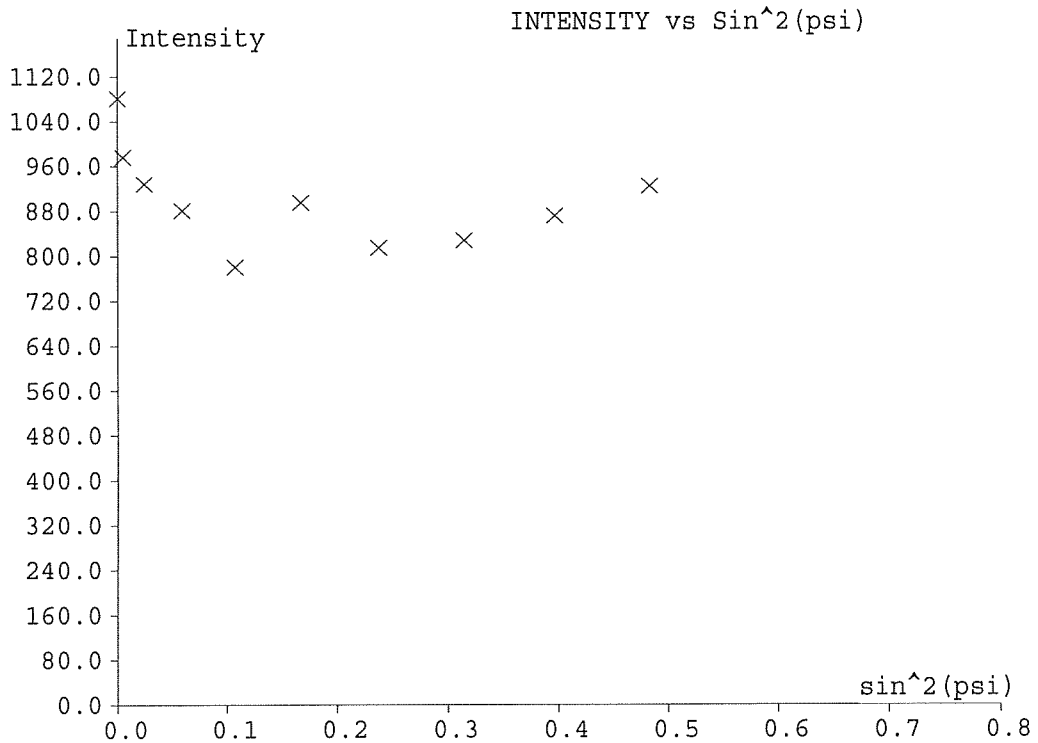



```
================================= TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19382.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 15 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   3:53pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00026   163.24   1081.0   3.31  0.27025    161.83  0.780066  0.000026
  5.0  0.00509   163.06    976.4   3.48  0.27190    161.82  0.780080  0.000023
 10.0  0.02483   163.78    928.3   3.11  0.26810    161.87  0.780027  0.000027
 15.0  0.05925   163.13    880.7   3.40  0.27112    161.82  0.780074  0.000031
 20.0  0.10729   162.10    780.8   3.46  0.27084    161.76  0.780143  0.000030
 25.0  0.16696   162.18    895.1   3.34  0.26971    161.77  0.780137  0.000027
 30.0  0.23709   161.47    814.6   3.34  0.26909    161.72  0.780183  0.000027
 35.0  0.31426   162.83    827.8   3.24  0.26924    161.81  0.780092  0.000022
 40.0  0.39610   165.92    871.8   3.25  0.27173    161.99  0.779890  0.000022
 45.0  0.48254   166.11    924.8   3.68  0.27630    162.00  0.779882  0.000026

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780116
Slope of Fitted Line...............:    -0.0003281
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -3.4 KSI     -23.1 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.4 MPa
Probable error.................(+/-):      1.7 KSI      12.1 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19382.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 15 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -3.4 KSI | -23.1 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.4 MPa |
| Probable error.....(+/-): | 1.7 KSI | 12.1 MPa |

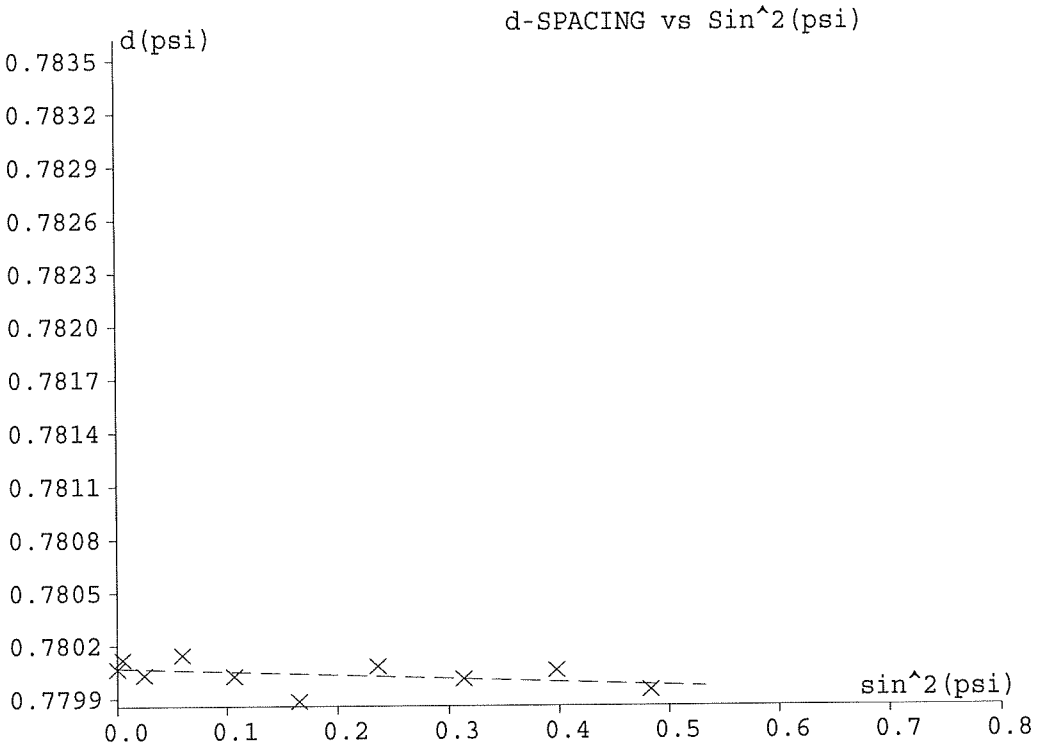


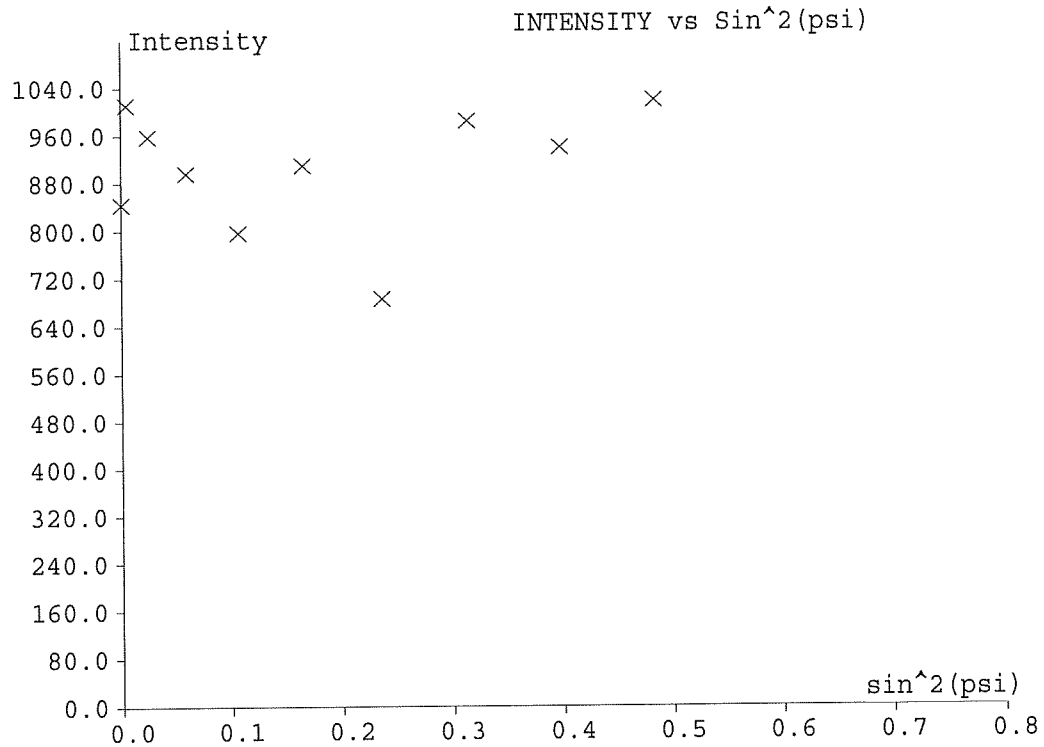



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19383.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 16 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   4:03pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00025   163.28    843.8   3.77  0.27439    161.83  0.780068  0.000035
  5.0  0.00514   162.46   1010.7   3.66  0.27278    161.78  0.780121  0.000022
 10.0  0.02485   163.74    957.5   3.29  0.27047    161.86  0.780033  0.000024
 15.0  0.05953   162.03    896.3   3.37  0.26984    161.76  0.780147  0.000035
 20.0  0.10671   163.86    796.2   3.34  0.27107    161.87  0.780026  0.000029
 25.0  0.16544   166.05    909.0   3.43  0.27393    162.00  0.779883  0.000028
 30.0  0.23640   162.96    685.7   3.13  0.26775    161.82  0.780082  0.000027
 35.0  0.31365   164.06    983.5   3.17  0.26910    161.88  0.780010  0.000022
 40.0  0.39743   163.28    939.2   2.99  0.26593    161.84  0.780059  0.000022
 45.0  0.48306   165.00   1017.8   3.01  0.26748    161.94  0.779946  0.000020

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780073
Slope of Fitted Line...............:    -0.0002007
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -2.0 KSI     -14.1 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.3 MPa
Probable error.................(+/-):      1.5 KSI      10.2 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19383.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 16 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -2.0 KSI | -14.1 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.3 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.2 MPa |



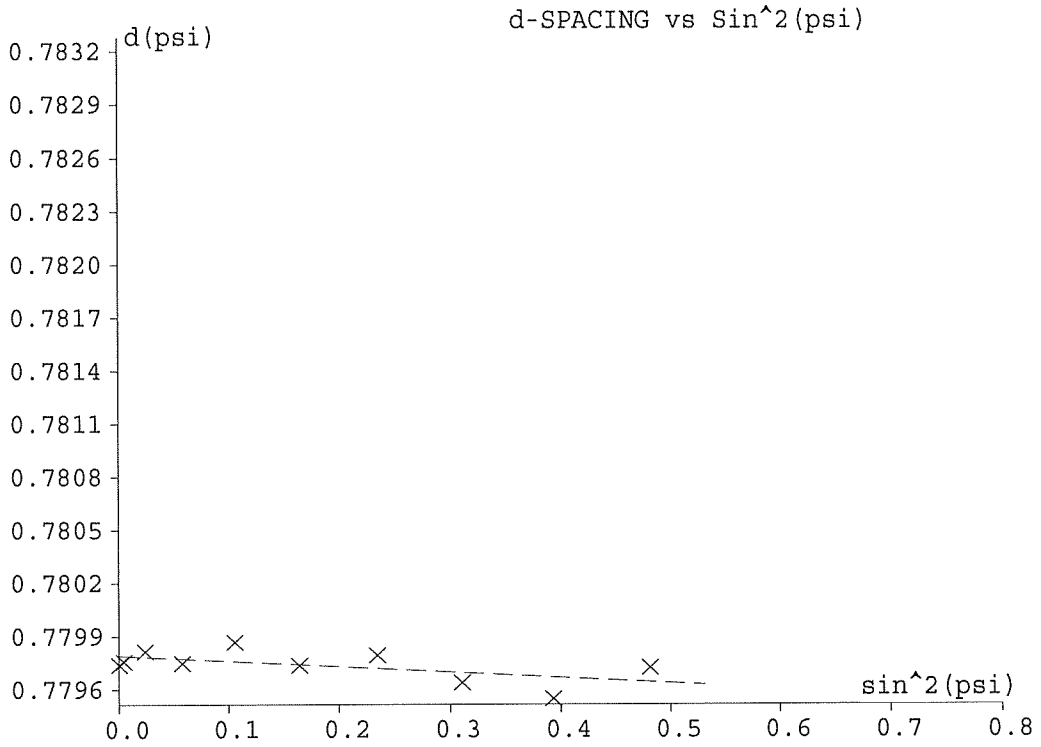
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19384.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 17 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   4:10pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758
```

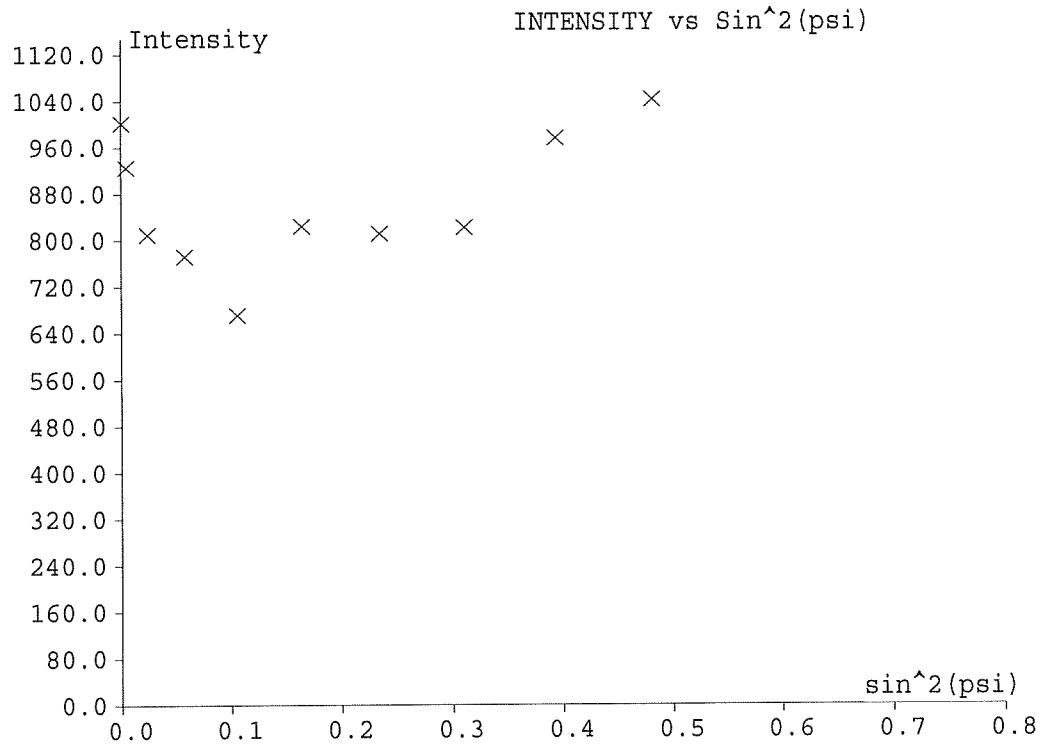
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00035 | 168.26 | 1002.1 | 3.30 | 0.27422 | 162.13 | 0.779738 | 0.000024 |
| 5.0 | 0.00472 | 168.03 | 925.7 | 3.59 | 0.27733 | 162.12 | 0.779757 | 0.000030 |
| 10.0 | 0.02430 | 167.13 | 809.8 | 3.56 | 0.27627 | 162.06 | 0.779815 | 0.000031 |
| 15.0 | 0.05801 | 168.13 | 772.1 | 3.41 | 0.27546 | 162.13 | 0.779748 | 0.000030 |
| 20.0 | 0.10592 | 166.32 | 671.2 | 3.57 | 0.27567 | 162.01 | 0.779867 | 0.000054 |
| 25.0 | 0.16455 | 168.34 | 823.6 | 3.49 | 0.27665 | 162.14 | 0.779736 | 0.000028 |
| 30.0 | 0.23442 | 167.43 | 811.1 | 3.40 | 0.27473 | 162.08 | 0.779793 | 0.000025 |
| 35.0 | 0.31084 | 169.78 | 821.8 | 3.14 | 0.27303 | 162.23 | 0.779637 | 0.000021 |
| 40.0 | 0.39337 | 171.27 | 976.0 | 3.54 | 0.27988 | 162.31 | 0.779548 | 0.000027 |
| 45.0 | 0.48125 | 168.51 | 1042.6 | 3.31 | 0.27459 | 162.15 | 0.779722 | 0.000018 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.779791
Slope of Fitted Line...............:    -0.0003089
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -3.2 KSI     -21.8 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.5 MPa
Probable error.................(+/-):      1.5 KSI      10.6 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19384.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 17 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -3.2 KSI | -21.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.5 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.6 MPa |

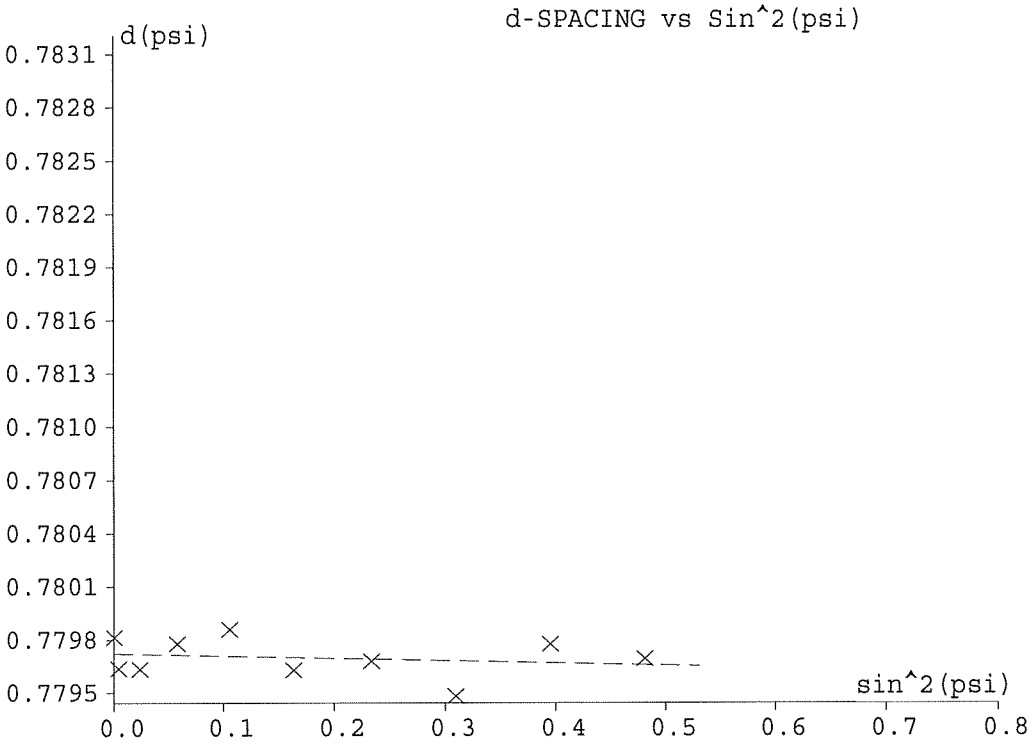


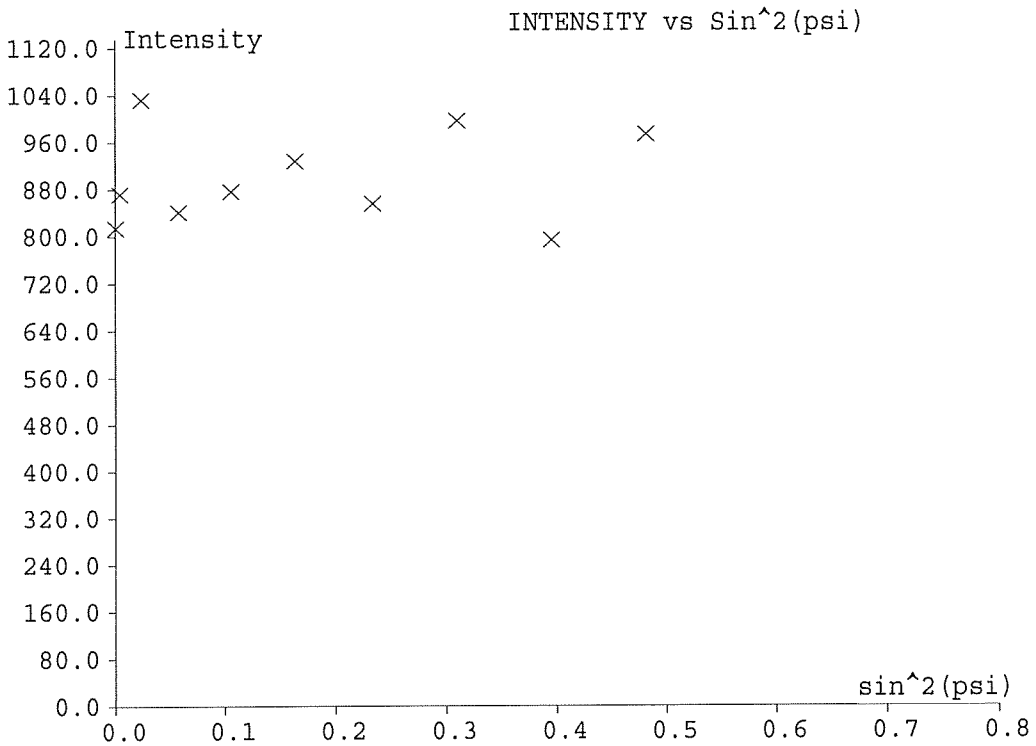



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19385.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 18 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   4:30pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00032   167.14    814.1   3.51  0.27582    162.06  0.779813  0.000035
  5.0  0.00459   169.88    871.8   3.53  0.27852    162.23  0.779637  0.000032
 10.0  0.02385   169.87   1032.4   3.21  0.27429    162.23  0.779633  0.000020
 15.0  0.05813   167.64    841.7   3.27  0.27327    162.10  0.779778  0.000033
 20.0  0.10588   166.41    876.8   3.36  0.27346    162.02  0.779859  0.000023
 25.0  0.16389   169.98    928.3   3.28  0.27532    162.24  0.779627  0.000025
 30.0  0.23363   169.22    855.9   3.44  0.27679    162.19  0.779678  0.000024
 35.0  0.30965   172.33    997.1   3.55  0.28091    162.38  0.779481  0.000026
 40.0  0.39519   167.63    794.2   3.05  0.27005    162.10  0.779775  0.000030
 45.0  0.48101   168.97    974.3   3.37  0.27567    162.18  0.779693  0.000018

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.779721
Slope of Fitted Line...............:    -0.0001302
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -1.3 KSI      -9.2 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.6 MPa
Probable error.................(+/-):      2.3 KSI      15.9 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19385.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 18 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -1.3 KSI | -9.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.6 MPa |
| Probable error.....(+/-): | 2.3 KSI | 15.9 MPa |

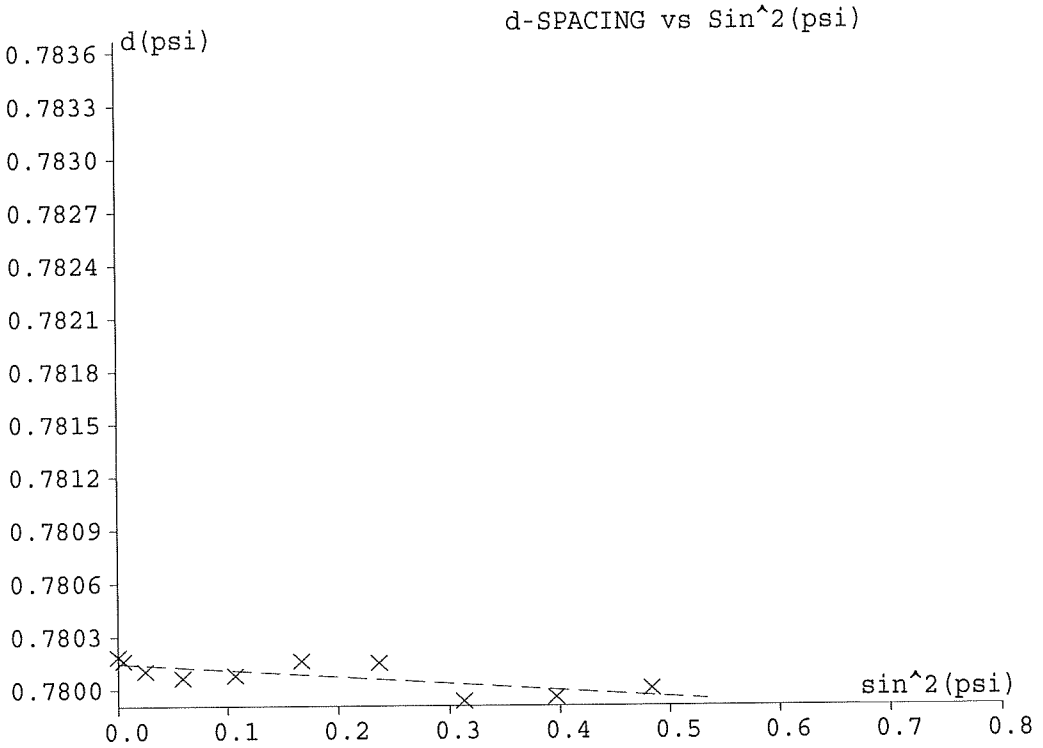


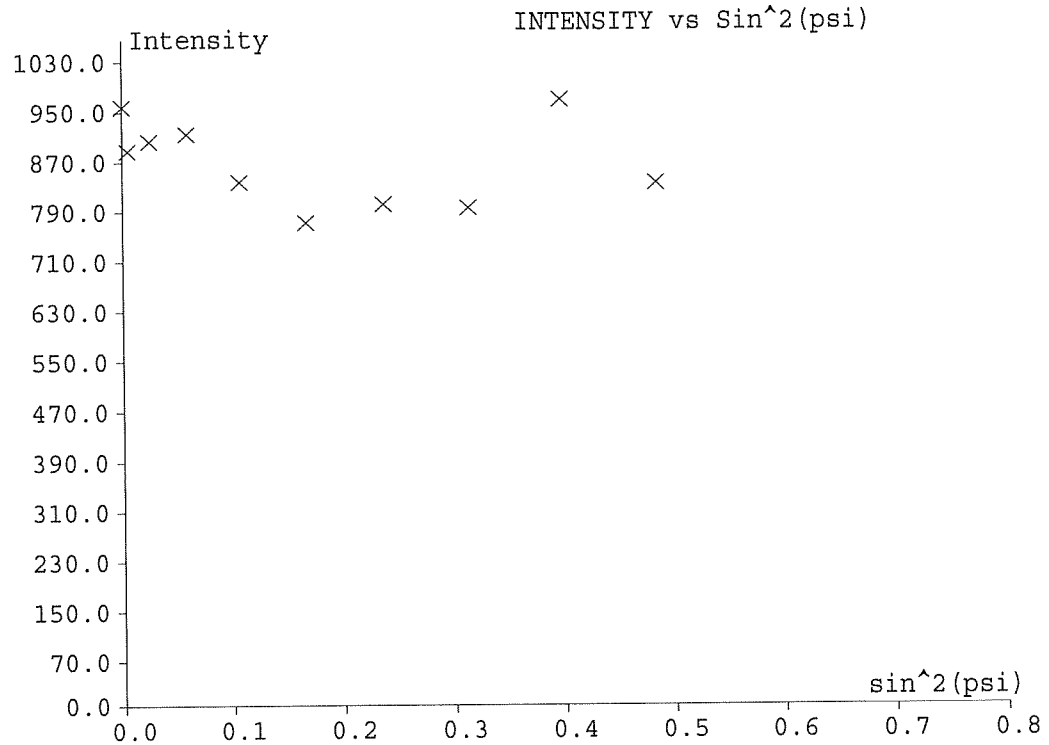



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19386.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 19 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   4:37pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00023   161.47    958.4   3.69  0.27208    161.72  0.780186  0.000027
  5.0  0.00518   161.79    887.8   3.40  0.27002    161.74  0.780163  0.000030
 10.0  0.02502   162.74    902.9   3.81  0.27416    161.80  0.780104  0.000035
 15.0  0.05922   163.26    915.0   3.34  0.27059    161.83  0.780065  0.000032
 20.0  0.10697   163.07    837.8   3.48  0.27193    161.82  0.780079  0.000027
 25.0  0.16709   161.85    772.4   3.52  0.27122    161.74  0.780160  0.000034
 30.0  0.23686   161.97    801.7   3.26  0.26871    161.75  0.780150  0.000027
 35.0  0.31307   165.28    795.4   3.34  0.27222    161.95  0.779932  0.000024
 40.0  0.39661   164.96    968.3   3.42  0.27287    161.93  0.779954  0.000023
 45.0  0.48353   164.10    834.5   2.96  0.26601    161.89  0.780004  0.000021

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780149
Slope of Fitted Line...............:    -0.0003836
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -3.9 KSI     -27.0 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.5 MPa
Probable error.................(+/-):      1.3 KSI       8.9 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19386.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 19 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -3.9 KSI | -27.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.5 MPa |
| Probable error.....(+/-): | 1.3 KSI | 8.9 MPa |

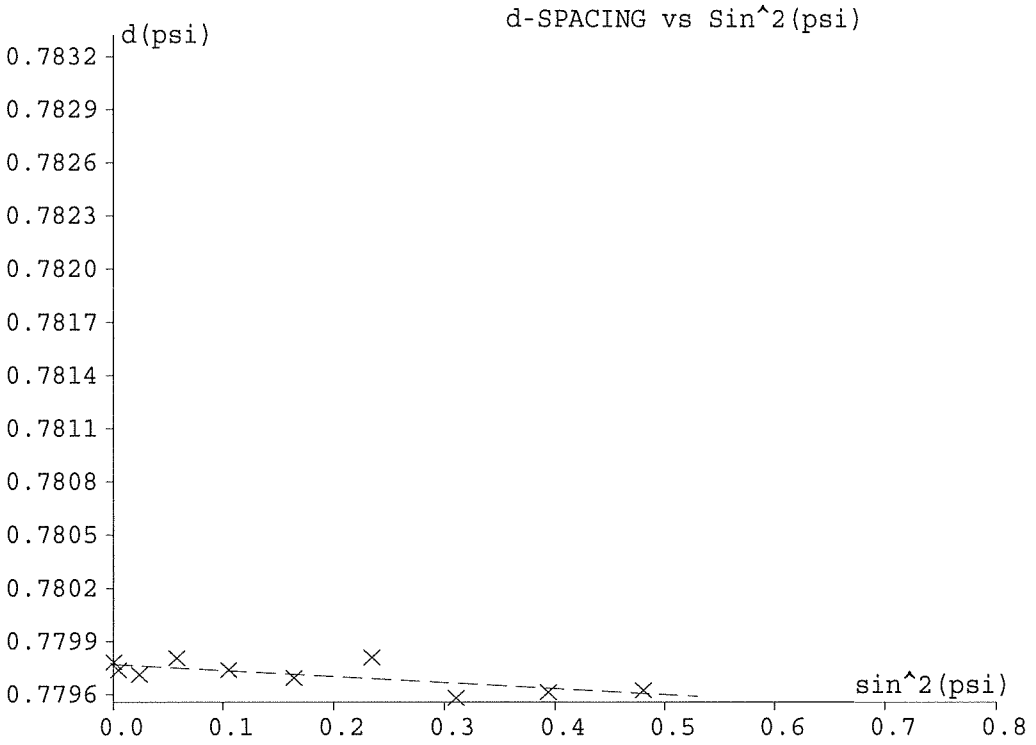


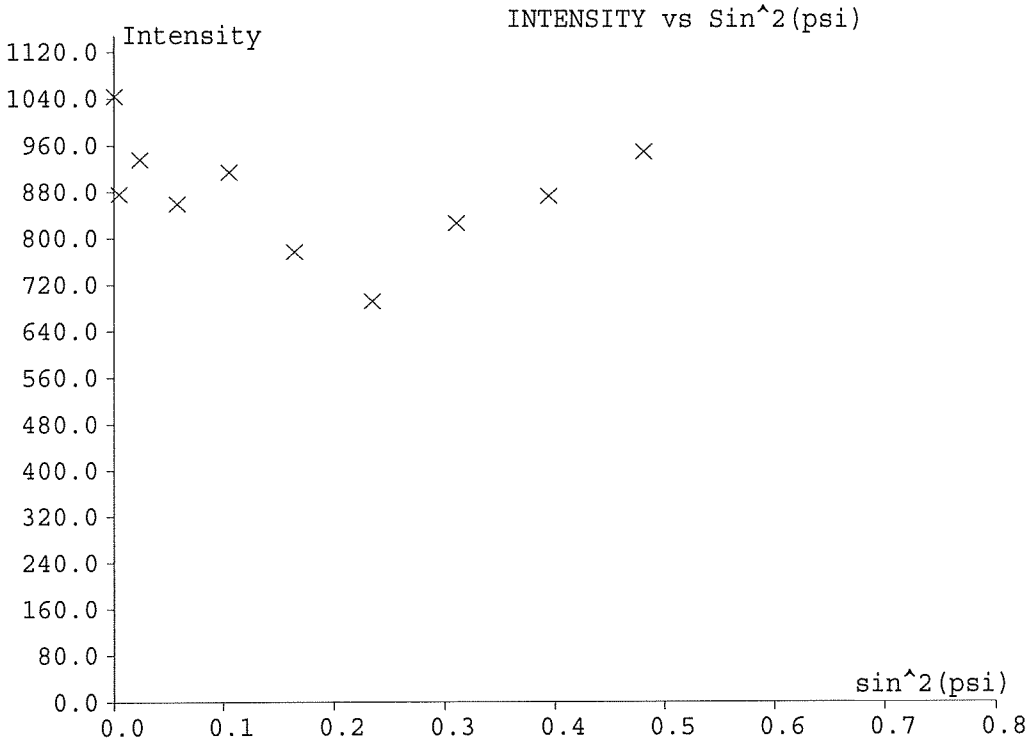



```
================================= TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2005\SBIR\50632\19387.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 20 / 1.5" from Hole / Baseline / Transverse / ebm

Acquisition date & time:   8/22/2005   4:45pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  30.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.42245E-08   B   -5.2884E-06   C  0.0618978      D   148.0758


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00033   167.61   1043.9   3.49  0.27601    162.09  0.779783  0.000027
  5.0  0.00470   168.36    875.9   3.77  0.27908    162.14  0.779737  0.000028
 10.0  0.02405   168.70    935.7   3.49  0.27696    162.16  0.779712  0.000031
 15.0  0.05824   167.23    859.9   3.43  0.27491    162.07  0.779806  0.000024
 20.0  0.10528   168.24    913.8   3.31  0.27428    162.13  0.779740  0.000021
 25.0  0.16430   168.85    777.2   2.97  0.26951    162.18  0.779695  0.000026
 30.0  0.23454   167.20    691.7   3.52  0.27606    162.07  0.779810  0.000022
 35.0  0.31041   170.70    826.7   3.28  0.27587    162.28  0.779581  0.000025
 40.0  0.39389   170.28    873.2   3.61  0.27956    162.25  0.779612  0.000023
 45.0  0.48044   169.96    950.0   3.05  0.27166    162.24  0.779624  0.000017

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.779770
Slope of Fitted Line...............:    -0.0003409
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -3.5 KSI     -24.0 MPa

Counting Statistics Stress Error (+/-):      0.5 KSI       3.2 MPa
Probable error.................(+/-):      1.2 KSI       8.3 MPa
```

File: C:\STRESS\DATA\2005\SBIR\50632\19387.STR
Sample Description:
SBIR / WP / CW Holes / AF Std. 20 / 1.5" from Hole / Baseline / Transverse / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -3.5 KSI | -24.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.5 KSI | 3.2 MPa |
| Probable error.....(+/-): | 1.2 KSI | 8.3 MPa |

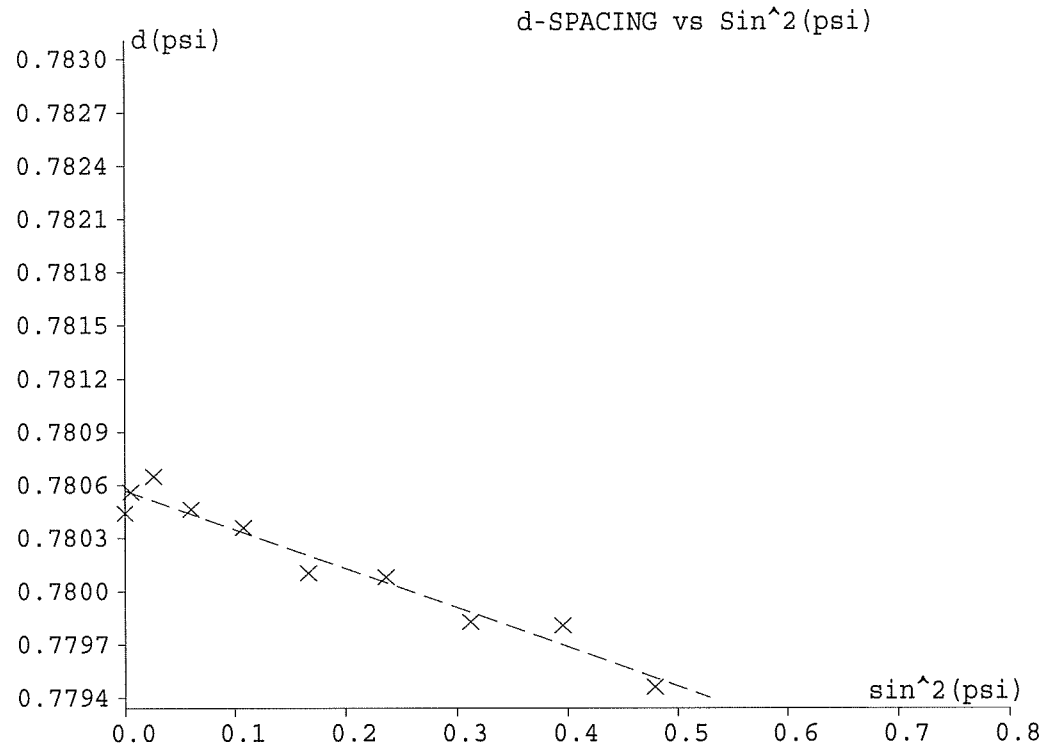


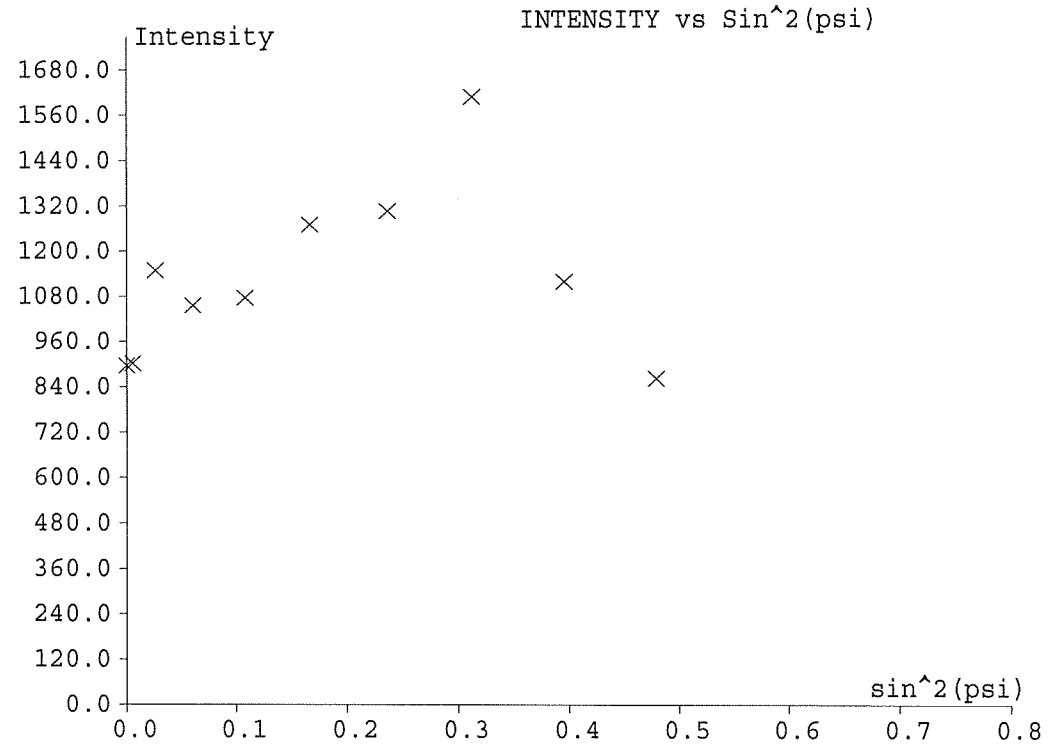



```
================================= TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7723.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 1 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   6:47pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00017   159.10    895.9   4.29  0.27249    161.49  0.780442  0.000062
  5.0  0.00565   157.21    902.1   3.88  0.26898    161.38  0.780561  0.000043
 10.0  0.02639   155.86   1148.6   3.91  0.26809    161.30  0.780649  0.000040
 15.0  0.06072   158.74   1055.0   4.16  0.27141    161.47  0.780463  0.000042
 20.0  0.10835   160.37   1075.9   4.17  0.27270    161.56  0.780359  0.000045
 25.0  0.16675   164.37   1269.8   4.03  0.27531    161.80  0.780102  0.000036
 30.0  0.23638   164.75   1305.1   4.09  0.27598    161.82  0.780079  0.000033
 35.0  0.31226   168.76   1606.7   3.94  0.27893    162.05  0.779825  0.000029
 40.0  0.39544   169.08   1117.6   4.08  0.27993    162.07  0.779806  0.000029
 45.0  0.47911   174.62    861.2   4.06  0.28499    162.39  0.779462  0.000035

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780570
Slope of Fitted Line...............:     -0.002207
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -22.5 KSI    -155.4 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.5 MPa
Probable error.................(+/-):      1.8 KSI      12.4 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7723.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 1 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -22.5 KSI | -155.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.5 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.4 MPa |

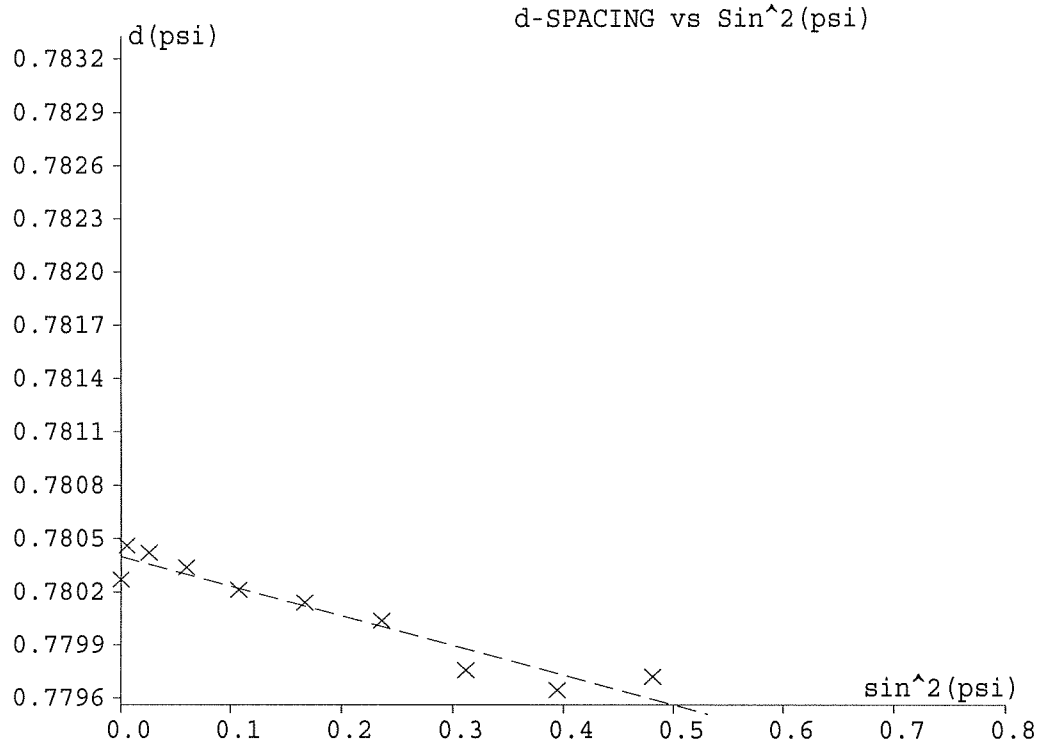


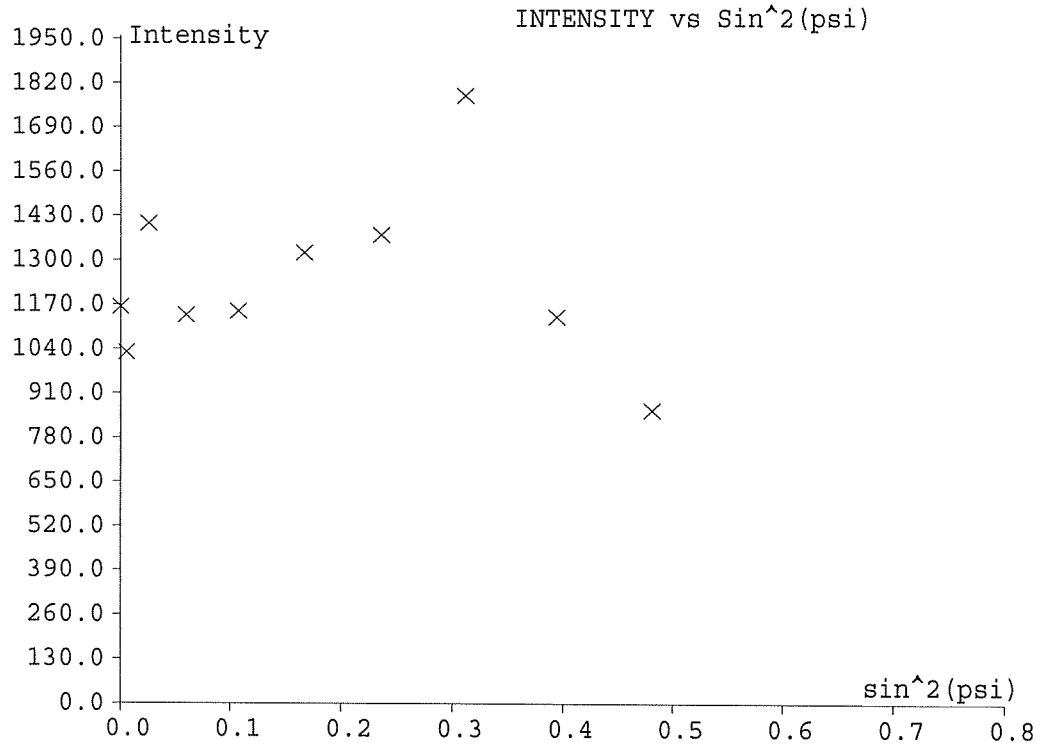



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7724.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 1 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   6:53pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00021   161.76   1163.2   4.23  0.27418    161.64  0.780270  0.000046
  5.0  0.00553   158.78   1030.7   4.11  0.27122    161.47  0.780461  0.000053
 10.0  0.02582   159.39   1406.9   4.13  0.27177    161.51  0.780422  0.000042
 15.0  0.06025   160.66   1138.9   3.98  0.27208    161.58  0.780339  0.000040
 20.0  0.10762   162.66   1150.4   4.03  0.27385    161.70  0.780211  0.000039
 25.0  0.16697   163.79   1320.6   4.05  0.27489    161.76  0.780139  0.000037
 30.0  0.23609   165.42   1371.8   4.09  0.27660    161.86  0.780036  0.000030
 35.0  0.31175   169.87   1780.1   4.04  0.28044    162.12  0.779756  0.000029
 40.0  0.39415   171.67   1133.0   4.11  0.28251    162.22  0.779645  0.000034
 45.0  0.48123   170.45    858.6   4.04  0.28098    162.15  0.779720  0.000033

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780400
Slope of Fitted Line...............:     -0.001674
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -17.1 KSI    -117.9 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.3 MPa
Probable error.................(+/-):      1.8 KSI      12.7 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7724.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 1 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -17.1 KSI | -117.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.3 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.7 MPa |

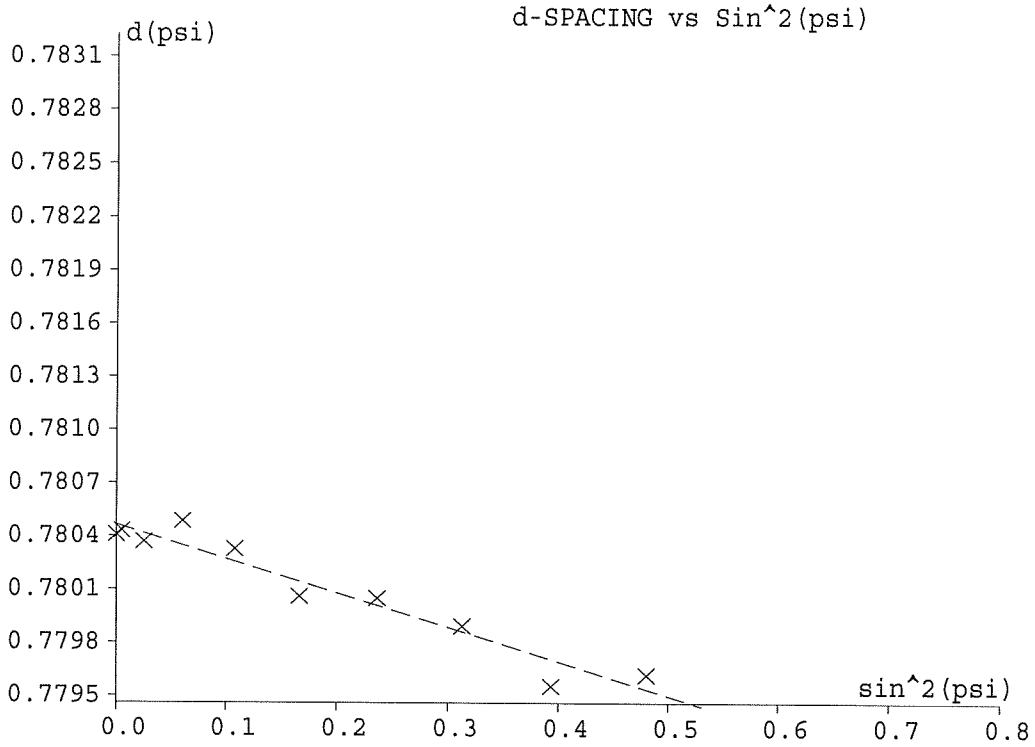


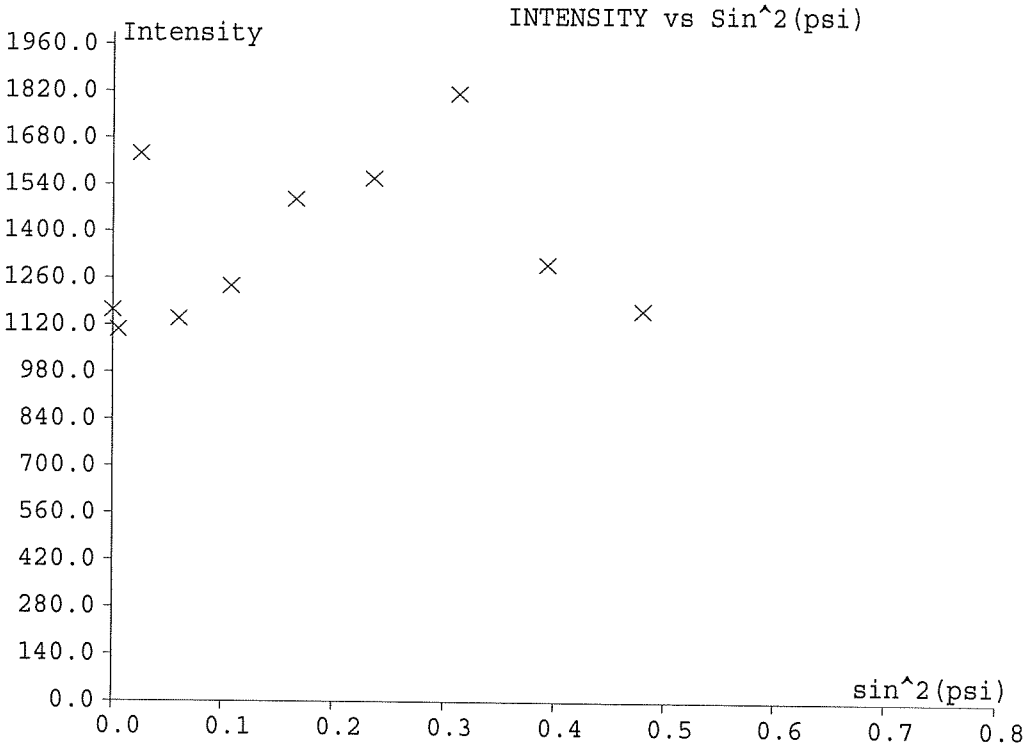



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7725.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 1 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   6:58pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00018   159.61   1164.2   4.18  0.27216    161.52  0.780408  0.000041
  5.0  0.00549   159.31   1106.5   4.51  0.27410    161.50  0.780430  0.000045
 10.0  0.02569   160.19   1632.3   3.84  0.27106    161.56  0.780368  0.000036
 15.0  0.06080   158.40   1138.5   3.96  0.27024    161.45  0.780485  0.000046
 20.0  0.10820   160.82   1236.3   3.86  0.27160    161.59  0.780328  0.000037
 25.0  0.16650   165.04   1495.7   4.07  0.27617    161.84  0.780060  0.000032
 30.0  0.23619   165.19   1558.3   3.98  0.27583    161.85  0.780050  0.000027
 35.0  0.31277   167.68   1810.8   3.76  0.27682    161.99  0.779892  0.000025
 40.0  0.39343   173.10   1300.1   3.97  0.28311    162.31  0.779555  0.000076
 45.0  0.48040   172.09   1162.9   4.09  0.28279    162.25  0.779619  0.000032

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780465
Slope of Fitted Line...............:     -0.00193
Material Stress Constant...........:    1.255E-07

*Residual Stress...................:    -19.7 KSI    -135.9 MPa

Counting Statistics Stress Error (+/-):      0.9 KSI       6.3 MPa
Probable error.................(+/-):      1.8 KSI      12.7 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7725.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 1 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -19.7 KSI | -135.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.3 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.7 MPa |

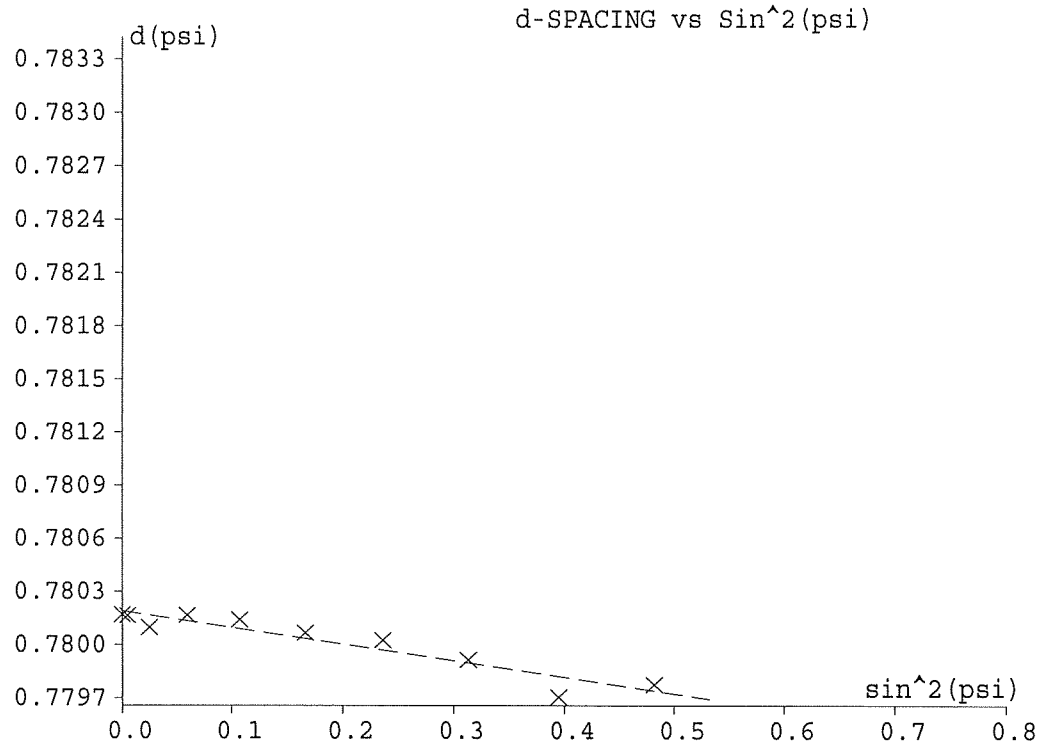


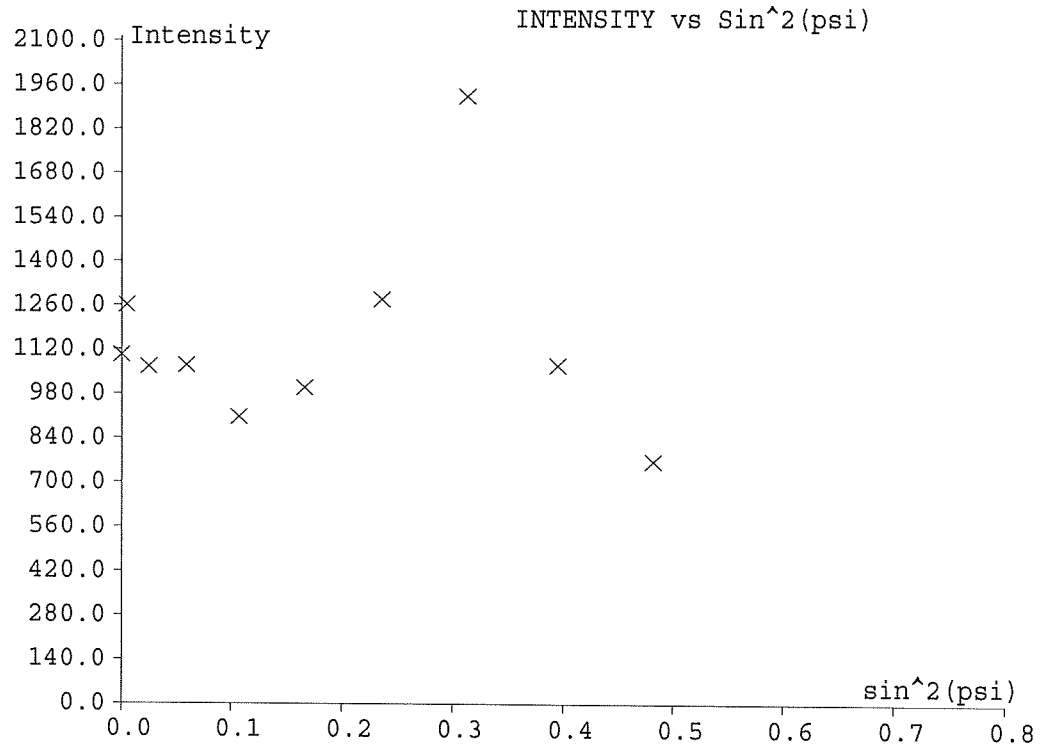



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7720.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 2 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   6:26pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00023   163.35   1103.4   4.55  0.27760    161.73  0.780171  0.000053
  5.0  0.00519   163.39   1261.6   4.04  0.27450    161.74  0.780165  0.000037
 10.0  0.02501   164.47   1065.6   4.39  0.27754    161.80  0.780099  0.000064
 15.0  0.05960   163.39   1069.9   4.23  0.27547    161.74  0.780166  0.000046
 20.0  0.10727   163.77    905.6   3.99  0.27457    161.76  0.780140  0.000039
 25.0  0.16655   164.93    997.8   4.23  0.27692    161.83  0.780068  0.000039
 30.0  0.23602   165.59   1277.4   4.09  0.27677    161.87  0.780025  0.000040
 35.0  0.31294   167.32   1920.4   3.96  0.27769    161.97  0.779916  0.000032
 40.0  0.39464   170.66   1067.8   3.94  0.28066    162.16  0.779707  0.000028
 45.0  0.48169   169.54    764.9   4.01  0.28001    162.10  0.779777  0.000074

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780189
Slope of Fitted Line...............:    -0.0009279
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -9.5 KSI     -65.3 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.6 MPa
Probable error.................(+/-):      1.2 KSI       8.1 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7720.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 2 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -9.5 KSI | -65.3 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.6 MPa |
| Probable error.....(+/-): | 1.2 KSI | 8.1 MPa |



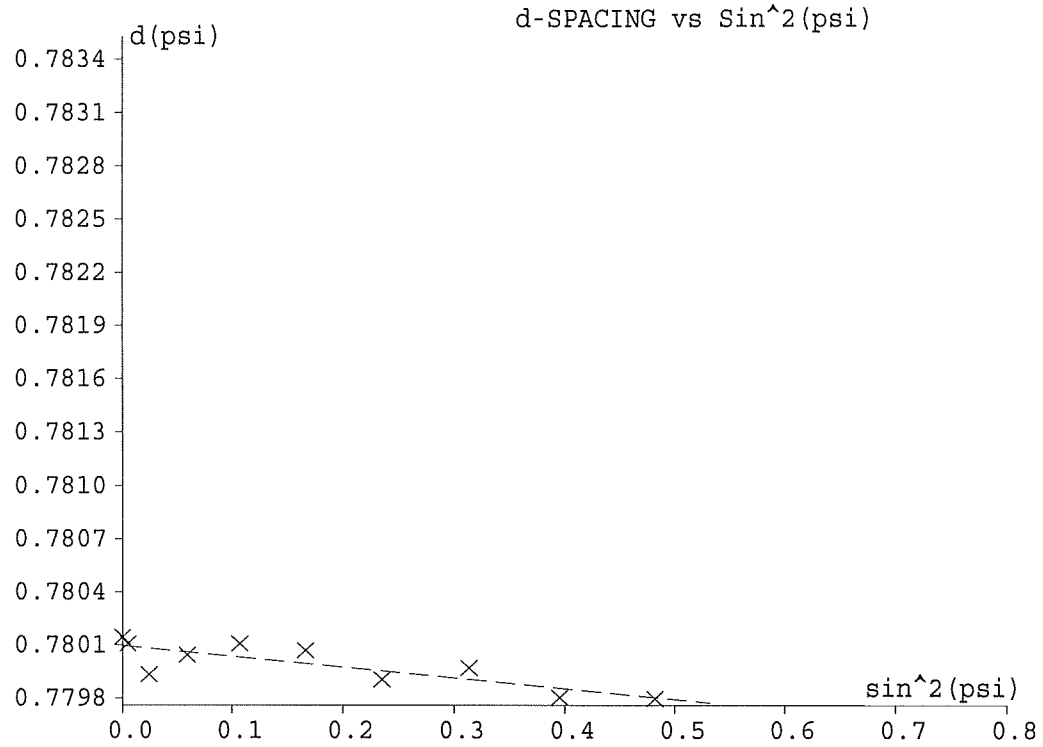
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7721.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 2 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   6:33pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

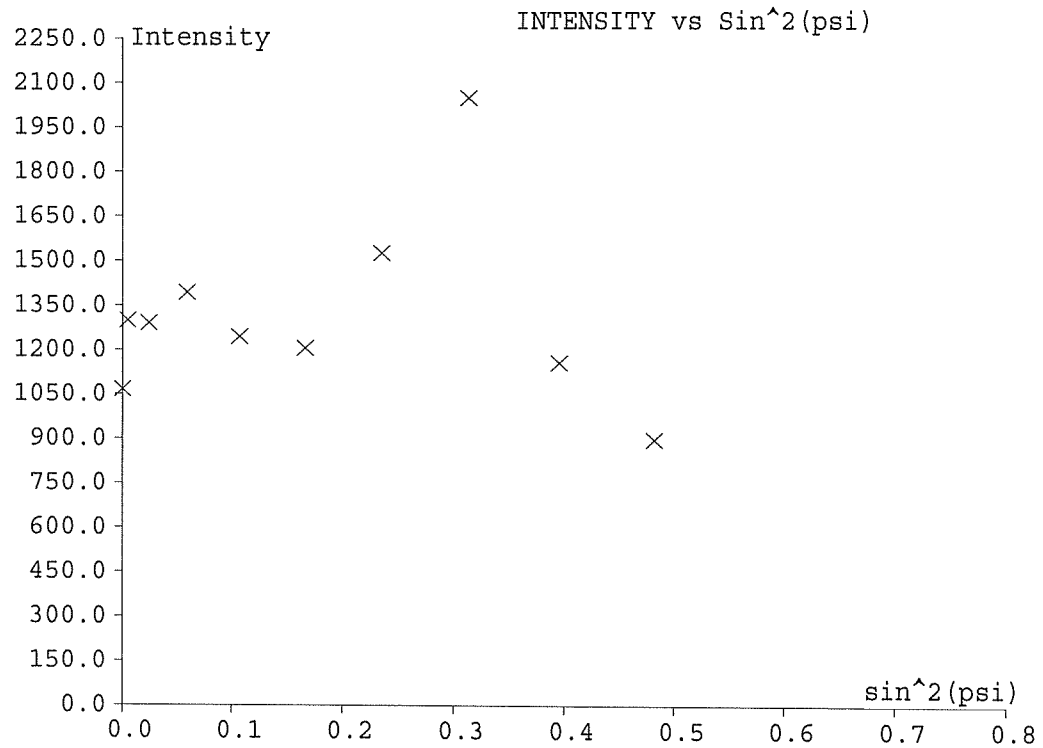
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | - | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00024 | 163.73 | 1067.1 | 4.42 | 0.27706 | | 161.76 | 0.780146 | 0.000049 |
| 5.0 | 0.00512 | 164.31 | 1298.4 | 4.14 | 0.27581 | | 161.79 | 0.780107 | 0.000038 |
| 10.0 | 0.02460 | 167.04 | 1290.3 | 4.11 | 0.27818 | | 161.95 | 0.779934 | 0.000042 |
| 15.0 | 0.05914 | 165.28 | 1392.8 | 4.02 | 0.27614 | | 161.85 | 0.780045 | 0.000035 |
| 20.0 | 0.10711 | 164.30 | 1244.2 | 4.21 | 0.27618 | | 161.79 | 0.780108 | 0.000042 |
| 25.0 | 0.16656 | 164.88 | 1205.3 | 3.91 | 0.27519 | | 161.83 | 0.780070 | 0.000035 |
| 30.0 | 0.23520 | 167.48 | 1524.2 | 3.94 | 0.27774 | | 161.98 | 0.779906 | 0.000031 |
| 35.0 | 0.31336 | 166.45 | 2048.4 | 3.93 | 0.27672 | | 161.92 | 0.779971 | 0.000027 |
| 40.0 | 0.39542 | 169.11 | 1156.7 | 4.04 | 0.27976 | | 162.07 | 0.779804 | 0.000028 |
| 45.0 | 0.48185 | 169.16 | 896.0 | 3.54 | 0.27642 | | 162.08 | 0.779797 | 0.000032 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780098
Slope of Fitted Line...............:    -0.0006092
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -6.2 KSI     -42.9 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.8 MPa
Probable error.................(+/-):      1.5 KSI      10.3 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7721.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 2 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -6.2 KSI | -42.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.8 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.3 MPa |

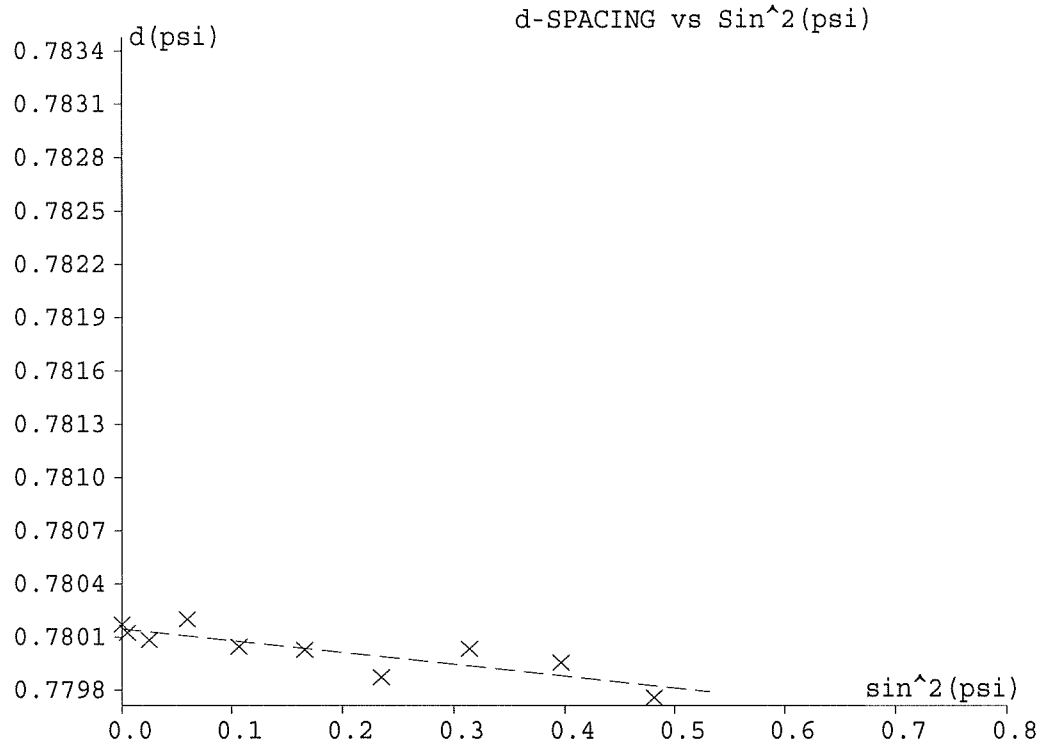


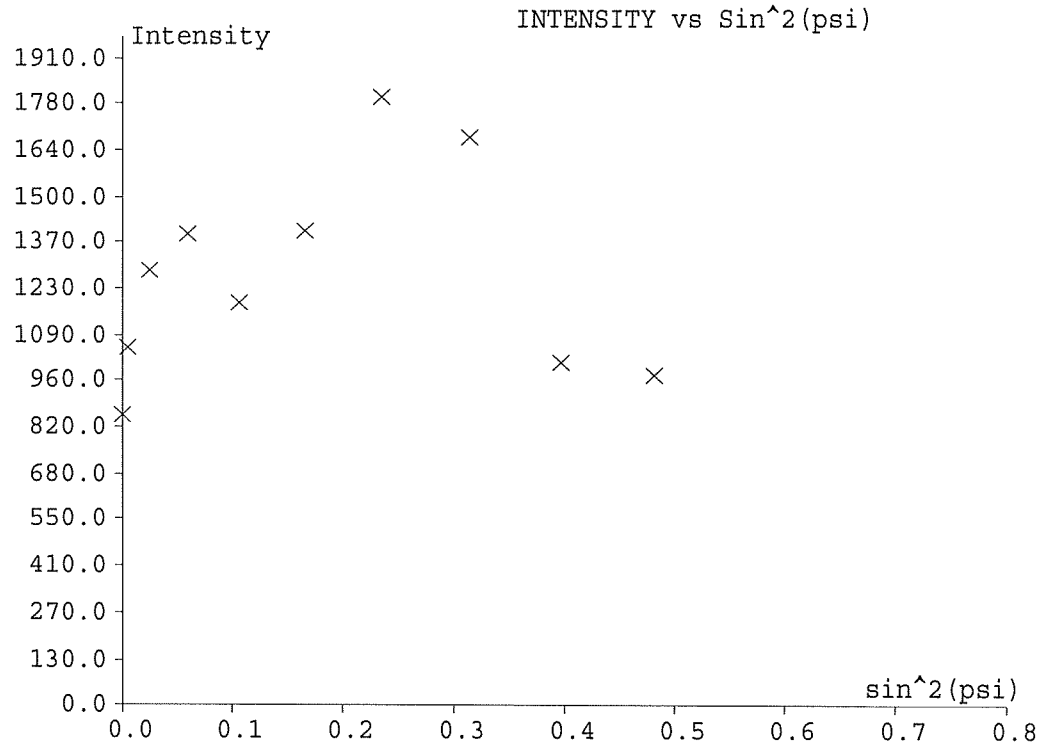



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7722.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 2 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   6:38pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00023   163.32    855.6   4.28  0.27572    161.73  0.780171  0.000046
  5.0  0.00514   164.05   1054.2   4.24  0.27613    161.78  0.780124  0.000041
 10.0  0.02497   164.69   1283.6   4.07  0.27581    161.82  0.780083  0.000030
 15.0  0.05973   162.83   1391.1   4.18  0.27468    161.71  0.780201  0.000037
 20.0  0.10680   165.24   1187.1   3.63  0.27365    161.85  0.780045  0.000034
 25.0  0.16630   165.55   1399.7   3.80  0.27520    161.87  0.780027  0.000037
 30.0  0.23496   168.00   1795.6   3.73  0.27683    162.01  0.779871  0.000026
 35.0  0.31382   165.43   1676.3   3.64  0.27386    161.86  0.780033  0.000023
 40.0  0.39661   166.71   1009.9   4.03  0.27750    161.93  0.779955  0.000036
 45.0  0.48154   169.84    971.9   3.99  0.28016    162.12  0.779758  0.000028

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780147
Slope of Fitted Line...............:    -0.0006704
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -6.8 KSI     -47.2 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.7 MPa
Probable error.................(+/-):      1.5 KSI      10.4 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7722.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 2 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -6.8 KSI | -47.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.7 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.4 MPa |

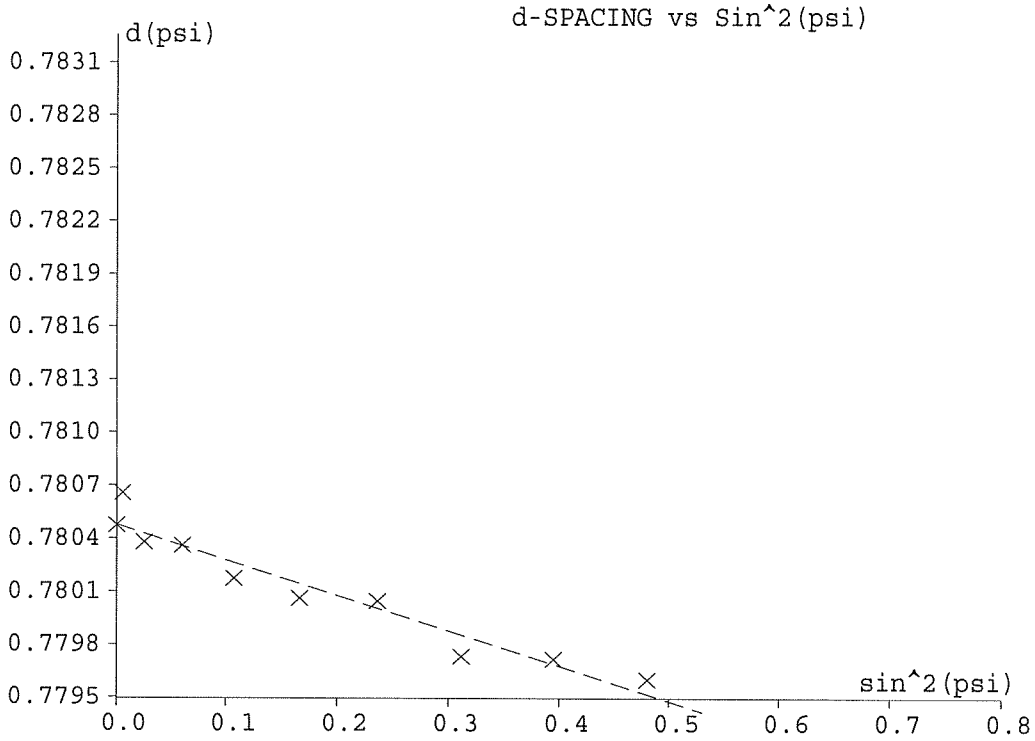


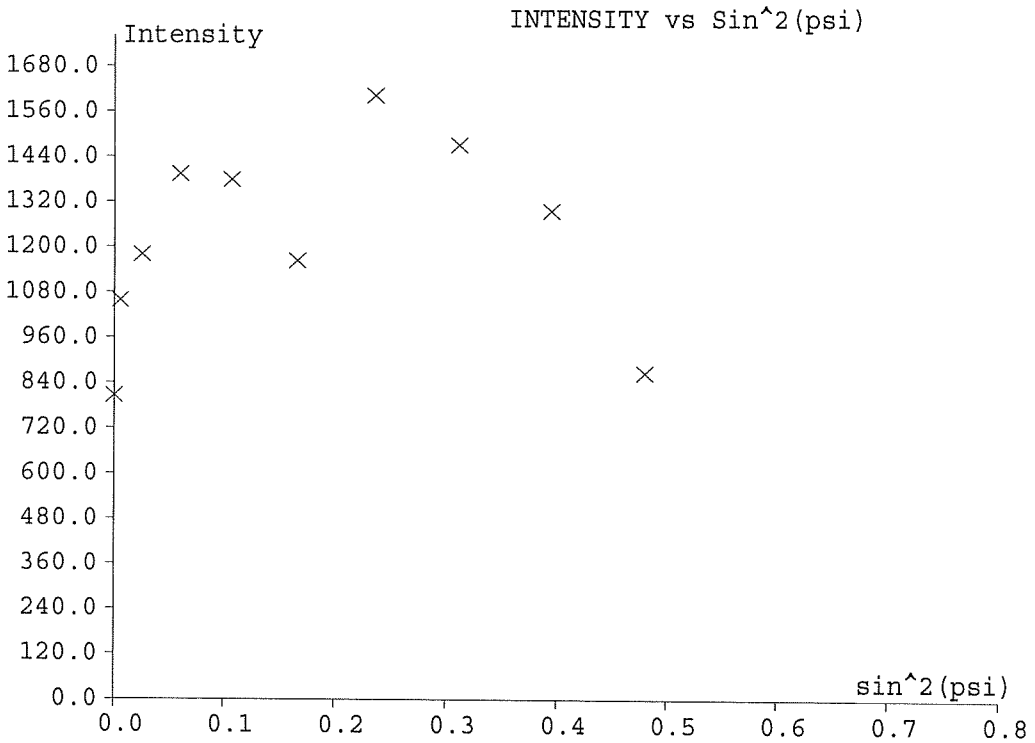



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7717.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 3 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   6:10pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00016   158.62    806.4   4.52  0.27366    161.46  0.780474  0.000095
  5.0  0.00576   155.76   1058.6   4.21  0.26938    161.30  0.780657  0.000059
 10.0  0.02571   160.07   1180.4   4.09  0.27212    161.55  0.780377  0.000043
 15.0  0.06033   160.33   1393.4   3.96  0.27171    161.56  0.780360  0.000041
 20.0  0.10744   163.29   1378.4   4.37  0.27634    161.73  0.780174  0.000036
 25.0  0.16651   165.04   1163.0   4.29  0.27740    161.83  0.780062  0.000037
 30.0  0.23616   165.27   1601.4   4.01  0.27608    161.85  0.780046  0.000030
 35.0  0.31156   170.28   1470.5   4.13  0.28134    162.14  0.779731  0.000034
 40.0  0.39472   170.48   1296.2   3.71  0.27893    162.16  0.779716  0.000031
 45.0  0.48025   172.36    865.9   3.87  0.28183    162.26  0.779600  0.000034

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780478
Slope of Fitted Line...............:     -0.002004
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -20.5 KSI    -141.0 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       6.8 MPa
Probable error.................(+/-):      2.0 KSI      13.6 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7717.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 3 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -20.5 KSI | -141.0 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 6.8 MPa |
| Probable error.....(+/-): | 2.0 KSI | 13.6 MPa |

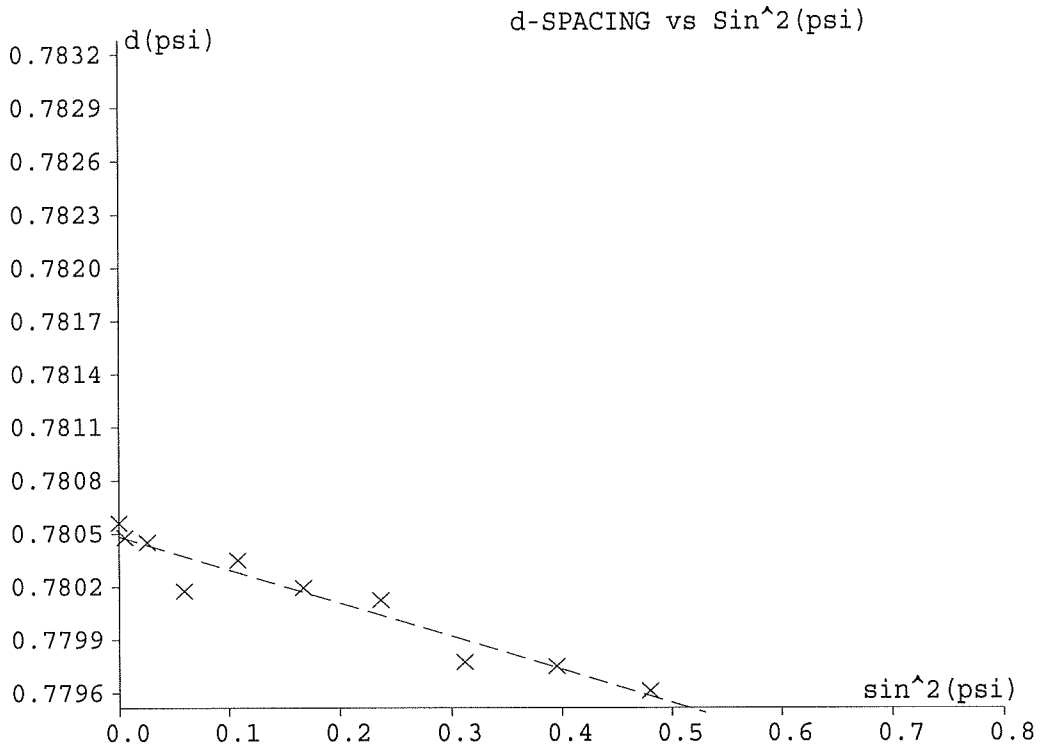


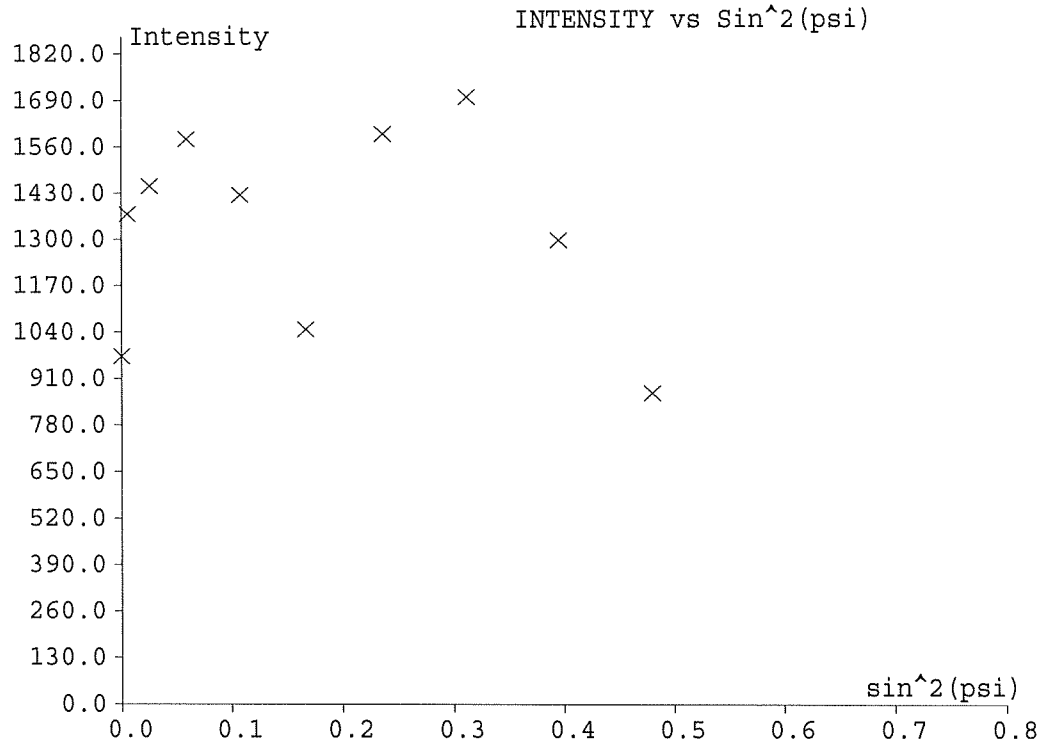



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7718.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 3 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   6:15pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00015   157.30    972.1   4.73  0.27327    161.38  0.780560  0.000054
  5.0  0.00555   158.51   1370.6   4.14  0.27113    161.46  0.780479  0.000035
 10.0  0.02589   158.94   1449.7   4.10  0.27131    161.48  0.780451  0.000035
 15.0  0.05964   163.22   1581.6   4.13  0.27474    161.73  0.780176  0.000034
 20.0  0.10831   160.49   1424.4   4.01  0.27206    161.57  0.780350  0.000031
 25.0  0.16730   162.90   1046.9   3.97  0.27373    161.71  0.780195  0.000036
 30.0  0.23669   164.03   1594.8   3.95  0.27462    161.78  0.780124  0.000030
 35.0  0.31188   169.57   1697.6   3.92  0.27953    162.10  0.779775  0.000026
 40.0  0.39500   169.93   1297.0   3.72  0.27848    162.12  0.779751  0.000029
 45.0  0.48034   172.18    869.5   3.88  0.28173    162.25  0.779612  0.000034

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780483
Slope of Fitted Line...............:     -0.001875
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -19.1 KSI    -132.0 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.9 MPa
Probable error.................(+/-):      1.9 KSI      13.1 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7718.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 3 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -19.1 KSI | -132.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.9 MPa |
| Probable error.....(+/-): | 1.9 KSI | 13.1 MPa |

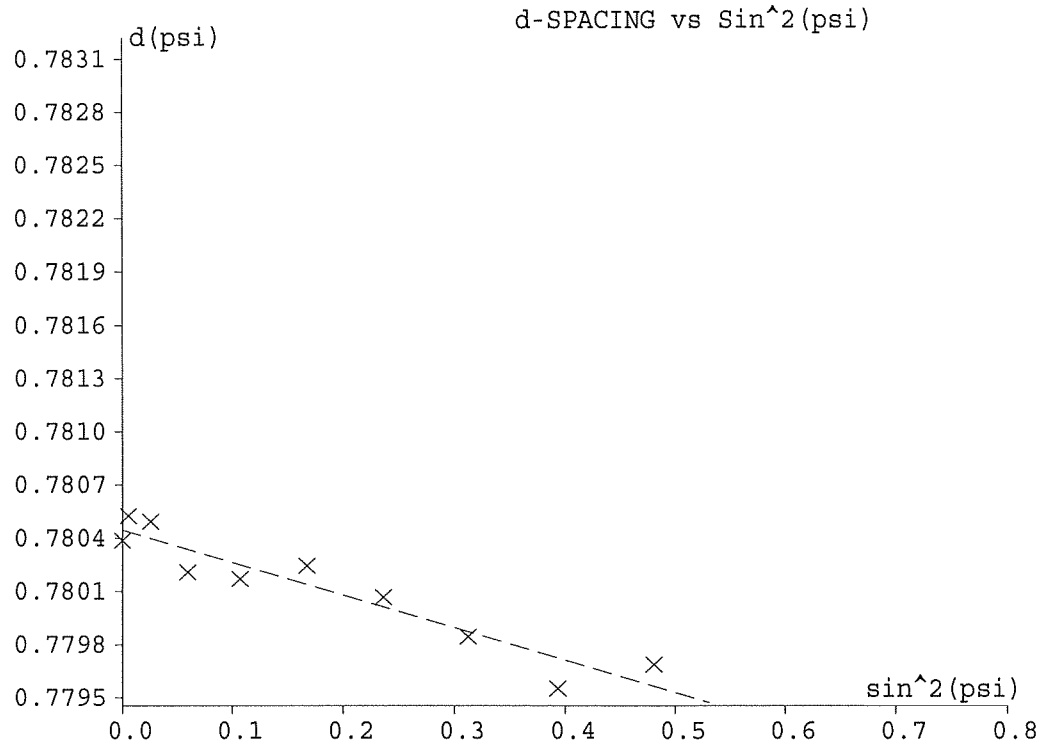


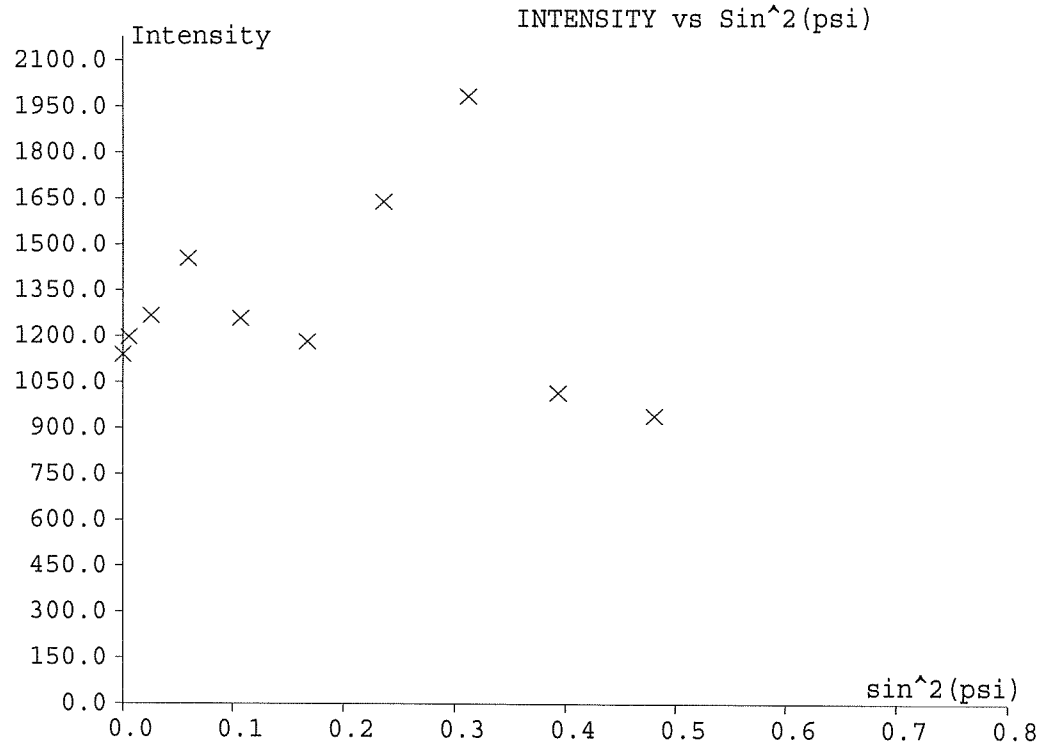



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7719.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 3 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   6:20pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00018   159.93   1139.2   4.21  0.27259    161.54  0.780387  0.000042
  5.0  0.00560   157.79   1197.4   4.21  0.27098    161.41  0.780526  0.000056
 10.0  0.02600   158.27   1267.3   4.03  0.27046    161.44  0.780493  0.000036
 15.0  0.05976   162.71   1453.4   4.07  0.27405    161.70  0.780208  0.000035
 20.0  0.10742   163.32   1257.8   4.18  0.27509    161.74  0.780170  0.000034
 25.0  0.16759   162.12   1181.6   3.77  0.27200    161.67  0.780244  0.000042
 30.0  0.23630   164.91   1637.8   3.88  0.27511    161.83  0.780067  0.000030
 35.0  0.31242   168.40   1979.8   3.67  0.27676    162.03  0.779846  0.000026
 40.0  0.39341   173.13   1013.5   4.04  0.28350    162.31  0.779553  0.000035
 45.0  0.48097   170.92    937.9   3.75  0.27960    162.18  0.779689  0.000040

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780446
Slope of Fitted Line...............:     -0.001832
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -18.7 KSI    -128.9 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.5 MPa
Probable error.................(+/-):      2.3 KSI      15.6 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7719.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 3 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -18.7 KSI | -128.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.5 MPa |
| Probable error.....(+/-): | 2.3 KSI | 15.6 MPa |

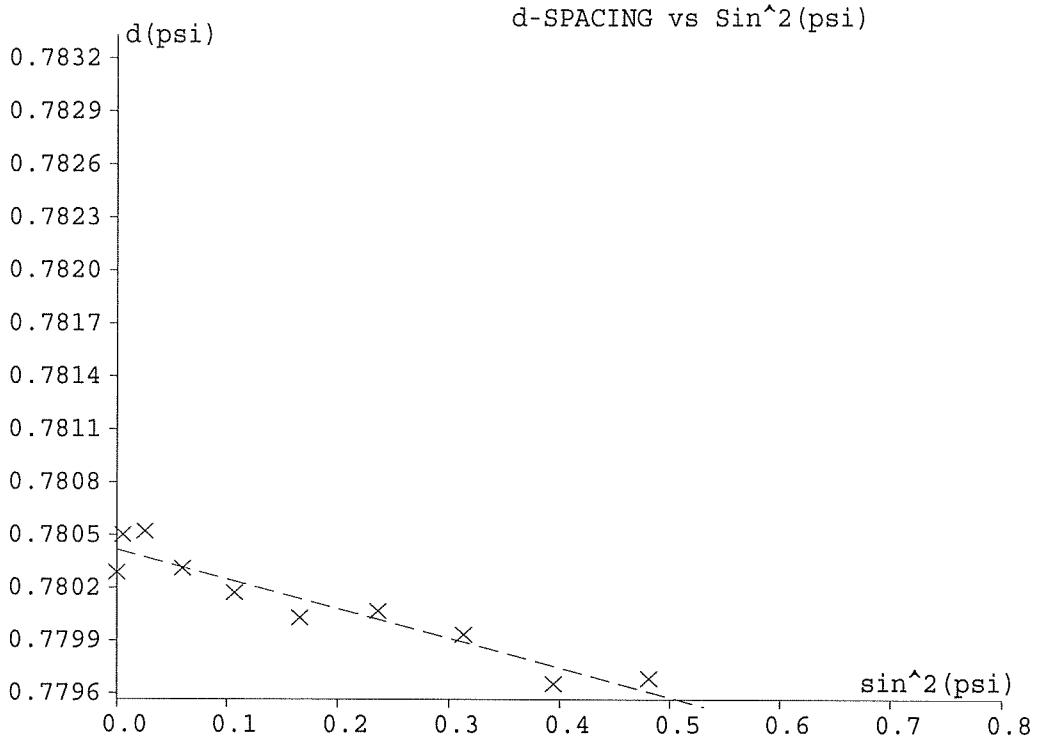


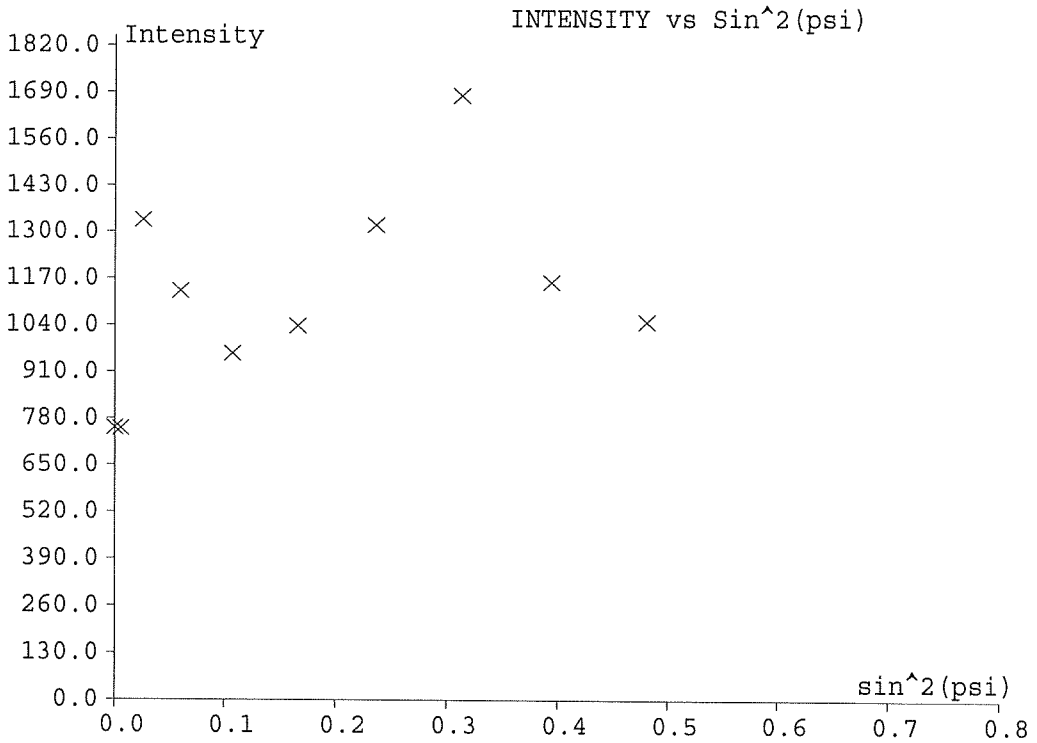



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7714.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 4 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   5:50pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00020   161.48    753.6   4.20  0.27377    161.63  0.780287  0.000057
  5.0  0.00558   158.17    752.3   4.55  0.27346    161.43  0.780503  0.000052
 10.0  0.02607   157.80   1333.1   3.99  0.26994    161.42  0.780523  0.000037
 15.0  0.06015   161.11   1135.2   4.15  0.27320    161.61  0.780311  0.000050
 20.0  0.10744   163.26    961.1   4.12  0.27472    161.73  0.780173  0.000037
 25.0  0.16631   165.53   1037.1   4.07  0.27658    161.86  0.780029  0.000039
 30.0  0.23630   164.92   1317.9   4.01  0.27576    161.83  0.780067  0.000030
 35.0  0.31308   167.02   1679.3   3.79  0.27642    161.95  0.779933  0.000026
 40.0  0.39422   171.53   1158.6   4.19  0.28283    162.21  0.779654  0.000031
 45.0  0.48094   170.98   1049.2   3.67  0.27901    162.18  0.779685  0.000034

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780418
Slope of Fitted Line...............:     -0.001682
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -17.2 KSI    -118.4 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.5 MPa
Probable error.................(+/-):      2.0 KSI      14.1 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7714.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 4 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -17.2 KSI | -118.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.5 MPa |
| Probable error.....(+/-): | 2.0 KSI | 14.1 MPa |

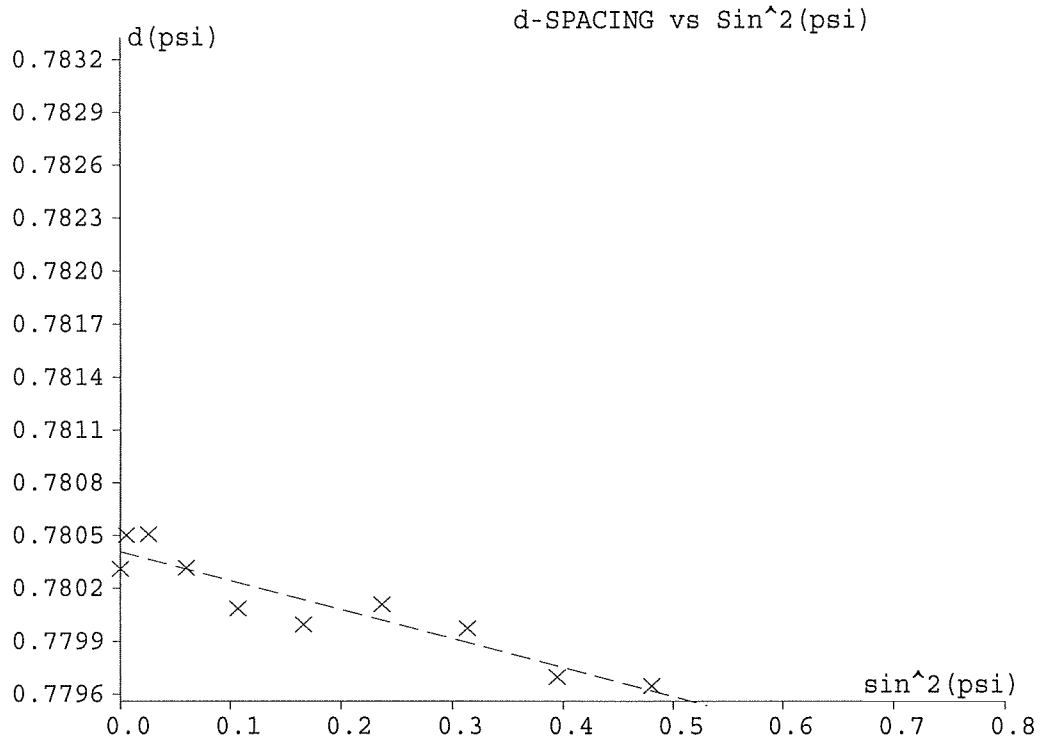


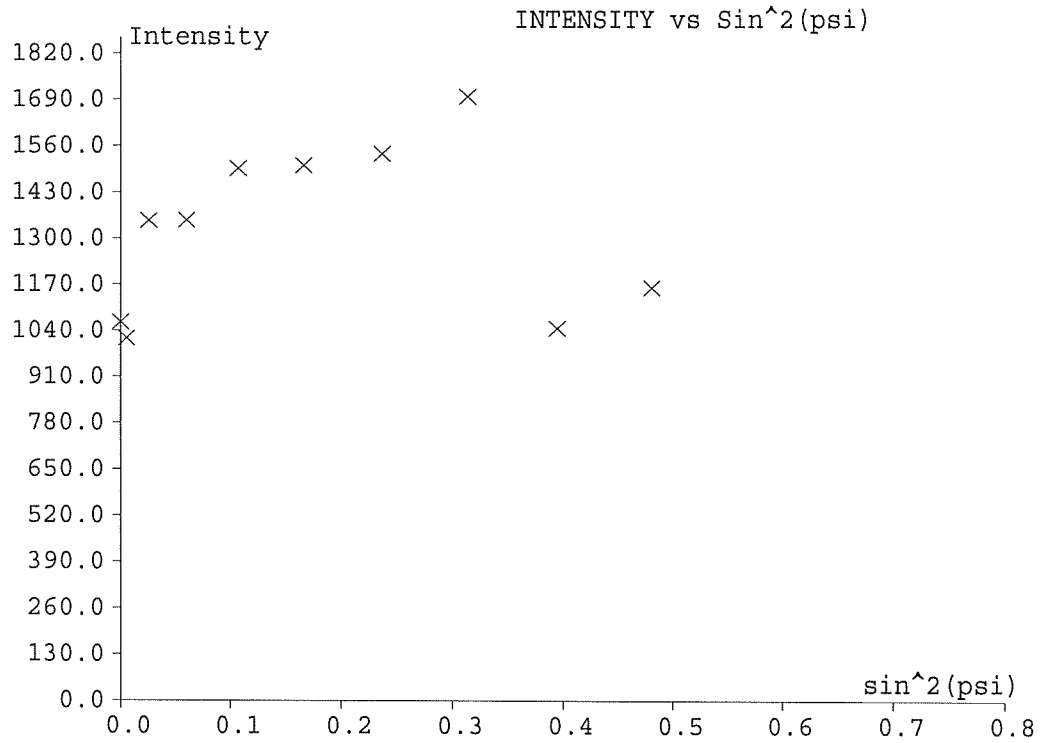



```
================================== TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7715.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 4 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   5:55pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00020   161.16   1063.8   4.51  0.27557    161.61  0.780310  0.000060
  5.0  0.00558   158.13   1018.7   3.96  0.27005    161.43  0.780502  0.000051
 10.0  0.02603   158.04   1350.4   3.97  0.27002    161.43  0.780508  0.000038
 15.0  0.06017   161.01   1351.4   4.02  0.27249    161.60  0.780317  0.000037
 20.0  0.10700   164.63   1496.4   3.88  0.27485    161.81  0.780086  0.000038
 25.0  0.16611   166.07   1503.7   4.09  0.27722    161.90  0.779995  0.000035
 30.0  0.23659   164.26   1536.2   3.90  0.27462    161.79  0.780109  0.000028
 35.0  0.31338   166.35   1696.2   3.53  0.27386    161.92  0.779974  0.000021
 40.0  0.39457   170.83   1045.4   4.32  0.28291    162.17  0.779698  0.000040
 45.0  0.48063   171.58   1159.7   3.68  0.27968    162.22  0.779647  0.000029

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780408
Slope of Fitted Line...............:     -0.001642
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -16.8 KSI    -115.6 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.4 MPa
Probable error.................(+/-):      2.2 KSI      15.4 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7715.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 4 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -16.8 KSI | -115.6 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.4 MPa |
| Probable error.....(+/-): | 2.2 KSI | 15.4 MPa |

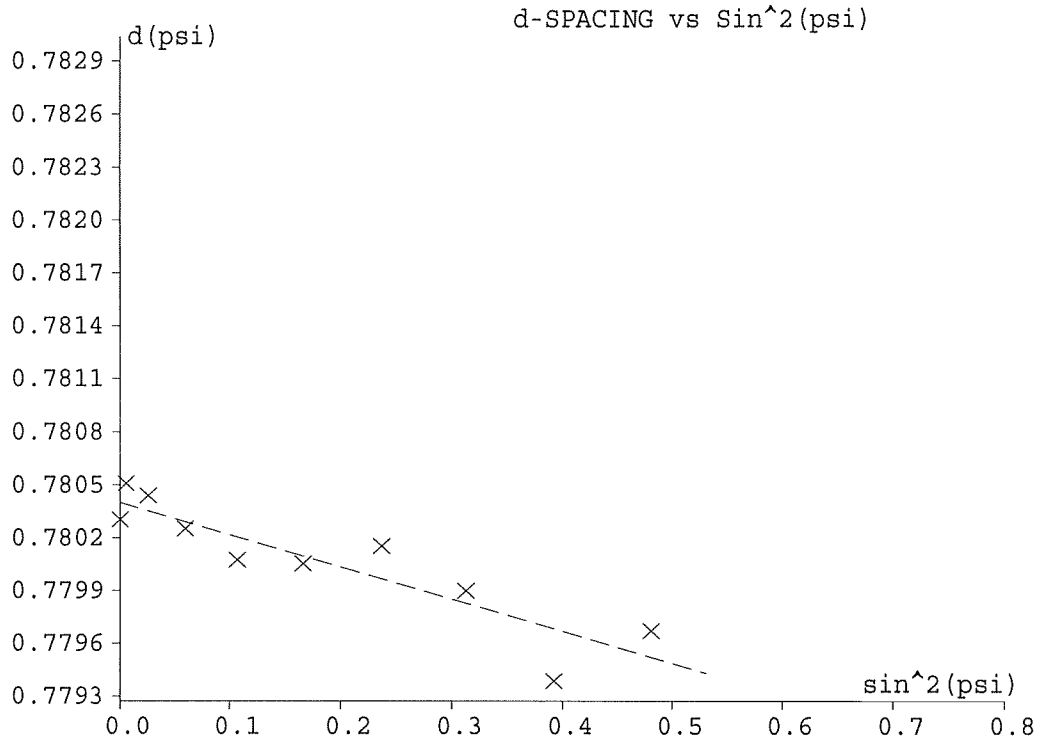


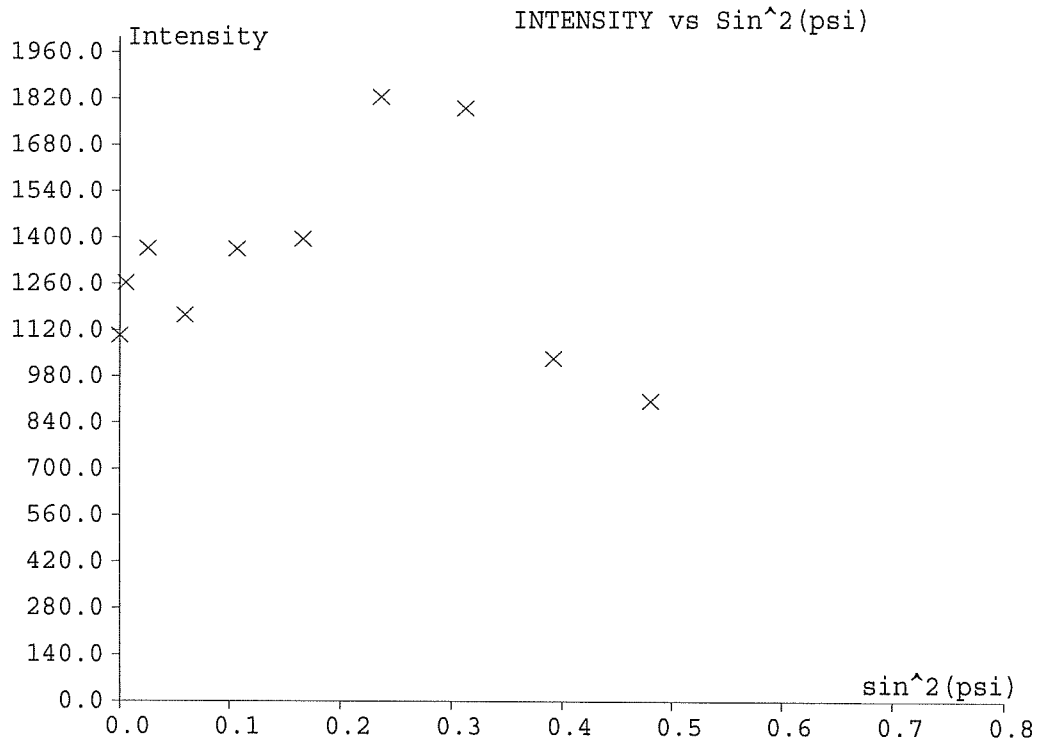



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7716.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 4 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   6:01pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00020   161.22   1104.8   4.19  0.27350    161.61  0.780304  0.000049
  5.0  0.00558   158.00   1263.4   3.73  0.26853    161.43  0.780509  0.000041
 10.0  0.02586   159.11   1367.4   4.15  0.27165    161.49  0.780440  0.000046
 15.0  0.05992   162.03   1165.8   4.02  0.27329    161.66  0.780251  0.000039
 20.0  0.10695   164.79   1364.8   3.89  0.27504    161.82  0.780075  0.000032
 25.0  0.16646   165.16   1395.3   4.14  0.27660    161.84  0.780053  0.000045
 30.0  0.23689   163.56   1823.7   3.91  0.27400    161.75  0.780153  0.000033
 35.0  0.31282   167.57   1789.5   3.77  0.27677    161.98  0.779899  0.000023
 40.0  0.39206   175.86   1034.1   4.09  0.28631    162.47  0.779386  0.000053
 45.0  0.48082   171.23    905.1   3.86  0.28074    162.20  0.779671  0.000029

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780401
Slope of Fitted Line...............:     -0.00183
Material Stress Constant...........:    1.255E-07

*Residual Stress...................:    -18.7 KSI    -128.8 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.5 MPa
Probable error.................(+/-):      3.2 KSI      21.8 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7716.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 4 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -18.7 KSI | -128.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.5 MPa |
| Probable error.....(+/-): | 3.2 KSI | 21.8 MPa |

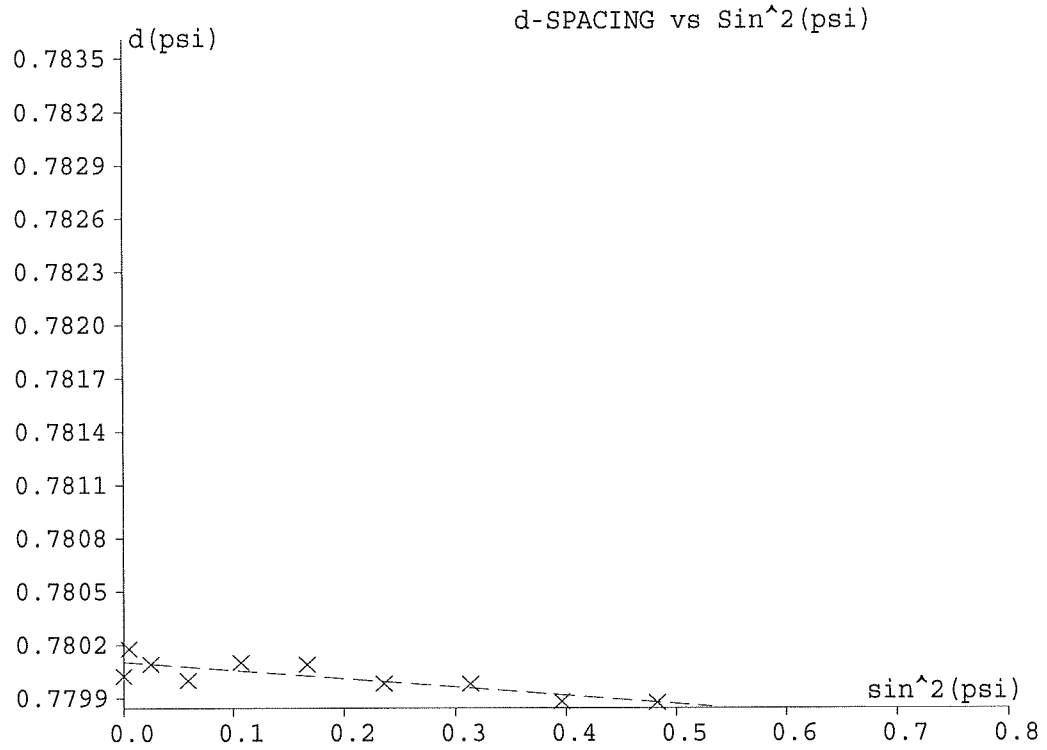


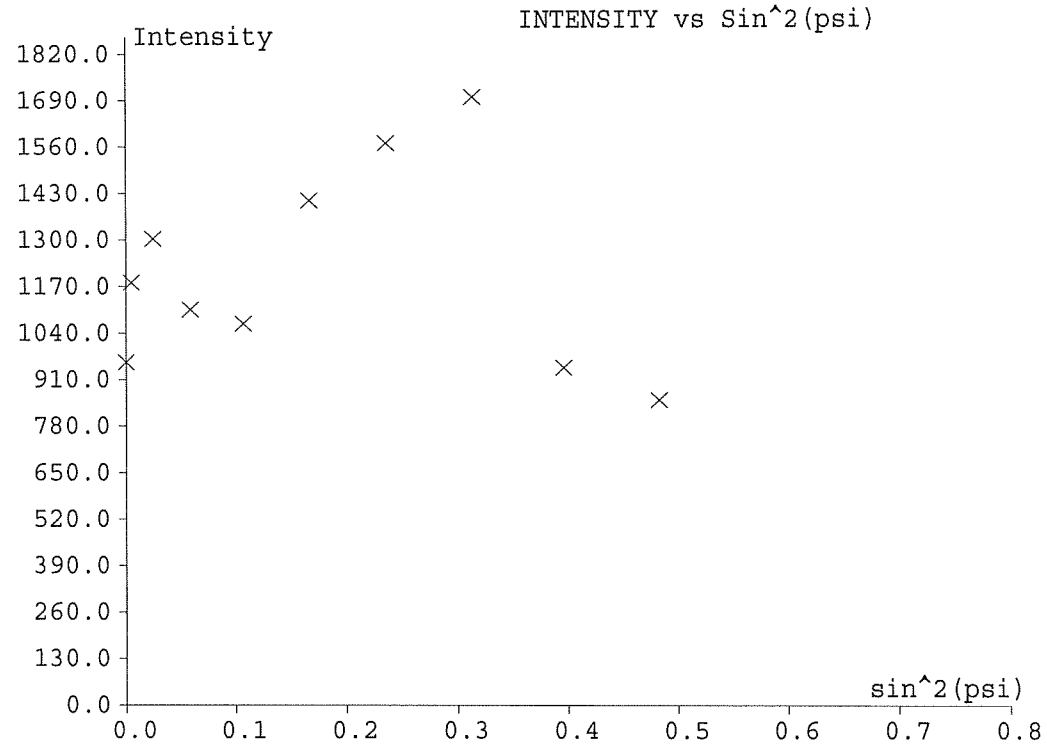



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7711.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 5 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   5:20pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00027   165.62    958.9   4.32  0.27809    161.87  0.780025  0.000065
  5.0  0.00520   163.17   1180.4   3.84  0.27329    161.73  0.780178  0.000031
 10.0  0.02499   164.54   1302.1   3.87  0.27471    161.81  0.780091  0.000040
 15.0  0.05897   166.05   1105.5   4.61  0.28025    161.89  0.780000  0.000062
 20.0  0.10707   164.42   1066.2   4.07  0.27558    161.80  0.780100  0.000046
 25.0  0.16667   164.59   1409.4   4.01  0.27546    161.81  0.780089  0.000027
 30.0  0.23572   166.28   1568.9   4.03  0.27710    161.91  0.779982  0.000030
 35.0  0.31342   166.32   1698.1   3.94  0.27666    161.91  0.779979  0.000026
 40.0  0.39603   167.89    942.9   4.01  0.27846    162.00  0.779880  0.000030
 45.0  0.48249   167.93    852.1   3.64  0.27612    162.01  0.779875  0.000029

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780104
Slope of Fitted Line...............:    -0.0004717
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -4.8 KSI     -33.2 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.3 MPa
Probable error.................(+/-):      1.1 KSI       7.8 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7711.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 5 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -4.8 KSI | -33.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.3 MPa |
| Probable error.....(+/-): | 1.1 KSI | 7.8 MPa |

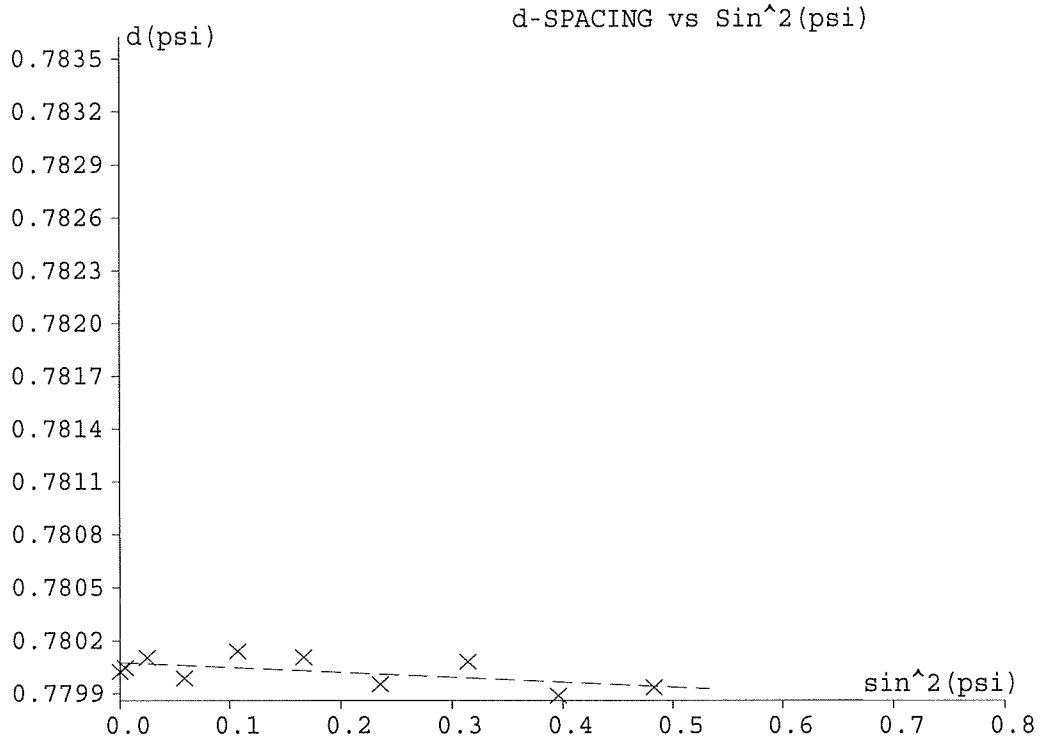


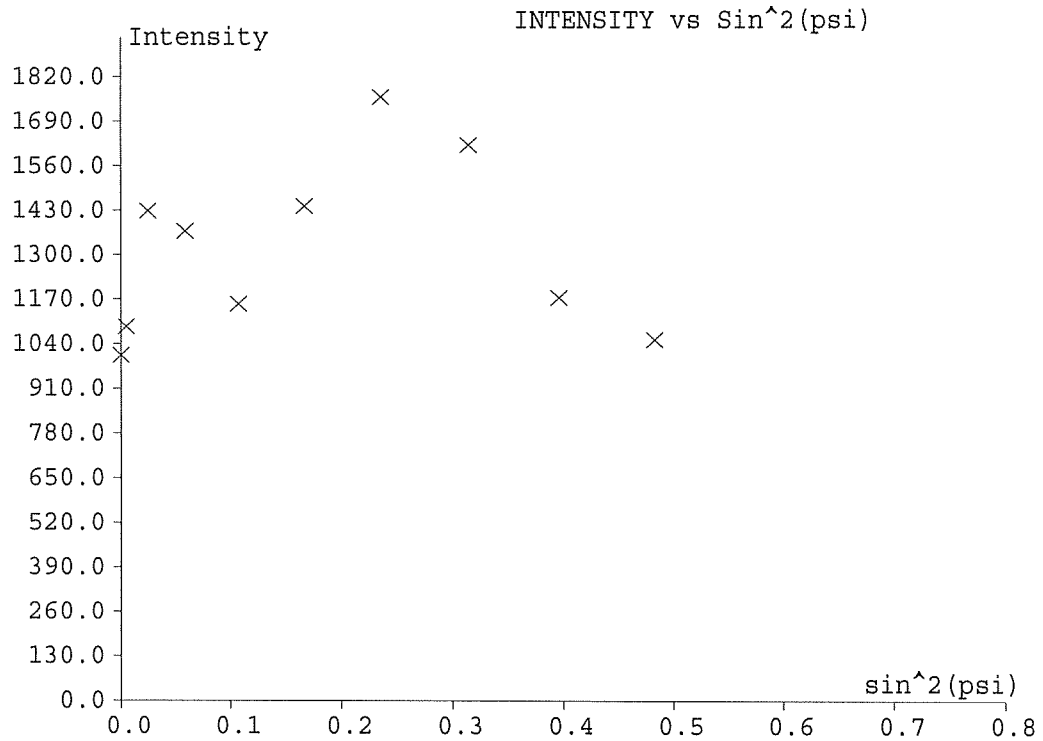



```
================================== TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7712.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 5 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   5:33pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00027   165.64   1006.4   4.37  0.27848    161.87  0.780024  0.000054
  5.0  0.00505   165.26   1089.7   3.93  0.27567    161.85  0.780046  0.000045
 10.0  0.02503   164.31   1428.3   3.66  0.27305    161.80  0.780104  0.000031
 15.0  0.05892   166.22   1369.2   4.12  0.27750    161.90  0.779986  0.000039
 20.0  0.10727   163.82   1155.6   4.27  0.27614    161.76  0.780139  0.000049
 25.0  0.16676   164.35   1441.3   4.11  0.27572    161.80  0.780104  0.000031
 30.0  0.23552   166.73   1759.4   3.81  0.27634    161.94  0.779952  0.000028
 35.0  0.31418   164.69   1619.7   3.76  0.27410    161.82  0.780081  0.000024
 40.0  0.39607   167.78   1172.8   3.80  0.27721    162.00  0.779886  0.000026
 45.0  0.48297   167.02   1050.4   3.91  0.27717    161.95  0.779935  0.000031

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780076
Slope of Fitted Line...............:    -0.0002788
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -2.8 KSI     -19.6 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.9 MPa
Probable error.................(+/-):      1.4 KSI      10.0 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7712.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 5 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -2.8 KSI | -19.6 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.9 MPa |
| Probable error.....(+/-): | 1.4 KSI | 10.0 MPa |

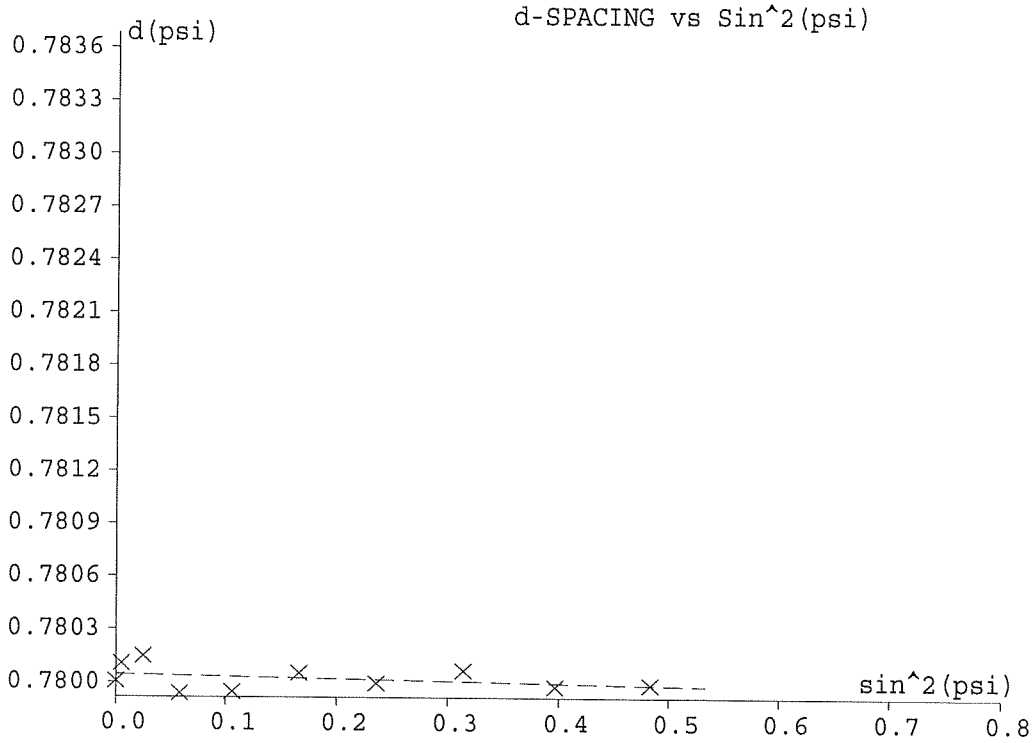


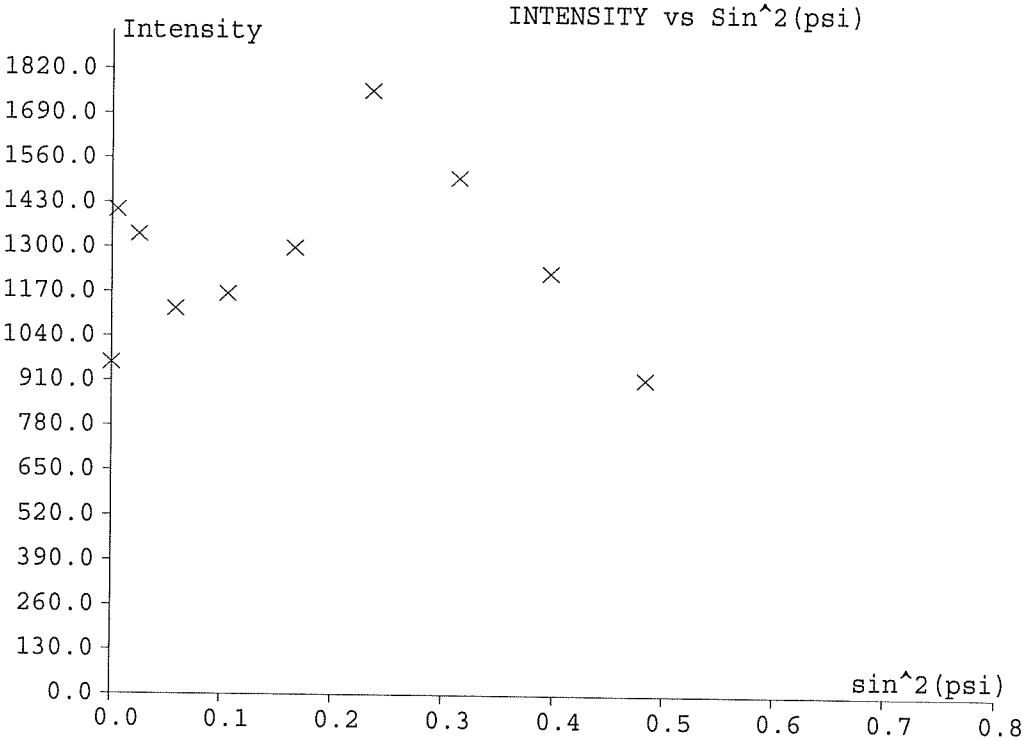



```
================================== TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7713.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 5 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   5:39pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00027   165.92    963.3   4.23  0.27782    161.89  0.780006  0.000052
  5.0  0.00512   164.27   1408.3   3.68  0.27316    161.79  0.780106  0.000047
 10.0  0.02513   163.64   1336.9   3.68  0.27257    161.76  0.780147  0.000031
 15.0  0.05874   166.98   1120.9   4.09  0.27803    161.95  0.779938  0.000041
 20.0  0.10631   166.84   1163.9   4.09  0.27794    161.94  0.779947  0.000045
 25.0  0.16646   165.14   1298.1   4.09  0.27635    161.84  0.780054  0.000038
 30.0  0.23582   166.05   1755.5   3.99  0.27670    161.90  0.779996  0.000029
 35.0  0.31408   164.87   1502.0   3.66  0.27355    161.83  0.780068  0.000029
 40.0  0.39679   166.34   1226.2   3.93  0.27663    161.91  0.779977  0.000026
 45.0  0.48341   166.19    916.2   4.22  0.27802    161.90  0.779989  0.000039

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780044
Slope of Fitted Line...............:    -0.0001155
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -1.2 KSI      -8.1 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.3 MPa
Probable error.................(+/-):      1.4 KSI       9.5 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7713.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 5 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -1.2 KSI | -8.1 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.3 MPa |
| Probable error.....(+/-): | 1.4 KSI | 9.5 MPa |

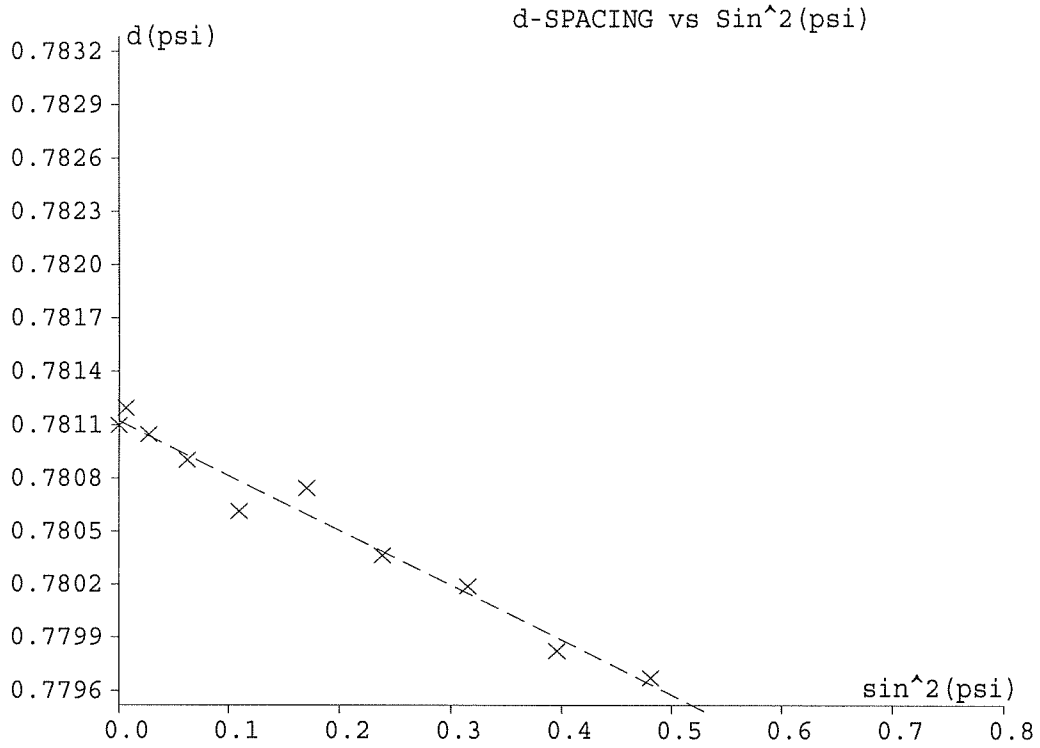


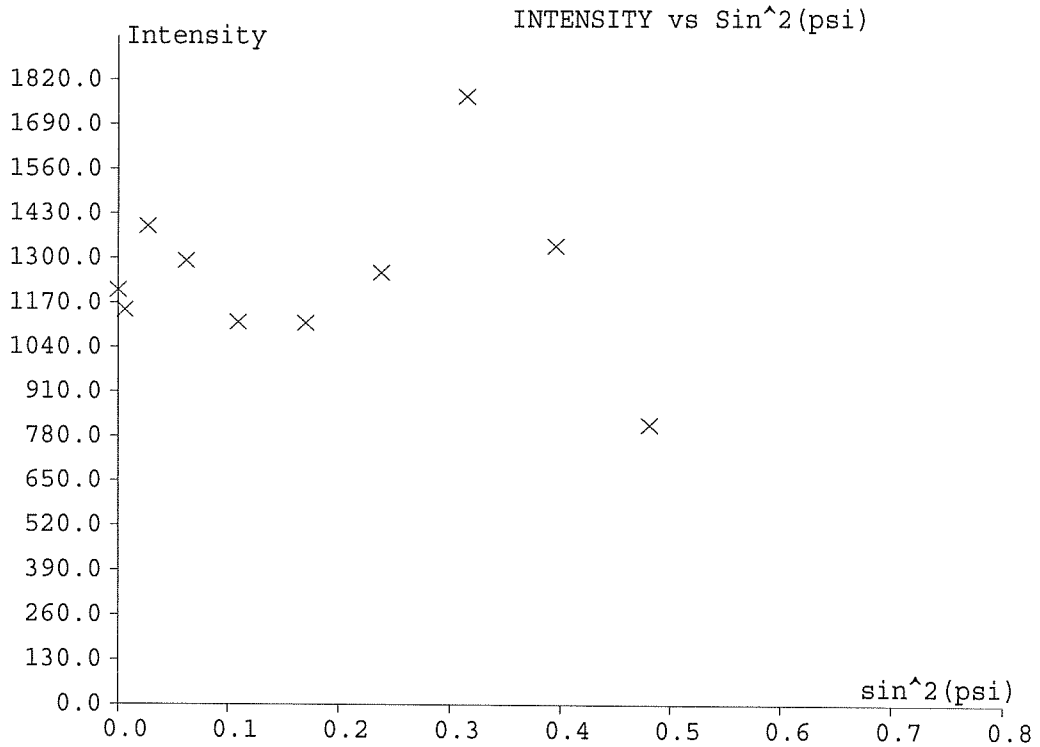



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7708.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 6 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   4:56pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00006   149.07   1206.7   4.41  0.26546    160.91  0.781098  0.000054
  5.0  0.00640   147.61   1149.4   4.41  0.26434    160.82  0.781195  0.000054
 10.0  0.02738   149.83   1392.8   4.38  0.26586    160.95  0.781047  0.000044
 15.0  0.06236   152.03   1291.8   4.33  0.26727    161.08  0.780902  0.000036
 20.0  0.10960   156.41   1112.5   4.19  0.26975    161.33  0.780614  0.000046
 25.0  0.17053   154.45   1109.7   4.35  0.26930    161.22  0.780743  0.000060
 30.0  0.23831   160.32   1256.4   4.40  0.27418    161.56  0.780363  0.000054
 35.0  0.31497   163.04   1769.5   4.20  0.27496    161.72  0.780188  0.000040
 40.0  0.39557   168.84   1333.5   4.31  0.28099    162.06  0.779822  0.000032
 45.0  0.48083   171.27    811.9   4.38  0.28365    162.20  0.779671  0.000057

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781124
Slope of Fitted Line...............:     -0.003096
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -31.6 KSI    -217.7 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       6.7 MPa
Probable error.................(+/-):      1.9 KSI      12.8 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7708.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 6 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -31.6 KSI | -217.7 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 6.7 MPa |
| Probable error.....(+/-): | 1.9 KSI | 12.8 MPa |

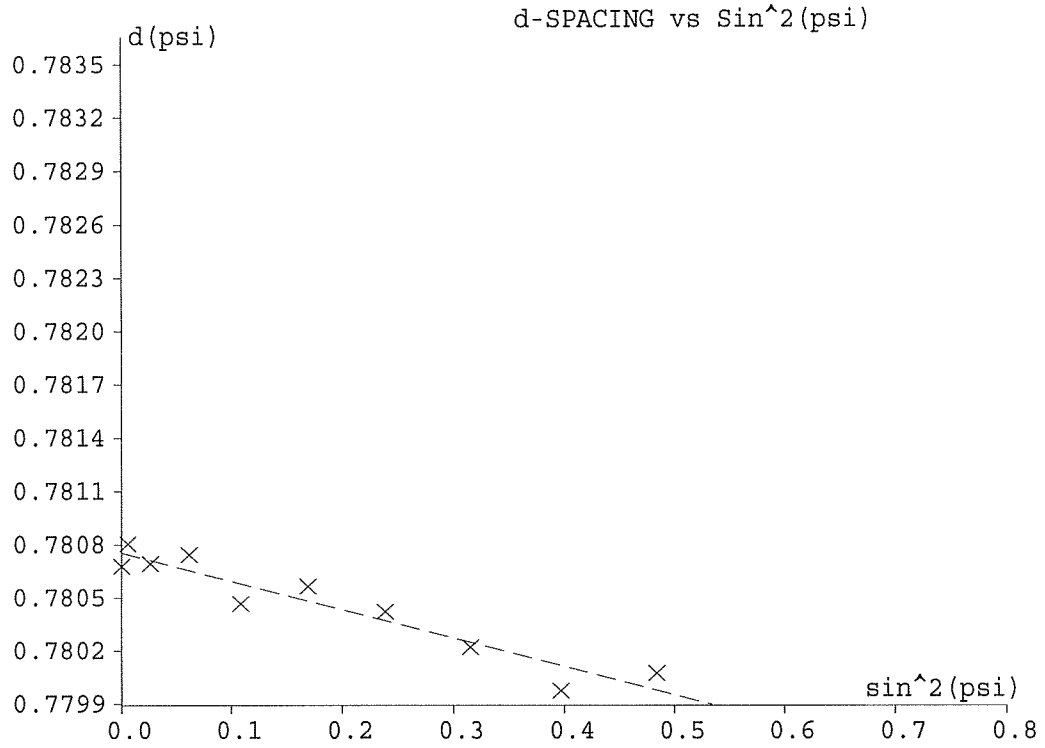


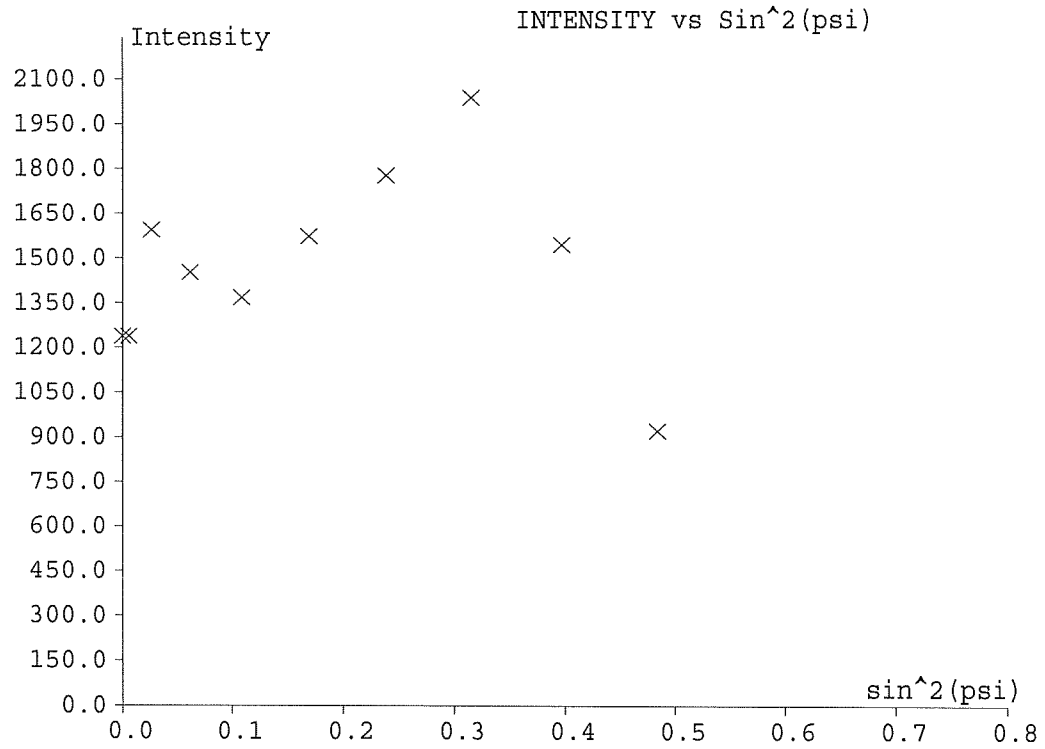



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7709.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 6 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   5:02pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00012   155.44   1238.3   4.41  0.27045    161.28  0.780679  0.000048
  5.0  0.00593   153.48   1237.9   4.22  0.26768    161.16  0.780806  0.000045
 10.0  0.02650   155.18   1594.1   4.08  0.26833    161.26  0.780694  0.000045
 15.0  0.06177   154.40   1451.7   3.86  0.26677    161.22  0.780744  0.000041
 20.0  0.10888   158.67   1366.2   4.20  0.27155    161.47  0.780468  0.000044
 25.0  0.16948   157.18   1572.0   4.14  0.27012    161.38  0.780564  0.000037
 30.0  0.23870   159.38   1775.3   4.18  0.27202    161.51  0.780422  0.000030
 35.0  0.31522   162.51   2035.2   4.08  0.27397    161.69  0.780221  0.000029
 40.0  0.39678   166.39   1543.0   4.22  0.27817    161.91  0.779976  0.000038
 45.0  0.48409   164.83    919.2   4.10  0.27609    161.82  0.780074  0.000041

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780755
Slope of Fitted Line...............:     -0.001604
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -16.4 KSI    -112.9 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.7 MPa
Probable error.................(+/-):      1.8 KSI      12.7 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7709.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 6 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -16.4 KSI | -112.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.7 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.7 MPa |

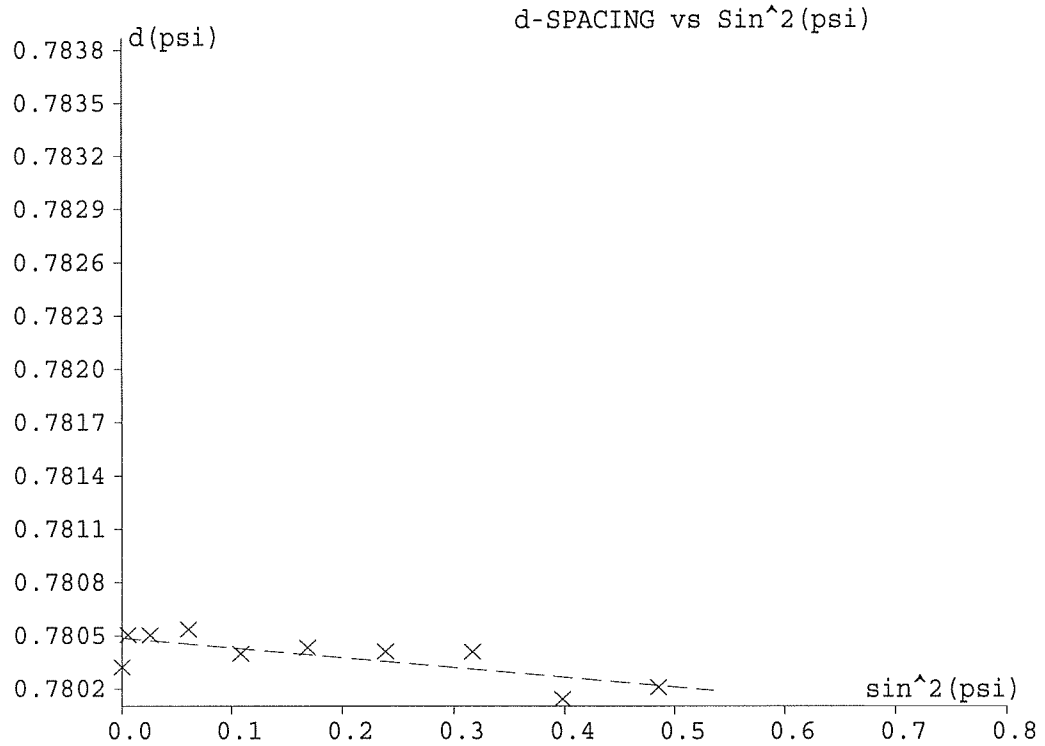


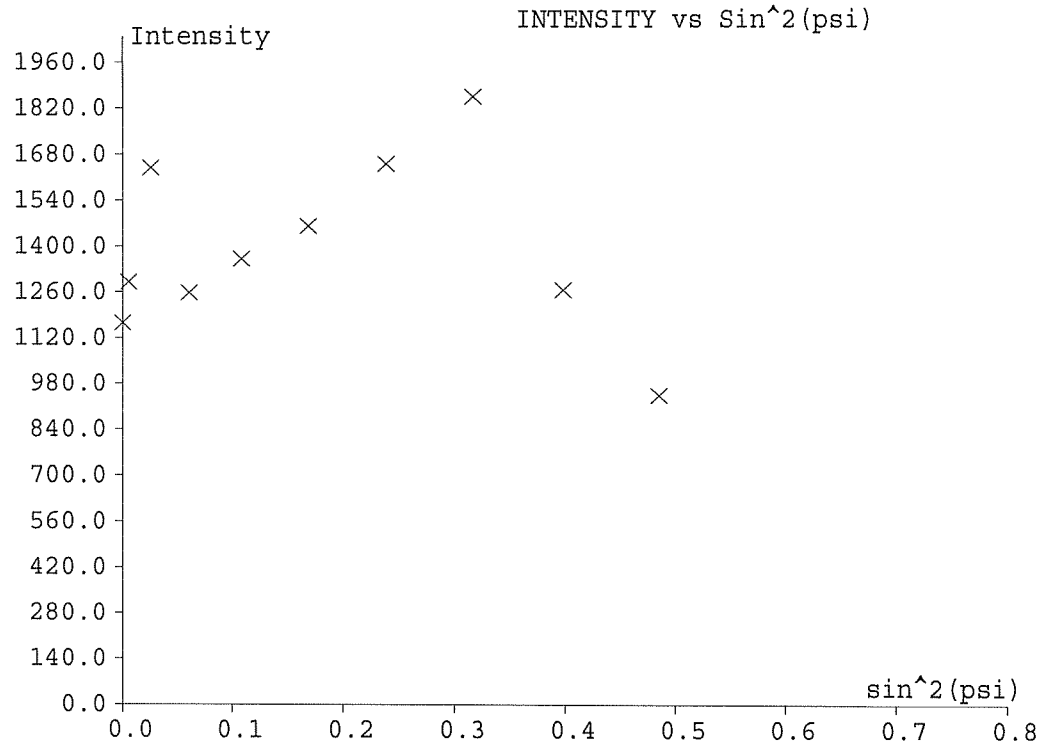



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7710.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 6 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

Acquisition date & time:  10/28/2005   5:11pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00019   160.96   1165.8   4.65  0.27604    161.60  0.780324  0.000047
  5.0  0.00558   158.05   1290.2   3.71  0.26842    161.43  0.780505  0.000043
 10.0  0.02602   158.14   1639.0   4.28  0.27168    161.43  0.780503  0.000035
 15.0  0.06099   157.64   1257.6   4.33  0.27159    161.40  0.780536  0.000047
 20.0  0.10855   159.74   1360.5   4.18  0.27228    161.53  0.780399  0.000044
 25.0  0.16871   159.20   1460.5   3.97  0.27088    161.50  0.780433  0.000033
 30.0  0.23864   159.50   1649.1   3.82  0.27037    161.52  0.780413  0.000028
 35.0  0.31660   159.58   1853.4   4.16  0.27208    161.52  0.780409  0.000029
 40.0  0.39810   163.73   1265.5   4.05  0.27486    161.76  0.780143  0.000049
 45.0  0.48518   162.67    942.7   3.91  0.27326    161.70  0.780210  0.000032

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780488
Slope of Fitted Line...............:    -0.0005543
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -5.7 KSI     -39.0 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.4 MPa
Probable error.................(+/-):      1.8 KSI      12.3 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7710.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 6 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / KJR

| | | |
|---|---|---|
| *Residual Stress.....: | -5.7 KSI | -39.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.4 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.3 MPa |

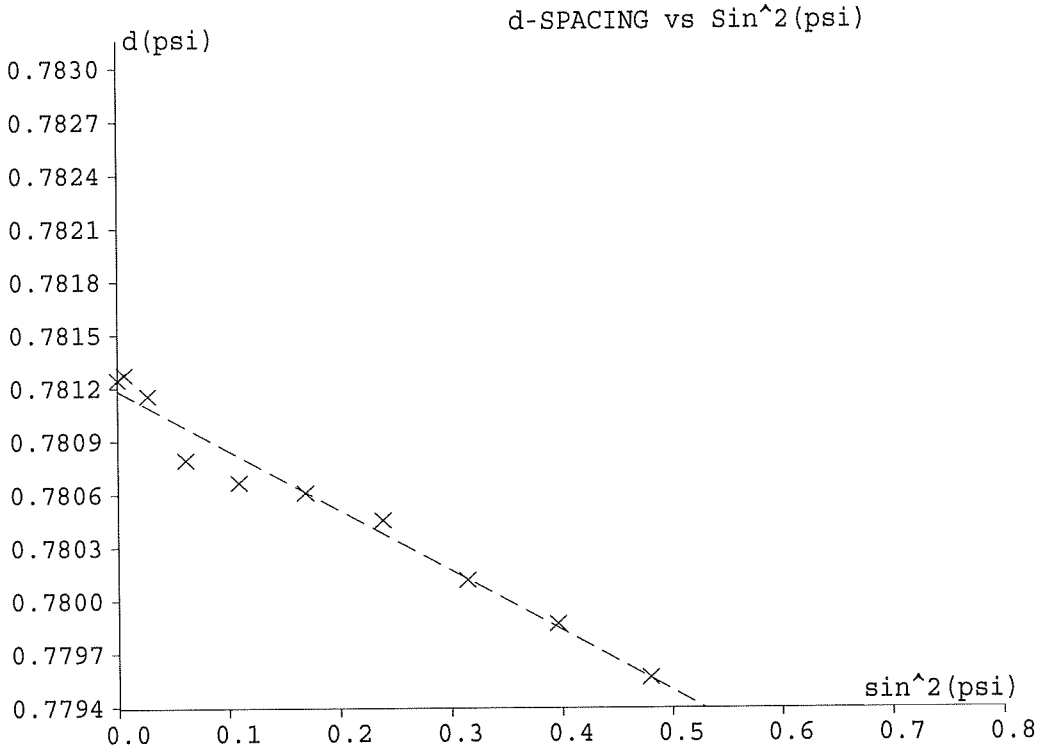


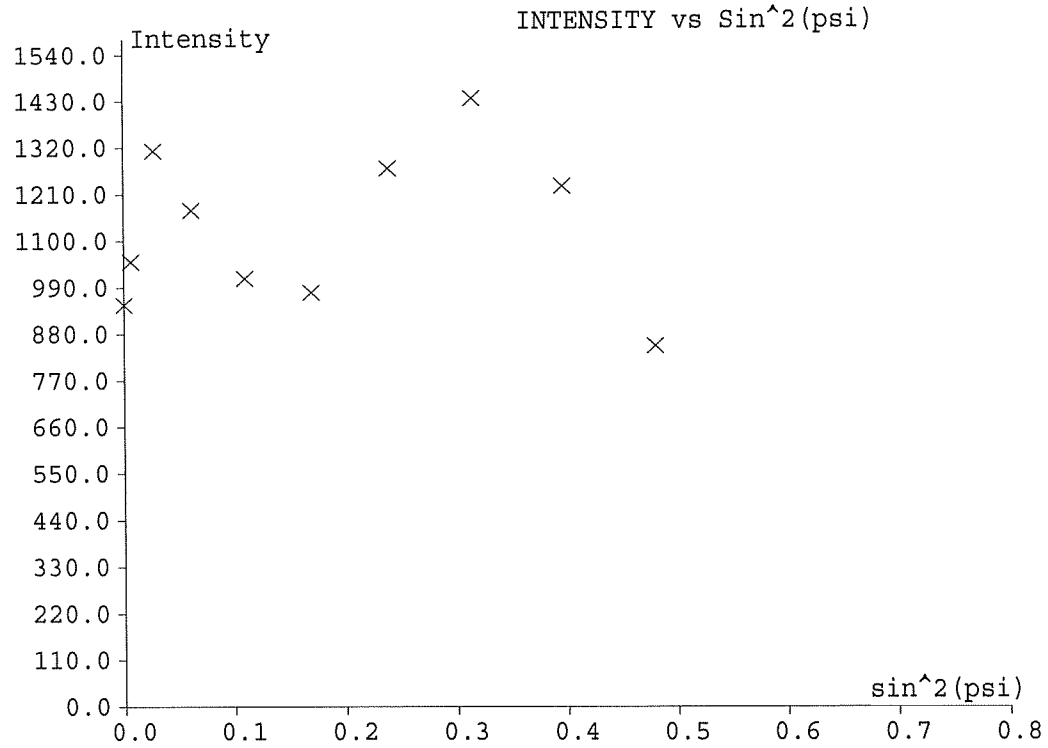



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7705.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 7 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:58pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00005   146.88    948.9   4.67  0.26491    160.78  0.781245  0.000057
  5.0  0.00650   146.41   1050.7   4.33  0.26290    160.75  0.781275  0.000060
 10.0  0.02765   148.18   1313.1   4.09  0.26296    160.86  0.781155  0.000039
 15.0  0.06195   153.72   1172.0   4.47  0.26948    161.18  0.780792  0.000067
 20.0  0.10985   155.67   1011.0   4.46  0.27094    161.29  0.780665  0.000062
 25.0  0.16973   156.53    977.4   4.16  0.26971    161.34  0.780607  0.000048
 30.0  0.23890   158.92   1269.8   4.12  0.27135    161.48  0.780452  0.000055
 35.0  0.31442   164.19   1434.5   4.01  0.27505    161.79  0.780114  0.000043
 40.0  0.39591   168.12   1226.6   4.06  0.27895    162.02  0.779866  0.000036
 45.0  0.47995   173.01    850.0   4.50  0.28587    162.30  0.779564  0.000056

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781183
Slope of Fitted Line...............:     -0.00338
Material Stress Constant...........:    1.255E-07

*Residual Stress...................:    -34.5 KSI    -237.7 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       7.2 MPa
Probable error.................(+/-):      2.0 KSI      13.9 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7705.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 7 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -34.5 KSI | -237.7 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 7.2 MPa |
| Probable error.....(+/-): | 2.0 KSI | 13.9 MPa |



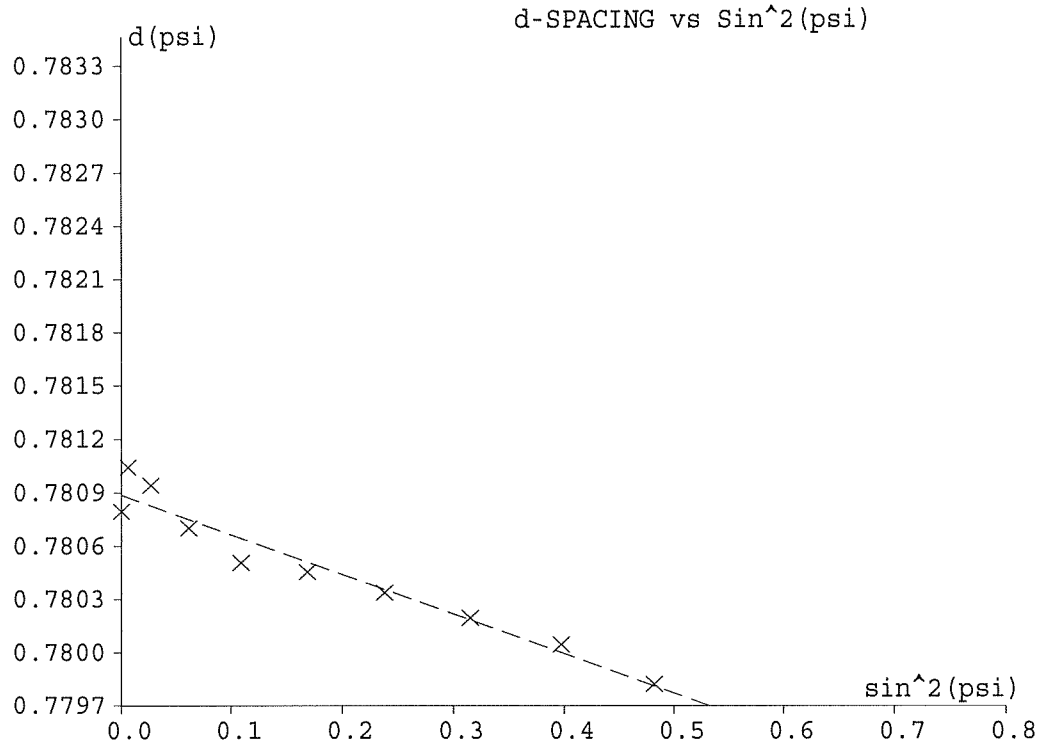
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7706.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 7 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   4:03pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

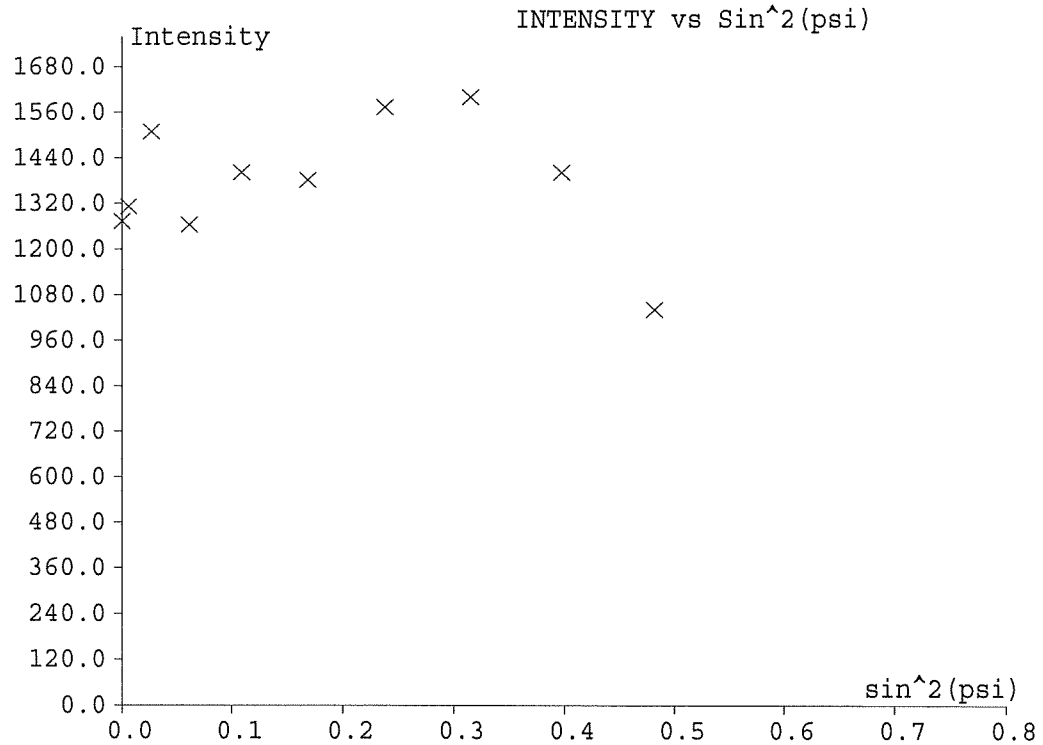
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00010 | 153.69 | 1272.9 | 4.48 | 0.26948 | 161.17 | 0.780794 | 0.000051 |
| 5.0 | 0.00622 | 149.90 | 1312.1 | 4.37 | 0.26585 | 160.96 | 0.781043 | 0.000041 |
| 10.0 | 0.02712 | 151.40 | 1509.2 | 4.15 | 0.26569 | 161.04 | 0.780942 | 0.000040 |
| 15.0 | 0.06161 | 155.09 | 1263.4 | 4.30 | 0.26946 | 161.26 | 0.780701 | 0.000050 |
| 20.0 | 0.10907 | 158.09 | 1401.5 | 4.20 | 0.27113 | 161.43 | 0.780506 | 0.000048 |
| 25.0 | 0.16883 | 158.90 | 1381.0 | 4.12 | 0.27133 | 161.48 | 0.780453 | 0.000051 |
| 30.0 | 0.23813 | 160.71 | 1571.8 | 4.18 | 0.27306 | 161.58 | 0.780337 | 0.000033 |
| 35.0 | 0.31502 | 162.93 | 1598.2 | 4.04 | 0.27409 | 161.71 | 0.780194 | 0.000041 |
| 40.0 | 0.39732 | 165.28 | 1399.2 | 4.05 | 0.27628 | 161.85 | 0.780045 | 0.000026 |
| 45.0 | 0.48205 | 168.86 | 1039.4 | 4.22 | 0.28047 | 162.06 | 0.779821 | 0.000032 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780888
Slope of Fitted Line...............:     -0.002237
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -22.8 KSI    -157.4 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.2 MPa
Probable error.................(+/-):      2.0 KSI      13.5 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7706.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 7 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -22.8 KSI | -157.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.2 MPa |
| Probable error.....(+/-): | 2.0 KSI | 13.5 MPa |

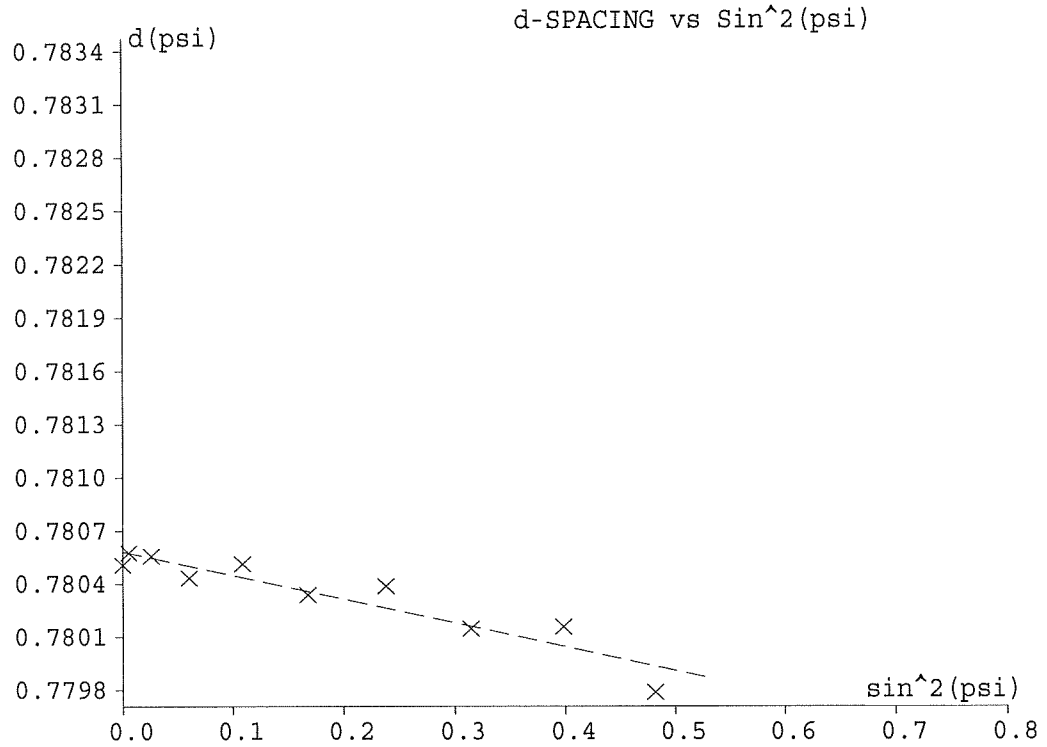


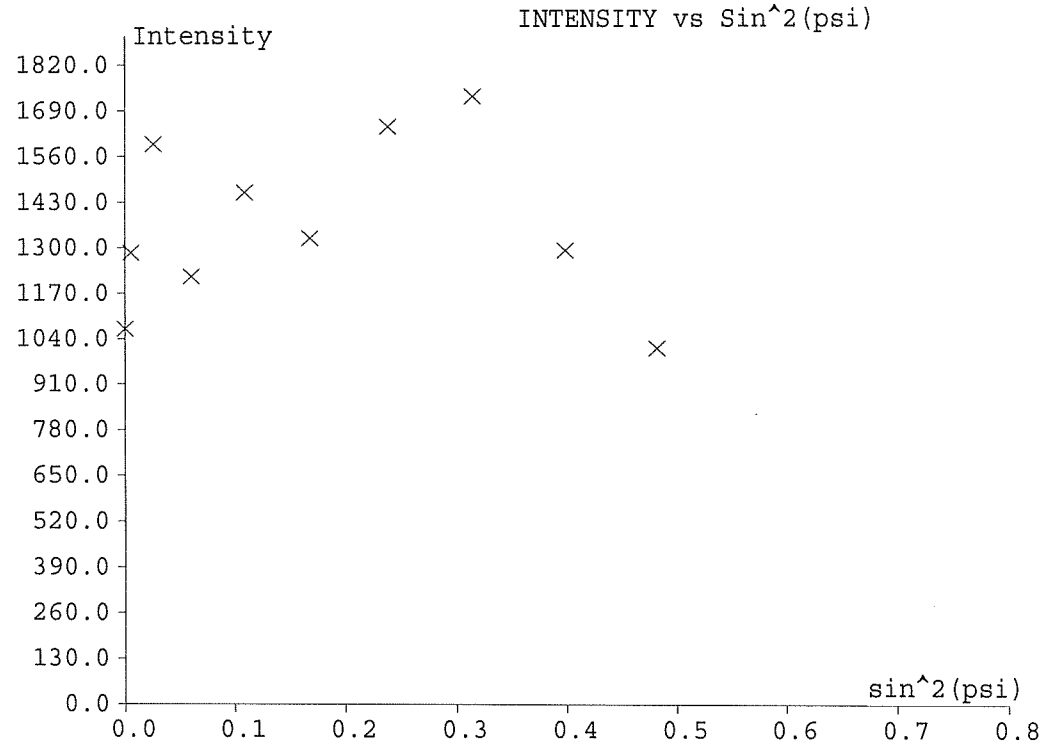



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7707.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 7 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   4:08pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00016   158.11   1068.3   4.42  0.27256    161.43  0.780506  0.000053
  5.0  0.00566   157.00   1285.9   4.03  0.26950    161.37  0.780575  0.000039
 10.0  0.02615   157.29   1594.7   3.86  0.26896    161.39  0.780556  0.000037
 15.0  0.06060   159.24   1217.6   4.34  0.27291    161.50  0.780433  0.000044
 20.0  0.10909   158.01   1456.9   4.15  0.27081    161.43  0.780511  0.000043
 25.0  0.16814   160.73   1326.5   4.18  0.27306    161.58  0.780336  0.000035
 30.0  0.23846   159.89   1643.6   3.58  0.26889    161.54  0.780386  0.000031
 35.0  0.31466   163.68   1728.8   3.79  0.27340    161.76  0.780145  0.000025
 40.0  0.39820   163.53   1291.8   4.23  0.27556    161.75  0.780157  0.000027
 45.0  0.48178   169.38   1011.5   4.21  0.28095    162.09  0.779788  0.000040

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780581
Slope of Fitted Line...............:     -0.001343
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -13.7 KSI     -94.5 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.3 MPa
Probable error.................(+/-):      1.8 KSI      12.4 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7707.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 7 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -13.7 KSI | -94.5 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.3 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.4 MPa |

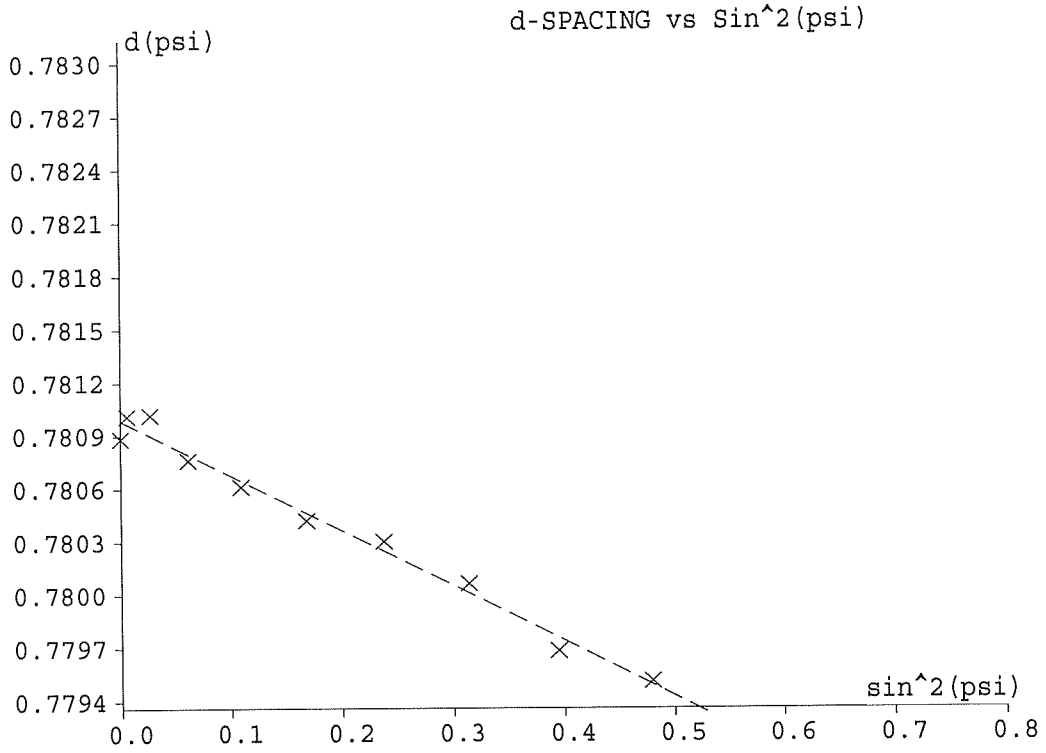


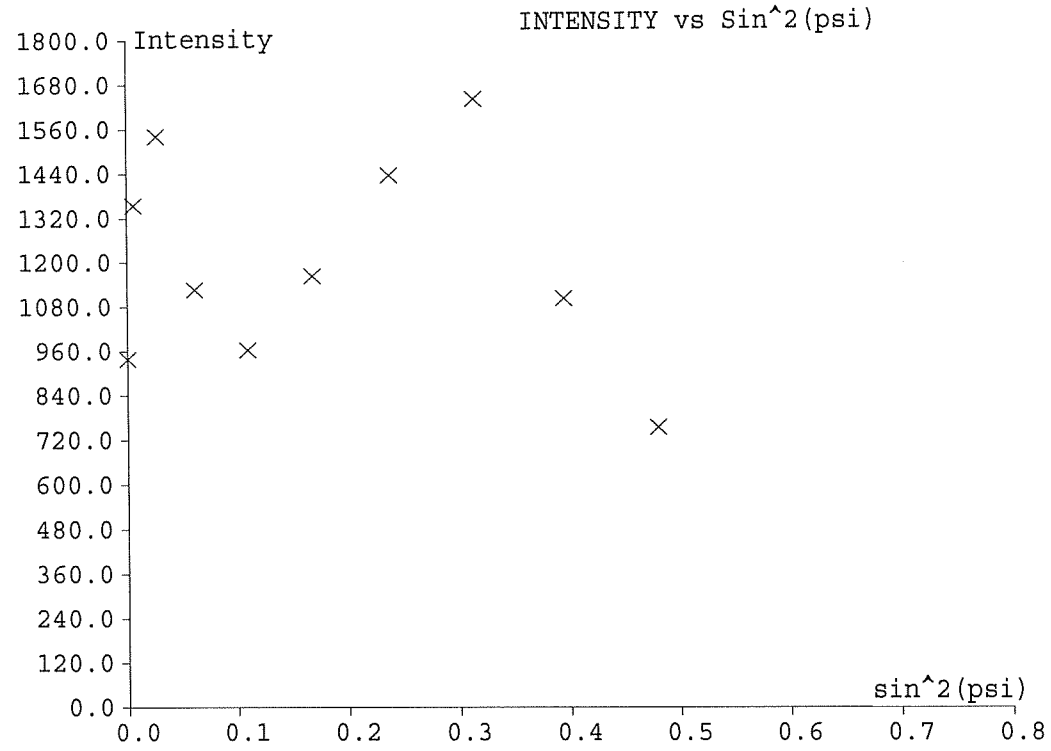



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7702.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 8 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:42pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00009   152.28    938.2   4.20  0.26664    161.09  0.780884  0.000056
  5.0  0.00618   150.34   1353.8   4.34  0.26603    160.98  0.781013  0.000044
 10.0  0.02730   150.28   1540.4   4.39  0.26628    160.98  0.781018  0.000044
 15.0  0.06183   154.22   1125.9   4.69  0.27076    161.20  0.780761  0.000061
 20.0  0.10958   156.48    962.5   4.29  0.27045    161.34  0.780611  0.000050
 25.0  0.16863   159.42   1162.7   4.12  0.27177    161.51  0.780420  0.000049
 30.0  0.23788   161.30   1433.9   4.36  0.27465    161.62  0.780301  0.000035
 35.0  0.31405   164.99   1638.2   3.99  0.27571    161.83  0.780063  0.000034
 40.0  0.39446   171.04   1100.0   4.12  0.28200    162.19  0.779684  0.000047
 45.0  0.47954   173.80    752.1   4.36  0.28582    162.35  0.779514  0.000088

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780987
Slope of Fitted Line...............:     -0.003113
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -31.8 KSI    -219.0 MPa

Counting Statistics Stress Error (+/-):      1.3 KSI       8.9 MPa
Probable error.................(+/-):      1.4 KSI       9.9 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7702.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 8 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -31.8 KSI | -219.0 MPa |
| Counting Statistics Stress Error (+/-): | 1.3 KSI | 8.9 MPa |
| Probable error.....(+/-): | 1.4 KSI | 9.9 MPa |



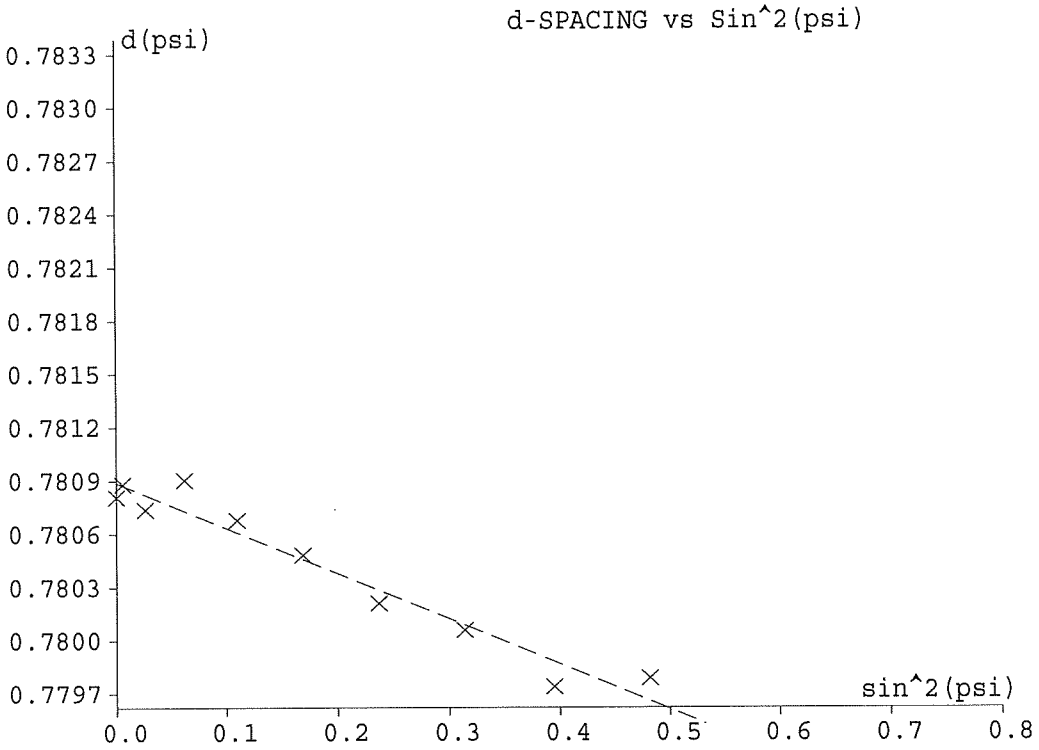
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7703.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 8 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:47pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

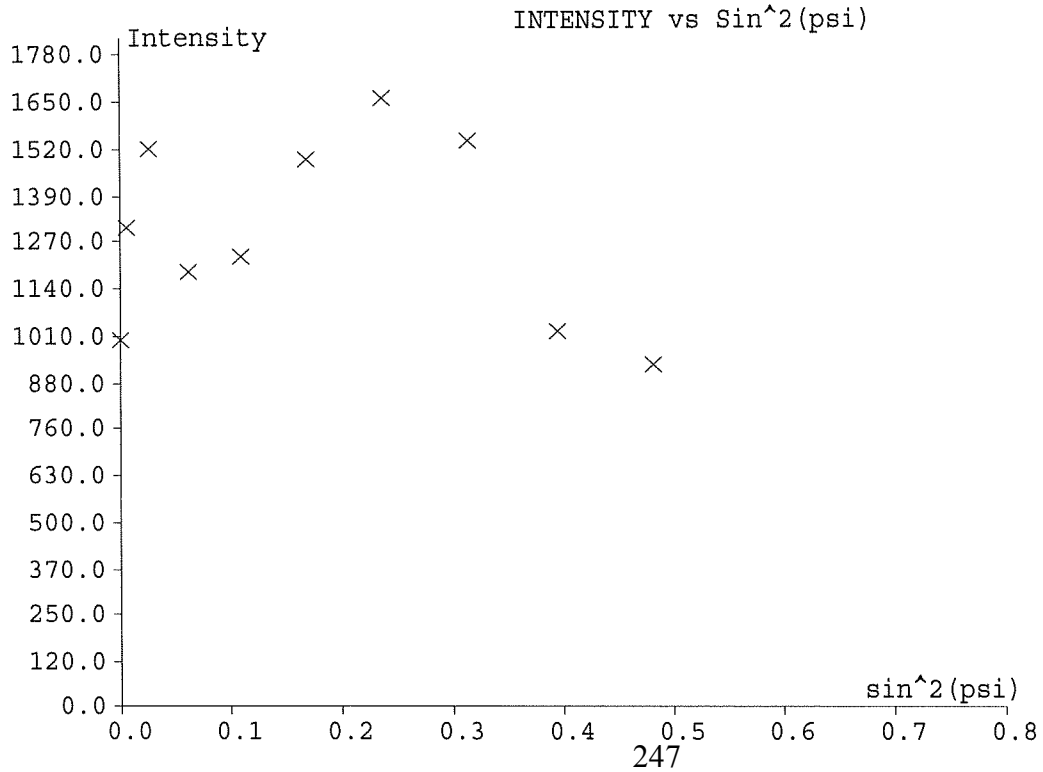
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00010 | 153.43 | 1000.0 | 4.10 | 0.26704 | 161.16 | 0.780808 | 0.000051 |
| 5.0 | 0.00602 | 152.38 | 1306.4 | 4.51 | 0.26867 | 161.10 | 0.780880 | 0.000060 |
| 10.0 | 0.02661 | 154.48 | 1521.1 | 3.81 | 0.26653 | 161.22 | 0.780739 | 0.000032 |
| 15.0 | 0.06237 | 151.97 | 1185.8 | 4.23 | 0.26655 | 161.08 | 0.780905 | 0.000035 |
| 20.0 | 0.10991 | 155.43 | 1226.6 | 4.20 | 0.26907 | 161.28 | 0.780679 | 0.000040 |
| 25.0 | 0.16900 | 158.44 | 1491.9 | 3.98 | 0.27036 | 161.45 | 0.780482 | 0.000035 |
| 30.0 | 0.23727 | 162.69 | 1658.7 | 4.10 | 0.27416 | 161.70 | 0.780210 | 0.000035 |
| 35.0 | 0.31401 | 165.06 | 1541.5 | 3.96 | 0.27563 | 161.84 | 0.780058 | 0.000032 |
| 40.0 | 0.39490 | 170.20 | 1022.3 | 4.43 | 0.28294 | 162.13 | 0.779738 | 0.000034 |
| 45.0 | 0.48177 | 169.39 | 931.5 | 3.97 | 0.27966 | 162.09 | 0.779786 | 0.000038 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780889
Slope of Fitted Line...............:     -0.002554
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -26.1 KSI    -179.7 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.7 MPa
Probable error.................(+/-):      2.1 KSI      14.7 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7703.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 8 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -26.1 KSI | -179.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.7 MPa |
| Probable error.....(+/-): | 2.1 KSI | 14.7 MPa |

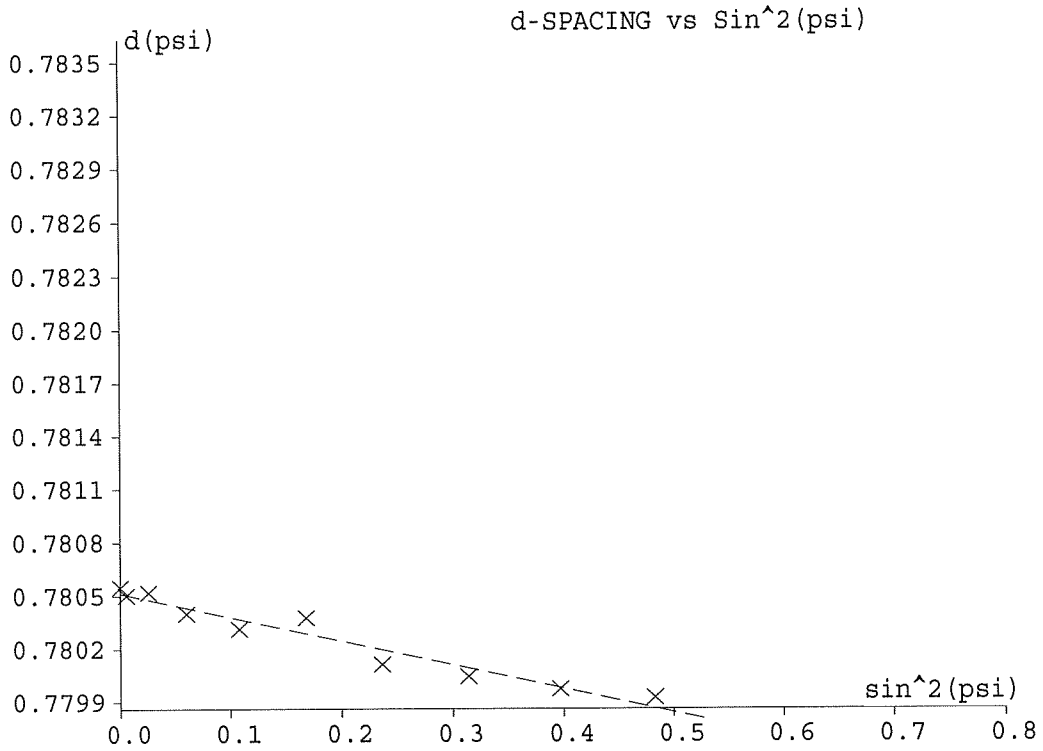


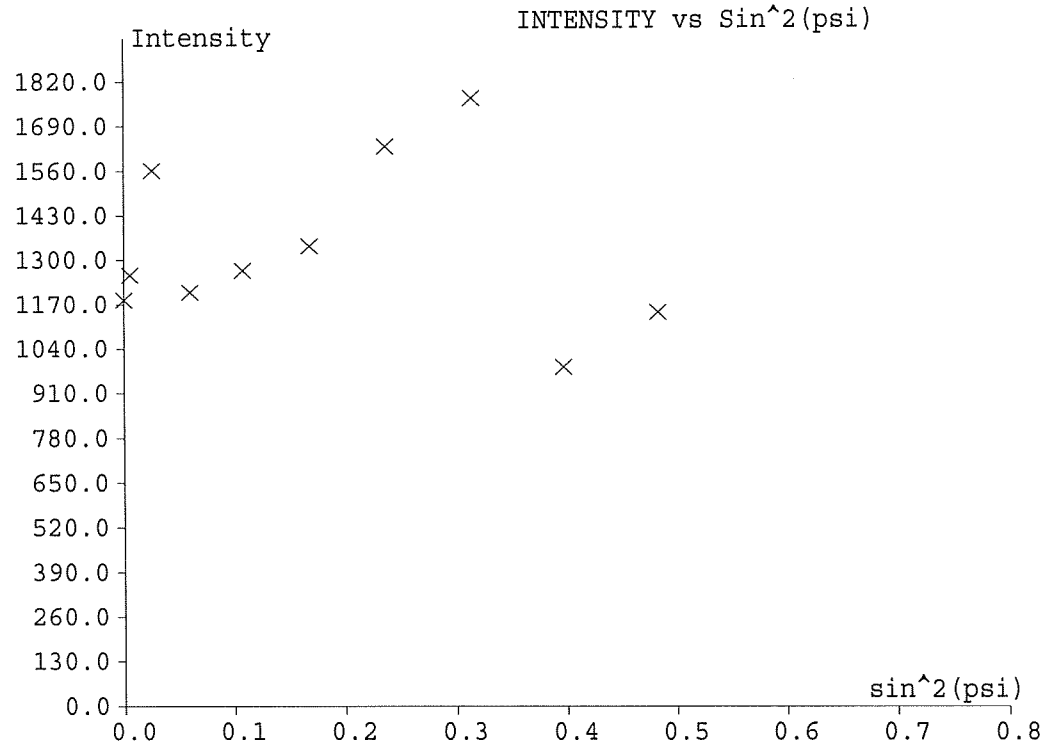



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7704.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 8 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:52pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00015   157.43   1182.4   4.12  0.27023    161.39  0.780548  0.000046
  5.0  0.00558   158.16   1255.2   4.61  0.27373    161.43  0.780504  0.000057
 10.0  0.02606   157.87   1561.2   4.14  0.27063    161.42  0.780520  0.000037
 15.0  0.06048   159.73   1204.8   4.27  0.27288    161.53  0.780400  0.000057
 20.0  0.10813   161.08   1268.9   4.24  0.27371    161.60  0.780314  0.000040
 25.0  0.16838   160.08   1339.3   4.09  0.27213    161.55  0.780377  0.000033
 30.0  0.23662   164.21   1629.9   4.18  0.27589    161.79  0.780113  0.000050
 35.0  0.31392   165.25   1769.6   3.90  0.27549    161.85  0.780046  0.000035
 40.0  0.39678   166.40    984.5   4.22  0.27819    161.91  0.779975  0.000037
 45.0  0.48290   167.15   1144.2   3.81  0.27669    161.96  0.779926  0.000034

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780513
Slope of Fitted Line...............:     -0.00134
Material Stress Constant...........:    1.255E-07

*Residual Stress...................:    -13.7 KSI     -94.3 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.6 MPa
Probable error.................(+/-):      1.2 KSI       8.0 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7704.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 8 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -13.7 KSI | -94.3 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.6 MPa |
| Probable error.....(+/-): | 1.2 KSI | 8.0 MPa |

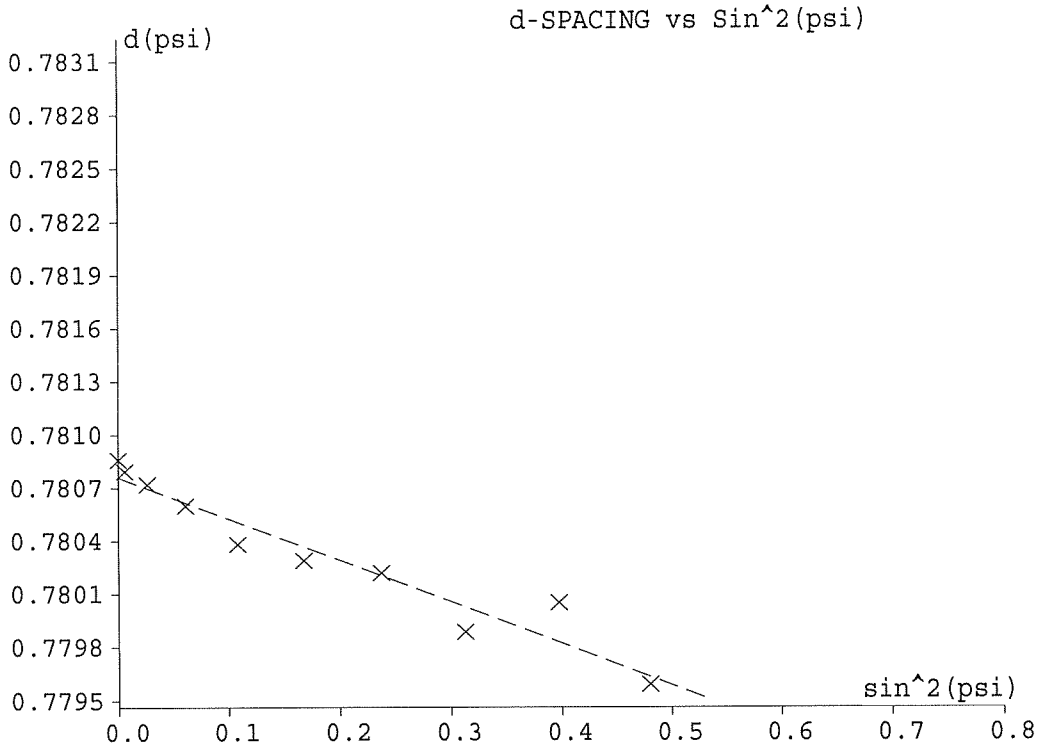


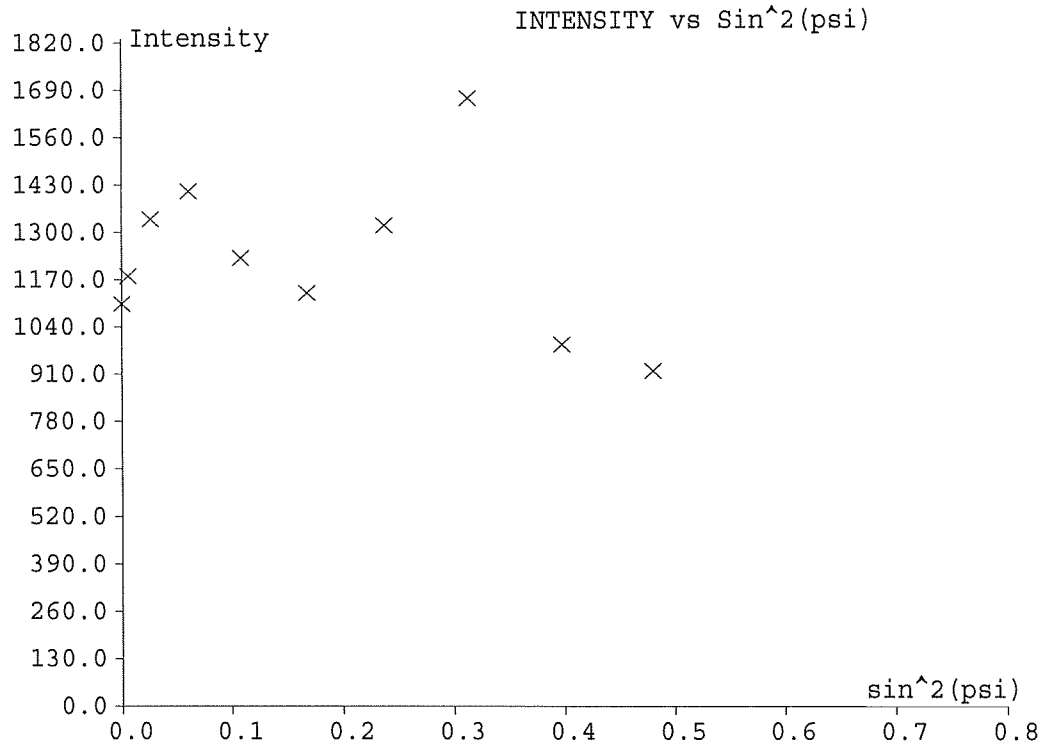



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7699.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 9 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:26pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00010   152.73   1103.7   4.60  0.26942    161.12  0.780858  0.000046
  5.0  0.00592   153.67   1179.4   4.37  0.26880    161.17  0.780794  0.000046
 10.0  0.02656   154.84   1336.3   4.73  0.27132    161.24  0.780720  0.000052
 15.0  0.06123   156.64   1412.4   4.05  0.26928    161.35  0.780599  0.000044
 20.0  0.10846   160.03   1228.5   4.27  0.27308    161.54  0.780381  0.000062
 25.0  0.16786   161.48   1132.7   4.35  0.27472    161.63  0.780289  0.000055
 30.0  0.23732   162.61   1317.2   4.42  0.27611    161.69  0.780217  0.000044
 35.0  0.31272   167.81   1665.2   4.16  0.27917    162.00  0.779886  0.000048
 40.0  0.39737   165.20    989.1   4.17  0.27679    161.84  0.780050  0.000050
 45.0  0.48017   172.55    916.2   4.28  0.28426    162.27  0.779591  0.000045

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780760
Slope of Fitted Line...............:     -0.002345
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -23.9 KSI    -165.0 MPa

Counting Statistics Stress Error (+/-):      0.9 KSI       6.5 MPa
Probable error.................(+/-):      2.3 KSI      15.7 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7699.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 9 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -23.9 KSI | -165.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.5 MPa |
| Probable error.....(+/-): | 2.3 KSI | 15.7 MPa |



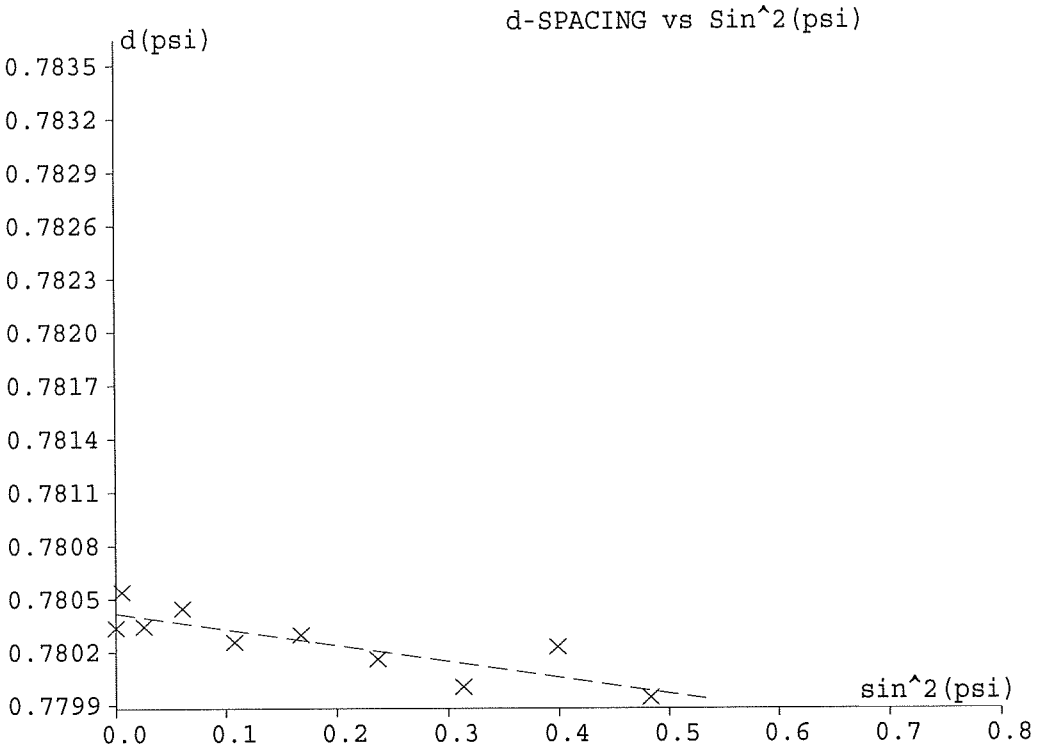
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7700.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 9 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:31pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

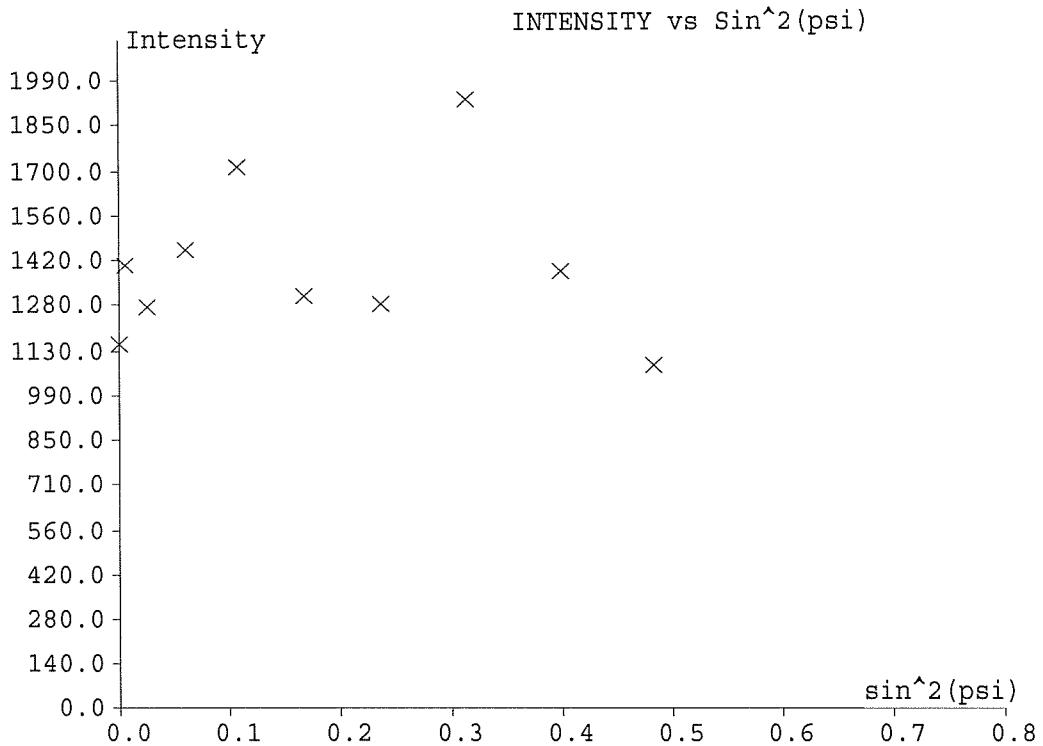
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00019 | 160.76 | 1153.5 | 4.56 | 0.27558 | 161.58 | 0.780337 | 0.000044 |
| 5.0 | 0.00562 | 157.55 | 1403.7 | 4.08 | 0.27013 | 161.40 | 0.780540 | 0.000047 |
| 10.0 | 0.02563 | 160.62 | 1271.4 | 4.54 | 0.27533 | 161.58 | 0.780345 | 0.000055 |
| 15.0 | 0.06065 | 159.00 | 1452.9 | 3.86 | 0.27025 | 161.49 | 0.780445 | 0.000037 |
| 20.0 | 0.10785 | 161.93 | 1714.3 | 3.82 | 0.27226 | 161.66 | 0.780257 | 0.000033 |
| 25.0 | 0.16791 | 161.32 | 1304.8 | 3.97 | 0.27250 | 161.62 | 0.780297 | 0.000033 |
| 30.0 | 0.23692 | 163.50 | 1280.0 | 4.04 | 0.27457 | 161.75 | 0.780158 | 0.000036 |
| 35.0 | 0.31359 | 165.95 | 1926.7 | 3.94 | 0.27634 | 161.89 | 0.780002 | 0.000029 |
| 40.0 | 0.39875 | 162.38 | 1382.3 | 3.81 | 0.27250 | 161.68 | 0.780228 | 0.000024 |
| 45.0 | 0.48303 | 166.93 | 1084.8 | 4.16 | 0.27837 | 161.95 | 0.779941 | 0.000045 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780418
Slope of Fitted Line...............:    -0.0009065
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -9.3 KSI     -63.8 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.7 MPa
Probable error.................(+/-):      2.1 KSI      14.2 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7700.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 9 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -9.3 KSI | -63.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.7 MPa |
| Probable error.....(+/-): | 2.1 KSI | 14.2 MPa |

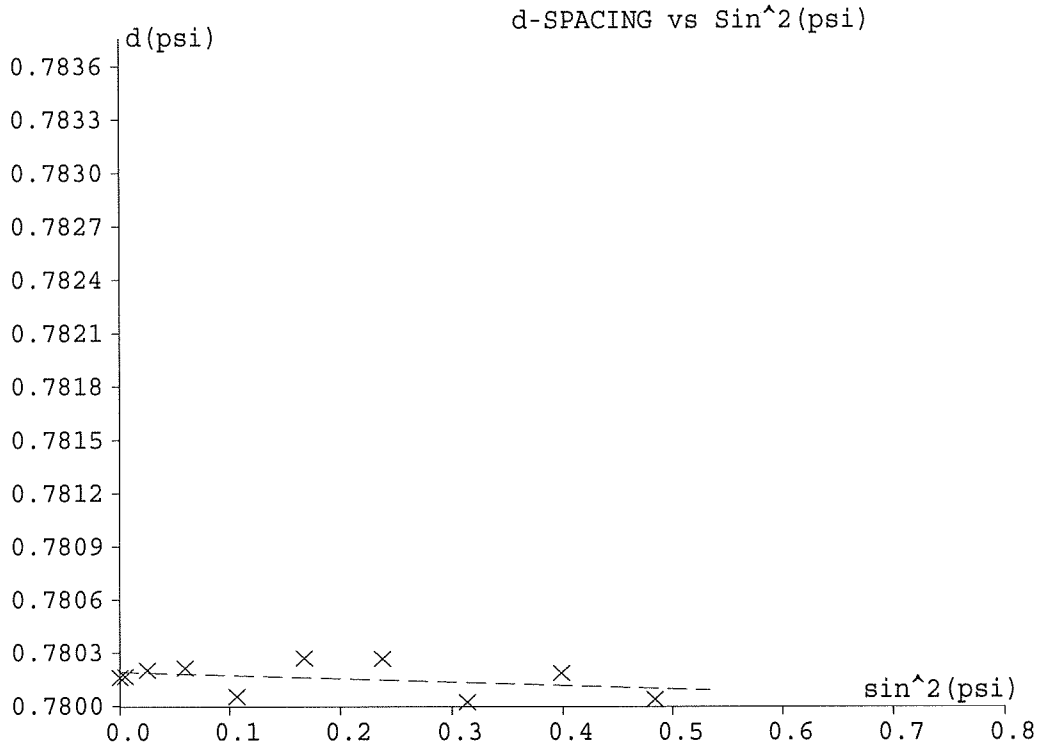


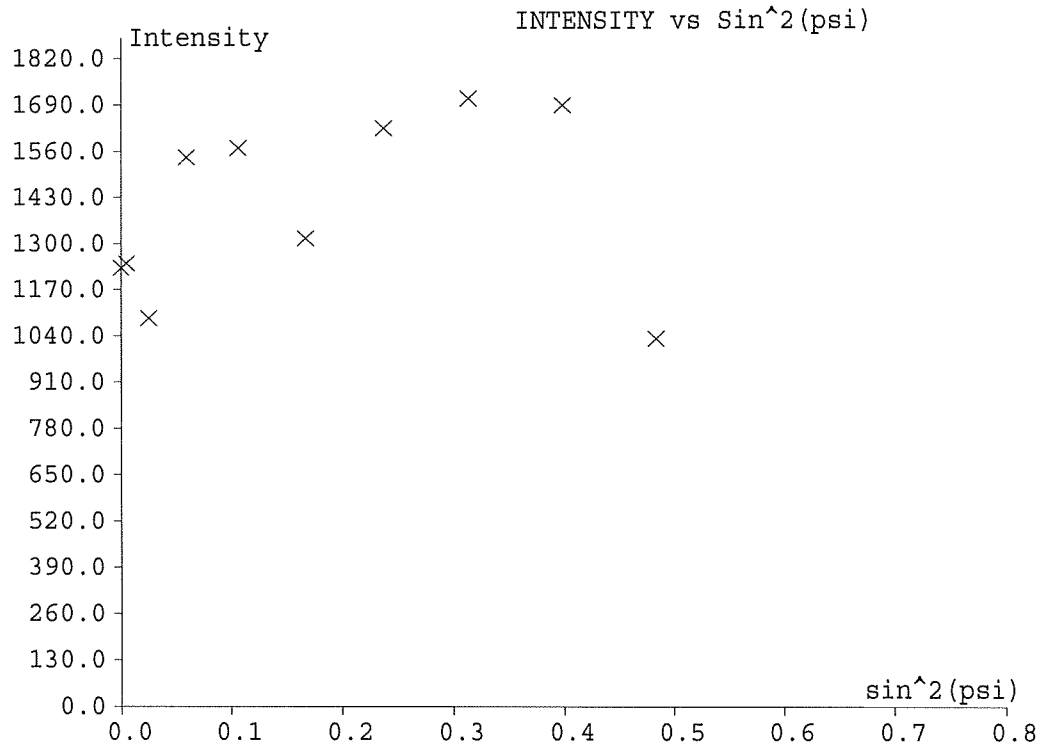



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7701.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 9 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:36pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00023   163.46   1231.3   4.04  0.27452    161.74  0.780160  0.000040
  5.0  0.00519   163.36   1243.7   3.72  0.27263    161.74  0.780165  0.000031
 10.0  0.02527   162.82   1089.4   4.00  0.27382    161.71  0.780201  0.000039
 15.0  0.05978   162.62   1542.6   3.80  0.27261    161.70  0.780213  0.000027
 20.0  0.10683   165.18   1569.0   4.04  0.27614    161.84  0.780051  0.000030
 25.0  0.16774   161.77   1313.9   3.97  0.27287    161.65  0.780268  0.000034
 30.0  0.23765   161.80   1623.2   3.86  0.27235    161.65  0.780266  0.000032
 35.0  0.31372   165.69   1706.2   4.15  0.27716    161.87  0.780020  0.000039
 40.0  0.39841   163.05   1687.5   3.61  0.27154    161.72  0.780184  0.000023
 45.0  0.48379   165.42   1030.6   4.08  0.27655    161.86  0.780036  0.000035

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780191
Slope of Fitted Line...............:    -0.0001943
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -2.0 KSI     -13.7 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       4.6 MPa
Probable error.................(+/-):      1.8 KSI      12.2 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7701.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 9 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -2.0 KSI | -13.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 4.6 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.2 MPa |

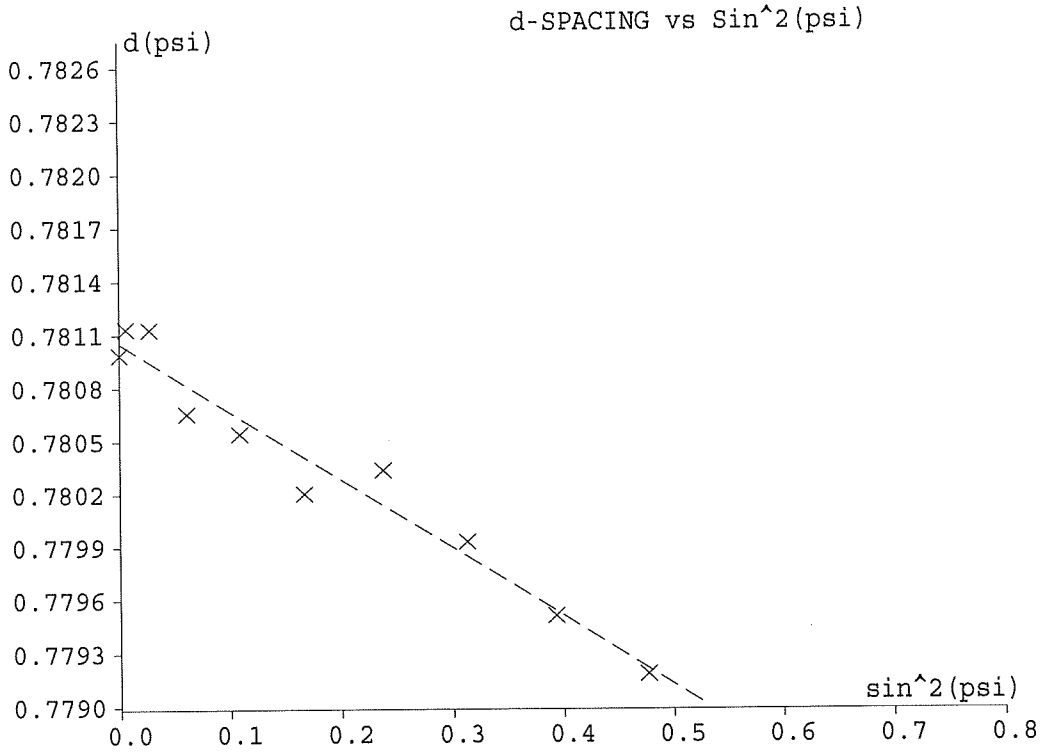


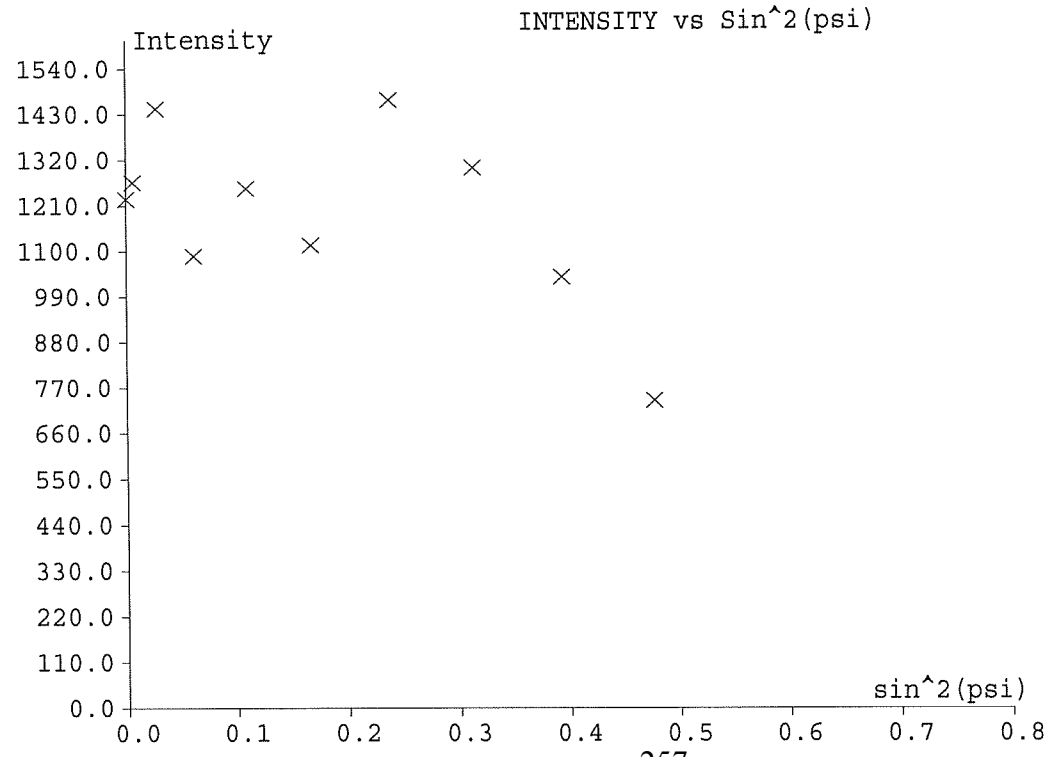



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7696.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 10 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:08pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00008   150.76   1226.2   4.69  0.26802    161.00  0.780987  0.000063
  5.0  0.00633   148.55   1266.0   4.76  0.26637    160.88  0.781134  0.000054
 10.0  0.02759   148.60   1443.4   4.59  0.26614    160.88  0.781130  0.000041
 15.0  0.06144   155.83   1088.2   4.61  0.27188    161.30  0.780656  0.000050
 20.0  0.10924   157.57   1250.7   4.41  0.27206    161.40  0.780541  0.000064
 25.0  0.16734   162.88   1113.8   4.57  0.27733    161.71  0.780201  0.000065
 30.0  0.23811   160.77   1461.7   4.28  0.27374    161.59  0.780334  0.000042
 35.0  0.31304   167.16   1298.3   4.27  0.27920    161.96  0.779928  0.000054
 40.0  0.39306   173.87   1034.8   4.28  0.28552    162.35  0.779509  0.000047
 45.0  0.47677   179.24    736.9   4.63  0.29206    162.66  0.779181  0.000054

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781051
Slope of Fitted Line...............:     -0.003855
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -39.3 KSI    -271.2 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.3 MPa
Probable error.................(+/-):      3.0 KSI      20.4 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7696.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 10 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -39.3 KSI | -271.2 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.3 MPa |
| Probable error.....(+/-): | 3.0 KSI | 20.4 MPa |

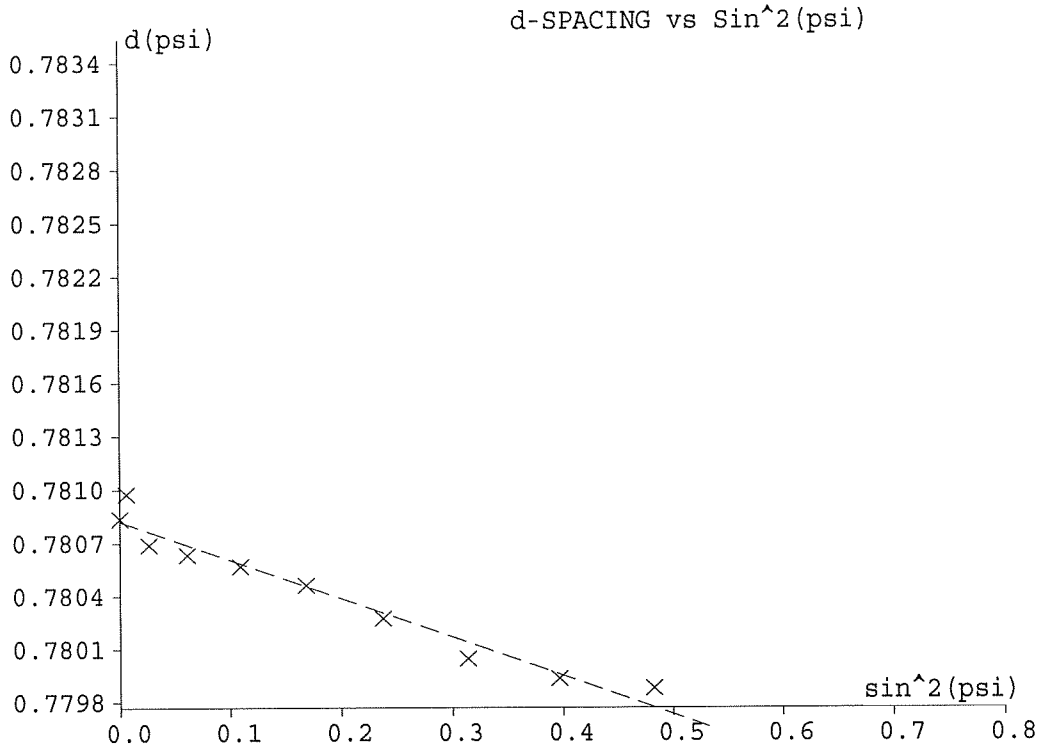


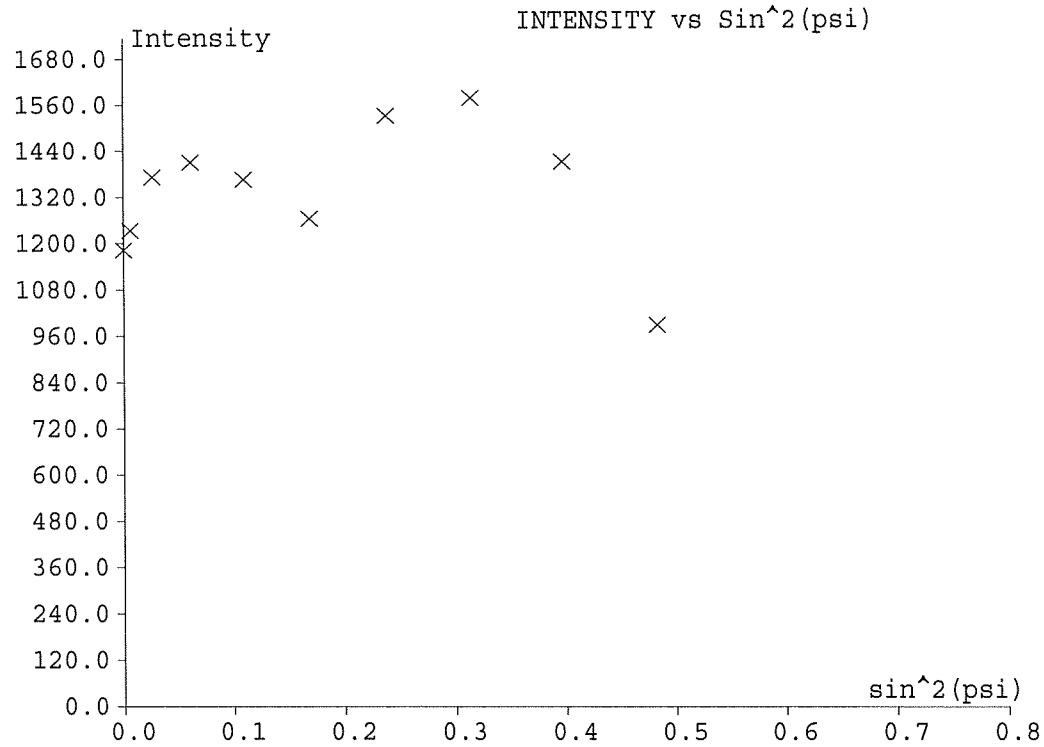



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7697.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 10 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:13pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00010   153.05   1182.9   4.65  0.26976    161.14  0.780837  0.000067
  5.0  0.00614   150.93   1233.1   4.47  0.26731    161.01  0.780976  0.000043
 10.0  0.02649   155.31   1372.1   4.54  0.27119    161.27  0.780689  0.000065
 15.0  0.06135   156.16   1410.3   4.38  0.27081    161.32  0.780632  0.000045
 20.0  0.10937   157.16   1365.2   4.33  0.27125    161.38  0.780567  0.000041
 25.0  0.16887   158.78   1263.3   4.18  0.27153    161.47  0.780461  0.000047
 30.0  0.23770   161.71   1529.8   4.14  0.27360    161.64  0.780273  0.000038
 35.0  0.31391   165.28   1575.7   4.14  0.27671    161.85  0.780045  0.000049
 40.0  0.39645   167.05   1409.7   4.13  0.27833    161.95  0.779934  0.000035
 45.0  0.48253   167.90    986.4   4.09  0.27889    162.00  0.779880  0.000041

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780821
Slope of Fitted Line...............:     -0.002174
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -22.2 KSI    -153.0 MPa

Counting Statistics Stress Error (+/-):      0.9 KSI       6.5 MPa
Probable error.................(+/-):      1.7 KSI      11.8 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7697.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 10 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -22.2 KSI | -153.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.5 MPa |
| Probable error.....(+/-): | 1.7 KSI | 11.8 MPa |

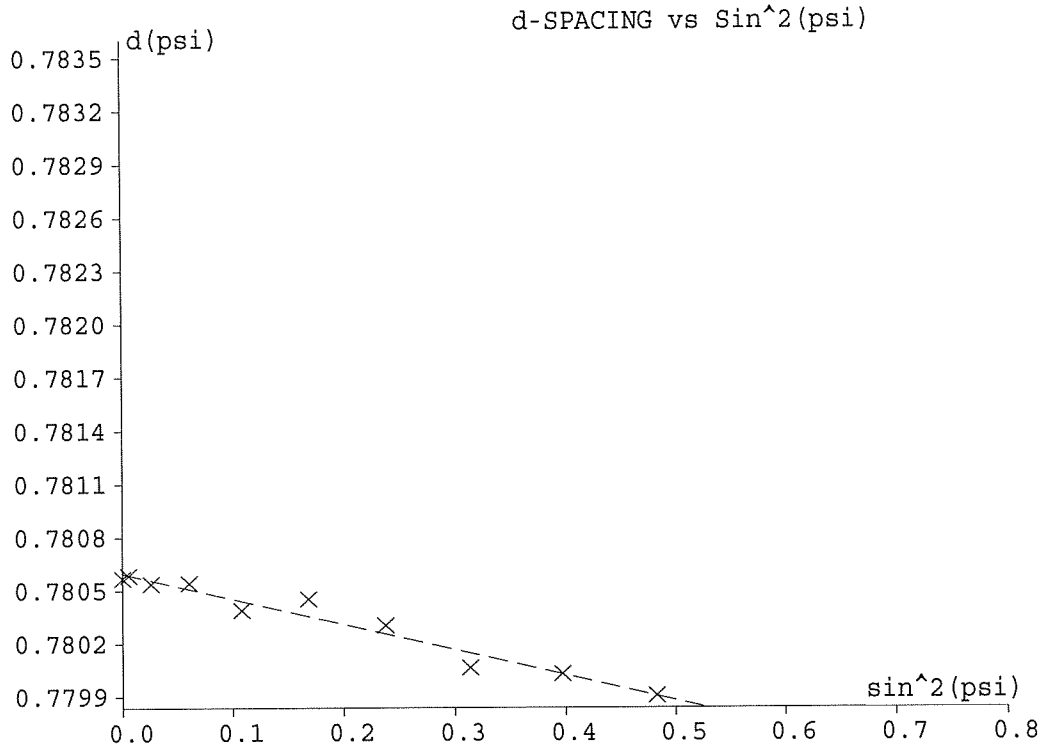


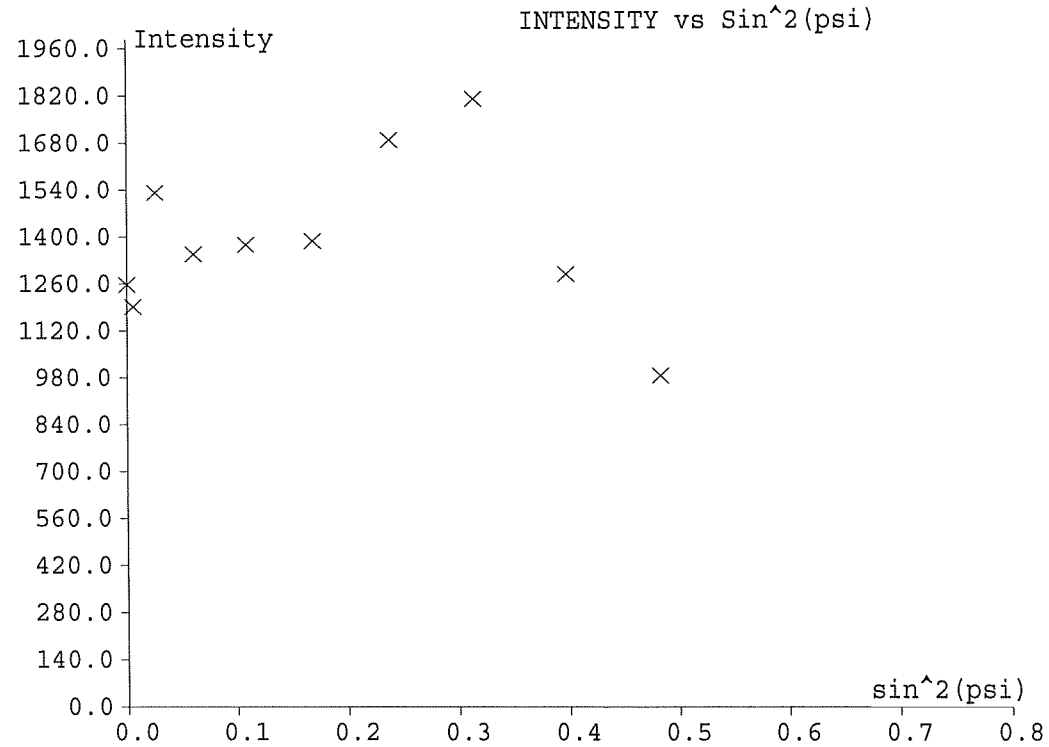



```
================================== TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7698.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 10 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:18pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00014   157.13   1257.2   4.43  0.27188    161.37  0.780570  0.000041
  5.0  0.00567   156.90   1191.3   4.46  0.27190    161.36  0.780585  0.000049
 10.0  0.02611   157.59   1530.9   4.32  0.27151    161.40  0.780539  0.000048
 15.0  0.06101   157.52   1347.4   4.17  0.27054    161.40  0.780542  0.000053
 20.0  0.10850   159.92   1375.0   4.33  0.27340    161.54  0.780389  0.000055
 25.0  0.16883   158.90   1385.3   4.04  0.27098    161.48  0.780453  0.000040
 30.0  0.23789   161.24   1685.0   3.95  0.27236    161.62  0.780301  0.000030
 35.0  0.31403   165.01   1806.1   3.91  0.27535    161.83  0.780062  0.000027
 40.0  0.39719   165.55   1284.2   3.91  0.27584    161.87  0.780028  0.000033
 45.0  0.48273   167.50    982.5   4.10  0.27859    161.98  0.779905  0.000033

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780596
Slope of Fitted Line...............:     -0.001438
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -14.7 KSI    -101.2 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.3 MPa
Probable error.................(+/-):      1.1 KSI       7.4 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7698.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 10 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -14.7 KSI | -101.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.3 MPa |
| Probable error.....(+/-): | 1.1 KSI | 7.4 MPa |



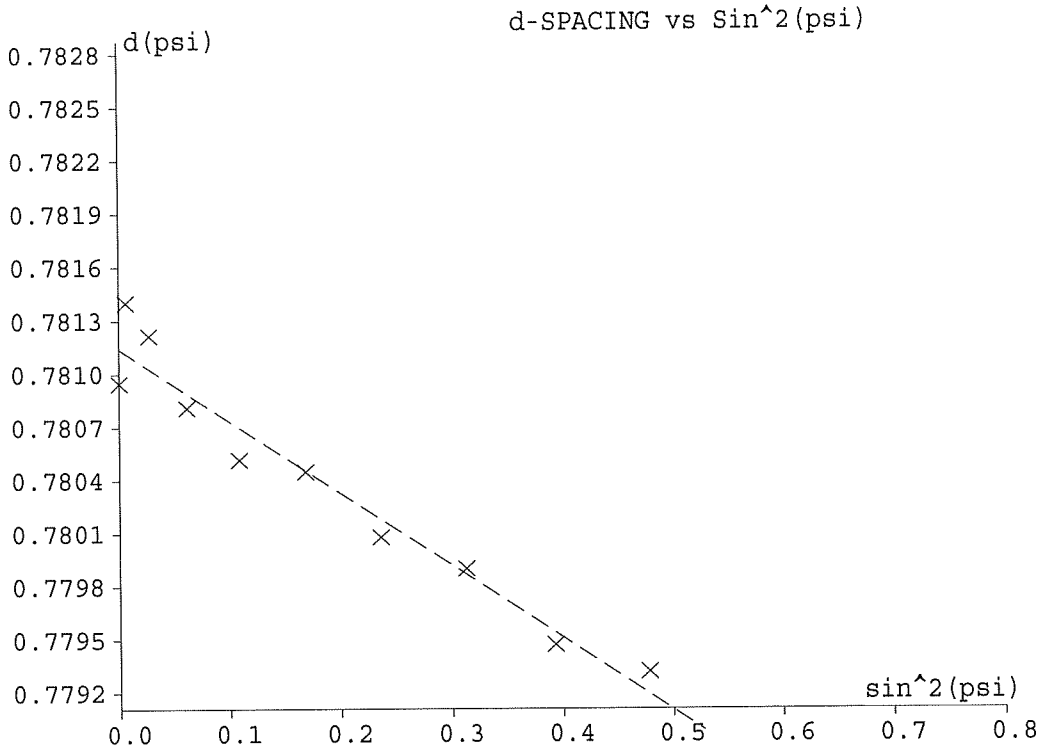
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7693.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 11 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   2:52pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

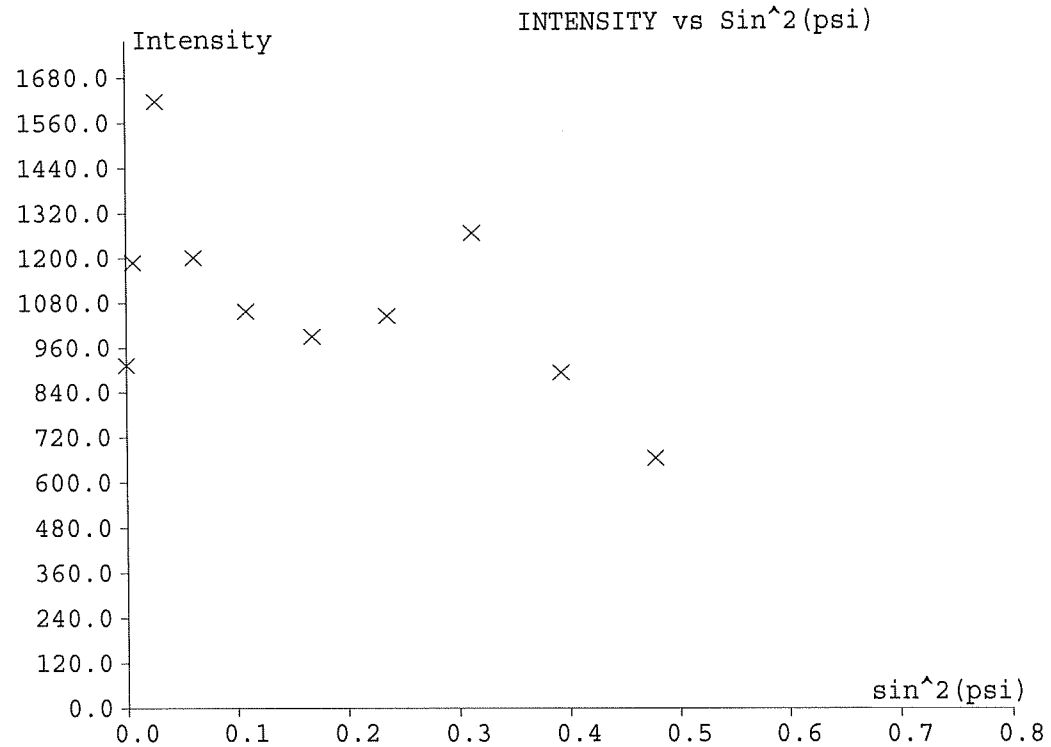
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | - | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00008 | 151.36 | 913.1 | 5.04 | 0.26906 | | 161.04 | 0.780948 | 0.000075 |
| 5.0 | 0.00665 | 144.56 | 1187.9 | 4.85 | 0.26331 | | 160.65 | 0.781400 | 0.000061 |
| 10.0 | 0.02780 | 147.32 | 1617.1 | 4.73 | 0.26535 | | 160.80 | 0.781215 | 0.000050 |
| 15.0 | 0.06201 | 153.50 | 1200.9 | 4.85 | 0.27046 | | 161.16 | 0.780808 | 0.000070 |
| 20.0 | 0.10912 | 158.00 | 1056.9 | 4.87 | 0.27410 | | 161.42 | 0.780515 | 0.000080 |
| 25.0 | 0.16879 | 159.06 | 988.4 | 4.53 | 0.27406 | | 161.49 | 0.780446 | 0.000071 |
| 30.0 | 0.23637 | 164.84 | 1043.3 | 4.68 | 0.27937 | | 161.82 | 0.780077 | 0.000056 |
| 35.0 | 0.31280 | 167.69 | 1264.6 | 4.53 | 0.28129 | | 161.99 | 0.779896 | 0.000050 |
| 40.0 | 0.39273 | 174.54 | 890.7 | 4.41 | 0.28679 | | 162.39 | 0.779469 | 0.000047 |
| 45.0 | 0.47791 | 177.00 | 663.2 | 4.54 | 0.28963 | | 162.53 | 0.779318 | 0.000059 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781141
Slope of Fitted Line...............:     -0.00408
Material Stress Constant...........:    1.255E-07

*Residual Stress...................:    -41.6 KSI    -287.0 MPa

Counting Statistics Stress Error (+/-):      1.2 KSI       8.2 MPa
Probable error.................(+/-):      3.4 KSI      23.2 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7693.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 11 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -41.6 KSI | -287.0 MPa |
| Counting Statistics Stress Error (+/-): | 1.2 KSI | 8.2 MPa |
| Probable error.....(+/-): | 3.4 KSI | 23.2 MPa |

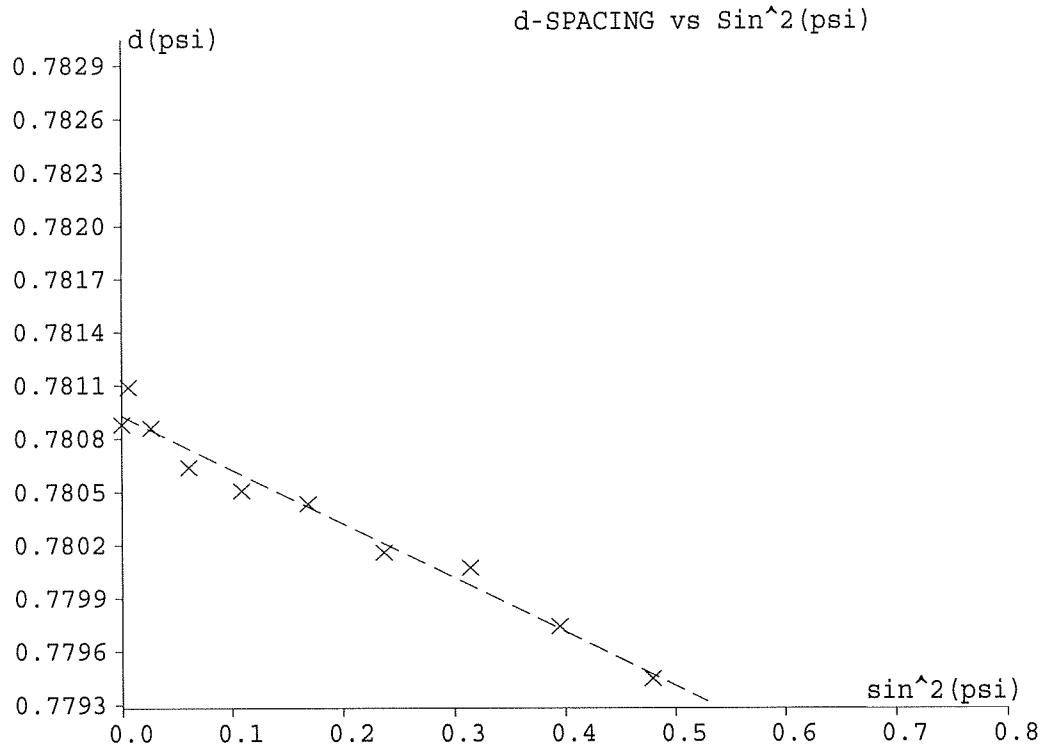


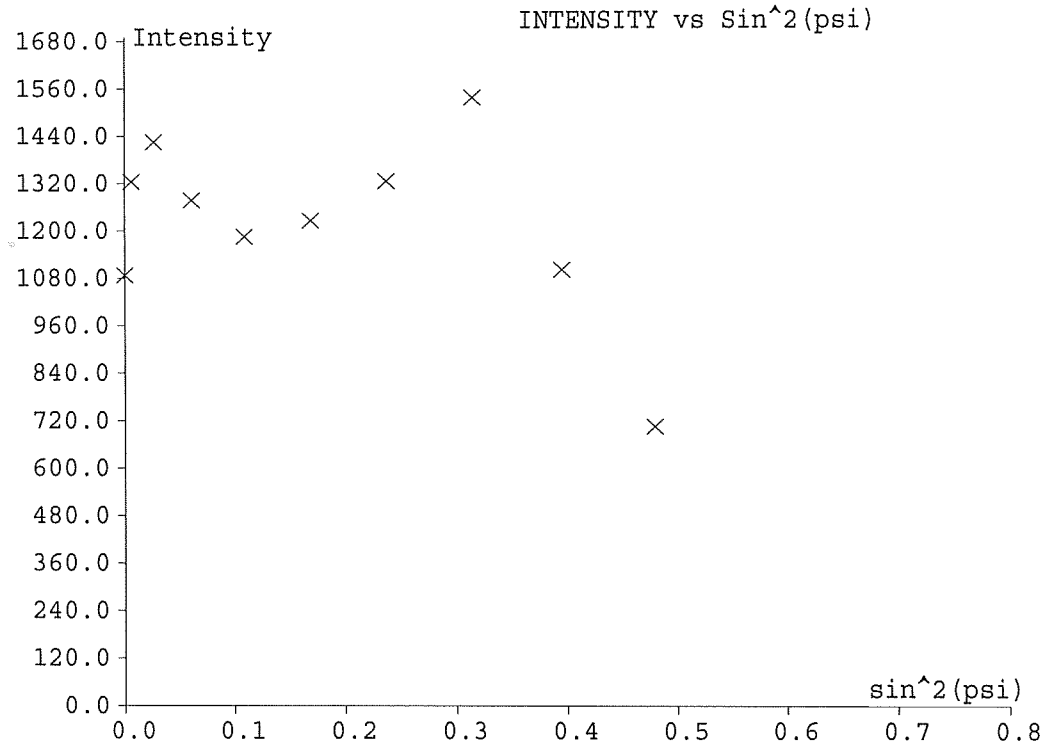



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7694.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 11 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   2:57pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00009   152.39   1087.8   4.85  0.26956    161.10  0.780881  0.000070
  5.0  0.00627   149.21   1323.7   4.76  0.26689    160.91  0.781090  0.000049
 10.0  0.02691   152.68   1424.3   4.55  0.26917    161.12  0.780861  0.000048
 15.0  0.06137   156.11   1276.8   5.03  0.27285    161.31  0.780638  0.000054
 20.0  0.10908   158.11   1184.6   4.53  0.27330    161.43  0.780507  0.000050
 25.0  0.16871   159.22   1225.3   4.19  0.27192    161.50  0.780433  0.000040
 30.0  0.23692   163.53   1324.6   4.35  0.27639    161.75  0.780158  0.000039
 35.0  0.31410   164.91   1536.1   4.43  0.27818    161.83  0.780071  0.000048
 40.0  0.39493   170.11   1100.2   4.11  0.28104    162.13  0.779742  0.000054
 45.0  0.47898   174.90    704.3   4.42  0.28713    162.41  0.779446  0.000077

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780930
Slope of Fitted Line...............:     -0.003044
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -31.1 KSI    -214.1 MPa

Counting Statistics Stress Error (+/-):      1.3 KSI       8.7 MPa
Probable error.................(+/-):      1.8 KSI      12.6 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7694.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 11 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -31.1 KSI | -214.1 MPa |
| Counting Statistics Stress Error (+/-): | 1.3 KSI | 8.7 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.6 MPa |

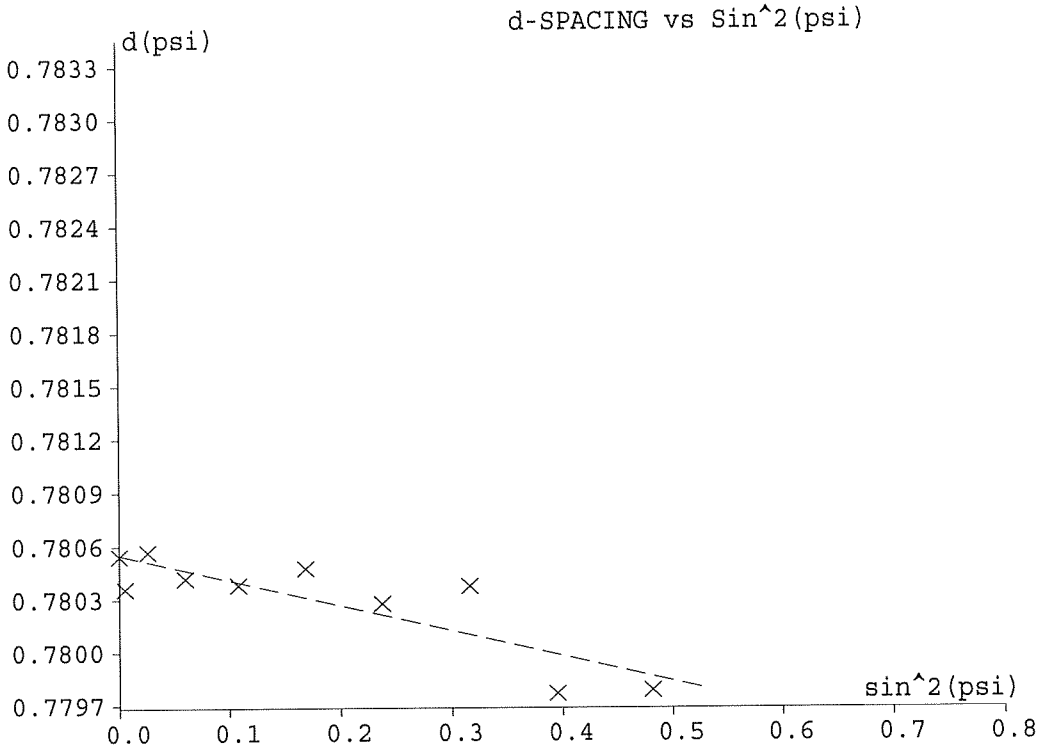


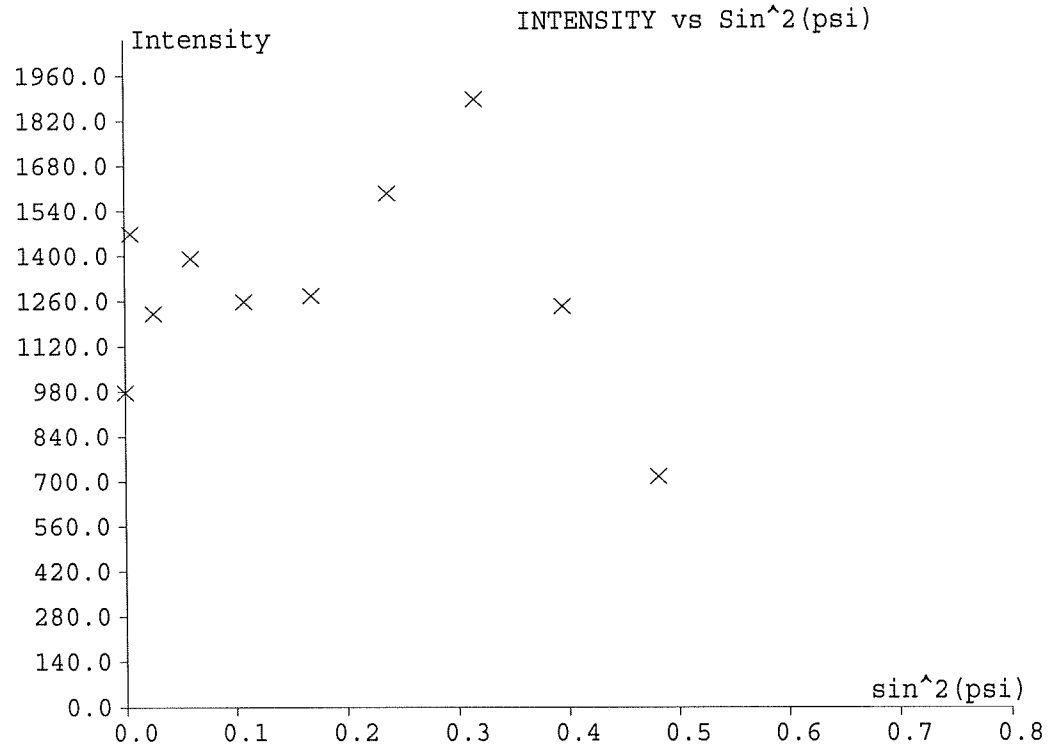



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7695.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 11 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   3:02pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00015   157.56    976.9   4.50  0.27267    161.40  0.780542  0.000060
  5.0  0.00541   160.41   1469.0   4.59  0.27549    161.56  0.780359  0.000039
 10.0  0.02618   157.18   1221.4   4.52  0.27250    161.38  0.780567  0.000046
 15.0  0.06054   159.51   1391.8   4.51  0.27428    161.51  0.780416  0.000038
 20.0  0.10845   160.07   1257.5   4.22  0.27278    161.55  0.780378  0.000055
 25.0  0.16895   158.56   1274.8   3.82  0.26971    161.46  0.780474  0.000037
 30.0  0.23770   161.68   1591.8   4.05  0.27319    161.64  0.780274  0.000030
 35.0  0.31633   160.13   1882.6   3.78  0.27057    161.55  0.780372  0.000023
 40.0  0.39511   169.74   1240.2   4.19  0.28117    162.11  0.779765  0.000044
 45.0  0.48175   169.47    713.1   4.47  0.28255    162.09  0.779784  0.000074

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780550
Slope of Fitted Line...............:     -0.001428
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -14.6 KSI    -100.5 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.7 MPa
Probable error.................(+/-):      3.1 KSI      21.6 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7695.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 11 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -14.6 KSI | -100.5 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.7 MPa |
| Probable error.....(+/-): | 3.1 KSI | 21.6 MPa |

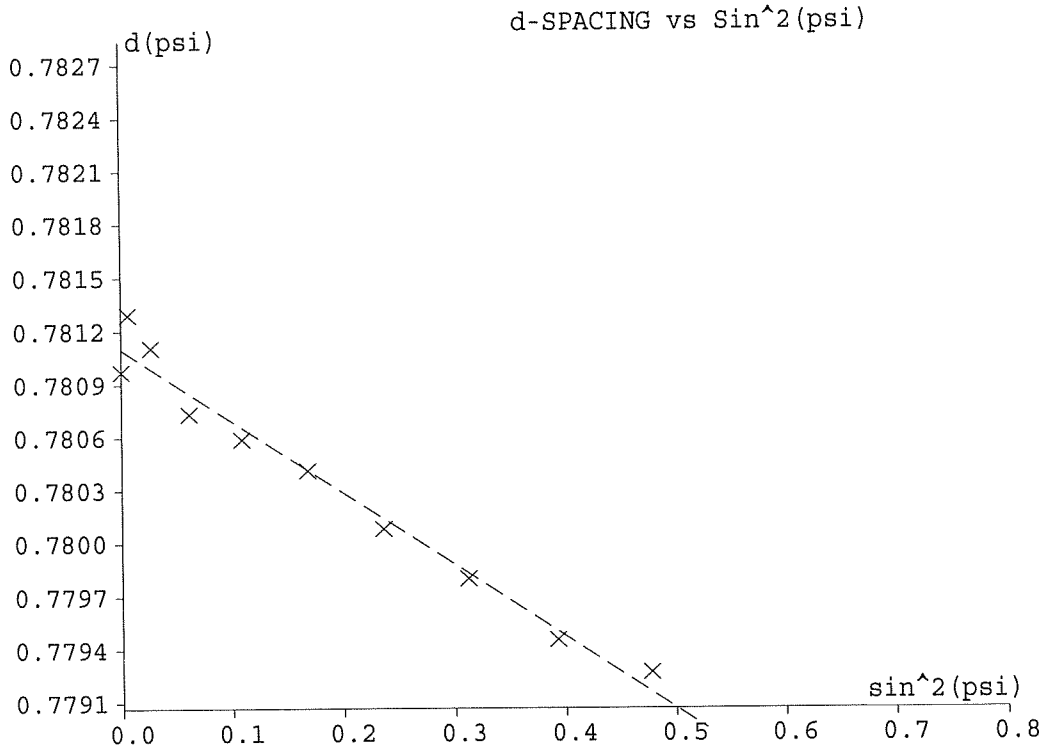


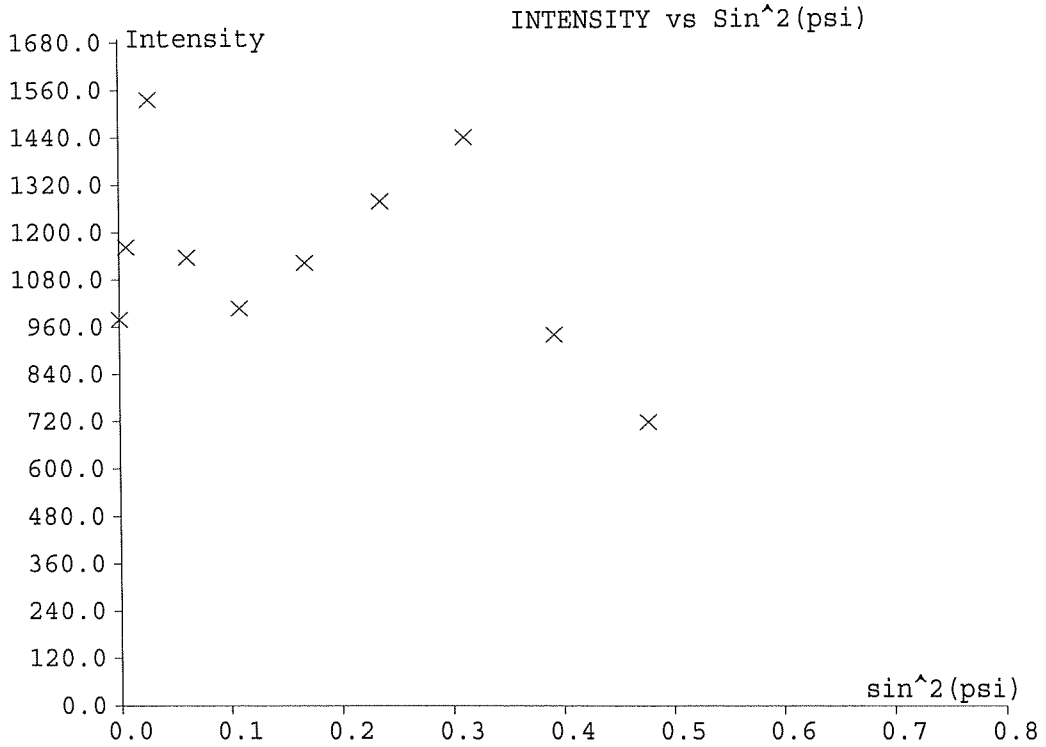



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7690.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 12 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   2:35pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00008   151.00    979.2   5.03  0.26876    161.02  0.780972  0.000059
  5.0  0.00652   146.18   1163.2   4.99  0.26484    160.74  0.781292  0.000059
 10.0  0.02752   148.98   1535.3   4.75  0.26671    160.90  0.781105  0.000054
 15.0  0.06172   154.66   1135.9   4.82  0.27133    161.23  0.780732  0.000073
 20.0  0.10947   156.88   1006.5   5.09  0.27367    161.36  0.780588  0.000093
 25.0  0.16858   159.58   1121.6   4.42  0.27374    161.52  0.780411  0.000046
 30.0  0.23639   164.77   1276.0   4.40  0.27783    161.82  0.780080  0.000064
 35.0  0.31207   169.24   1436.6   4.50  0.28251    162.08  0.779799  0.000042
 40.0  0.39261   174.77    937.5   4.31  0.28649    162.40  0.779454  0.000045
 45.0  0.47752   177.74    715.2   4.25  0.28898    162.58  0.779271  0.000047

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781099
Slope of Fitted Line...............:     -0.004062
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -41.4 KSI    -285.7 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.4 MPa
Probable error.................(+/-):      2.4 KSI      16.6 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7690.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 12 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -41.4 KSI | -285.7 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.4 MPa |
| Probable error.....(+/-): | 2.4 KSI | 16.6 MPa |



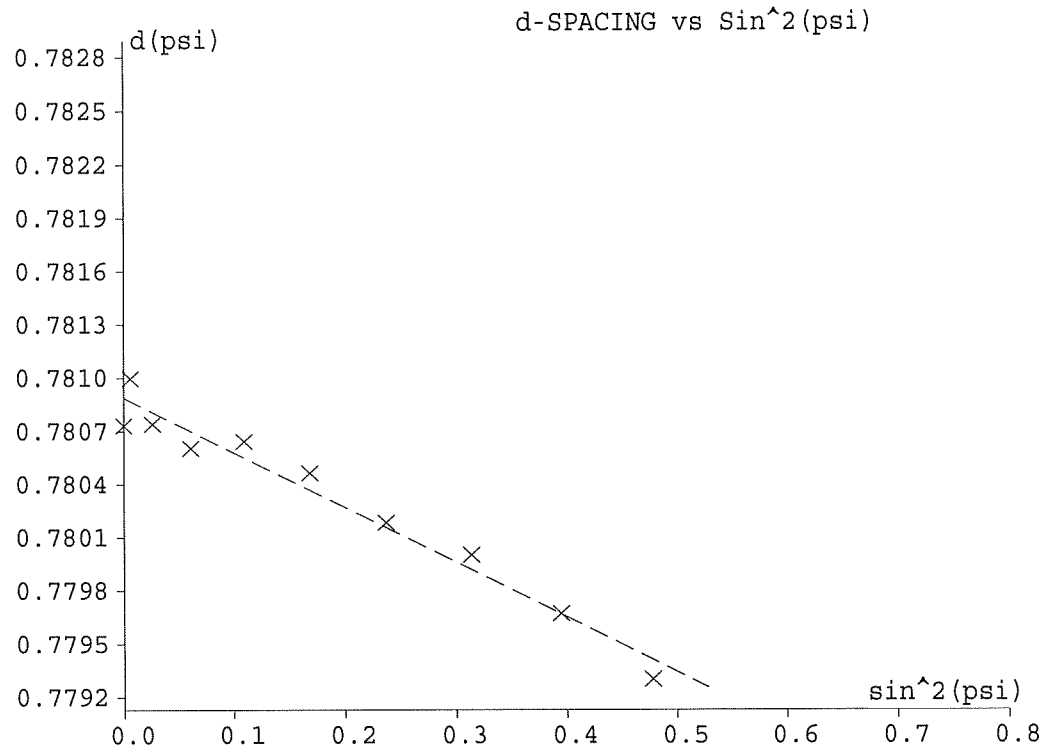
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7691.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 12 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   2:41pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

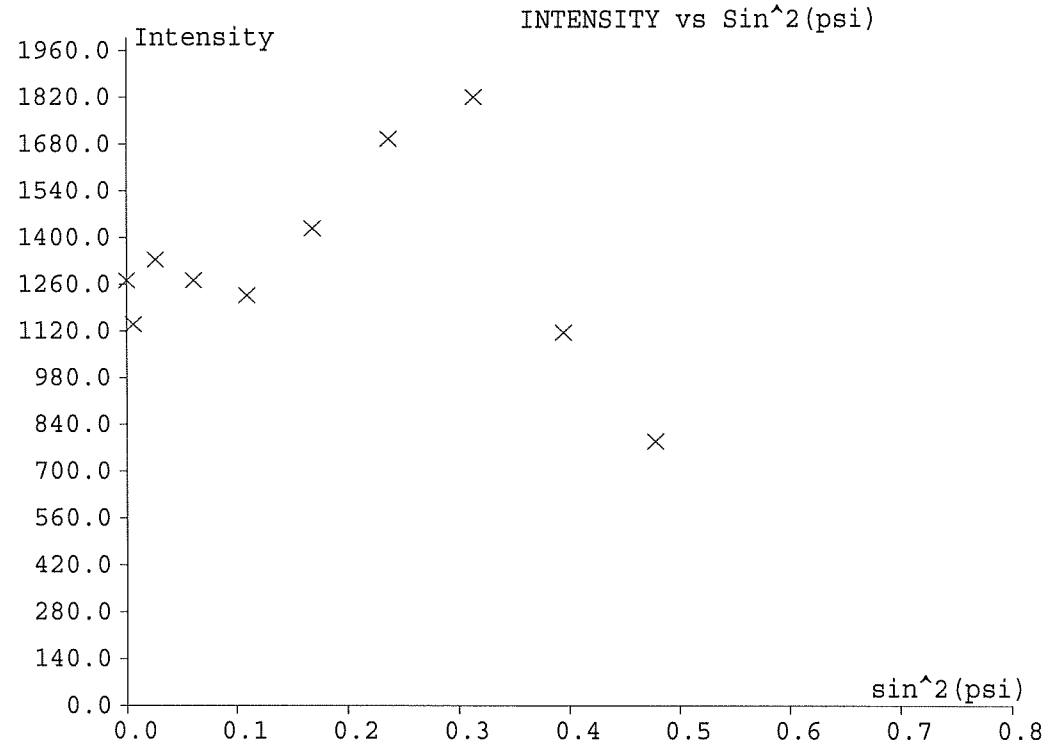
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | - | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00012 | 154.66 | 1270.9 | 4.65 | 0.27104 | | 161.23 | 0.780731 | 0.000050 |
| 5.0 | 0.00616 | 150.60 | 1140.3 | 4.44 | 0.26683 | | 161.00 | 0.780997 | 0.000052 |
| 10.0 | 0.02661 | 154.53 | 1333.3 | 4.63 | 0.27090 | | 161.22 | 0.780740 | 0.000061 |
| 15.0 | 0.06125 | 156.60 | 1271.6 | 4.49 | 0.27187 | | 161.34 | 0.780605 | 0.000044 |
| 20.0 | 0.10973 | 156.03 | 1226.1 | 4.50 | 0.27147 | | 161.31 | 0.780642 | 0.000058 |
| 25.0 | 0.16889 | 158.76 | 1425.4 | 4.36 | 0.27267 | | 161.47 | 0.780464 | 0.000041 |
| 30.0 | 0.23709 | 163.14 | 1693.4 | 4.28 | 0.27559 | | 161.72 | 0.780182 | 0.000040 |
| 35.0 | 0.31358 | 165.99 | 1817.4 | 4.13 | 0.27735 | | 161.89 | 0.780000 | 0.000038 |
| 40.0 | 0.39435 | 171.28 | 1113.3 | 4.31 | 0.28324 | | 162.20 | 0.779670 | 0.000042 |
| 45.0 | 0.47776 | 177.25 | 787.7 | 4.05 | 0.28742 | | 162.55 | 0.779300 | 0.000044 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780889
Slope of Fitted Line...............:     -0.003095
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -31.6 KSI    -217.7 MPa

Counting Statistics Stress Error (+/-):      0.9 KSI       6.5 MPa
Probable error.................(+/-):      2.1 KSI      14.8 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7691.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 12 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -31.6 KSI | -217.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.5 MPa |
| Probable error.....(+/-): | 2.1 KSI | 14.8 MPa |

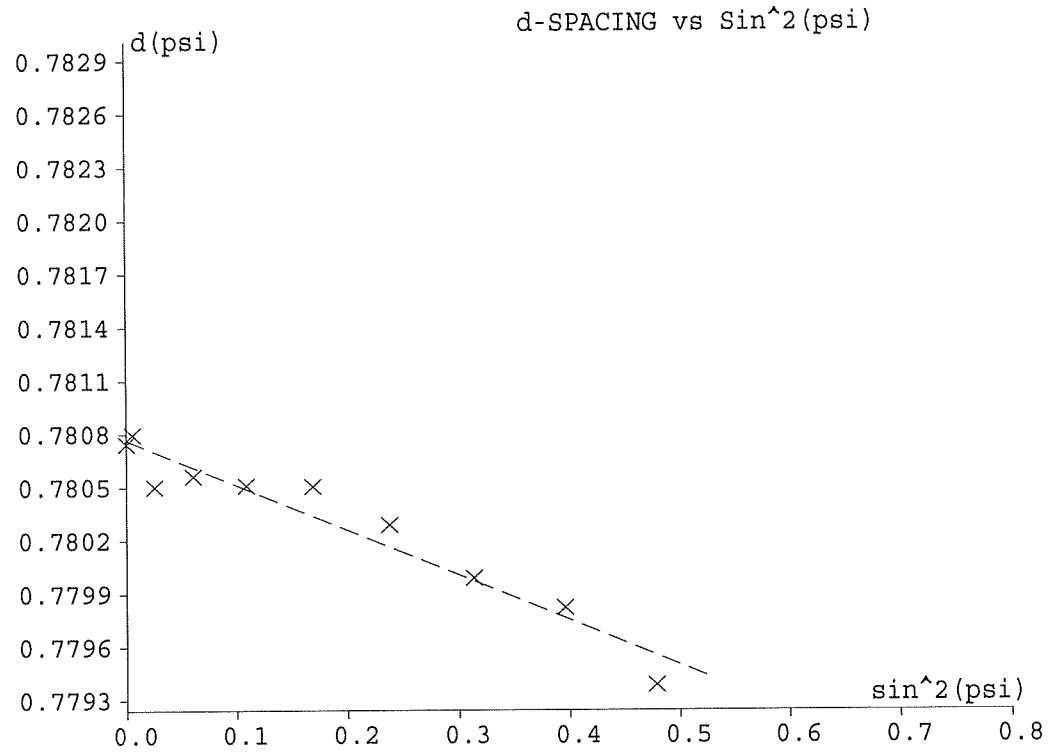


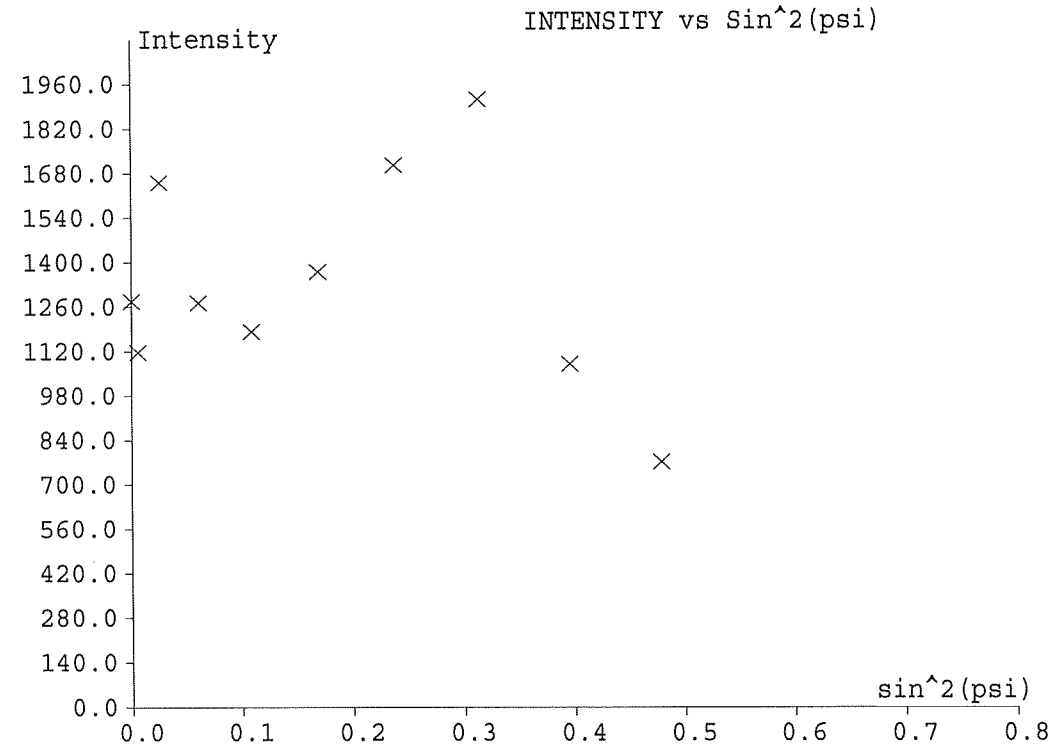



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7692.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 12 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   2:46pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00011   154.44   1276.7   4.38  0.26942    161.22  0.780744  0.000047
  5.0  0.00592   153.61   1116.6   4.20  0.26765    161.17  0.780797  0.000046
 10.0  0.02602   158.16   1650.1   4.35  0.27213    161.43  0.780502  0.000038
 15.0  0.06109   157.25   1271.9   4.47  0.27224    161.38  0.780562  0.000045
 20.0  0.10908   158.06   1181.6   4.33  0.27197    161.43  0.780509  0.000045
 25.0  0.16913   158.12   1368.7   4.20  0.27110    161.43  0.780504  0.000034
 30.0  0.23780   161.48   1703.1   4.23  0.27394    161.63  0.780288  0.000038
 35.0  0.31349   166.18   1909.0   4.11  0.27741    161.90  0.779988  0.000030
 40.0  0.39555   168.87   1077.7   4.36  0.28135    162.06  0.779821  0.000042
 45.0  0.47847   175.91    769.9   4.54  0.28868    162.47  0.779385  0.000065

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780765
Slope of Fitted Line...............:     -0.002533
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -25.8 KSI    -178.2 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       7.0 MPa
Probable error.................(+/-):      2.4 KSI      16.8 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7692.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 12 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -25.8 KSI | -178.2 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 7.0 MPa |
| Probable error.....(+/-): | 2.4 KSI | 16.8 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7687.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 13 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time: 10/28/2005 2:19pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 20.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A 1.99867E-07 B -7.91049E-05 C 0.0688651 D 148.0028

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00009 | 152.47 | 1172.1 | 4.78 | 0.26952 | 161.10 | 0.780875 | 0.000062 |
| 5.0 | 0.00619 | 150.20 | 1211.0 | 4.53 | 0.26706 | 160.97 | 0.781024 | 0.000063 |
| 10.0 | 0.02703 | 151.97 | 1291.2 | 4.64 | 0.26888 | 161.07 | 0.780908 | 0.000051 |
| 15.0 | 0.06098 | 157.68 | 1369.1 | 4.46 | 0.27251 | 161.41 | 0.780534 | 0.000042 |
| 20.0 | 0.10870 | 159.31 | 1271.2 | 4.66 | 0.27475 | 161.50 | 0.780430 | 0.000079 |
| 25.0 | 0.16924 | 157.86 | 1092.5 | 4.64 | 0.27355 | 161.42 | 0.780523 | 0.000053 |
| 30.0 | 0.23731 | 162.65 | 1372.0 | 4.46 | 0.27643 | 161.69 | 0.780215 | 0.000044 |
| 35.0 | 0.31406 | 165.02 | 1399.0 | 4.54 | 0.27898 | 161.83 | 0.780065 | 0.000040 |
| 40.0 | 0.39459 | 170.79 | 1036.1 | 4.16 | 0.28195 | 162.17 | 0.779700 | 0.000038 |
| 45.0 | 0.47947 | 173.90 | 895.1 | 4.05 | 0.28428 | 162.35 | 0.779506 | 0.000049 |

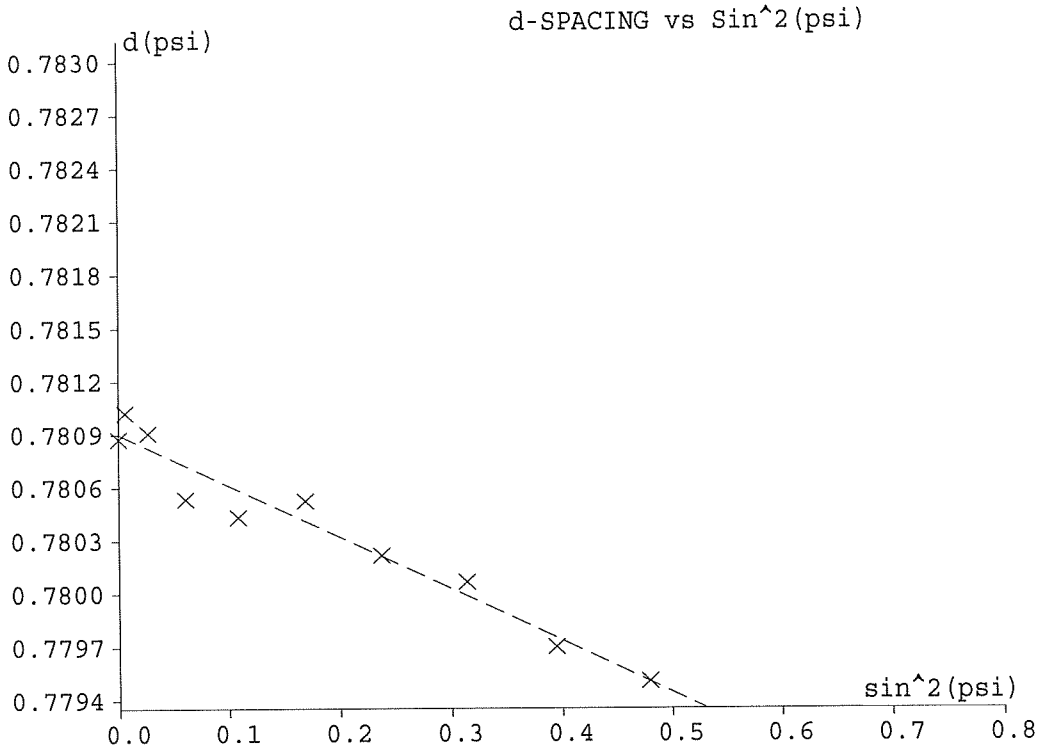
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780902
Slope of Fitted Line.....: -0.002915
Material Stress Constant.....: 1.255E-07

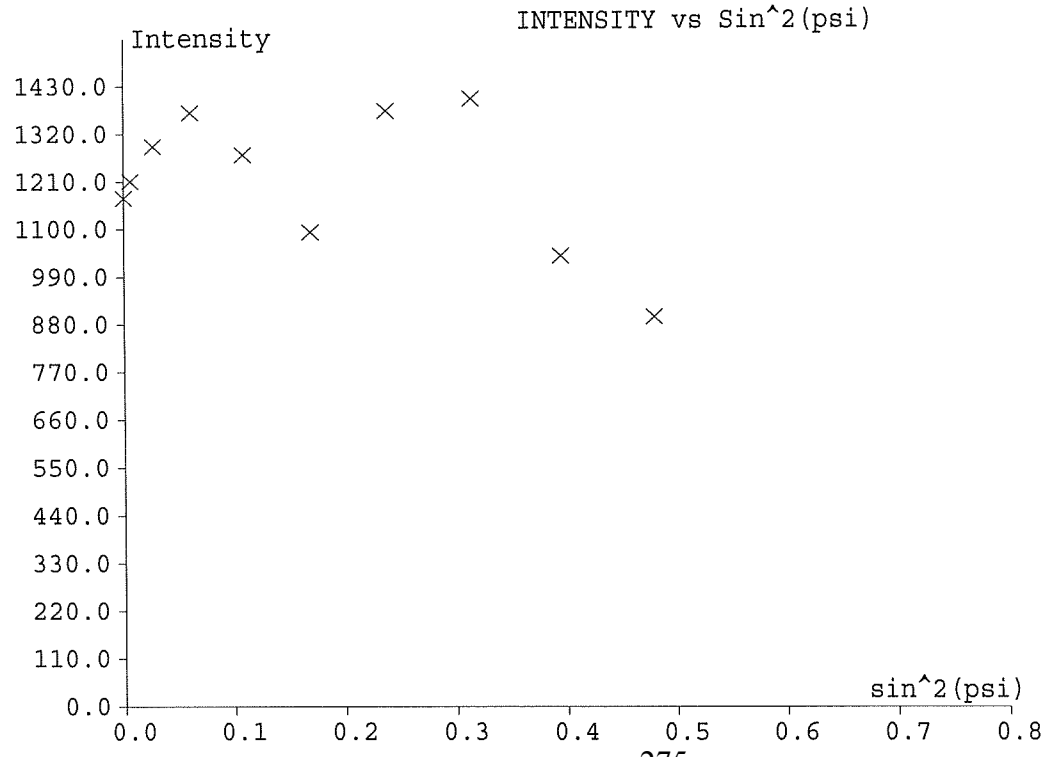
*Residual Stress.....: -29.7 KSI -205.0 MPa

Counting Statistics Stress Error (+/-): 1.0 KSI 7.0 MPa
Probable error.....(+/-): 2.3 KSI 16.1 MPa

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7687.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 13 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -29.7 KSI | -205.0 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 7.0 MPa |
| Probable error.....(+/-): | 2.3 KSI | 16.1 MPa |



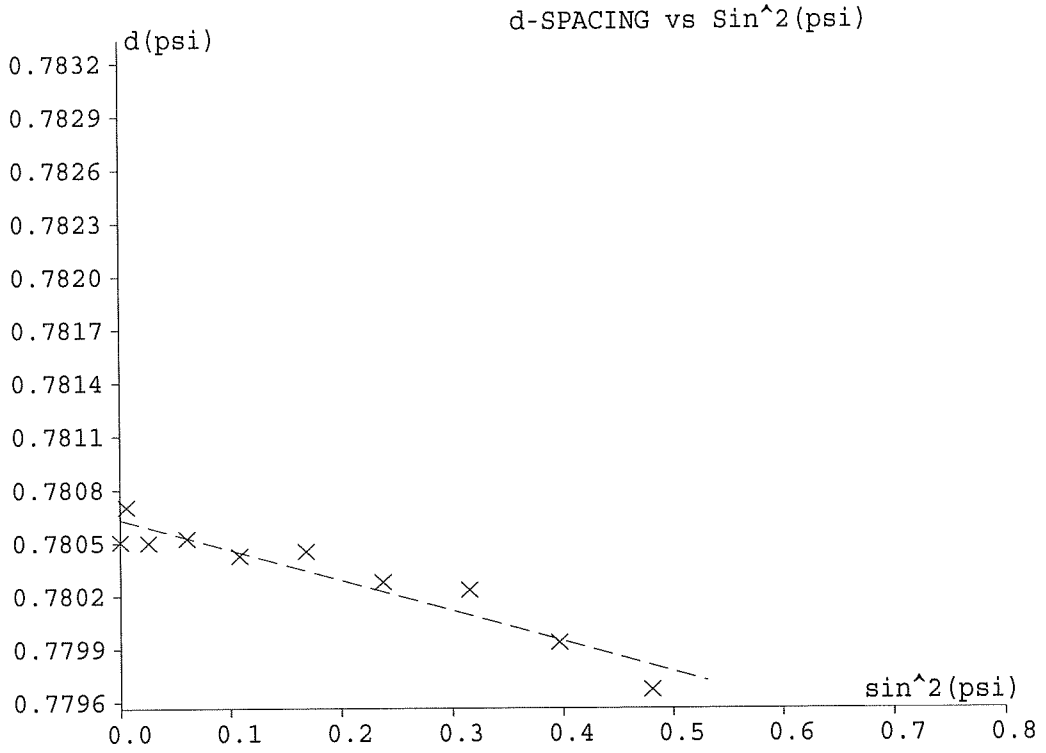
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7688.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 13 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   2:24pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

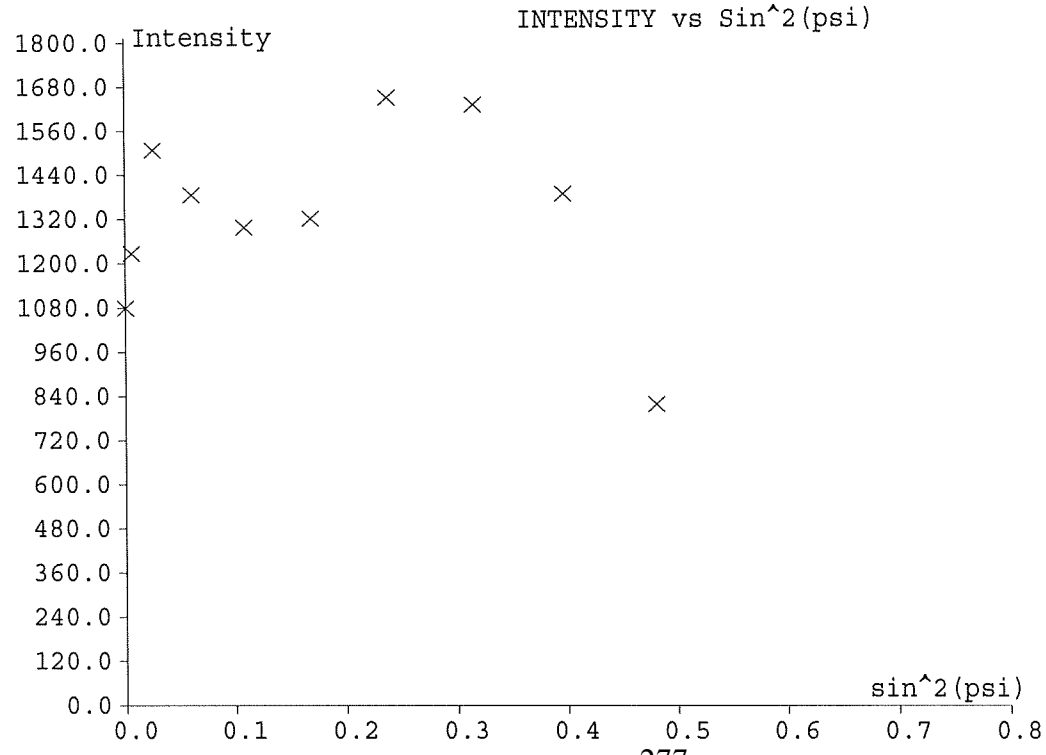
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00016 | 158.15 | 1079.3 | 4.77 | 0.27402 | 161.43 | 0.780505 | 0.000047 |
| 5.0 | 0.00581 | 155.11 | 1227.1 | 4.46 | 0.27048 | 161.26 | 0.780701 | 0.000054 |
| 10.0 | 0.02602 | 158.20 | 1508.0 | 4.41 | 0.27261 | 161.44 | 0.780501 | 0.000045 |
| 15.0 | 0.06094 | 157.83 | 1385.4 | 4.33 | 0.27180 | 161.42 | 0.780524 | 0.000045 |
| 20.0 | 0.10868 | 159.34 | 1296.5 | 4.29 | 0.27269 | 161.50 | 0.780426 | 0.000036 |
| 25.0 | 0.16881 | 158.98 | 1320.0 | 4.44 | 0.27336 | 161.48 | 0.780450 | 0.000049 |
| 30.0 | 0.23773 | 161.62 | 1648.9 | 4.05 | 0.27312 | 161.64 | 0.780278 | 0.000033 |
| 35.0 | 0.31530 | 162.34 | 1629.2 | 4.11 | 0.27399 | 161.68 | 0.780232 | 0.000033 |
| 40.0 | 0.39647 | 166.99 | 1385.3 | 3.94 | 0.27730 | 161.95 | 0.779937 | 0.000039 |
| 45.0 | 0.48082 | 171.28 | 815.7 | 4.35 | 0.28350 | 162.20 | 0.779671 | 0.000057 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780631
Slope of Fitted Line...............:     -0.001713
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -17.5 KSI    -120.5 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       6.7 MPa
Probable error.................(+/-):      2.0 KSI      14.0 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7688.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 13 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -17.5 KSI | -120.5 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 6.7 MPa |
| Probable error.....(+/-): | 2.0 KSI | 14.0 MPa |

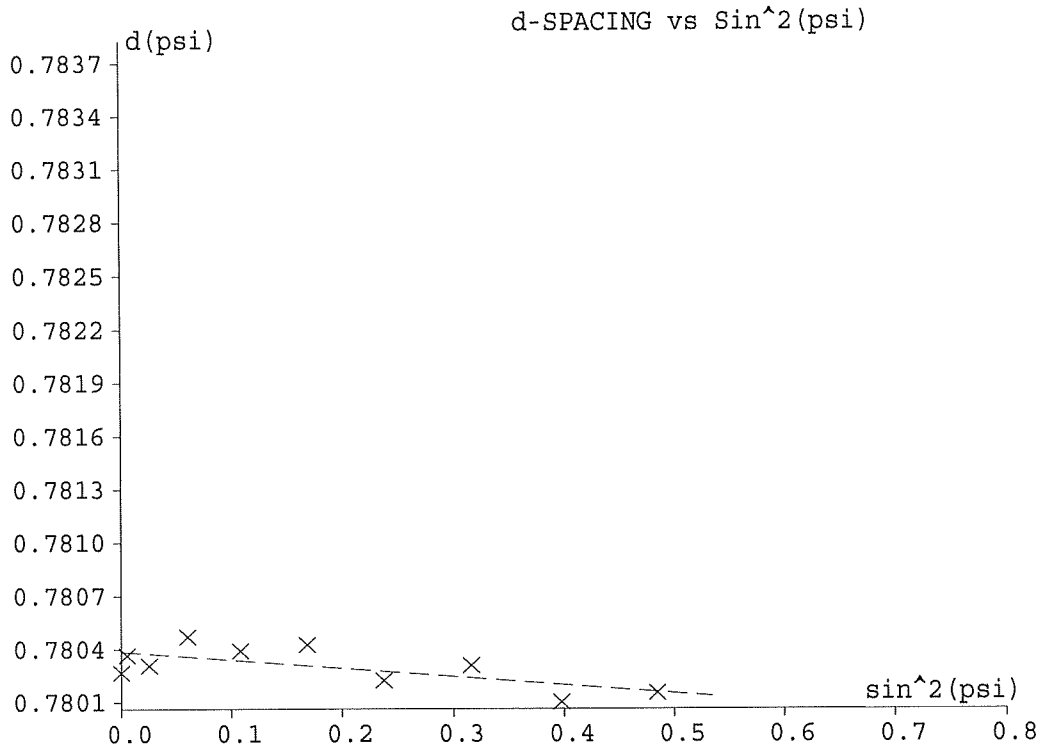


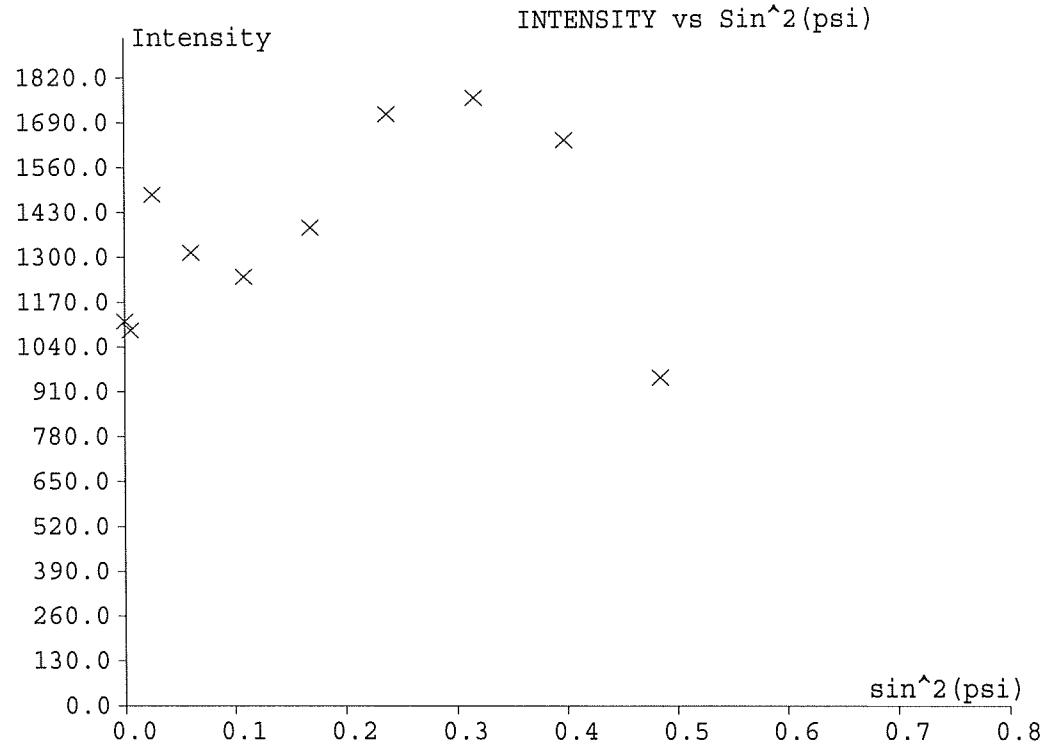



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7689.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 13 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   2:29pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00021   161.84   1113.6   4.70  0.27684    161.65  0.780267  0.000059
  5.0  0.00542   160.29   1088.1   4.38  0.27401    161.56  0.780366  0.000054
 10.0  0.02553   161.16   1480.8   4.07  0.27285    161.61  0.780308  0.000048
 15.0  0.06074   158.65   1313.4   4.24  0.27183    161.46  0.780470  0.000044
 20.0  0.10851   159.86   1242.5   4.02  0.27165    161.54  0.780391  0.000043
 25.0  0.16867   159.33   1384.5   4.19  0.27203    161.50  0.780426  0.000035
 30.0  0.23736   162.51   1712.0   4.34  0.27548    161.69  0.780223  0.000032
 35.0  0.31586   161.13   1758.3   3.85  0.27179    161.61  0.780308  0.000024
 40.0  0.39776   164.40   1635.6   3.99  0.27517    161.80  0.780100  0.000047
 45.0  0.48473   163.56    947.8   3.94  0.27414    161.75  0.780153  0.000044

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780386
Slope of Fitted Line...............:    -0.0004718
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -4.8 KSI     -33.2 MPa

Counting Statistics Stress Error (+/-):      0.9 KSI       6.4 MPa
Probable error.................(+/-):      1.8 KSI      12.4 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7689.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 13 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.8 KSI | -33.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.4 MPa |
| Probable error.....(+/-): | 1.8 KSI | 12.4 MPa |



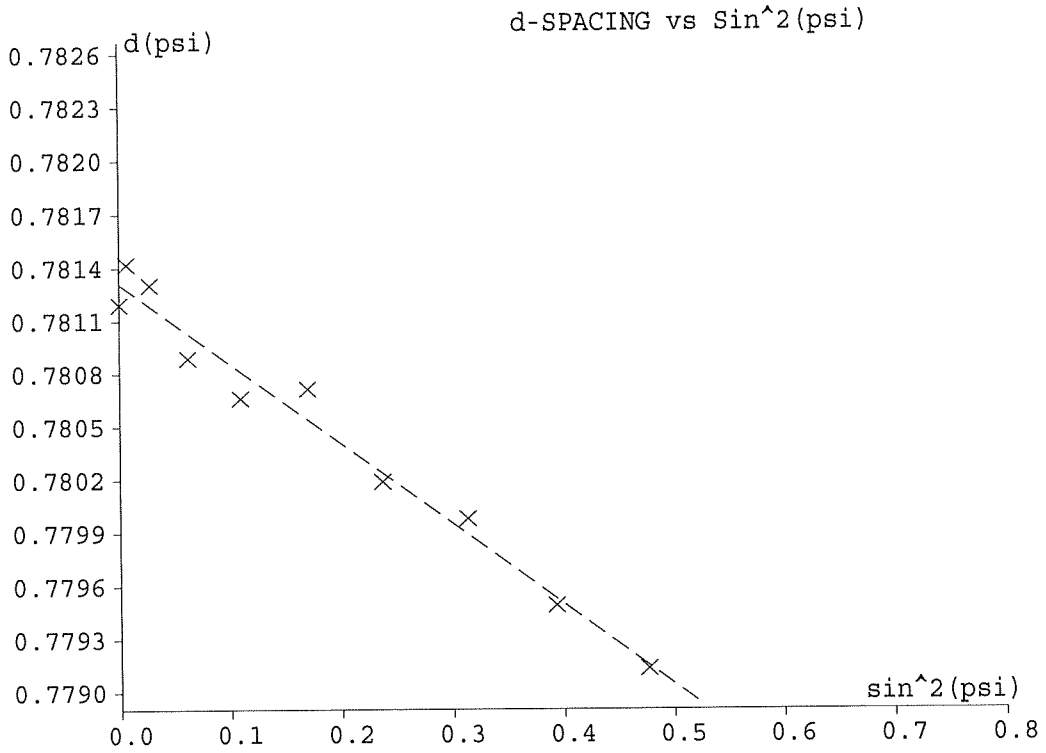
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7684.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 14 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   2:02pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

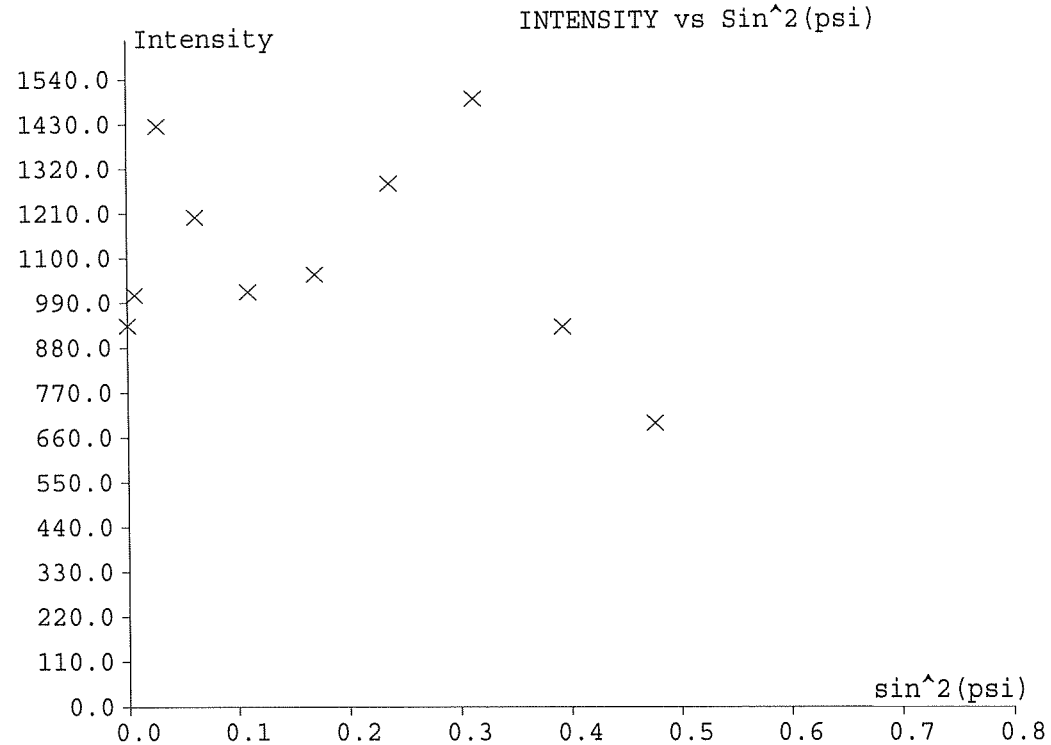
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | - | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00005 | 147.69 | 933.5 | 4.66 | 0.26554 | | 160.83 | 0.781191 | 0.000070 |
| 5.0 | 0.00667 | 144.28 | 1009.3 | 4.90 | 0.26315 | | 160.63 | 0.781419 | 0.000059 |
| 10.0 | 0.02801 | 146.01 | 1425.4 | 4.67 | 0.26423 | | 160.73 | 0.781303 | 0.000056 |
| 15.0 | 0.06230 | 152.30 | 1200.8 | 4.84 | 0.26948 | | 161.09 | 0.780886 | 0.000066 |
| 20.0 | 0.10982 | 155.77 | 1016.1 | 4.74 | 0.27208 | | 161.29 | 0.780659 | 0.000050 |
| 25.0 | 0.17034 | 154.95 | 1058.4 | 4.40 | 0.26996 | | 161.25 | 0.780711 | 0.000048 |
| 30.0 | 0.23712 | 163.10 | 1281.9 | 4.69 | 0.27783 | | 161.72 | 0.780187 | 0.000048 |
| 35.0 | 0.31340 | 166.38 | 1488.7 | 4.25 | 0.27835 | | 161.91 | 0.779977 | 0.000034 |
| 40.0 | 0.39291 | 174.18 | 928.4 | 4.36 | 0.28621 | | 162.37 | 0.779491 | 0.000051 |
| 45.0 | 0.47636 | 180.03 | 693.0 | 4.61 | 0.29268 | | 162.71 | 0.779133 | 0.000052 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781310
Slope of Fitted Line...............:     -0.004532
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -46.2 KSI    -318.7 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.7 MPa
Probable error.................(+/-):      2.6 KSI      17.8 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7684.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 14 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -46.2 KSI | -318.7 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.7 MPa |
| Probable error.....(+/-): | 2.6 KSI | 17.8 MPa |



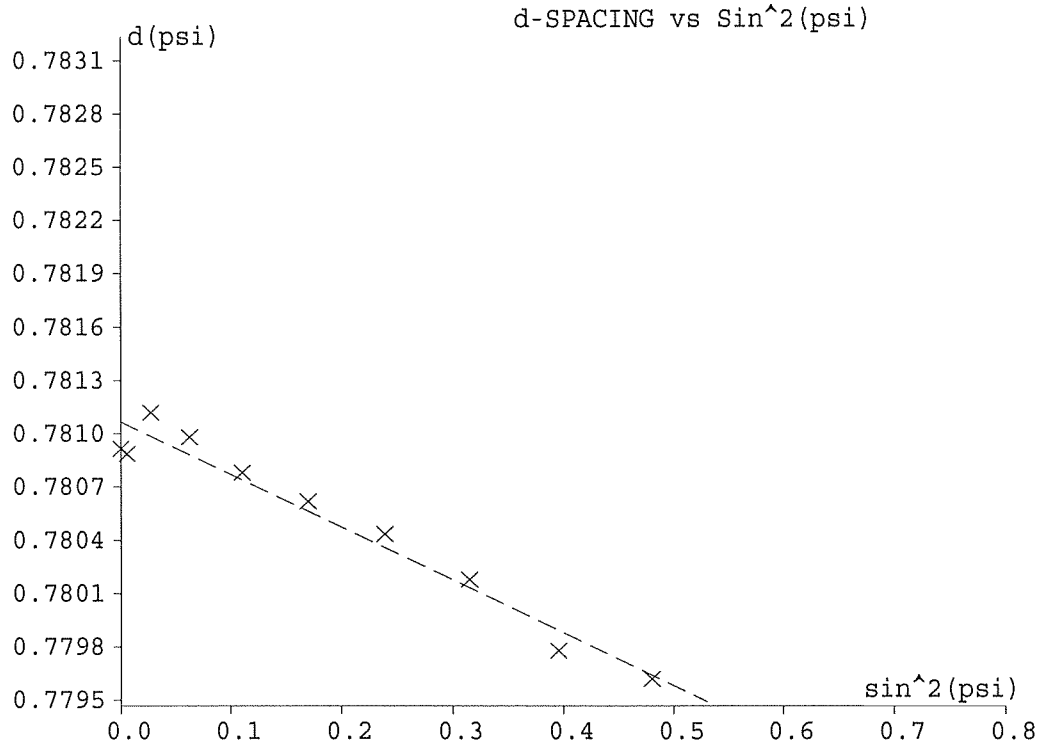
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7685.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 14 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   2:07pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

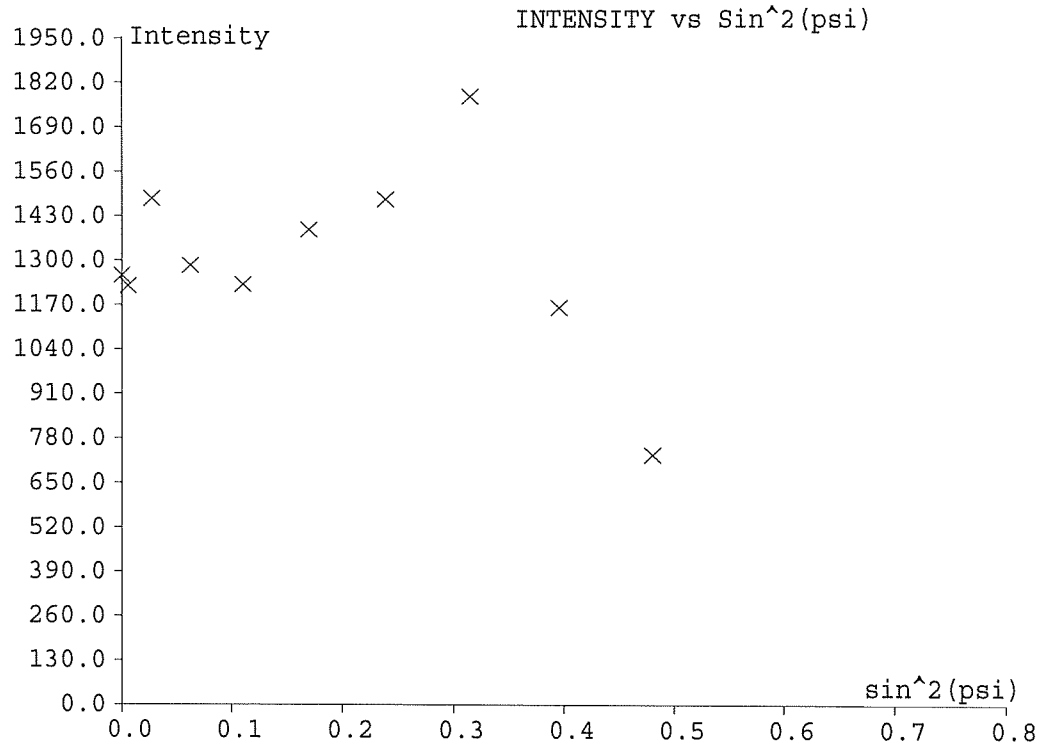
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00009 | 151.85 | 1256.1 | 4.53 | 0.26841 | 161.07 | 0.780915 | 0.000063 |
| 5.0 | 0.00603 | 152.30 | 1224.9 | 5.01 | 0.26976 | 161.09 | 0.780887 | 0.000079 |
| 10.0 | 0.02756 | 148.73 | 1481.4 | 4.38 | 0.26501 | 160.89 | 0.781120 | 0.000041 |
| 15.0 | 0.06265 | 150.86 | 1285.1 | 4.54 | 0.26769 | 161.01 | 0.780981 | 0.000043 |
| 20.0 | 0.11041 | 153.87 | 1229.2 | 4.21 | 0.26791 | 161.19 | 0.780780 | 0.000057 |
| 25.0 | 0.16979 | 156.36 | 1389.1 | 4.16 | 0.26956 | 161.33 | 0.780617 | 0.000043 |
| 30.0 | 0.23878 | 159.22 | 1476.8 | 4.29 | 0.27255 | 161.50 | 0.780434 | 0.000040 |
| 35.0 | 0.31489 | 163.20 | 1777.0 | 4.04 | 0.27430 | 161.73 | 0.780177 | 0.000037 |
| 40.0 | 0.39522 | 169.51 | 1160.9 | 4.13 | 0.28060 | 162.10 | 0.779779 | 0.000048 |
| 45.0 | 0.48040 | 172.11 | 730.8 | 4.40 | 0.28451 | 162.25 | 0.779619 | 0.000048 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781068
Slope of Fitted Line...............:     -0.002972
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -30.3 KSI    -209.1 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.3 MPa
Probable error.................(+/-):      2.3 KSI      15.6 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7685.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 14 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -30.3 KSI | -209.1 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.3 MPa |
| Probable error.....(+/-): | 2.3 KSI | 15.6 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7686.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 14 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time: 10/28/2005 2:12pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 20.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A 1.99867E-07 B -7.91049E-05 C 0.0688651 D 148.0028

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00013 | 155.71 | 1434.7 | 4.59 | 0.27176 | 161.29 | 0.780663 | 0.000049 |
| 5.0 | 0.00605 | 151.99 | 1288.1 | 4.49 | 0.26825 | 161.08 | 0.780905 | 0.000045 |
| 10.0 | 0.02709 | 151.60 | 1265.8 | 4.28 | 0.26662 | 161.05 | 0.780930 | 0.000040 |
| 15.0 | 0.06205 | 153.29 | 1456.6 | 4.31 | 0.26808 | 161.15 | 0.780819 | 0.000048 |
| 20.0 | 0.10960 | 156.42 | 1235.2 | 4.20 | 0.26985 | 161.33 | 0.780614 | 0.000045 |
| 25.0 | 0.16964 | 156.76 | 1388.3 | 4.11 | 0.26967 | 161.35 | 0.780592 | 0.000053 |
| 30.0 | 0.23842 | 160.03 | 1609.1 | 4.02 | 0.27175 | 161.54 | 0.780380 | 0.000039 |
| 35.0 | 0.31518 | 162.57 | 1849.5 | 3.97 | 0.27350 | 161.69 | 0.780217 | 0.000030 |
| 40.0 | 0.39700 | 165.95 | 1110.0 | 4.26 | 0.27803 | 161.89 | 0.780004 | 0.000045 |
| 45.0 | 0.48430 | 164.42 | 771.8 | 4.16 | 0.27601 | 161.80 | 0.780100 | 0.000048 |

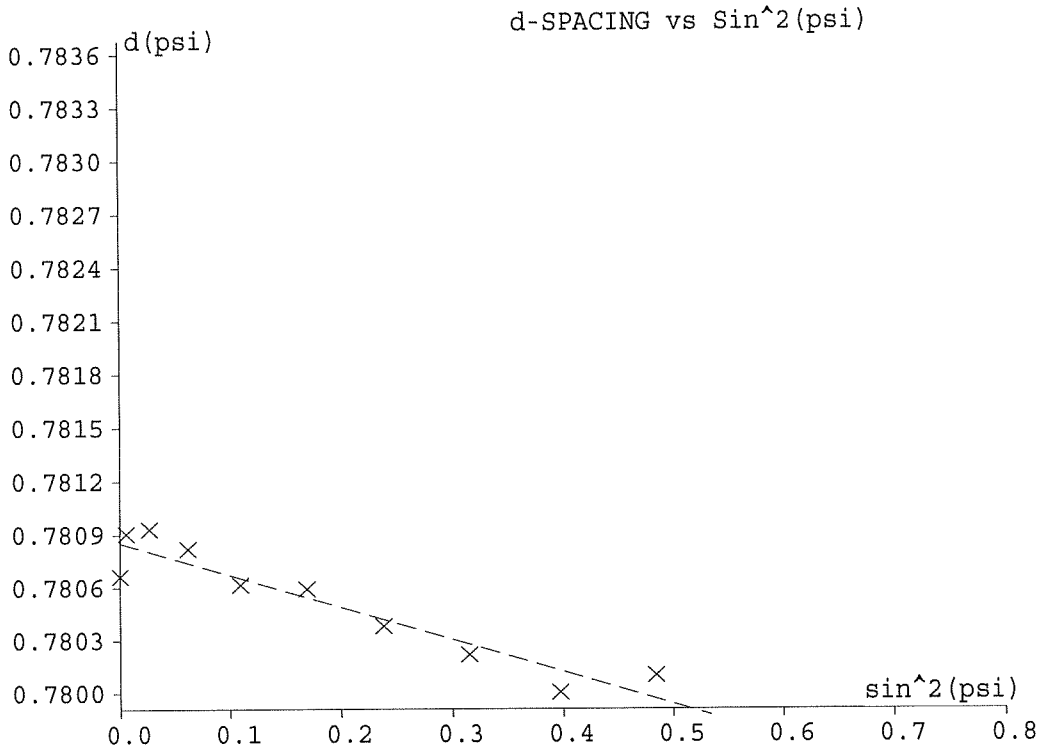
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780853
Slope of Fitted Line.....: -0.001829
Material Stress Constant.....: 1.255E-07

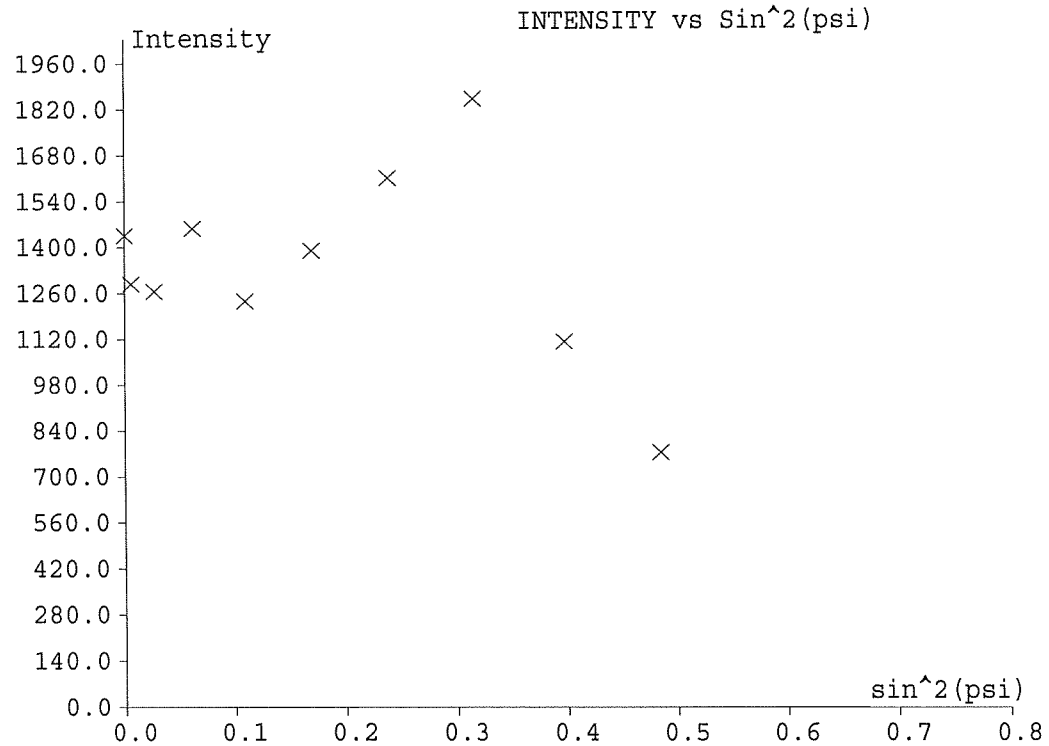
*Residual Stress.....: -18.7 KSI -128.6 MPa

Counting Statistics Stress Error (+/-): 0.9 KSI 6.2 MPa
Probable error.....(+/-): 2.3 KSI 15.5 MPa

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7686.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 14 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -18.7 KSI | -128.6 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.2 MPa |
| Probable error.....(+/-): | 2.3 KSI | 15.5 MPa |



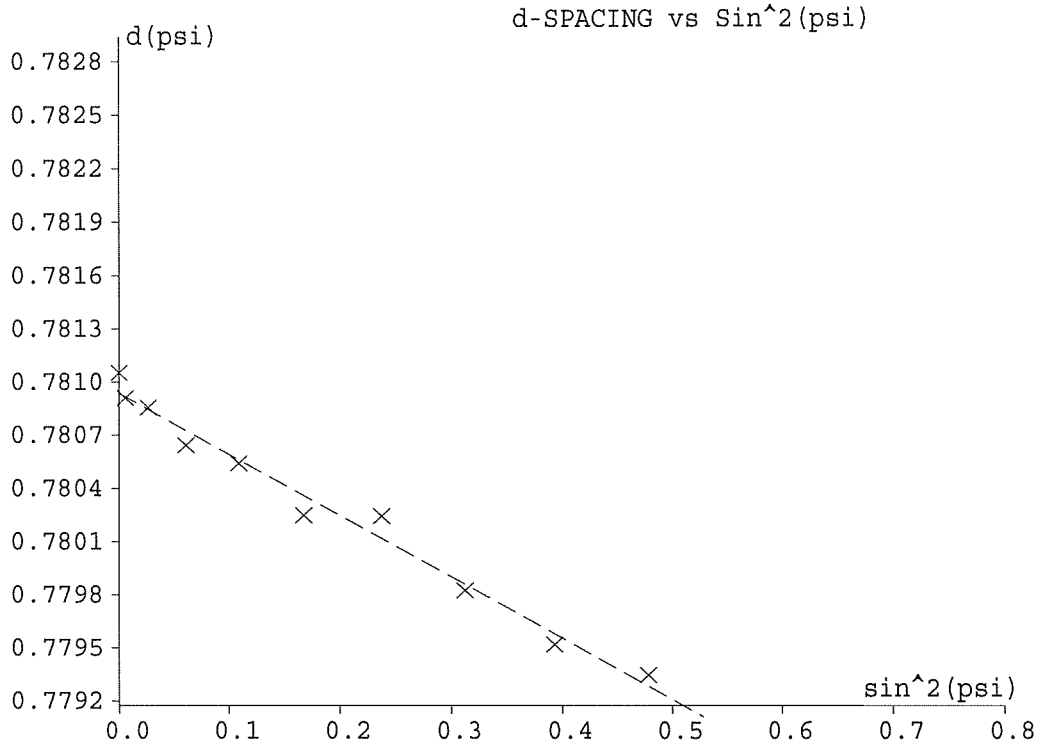
```
================================== TEC Stress Analyzer v1.64 ====================
============================ Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7681.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 15 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   1:43pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

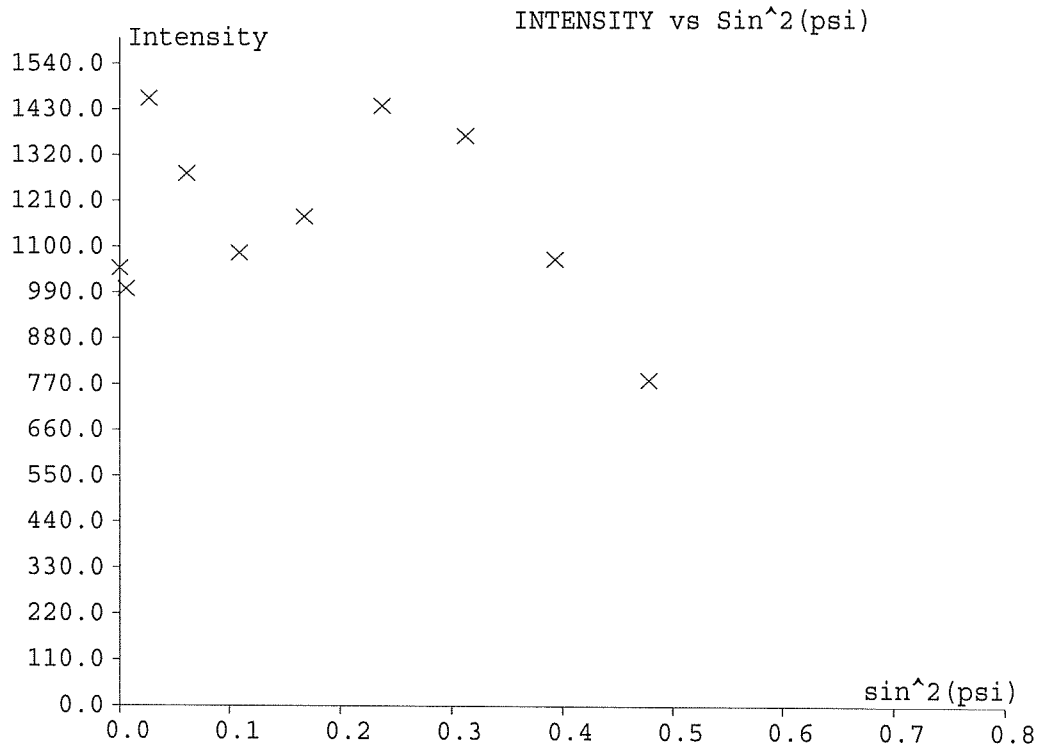
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00007 | 149.79 | 1048.7 | 5.09 | 0.26786 | 160.95 | 0.781052 | 0.000107 |
| 5.0 | 0.00606 | 151.95 | 998.4 | 4.94 | 0.26938 | 161.07 | 0.780910 | 0.000060 |
| 10.0 | 0.02690 | 152.77 | 1455.9 | 4.86 | 0.26989 | 161.12 | 0.780856 | 0.000060 |
| 15.0 | 0.06139 | 156.03 | 1275.5 | 4.57 | 0.27192 | 161.31 | 0.780642 | 0.000044 |
| 20.0 | 0.10923 | 157.62 | 1084.5 | 4.96 | 0.27396 | 161.40 | 0.780540 | 0.000070 |
| 25.0 | 0.16761 | 162.16 | 1171.0 | 4.86 | 0.27740 | 161.66 | 0.780247 | 0.000066 |
| 30.0 | 0.23749 | 162.22 | 1436.7 | 4.33 | 0.27516 | 161.67 | 0.780242 | 0.000050 |
| 35.0 | 0.31225 | 168.84 | 1364.8 | 4.41 | 0.28163 | 162.06 | 0.779823 | 0.000039 |
| 40.0 | 0.39314 | 173.72 | 1068.3 | 4.30 | 0.28545 | 162.34 | 0.779519 | 0.000047 |
| 45.0 | 0.47815 | 176.51 | 779.0 | 4.32 | 0.28815 | 162.50 | 0.779347 | 0.000050 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780937
Slope of Fitted Line...............:     -0.003457
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -35.3 KSI    -243.2 MPa

Counting Statistics Stress Error (+/-):      1.2 KSI       8.4 MPa
Probable error.................(+/-):      1.7 KSI      11.7 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7681.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 15 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -35.3 KSI | -243.2 MPa |
| Counting Statistics Stress Error (+/-): | 1.2 KSI | 8.4 MPa |
| Probable error.....(+/-): | 1.7 KSI | 11.7 MPa |

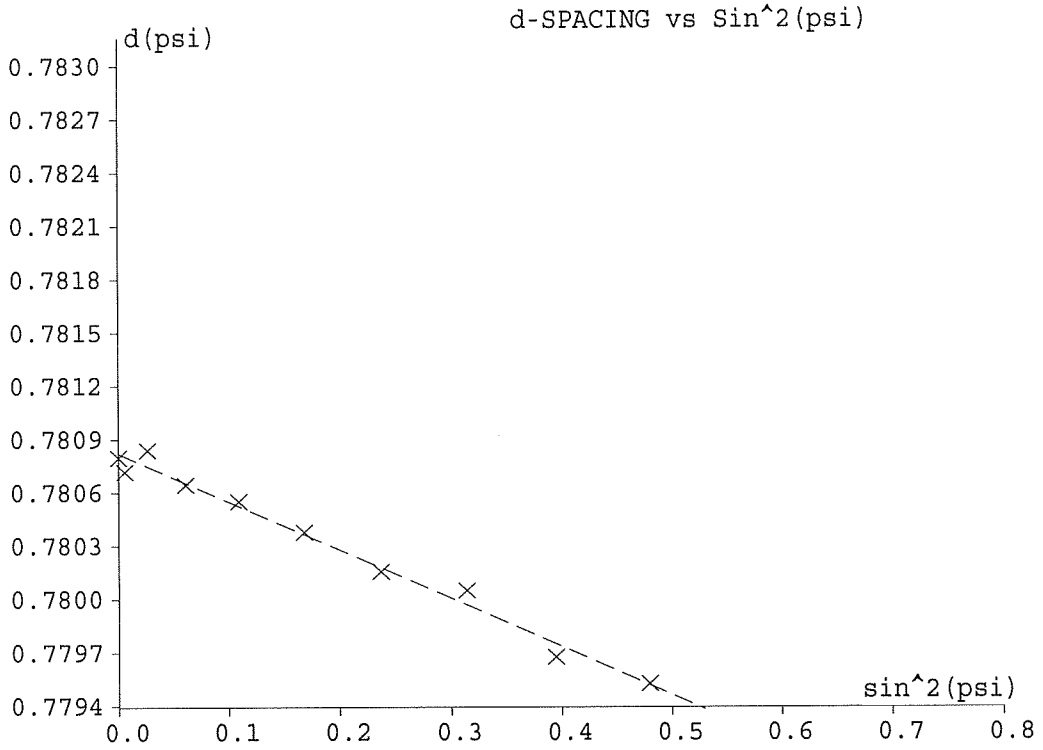


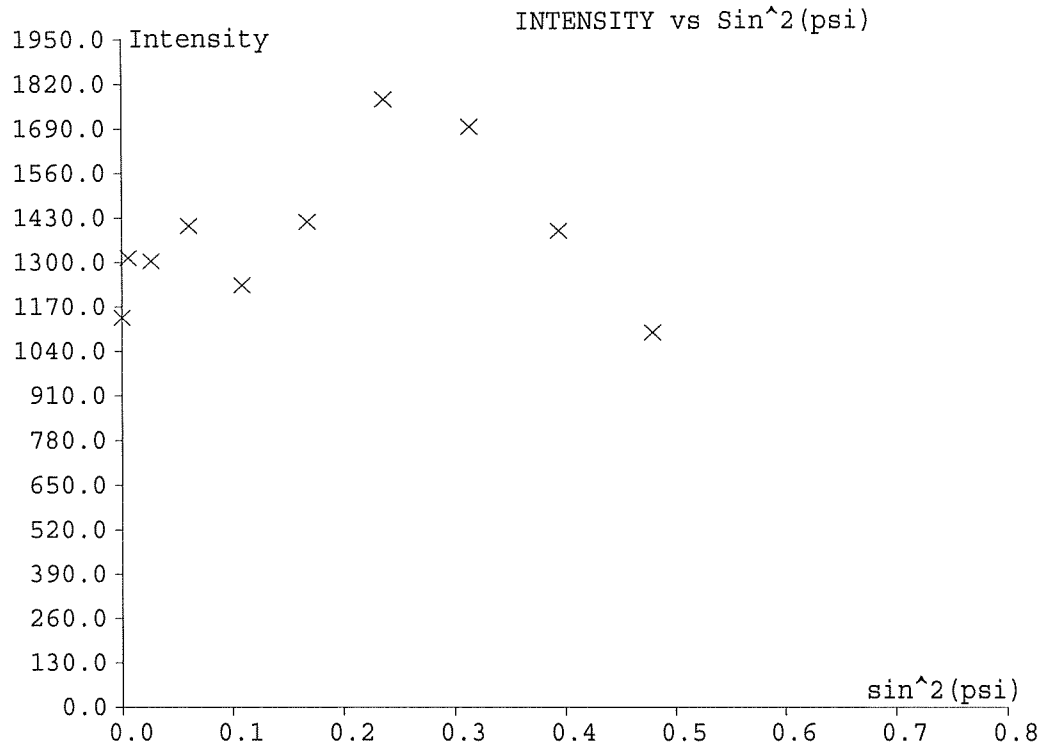



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7682.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 15 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   1:49pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00010   153.67   1138.2   4.79  0.27048    161.17  0.780797  0.000074
  5.0  0.00583   154.87   1312.7   4.61  0.27114    161.24  0.780718  0.000062
 10.0  0.02686   153.01   1303.6   4.44  0.26871    161.14  0.780838  0.000052
 15.0  0.06139   155.98   1406.0   4.33  0.27030    161.31  0.780644  0.000047
 20.0  0.10928   157.44   1232.3   4.43  0.27215    161.39  0.780549  0.000040
 25.0  0.16838   160.11   1417.1   4.30  0.27333    161.55  0.780376  0.000044
 30.0  0.23689   163.58   1773.7   4.26  0.27581    161.75  0.780154  0.000034
 35.0  0.31393   165.28   1693.9   4.39  0.27826    161.85  0.780047  0.000045
 40.0  0.39439   171.19   1389.4   4.19  0.28249    162.19  0.779675  0.000035
 45.0  0.47963   173.62   1091.9   4.30  0.28540    162.34  0.779525  0.000039

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780820
Slope of Fitted Line...............:     -0.002716
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -27.7 KSI    -191.1 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       6.7 MPa
Probable error.................(+/-):      1.2 KSI       8.4 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7682.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 15 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -27.7 KSI | -191.1 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 6.7 MPa |
| Probable error.....(+/-): | 1.2 KSI | 8.4 MPa |

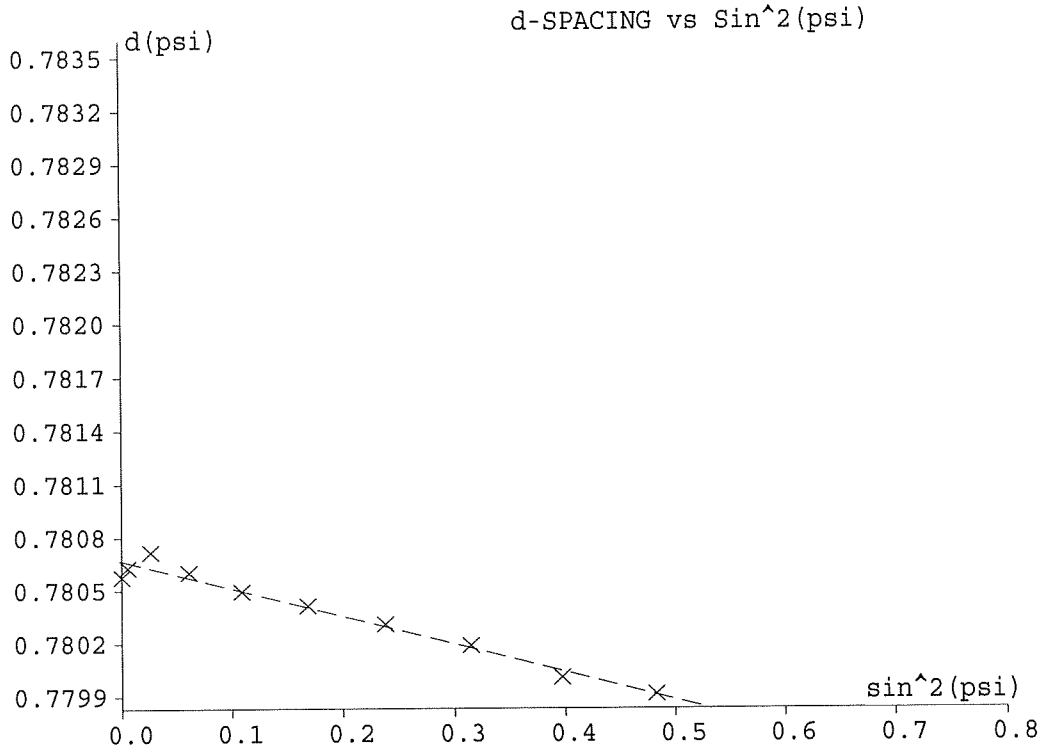


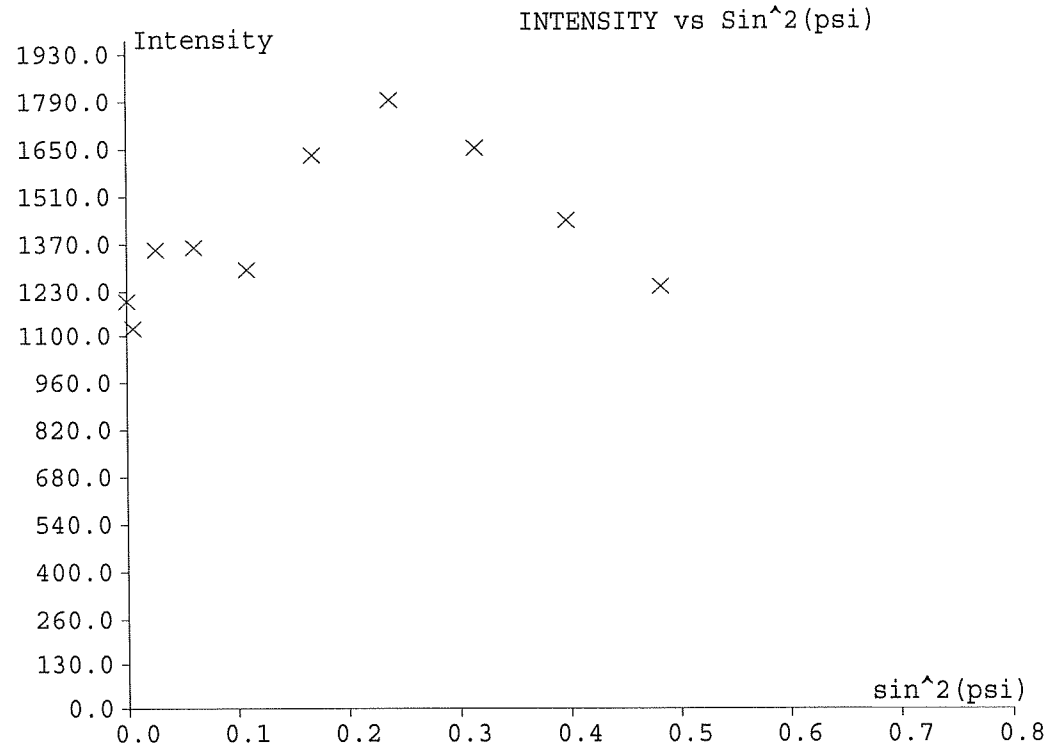



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7683.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 15 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   1:55pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00014   157.02   1202.0   4.31  0.27097    161.37  0.780576  0.000047
  5.0  0.00572   156.21   1121.8   4.37  0.27075    161.32  0.780629  0.000050
 10.0  0.02656   154.83   1354.6   4.28  0.26908    161.24  0.780718  0.000037
 15.0  0.06124   156.57   1361.3   3.89  0.26851    161.34  0.780603  0.000044
 20.0  0.10901   158.28   1294.7   4.23  0.27146    161.44  0.780493  0.000038
 25.0  0.16859   159.52   1630.8   4.07  0.27161    161.51  0.780413  0.000038
 30.0  0.23793   161.15   1792.8   3.95  0.27229    161.61  0.780308  0.000026
 35.0  0.31496   163.05   1651.5   3.99  0.27396    161.72  0.780186  0.000032
 40.0  0.39702   165.91   1437.2   4.21  0.27765    161.89  0.780006  0.000032
 45.0  0.48279   167.36   1242.8   3.89  0.27740    161.97  0.779913  0.000030

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780668
Slope of Fitted Line...............:     -0.001574
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -16.1 KSI    -110.7 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       5.1 MPa
Probable error.................(+/-):      1.0 KSI       6.9 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7683.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 15 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -16.1 KSI | -110.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 5.1 MPa |
| Probable error.....(+/-): | 1.0 KSI | 6.9 MPa |

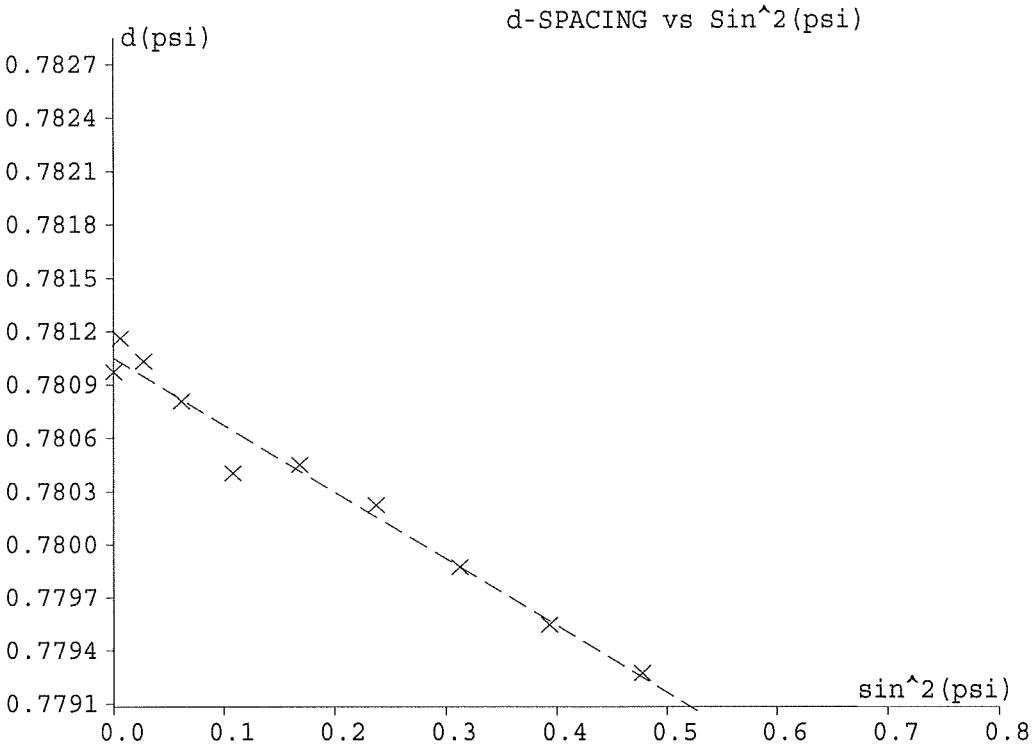


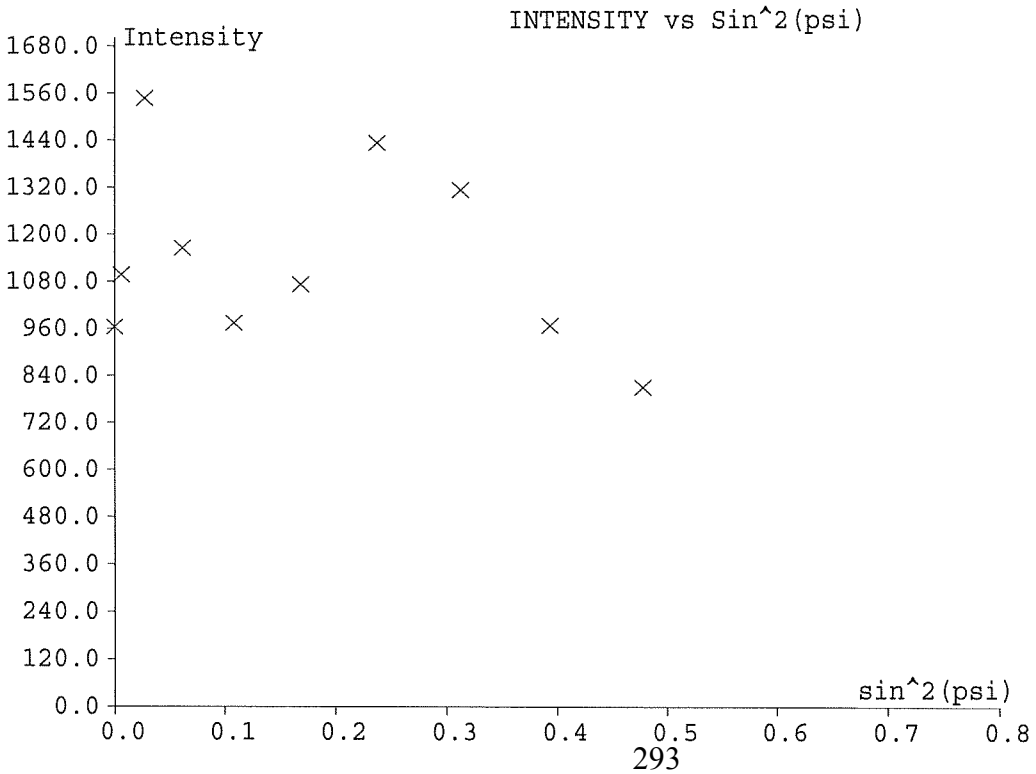



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7678.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 16 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   1:25pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00008   150.98    963.6   4.67  0.26815    161.02  0.780973  0.000073
  5.0  0.00636   148.12   1097.3   4.80  0.26610    160.85  0.781163  0.000065
 10.0  0.02734   150.08   1547.1   4.53  0.26701    160.96  0.781032  0.000048
 15.0  0.06200   153.50   1164.2   4.59  0.27002    161.16  0.780807  0.000070
 20.0  0.10857   159.71    973.8   4.76  0.27524    161.52  0.780405  0.000057
 25.0  0.16881   158.99   1071.6   4.64  0.27446    161.48  0.780450  0.000064
 30.0  0.23736   162.52   1432.1   4.46  0.27631    161.69  0.780223  0.000041
 35.0  0.31261   168.05   1311.1   4.32  0.28033    162.01  0.779872  0.000046
 40.0  0.39335   173.29    966.5   4.44  0.28581    162.32  0.779546  0.000045
 45.0  0.47755   177.71    808.6   4.52  0.29015    162.57  0.779274  0.000070

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781050
Slope of Fitted Line...............:     -0.003765
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -38.4 KSI    -264.8 MPa

Counting Statistics Stress Error (+/-):      1.2 KSI       8.6 MPa
Probable error.................(+/-):      2.2 KSI      15.0 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7678.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 16 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -38.4 KSI | -264.8 MPa |
| Counting Statistics Stress Error (+/-): | 1.2 KSI | 8.6 MPa |
| Probable error.....(+/-): | 2.2 KSI | 15.0 MPa |

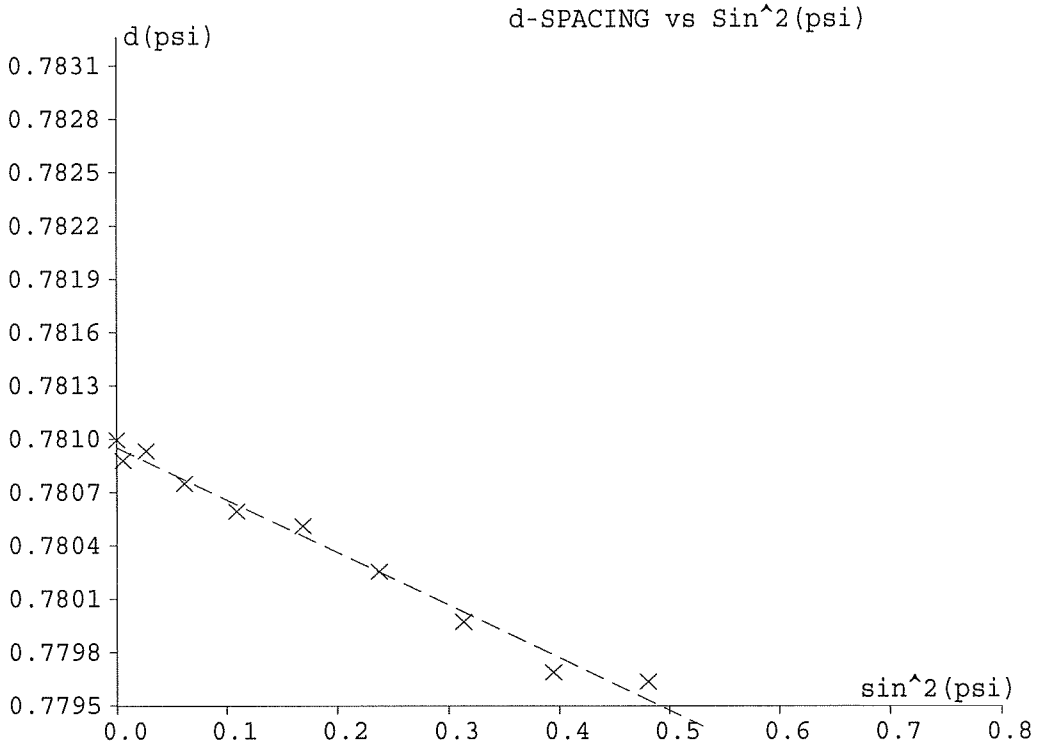


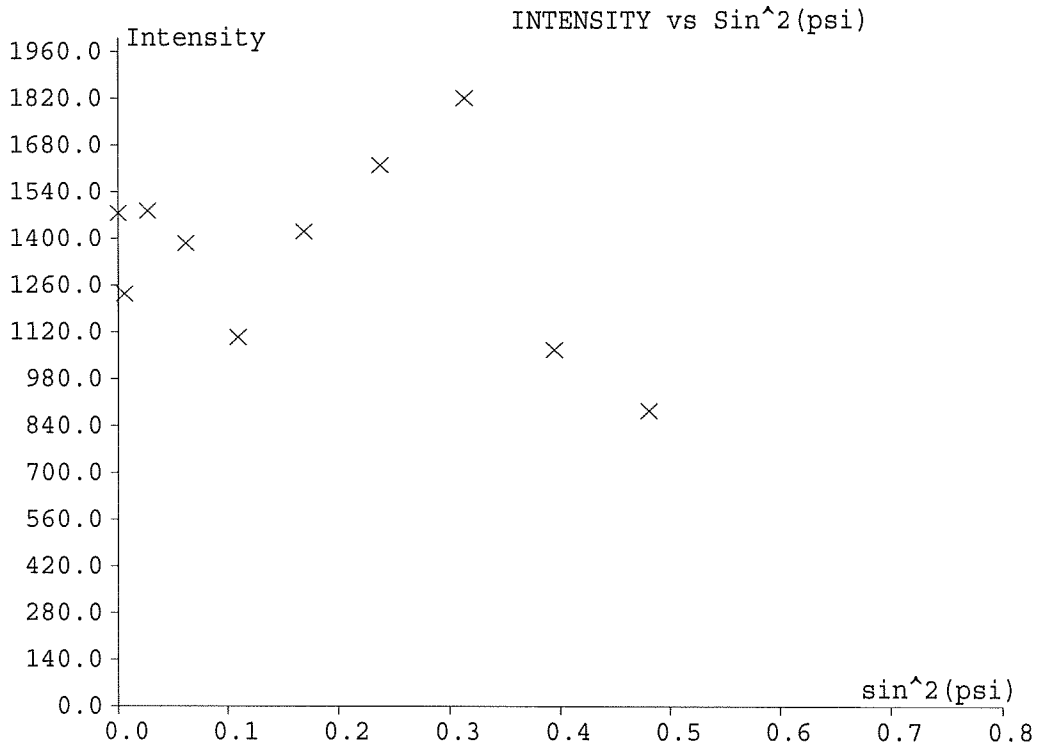



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7679.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 16 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   1:31pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00008   150.64   1475.6   4.45  0.26693    161.00  0.780994  0.000089
  5.0  0.00602   152.42   1233.9   4.72  0.26939    161.10  0.780878  0.000050
 10.0  0.02709   151.58   1482.7   4.35  0.26703    161.05  0.780931  0.000054
 15.0  0.06179   154.40   1385.1   4.65  0.27084    161.21  0.780749  0.000049
 20.0  0.10949   156.81   1103.4   4.64  0.27272    161.35  0.780592  0.000063
 25.0  0.16916   158.06   1420.1   4.28  0.27161    161.43  0.780508  0.000035
 30.0  0.23755   162.05   1618.6   4.28  0.27471    161.66  0.780251  0.000035
 35.0  0.31335   166.46   1818.7   4.01  0.27715    161.92  0.779970  0.000040
 40.0  0.39449   171.00   1065.0   4.29  0.28291    162.18  0.779687  0.000045
 45.0  0.48053   171.86    884.2   4.33  0.28389    162.23  0.779634  0.000049

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780952
Slope of Fitted Line...............:     -0.002957
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -30.2 KSI    -208.0 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.6 MPa
Probable error.................(+/-):      1.4 KSI       9.3 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7679.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 16 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -30.2 KSI | -208.0 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.6 MPa |
| Probable error.....(+/-): | 1.4 KSI | 9.3 MPa |

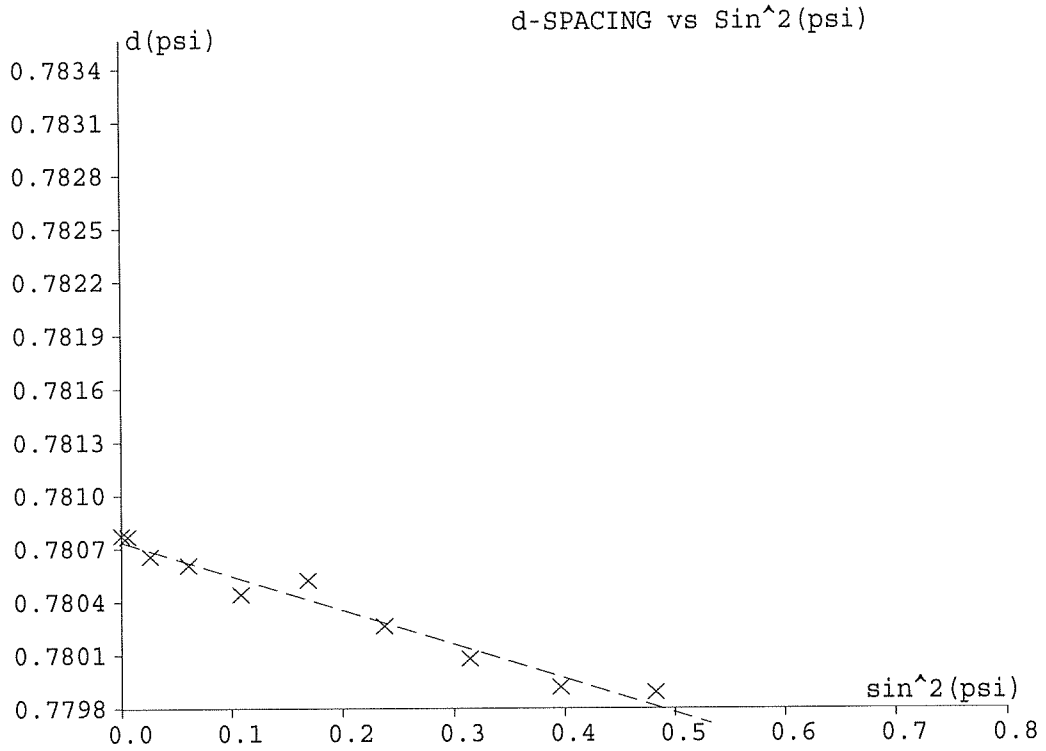


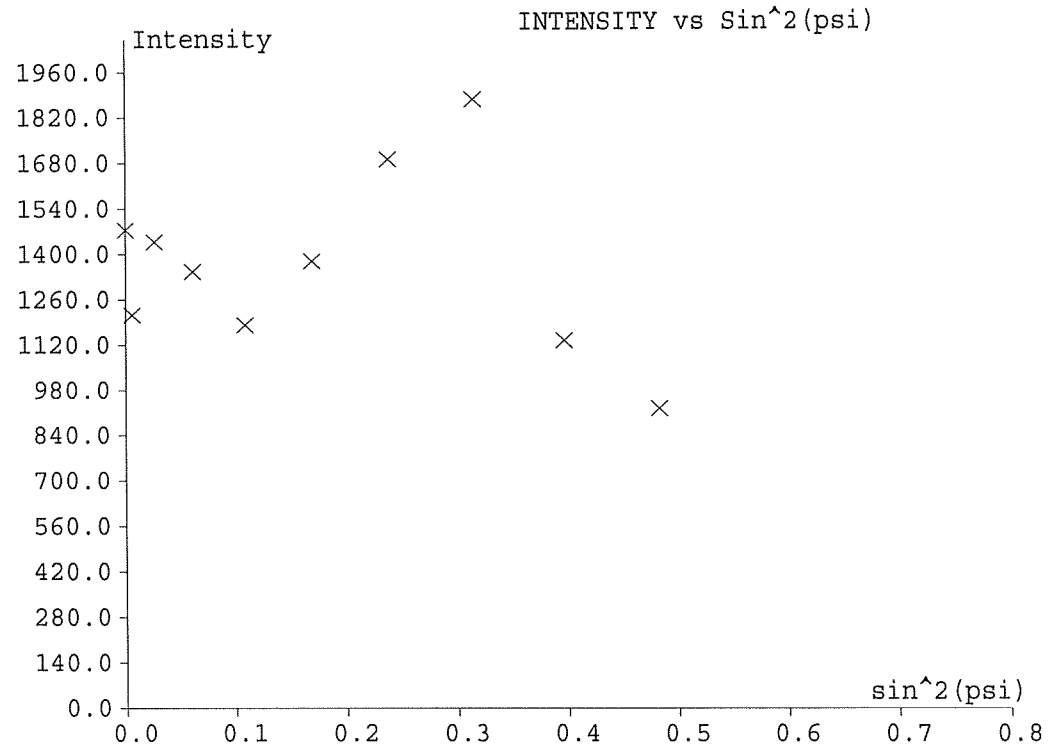



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7680.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 16 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   1:37pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00011   153.99   1474.6   4.35  0.26890    161.19  0.780773  0.000048
  5.0  0.00589   154.07   1212.6   4.40  0.26931    161.20  0.780768  0.000076
 10.0  0.02640   155.81   1437.6   4.49  0.27124    161.30  0.780656  0.000050
 15.0  0.06125   156.57   1346.0   4.36  0.27099    161.34  0.780606  0.000042
 20.0  0.10875   159.11   1180.6   4.42  0.27338    161.49  0.780441  0.000054
 25.0  0.16922   157.85   1377.2   3.83  0.26920    161.42  0.780520  0.000034
 30.0  0.23763   161.86   1690.0   4.09  0.27348    161.65  0.780263  0.000032
 35.0  0.31416   164.74   1873.5   3.85  0.27480    161.82  0.780078  0.000038
 40.0  0.39632   167.33   1131.3   4.38  0.28004    161.97  0.779918  0.000055
 45.0  0.48259   167.79    921.4   4.19  0.27930    162.00  0.779888  0.000038

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780737
Slope of Fitted Line...............:     -0.001921
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -19.6 KSI    -135.2 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       6.8 MPa
Probable error.................(+/-):      1.3 KSI       9.2 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7680.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 16 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -19.6 KSI | -135.2 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 6.8 MPa |
| Probable error.....(+/-): | 1.3 KSI | 9.2 MPa |



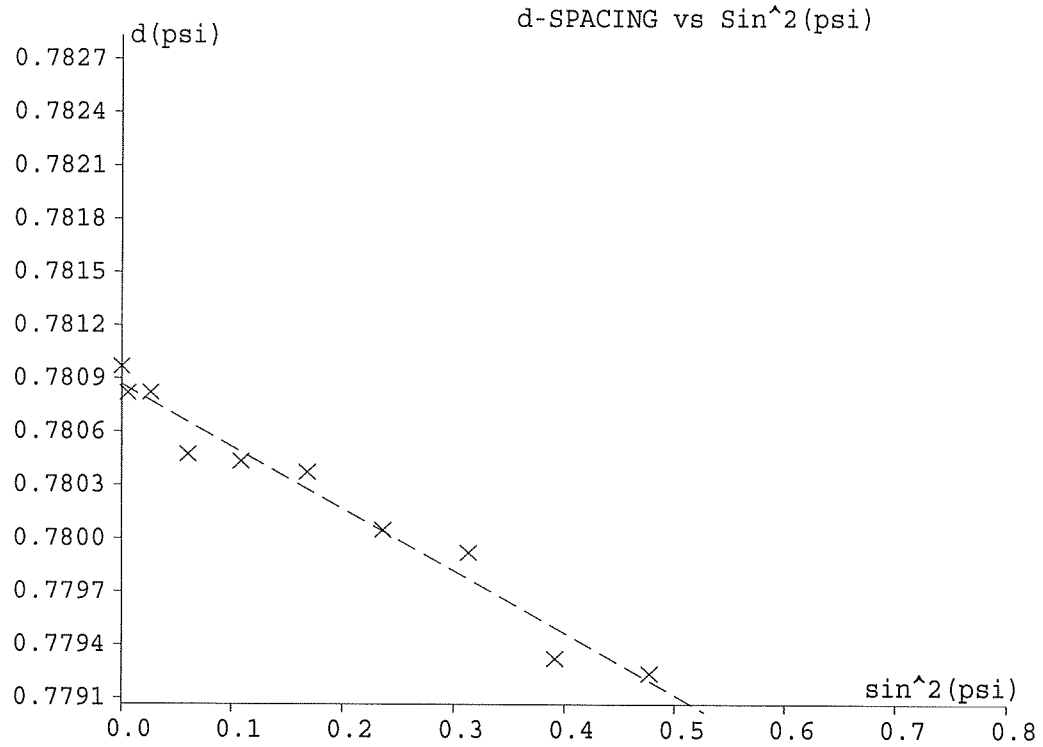
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7675.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 17 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   1:05pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

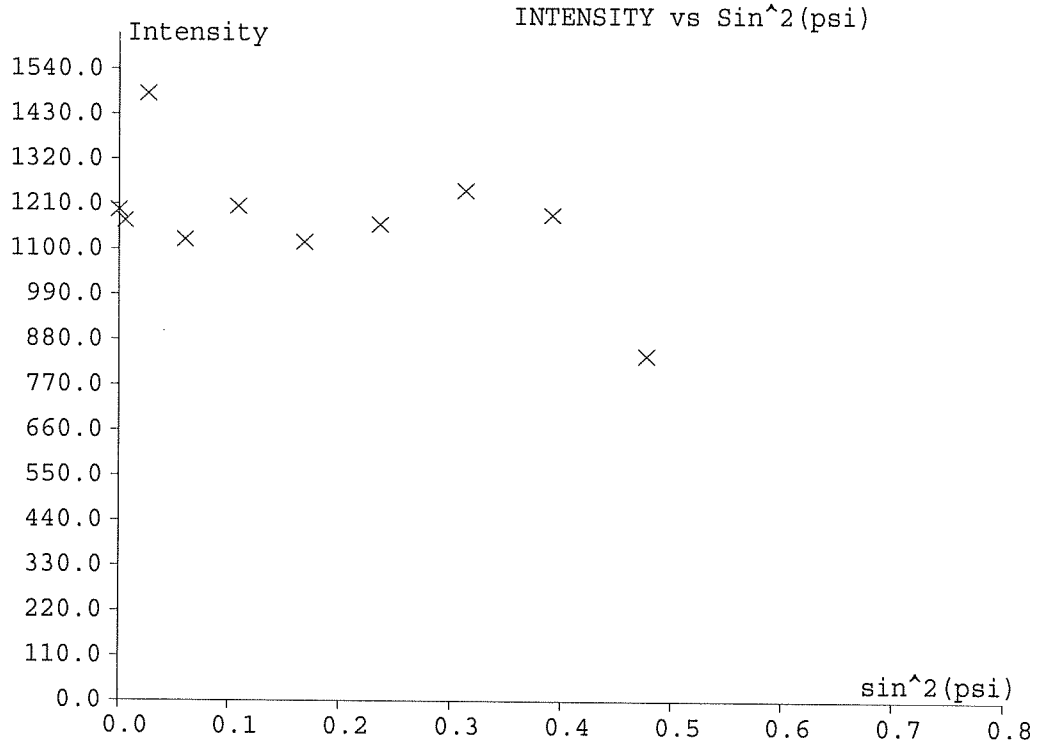
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00008 | 151.08 | 1195.8 | 4.85 | 0.26852 | 161.02 | 0.780967 | 0.000071 |
| 5.0 | 0.00595 | 153.33 | 1169.3 | 4.83 | 0.27028 | 161.15 | 0.780819 | 0.000052 |
| 10.0 | 0.02681 | 153.31 | 1479.5 | 4.85 | 0.27031 | 161.15 | 0.780820 | 0.000062 |
| 15.0 | 0.06076 | 158.62 | 1122.8 | 4.73 | 0.27433 | 161.46 | 0.780475 | 0.000053 |
| 20.0 | 0.10872 | 159.25 | 1203.3 | 4.56 | 0.27437 | 161.50 | 0.780434 | 0.000067 |
| 25.0 | 0.16836 | 160.19 | 1116.3 | 4.63 | 0.27539 | 161.55 | 0.780374 | 0.000072 |
| 30.0 | 0.23617 | 165.28 | 1159.2 | 4.61 | 0.27959 | 161.85 | 0.780048 | 0.000050 |
| 35.0 | 0.31298 | 167.31 | 1241.9 | 4.58 | 0.28126 | 161.97 | 0.779920 | 0.000057 |
| 40.0 | 0.39156 | 176.86 | 1182.4 | 4.31 | 0.28841 | 162.53 | 0.779325 | 0.000052 |
| 45.0 | 0.47726 | 178.27 | 840.0 | 4.57 | 0.29091 | 162.61 | 0.779240 | 0.000046 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780868
Slope of Fitted Line...............:     -0.003499
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -35.7 KSI    -246.2 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.5 MPa
Probable error.................(+/-):      2.4 KSI      16.3 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7675.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 17 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -35.7 KSI | -246.2 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.5 MPa |
| Probable error.....(+/-): | 2.4 KSI | 16.3 MPa |

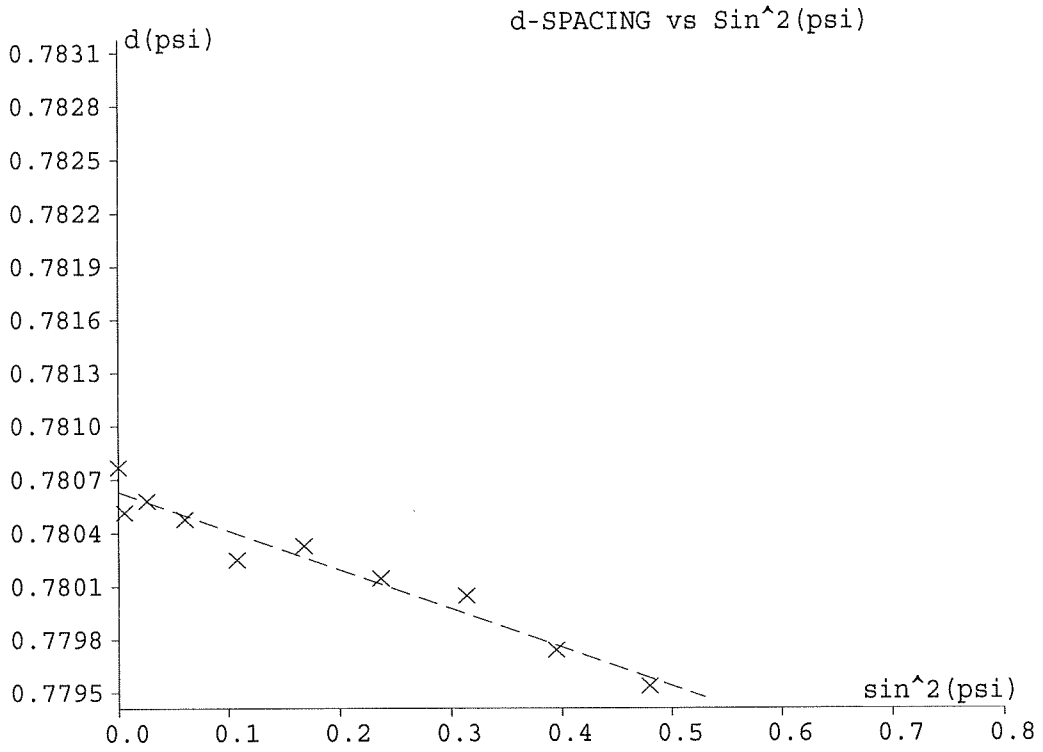


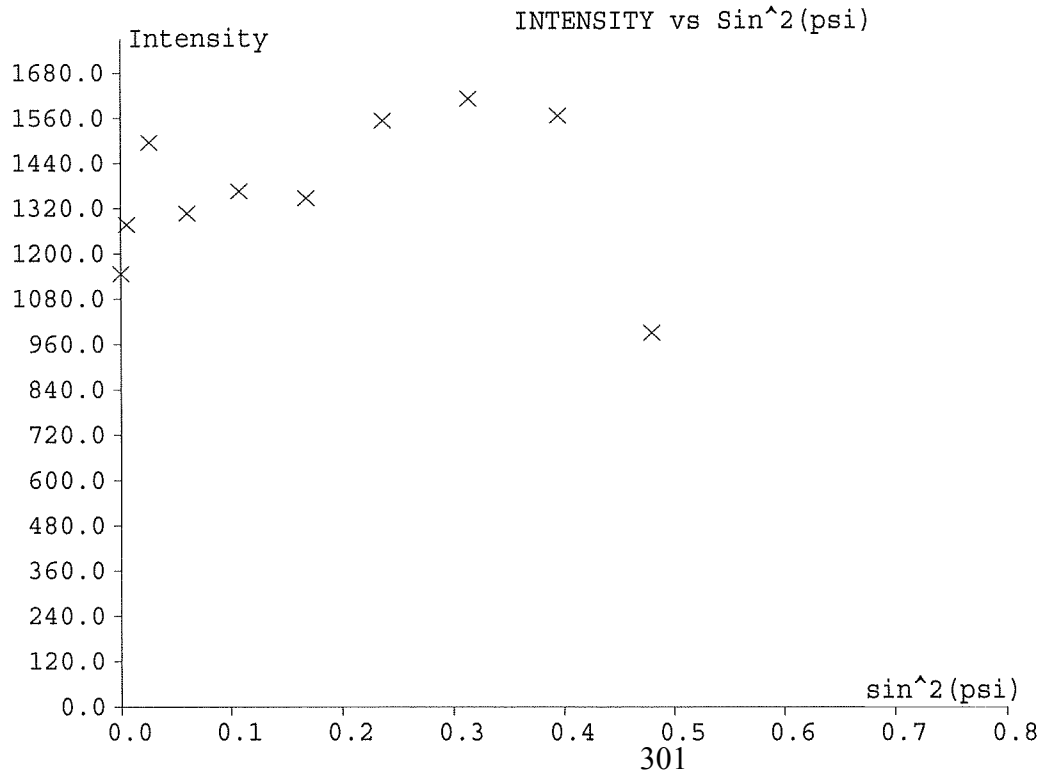



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7676.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 17 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   1:12pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00011   154.10   1146.3   4.64  0.27058    161.20  0.780768  0.000079
  5.0  0.00559   157.99   1277.0   4.62  0.27362    161.42  0.780515  0.000054
 10.0  0.02622   156.97   1495.5   4.61  0.27281    161.36  0.780581  0.000040
 15.0  0.06077   158.57   1306.4   4.87  0.27454    161.46  0.780478  0.000060
 20.0  0.10781   162.12   1365.2   4.71  0.27707    161.66  0.780250  0.000055
 25.0  0.16808   160.87   1347.1   4.13  0.27292    161.59  0.780327  0.000045
 30.0  0.23683   163.73   1552.5   4.32  0.27641    161.76  0.780145  0.000037
 35.0  0.31393   165.26   1609.7   4.32  0.27777    161.85  0.780048  0.000043
 40.0  0.39491   170.14   1563.9   4.15  0.28129    162.13  0.779740  0.000050
 45.0  0.47972   173.46    988.1   4.65  0.28698    162.32  0.779536  0.000057

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780631
Slope of Fitted Line...............:     -0.002185
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -22.3 KSI    -153.8 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.8 MPa
Probable error.................(+/-):      1.9 KSI      12.8 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7676.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 17 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -22.3 KSI | -153.8 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.8 MPa |
| Probable error.....(+/-): | 1.9 KSI | 12.8 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7677.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 17 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time: 10/28/2005 1:17pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 20.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A 1.99867E-07 B -7.91049E-05 C 0.0688651 D 148.0028

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00020 | 161.69 | 1211.8 | 4.67 | 0.27666 | 161.64 | 0.780278 | 0.000045 |
| 5.0 | 0.00538 | 160.86 | 1213.9 | 4.33 | 0.27411 | 161.59 | 0.780329 | 0.000045 |
| 10.0 | 0.02593 | 158.71 | 1252.2 | 4.12 | 0.27122 | 161.47 | 0.780465 | 0.000047 |
| 15.0 | 0.05955 | 163.62 | 1349.0 | 4.45 | 0.27716 | 161.75 | 0.780153 | 0.000050 |
| 20.0 | 0.10748 | 163.16 | 1254.7 | 4.58 | 0.27761 | 161.72 | 0.780183 | 0.000052 |
| 25.0 | 0.16778 | 161.66 | 1343.5 | 4.22 | 0.27401 | 161.64 | 0.780276 | 0.000050 |
| 30.0 | 0.23758 | 161.98 | 1706.4 | 4.12 | 0.27374 | 161.66 | 0.780255 | 0.000033 |
| 35.0 | 0.31472 | 163.56 | 1686.9 | 4.18 | 0.27533 | 161.75 | 0.780154 | 0.000033 |
| 40.0 | 0.39608 | 167.79 | 1601.6 | 3.96 | 0.27812 | 162.00 | 0.779887 | 0.000037 |
| 45.0 | 0.48193 | 169.11 | 1115.0 | 4.37 | 0.28159 | 162.07 | 0.779806 | 0.000065 |

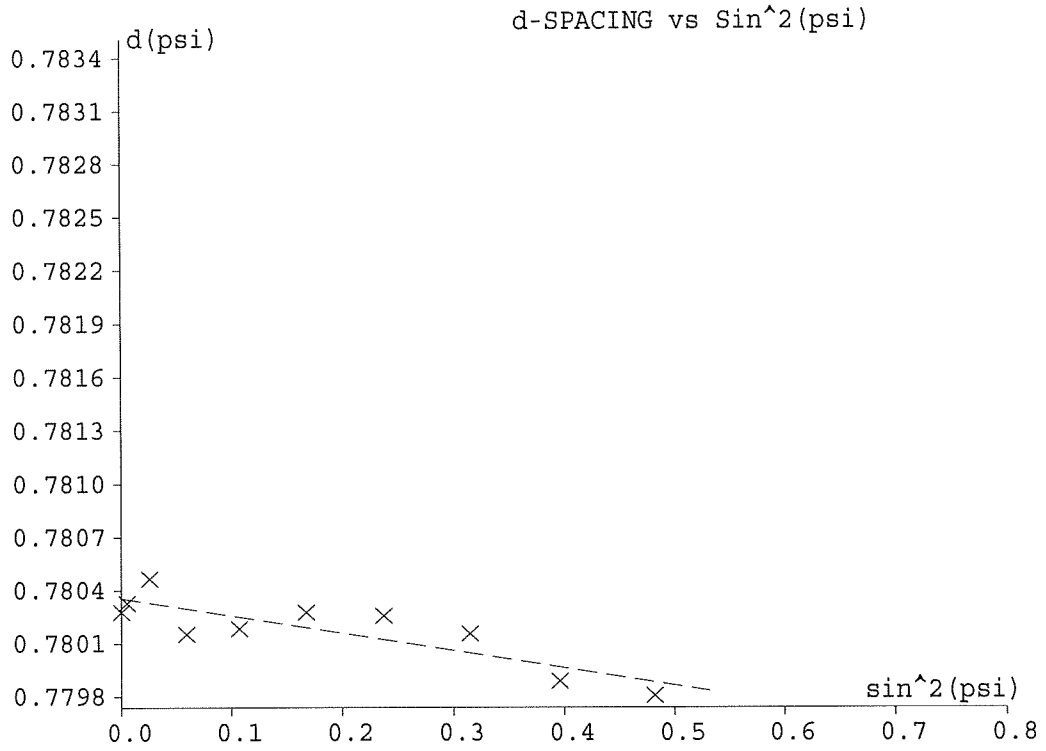
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780355
Slope of Fitted Line.....: -0.0009821
Material Stress Constant.....: 1.255E-07

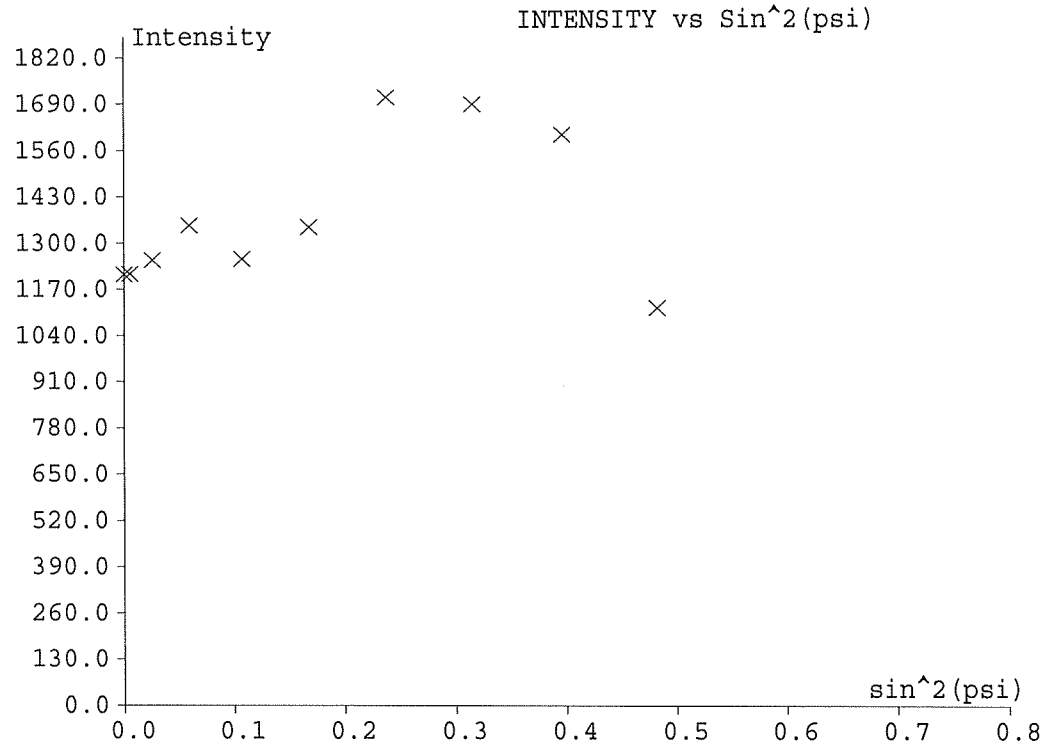
*Residual Stress.....: -10.0 KSI -69.1 MPa

Counting Statistics Stress Error (+/-): 1.0 KSI 7.0 MPa
Probable error.....(+/-): 2.2 KSI 15.2 MPa

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7677.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 17 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -10.0 KSI | -69.1 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 7.0 MPa |
| Probable error.....(+/-): | 2.2 KSI | 15.2 MPa |

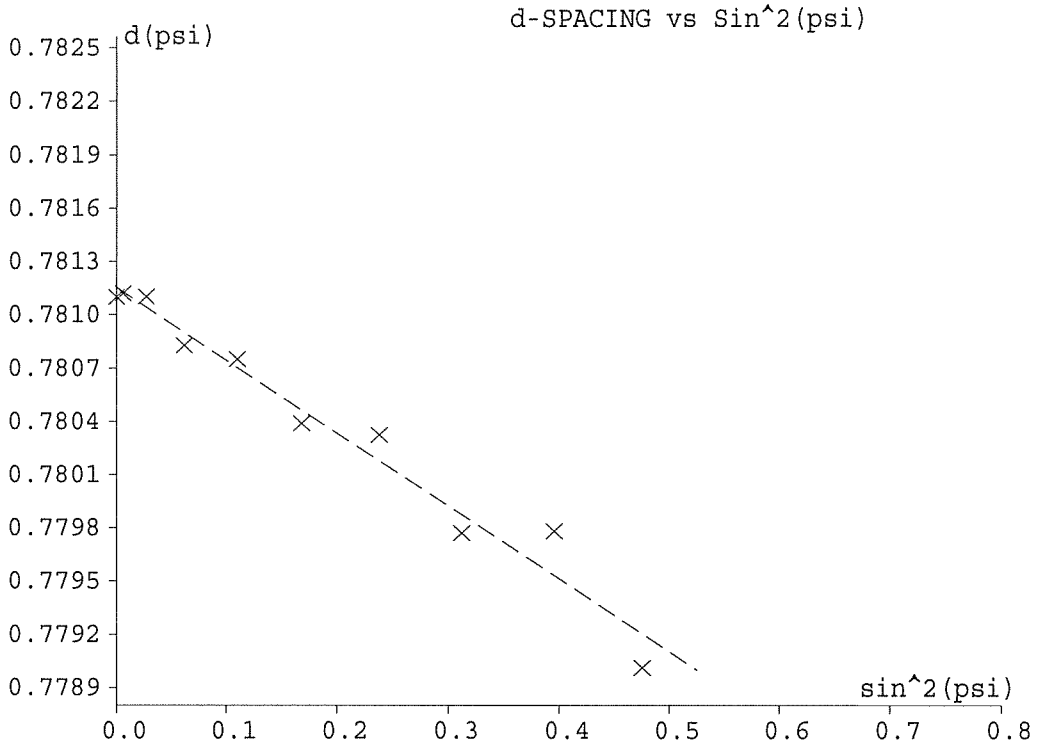


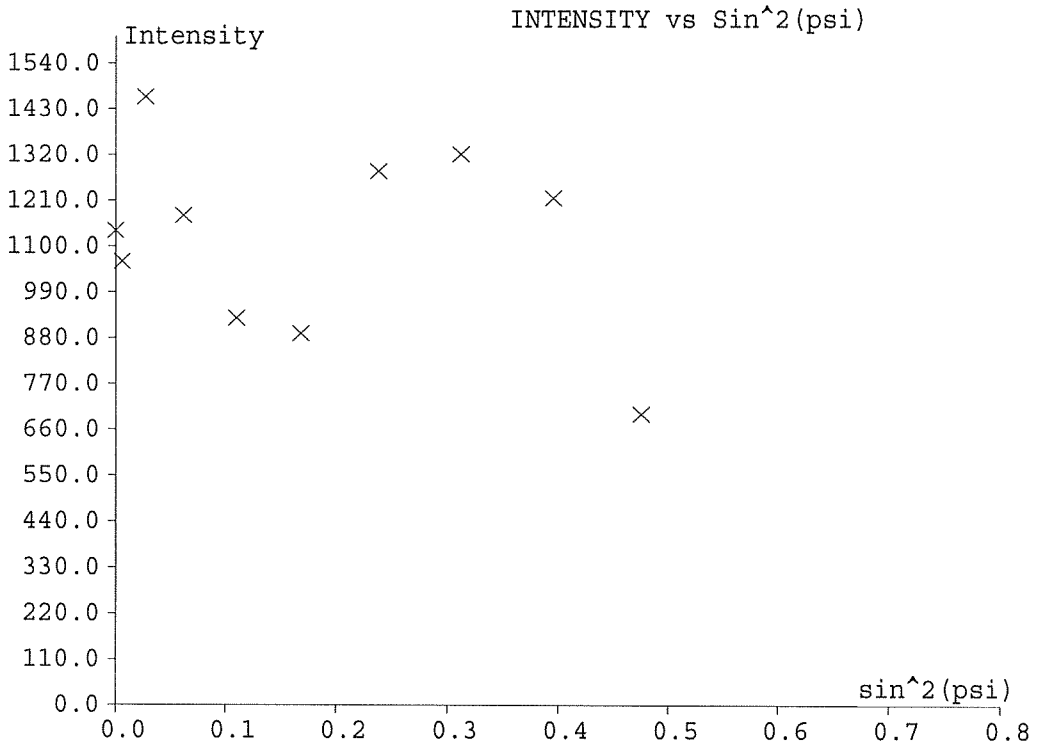



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7672.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 18 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   0:48pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00006   149.05   1137.5   4.68  0.26664    160.90  0.781101  0.000058
  5.0  0.00631   148.74   1063.6   4.37  0.26493    160.89  0.781119  0.000048
 10.0  0.02751   149.02   1459.2   4.36  0.26509    160.90  0.781101  0.000042
 15.0  0.06208   153.16   1173.8   4.30  0.26796    161.14  0.780828  0.000052
 20.0  0.11026   154.38    927.4   4.70  0.27090    161.21  0.780750  0.000076
 25.0  0.16845   159.93    890.7   4.35  0.27354    161.54  0.780388  0.000082
 30.0  0.23804   160.93   1280.1   4.17  0.27317    161.60  0.780323  0.000055
 35.0  0.31185   169.68   1320.7   4.28  0.28163    162.11  0.779770  0.000046
 40.0  0.39524   169.52   1215.4   4.44  0.28241    162.09  0.779781  0.000057
 45.0  0.47534   182.02    696.4   4.58  0.29464    162.83  0.779012  0.000062

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781154
Slope of Fitted Line...............:     -0.004105
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -41.9 KSI    -288.7 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.8 MPa
Probable error.................(+/-):      2.7 KSI      18.9 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7672.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 18 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -41.9 KSI | -288.7 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.8 MPa |
| Probable error.....(+/-): | 2.7 KSI | 18.9 MPa |

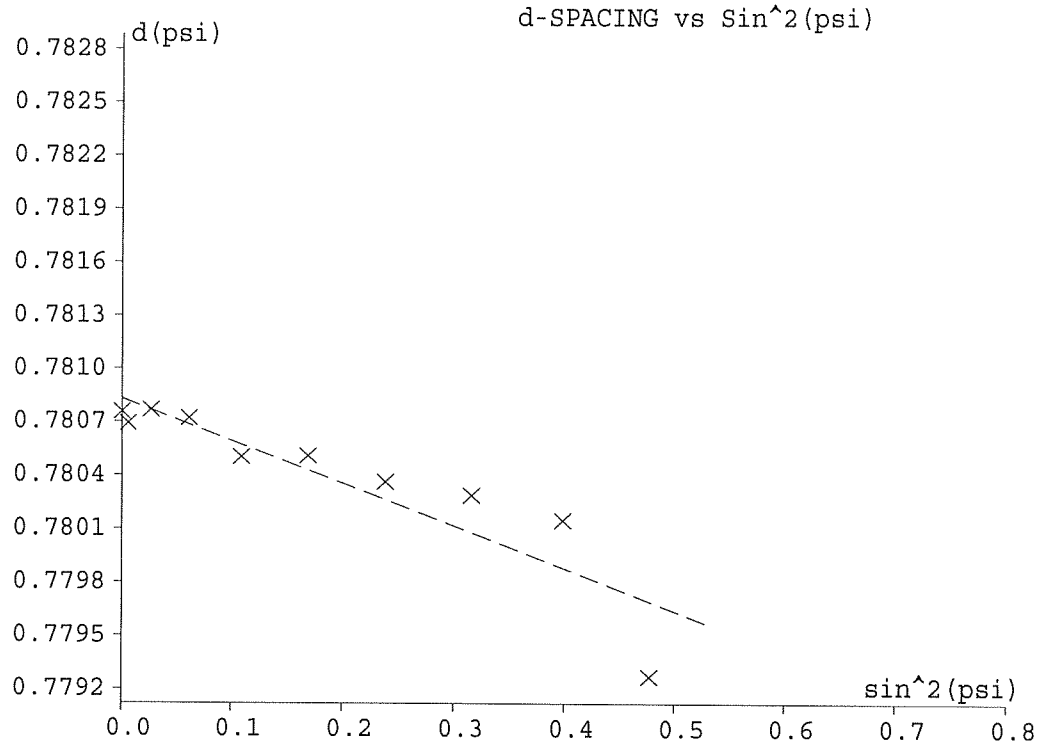


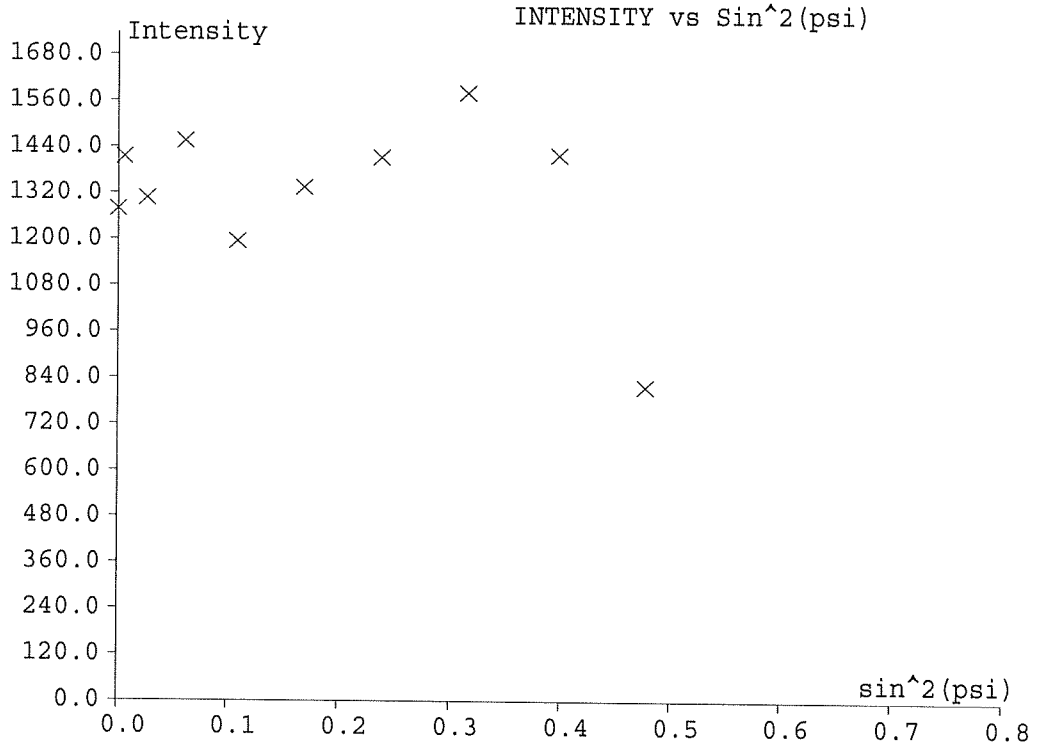



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7673.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 18 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   0:54pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00011   154.26   1278.1   4.57  0.27051    161.21  0.780757  0.000056
  5.0  0.00580   155.26   1413.8   4.53  0.27107    161.26  0.780692  0.000049
 10.0  0.02668   154.09   1306.4   4.44  0.26959    161.20  0.780767  0.000045
 15.0  0.06168   154.76   1455.1   4.12  0.26816    161.24  0.780722  0.000036
 20.0  0.10906   158.13   1194.3   4.20  0.27118    161.43  0.780503  0.000041
 25.0  0.16915   158.05   1334.3   4.19  0.27101    161.43  0.780508  0.000042
 30.0  0.23830   160.31   1411.4   3.99  0.27183    161.56  0.780362  0.000036
 35.0  0.31570   161.48   1578.9   3.96  0.27261    161.63  0.780286  0.000037
 40.0  0.39812   163.68   1417.4   4.14  0.27522    161.76  0.780147  0.000030
 45.0  0.47750   177.80    816.7   4.57  0.29047    162.58  0.779269  0.000053

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780831
Slope of Fitted Line...............:     -0.002383
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -24.3 KSI    -167.7 MPa

Counting Statistics Stress Error (+/-):      0.9 KSI       6.4 MPa
Probable error.................(+/-):      4.1 KSI      28.1 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7673.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 18 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -24.3 KSI | -167.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.4 MPa |
| Probable error.....(+/-): | 4.1 KSI | 28.1 MPa |



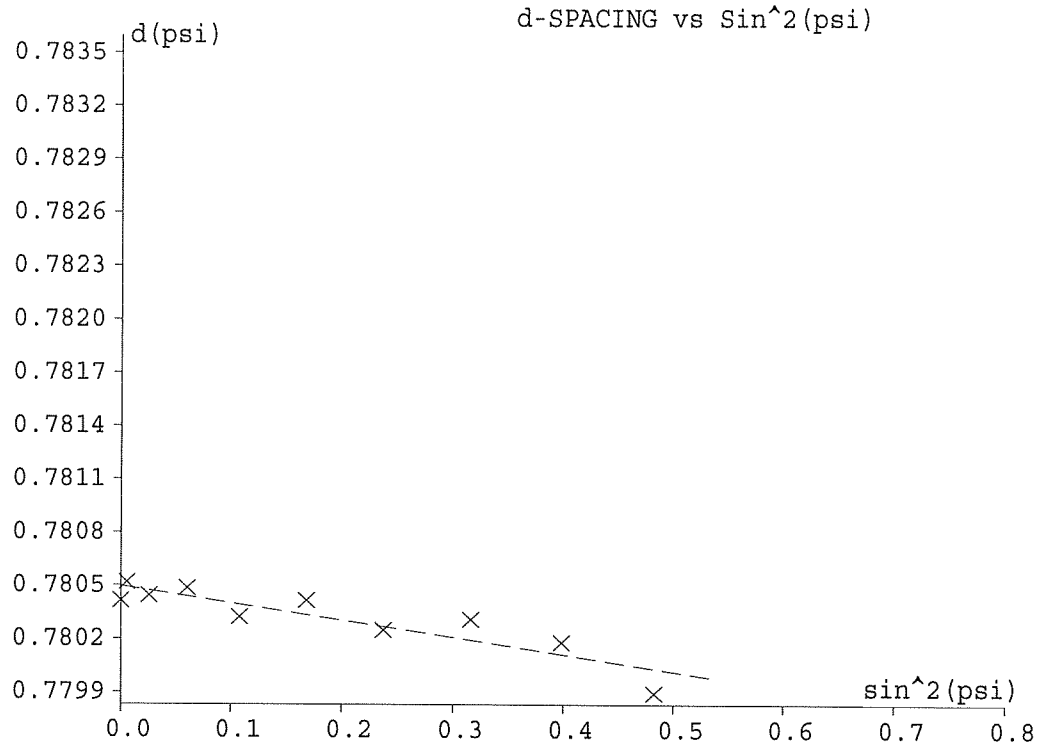
```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7674.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 18 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   0:59pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028
```

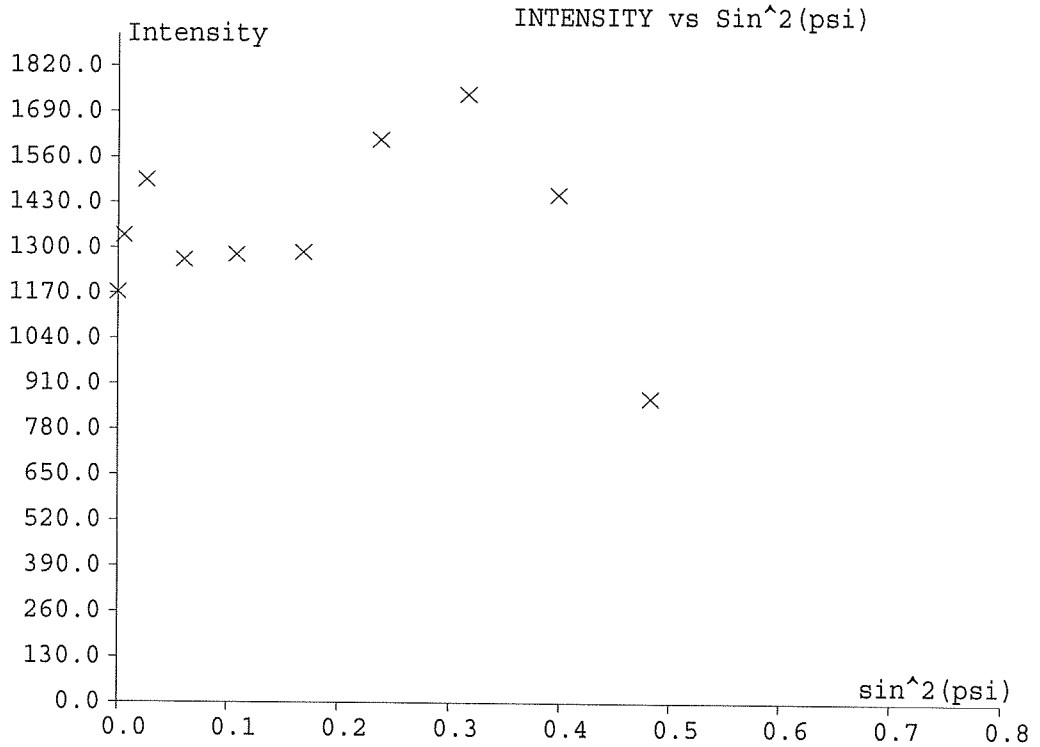
| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00017 | 159.52 | 1172.9 | 4.28 | 0.27274 | 161.51 | 0.780414 | 0.000045 |
| 5.0 | 0.00559 | 157.92 | 1335.9 | 4.23 | 0.27117 | 161.42 | 0.780517 | 0.000040 |
| 10.0 | 0.02587 | 159.09 | 1495.0 | 4.52 | 0.27403 | 161.49 | 0.780444 | 0.000041 |
| 15.0 | 0.06080 | 158.38 | 1266.7 | 3.92 | 0.27002 | 161.45 | 0.780486 | 0.000043 |
| 20.0 | 0.10817 | 160.98 | 1281.4 | 4.55 | 0.27568 | 161.60 | 0.780322 | 0.000050 |
| 25.0 | 0.16861 | 159.49 | 1287.6 | 4.18 | 0.27207 | 161.51 | 0.780415 | 0.000035 |
| 30.0 | 0.23754 | 162.05 | 1609.0 | 3.94 | 0.27295 | 161.66 | 0.780250 | 0.000029 |
| 35.0 | 0.31586 | 161.14 | 1738.3 | 3.88 | 0.27196 | 161.61 | 0.780308 | 0.000028 |
| 40.0 | 0.39838 | 163.14 | 1452.4 | 3.88 | 0.27349 | 161.73 | 0.780180 | 0.000029 |
| 45.0 | 0.48265 | 167.69 | 868.2 | 4.34 | 0.28012 | 161.99 | 0.779895 | 0.000055 |

```
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780496
Slope of Fitted Line...............:    -0.0009599
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -9.8 KSI     -67.6 MPa

Counting Statistics Stress Error (+/-):      0.9 KSI       6.1 MPa
Probable error.................(+/-):      1.7 KSI      11.7 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7674.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 18 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -9.8 KSI | -67.6 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.1 MPa |
| Probable error.....(+/-): | 1.7 KSI | 11.7 MPa |

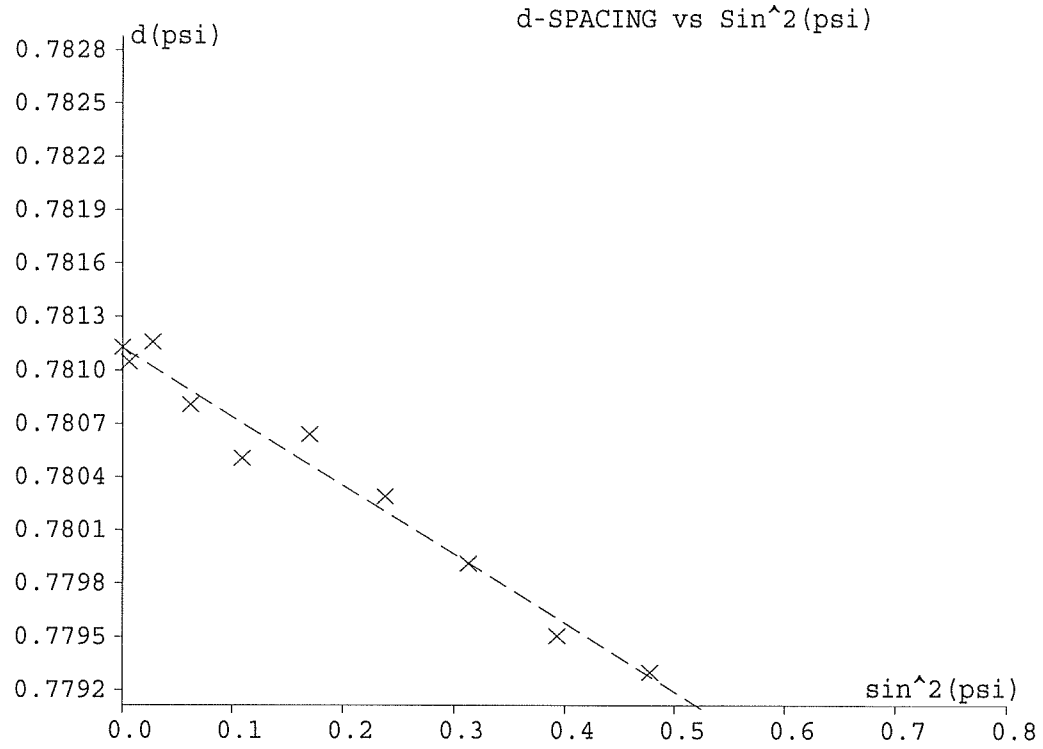


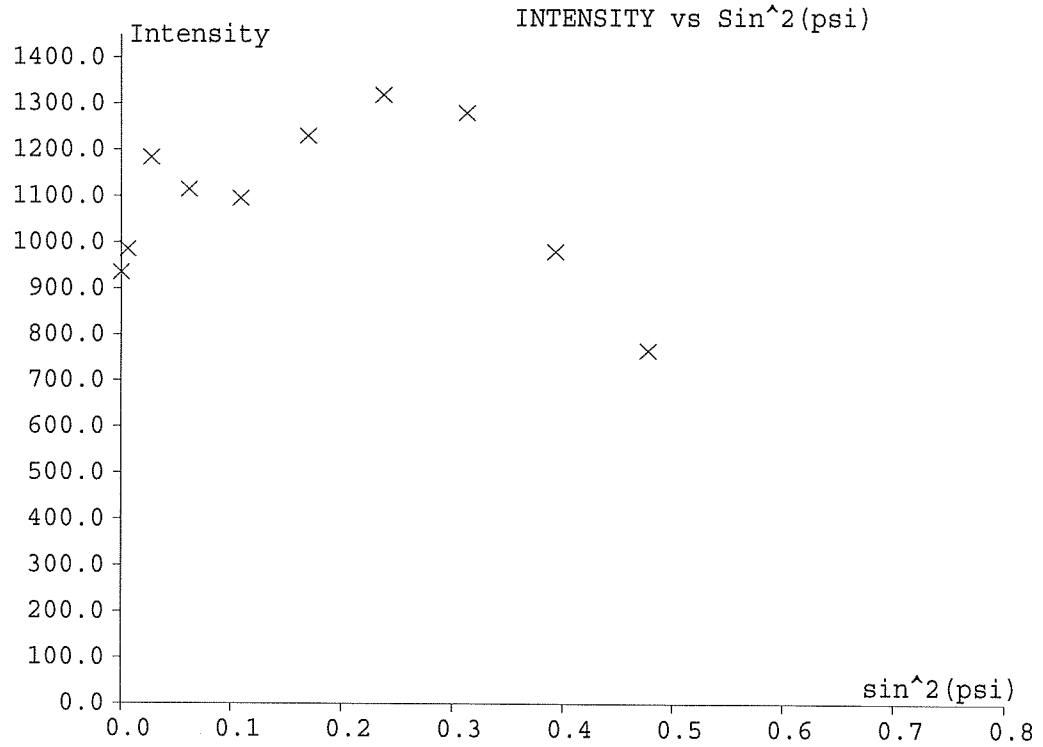



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7669.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 19 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   0:32pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00006   148.63    935.4   4.96  0.26675    160.88  0.781129  0.000070
  5.0  0.00622   149.89    985.0   4.76  0.26743    160.95  0.781045  0.000070
 10.0  0.02766   148.18   1183.7   4.77  0.26610    160.85  0.781159  0.000061
 15.0  0.06201   153.46   1114.7   4.35  0.26849    161.16  0.780808  0.000057
 20.0  0.10907   158.13   1095.4   4.72  0.27392    161.43  0.780506  0.000066
 25.0  0.16993   156.01   1229.2   4.21  0.26957    161.31  0.780641  0.000048
 30.0  0.23782   161.47   1318.2   4.49  0.27570    161.63  0.780291  0.000046
 35.0  0.31291   167.46   1279.3   4.54  0.28115    161.97  0.779911  0.000055
 40.0  0.39302   173.96    979.8   4.41  0.28623    162.35  0.779504  0.000060
 45.0  0.47777   177.25    765.2   4.43  0.28933    162.55  0.779302  0.000058

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.781125
Slope of Fitted Line...............:     -0.003871
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -39.5 KSI    -272.3 MPa

Counting Statistics Stress Error (+/-):      1.2 KSI       8.5 MPa
Probable error.................(+/-):      2.4 KSI      16.6 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7669.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 19 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -39.5 KSI | -272.3 MPa |
| Counting Statistics Stress Error (+/-): | 1.2 KSI | 8.5 MPa |
| Probable error.....(+/-): | 2.4 KSI | 16.6 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7670.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 19 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time: 10/28/2005 0:37pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 20.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A 1.99867E-07 B -7.91049E-05 C 0.0688651 D 148.0028

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00011 | 154.29 | 1233.9 | 4.71 | 0.27084 | 161.21 | 0.780756 | 0.000057 |
| 5.0 | 0.00624 | 149.56 | 1378.2 | 4.50 | 0.26640 | 160.94 | 0.781066 | 0.000057 |
| 10.0 | 0.02739 | 149.76 | 1517.5 | 4.61 | 0.26710 | 160.95 | 0.781053 | 0.000040 |
| 15.0 | 0.06206 | 153.23 | 1321.9 | 4.19 | 0.26732 | 161.15 | 0.780822 | 0.000043 |
| 20.0 | 0.10970 | 156.13 | 1278.6 | 4.53 | 0.27172 | 161.32 | 0.780635 | 0.000040 |
| 25.0 | 0.16926 | 157.77 | 1451.5 | 4.23 | 0.27108 | 161.41 | 0.780526 | 0.000043 |
| 30.0 | 0.23892 | 158.88 | 1567.3 | 4.18 | 0.27159 | 161.48 | 0.780455 | 0.000034 |
| 35.0 | 0.31438 | 164.30 | 1561.4 | 4.31 | 0.27683 | 161.79 | 0.780108 | 0.000040 |
| 40.0 | 0.39640 | 167.14 | 1230.7 | 4.04 | 0.27794 | 161.96 | 0.779928 | 0.000035 |
| 45.0 | 0.47951 | 173.85 | 932.3 | 4.29 | 0.28553 | 162.35 | 0.779510 | 0.000053 |

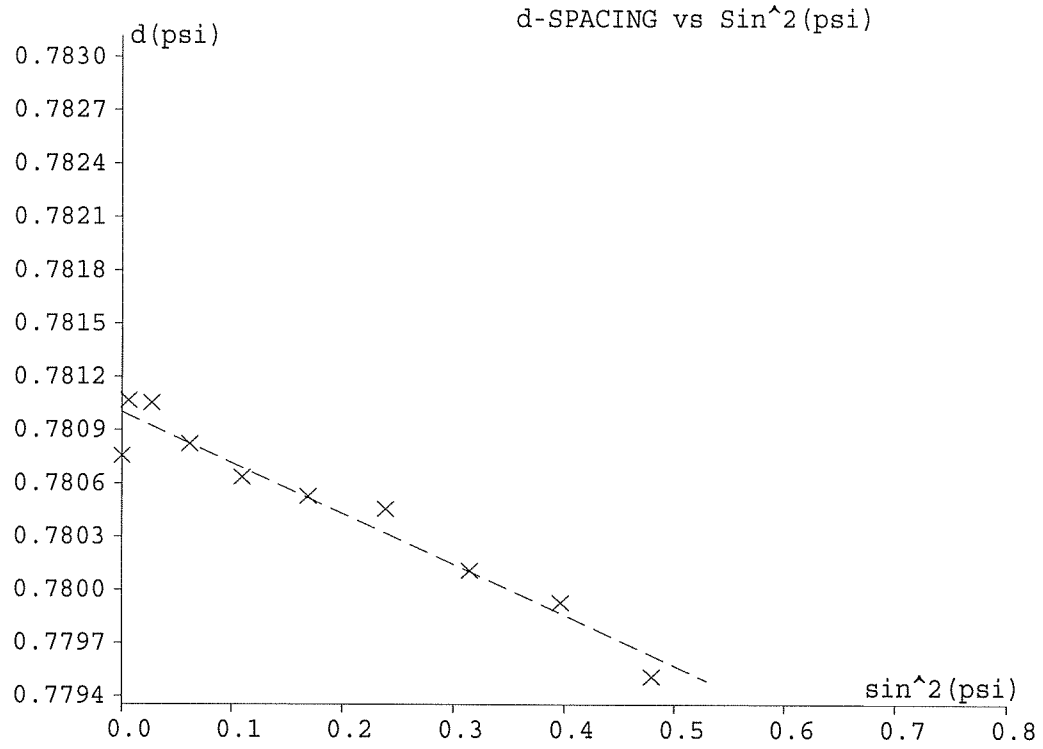
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.781002
Slope of Fitted Line.....: -0.002861
Material Stress Constant.....: 1.255E-07

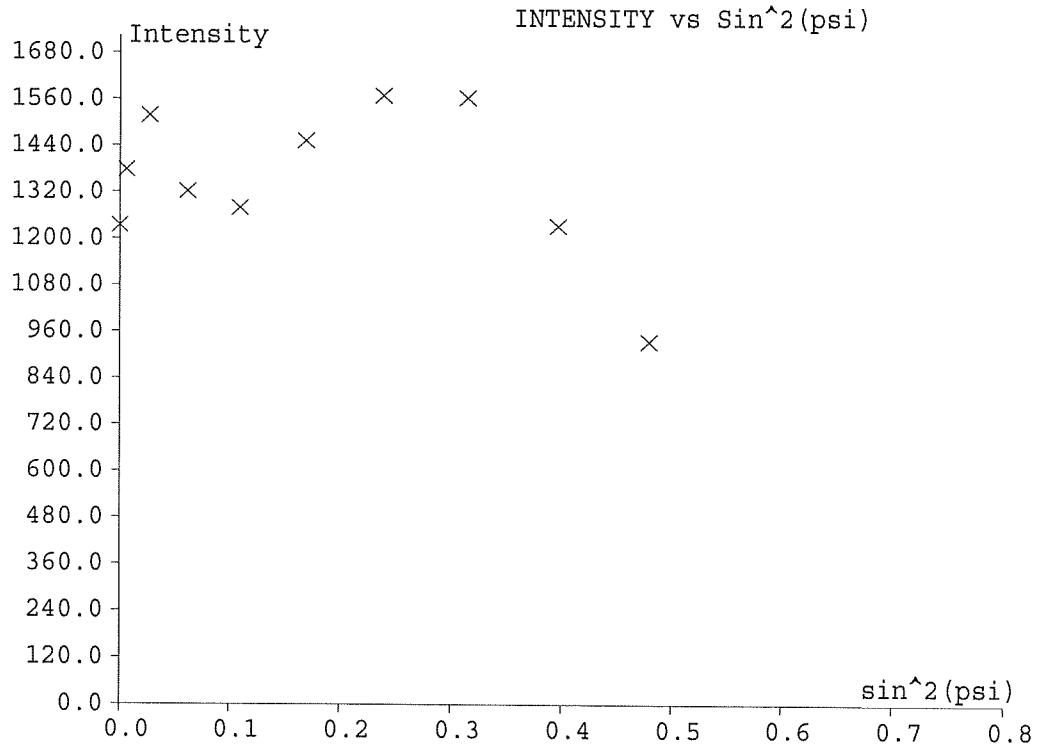
*Residual Stress.....: -29.2 KSI -201.3 MPa

Counting Statistics Stress Error (+/-): 1.0 KSI 6.6 MPa
Probable error.....(+/-): 2.5 KSI 17.0 MPa

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7670.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 19 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -29.2 KSI | -201.3 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 6.6 MPa |
| Probable error.....(+/-): | 2.5 KSI | 17.0 MPa |



================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7671.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 19 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time: 10/28/2005 0:42pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 20.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.50
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A 1.99867E-07 B -7.91049E-05 C 0.0688651 D 148.0028

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00017 | 159.37 | 1202.3 | 4.54 | 0.27435 | 161.50 | 0.780426 | 0.000053 |
| 5.0 | 0.00596 | 153.11 | 1287.3 | 4.21 | 0.26732 | 161.14 | 0.780830 | 0.000053 |
| 10.0 | 0.02664 | 154.36 | 1400.3 | 4.35 | 0.26919 | 161.21 | 0.780749 | 0.000052 |
| 15.0 | 0.06131 | 156.33 | 1363.8 | 4.27 | 0.27022 | 161.33 | 0.780620 | 0.000047 |
| 20.0 | 0.10935 | 157.22 | 1377.9 | 4.27 | 0.27087 | 161.38 | 0.780563 | 0.000040 |
| 25.0 | 0.16795 | 161.23 | 1332.1 | 4.23 | 0.27376 | 161.61 | 0.780304 | 0.000043 |
| 30.0 | 0.23880 | 159.13 | 1536.3 | 3.88 | 0.27043 | 161.49 | 0.780437 | 0.000040 |
| 35.0 | 0.31381 | 165.49 | 1788.5 | 3.94 | 0.27593 | 161.86 | 0.780031 | 0.000031 |
| 40.0 | 0.39755 | 164.80 | 1397.6 | 3.80 | 0.27451 | 161.82 | 0.780074 | 0.000028 |
| 45.0 | 0.48280 | 167.34 | 1101.8 | 3.92 | 0.27751 | 161.97 | 0.779914 | 0.000034 |

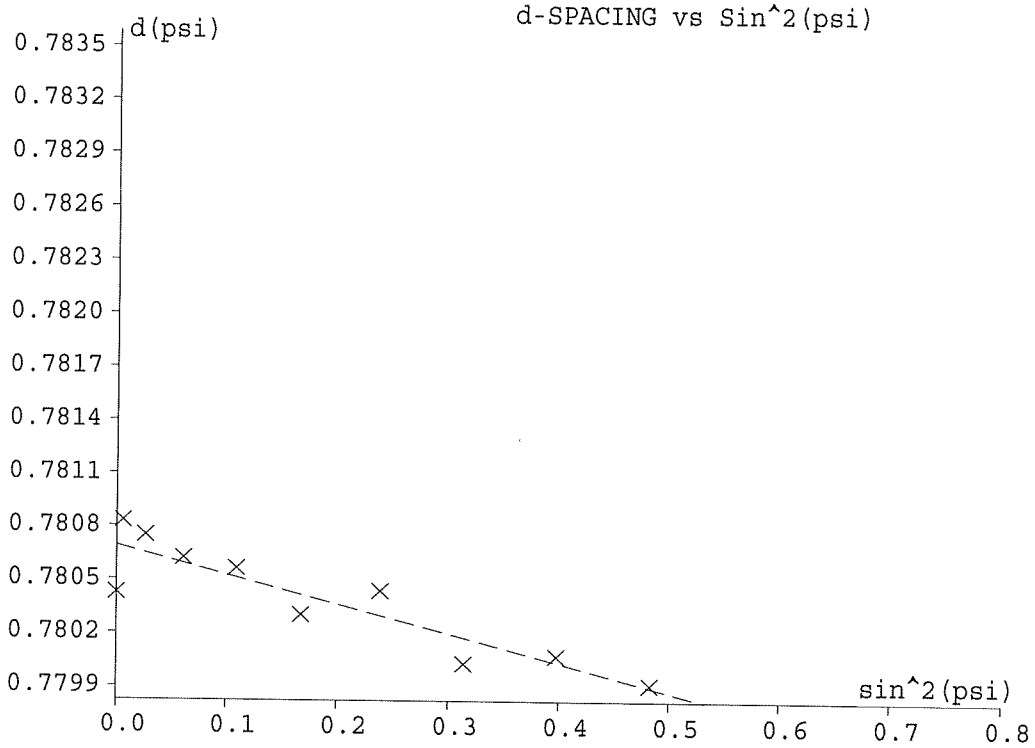
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.780690
Slope of Fitted Line.....: -0.001636
Material Stress Constant.....: 1.255E-07

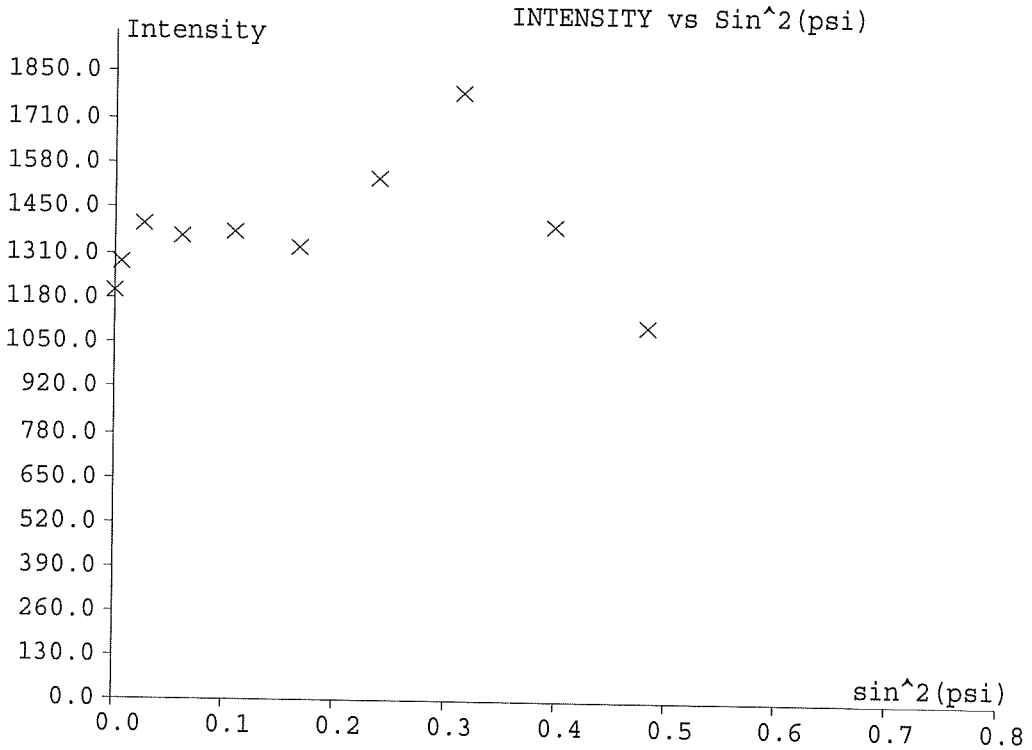
*Residual Stress.....: -16.7 KSI -115.2 MPa

Counting Statistics Stress Error (+/-): 0.8 KSI 5.6 MPa
Probable error.....(+/-): 2.8 KSI 19.3 MPa

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7671.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 19 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -16.7 KSI | -115.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.6 MPa |
| Probable error.....(+/-): | 2.8 KSI | 19.3 MPa |

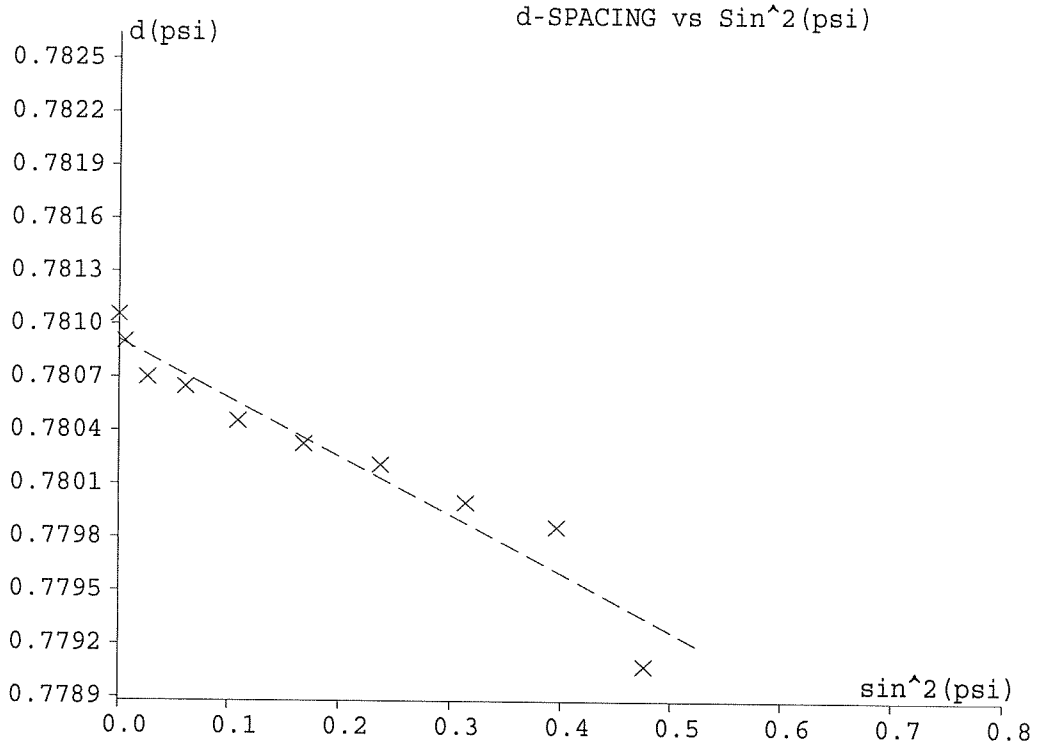


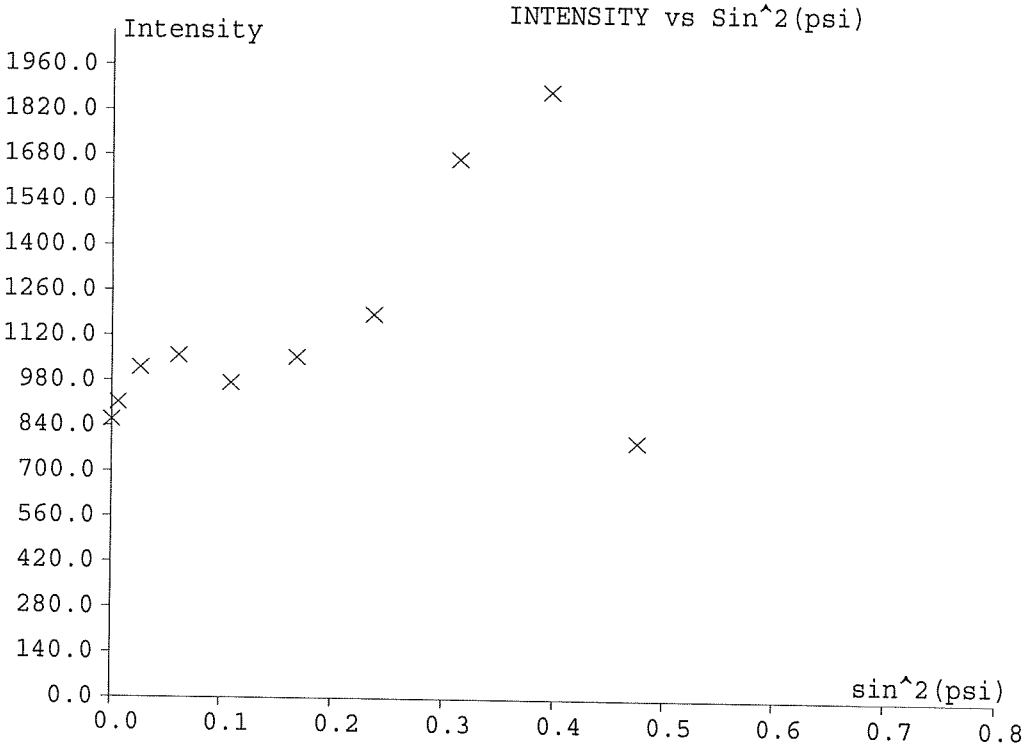



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7666.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 20 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   0:15pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00007   149.77    859.3   5.24  0.26803    160.95  0.781054  0.000133
  5.0  0.00605   152.05    912.4   4.86  0.26932    161.08  0.780903  0.000067
 10.0  0.02651   155.18   1020.5   5.17  0.27249    161.26  0.780699  0.000067
 15.0  0.06141   155.95   1057.7   4.89  0.27249    161.30  0.780648  0.000059
 20.0  0.10881   158.95    973.7   4.87  0.27484    161.48  0.780454  0.000073
 25.0  0.16808   160.94   1053.7   4.61  0.27594    161.59  0.780325  0.000062
 30.0  0.23726   162.77   1186.5   4.80  0.27778    161.70  0.780208  0.000071
 35.0  0.31355   166.12   1667.7   4.89  0.28107    161.90  0.779996  0.000046
 40.0  0.39584   168.29   1877.7   4.38  0.28090    162.02  0.779858  0.000032
 45.0  0.47588   180.93    794.9   4.36  0.29249    162.76  0.779077  0.000050

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780912
Slope of Fitted Line...............:     -0.003289
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -33.6 KSI    -231.4 MPa

Counting Statistics Stress Error (+/-):      1.4 KSI       9.4 MPa
Probable error.................(+/-):      3.2 KSI      22.0 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7666.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 20 / 0.05" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -33.6 KSI | -231.4 MPa |
| Counting Statistics Stress Error (+/-): | 1.4 KSI | 9.4 MPa |
| Probable error.....(+/-): | 3.2 KSI | 22.0 MPa |

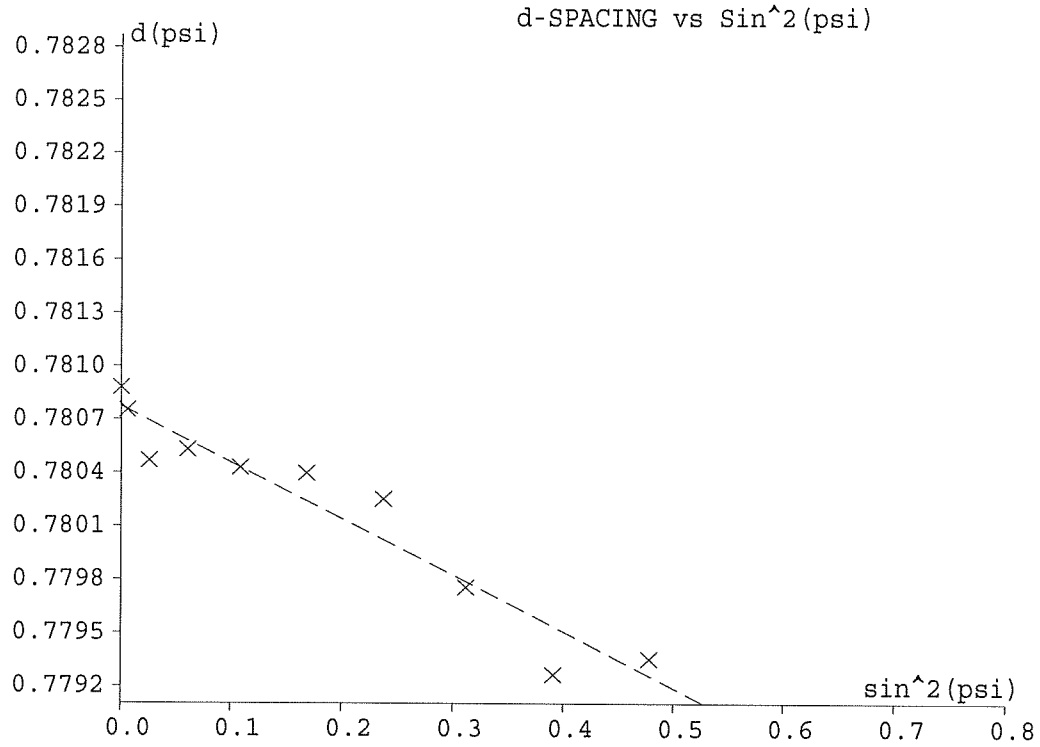


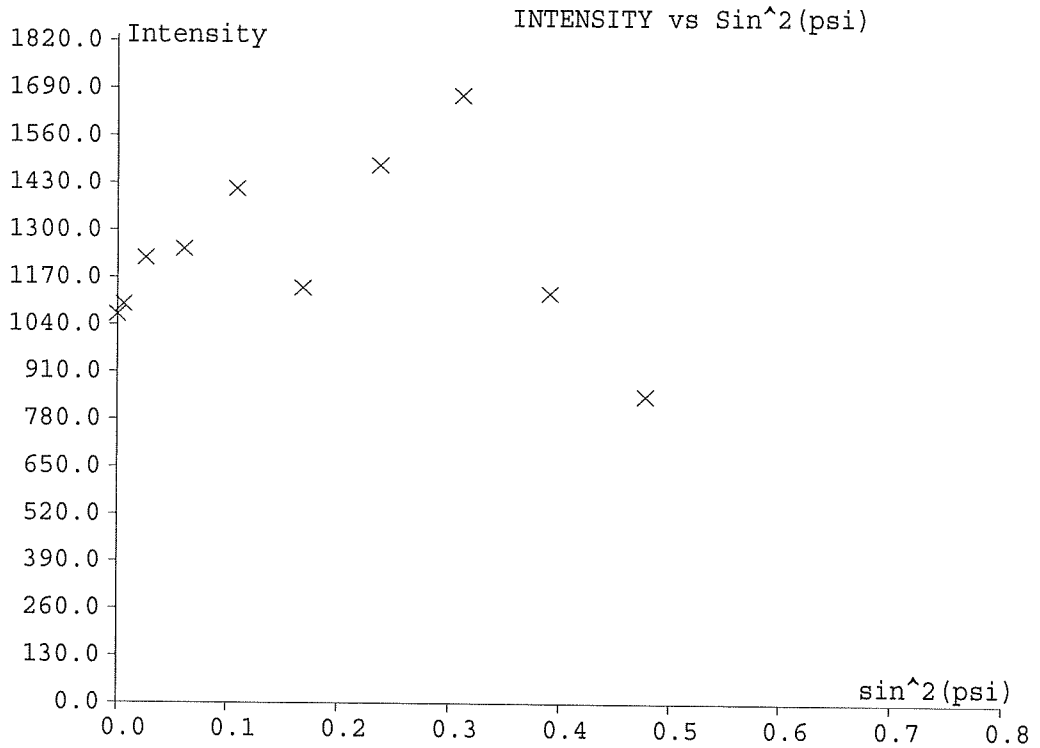



```
================================== TEC Stress Analyzer v1.64 ===================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7667.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 20 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   0:21pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00009   152.40   1068.1   5.08  0.26998    161.10  0.780880  0.000071
  5.0  0.00587   154.34   1096.0   4.54  0.27038    161.21  0.780752  0.000054
 10.0  0.02594   158.70   1223.8   4.56  0.27399    161.46  0.780469  0.000051
 15.0  0.06097   157.76   1248.6   4.82  0.27381    161.41  0.780531  0.000051
 20.0  0.10869   159.32   1413.5   4.56  0.27442    161.50  0.780429  0.000059
 25.0  0.16849   159.83   1140.9   4.62  0.27509    161.53  0.780396  0.000062
 30.0  0.23755   162.08   1477.8   4.41  0.27563    161.66  0.780251  0.000038
 35.0  0.31172   169.96   1668.7   4.50  0.28315    162.12  0.779754  0.000046
 40.0  0.39108   177.85   1126.2   4.42  0.28984    162.58  0.779265  0.000046
 45.0  0.47821   176.38    843.5   4.24  0.28765    162.50  0.779354  0.000041

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780775
Slope of Fitted Line...............:     -0.003167
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -32.3 KSI    -222.9 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       6.9 MPa
Probable error.................(+/-):      3.3 KSI      23.1 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7667.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 20 / 0.10" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -32.3 KSI | -222.9 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 6.9 MPa |
| Probable error.....(+/-): | 3.3 KSI | 23.1 MPa |

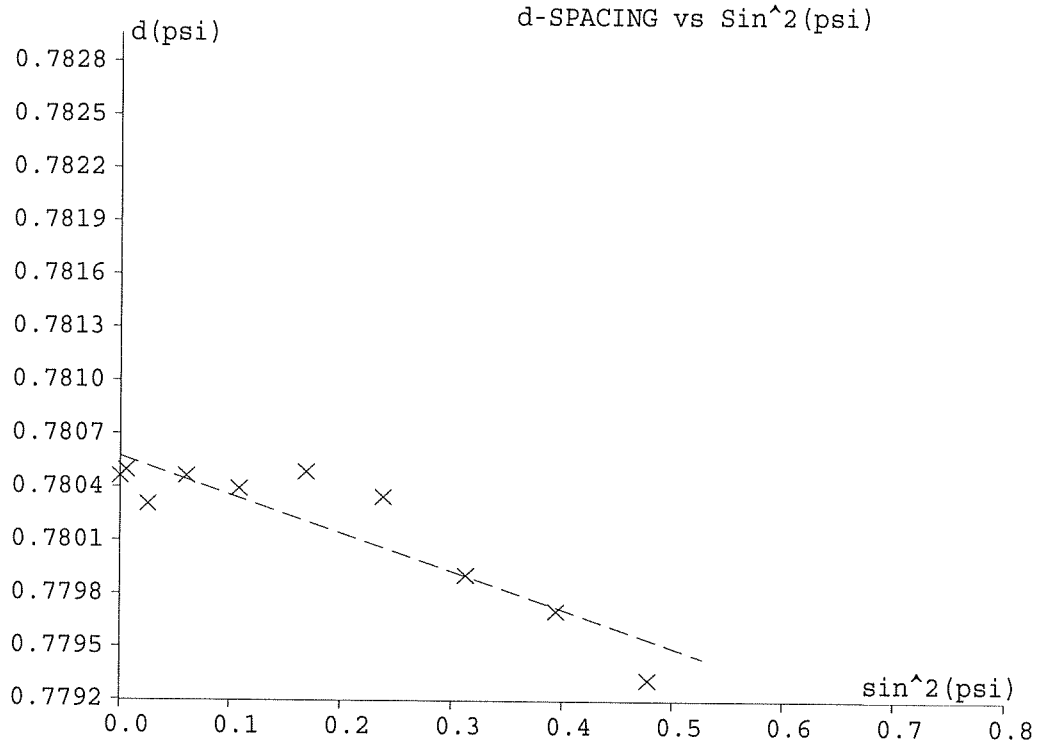


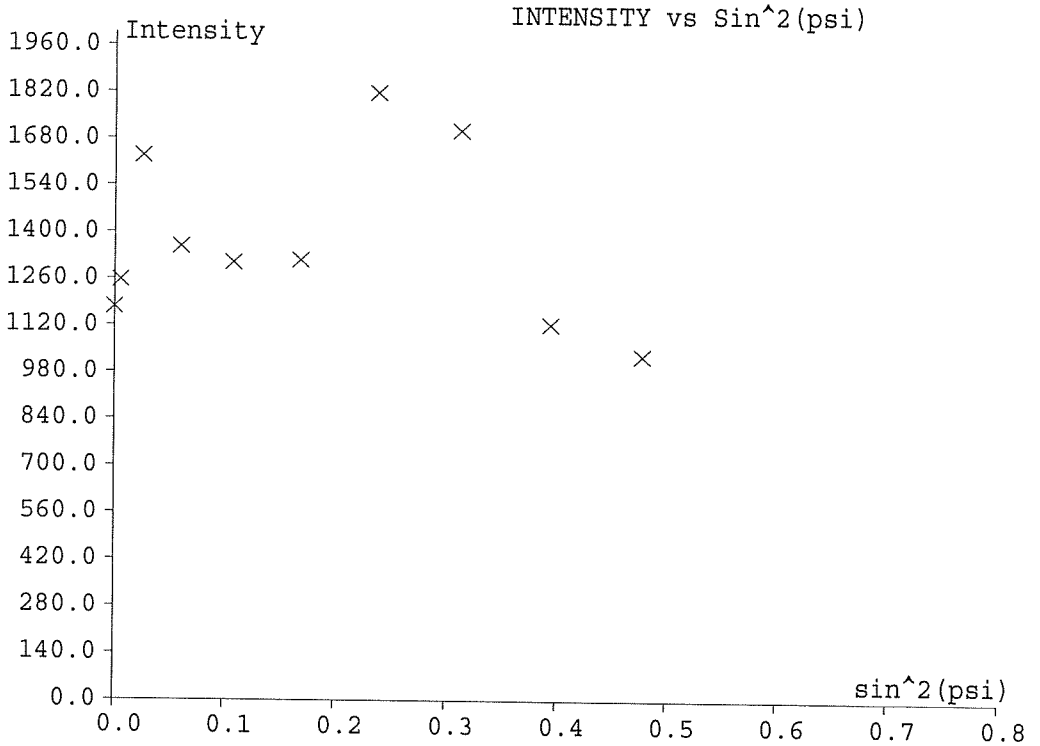



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7668.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 20 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

Acquisition date & time:  10/28/2005   0:26pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.50
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00016   158.83   1175.4   4.97  0.27493    161.47  0.780461  0.000055
  5.0  0.00557   158.28   1255.6   4.45  0.27289    161.44  0.780496  0.000039
 10.0  0.02553   161.25   1628.7   4.53  0.27577    161.61  0.780305  0.000048
 15.0  0.06072   158.79   1356.7   4.52  0.27380    161.47  0.780463  0.000041
 20.0  0.10852   159.81   1308.8   3.94  0.27121    161.53  0.780394  0.000041
 25.0  0.16903   158.38   1315.2   4.22  0.27144    161.45  0.780487  0.000038
 30.0  0.23819   160.57   1816.2   4.04  0.27229    161.58  0.780345  0.000037
 35.0  0.31285   167.57   1703.1   4.45  0.28071    161.98  0.779903  0.000042
 40.0  0.39461   170.76   1122.9   4.29  0.28269    162.17  0.779703  0.000049
 45.0  0.47787   177.05   1028.7   4.33  0.28869    162.54  0.779314  0.000086

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780574
Slope of Fitted Line...............:     -0.002157
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -22.0 KSI    -151.8 MPa

Counting Statistics Stress Error (+/-):      1.3 KSI       8.6 MPa
Probable error.................(+/-):      3.7 KSI      25.6 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7668.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 20 / 0.15" from Hole / Longitudinal
Circumferential with respect to Hole / ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -22.0 KSI | -151.8 MPa |
| Counting Statistics Stress Error (+/-): | 1.3 KSI | 8.6 MPa |
| Probable error.....(+/-): | 3.7 KSI | 25.6 MPa |

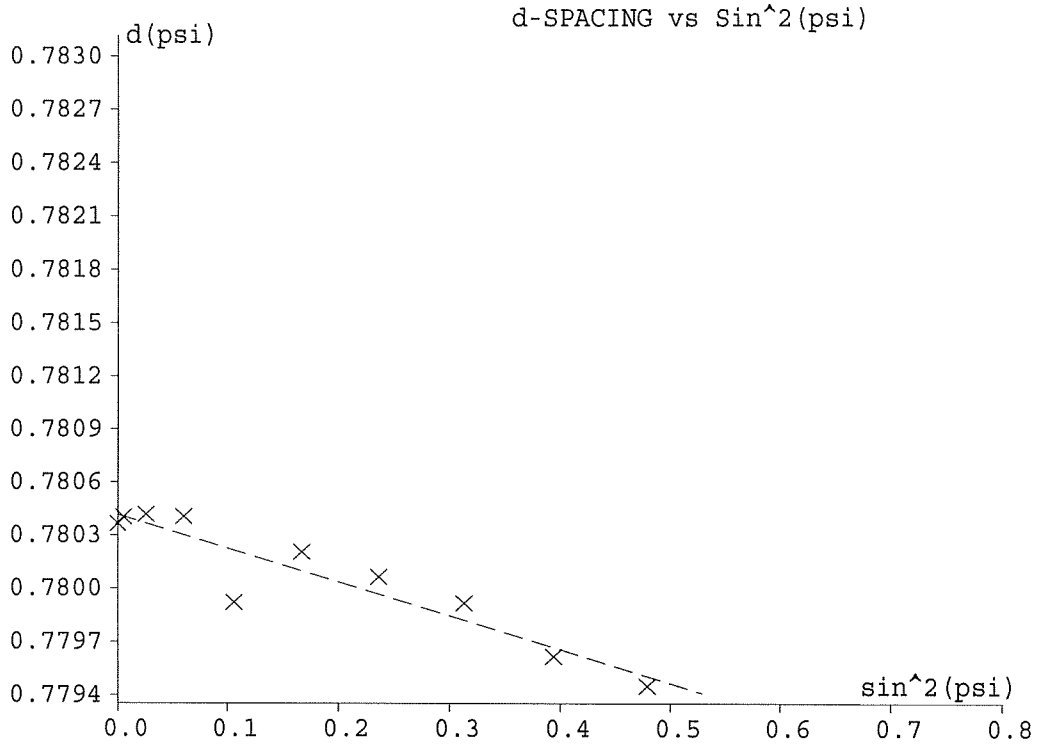


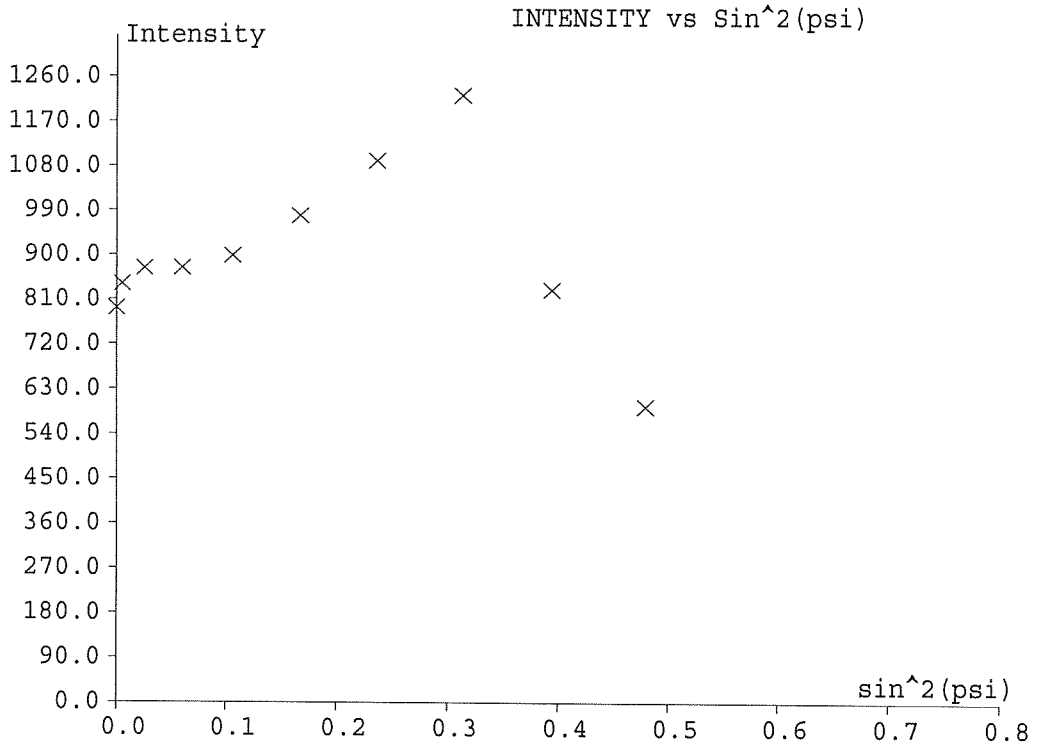



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7771.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 1 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   5:26pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0   0.00018   160.25    792.6   4.06  0.27210    161.56  0.780366  0.000042
  5.0   0.00546   159.68    841.4   4.02  0.27151    161.52  0.780402  0.000058
 10.0   0.02581   159.41    873.1   3.72  0.26956    161.51  0.780418  0.000047
 15.0   0.06050   159.65    873.7   4.00  0.27136    161.52  0.780404  0.000055
 20.0   0.10619   167.27    898.4   4.41  0.28016    161.96  0.779922  0.000118
 25.0   0.16736   162.75    978.8   3.86  0.27310    161.70  0.780205  0.000044
 30.0   0.23627   164.98   1089.5   3.85  0.27499    161.83  0.780063  0.000040
 35.0   0.31295   167.28   1220.7   3.72  0.27614    161.97  0.779917  0.000027
 40.0   0.39391   172.12    828.1   3.93  0.28196    162.25  0.779615  0.000039
 45.0   0.47901   174.80    593.5   4.10  0.28541    162.41  0.779450  0.000049

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780416
Slope of Fitted Line...............:      -0.0019
Material Stress Constant...........:    1.255E-07

*Residual Stress...................:    -19.4 KSI    -133.8 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       6.7 MPa
Probable error.................(+/-):      2.6 KSI      18.0 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7771.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 1 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -19.4 KSI | -133.8 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 6.7 MPa |
| Probable error.....(+/-): | 2.6 KSI | 18.0 MPa |

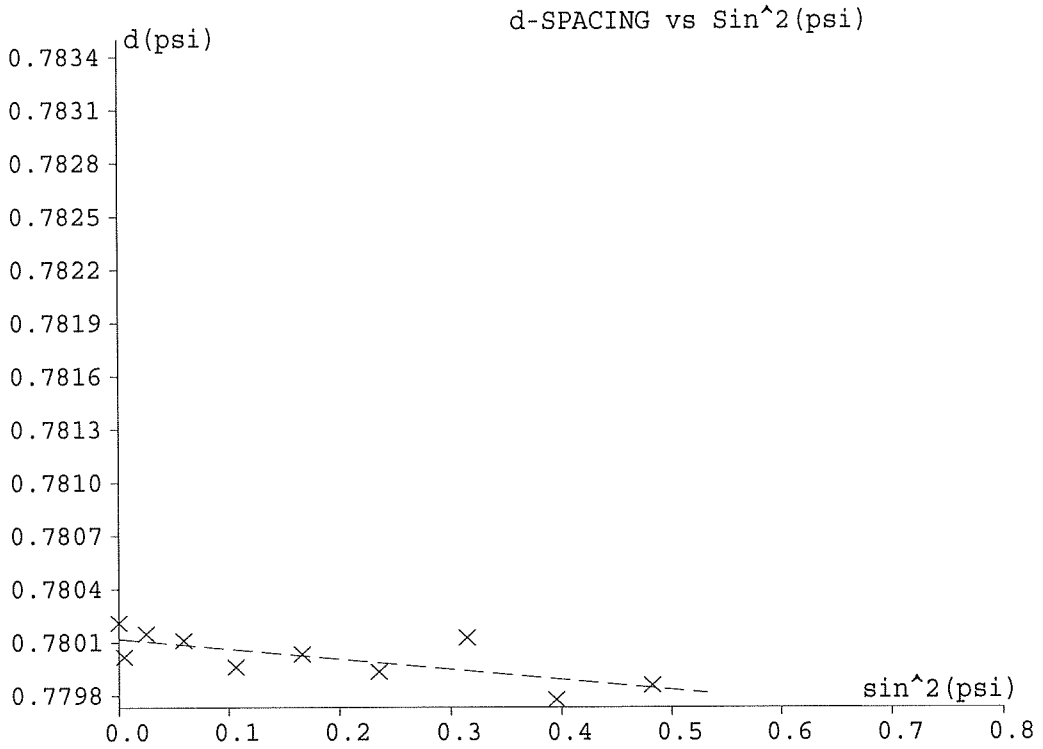


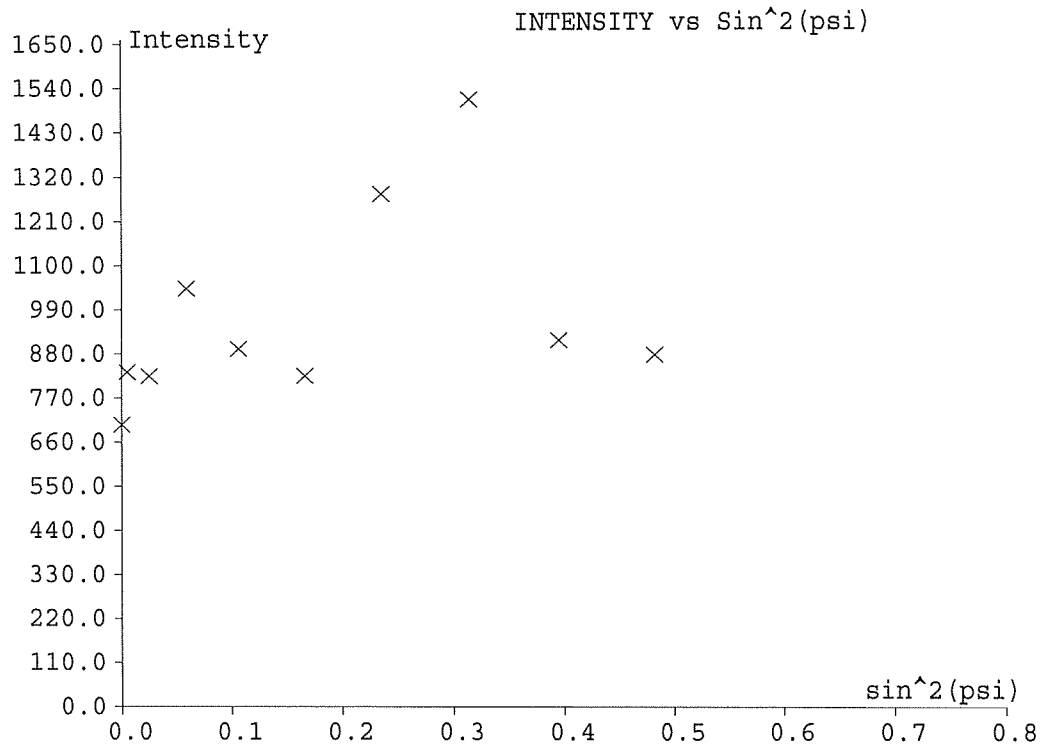



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7772.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 2 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   5:31pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00022   162.65    703.0   3.91  0.27327    161.70  0.780211  0.000062
  5.0  0.00502   165.65    834.3   3.74  0.27480    161.87  0.780020  0.000034
 10.0  0.02514   163.66    824.3   4.21  0.27557    161.75  0.780149  0.000054
 15.0  0.05939   164.24   1042.5   4.15  0.27578    161.79  0.780112  0.000049
 20.0  0.10639   166.63    892.1   4.29  0.27887    161.93  0.779961  0.000052
 25.0  0.16634   165.47    824.1   4.19  0.27714    161.86  0.780034  0.000046
 30.0  0.23540   167.01   1276.7   3.91  0.27715    161.95  0.779935  0.000028
 35.0  0.31452   163.96   1510.7   3.67  0.27281    161.78  0.780126  0.000026
 40.0  0.39522   169.51    912.2   3.96  0.27973    162.10  0.779778  0.000033
 45.0  0.48235   168.22    875.5   3.83  0.27786    162.02  0.779858  0.000033

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780121
Slope of Fitted Line...............:     -0.000573
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -5.9 KSI     -40.4 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.6 MPa
Probable error.................(+/-):      2.0 KSI      13.7 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7772.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 2 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -5.9 KSI | -40.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.6 MPa |
| Probable error.....(+/-): | 2.0 KSI | 13.7 MPa |

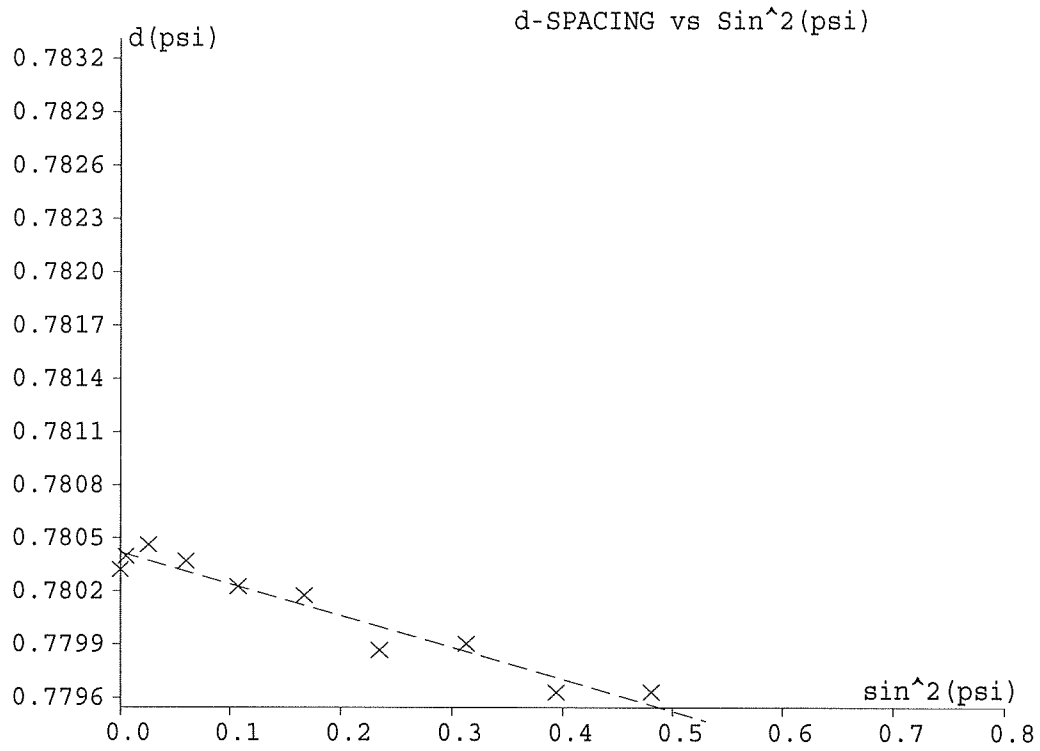


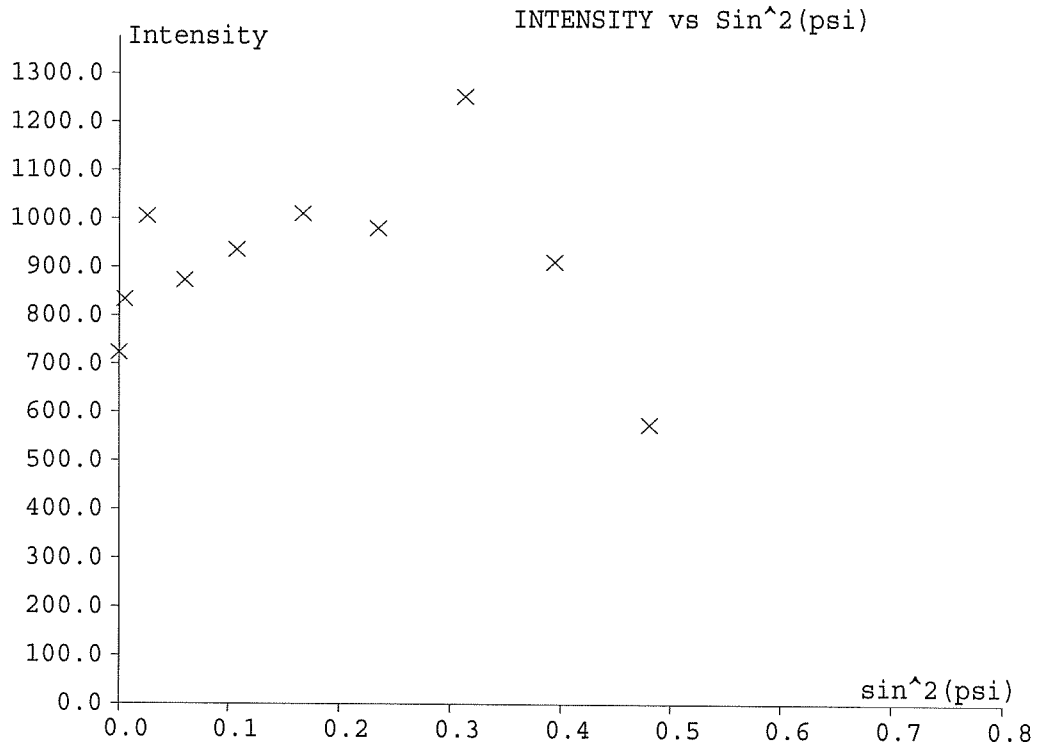



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7773.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 3 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   5:37pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


 Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00019   160.95    723.2   4.18  0.27322    161.60  0.780322  0.000057
  5.0  0.00546   159.76    833.8   4.15  0.27217    161.53  0.780398  0.000059
 10.0  0.02592   158.75   1005.0   4.06  0.27094    161.47  0.780462  0.000049
 15.0  0.06037   160.15    873.2   4.02  0.27188    161.55  0.780372  0.000055
 20.0  0.10770   162.40    935.7   3.80  0.27241    161.68  0.780227  0.000046
 25.0  0.16719   163.21   1009.8   3.95  0.27385    161.73  0.780176  0.000054
 30.0  0.23493   168.12    979.7   4.22  0.27978    162.01  0.779867  0.000050
 35.0  0.31285   167.49   1251.3   3.72  0.27630    161.98  0.779904  0.000024
 40.0  0.39403   171.91    909.9   4.15  0.28297    162.24  0.779630  0.000032
 45.0  0.48051   171.86    574.0   3.97  0.28192    162.23  0.779632  0.000041

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780419
Slope of Fitted Line...............:     -0.001789
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -18.3 KSI    -125.9 MPa

Counting Statistics Stress Error (+/-):      0.9 KSI       6.2 MPa
Probable error.................(+/-):      1.7 KSI      11.5 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7773.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 3 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -18.3 KSI | -125.9 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.2 MPa |
| Probable error.....(+/-): | 1.7 KSI | 11.5 MPa |

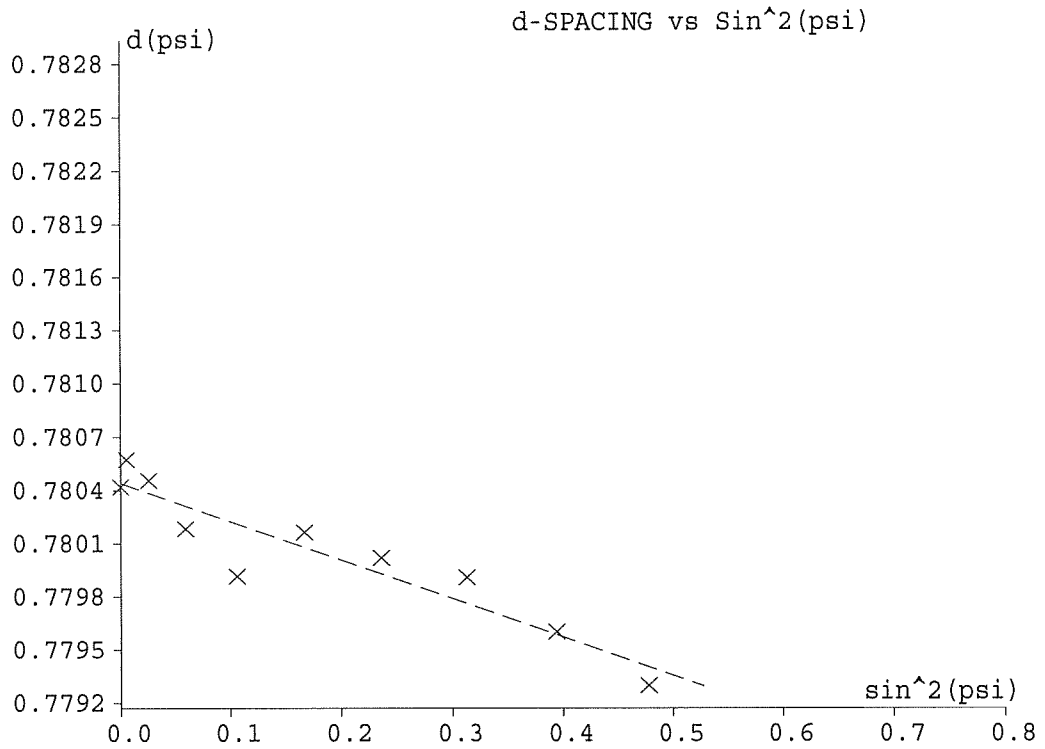


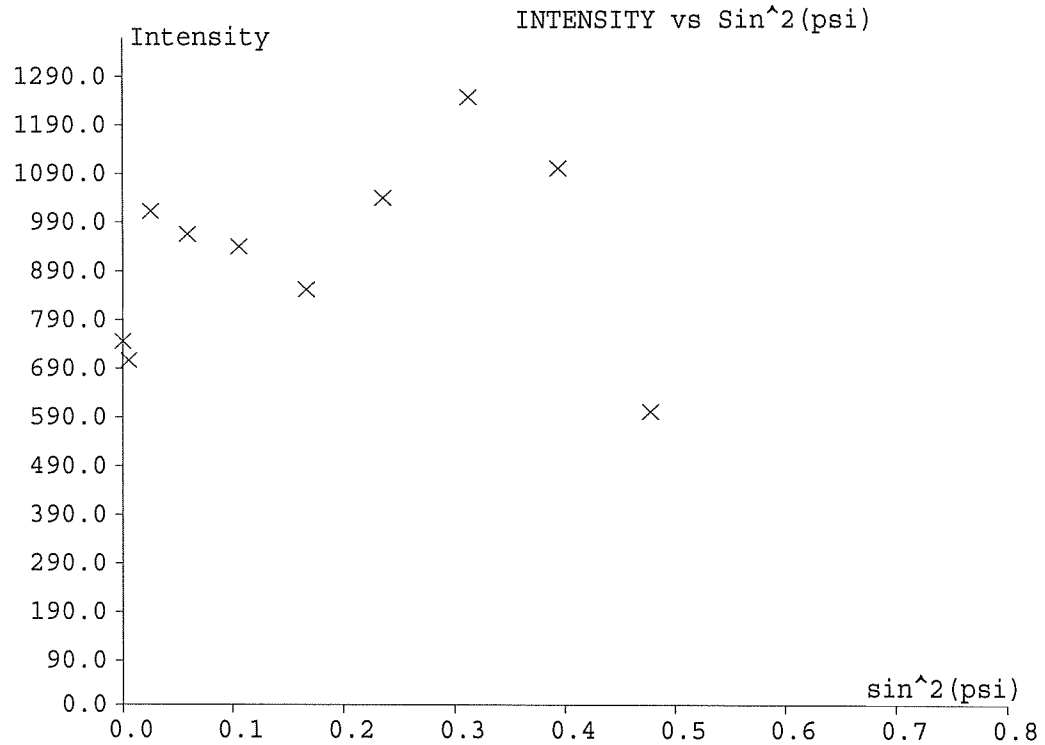



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7774.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 4 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   5:43pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00017   159.41    746.1   3.95  0.27097    161.51  0.780419  0.000053
  5.0  0.00566   157.04    706.5   3.91  0.26898    161.37  0.780572  0.000052
 10.0  0.02591   158.82   1012.8   3.75  0.26931    161.48  0.780456  0.000047
 15.0  0.05967   163.13    965.0   4.38  0.27624    161.72  0.780184  0.000065
 20.0  0.10616   167.34    939.5   4.20  0.27898    161.97  0.779916  0.000041
 25.0  0.16712   163.41    851.5   4.02  0.27442    161.74  0.780164  0.000045
 30.0  0.23597   165.70   1038.6   3.99  0.27637    161.87  0.780018  0.000032
 35.0  0.31289   167.41   1245.7   3.68  0.27598    161.98  0.779908  0.000025
 40.0  0.39380   172.36   1099.2   4.05  0.28285    162.26  0.779601  0.000029
 45.0  0.47775   177.29    601.0   4.31  0.28883    162.55  0.779299  0.000066

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780441
Slope of Fitted Line...............:     -0.00217
Material Stress Constant...........:    1.255E-07

*Residual Stress...................:    -22.2 KSI    -152.8 MPa

Counting Statistics Stress Error (+/-):      1.1 KSI       7.3 MPa
Probable error.................(+/-):      3.0 KSI      20.5 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7774.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 4 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -22.2 KSI | -152.8 MPa |
| Counting Statistics Stress Error (+/-): | 1.1 KSI | 7.3 MPa |
| Probable error.....(+/-): | 3.0 KSI | 20.5 MPa |

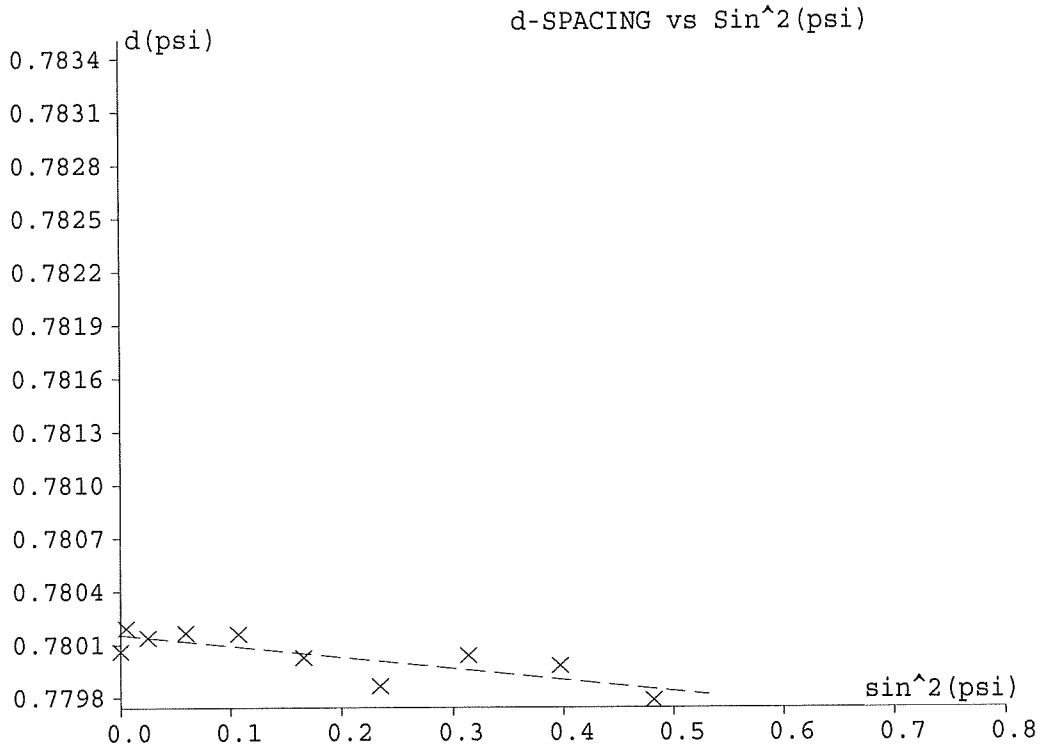


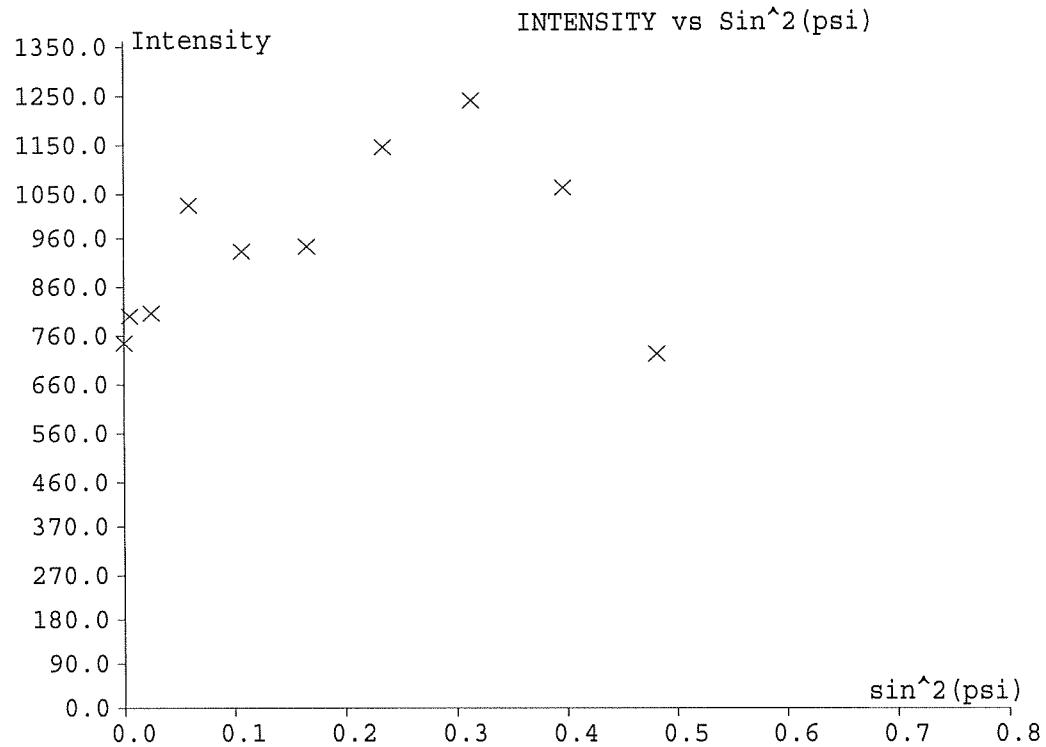



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7775.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 5 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   5:48pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00026   165.04    745.2   4.25  0.27712    161.84  0.780061  0.000052
  5.0  0.00522   162.89    800.6   3.60  0.27138    161.71  0.780194  0.000033
 10.0  0.02511   163.75    806.6   3.50  0.27133    161.76  0.780138  0.000054
 15.0  0.05960   163.36   1027.7   3.87  0.27363    161.74  0.780166  0.000036
 20.0  0.10736   163.44    932.4   3.64  0.27210    161.75  0.780159  0.000031
 25.0  0.16629   165.59    942.8   3.99  0.27626    161.87  0.780025  0.000039
 30.0  0.23490   168.17   1145.3   3.86  0.27797    162.02  0.779862  0.000036
 35.0  0.31384   165.40   1239.0   3.75  0.27468    161.86  0.780036  0.000032
 40.0  0.39679   166.34   1061.2   3.87  0.27636    161.91  0.779977  0.000030
 45.0  0.48175   169.42    721.8   3.85  0.27907    162.09  0.779784  0.000040

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780155
Slope of Fitted Line...............:    -0.0006423
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -6.6 KSI     -45.2 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.5 MPa
Probable error.................(+/-):      1.7 KSI      11.4 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7775.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 5 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -6.6 KSI | -45.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.5 MPa |
| Probable error.....(+/-): | 1.7 KSI | 11.4 MPa |

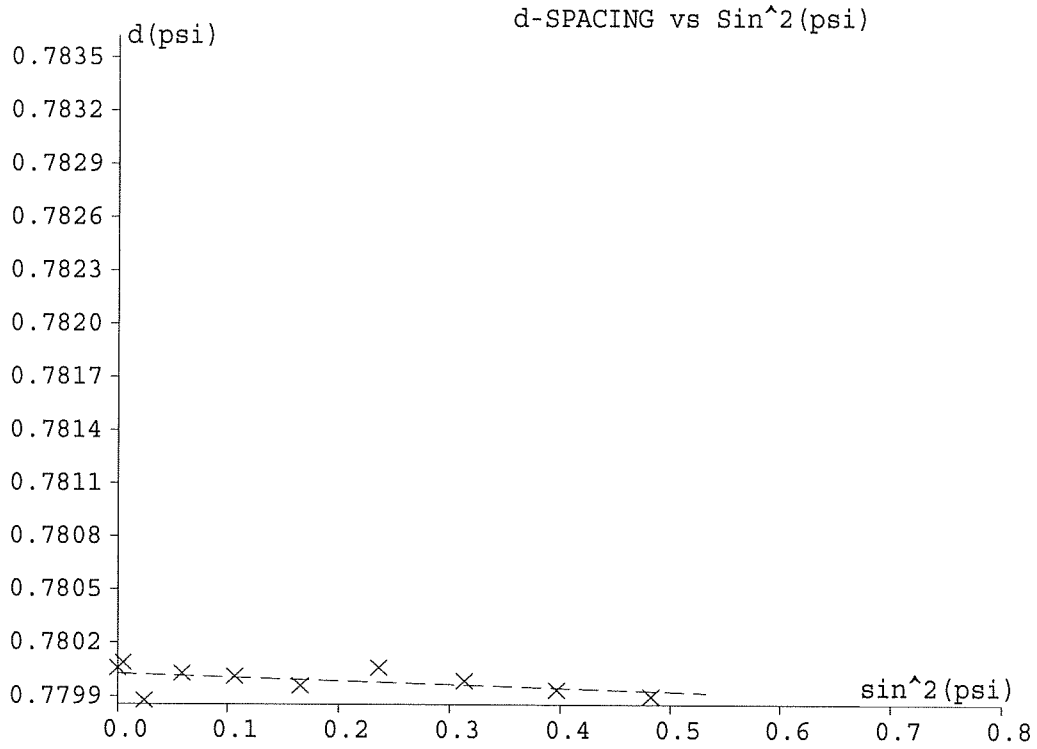


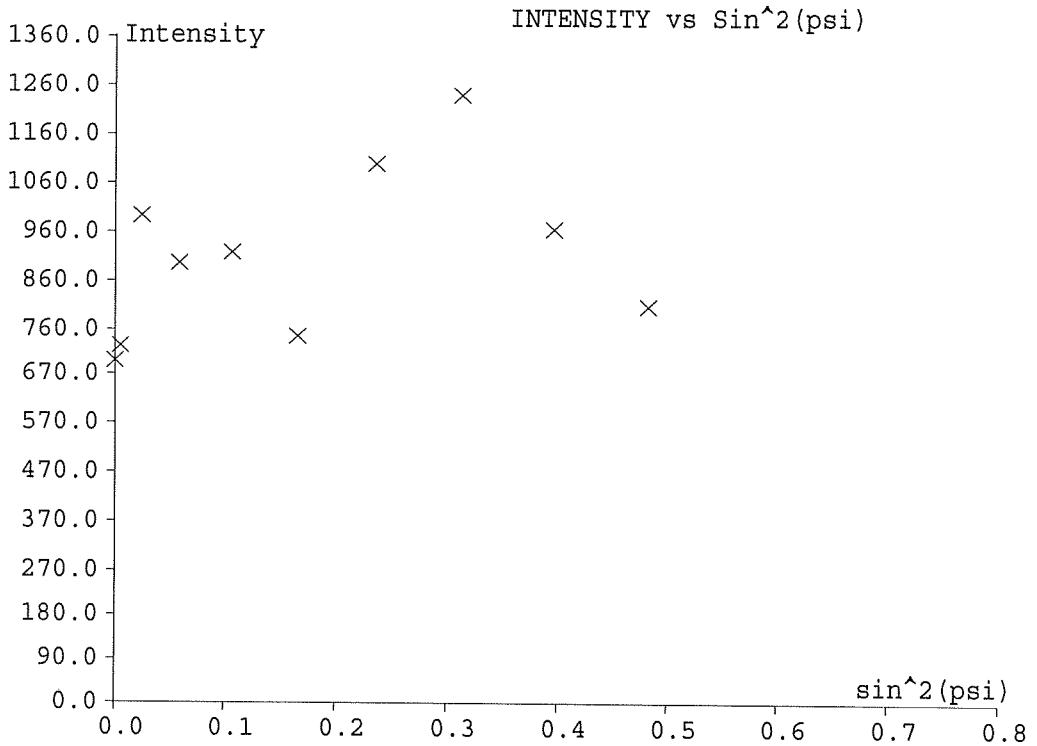



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7776.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 6 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   5:55pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00026   165.03    696.7   3.75  0.27436    161.84  0.780059  0.000086
  5.0  0.00510   164.57    727.8   3.89  0.27481    161.81  0.780089  0.000048
 10.0  0.02446   167.93    993.8   4.11  0.27905    162.00  0.779878  0.000039
 15.0  0.05909   165.51    896.8   4.01  0.27628    161.86  0.780030  0.000038
 20.0  0.10664   165.80    918.2   4.17  0.27738    161.88  0.780013  0.000045
 25.0  0.16590   166.61    747.1   4.00  0.27725    161.93  0.779961  0.000057
 30.0  0.23627   164.92   1099.0   3.35  0.27076    161.83  0.780062  0.000037
 35.0  0.31348   166.17   1239.2   3.79  0.27565    161.90  0.779987  0.000028
 40.0  0.39648   166.96    965.2   3.81  0.27656    161.95  0.779938  0.000031
 45.0  0.48270   167.51    807.9   3.54  0.27491    161.98  0.779901  0.000033

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780027
Slope of Fitted Line...............:    -0.0001988
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -2.0 KSI     -14.0 MPa

Counting Statistics Stress Error (+/-):      0.9 KSI       6.2 MPa
Probable error.................(+/-):      1.3 KSI       9.1 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7776.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 6 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -2.0 KSI | -14.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.2 MPa |
| Probable error.....(+/-): | 1.3 KSI | 9.1 MPa |

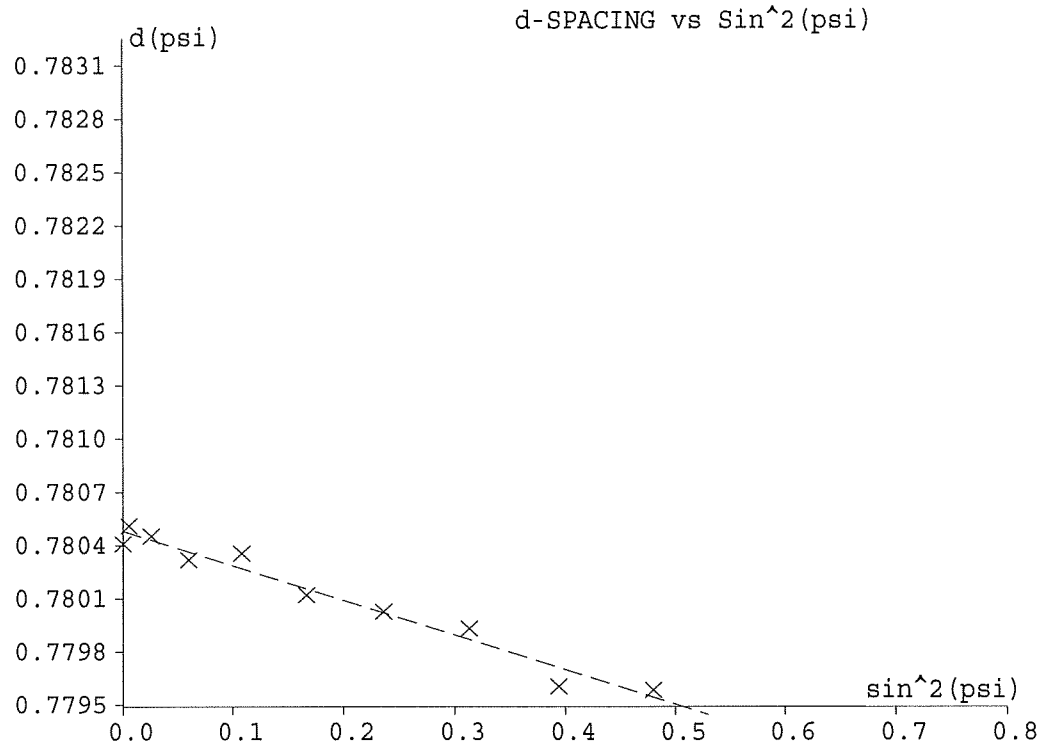


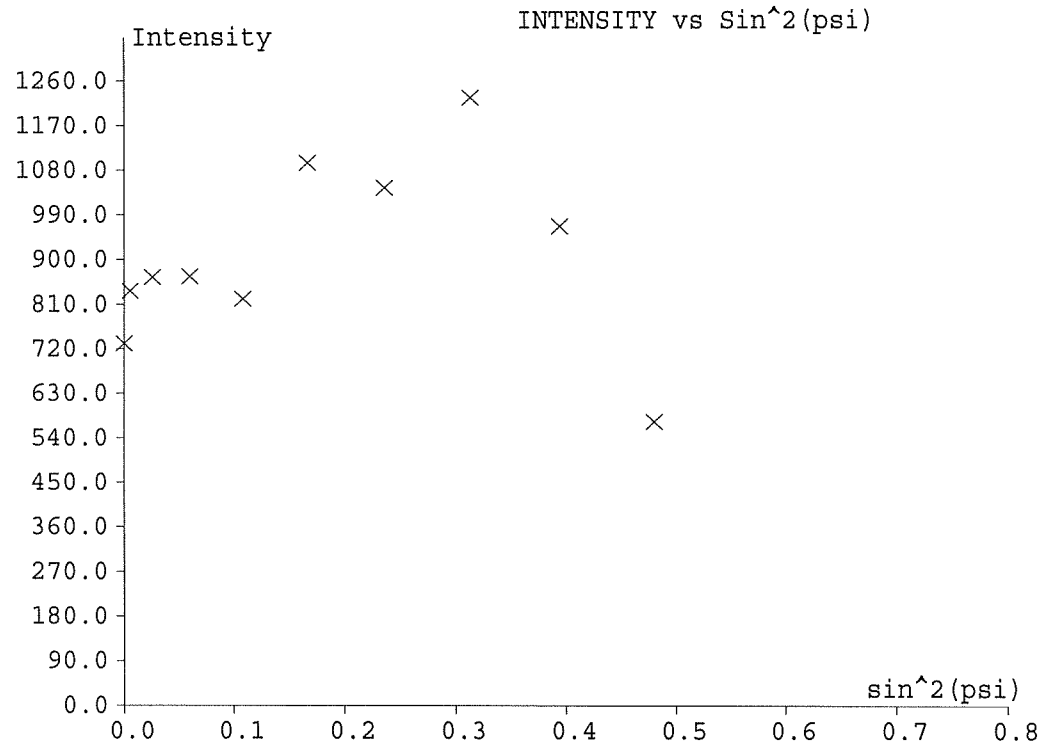



```
================================== TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7777.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 7 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   6:01pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00018   159.58    731.0   4.04  0.27149    161.52  0.780409  0.000086
  5.0  0.00559   158.02    837.1   4.12  0.27065    161.43  0.780510  0.000044
 10.0  0.02590   158.92    865.0   4.27  0.27219    161.48  0.780453  0.000072
 15.0  0.06017   161.05    865.9   4.55  0.27575    161.60  0.780318  0.000061
 20.0  0.10833   160.45    821.0   4.33  0.27381    161.57  0.780354  0.000039
 25.0  0.16685   164.08   1093.9   3.72  0.27323    161.78  0.780119  0.000034
 30.0  0.23603   165.57   1044.0   4.13  0.27696    161.87  0.780027  0.000053
 35.0  0.31306   167.08   1225.2   3.88  0.27708    161.96  0.779931  0.000031
 40.0  0.39382   172.32    966.1   3.92  0.28209    162.26  0.779603  0.000025
 45.0  0.48011   172.66    572.1   4.22  0.28404    162.28  0.779584  0.000040

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780481
Slope of Fitted Line...............:     -0.001954
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -19.9 KSI    -137.5 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       7.0 MPa
Probable error.................(+/-):      1.3 KSI       9.1 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7777.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 7 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -19.9 KSI | -137.5 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 7.0 MPa |
| Probable error.....(+/-): | 1.3 KSI | 9.1 MPa |

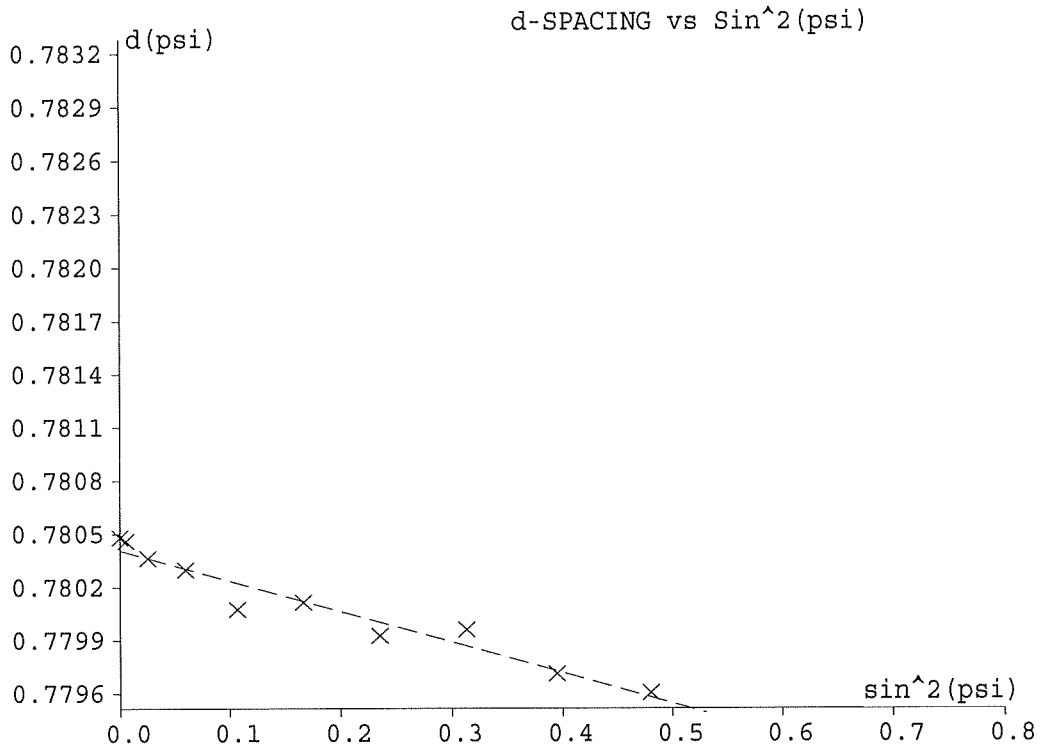


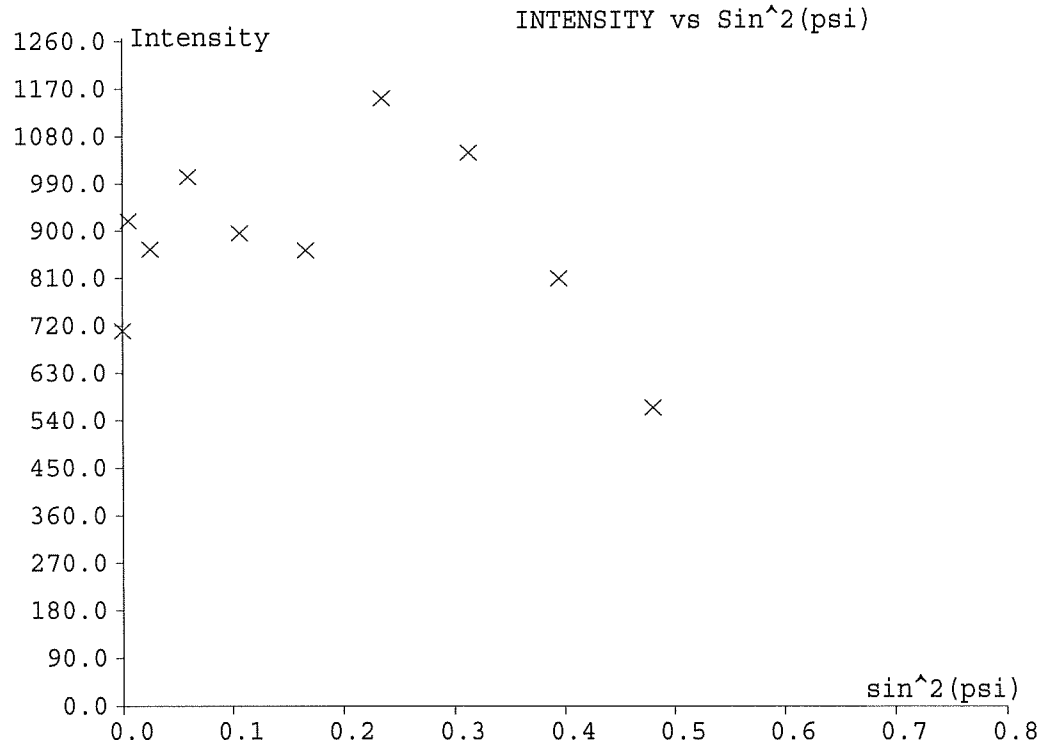



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7778.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 8 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   6:06pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00016   158.48    710.0   4.16  0.27121    161.45  0.780480  0.000065
  5.0  0.00553   158.77    918.9   4.03  0.27086    161.47  0.780461  0.000051
 10.0  0.02568   160.28    864.6   4.09  0.27228    161.56  0.780364  0.000046
 15.0  0.06010   161.30   1003.0   4.21  0.27369    161.62  0.780299  0.000049
 20.0  0.10695   164.81    895.4   4.17  0.27640    161.82  0.780075  0.000058
 25.0  0.16682   164.18    862.2   3.96  0.27482    161.79  0.780114  0.000049
 30.0  0.23534   167.17   1151.4   4.02  0.27786    161.96  0.779926  0.000051
 35.0  0.31327   166.60   1047.7   3.77  0.27591    161.93  0.779960  0.000032
 40.0  0.39467   170.62    808.3   4.13  0.28166    162.16  0.779710  0.000040
 45.0  0.48028   172.31    563.8   3.87  0.28182    162.26  0.779604  0.000048

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780409
Slope of Fitted Line...............:     -0.001728
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -17.6 KSI    -121.7 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       6.7 MPa
Probable error.................(+/-):      1.5 KSI      10.4 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7778.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 8 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -17.6 KSI | -121.7 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 6.7 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.4 MPa |

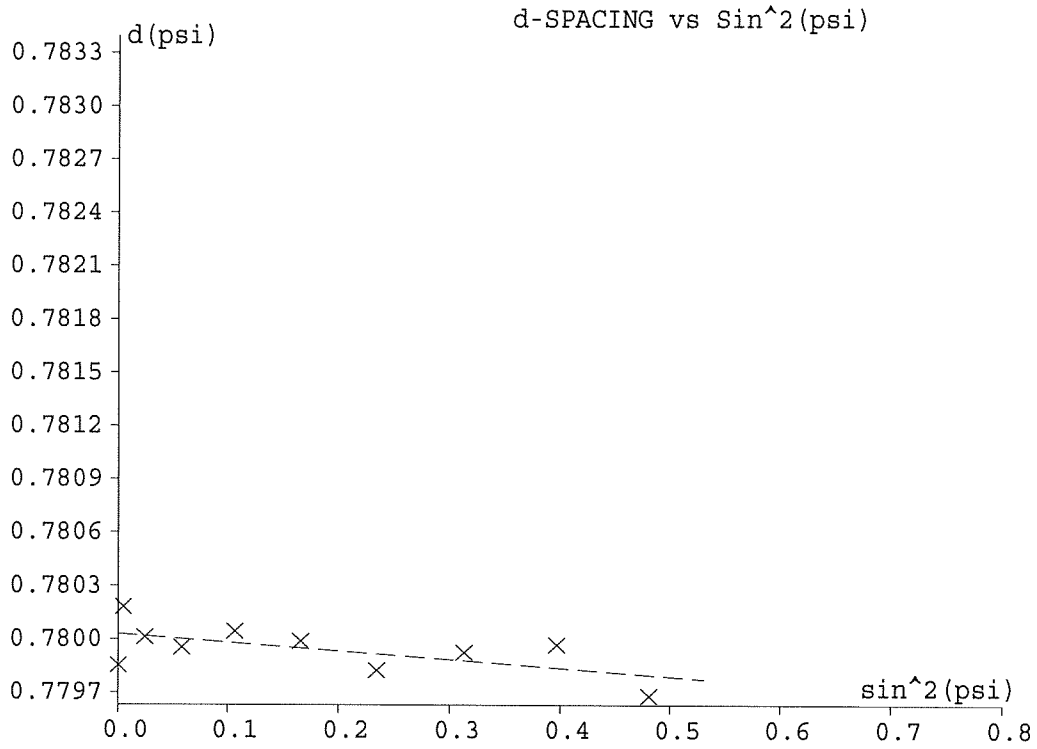


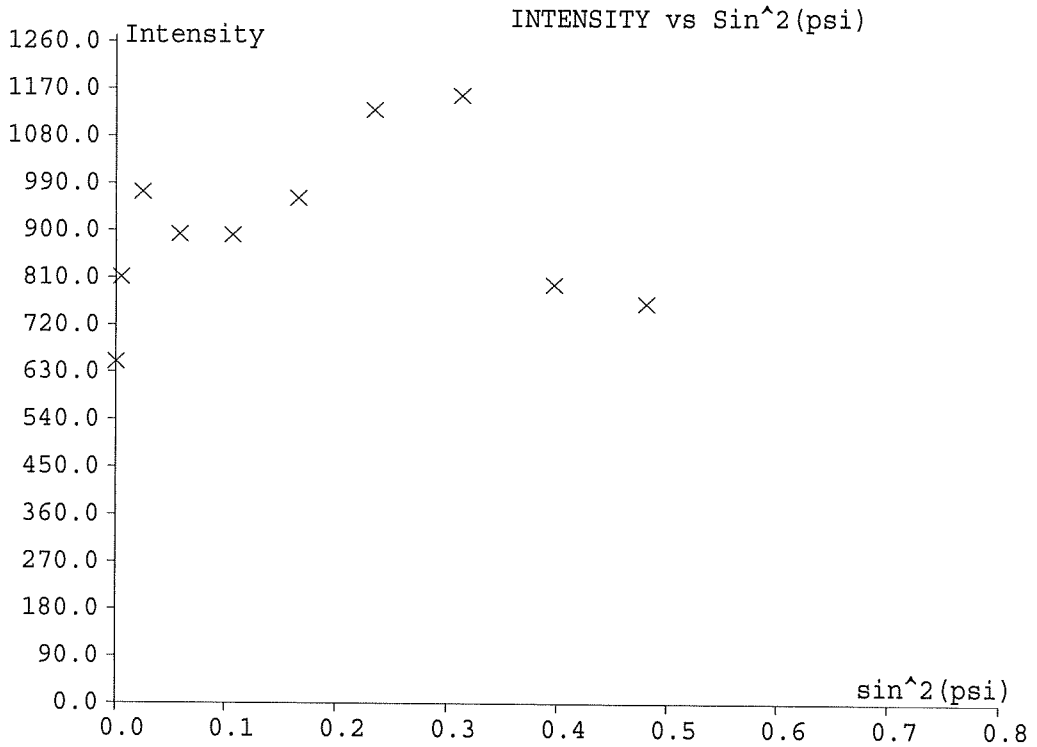



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7779.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 9 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   6:12pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00031   168.36    649.9   4.44  0.28138    162.03  0.779853  0.000069
  5.0  0.00521   163.11    811.1   4.00  0.27403    161.72  0.780182  0.000046
 10.0  0.02479   165.80    973.5   4.01  0.27653    161.88  0.780012  0.000045
 15.0  0.05880   166.72    892.8   4.18  0.27825    161.93  0.779955  0.000040
 20.0  0.10680   165.25    891.0   3.81  0.27499    161.85  0.780045  0.000040
 25.0  0.16608   166.11    960.9   3.59  0.27413    161.90  0.779989  0.000037
 30.0  0.23465   168.75   1128.8   3.80  0.27807    162.05  0.779825  0.000040
 35.0  0.31302   167.17   1156.2   4.12  0.27839    161.96  0.779926  0.000032
 40.0  0.39673   166.47    796.3   3.87  0.27649    161.92  0.779969  0.000036
 45.0  0.48091   171.06    760.5   3.78  0.28000    162.19  0.779681  0.000041

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780030
Slope of Fitted Line...............:    -0.0004821
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -4.9 KSI     -34.0 MPa

Counting Statistics Stress Error (+/-):      0.9 KSI       6.1 MPa
Probable error.................(+/-):      2.3 KSI      15.6 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7779.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 9 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.9 KSI | -34.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.9 KSI | 6.1 MPa |
| Probable error.....(+/-): | 2.3 KSI | 15.6 MPa |

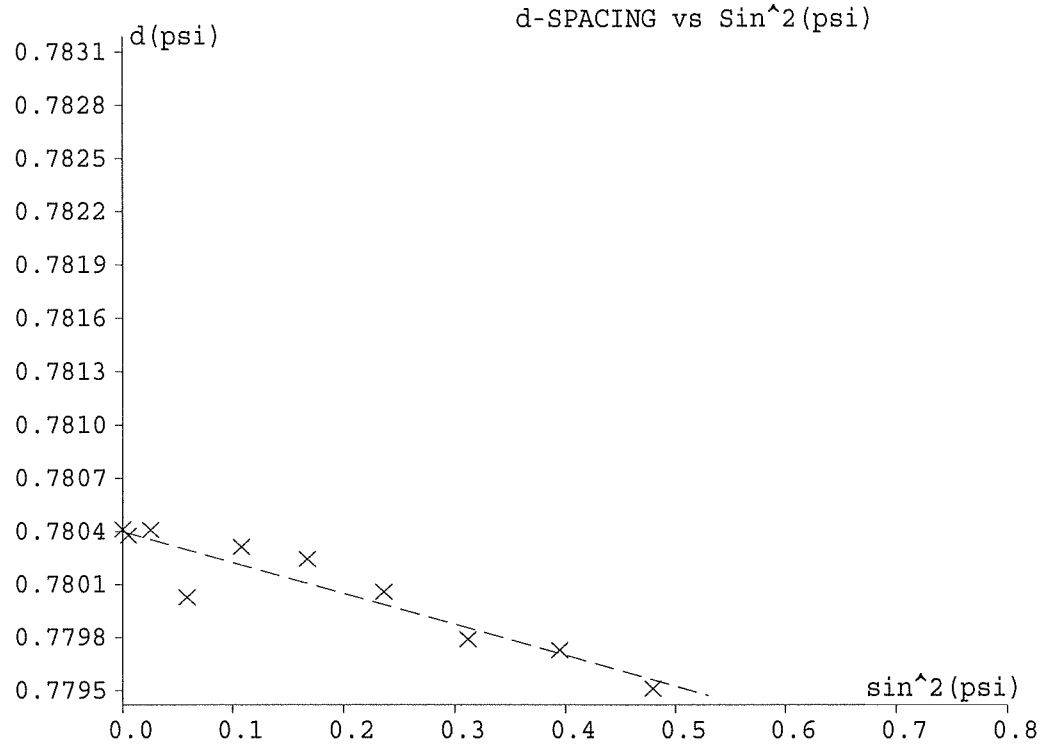


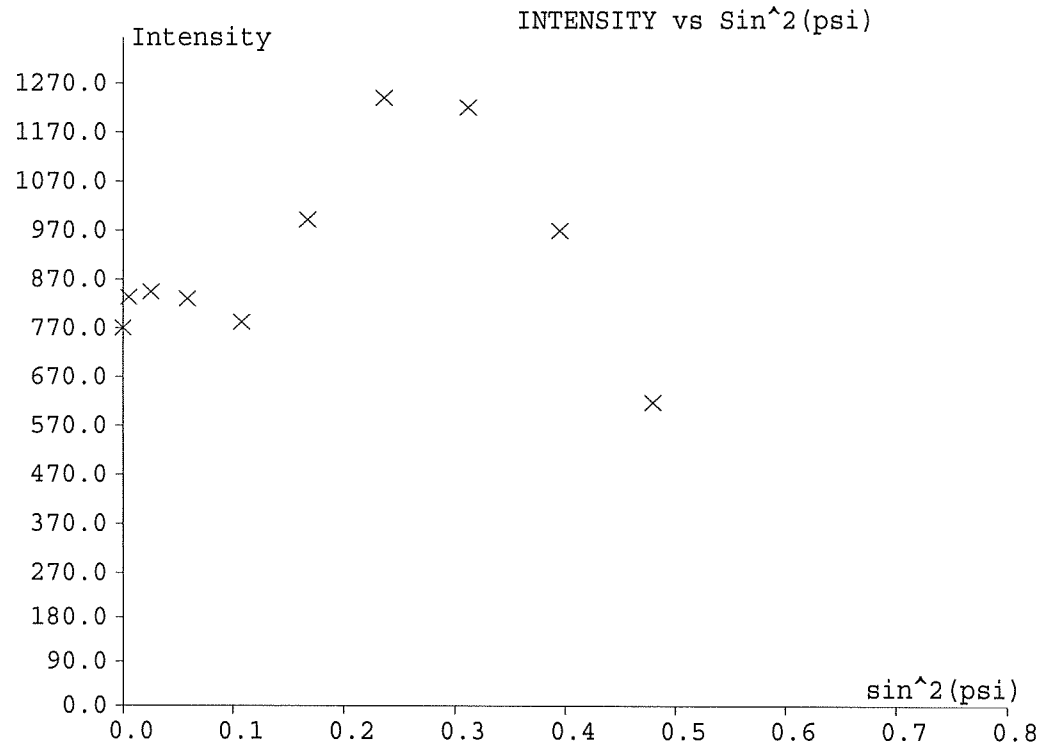



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7780.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 10 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   6:18pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00018   159.53    771.0   3.92  0.27094    161.52  0.780412  0.000043
  5.0  0.00543   160.06    833.5   4.08  0.27208    161.55  0.780378  0.000064
 10.0  0.02578   159.64    844.7   4.49  0.27427    161.52  0.780408  0.000104
 15.0  0.05907   165.58    830.5   4.23  0.27752    161.87  0.780027  0.000053
 20.0  0.10813   161.07    782.7   4.05  0.27268    161.60  0.780313  0.000043
 25.0  0.16759   162.12    991.7   3.62  0.27092    161.67  0.780243  0.000036
 30.0  0.23625   165.01   1239.4   3.61  0.27330    161.84  0.780059  0.000031
 35.0  0.31200   169.32   1220.1   3.81  0.27869    162.09  0.779790  0.000035
 40.0  0.39482   170.32    968.8   4.10  0.28120    162.14  0.779728  0.000045
 45.0  0.47952   173.77    617.2   3.72  0.28198    162.35  0.779512  0.000037

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780400
Slope of Fitted Line...............:     -0.001748
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -17.8 KSI    -123.1 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       7.2 MPa
Probable error.................(+/-):      2.4 KSI      16.6 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7780.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 10 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -17.8 KSI | -123.1 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 7.2 MPa |
| Probable error.....(+/-): | 2.4 KSI | 16.6 MPa |

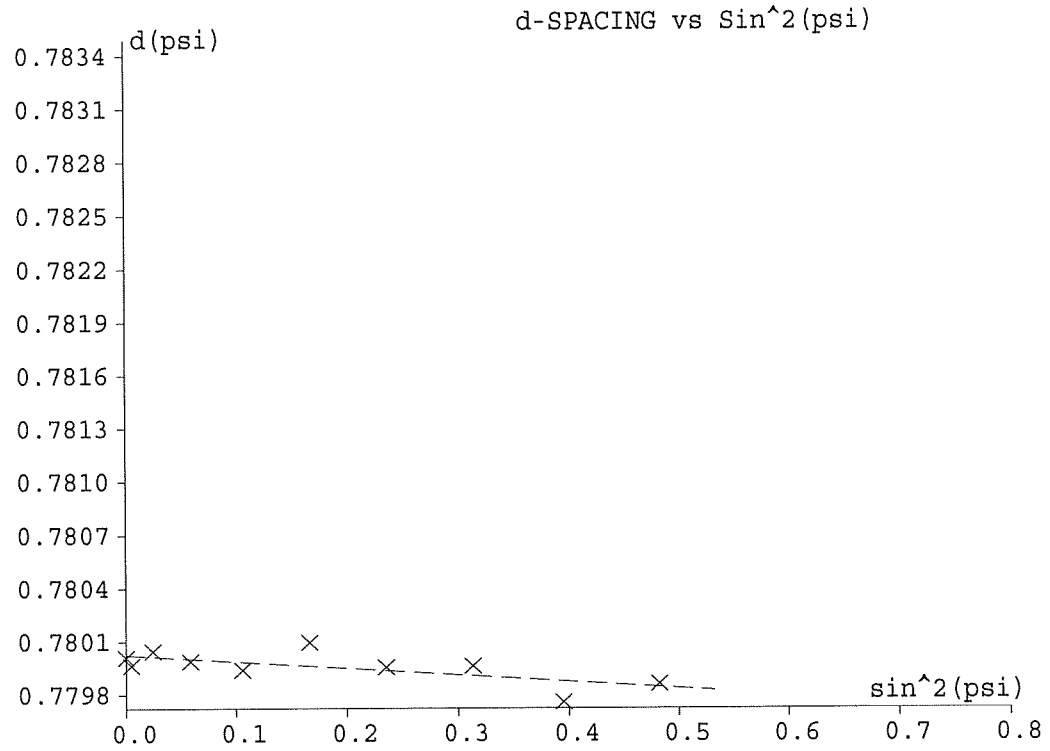


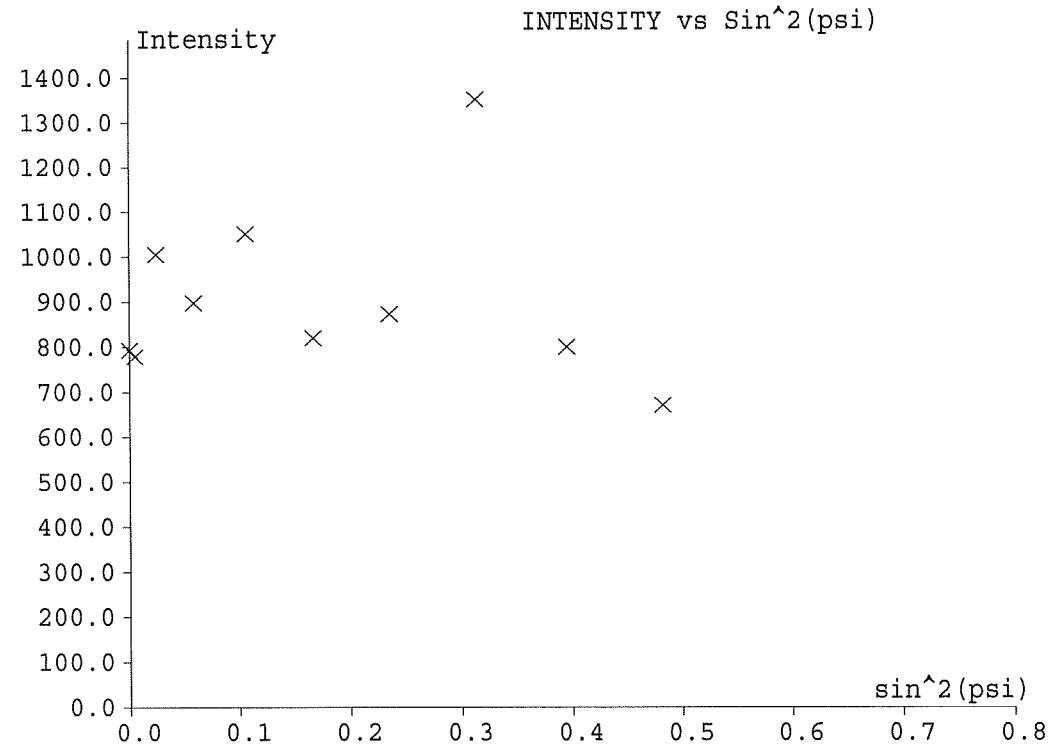



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7781.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 11 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   6:23pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00027   165.84    792.6   4.07  0.27688    161.88  0.780010  0.000055
  5.0  0.00496   166.55    778.8   3.95  0.27695    161.92  0.779964  0.000040
 10.0  0.02488   165.24   1004.8   3.75  0.27452    161.85  0.780046  0.000040
 15.0  0.05892   166.21    897.6   4.27  0.27831    161.90  0.779988  0.000057
 20.0  0.10628   166.94   1050.2   4.00  0.27754    161.95  0.779940  0.000043
 25.0  0.16671   164.47    819.6   3.84  0.27449    161.80  0.780095  0.000036
 30.0  0.23553   166.67    871.5   3.53  0.27410    161.93  0.779954  0.000035
 35.0  0.31328   166.61   1349.2   3.94  0.27695    161.93  0.779960  0.000023
 40.0  0.39505   169.86    798.8   4.11  0.28083    162.12  0.779758  0.000027
 45.0  0.48237   168.16    669.3   3.67  0.27649    162.02  0.779861  0.000029

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780025
Slope of Fitted Line...............:    -0.0003778
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -3.9 KSI     -26.6 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       5.1 MPa
Probable error.................(+/-):      1.4 KSI       9.9 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7781.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 11 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -3.9 KSI | -26.6 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 5.1 MPa |
| Probable error.....(+/-): | 1.4 KSI | 9.9 MPa |

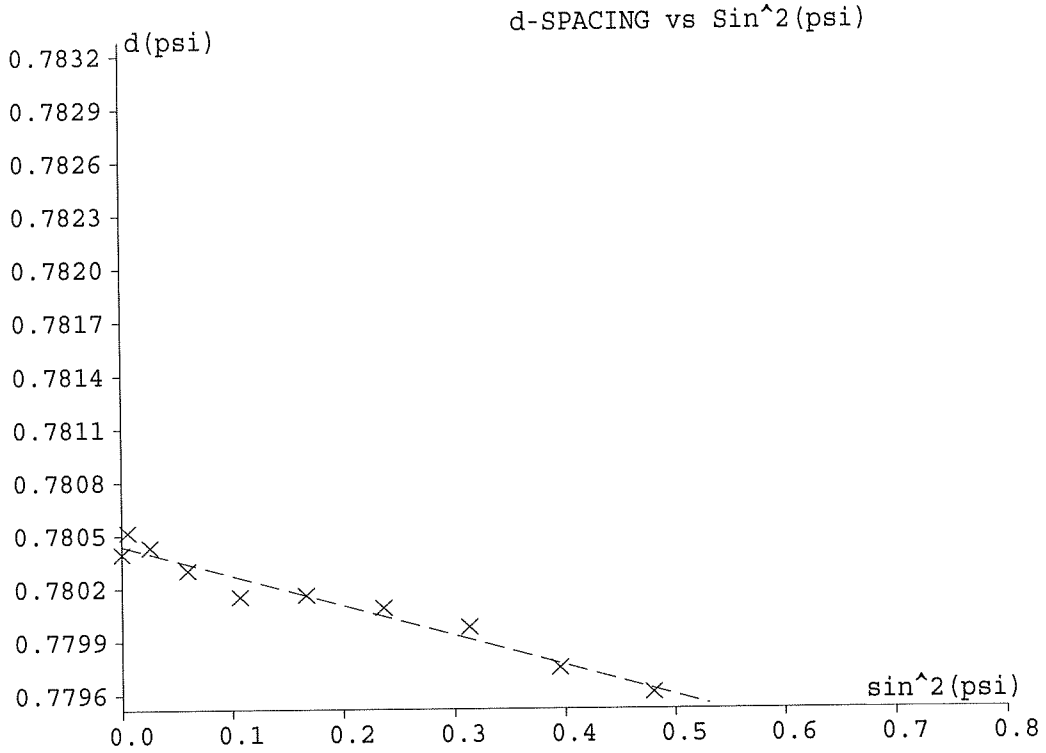


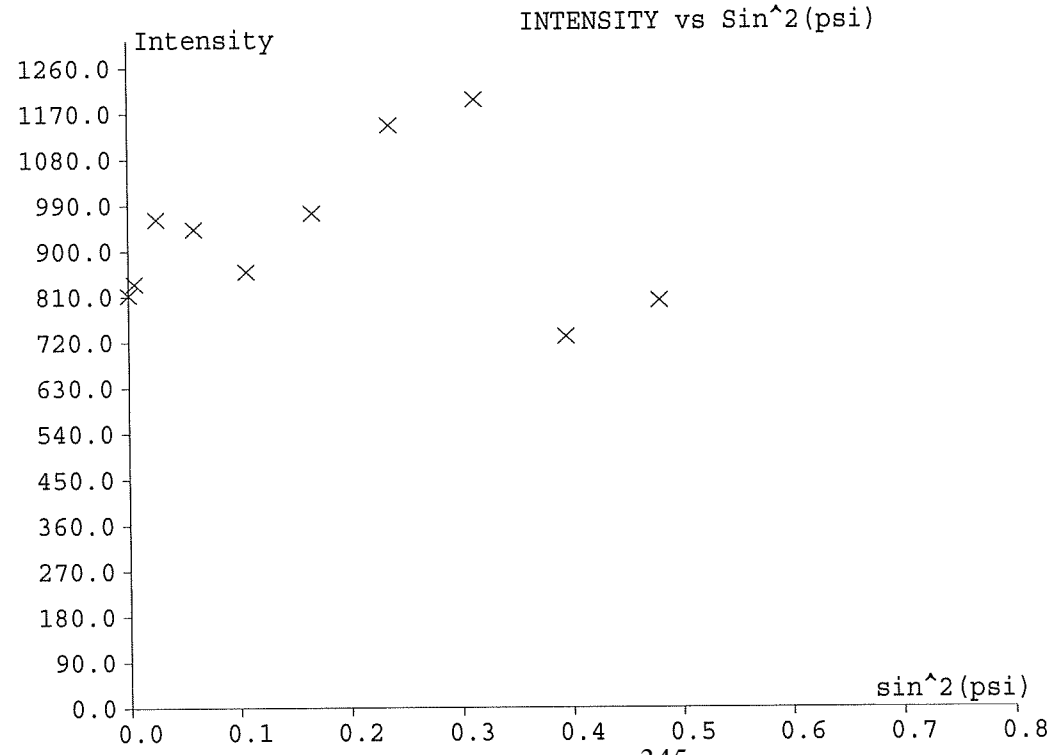



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7782.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 12 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   6:29pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00018   159.82    812.5   4.26  0.27283    161.53  0.780394  0.000049
  5.0  0.00559   157.92    835.2   4.15  0.27075    161.42  0.780516  0.000055
 10.0  0.02584   159.20    962.4   3.73  0.26947    161.50  0.780432  0.000043
 15.0  0.06011   161.28    942.6   4.07  0.27294    161.62  0.780300  0.000045
 20.0  0.10732   163.65    858.9   4.38  0.27669    161.75  0.780150  0.000059
 25.0  0.16710   163.45    973.4   3.91  0.27392    161.74  0.780160  0.000045
 30.0  0.23644   164.54   1145.7   3.48  0.27179    161.81  0.780088  0.000029
 35.0  0.31341   166.34   1195.2   3.95  0.27675    161.91  0.779977  0.000032
 40.0  0.39497   170.01    729.8   4.01  0.28043    162.13  0.779747  0.000038
 45.0  0.48032   172.22    800.2   3.84  0.28152    162.26  0.779609  0.000033

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780440
Slope of Fitted Line...............:     -0.001688
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -17.2 KSI    -118.8 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.6 MPa
Probable error.................(+/-):      1.3 KSI       8.6 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7782.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 12 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -17.2 KSI | -118.8 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.6 MPa |
| Probable error.....(+/-): | 1.3 KSI | 8.6 MPa |



========== TEC Stress Analyzer v1.64 ==========
========== Residual Stress Analysis Report ==========

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7783.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 13 / Baseline / Longitudinal
ebm

Acquisition date & time: 11/04/2005 6:34pm

Material [hkl].....: Al 5083-H23 [333]
Depth.....: 0.0000000
Phi angle.....: 0.00
Collimator.....: Round_4mm
Bracket.....: 160s
Peak Bounding Range [percent].....: 20
X-ray Target Description and Wavelength: copper 1.54056
PSI Oscillation Angle Range.....: 2.00
Spectra count time (PSI=0).....: 20.0
High Voltage(kV) and Beam Current(mA)..: 45.00 1.00
ADC Channels Full Scale.....: 256
Detector Calibration Coefficients:
A 1.99867E-07 B -7.91049E-05 C 0.0688651 D 148.0028

| Psi | Sin^2(psi) | Pk Chan | Intens | FWHM | Kalp Cor A | 2-Theta | D Spacing | St. Dev. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00025 | 164.66 | 842.7 | 4.15 | 0.27619 | 161.81 | 0.780085 | 0.000045 |
| 5.0 | 0.00484 | 168.17 | 824.6 | 3.94 | 0.27839 | 162.02 | 0.779863 | 0.000043 |
| 10.0 | 0.02468 | 166.49 | 879.5 | 3.94 | 0.27685 | 161.92 | 0.779968 | 0.000055 |
| 15.0 | 0.05870 | 167.11 | 846.5 | 4.00 | 0.27769 | 161.96 | 0.779929 | 0.000052 |
| 20.0 | 0.10666 | 165.71 | 762.8 | 3.94 | 0.27610 | 161.88 | 0.780017 | 0.000039 |
| 25.0 | 0.16594 | 166.53 | 829.0 | 4.02 | 0.27725 | 161.92 | 0.779966 | 0.000053 |
| 30.0 | 0.23489 | 168.17 | 1187.4 | 3.71 | 0.27687 | 162.02 | 0.779861 | 0.000028 |
| 35.0 | 0.31341 | 166.18 | 1395.9 | 3.07 | 0.26805 | 161.91 | 0.779979 | 0.000028 |
| 40.0 | 0.39585 | 168.25 | 794.2 | 4.15 | 0.27951 | 162.02 | 0.779858 | 0.000047 |
| 45.0 | 0.48222 | 168.46 | 683.1 | 3.67 | 0.27680 | 162.04 | 0.779842 | 0.000034 |

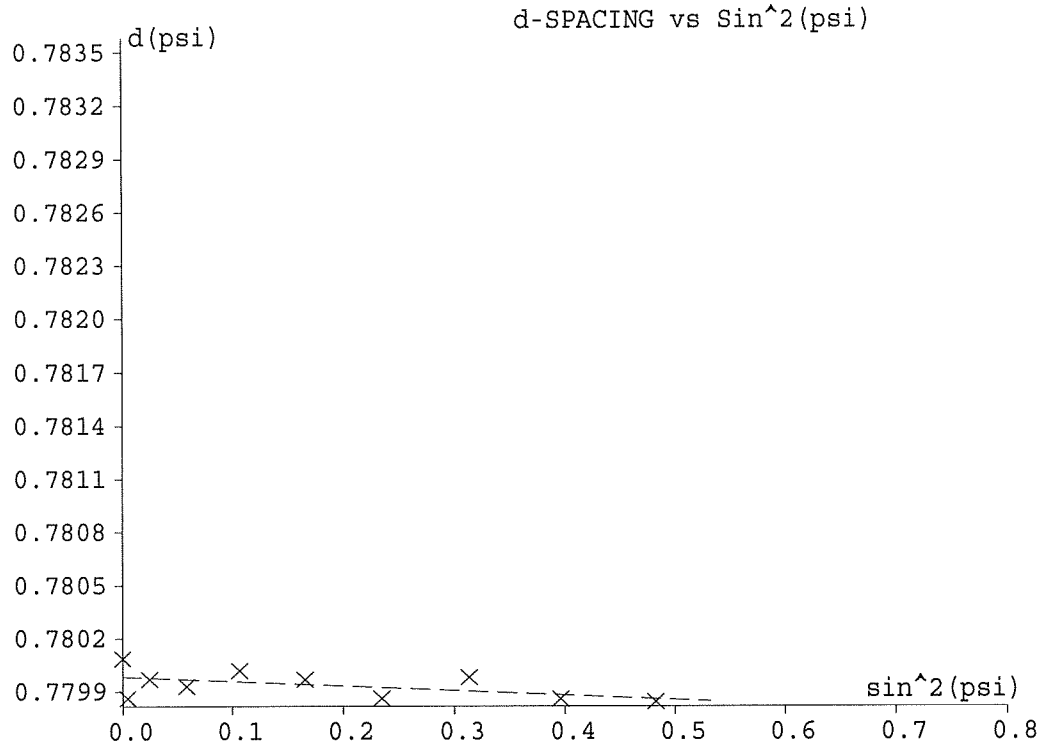
Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept.....: 0.779982
Slope of Fitted Line.....: -0.0002556
Material Stress Constant.....: 1.255E-07

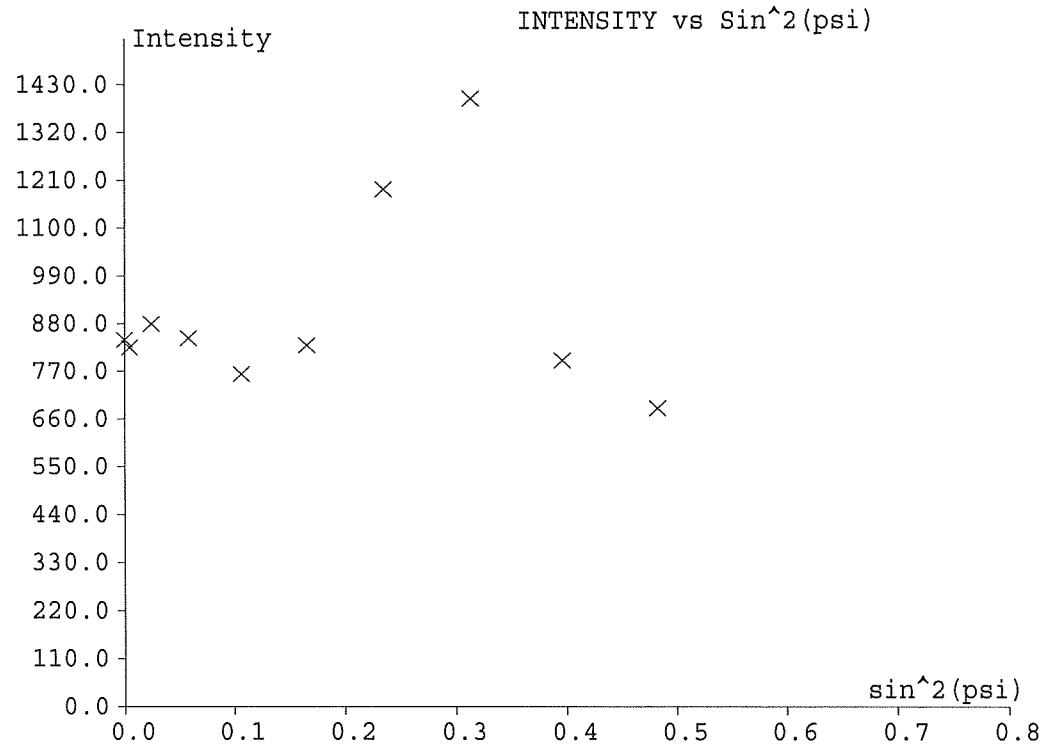
*Residual Stress.....: -2.6 KSI -18.0 MPa

Counting Statistics Stress Error (+/-): 0.8 KSI 5.7 MPa
Probable error.....(+/-): 1.4 KSI 9.8 MPa
Warning: Counting statistics may be the controlling error!

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7783.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 13 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -2.6 KSI | -18.0 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.7 MPa |
| Probable error.....(+/-): | 1.4 KSI | 9.8 MPa |

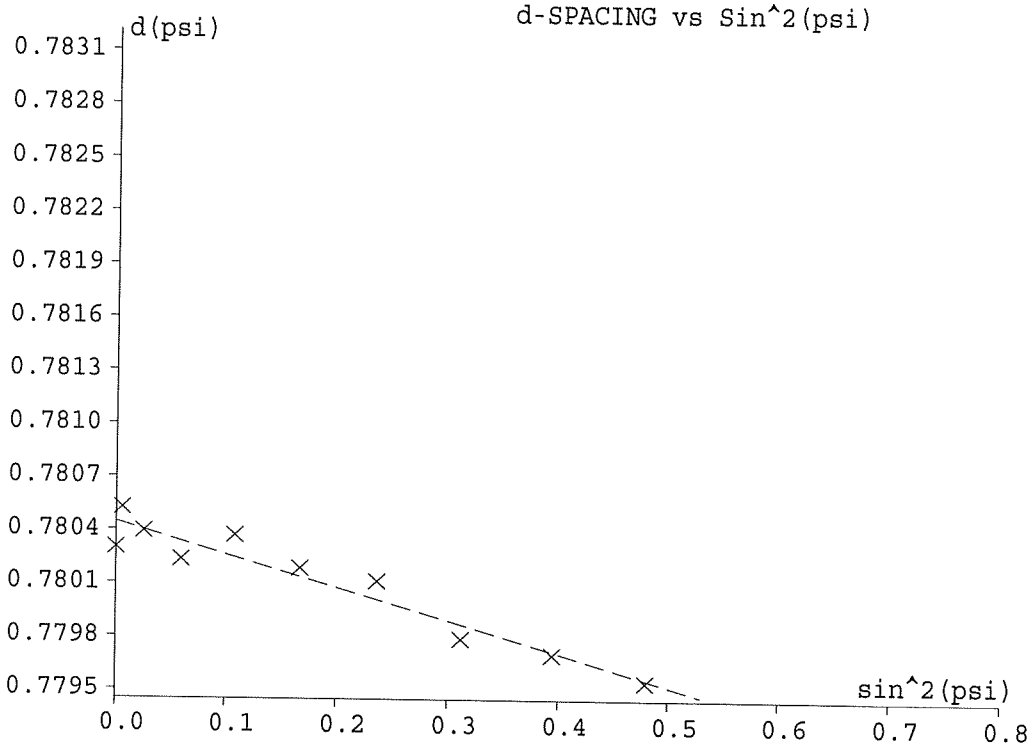


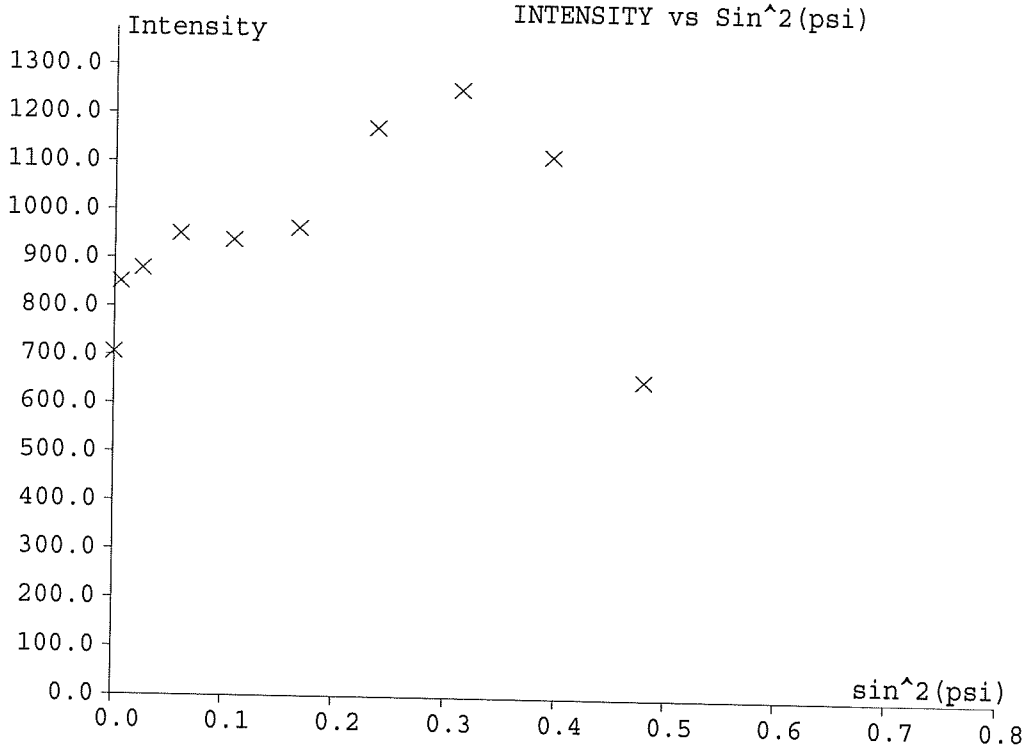



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7784.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 14 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   6:40pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00020   161.25    706.0   3.98  0.27252    161.62  0.780301  0.000052
  5.0  0.00560   157.77    850.6   3.79  0.26889    161.41  0.780524  0.000046
 10.0  0.02575   159.84    878.8   4.07  0.27185    161.53  0.780392  0.000046
 15.0  0.05986   162.31    950.6   4.17  0.27423    161.68  0.780234  0.000037
 20.0  0.10841   160.15    937.9   4.00  0.27175    161.55  0.780372  0.000040
 25.0  0.16724   163.04    962.9   3.72  0.27232    161.72  0.780185  0.000037
 30.0  0.23662   164.17   1170.6   3.74  0.27351    161.79  0.780114  0.000035
 35.0  0.31199   169.33   1250.2   3.81  0.27867    162.09  0.779789  0.000039
 40.0  0.39458   170.75   1113.9   3.74  0.27941    162.17  0.779699  0.000032
 45.0  0.47980   173.22    652.7   3.73  0.28153    162.32  0.779546  0.000035

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780446
Slope of Fitted Line...............:     -0.001843
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -18.8 KSI    -129.7 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.5 MPa
Probable error.................(+/-):      1.9 KSI      13.3 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7784.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 14 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -18.8 KSI | -129.7 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.5 MPa |
| Probable error.....(+/-): | 1.9 KSI | 13.3 MPa |

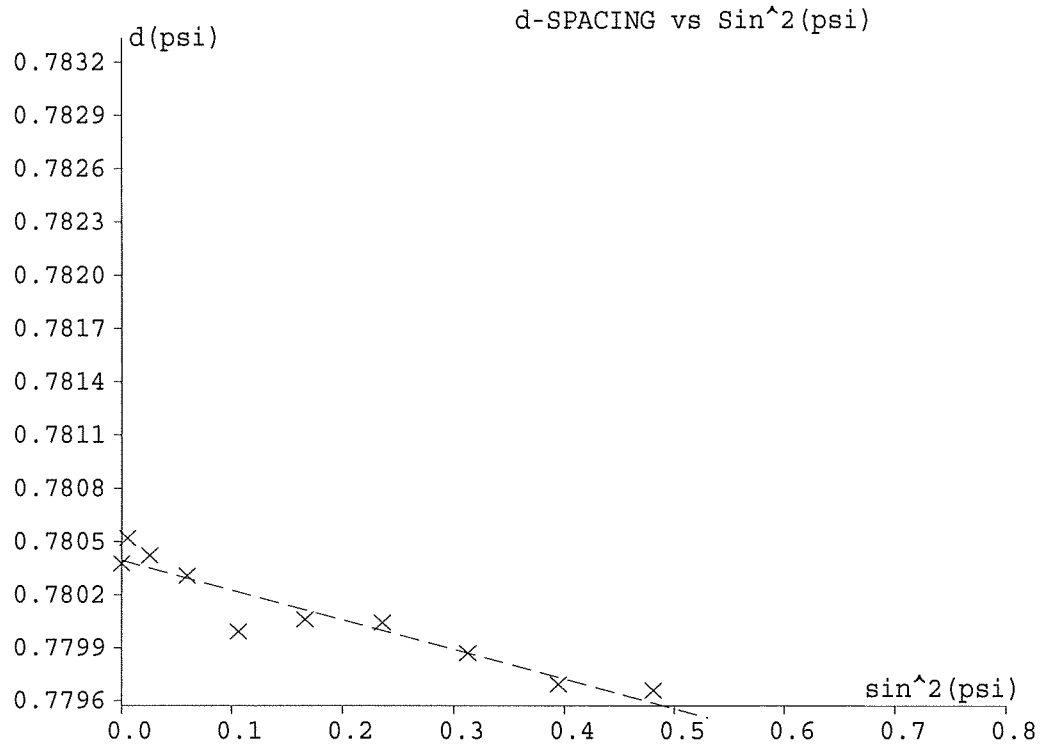


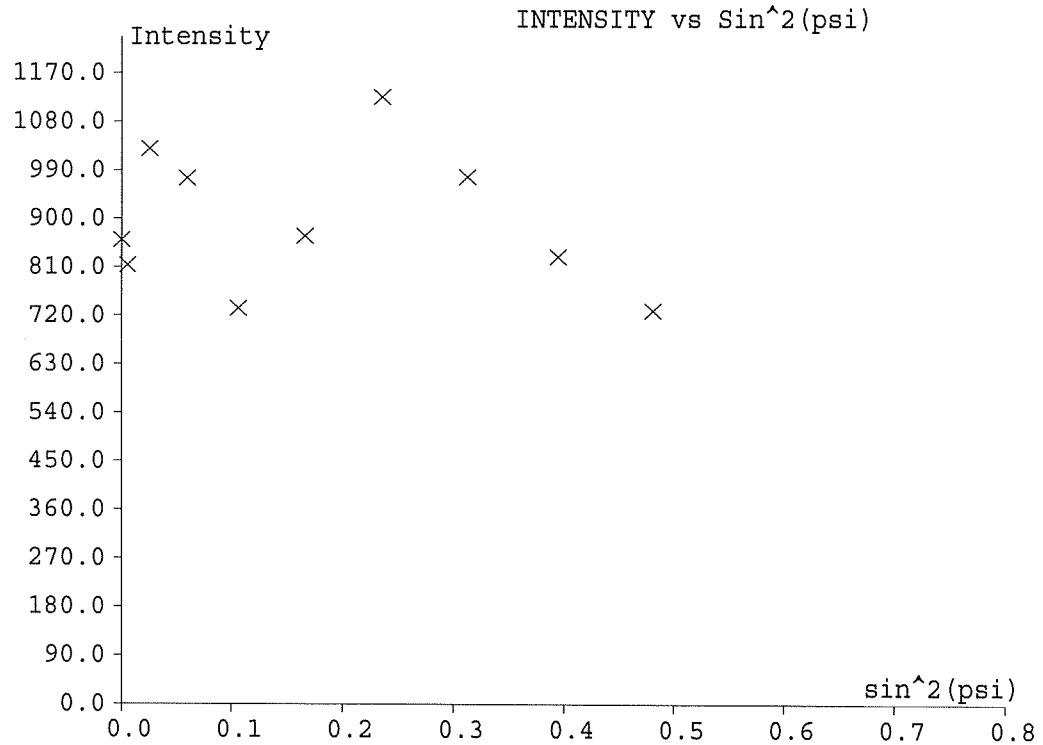



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7785.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 15 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   6:45pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00018   160.07    860.7   3.96  0.27152    161.55  0.780377  0.000045
  5.0  0.00560   157.87    813.8   4.19  0.27085    161.42  0.780520  0.000046
 10.0  0.02582   159.39   1029.2   3.99  0.27111    161.51  0.780421  0.000039
 15.0  0.06014   161.15    974.8   4.07  0.27284    161.61  0.780308  0.000043
 20.0  0.10654   166.13    732.8   4.22  0.27793    161.90  0.779992  0.000048
 25.0  0.16650   165.03    866.7   3.98  0.27570    161.84  0.780060  0.000042
 30.0  0.23613   165.29   1124.2   3.69  0.27415    161.85  0.780042  0.000034
 35.0  0.31260   168.04    976.2   3.93  0.27819    162.01  0.779870  0.000029
 40.0  0.39454   170.89    827.9   4.12  0.28185    162.18  0.779693  0.000040
 45.0  0.48073   171.40    727.5   3.70  0.27966    162.21  0.779659  0.000029

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780395
Slope of Fitted Line...............:     -0.001679
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -17.1 KSI    -118.2 MPa

Counting Statistics Stress Error (+/-):      0.7 KSI       5.1 MPa
Probable error.................(+/-):      2.0 KSI      14.1 MPa
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7785.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 15 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -17.1 KSI | -118.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.7 KSI | 5.1 MPa |
| Probable error.....(+/-): | 2.0 KSI | 14.1 MPa |

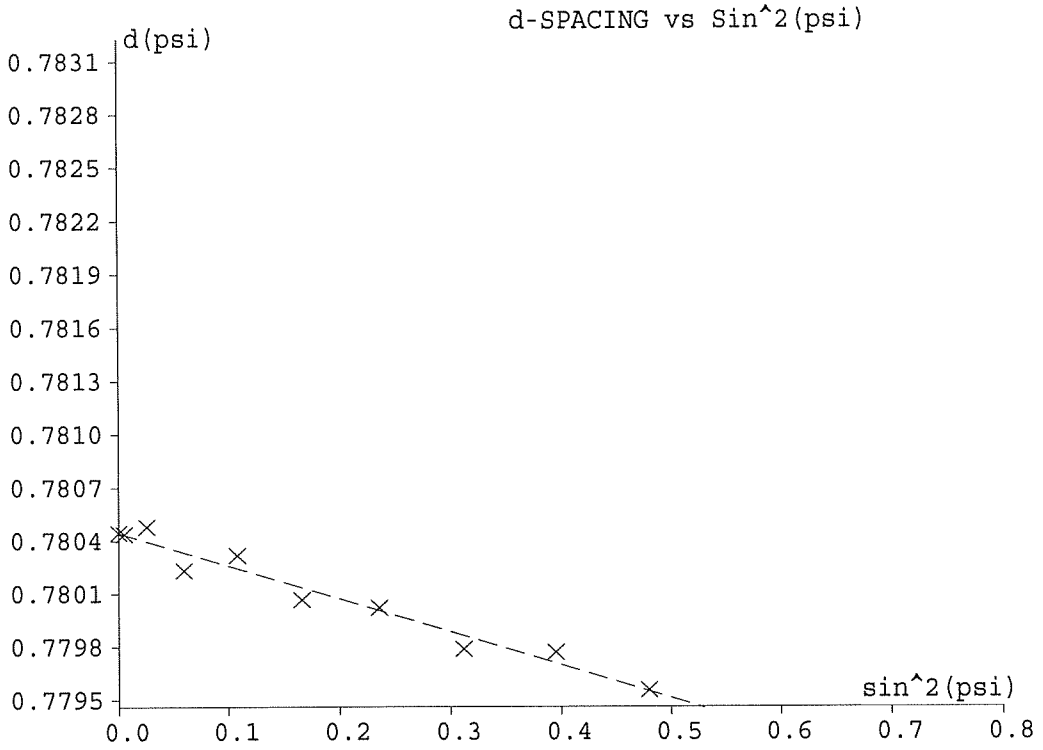


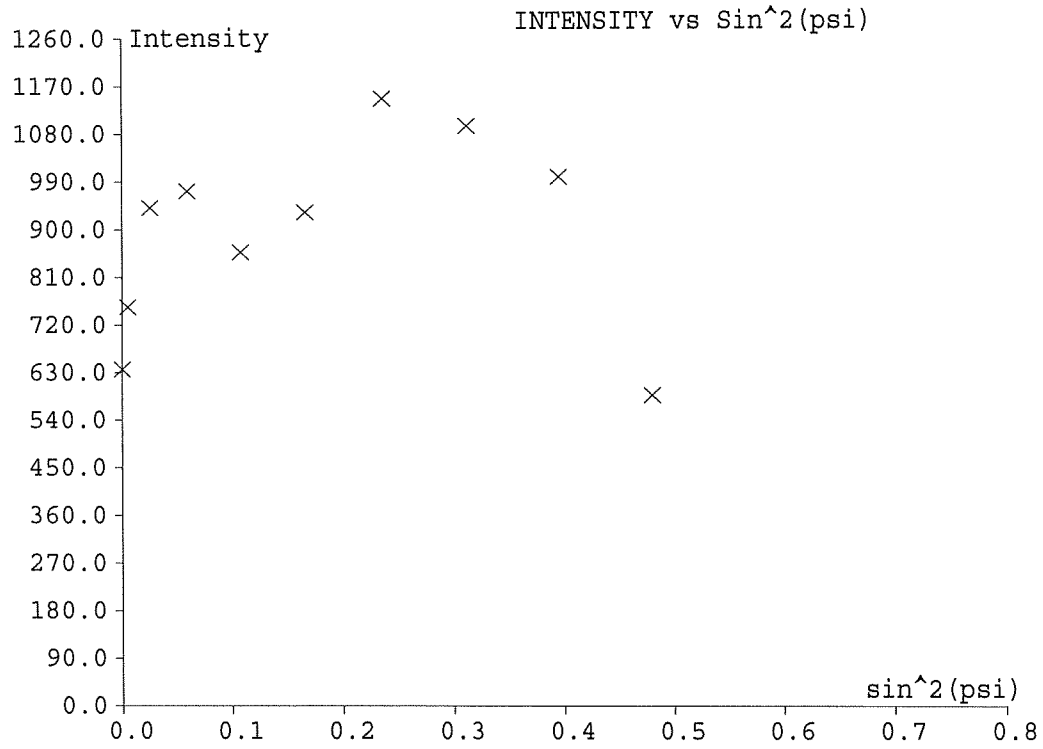



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7786.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 16 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   6:51pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00017   159.01    635.9   3.94  0.27061    161.49  0.780445  0.000052
  5.0  0.00550   159.12    753.9   3.89  0.27045    161.49  0.780438  0.000049
 10.0  0.02596   158.47    940.7   3.90  0.26999    161.45  0.780480  0.000054
 15.0  0.05985   162.34    972.3   4.13  0.27408    161.68  0.780232  0.000042
 20.0  0.10814   161.00    857.1   3.98  0.27234    161.60  0.780317  0.000040
 25.0  0.16653   164.95    931.9   3.94  0.27545    161.83  0.780065  0.000045
 30.0  0.23599   165.65   1145.7   4.00  0.27639    161.87  0.780021  0.000039
 35.0  0.31198   169.37   1093.9   4.14  0.28052    162.09  0.779788  0.000036
 40.0  0.39515   169.65    997.8   3.91  0.27958    162.11  0.779770  0.000050
 45.0  0.47989   173.11    585.9   4.32  0.28499    162.31  0.779556  0.000190

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780445
Slope of Fitted Line...............:     -0.001864
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -19.0 KSI    -131.2 MPa

Counting Statistics Stress Error (+/-):      2.4 KSI      16.2 MPa
Probable error.................(+/-):      1.4 KSI       9.4 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7786.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 16 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -19.0 KSI | -131.2 MPa |
| Counting Statistics Stress Error (+/-): | 2.4 KSI | 16.2 MPa |
| Probable error.....(+/-): | 1.4 KSI | 9.4 MPa |

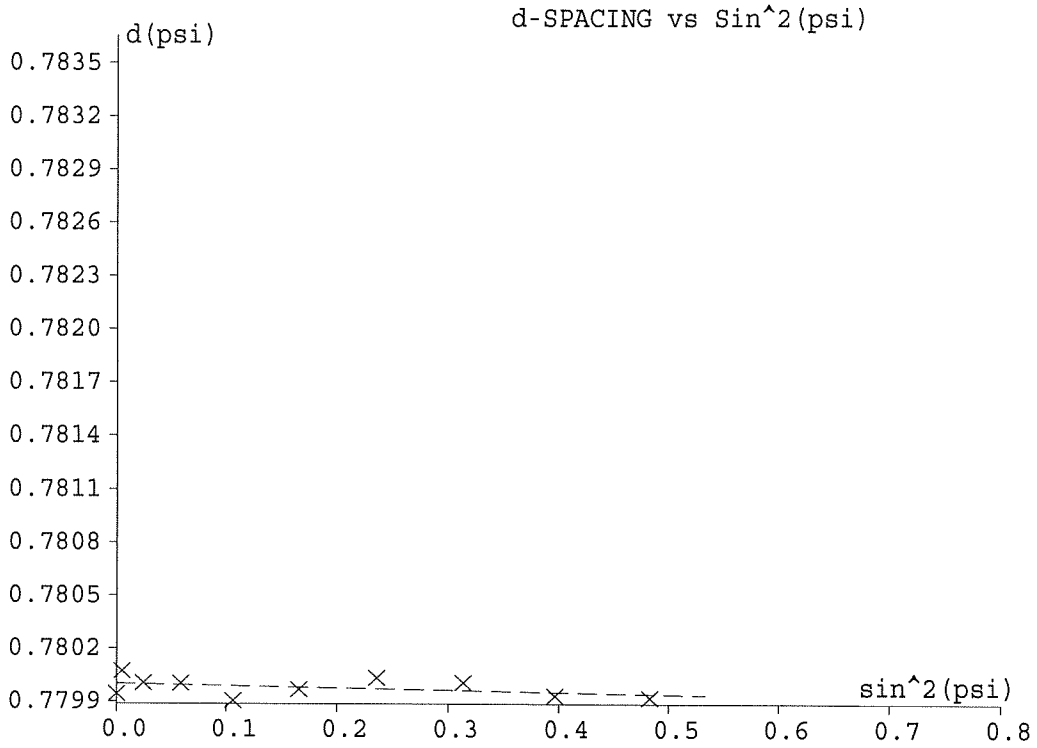


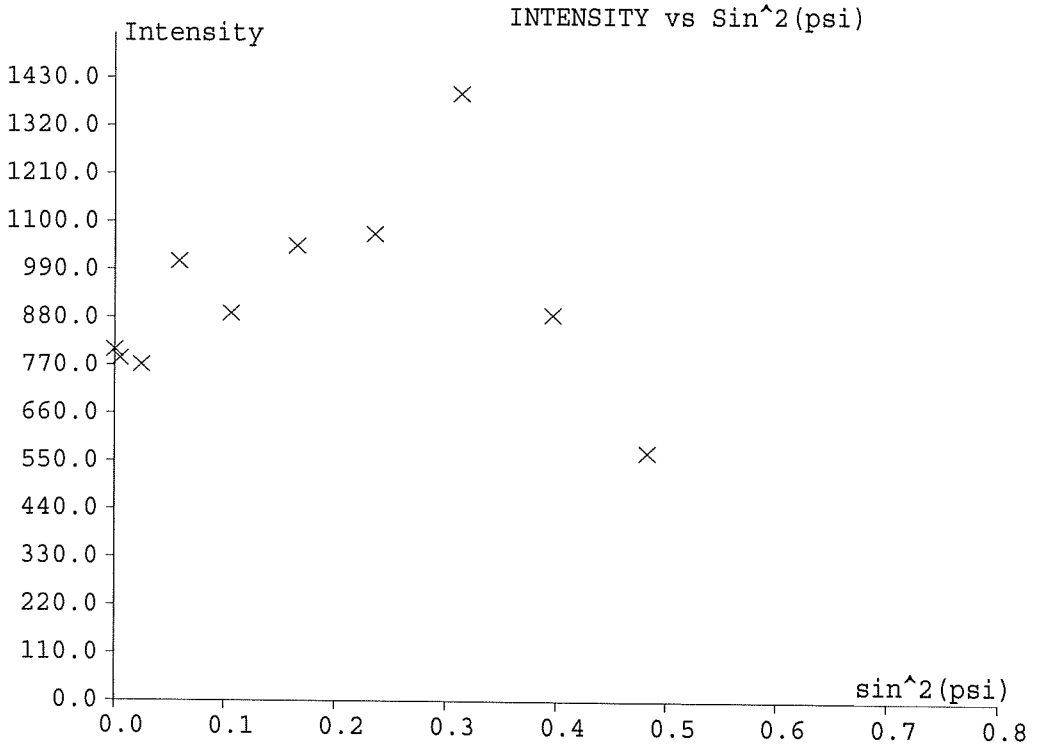



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7787.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 17 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   6:56pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00029   166.86    806.0   3.87  0.27682    161.94  0.779944  0.000043
  5.0  0.00508   164.83    785.9   3.92  0.27522    161.82  0.780073  0.000038
 10.0  0.02478   165.94    771.5   4.26  0.27800    161.89  0.780005  0.000047
 15.0  0.05898   165.93   1008.6   3.93  0.27629    161.89  0.780003  0.000042
 20.0  0.10611   167.49    889.5   3.99  0.27799    161.98  0.779906  0.000036
 25.0  0.16596   166.47   1044.1   4.05  0.27735    161.92  0.779970  0.000040
 30.0  0.23608   165.46   1071.1   4.14  0.27688    161.86  0.780034  0.000040
 35.0  0.31363   165.85   1392.7   3.85  0.27581    161.88  0.780008  0.000028
 40.0  0.39644   167.02    886.0   3.73  0.27600    161.95  0.779933  0.000036
 45.0  0.48287   167.21    569.2   3.83  0.27688    161.96  0.779922  0.000044

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780001
Slope of Fitted Line...............:    -0.0001193
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -1.2 KSI      -8.4 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.6 MPa
Probable error.................(+/-):      1.0 KSI       7.2 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7787.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 17 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -1.2 KSI | -8.4 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.6 MPa |
| Probable error.....(+/-): | 1.0 KSI | 7.2 MPa |

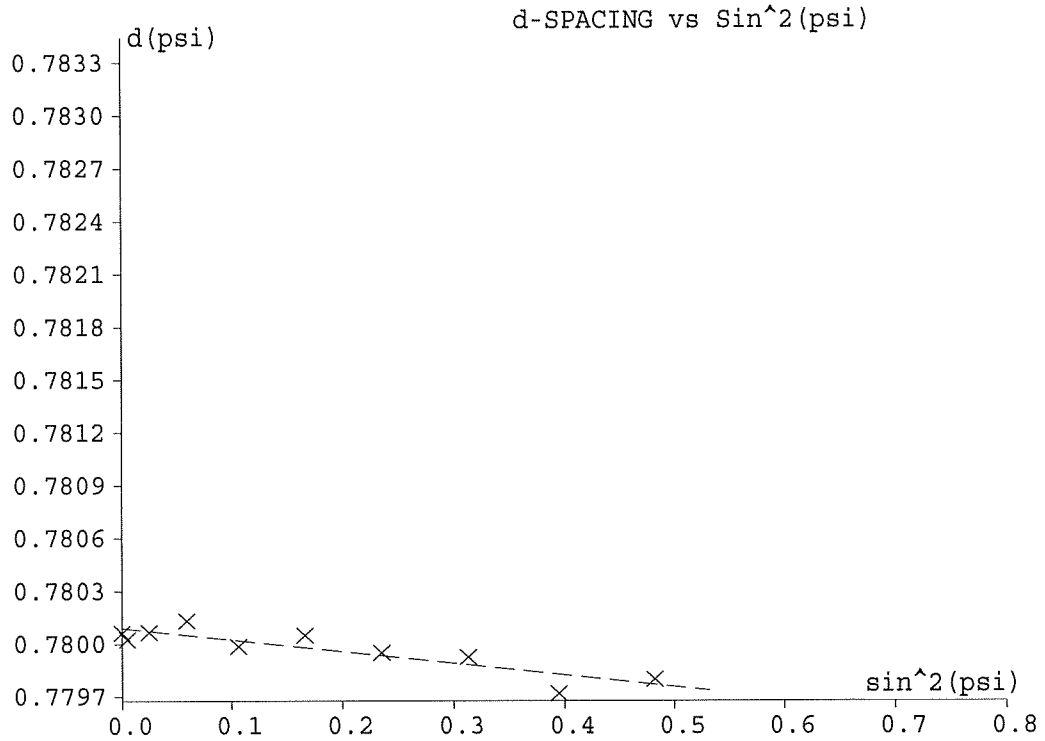


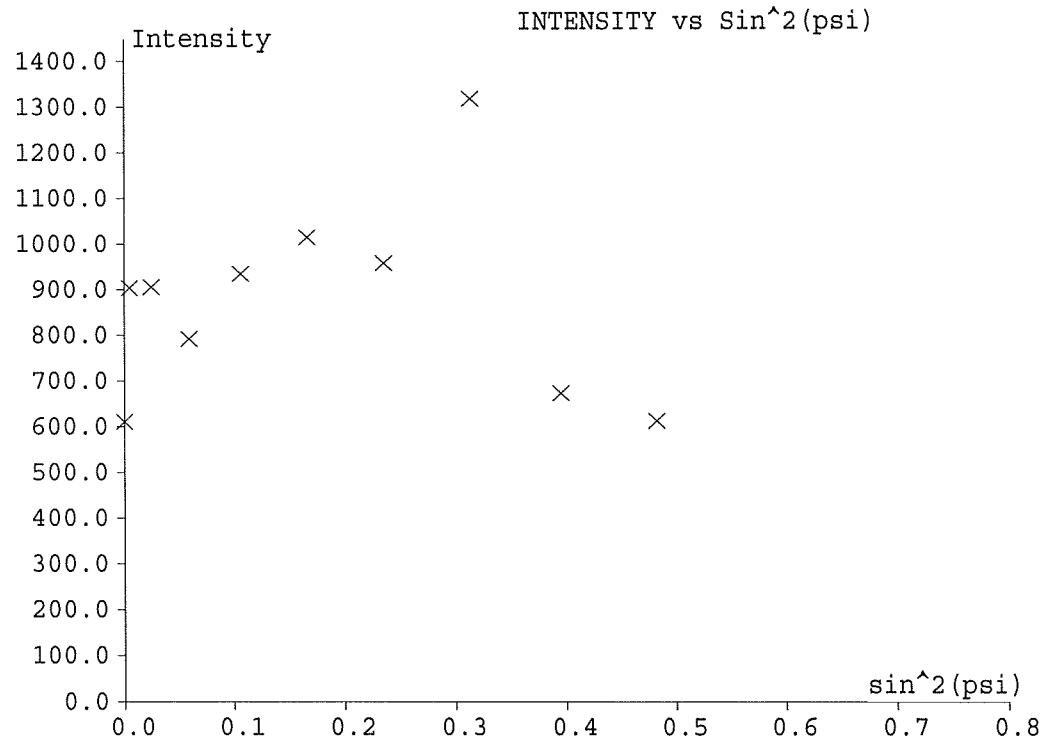



```
================================= TEC Stress Analyzer v1.64 ====================
============================= Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7788.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 18 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   7:02pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00026   164.99    610.4   4.08  0.27617    161.83  0.780063  0.000068
  5.0  0.00503   165.58    903.2   3.92  0.27591    161.87  0.780026  0.000042
 10.0  0.02493   164.96    905.5   4.16  0.27650    161.83  0.780066  0.000047
 15.0  0.05947   163.90    791.9   3.89  0.27420    161.77  0.780131  0.000053
 20.0  0.10650   166.21    933.8   3.86  0.27616    161.91  0.779985  0.000048
 25.0  0.16643   165.21   1014.0   3.92  0.27556    161.85  0.780049  0.000036
 30.0  0.23549   166.81    956.6   4.08  0.27786    161.94  0.779949  0.000040
 35.0  0.31300   167.18   1316.3   3.81  0.27670    161.96  0.779924  0.000025
 40.0  0.39473   170.52    672.5   4.25  0.28220    162.15  0.779717  0.000058
 45.0  0.48186   169.18    612.1   3.76  0.27814    162.08  0.779797  0.000049

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780090
Slope of Fitted Line...............:    -0.0006665
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -6.8 KSI     -46.9 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       7.0 MPa
Probable error.................(+/-):      1.3 KSI       8.6 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7788.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 18 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -6.8 KSI | -46.9 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 7.0 MPa |
| Probable error.....(+/-): | 1.3 KSI | 8.6 MPa |

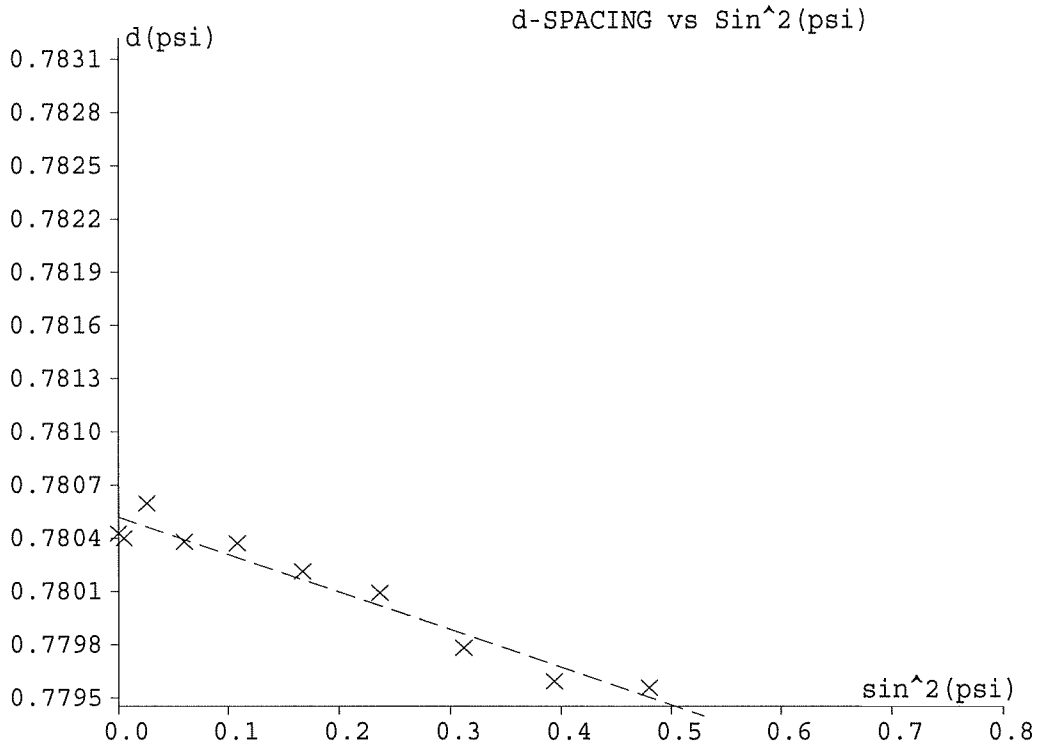


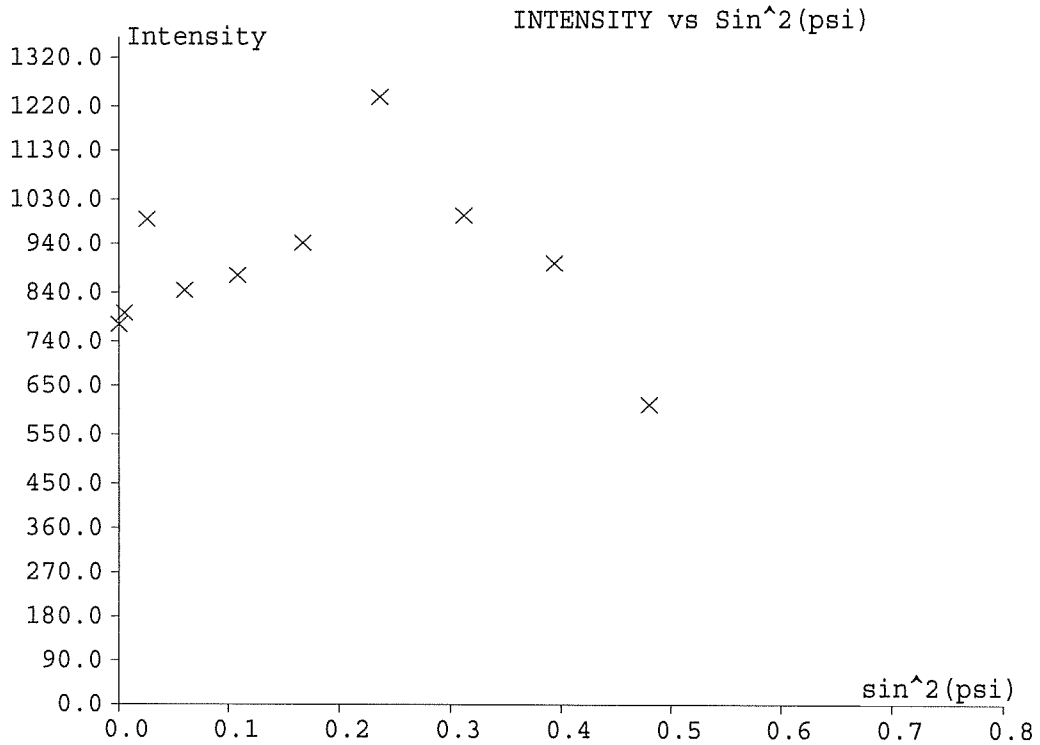



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7789.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 19 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   7:07pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00017   159.29    774.8   3.95  0.27086    161.50  0.780427  0.000055
  5.0  0.00546   159.73    798.1   4.22  0.27255    161.53  0.780400  0.000077
 10.0  0.02626   156.68    989.6   4.09  0.26951    161.35  0.780597  0.000041
 15.0  0.06040   160.06    844.7   4.18  0.27255    161.55  0.780379  0.000050
 20.0  0.10841   160.16    875.6   3.94  0.27151    161.55  0.780371  0.000059
 25.0  0.16740   162.64    941.4   3.92  0.27327    161.70  0.780212  0.000039
 30.0  0.23647   164.53   1238.5   3.84  0.27457    161.81  0.780092  0.000027
 35.0  0.31194   169.45    997.0   4.02  0.28000    162.09  0.779782  0.000037
 40.0  0.39374   172.47    899.8   4.01  0.28273    162.27  0.779594  0.000049
 45.0  0.47991   173.03    611.1   3.85  0.28238    162.30  0.779559  0.000045

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780520
Slope of Fitted Line...............:     -0.002113
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:    -21.6 KSI    -148.7 MPa

Counting Statistics Stress Error (+/-):      1.0 KSI       7.0 MPa
Probable error.................(+/-):      1.9 KSI      12.8 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7789.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 19 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -21.6 KSI | -148.7 MPa |
| Counting Statistics Stress Error (+/-): | 1.0 KSI | 7.0 MPa |
| Probable error.....(+/-): | 1.9 KSI | 12.8 MPa |

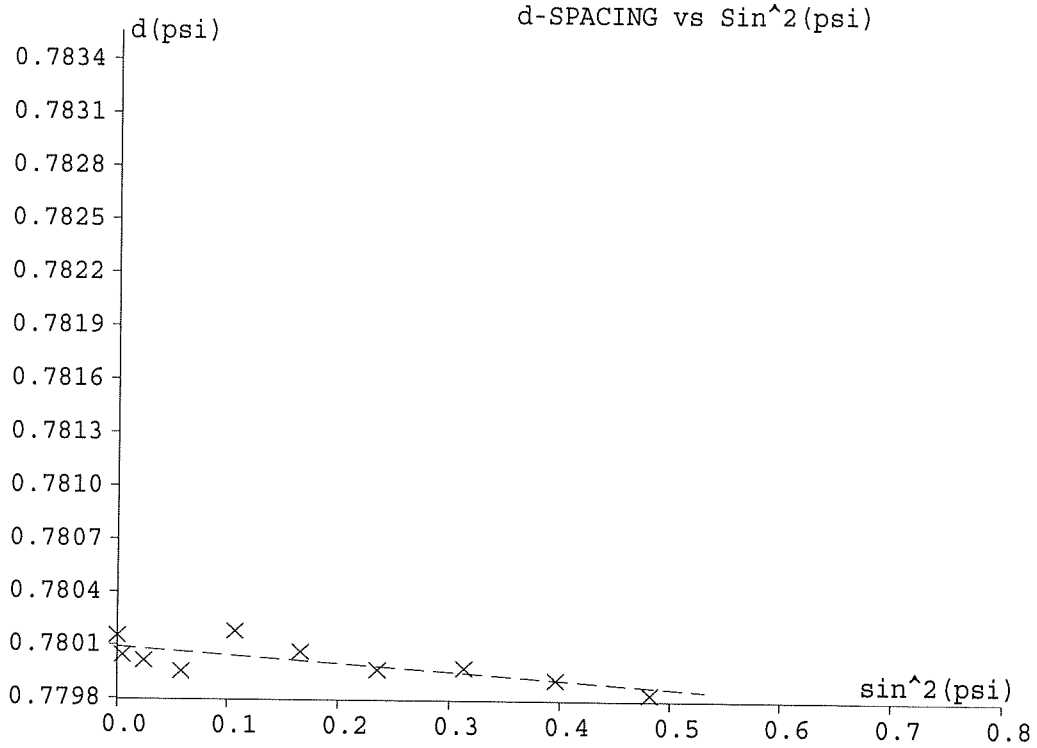


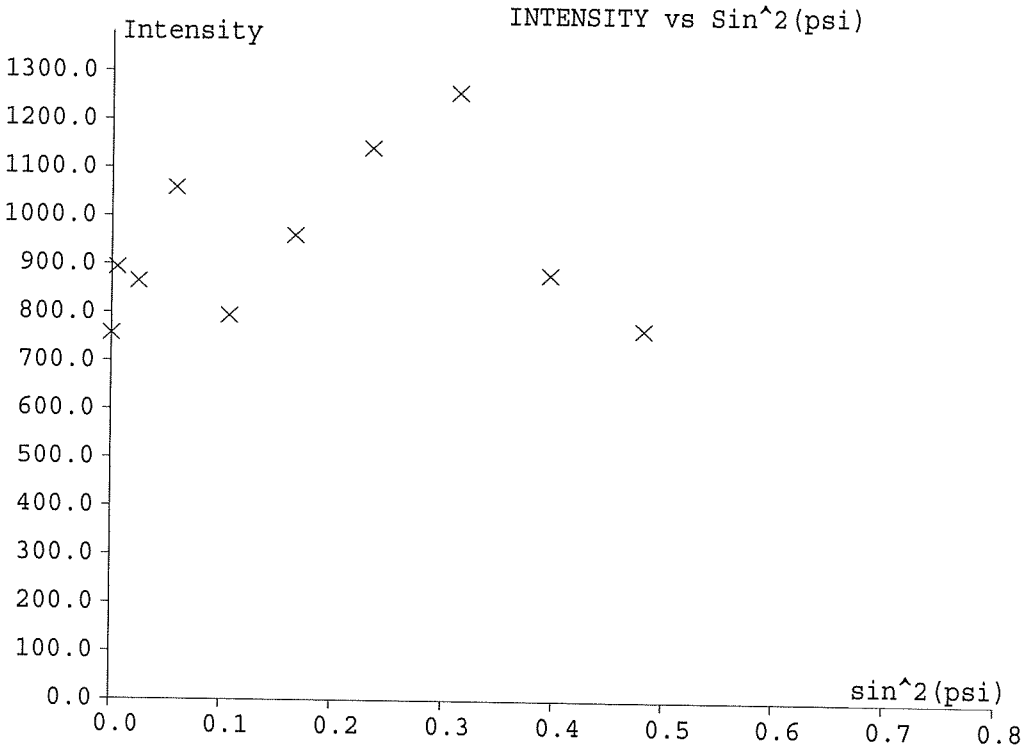



```
================================== TEC Stress Analyzer v1.64 ====================
============================== Residual Stress Analysis Report ================

File:  C:\STRESS\DATA\2143\2005\SBIR\50632\7790.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 20 / Baseline / Longitudinal
ebm

Acquisition date & time:  11/04/2005   7:12pm

Material [hkl].....................: Al 5083-H23   [333]
Depth..............................:   0.0000000
Phi angle..........................:   0.00
Collimator.........................: Round_4mm
Bracket............................: 160s
Peak Bounding Range [percent]......:  20
X-ray Target Description and Wavelength: copper     1.54056
PSI Oscillation Angle Range........:   2.00
Spectra count time (PSI=0).........:  20.0
High Voltage(kV) and Beam Current(mA)..: 45.00    1.00
ADC Channels Full Scale............: 256
Detector Calibration Coefficients:
A   1.99867E-07   B  -7.91049E-05   C  0.0688651      D   148.0028


Psi  Sin^2(psi) Pk Chan  Intens   FWHM  Kalp Cor A 2-Theta D Spacing  St. Dev.
---- ---------- ------- -------- ------ -------- - ------- ---------  --------
  0.0  0.00023   163.56    757.7   3.77  0.27315    161.75  0.780152  0.000060
  5.0  0.00505   165.31    893.4   3.86  0.27535    161.85  0.780042  0.000041
 10.0  0.02480   165.77    864.5   3.81  0.27544    161.88  0.780012  0.000038
 15.0  0.05879   166.74   1058.2   4.04  0.27758    161.94  0.779953  0.000043
 20.0  0.10747   163.11    794.5   3.66  0.27196    161.73  0.780180  0.000036
 25.0  0.16652   164.93    959.9   3.66  0.27361    161.83  0.780064  0.000033
 30.0  0.23559   166.57   1140.7   3.90  0.27671    161.93  0.779963  0.000030
 35.0  0.31338   166.39   1256.1   3.77  0.27572    161.92  0.779973  0.000029
 40.0  0.39626   167.44    880.2   4.15  0.27880    161.98  0.779910  0.000047
 45.0  0.48212   168.65    767.7   3.59  0.27630    162.05  0.779829  0.000031

Fitted Delta D vs Sin^2(psi) Data:
D Spacing Intercept................:   0.780090
Slope of Fitted Line...............:    -0.0004569
Material Stress Constant...........:     1.255E-07

*Residual Stress...................:     -4.7 KSI     -32.2 MPa

Counting Statistics Stress Error (+/-):      0.8 KSI       5.6 MPa
Probable error.................(+/-):      1.5 KSI      10.5 MPa
Warning: Counting statistics may be the controlling error!
```

File: C:\STRESS\DATA\2143\2005\SBIR\50632\7790.STR
Sample Description:
SBIR / WP / CW Holes / AF Std 20 / Baseline / Longitudinal
ebm

| | | |
|---|---|---|
| *Residual Stress.....: | -4.7 KSI | -32.2 MPa |
| Counting Statistics Stress Error (+/-): | 0.8 KSI | 5.6 MPa |
| Probable error.....(+/-): | 1.5 KSI | 10.5 MPa |



# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 2/17/2005 12:28:59 PM

**Description:** SBIR / AF Standard 1 / .05" from Edge / ebm
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 1 - 17Feb2005-12 32pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -17.3930 | -119.9203 |
| **Counting Statistics Error (+/-):** | 3.2790 | 22.6076 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.779541 | **Slope of Fitted Line:** | -0.001739 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 230.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000008 | 46 | 459 | 1.644021E-8 | -1.133431E-5 | 1.769458E-2 | -1.670266E2 |
| S/N 00000010 | 23 | 441 | 7.588810E-9 | -5.801301E-6 | 1.680615E-2 | 1.590654E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.17456 | 227.64 | 120.0 | 2.74 | 28369 | 27593 | 162.608 | 0.00000 | N/A | 0.779238 | 0.000076 | 00000008 | |
| 41.5 | 0.43858 | 252.12 | 6.6 | 1.18 | 7667 | 1507 | 163.055 | 0.00000 | N/A | 0.778779 | 0.000038 | 00000010 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 2/17/2005 12:37:10 PM

**Description:** SBIR / AF Standard 1 / .10" from Edge / ebm
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 1 - 17Feb2005-12 42pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -14.4643 | -99.7275 |
| **Counting Statistics Error (+/-):** | 2.6624 | 18.3568 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780123 | **Slope of Fitted Line:** | -0.001495 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000008 | 46 | 459 | 1.644021E-8 | -1.133431E-5 | 1.769458E-2 | -1.670266E2 |
| S/N 00000010 | 23 | 441 | 7.588810E-9 | -5.801301E-6 | 1.680615E-2 | 1.590654E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.17845 | 189.01 | 132.1 | 2.41 | 40625 | 39620 | 162.024 | 0.00000 | N/A | 0.779856 | 0.000025 | 00000008 | |
| 41.5 | 0.44429 | 209.22 | 2.7 | 1.06 | 810 | 804 | 162.397 | 0.00000 | N/A | 0.779458 | 0.000064 | 00000010 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 2/17/2005 12:52:22 PM

**Description:** SBIR / AF Standard 1 / .15" from Edge / ebm
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 1 - 17Feb2005-12 57pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -16.6326 | -114.6774 |
| **Counting Statistics Error (+/-):** | 1.3000 | 8.9632 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780240 | **Slope of Fitted Line:** | -0.001726 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000008 | 46 | 459 | 1.644021E-8 | -1.133431E-5 | 1.769458E-2 | -1.670266E2 |
| S/N 00000010 | 23 | 441 | 7.588810E-9 | -5.801301E-6 | 1.680615E-2 | 1.590654E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17892 | 184.39 | 173.8 | 1.80 | 53339 | 52125 | 161.954 | 0.00000 | N/A | 0.779932 | 0.000015 | 00000008 | |
| 41.5 | 0.44441 | 208.30 | 110.4 | 3.27 | 34721 | 33113 | 162.383 | 0.00000 | N/A | 0.779473 | 0.000030 | 00000010 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 2/17/2005 1:52:45 PM

**Description:** SBIR / AF Standard 2 / .05" from Edge / ebm
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 2 - 17Feb2005-01 57pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -27.2320 | -187.7577 |
| **Counting Statistics Error (+/-):** | 1.5903 | 10.9647 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780236 | **Slope of Fitted Line:** | -0.002798 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000008 | 46 | 459 | 1.644021E-8 | -1.133431E-5 | 1.769458E-2 | -1.670266E2 |
| S/N 00000010 | 23 | 441 | 7.588810E-9 | -5.801301E-6 | 1.680615E-2 | 1.590654E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.17771 | 196.23 | 68.4 | 1.79 | 21481 | 20521 | 162.133 | 0.00000 | N/A | 0.779738 | 0.000024 | 00000008 | |
| 41.5 | 0.44049 | 237.75 | 54.0 | 2.03 | 18004 | 16202 | 162.835 | 0.00000 | N/A | 0.779003 | 0.000033 | 00000010 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 2/17/2005 2:06:27 PM

**Description:** SBIR / AF Standard 2 / .10" from Edge / ebm
(E:\SBIR - AF Standard 2 - 17Feb2005-02 11pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | 7.4504 | 51.3689 |
| **Counting Statistics Error (+/-):** | 4.1125 | 28.3546 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.779391 | **Slope of Fitted Line:** | 0.000756 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000008 | 46 | 459 | 1.644021E-8 | -1.133431E-5 | 1.769458E-2 | -1.670266E2 |
| S/N 00000010 | 23 | 441 | 7.588810E-9 | -5.801301E-6 | 1.680615E-2 | 1.590654E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.17638 | 209.53 | 103.6 | 1.76 | 32781 | 31187 | 162.335 | 0.00000 | N/A | 0.779525 | 0.000019 | 00000008 | |
| 41.5 | 0.44650 | 192.67 | 110.3 | 3.35 | 36612 | 33192 | 162.142 | 0.00000 | N/A | 0.779729 | 0.000107 | 00000010 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 2/17/2005 2:39:26 PM

**Description:** SBIR / AF Standard 3 / .10" from Edge / ebm
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 3 - 17Feb2005-02 44pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -4.3795 | -30.1957 |
| **Counting Statistics Error (+/-):** | 1.6045 | 11.0629 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780120 | **Slope of Fitted Line:** | -0.000457 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000008 | 46 | 459 | 1.644021E-8 | -1.133431E-5 | 1.769458E-2 | -1.670266E2 |
| S/N 00000010 | 23 | 441 | 7.588810E-9 | -5.801301E-6 | 1.680615E-2 | 1.590654E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.17957 | 194.34 | 106.8 | 2.40 | 32824 | 32132 | 161.856 | 0.24913 | N/A | 0.780038 | 0.000031 | 00000008 | |
| 41.5 | 0.44801 | 198.21 | 62.4 | 2.64 | 19934 | 18775 | 161.969 | 0.25896 | N/A | 0.779915 | 0.000028 | 00000010 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 2/17/2005 2:46:59 PM

**Description:** SBIR / AF Standard 3 / .15" from Edge / ebm
(E:\SBIR - AF Standard 3 - 17Feb2005-02 51pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | 3.5071 | 24.1806 |
| **Counting Statistics Error (+/-):** | 7.5543 | 52.0849 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.779874 | **Slope of Fitted Line:** | 0.000364 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000008 | 46 | 459 | 1.644021E-8 | -1.133431E-5 | 1.769458E-2 | -1.670266E2 |
| S/N 00000010 | 23 | 441 | 7.588810E-9 | -5.801301E-6 | 1.680615E-2 | 1.590654E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.17897 | 183.90 | 141.1 | 2.14 | 43207 | 42324 | 161.946 | 0.00000 | N/A | 0.779940 | 0.000023 | 00000008 | |
| 41.5 | 0.44899 | 174.11 | 78.5 | 3.13 | 25496 | 23545 | 161.856 | 0.00000 | N/A | 0.780038 | 0.000198 | 00000010 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 2/17/2005 3:23:37 PM

**Description:** SBIR / AF Standard 5 / .10" from Edge / ebm
(E:\SBIR - AF Standard 5 - 17Feb2005-03 28pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | 0.3758 | 2.5908 |
| **Counting Statistics Error (+/-):** | 1.0387 | 7.1618 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.779557 | **Slope of Fitted Line:** | 0.000038 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000008 | 46 | 459 | 1.644021E-8 | -1.133431E-5 | 1.769458E-2 | -1.670266E2 |
| S/N 00000010 | 23 | 441 | 7.588810E-9 | -5.801301E-6 | 1.680615E-2 | 1.590654E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17662 | 207.07 | 147.7 | 2.02 | 45144 | 44318 | 162.297 | 0.00000 | N/A | 0.779564 | 0.000018 | 00000008 | |
| 41.5 | 0.44524 | 202.11 | 93.3 | 2.30 | 29108 | 27997 | 162.288 | 0.00000 | N/A | 0.779574 | 0.000021 | 00000010 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 2/17/2005 3:35:37 PM

**Description:** SBIR / AF Standard 5 / .15" from Edge / ebm
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 5 - 17Feb2005-03 40pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -0.9662 | -6.6616 |
| **Counting Statistics Error (+/-):** | 1.4446 | 9.9599 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.779503 | **Slope of Fitted Line:** | -0.000098 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000008 | 46 | 459 | 1.644021E-8 | -1.133431E-5 | 1.769458E-2 | -1.670266E2 |
| S/N 00000010 | 23 | 441 | 7.588810E-9 | -5.801301E-6 | 1.680615E-2 | 1.590654E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.17613 | 229.82 | 120.8 | 2.87 | 36816 | 36351 | 162.371 | 0.26962 | N/A | 0.779486 | 0.000019 | 00000008 | |
| 41.5 | 0.44430 | 225.62 | 90.8 | 2.39 | 28423 | 27342 | 162.396 | 0.25284 | N/A | 0.779459 | 0.000033 | 00000010 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/3/2005 3:08:49 PM

**Description:** SBIR / AF Standard 6 / 0.10" from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 6 - 03Aug2005-03 13pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -33.1129 | -228.3049 |
| **Counting Statistics Error (+/-):** | 2.4204 | 16.6877 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780703 | **Slope of Fitted Line:** | -0.003461 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17972 | 175.11 | 102.4 | 1.76 | 31110 | 30716 | 161.834 | N/A | 163.690 | 0.780081 | 0.000031 | 00000007 | BM |
| 41.5 | 0.44176 | 239.05 | 139.3 | 2.92 | 44572 | 41779 | 162.689 | N/A | 164.608 | 0.779174 | 0.000054 | 00000011 | BM |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/3/2005 3:48:10 PM

**Description:** SBIR / AF Standard 7 / 0.05" from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 7 - 03Aug2005-03 53pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -33.1033 | -228.2387 |
| **Counting Statistics Error (+/-):** | 1.3845 | 9.5456 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780893 | **Slope of Fitted Line:** | -0.003492 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18082 | 164.47 | 127.3 | 1.61 | 38872 | 38322 | 161.669 | N/A | 163.439 | 0.780262 | 0.000024 | 00000007 | BM |
| 41.5 | 0.44319 | 229.81 | 103.8 | 2.15 | 32151 | 31252 | 162.524 | N/A | 164.570 | 0.779346 | 0.000026 | 00000011 | BM |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/3/2005 3:38:41 PM

**Description:** SBIR / AF Standard 7 / 0.10" from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 7 - 03Aug2005-03 43pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -15.3771 | -106.0215 |
| **Counting Statistics Error (+/-):** | 1.3019 | 8.9760 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780497 | **Slope of Fitted Line:** | -0.001616 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18048 | 167.77 | 160.5 | 1.61 | 48662 | 48142 | 161.720 | N/A | 163.667 | 0.780206 | 0.000021 | 00000007 | BM |
| 41.5 | 0.44671 | 207.07 | 156.5 | 1.78 | 47852 | 46936 | 162.118 | N/A | 163.626 | 0.779775 | 0.000026 | 00000011 | BM |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/3/2005 3:28:31 PM

**Description:** SBIR / AF Standard 7 / 0.15" from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 7 - 03Aug2005-03 33pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | 0.9458 | 6.5209 |
| **Counting Statistics Error (+/-):** | 1.3499 | 9.3070 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780321 | **Slope of Fitted Line:** | 0.000100 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
| 24.5 | 0.18129 | 159.98 | 179.7 | 1.54 | 54545 | 53897 | 161.599 | N/A | 163.410 | 0.780339 | 0.000019 | 00000007 | BM |
| 41.5 | 0.45143 | 176.82 | 168.3 | 1.33 | 51991 | 50492 | 161.575 | N/A | 163.373 | 0.780366 | 0.000030 | 00000011 | BM |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/10/2005 1:27:41 PM

**Description:** SBIR / AF Standard 8 / 0.05 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 8 - 10Aug2005-01 32pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -27.5135 | -189.6983 |
| **Counting Statistics Error (+/-):** | 1.8919 | 13.0442 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780768 | **Slope of Fitted Line:** | -0.002902 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18083 | 164.37 | 62.1 | 1.68 | 18823 | 18635 | 161.668 | N/A | 163.858 | 0.780243 | 0.000040 | 00000007 | |
| 41.5 | 0.44446 | 221.64 | 99.4 | 0.81 | 30140 | 29831 | 162.378 | N/A | 164.676 | 0.779479 | 0.000028 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/10/2005 1:15:51 PM

**Description:** SBIR / AF Standard 8 / 0.10 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 8 - 10Aug2005-01 20pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -11.1079 | -76.5858 |
| **Counting Statistics Error (+/-):** | 1.5870 | 10.9418 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780295 | **Slope of Fitted Line:** | -0.001161 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.17987 | 173.65 | 113.4 | 2.09 | 34901 | 34014 | 161.812 | N/A | 163.895 | 0.780086 | 0.000031 | 00000007 | B |
| 41.5 | 0.44688 | 206.01 | 8.8 | 0.61 | 2675 | 2637 | 162.099 | N/A | 162.517 | 0.779775 | 0.000028 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/10/2005 8:46:50 AM

**Description:** SBIR / AF Standard 8 / 0.15 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 8 - 10Aug2005-08 51am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -0.4917 | -3.3904 |
| **Counting Statistics Error (+/-):** | 2.2516 | 15.5241 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780271 | **Slope of Fitted Line:** | -0.000052 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18094 | 163.32 | 160.5 | 1.38 | 48665 | 48144 | 161.651 | N/A | 163.358 | 0.780261 | 0.000024 | 00000007 | |
| 41.5 | 0.45065 | 181.77 | 7.1 | 0.70 | 2167 | 2131 | 161.664 | N/A | 162.161 | 0.780247 | 0.000054 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/10/2005 2:48:43 PM

**Description:** SBIR / AF Standard 9 / 0.05 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 9 - 10Aug2005-02 53pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -30.5887 | -210.9011 |
| **Counting Statistics Error (+/-):** | 1.9442 | 13.4049 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780917 | **Slope of Fitted Line:** | -0.003240 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18136 | 159.36 | 93.0 | 1.52 | 28192 | 27892 | 161.590 | N/A | 163.618 | 0.780329 | 0.000027 | 00000007 | |
| 41.5 | 0.44444 | 221.73 | 7.8 | 0.79 | 2367 | 2327 | 162.380 | N/A | 163.547 | 0.779477 | 0.000042 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/10/2005 1:55:48 PM

**Description:** SBIR / AF Standard 9 / 0.10 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 9 - 10Aug2005-02 00pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -15.5929 | -107.5094 |
| **Counting Statistics Error (+/-):** | 2.2302 | 15.3769 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780313 | **Slope of Fitted Line:** | -0.001625 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17947 | 177.48 | 163.1 | 1.83 | 49429 | 48941 | 161.871 | N/A | 163.829 | 0.780021 | 0.000022 | 00000007 | |
| 41.5 | 0.44536 | 215.80 | 153.6 | 0.81 | 50549 | 46065 | 162.274 | N/A | 164.392 | 0.779589 | 0.000054 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/10/2005 1:36:28 PM

**Description:** SBIR / AF Standard 9 / 0.15 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 9 - 10Aug2005-01 41pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -25.4072 | -175.1762 |
| **Counting Statistics Error (+/-):** | 1.7271 | 11.9079 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780337 | **Slope of Fitted Line:** | -0.002628 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17852 | 186.63 | 164.5 | 2.06 | 50948 | 49360 | 162.013 | N/A | 163.942 | 0.779868 | 0.000030 | 00000007 | |
| 41.5 | 0.44194 | 237.90 | 0.4 | 0.35 | 870 | 122 | 162.668 | N/A | 163.376 | 0.779176 | 0.000033 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/11/2005 8:27:22 AM

**Description:** SBIR / AF Standard 10 / 0.05 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 10 - 11Aug2005-08 32am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -23.4728 | -161.8392 |
| **Counting Statistics Error (+/-):** | 1.8390 | 12.6794 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780777 | **Slope of Fitted Line:** | -0.002485 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18134 | 159.55 | 83.8 | 1.49 | 25525 | 25223 | 161.593 | N/A | 163.500 | 0.780326 | 0.000025 | 00000007 | |
| 41.5 | 0.44601 | 211.62 | 94.4 | 2.71 | 29959 | 28416 | 162.199 | N/A | 164.828 | 0.779668 | 0.000041 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/11/2005 8:12:58 AM

**Description:** SBIR / AF Standard 10 / 0.10 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 10 - 11Aug2005-08 17am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -25.5900 | -176.4364 |
| **Counting Statistics Error (+/-):** | 1.5700 | 10.8246 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780930 | **Slope of Fitted Line:** | -0.002724 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18199 | 153.31 | 143.6 | 1.47 | 45918 | 43234 | 161.495 | N/A | 163.338 | 0.780434 | 0.000036 | 00000007 | B |
| 41.5 | 0.44638 | 209.25 | 167.0 | 0.75 | 50795 | 50253 | 162.157 | N/A | 163.810 | 0.779714 | 0.000019 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/11/2005 7:58:22 AM

**Description:** SBIR / AF Standard 10 / 0.15 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 10 - 11Aug2005-08 03am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -39.5995 | -273.0286 |
| **Counting Statistics Error (+/-):** | 1.5731 | 10.8461 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.781231 | **Slope of Fitted Line:** | -0.004224 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18216 | 151.70 | 139.2 | 1.48 | 44406 | 41900 | 161.470 | N/A | 163.159 | 0.780462 | 0.000036 | 00000007 | B |
| 41.5 | 0.44346 | 228.08 | 172.1 | 0.82 | 52298 | 51811 | 162.493 | N/A | 164.092 | 0.779358 | 0.000019 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/11/2005 8:57:45 AM

**Description:** SBIR / AF Standard 11 / 0.05 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 11 - 11Aug2005-09 02am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -31.7644 | -219.0077 |
| **Counting Statistics Error (+/-):** | 2.0837 | 14.3669 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780841 | **Slope of Fitted Line:** | -0.003349 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18079 | 164.84 | 55.6 | 1.87 | 17310 | 16743 | 161.675 | N/A | 163.793 | 0.780235 | 0.000047 | 00000007 | B |
| 41.5 | 0.44344 | 228.19 | 115.8 | 2.71 | 35104 | 34844 | 162.495 | N/A | 164.845 | 0.779356 | 0.000025 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/11/2005 8:37:31 AM

**Description:** SBIR / AF Standard 11 / 0.15 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 11 - 11Aug2005-08 42am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -6.1851 | -42.6447 |
| **Counting Statistics Error (+/-):** | 1.6345 | 11.2694 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.779753 | **Slope of Fitted Line:** | -0.000632 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17710 | 200.37 | 150.1 | 2.16 | 45529 | 45194 | 162.225 | N/A | 164.220 | 0.779641 | 0.000022 | 00000007 | B |
| 41.5 | 0.44440 | 222.01 | 162.2 | 2.39 | 50401 | 48821 | 162.385 | N/A | 164.257 | 0.779472 | 0.000036 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/11/2005 12:02:33 PM

**Description:** sBIR / AF Standard 12 / 0.05 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\sBIR - AF Standard 12 - 11Aug2005-12 07pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -21.8835 | -150.8811 |
| **Counting Statistics Error (+/-):** | 1.4821 | 10.2187 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780711 | **Slope of Fitted Line:** | -0.002313 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18113 | 161.54 | 99.0 | 1.49 | 30243 | 29799 | 161.624 | N/A | 163.143 | 0.780292 | 0.000026 | 00000007 | B |
| 41.5 | 0.44610 | 211.06 | 93.2 | 0.80 | 28279 | 28061 | 162.189 | N/A | 164.338 | 0.779679 | 0.000028 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/11/2005 9:42:18 AM

**Description:** SBIR / AF Standard 12 / 0.10 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 12 - 11Aug2005-09 47am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -18.1930 | -125.4361 |
| **Counting Statistics Error (+/-):** | 1.9312 | 13.3153 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780489 | **Slope of Fitted Line:** | -0.001908 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18023 | 170.13 | 165.1 | 0.53 | 53256 | 49682 | 161.757 | N/A | 164.358 | 0.780145 | 0.000025 | 00000007 | B |
| 41.5 | 0.44577 | 213.19 | 115.3 | 2.28 | 35750 | 34708 | 162.227 | N/A | 164.587 | 0.779638 | 0.000043 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/11/2005 12:15:30 PM

**Description:** SBIR / AF Standard 13 / 0.15 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\sBIR - AF Standard 13 - 11Aug2005-12 20pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -2.6803 | -18.4799 |
| **Counting Statistics Error (+/-):** | 1.0807 | 7.4512 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.779868 | **Slope of Fitted Line:** | -0.000276 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17809 | 190.80 | 190.3 | 1.96 | 58786 | 57292 | 162.077 | N/A | 164.025 | 0.779819 | 0.000021 | 00000007 | BM |
| 41.5 | 0.44646 | 208.68 | 172.5 | 2.46 | 52249 | 51937 | 162.146 | N/A | 164.468 | 0.779745 | 0.000019 | 00000011 | BM |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 8:10:08 AM

**Description:** SBIR / AF Standard 14 / 0.05 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 14 - 12Aug2005-08 15am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -32.1290 | -221.5211 |
| **Counting Statistics Error (+/-):** | 2.6156 | 18.0338 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780949 | **Slope of Fitted Line:** | -0.003404 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18137 | 159.21 | 144.0 | 1.78 | 45554 | 43212 | 161.587 | N/A | 163.711 | 0.780332 | 0.000030 | 00000007 | B |
| 41.5 | 0.44412 | 223.83 | 90.1 | 2.08 | 28561 | 27028 | 162.417 | N/A | 164.369 | 0.779438 | 0.000060 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 8:00:57 AM

**Description:** SBIR / AF Standard 14 / 0.10 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 14 - 12Aug2005-08 05am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -22.9687 | -158.3630 |
| **Counting Statistics Error (+/-):** | 2.2187 | 15.2974 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780521 | **Slope of Fitted Line:** | -0.002403 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17988 | 173.49 | 152.2 | 1.68 | 46490 | 45813 | 161.809 | N/A | 163.514 | 0.780088 | 0.000023 | 00000007 | B |
| 41.5 | 0.44425 | 223.00 | 136.7 | 1.91 | 44129 | 41143 | 162.402 | N/A | 164.112 | 0.779453 | 0.000053 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 7:45:48 AM

**Description:** SBIR / AF Standard 14 / 0.15 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 14 - 12Aug2005-07 50am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -20.6591 | -142.4395 |
| **Counting Statistics Error (+/-):** | 1.4880 | 10.2591 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780506 | **Slope of Fitted Line:** | -0.002164 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18006 | 171.83 | 164.0 | 2.05 | 54191 | 49352 | 161.783 | N/A | 163.750 | 0.780117 | 0.000029 | 00000007 | B |
| 41.5 | 0.44499 | 218.22 | 173.0 | 2.78 | 54258 | 52084 | 162.317 | N/A | 164.772 | 0.779543 | 0.000026 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 8:18:06 AM

**Description:** SBIR / AF Standard 15 / 0.15 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 15 - 12Aug2005-08 23am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | 3.6156 | 24.9285 |
| **Counting Statistics Error (+/-):** | 2.0901 | 14.4107 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780051 | **Slope of Fitted Line:** | 0.000378 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18007 | 171.67 | 138.1 | 2.08 | 45214 | 41562 | 161.781 | N/A | 163.842 | 0.780119 | 0.000030 | 00000007 | B |
| 41.5 | 0.45045 | 183.09 | 139.5 | 1.87 | 46017 | 41988 | 161.688 | N/A | 163.677 | 0.780221 | 0.000046 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 9:18:34 AM

**Description:** SBIR / AF Standard 16 / 0.05 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 16 - 12Aug2005-09 23am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -31.1878 | -215.0321 |
| **Counting Statistics Error (+/-):** | 1.6094 | 11.0965 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.781114 | **Slope of Fitted Line:** | -0.003333 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18243 | 149.12 | 115.2 | 1.51 | 36394 | 34673 | 161.430 | N/A | 163.454 | 0.780506 | 0.000031 | 00000007 | B |
| 41.5 | 0.44569 | 213.69 | 125.0 | 2.22 | 38038 | 37629 | 162.236 | N/A | 164.456 | 0.779629 | 0.000027 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 9:06:29 AM

**Description:** SBIR / AF Standard 16 / 0.10 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 16 - 12Aug2005-09 11am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -31.6600 | -218.2877 |
| **Counting Statistics Error (+/-):** | 1.1303 | 7.7931 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780984 | **Slope of Fitted Line:** | -0.003361 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18163 | 156.81 | 157.9 | 1.60 | 48061 | 47538 | 161.550 | N/A | 163.642 | 0.780373 | 0.000020 | 00000007 | B |
| 41.5 | 0.44455 | 221.06 | 168.1 | 2.75 | 50935 | 50602 | 162.368 | N/A | 164.809 | 0.779490 | 0.000021 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 8:49:26 AM

**Description:** SBIR / AF Standard 16 / 0.15 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 16 - 12Aug2005-08 54am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -12.4044 | -85.5252 |
| **Counting Statistics Error (+/-):** | 1.9421 | 13.3904 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780367 | **Slope of Fitted Line:** | -0.001300 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18015 | 170.89 | 165.6 | 1.84 | 50374 | 49845 | 161.769 | N/A | 163.970 | 0.780132 | 0.000024 | 00000007 | B |
| 41.5 | 0.44696 | 205.49 | 175.6 | 2.68 | 60528 | 52869 | 162.089 | N/A | 164.236 | 0.779786 | 0.000045 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 11:29:55 AM

**Description:** SBIR / AF Standard 17 / 0.05 from Edge / Hoop / jb
(E:\SBIR - AF Standard 17 - 12Aug2005-11 34am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -38.9754 | -268.7253 |
| **Counting Statistics Error (+/-):** | 1.3417 | 9.2506 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.781160 | **Slope of Fitted Line:** | -0.004146 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18183 | 154.90 | 94.8 | 1.36 | 28685 | 28453 | 161.520 | N/A | 163.309 | 0.780406 | 0.000025 | 00000007 | B |
| 41.5 | 0.44317 | 229.97 | 110.8 | 1.99 | 33469 | 33252 | 162.527 | N/A | 163.962 | 0.779323 | 0.000024 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 11:05:45 AM

**Description:** SBIR / AF Standard 17 / 0.10 from Edge / Hoop / jb
(E:\SBIR - AF Standard 17 - 12Aug2005-11 10am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -6.9073 | -47.6238 |
| **Counting Statistics Error (+/-):** | 1.9045 | 13.1308 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780487 | **Slope of Fitted Line:** | -0.000732 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18151 | 157.94 | 137.0 | 1.66 | 41919 | 41229 | 161.567 | N/A | 163.584 | 0.780354 | 0.000024 | 00000007 | B |
| 41.5 | 0.44994 | 186.34 | 145.2 | 0.79 | 48791 | 43711 | 161.746 | N/A | 163.561 | 0.780157 | 0.000044 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 10:32:20 AM

**Description:** SBIR / AF Standard 17 / 0.15 from Edge / Hoop / jb
(E:\SBIR - AF Standard 17 - 12Aug2005-10 37am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | 6.7420 | 46.4843 |
| **Counting Statistics Error (+/-):** | 1.1976 | 8.2569 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.779828 | **Slope of Fitted Line:** | 0.000700 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17905 | 181.54 | 160.4 | 2.09 | 50828 | 48288 | 161.934 | N/A | 163.770 | 0.779953 | 0.000024 | 00000007 | B |
| 41.5 | 0.44982 | 187.10 | 176.4 | 1.67 | 53529 | 53110 | 161.760 | N/A | 164.012 | 0.780142 | 0.000020 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 12:30:53 PM

**Description:** SBIR / AF Standard 18 / 0.05 from Edge / Hoop / jb
(E:\SBIR - AF Standard 18 - 12Aug2005-12 35pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -43.9465 | -303.0001 |
| **Counting Statistics Error (+/-):** | 4.4074 | 30.3876 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.781169 | **Slope of Fitted Line:** | -0.004657 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18133 | 159.65 | 90.5 | 1.38 | 39354 | 27138 | 161.594 | N/A | 163.927 | 0.780324 | 0.000061 | 00000007 | B |
| 41.5 | 0.44142 | 241.29 | 100.1 | 3.56 | 35298 | 30023 | 162.728 | N/A | 165.543 | 0.779113 | 0.000094 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 11:38:16 AM

**Description:** SBIR / AF Standard 18 / 0.15 from Edge / Hoop / jb
(E:\SBIR - AF Standard 18 - 12Aug2005-11 43am.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -5.9861 | -41.2724 |
| **Counting Statistics Error (+/-):** | 1.6278 | 11.2233 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780191 | **Slope of Fitted Line:** | -0.000626 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.17982 | 174.08 | 177.6 | 1.96 | 57023 | 53464 | 161.818 | N/A | 163.845 | 0.780078 | 0.000032 | 00000007 | B |
| 41.5 | 0.44797 | 198.99 | 150.3 | 2.43 | 46018 | 45250 | 161.973 | N/A | 164.450 | 0.779911 | 0.000028 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 4:11:02 PM

**Description:** SBIR / AF Standard 19 / 0.05 from Edge / Hoop / jb
(E:\SBIR - AF Standard 19 - 12Aug2005-04 16pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -26.4353 | -182.2649 |
| **Counting Statistics Error (+/-):** | 2.4272 | 16.7349 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780920 | **Slope of Fitted Line:** | -0.002811 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18184 | 154.74 | 141.2 | 1.47 | 46797 | 42374 | 161.518 | N/A | 163.509 | 0.780409 | 0.000037 | 00000007 | B |
| 41.5 | 0.44599 | 211.72 | 138.3 | 2.66 | 46099 | 41482 | 162.201 | N/A | 164.549 | 0.779666 | 0.000051 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 3:49:25 PM

**Description:** SBIR / AF Standard 19 / 0.10 from Edge / Hoop / jb
(E:\SBIR - AF Standard 19 - 12Aug2005-03 54pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -30.7809 | -212.2264 |
| **Counting Statistics Error (+/-):** | 1.9061 | 13.1423 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.781016 | **Slope of Fitted Line:** | -0.003275 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18191 | 154.08 | 136.9 | 0.53 | 44830 | 41193 | 161.507 | N/A | 163.227 | 0.780420 | 0.000041 | 00000007 | B |
| 41.5 | 0.44511 | 217.42 | 135.8 | 2.63 | 41942 | 40863 | 162.303 | N/A | 164.842 | 0.779558 | 0.000027 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 12:38:37 PM

**Description:** SBIR / AF Standard 19 / 0.15 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 19 - 12Aug2005-12 43pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | 2.1306 | 14.6902 |
| **Counting Statistics Error (+/-):** | 1.9367 | 13.3533 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.779952 | **Slope of Fitted Line:** | 0.000222 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17929 | 179.19 | 199.5 | 2.09 | 61753 | 60037 | 161.898 | N/A | 164.209 | 0.779992 | 0.000020 | 00000007 | B |
| 41.5 | 0.44910 | 191.72 | 157.5 | 2.17 | 54445 | 47395 | 161.843 | N/A | 164.150 | 0.780052 | 0.000047 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 4:26:19 PM

**Description:** SBIR / AF Standard 20 / 0.10 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 20 - 12Aug2005-04 31pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -13.8069 | -95.1953 |
| **Counting Statistics Error (+/-):** | 1.3697 | 9.4437 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780116 | **Slope of Fitted Line:** | -0.001427 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17848 | 187.00 | 136.5 | 2.03 | 41378 | 40944 | 162.018 | N/A | 164.345 | 0.779862 | 0.000029 | 00000007 | B |
| 41.5 | 0.44448 | 221.46 | 128.5 | 2.24 | 38799 | 38546 | 162.375 | N/A | 164.480 | 0.779482 | 0.000020 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/12/2005 4:19:22 PM

**Description:** SBIR / AF Standard 20 / 0.15 from Edge / Hoop / jb
(C:\SBIR DATA FROM MAX\SBIR - AF Standard 20 - 12Aug2005-04 24pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -9.5970 | -66.1689 |
| **Counting Statistics Error (+/-):** | 1.0594 | 7.3046 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780107 | **Slope of Fitted Line:** | -0.000995 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Aluminum Alloy [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17890 | 182.96 | 173.8 | 1.85 | 52659 | 52136 | 161.956 | N/A | 163.845 | 0.779929 | 0.000022 | 00000007 | B |
| 41.5 | 0.44597 | 211.89 | 192.0 | 0.76 | 58091 | 57605 | 162.204 | N/A | 164.141 | 0.779663 | 0.000017 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/15/2005 5:03:42 PM

**Description:** SBIR / WP / Hole # 1 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.05 from Edge of Hole / Hoop / JB
(E:\SBIR - WP - Hole # 1 - 15Aug2005-05 08pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -20.2277 | -139.4647 |
| **Counting Statistics Error (+/-):** | 1.5907 | 10.9675 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780400 | **Slope of Fitted Line:** | -0.002109 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17947 | 193.67 | 140.6 | 2.44 | 42655 | 42191 | 161.871 | 0.25070 | N/A | 0.780021 | 0.000022 | 00000007 | |
| 41.5 | 0.44433 | 223.57 | 7.9 | 1.08 | 2394 | 2366 | 162.393 | 0.01944 | N/A | 0.779463 | 0.000035 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 10:28:32 AM

**Description:** SBIR / WP / Hole # 1 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.10 from Edge of Hole / Hoop / JB
(E:\SBIR - WP - Hole # 1 - 19Aug2005-10 33am.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -36.7802 | -253.5899 |
| **Counting Statistics Error (+/-):** | 3.3365 | 23.0041 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780940 | **Slope of Fitted Line:** | -0.003879 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18080 | 165.58 | 7.0 | 0.91 | 2125 | 2107 | 161.672 | 0.01424 | N/A | 0.780238 | 0.000030 | 00000007 | |
| 41.5 | 0.44235 | 236.65 | 4.2 | 1.19 | 1270 | 1258 | 162.621 | 0.02425 | N/A | 0.779224 | 0.000080 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 11:09:22 AM

**Description:** SBIR / WP / Hole # 1 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.15 from Edge of Hole / Hoop / JB
(E:\SBIR - WP - Hole # 1 - 19Aug2005-11 14am.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -32.6647 | -225.2146 |
| **Counting Statistics Error (+/-):** | 1.6634 | 11.4687 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780770 | **Slope of Fitted Line:** | -0.003430 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18027 | 170.14 | 7.2 | 0.73 | 2221 | 2168 | 161.751 | 0.00597 | N/A | 0.780152 | 0.000028 | 00000007 | |
| 41.5 | 0.44258 | 234.68 | 6.5 | 0.99 | 1997 | 1948 | 162.594 | 0.01632 | N/A | 0.779252 | 0.000032 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 11:21:18 AM

**Description:** SBIR / WP / Hole # 2 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.05 from Edge of Hole / Hoop / J
(E:\SBIR - WP - Hole # 2 - 19Aug2005-11 26am.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -22.8086 | -157.2597 |
| **Counting Statistics Error (+/-):** | 2.8274 | 19.4945 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780652 | **Slope of Fitted Line:** | -0.002402 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.18068 | 182.88 | 144.5 | 3.00 | 43963 | 43337 | 161.691 | 0.26420 | N/A | 0.780218 | 0.000029 | 00000007 | |
| 41.5 | 0.44531 | 219.35 | 4.1 | 1.43 | 1261 | 1233 | 162.280 | 0.05741 | N/A | 0.779583 | 0.000067 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 11:28:44 AM

**Description:** SBIR / WP / Hole # 2 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.10 from Edge of Hole / Hoop / J
(E:\SBIR - WP - Hole # 2 - 19Aug2005-11 33am.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -26.8241 | -184.9450 |
| **Counting Statistics Error (+/-):** | 2.0893 | 14.4050 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780769 | **Slope of Fitted Line:** | -0.002831 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18092 | 164.19 | 9.3 | 0.80 | 2846 | 2802 | 161.655 | 0.00938 | N/A | 0.780257 | 0.000029 | 00000007 | |
| 41.5 | 0.44471 | 221.04 | 6.9 | 1.07 | 2102 | 2071 | 162.348 | 0.01910 | N/A | 0.779510 | 0.000045 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 11:36:07 AM

**Description:** SBIR / WP / Hole # 2 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.15 from Edge of Hole / Hoop / J
(E:\SBIR - WP - Hole # 2 - 19Aug2005-11 41am.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -15.8750 | -109.4544 |
| **Counting Statistics Error (+/-):** | 1.8722 | 12.9087 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780317 | **Slope of Fitted Line:** | -0.001655 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.17946 | 177.79 | 8.3 | 0.68 | 2552 | 2503 | 161.872 | 0.00400 | N/A | 0.780020 | 0.000022 | 00000007 | |
| 41.5 | 0.44529 | 217.45 | 6.3 | 1.14 | 1913 | 1880 | 162.282 | 0.02139 | N/A | 0.779580 | 0.000043 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 11:43:58 AM

**Description:** SBIR / WP / Hole # 3 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.05 from Edge of Hole / Hoop / J
(E:\SBIR - WP - Hole # 3 - 19Aug2005-11 48am.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -77.3703 | -533.4483 |
| **Counting Statistics Error (+/-):** | 3.2287 | 22.2610 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.781741 | **Slope of Fitted Line:** | -0.008185 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

**SPECTRUM DATA**

| Psi | Sin^2(psi) | Peak Chnl | Intensity | FWHM | Peak Gross | Peak Net | 2-Theta | Ka Corr | Ka2 Peak | D Spacing | Std. Dev. | Det. S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24.5 | 0.18094 | 164.63 | 7.4 | 1.04 | 2253 | 2205 | 161.652 | 0.01914 | N/A | 0.780260 | 0.000077 | 00000007 | |
| 41.5 | 0.43349 | 309.65 | 115.2 | 3.81 | 36897 | 34551 | 163.645 | 0.30272 | N/A | 0.778193 | 0.000020 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 11:51:45 AM

**Description:** SBIR / WP / Hole # 3 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.10 from Edge of Hole / Hoop / J
(E:\SBIR - WP - Hole # 3 - 19Aug2005-11 56am.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -52.9253 | -364.9067 |
| **Counting Statistics Error (+/-):** | 1.4048 | 9.6856 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.781035 | **Slope of Fitted Line:** | -0.005530 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17960 | 176.39 | 7.1 | 0.65 | 2156 | 2124 | 161.852 | 0.00253 | N/A | 0.780042 | 0.000028 | 00000007 | |
| 41.5 | 0.43720 | 269.31 | 14.3 | 0.91 | 4359 | 4288 | 163.215 | 0.01217 | N/A | 0.778618 | 0.000022 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 11:57:51 AM

**Description:** SBIR / WP / Hole # 3 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.15 from Edge of Hole / Hoop / J
(E:\SBIR - WP - Hole # 3 - 19Aug2005-12 02pm.set)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -12.6008 | -86.8794 |
| **Counting Statistics Error (+/-):** | 1.1041 | 7.6124 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780418 | **Slope of Fitted Line:** | -0.001324 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18044 | 168.14 | 222.9 | 1.96 | 74310 | 66857 | 161.726 | N/A | 163.861 | 0.780179 | 0.000023 | 00000007 | B |
| 41.5 | 0.44729 | 203.39 | 252.7 | 1.27 | 76912 | 75823 | 162.052 | N/A | 163.995 | 0.779826 | 0.000017 | 00000011 | B |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 12:04:12 PM

**Description:** SBIR / WP / Hole # 4 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.05 from Edge of Hole / Hoop / JB
(E:\SBIR - WP - Hole # 4 - 19Aug2005-12 09pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -38.9161 | -268.3166 |
| **Counting Statistics Error (+/-):** | 2.2946 | 15.8208 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.781088 | **Slope of Fitted Line:** | -0.004126 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18142 | 159.73 | 12.0 | 0.91 | 3653 | 3599 | 161.581 | 0.01466 | N/A | 0.780339 | 0.000041 | 00000007 | |
| 41.5 | 0.44266 | 249.07 | 83.8 | 3.38 | 25950 | 25144 | 162.585 | 0.28146 | N/A | 0.779261 | 0.000042 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 12:10:01 PM

**Description:** SBIR / WP / Hole # 4 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.10 from Edge of Hole / Hoop / JB
(E:\SBIR - WP - Hole # 4 - 19Aug2005-12 15pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -20.6846 | -142.6151 |
| **Counting Statistics Error (+/-):** | 4.2609 | 29.3778 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780436 | **Slope of Fitted Line:** | -0.002159 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 301.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17963 | 175.91 | 8.2 | 0.53 | 2498 | 2459 | 161.847 | 0.00025 | N/A | 0.780048 | 0.000022 | 00000007 | |
| 41.5 | 0.44443 | 223.21 | 4.2 | 1.25 | 1268 | 1254 | 162.381 | 0.02546 | N/A | 0.779476 | 0.000108 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 12:16:02 PM

**Description:** SBIR / WP / Hole # 4 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.15 from Edge of Hole / Hoop / JB
(E:\SBIR - WP - Hole # 4 - 19Aug2005-12 21pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -16.8144 | -115.9308 |
| **Counting Statistics Error (+/-):** | 2.1146 | 14.5796 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780329 | **Slope of Fitted Line:** | -0.001752 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17943 | 178.64 | 8.7 | 0.86 | 2641 | 2605 | 161.877 | 0.01231 | N/A | 0.780015 | 0.000029 | 00000007 | |
| 41.5 | 0.44504 | 219.63 | 7.1 | 1.29 | 2139 | 2118 | 162.311 | 0.03114 | N/A | 0.779549 | 0.000047 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 12:22:09 PM

**Description:** SBIR / WP / Hole # 5 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.05 from Edge of Hole / Hoop / JB
(E:\SBIR - WP - Hole # 5 - 19Aug2005-12 27pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -38.6753 | -266.6561 |
| **Counting Statistics Error (+/-):** | 3.6740 | 25.3314 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780816 | **Slope of Fitted Line:** | -0.004048 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.17988 | 174.20 | 6.9 | 0.82 | 2092 | 2055 | 161.810 | 0.01024 | N/A | 0.780088 | 0.000031 | 00000007 | |
| 41.5 | 0.44073 | 262.05 | 86.4 | 3.90 | 27862 | 25915 | 162.807 | 0.29053 | N/A | 0.779032 | 0.000089 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 12:27:56 PM

**Description:** SBIR / WP / Hole # 5 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.10 from Edge of Hole / Hoop / JB
(E:\SBIR - WP - Hole # 5 - 19Aug2005-12 32pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -19.9917 | -137.8380 |
| **Counting Statistics Error (+/-):** | 3.0677 | 21.1511 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.780788 | **Slope of Fitted Line:** | -0.002124 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18180 | 156.28 | 10.8 | 0.99 | 3329 | 3246 | 161.524 | 0.01781 | N/A | 0.780402 | 0.000046 | 00000007 | |
| 41.5 | 0.44738 | 214.82 | 6.7 | 1.96 | 2029 | 2003 | 162.041 | 0.21560 | N/A | 0.779838 | 0.000065 | 00000011 | |

# TEC MAX Analysis Manager v1.0.26

## Single Exposure Residual Stress Report
## 8/19/2005 12:33:44 PM

**Description:** SBIR / WP / Hole # 5 / CW Holes / Std. 7320-001 2024-T351 / 0.25" Hole / Front 0.15 from Edge of Hole / Hoop / JB
(E:\SBIR - WP - Hole # 5 - 19Aug2005-12 38pm.mmt)

| STRESS RESULTS | | |
|---|---|---|
| | **KSI** | **MPa** |
| **Residual Stress:** | -48.3702 | -333.5002 |
| **Counting Statistics Error (+/-):** | 6.3705 | 43.9227 |

| Fitted Delta D vs Sin^2(Psi) | | | |
|---|---|---|---|
| **D-Spacing Intercept:** | 0.781496 | **Slope of Fitted Line:** | -0.005185 |

| MEASUREMENT PARAMETERS | | | |
|---|---|---|---|
| **Material Type [hkl]:** | Al 5083-H23 [333] | **Stress Constant:** | 1.255E-7 |
| **Depth:** | 0.00 | **Phi Angle:** | 0.00 |
| **Count Time:** | 300.0 sec | **Collimator:** | 5mm Collimator |
| **X-Ray Tube:** | Copper (Moxtek) | **X-Ray Wavelength:** | 1.5406 Angs. |
| **Tube Voltage:** | 26.0 KV | **Tube Current:** | 80.000 uA |
| **Filter:** | Nickel | **Orientation:** | Omega |

| DETECTOR CALIBRATION PARAMETERS | | | | | | |
|---|---|---|---|---|---|---|
| | **Active Channels** | | **Calibration Parameters** | | | |
| **Detector** | **Start** | **End** | **A** | **B** | **C** | **D** |
| S/N 00000007 | 61 | 451 | 8.675221E-9 | -6.629224E-6 | 1.703235E-2 | -1.669914E2 |
| S/N 00000011 | 61 | 451 | 1.123196E-8 | -8.658852E-6 | 2.002985E-2 | 1.582417E2 |

| SPECTRUM DATA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psi** | **Sin^2(psi)** | **Peak Chnl** | **Intensity** | **FWHM** | **Peak Gross** | **Peak Net** | **2-Theta** | **Ka Corr** | **Ka2 Peak** | **D Spacing** | **Std. Dev.** | **Det. S/N** | **Flags** |
| 24.5 | 0.18269 | 148.35 | 6.5 | 1.18 | 1984 | 1952 | 161.392 | 0.02619 | N/A | 0.780549 | 0.000153 | 00000007 | |
| 41.5 | 0.44218 | 238.97 | 6.0 | 1.41 | 1819 | 1794 | 162.641 | 0.04623 | N/A | 0.779204 | 0.000051 | 00000011 | |