The USAF Manufacturing Technology

Program Status Report

Wright Laboratory / Manufacturing Technology Directorate / Wright-Patterson AFB, Ohio
Visit the ManTech Homepage at: http://www.wl.wpafb.af.mil/mtx/mt_home.htm

Summer 1997

Manufacturing Technology USAF

Wright Laboratory is just one of the laboratories consolidated under the Air Force's single-lab reorganization. The new organization is called the Air Force Research Laboratory, and was activated at Wright-Patterson on April 8. The Manufacturing Technology Directorate also had a change in leadership. Dr. William Kessler left in April, and was replaced by Dr. Charles Browning.

In this issue:

DRA Team Earns Tech Transfer Award....2
Air Force Laboratories Consolidate....3
Software Quality Assessment....4
Composites Affordability; New MT Director....5
Industry Days....6
AMLCD Successes....7
PRISSM Migrates; Roadmap Review....10
1997 Defense Manufacturing Conference....11

DRA Project Team receives General Yates Award for Excellence in Technology Transfer

Several members of Wright Laboratory were recently presented the General Ronald W. Yates Team Award for Excellence in Technology Transfer.

The award was presented by Lt. Gen. Kenneth E. Eickmann, Aeronautical Systems Center commander, to the Defense Production Act Title III Program Discontinuously Reinforced Aluminum (DRA) Project Team, in a special ceremony held March 6, at Wright Laboratory Headquarters.

The award cited the project team's new standard for successful technology transition and transfer. What was previously an R&D material is now a useful, affordable, and commercially available product to solve difficult military and commercial problems. The DRA team gained two firsts in metal matrix composites (MMCs) applications. Working with the Ogden Air Logistics Center, the Royal Dutch Air Force and Lockheed-Martin, the team qualified DRA as the first MMC preferred spare for the F-16 ventral fin. DRA solved a vibration problem that greatly extended the fin's service life. The team collaborated with Pratt & Whitney (P&W) to qualify DRA components in the first commercial MMC turbine engine production application. It is now in production for the Boeing 777 P&W 4084 engine. Additionally, a ten-fold increase in life resulted in Walt Disney World choosing DRA for brake fins on its Big Thunder Railway.

The DPA Title III Program provides industry financial incentives to establish production capacity for critical DoD materials as determined by the President. As the executive agent for all of DoD, the WL/MT DPA Program Branch managed the $9.4 million contract to DWA Composite Specialties Inc. DRA is a metal matrix composite consisting of aluminum reinforced with silicon carbide particles that has higher strength, stiffness, and wear-resistance, but about the same weight and price as aerospace-grade aluminum.

The nomination package cited the Title III DRA Project Team's foresight in recognizing the potential of this material, along with the team's ability to work together to adapt to a changing market environment and unforeseen barriers. They were lauded for establishing a pathway for successful transition of an emerging material to a viable, affordable, commercially available material to solve problems in military and commercial applications.

Members of the team include: Eric Pohlenz, Phil Tydings, Willa Eichelman and Mary Lewis, all from the Manufacturing Technology Directorate; Capt. William Kralik and Dr. Benjy Maruyama, from the Materials Directorate; and Maj. Tim Fowler, from Ogden Air Logistics Center.

Air Force laboratories, Office of Scientific Research, consolidated under one commander

Air Force Research Laboratory activated April 8, 1997

By order of the Secretary of the Air Force, the Air Force Research Laboratory (AFRL) was activated at Wright-Patterson AFB on April 8, 1997, placing the four Air Force laboratories and the Air Force Office of Scientific Research (AFOSR) under a single commander.

Under this single-lab reorganization, Armstrong Laboratory (at Brooks AFB), Phillips Laboratory (at Kirtland AFB), Rome Laboratory (at Rome, NY), and Wright Laboratory have been consolidated with AFOSR (at Bolling AFB) and put under the command of Maj. Gen. Richard R. Paul. Prior to this, General Paul had been the director of science and technology for Air Force Materiel Command Headquarters.

Activation of AFRL is the first phase of a two-phase process. Phase I defined the command section, product executives, plans and programs, operational support, and provided an interim organizational structure. AFOSR and the four existing laboratories will remain named units until Phase II, which is expected to be implemented in October 1997. The four existing lab commanders will be dual-hatted as Product Executives, report to the AFRL commander, and no longer report to the product centers. The existing lab XP directors will report to the AFRL/XP director and no longer report to the existing lab commanders. AFOSR will report to the AFRL commander.

The transition efforts will include a plan to celebrate and memorialize the heritage of the current laboratories. Part of this includes an effort which is already underway to trace the history of the laboratories since their inception in the mid-1940s. Lab evolution since the formation of Air Force Systems Command, in 1961, will be given special emphasis.

Current planning calls for research activities to remain at their present geographic locations. The core of the new AFRL staff will come from the current headquarters AFMC science and technology staff, augmented by the staffs from the current laboratories.

The move is in response to a congressionally mandated initiative to consolidate defense laboratories and test centers. While it streamlines the Air Force laboratory structure, it has also created an organization that is 7,000 people strong. The reorganization is expected to reduce manpower, but it's too early to say how large these reductions will be or where they will occur.

Software process quality assessment program improves evaluations, transfers technology

Project Engineer:
David Judson
WL/MTI
(937) 255-7371

Contract Number:
F33615-95-C-5544

Under a contract with the Wright Laboratory Manufacturing Technology Directorate, engineers from AbTech Corporation developed a neural network-like tool which produces automatic, expert evaluations of software quality.

The tool is being used as the basis for development of a tool for the Phillips Laboratory which will automatically analyze historical satellite telemetry data, learn expected signal characteristics for specific signals using case-based reasoning and statistical network techniques, and apply these models to identify unexpected values or trends in telemetry data. It is also being used as the basis for development and implementation of statistical network models to detect Space Shuttle telemetry anomalies at NASA's Johnson Space Center. The tool has demonstrated the ability to verify sensor performance on the M109 Howitzer diesel engine, and is being used by Nortel Inc., to predict software errors.

ModelQuest Metrics™, an advanced statistical network modeling tool for estimating and assessing the quality of software based on historical source code metrics, process-related information, and defect data, was developed and delivered under this program. AbTech's general modeling tool, ModelQuest Expert™, can also be used to automatically create statistical process control (SPC), statistical quality control (SQC), and diagnostic models based on the historical data for an organization's products and/or processes. An MQ Metrics product was developed which automatically predicts future defects based on databases of examples found in neural networks.

Program managers, test engineers, production engineers, software engineers and quality managers understand the need to create reliable and maintainable products and processes. To analyze the quality of their products and processes, many organizations collect large amounts of data over time. Until now, no effective method existed for determining how this historical data actually relates to product and process quality. Statistical network modeling technology will enable the Department of Defense and industry to automatically generate powerful models of software, product, and/or process quality that are tailored to specific organizations based on their historical development and defect data. Statistical network models combine the power of neural networks and advanced statistical techniques to outperform both. ModelQuest Metrics and ModelQuest Expert provide this capability by: producing excellent prediction models based on an organization's historical data; providing engineers and managers with insightful reports automatically; and identifying key variables and problems.

The use of this unique modeling approach for software quality assessment, SPC, and SQC results in improved quality by identifying and analyzing defective and high-risk software, products, and processes early in the development and production cycle and acting on the underlying causes. The resulting predictive capability provided by this tool has created a growing customer market for this product.

Benefits

- Takes advantage of historical data
- Tailors models to organization
- Identifies/acts on quality problems
- Improves resource prioritization
- Identifies key variables

For more information, circle Reader Response Number 1

Composites Affordability Initiative collaborative effort to attack high cost issues

Engineers from the Wright Laboratory Manufacturing Technology Directorate, along with the Flight Dynamics and Materials Directorates, are undertaking a project to significantly reduce the cost of composite structures and expand their use in military systems. The Composites Affordability Initiative (CAI) will be a collaborative effort between the government and industry to jointly attack the issues and areas of cost associated with the use of composite materials.

The Department of Defense, primarily the Air Force and the Navy, will participate, along with the four major airframe manufacturers — Boeing, Lockheed Martin, Northrop Grumman, and McDonnell Douglas — in a collaborative effort to jointly develop and mature the essential approaches to achieve major cost reductions in composite structures.

These cost reductions will be achieved by addressing issues which cross the boundaries of cultural, business and technology domains from both the perspective of the government, and industry. The management team will be structured as a Leadership Integrated Product Team, using Integrated Product Process Development principles to accomplish required tasks via focus activity Integrated Product Teams created to address specific topics/issues. This team will have total responsibility for direction of the effort and all the assigned resources.

An example of cooperation and support, the CAI is being structured as a collaborative effort, with all members sharing in the results of the effort, including the early concept and structural demonstration. This demonstration will establish check points for the design and process technologies required to attain program goals. Extensive use of shared facilities will be required in the early phases of the program, with collocation of team CAI personnel necessary to most effectively accomplish and participate in all aspects of the effort. Progress will be measured through periodic demonstrations which will serve as major milestones in the initiative. These demonstrations will also provide opportunities to migrate the validated approaches for cost reduction to system program offices and production application.

The CAI will initially focus on fixed wing attack aircraft, as they represent the most costly and structurally challenging use of composites. However, the results will be applicable to other aircraft systems, both military and commercial, and could enhance composites use in ground vehicle and ship applications. Membership of the CAI will be expanded to cover new opportunities as they arise.

Project Engineer:
Dave Beeler
WL/MTPN
(937) 255-7277

For more information, circle Reader Response Number 2

Manufacturing Technology gets new director

Dr. William C. Kessler left his position as director of Manufacturing Technology in April, after accepting a job with Lockheed Martin Aeronautical Systems in Marietta, GA. He worked at Wright Laboratory since 1975 and was the Department of Defense's top ManTech official. Dr. Charles Browning, formerly of the Materials Directorate, replaced him as the MT Director.

Manufacturing Technology Directorate hosts Industry Days '97

By Dr. Mike Heberling
Manufacturing Technology Directorate

The Wright Laboratory Manufacturing Technology Directorate (MT) held its third annual Industry Days conference, April 8-9, at Dayton's Crowne Plaza Hotel.

Over 150 representatives from both the DoD and industry heard a mix of panels and presentations highlighting this year's theme — Implementing Lean Practices. The three keynote speakers: Jim Sinnett (corporate vice president, McDonnell Douglas), Thomas Doyle (vice president, TRW Automotive), and Fred Stahl (director for Production Transition, McDonnell Douglas) each provided their perspective and insight on lean manufacturing and business practices.

The Executive Director of Aeronautical Systems Center, Jerry Sutton, served as moderator for the Customer Panel session, which was one of the highlights of Industry Days '97. Although the panel members came from diverse organizations — the defense industry (Dr. David Spong, McDonnell Douglas, and Ron Milauskas, Textron Systems), the commercial industry (Tom Doyle, TRW Automotive), the Army (James Richey, Comanche Program Office) the F-22 SPO (Dr. Steven Butler), and Acquisition Policy, (Col. Robert Kayuha, ASC/AZ) — there were a number of common themes. All were very much concerned with affordability issues. While they felt that the initiative to identify lean practices was well under way, the real challenge was one of acceptance and implementation. For this to occur, all members of the value chain from the DoD to defense primes to commercial suppliers must have incentives to pursue and adopt lean practices.

The majority of the conference was devoted to MT's three Industrial Base Pilot (IBP) programs. The "Military Products from Commercial Lines" pilot program, managed by Mary Kinsella, is demonstrating the production of electronic modules compatible with the F-22 Raptor Advanced Tactical Fighter and the RAH-66 Comanche Helicopter, using a commercial automotive manufacturing line. The "Military Products Using Best Commercial/Military Practices" pilot program, managed by Tracy Houpt, is building an affordable C-17 horizontal stabilizer in an integrated factory with better quality, reduced weight, and decreased cost when compared to the existing military baseline. The "Lean Implementation Initiative - Modular Factory," managed by Brench Boden, targets aircraft, missile and electronic systems to demonstrate a modular factory approach for the manufacture of military products. The benefits include affordability, reduced cycle time, and lower inventory. The three IBP programs have made major strides in transitioning best practices from the laboratory environment into major production programs. The annual Industry Days conference provides a forum for the pilots to share their findings, lessons learned, and recommendations with the entire acquisition community.

ASC Executive Director Jerry Sutton (right) presents a memento to guest speaker, Fred Stahl, director for Production Transition for McDonnell Douglas.

This conference also provided Wright Laboratory with the opportunity to introduce Dr. Charles E. Browning, the new MT Director, who provided the closing remarks. Dr. Browning summarized the two day event and invited everyone to attend next year's Industry Days '98.

Active matrix liquid crystal display contracts help build strong manufacturing infrastructure

Manufacturing Technology Directorate engineers have successfully completed several contracts related to active matrix liquid crystal display (AMLCD) technology, all of which are in support of the Defense Advanced Research Projects Agency (DARPA) High Definition Systems Initiative.

This initiative focuses on developing the equipment, processes, and materials necessary to build a strong infrastructure to support display manufacturing. AMLCDs are the cockpit designer's choice for replacing CRTs in cockpit displays because they are sunlight readable, have full color capability and provide a large viewing area. With active matrix liquid crystal displays, the pilot/crew situation awareness is significantly increased by providing the capability of fusing the data, and presenting situation information to the pilot in a timely manner.

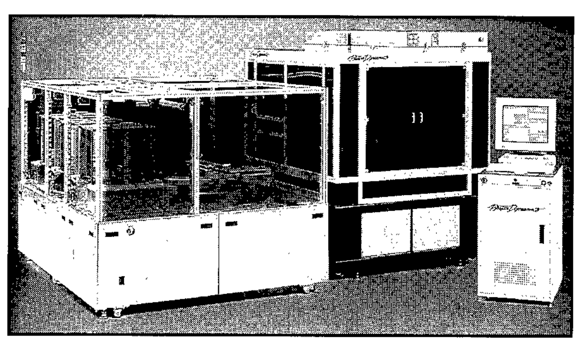
Active-Matrix Pixel and Line Defect Detection Technology

AMLCD manufacturing technology requires a method of testing flat panel pixels with high levels of accuracy. One of these contracts examined active-matrix pixel and line defect detection technology, and produced a new defect detection machine. This machine performs nondestructive testing on most flat panel technologies available today, and is capable of locating and identifying "opens" and "shorts" on glass substrates as large as 450mm square. The system allows testing of partially completed flat panels, improving manufacturing throughput by 30 percent, reducing flat panel display costs by 50 percent, and greatly reducing the overall inspection and repair process. This is the first time defect detection technology has been available for large flat panel displays.

The new defect detection system uses a patented electro-optic voltage transfer device that instantly detects and locates line and pixel defects using a technique called "non-contact voltage imaging" in AMLCD panels prior to final assembly, dramatically improving manufacturing yields. The system determines voltage levels with a new measurement method that uses a phenomenon involving interaction between light, electric fields and crystals. A two-dimensional image of the active matrix is produced from voltage levels in the matrix, similar to the way a photographic image is produced from light levels. The imaging process measures the voltage at any location with a resolution of approximately 120 millivolts, and a spatial resolution of approximately 30 microns. The software then stores the results in a data file, which can be passed on to the AMLCD Panel Laser Repair System for automated repair of the defects.

Mass Production In-Process Test System

In order to make flat panel displays affordable, a system that would evaluate high volumes of flat panel displays for all types of process defects during manufacture was developed. This project established the design for a mass production in-process test system capable of meeting the next generation testing demands. The system includes automated cassette-to-cassette in-process testing of partially completed flat panels, non-destructive testing of most flat panel technologies available today, and the capability to test flat panels with pixels that are 70 - 400 micrometers in size to an accuracy near one half of a volt. The resulting increased yield provides better quality, lower cost flat panel displays.



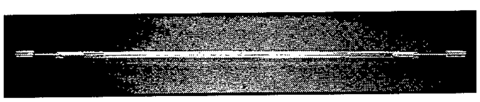
This In-Process Test System Mass Production System (IPT-MPS) provided the important step of automated cassette-to-cassette in-process testing of partially completed flat panels. The system elaborated on the previously developed manual in-process test system, and resulted in development of in-process testing technology in the key areas of image acquisition and processing, high-speed pipeline and parallel computing architecture, embedded processing, and precision mechanics.

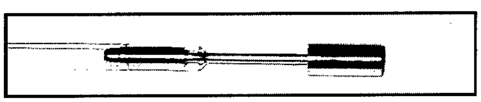
The IPT test method performs a true functional test of the panel, which makes it a valuable source of the most direct data for notifying the manufacturer of the exact quality of several in-process test steps. The IPT uses voltage modulators, applied plate-to-plate, to detect errors (opens or shorts) in the plates of silicon. A record of these errors is made and sent to the next machine, where a laser repairs the open or short. This mass production IPT improves on the previously used IPT system by enhancing these modulations to make them more sensitive to defects. This, along with improved capability of the micrometer sizes of pixels, results in higher accuracy tests. Use of cassette-to-cassette testing allows processed plates of silicon to be loaded and unloaded within the tester much easier. The information is a valuable aid for increasing yield, and thereby reducing the overall cost of producing flat panels in the future.

Extended Long Life Discharge Lamp for RTP

Another project under this initiative improved the long-arc, plasma discharge lamp's reliability by a factor of seven. The development of this extended long life discharge lamp for rapid thermal processing of flat panel displays reduced manufacturing costs and increased equipment availability, allowing more cost-effective production of large flat panel displays.

As the size of flat panel displays gets larger (17" diagonals or greater), the amorphous silicon-based (a-Si) display is not cost effective. Therefore, polysilicon-based (p-Si) displays must be used. Polysilicon is manufactured by recrystallizing the a-Si. This transformation provides a material that allows higher performing Thin-Film-Transistors (TFTs) which are the critical component of the flat panel display. Polysilicon allows for the driver circuitry to be placed directly on the active plate, thereby, making it possible to build larger displays. Rapid thermal processing uses a machine with lamps underneath and on top, and the heat from these lamps converts the a-Si to p-Si. Increasing the life of these lamps decreased the cost of processing plates of amorphous silicon.





This project resulted in an increase in the average lamp life for rapid thermal processing of flat panel displays from 60 hours to 430 hours, lamp manufacturing costs were reduced 50 percent and lamp costs per substrate were reduced from $1.18 to $.08 for a typical flat panel display throughput of 60 substrates per hour.

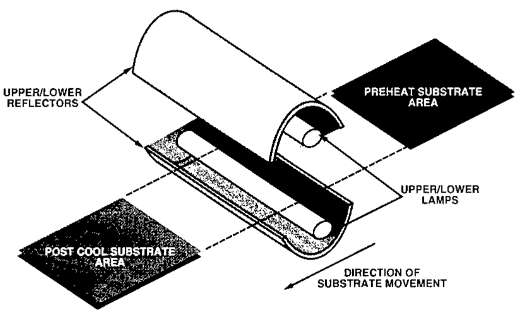
Project Engineer:
Robert Cross
WL/MTMC
(937) 255-2461

Contract Number:
Numerous

Rapid Thermal Processor/Excimer Laser Annealing

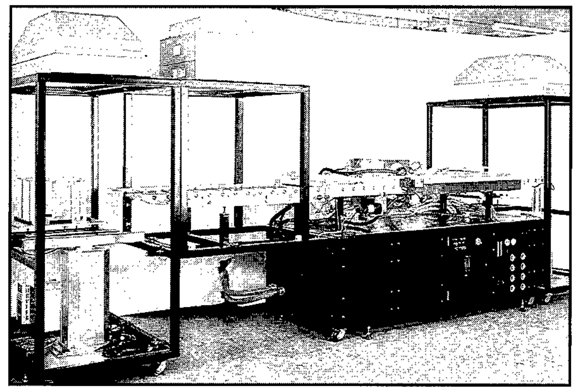
Use of polysilicon in these displays allows designers to incorporate the superior qualities of the polysilicon film with higher carrier mobilities, in the manufacture of TFTs, the key electronic component on these displays. TFTs act like on/off switches, resulting in less chance of confusion and better performance. The crystalline grain structure of polysilicon increases carrier mobility, allowing creation of better quality TFTs.

Under two separate programs, researchers developed two different approaches to convert amorphous silicon into polysilicon, for use in the cost effective manufacture of AMLCDs. The Rapid Thermal Process manufacturing system reduced manufacturing thermal cycle time by 7200 percent, reduced display costs by 30 percent by integrating driver circuits on glass, and resulted in improvements in flat panel display aperture ratio, gray scale, and resolution. The RTP technology enables, for the first time, glass sub-



strates to be heated to temperatures above their strain (working) temperatures, with little or no warpage, and reduces manufacturing cost, while improving thin film transistor (TFT) device performance. The Excimer Laser Annealing process manufactures displays with integrated display drivers and will lower manufacturing costs due to the use of low temperature/low cost substrates. This process uses a fast-pulsed excimer laser to crystallize amorphous silicon into polysilicon.

The RTP is a solid state conversion process, using lamps to convert amorphous silicon. This material then goes on plates and is processed to create the TFTs. The project developed a working prototype, large area rapid thermal processor capable of recrystallizing amorphous thin films, implant activation, aluminum alloying on quartz glass and low cost substrate glass. The resulting system is the first to selectively heat the thin films of interest to very high temperature, enhancing their electrical properties, while leaving the bulk temperature of the substrate material substantially below its strain point. The Excimer Laser Annealing is a similar process, but it uses a laser to take amorphous silicon through a liquid recrystallization phase conversion.



Laser Based Metal Deposition & Material Removal System

The yield in the production of AMLCD panels has been low, especially when AMLCD panels with larger size or more complicated processes are manufactured. To improve these yields and reduce the cost in the mass production of AMLCD panels, an integrated laser system was developed to repair "open" and "short" defects automatically, providing a laser repair technology which had never before been available for large flat panel displays.

This effort produced a laser-based metal deposition and material removal system capable of automatically making repairs, during the production process, to flat panels with pixel line geometries above five microns. The system performs cutting, ablating and metal deposition, dramatically improving production yields of AMLCDs. The Integrated Laser Repair System repairs most flat panel AMLCD technologies available today, as well as nearly all of those that are currently on the drawing boards for release several years from now. This new capability to automatically make repairs during production saves time, money and effort through reduced defects.

Besides the basic repair functions, the system can also combine the repair functions to create new process procedures called recipes. A recipe is a macro function used to sequence the basic functions. The system is a vision system which can make decisions, i.e., where a defect is located, what kind of defect it is, and how the defect can be repaired. The repair system is not an inspection system for the determination of global defects; it locates defective structures locally. After the files and data required in the repair are read, the system automatically implements optical focus using either the low or high magnification lens, aligns the reference marks using the plate or panel defined, and completes pixel alignment with the stored pixel structure. It analyzes defects, identifies defective pixel and lines, classifies defects as either "opens" or "shorts," defines repair points and path with repair rules which are created from global and local knowledge, and implements laser repair functions with the process parameters.

For more information, circle Reader Response Number 3

Program for Regional Improvement Services for Small Manufacturers migrates to Los Angeles

Project Engineer:
Marvin Gale
WL/MTX
(937) 255-7362

Contract Number:
F33615-92-D-5812

For more information, circle Reader Response Number 4

Program for Regional Improvement Services for Small Manufacturers (PRISSM) is a process to identify and implement world class manufacturing techniques within small and medium sized businesses.

PRISSM uses highly qualified assessors, leveraged support, and a structured methodology to identify, prioritize, and implement solutions for increased efficiency and profitability. The Manufacturing Technology Directorate sponsored the development of PRISSM with the vision of applying the PRISSM process to the supplier base of high impact aerospace regions.

The initial testbed for the PRISSM approach was the southern Ohio region. Air Force ManTech, in conjunction with the Institute of Advanced Manufacturing Sciences (IAMS), the Edison Welding Institute (EWI) and others, developed the formal process. Over 50 PRISSM assessments have been conducted since the program's inception in 1992. The next phase of the PRISSM Program is to migrate the methodology to other high payoff areas within the nation. Demographic data indicated the Los Angeles region to be one of those areas.

The PRISSM Program Kickoff for the Los Angeles region is tentatively scheduled to be held in late June. IAMS has selected the Los Angeles Regional Technology Alliance to be the PRISSM Provider for the Los Angeles region. They will use the capabilities of regional consultants and the California Manufacturing Technology Center to deliver the PRISSM services. Training and certification of the PRISSM Lead Assessors and PRISSM Project Managers will be provided by IAMS.

IAMS and EWI have identified and communicated with key Air Force prime contractors with supply chains that could benefit from this program including Hughes, Boeing and GE Aircraft Engines. Discussions are underway with these companies to clearly define a strategy for incorporating the PRISSM methodology as a supply chain development service to improve costs, quality and lead time in critical subtier contractors.

Manufacturing Technology Directorate 1997 Roadmap Review slated for July 17

The Wright Laboratory Manufacturing Technology Directorate Roadmap Review is scheduled for July 17, in the Dayton Convention Center. The annual review is designed to provide direction and guidance to the defense manufacturing community.

Dr. Charles Browning, MT Director, will host the event, and will provide a complete Directorate overview. Included will be a progress report on the Directorate's mission to help industry maintain an affordable defense manufacturing capability in an era of downsized budgets.

Leaders from academia, industry, and government agencies will attend the review to hear directorate engineers discuss program accomplishments, present planning activities, and future new starts. For more information, contact the Universal Technology Corporation, (937) 426-2808.

Defense Manufacturing Conference '97

"Building Partnerships for the 21st Century"

The 1997 Defense Manufacturing Conference (DMC '97) will be hosted by the Joint Defense Manufacturing Technology Panel. This panel identifies and integrates requirements, conducts joint program planning, develops joint strategies and oversees execution of the manufacturing technology programs conducted by the Army, Navy, Air Force, Defense Logistics Agency, and Defense Advanced Research Projects Agency.

DMC '97 will be a forum for presenting and discussing initiatives aimed at addressing critical defense manufacturing and sustainment needs. The agenda will be structured to provide participants with an overview of defense manufacturing technology and sustainment programs as well as detailed technical discussions relating to the various initiatives and the technology thrusts currently being pursued. Attendees will be presented not only with the status of both government and industry programs, but also with a vision for the future of defense manufacturing and sustainment. The Conference will pave the way towards future successes in the affordable production and sustainment of both military and commercial products.

All conference activities will be held at the Wyndham Palm Springs Hotel and the Palm Springs Convention Center which are located three blocks from downtown Palm Springs and approximately two miles from the Palm Springs Municipal Airport. They are surrounded by the living desert and magnificent San Jacinto Mountains.

Visit us on the worldwide web
http://mantech.iitri.com/dmc97/index.shtml

The DMC '97 exhibit area will be located in the Palm Springs Convention Center. Booth Space can be combined in groups or located side-by-side. A nonrefundable exhibitor fee of $1,250 per 8'x10' booth will be charged. Anyone interested in exhibit space, or more information on the Conference, should contact the DMC '97 Exhibit Manager at (937) 426-2808 (Fax: 426-8755; Email: utc-mmg@erinet.com).

Preliminary Agenda

Monday, December 1
General Session/Tutorials
- Special Topics

Tuesday, December 2
General Session
- Keynote Speakers

Awards Luncheon
Technical Sessions
- Metals Processing & Fabrication
- Composites Processing & Fabrication
- Electronics Processing & Fabrication
- Manufacturing & Engineering Systems
- Advanced Industrial Practices
- Special Topics

Wednesday, December 3
General Session
- Acquisition Reform

Open Lunch
Technical Sessions (Continued)

Thursday, December 4
General Session
- Government/Industry Panel
- Re-Engineering the Industrial Workplace

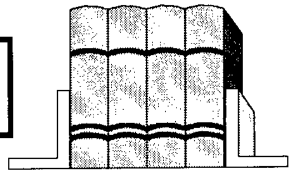
Group Luncheon
Focused Breakout Sessions
Conference Adjourn

End of Contract Forecast

DATE	PROJECT TITLE CONTRACT NO.	PRIME CONTRACTOR	POINT OF CONTACT
June 1997	Process Web: Process-Enable Planning & Composition of an Agile Virtual Corporation F33615-96-C-5604	Intelligent Systems Technology Incorporated Los Angeles, CA	Cliff Stogdill (937) 255-8589
June 1997	Green Card: A Biopolymer Based and Environmentally Safe Printed Wiring Board Technology F33615-95-C-5509	International Business Machines Corporation, Thomas J Watson Research Center Yorktown Heights, NY	Ronald Bing (937) 255-2461
June 1997	Electronics Sector End-to-End Pathfinder (Exchange of Engineering Information Through the Value Chain) F33615-94-C-4431	Arizona State University, CIM Research Center Tempe, AZ	Wallace Patterson (937) 255-8589
July 1997	AIM Software Process Quality Assessement (SPQA) Program F33615-95-C-5544 Abtech Corporation	Abtech Corporation Charlottesville, VA	David Judson (937) 255-7371
July 1997	Advanced Collaborative Open Resource Network (ACORN) F33615-94-C-4450	Carnegie Mellon University Pittsburgh, PA	Brian Stucke (937) 255-7371
July 1997	Precision Machining Program F33615-94-C-4440	AT&T Corporation, Guilford Center Greensboro, NC	Timothy Swigart (937) 255-3612
July 1997	Low Cost Flat Panel Display Fabrication F33615-94-1-4448	University of Alabama, Department of Electrical & Computer Engineering, Huntsville, AL	Robert Cross (937) 255-2461
July 1997	Rugate Coating Producibility F33615-93-C-5317	Hughes Company, Danbury Optical Incorporated, Danbury, CT	P Michael Price (937) 255-2461
August 1997	Manufacturing Simulation Driver (MSD) F33615-96-C-5609	Raytheon Company, Missiles Systems Division Tewksbury, MA	John Barnes (937) 255-7371
August 1997	Fiber Placement Benchmark & Technology Roadmap F33615-95-2-5563	McDonnell Douglas Corporation, Aerospace Division, St Louis, MO	Daniel Brewer (937) 255-7277
August 1997	Decision Support System for the Management of Agile Manufacturing F33615-95-2-5525	Phillips Laboratory Incorporated Briarcliff Manor, NY	Wallace Patterson (937) 255-8589
August 1997	Neural Network Error Compensation of Machine Tools F33615-95-C-5541	Tetra Precision Incorporated Palm Beach Gardens, FL	Siamack Mazdiyasni (937) 255-2413
August 1997	EcoBoard: A Tool for the Design of Green Printed Circuit Boards and Assemblies F33615-95-2-5548	Science Applications International Corp San Diego, CA	Ronald Bing (937) 255-2461
August 1997	Zero Dump Electroplating Process Development F33615-95-C-5506	Physical Sciences Incorporated Andover, MA	Ronald Bing (937) 255-2461
August 1997	Metal Forming Simulation F33615-93-C-5318	Northrop Grumman Corporation El Segundo, CA	Deborah Kennedy (937) 255-3612
August 1997	Flat Panel Displays	McDonnell Douglas Corporation St Louis, MO	John Blevins (937) 255-3701
August 1997	Flat Panel Displays	US Army, PM NV/RSTA Fort Belvoir, VA	John Blevins (937) 255-3701
August 1997	Flat Panel Displays	Chrysler Technologies Waco, TX	John Blevins (937) 255-3701
August 1997	Flat Panel Displays	James Grunder & Associates Incorporated Kansas City, KS	John Blevins (937) 255-3701
August 1997	Flat Panel Displays	Allied Signal Aerospace Company Fort Lauderdale, FL	John Blevins (937) 255-3701
August 1997	Flat Panel Displays	United Technologies Corporation, Sikorsky Aircraft, Stratford, CT	John Blevins (937) 255-3701
August 1997	New England Supplier Institute (NESI) F33615-94-2-4424	Bay State Skills Corporation, Center for Applied Technology, Boston, MA	Wallace Patterson (937) 255-8589

DATE	PROJECT TITLE CONTRACT NO.	PRIME CONTRACTOR	POINT OF CONTACT
September 1997	Resin Transfer Molding F33615-95-2-5558	United Technologies Corporation, Dow Corning Wallingford, CT	Diana Carlin (937) 255-7277
September 1997	Electrostatic Printing of High Definition Microstructures for Flat Panel Displays F33615-96-C-5104	Electrox Corporation Newark, NJ	Robert Cross (937) 255-2461
September 1997	Strategic Packaging for Single & Multi-Chip Modules Using Very Small Peripheral Arrays F33615-96-2-5110	Panda Project	Robert Cross (937) 255-2461
September 1997	Production Laser Peening Facility Development F33615-96-C-5624	LSP Technologies Dublin, OH	Timothy Swigart (937) 255-3612
September 1997	Responsible Agents for Product/Process Integrated Development (RAPPID) F33615-96-C-5511	Industrial Technology Institute Ann Arbor, MI	James Poindexter (937) 255-8589
September 1997	Internal Real-Time Distributed Object Management System F33615-96-C-5112	Systran Corporation Dayton, OH	David Judson (937) 255-7371
September 1997	Decision-Making with Incomplete Information in an Integrated Product and Process Development Enterprise - A Management Decision Tool for Cost Modeling & Affordability Applications	Florida A&M University Tallahassee, FL	Jon Jeffries (937) 255-8589
September 1997	Modeling for Rapid Thermal Processing F33615-95-C-5543	Integrated Systems Incorporated Sunnyvale, CA	P Michael Price (937) 255-2461
September 1997	Advanced Reconfigurable Machine for Flexible Fabrication F33615-95-C-5500	Lockheed Martin Corporation Baltimore , MD	Timothy Swigart (937) 255-3612
September 1997	Revolutionary Environmental Manufacture of Printed Wiring Boards with Electroless Plating and Conductive Inks F33615-95-C-5505	Microelectronics & Computer Technology Austin, TX	Ronald Bing (937) 255-2461
September 1997	Permanent Dry Film Resist for Printed Wiring Board Process Simplification and Environmental Benefit F33615-95-C-5504	E I DuPont De Nemours & Company Inc Research Triangle Park, NC	Ronald Bing (937) 255-2461
September 1997	Manufacturing of Thermoplastic Composite Preferred Spares (MATCOPS) F33615-91-C-5717	Northrop Grumman Corporation El Segundo, CA	Diana Carlin (937) 255-7277
September 1997	JSF Manufacturing Capability Assessment Tool Set (JMCATS) F33615-95-C-5527	General Research Corporation International Huntsville, AL	Theodore Finnessy (937) 255-4623
September 1997	Fast and Flexible Communication of Engineering Information in the Aerospace Industry F33615-94-C-4429	Massachusetts Institute of Technology, Office of Sponsored Programs, Cambridge, MA	George Orzel (937) 255-7371
September 1997	Alternatives to the Use of Fluoride and Hydrogen Fluoride in Electronics F33615-95-C-5501	Georgia Institute of Technology, School of Electrical & Computer Engineering, Atlanta, GA	Ronald Bing (937) 255-2461
September 1997	Design and Manufacture of Low Cost Composites (DMLCC), Engines F33615-91-C-5719	General Electric Company Cincinnati, OH	Michael Waddell (937) 255-7277
September 1997	Rapid Manufacture of Thermoplastic Radomes F33600-90-G-5308	E-Systems Incorporated, Greenville Division Greenville, TX	Michael Waddell (937) 255-7277
September 1997	Oxidation Resistant Coating Application (ORCA), F33615-93-C-5309	MSNW Incorporated San Marcos, CA	Kenneth Ronald (937) 255-7278
September 1997	Infrared Focal Plane Array/Flexible Manufacturing, F33615-93-C-4320	Texas Instruments Incorporated Dallas, TX	P Michael Price (937) 255-2461
September 1997	Manufacturing Technology for Tactical Grade Interferometric Fiber Optic Gyroscopes (IFOG) F33615-93-C-4321	Litton Corporation Woodland Hills, CA	Persis Elwood (937) 255-2461

Reports



Ultra-Thin Cast Nickel-Based Alloy Structures

Alog Number: 3844
Contract Number: F33615-93-C-4305
Technical Report Number: INTERIM
Distribution: LIMITED

Virtual Manufacturing - Enterprise Federation

Alog Number: 3845
Contract Number: F33615-95-C-5556
Technical Report Number: WL-TR-96-8018
Distribution: LIMITED

Advanced Composites Manufacturing Technology Strategic Plan

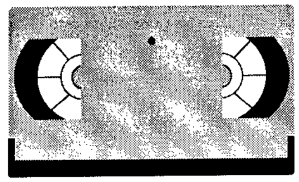
Alog Number: 3847
Contract Number: F33615-92-D-5812
Technical Report Number: WL-MT-084
Distribution: LIMITED

High Speed Volumetric Metrology

Alog Number: 3859
Contract Number: F33615-95-C-5550
Technical Report Number: VI-2763
Distribution: LIMITED

Engine Supplier Base Initiative

Alog Number: 3860
Contract Number: F33615-95-2-5555
Technical Report Number: WL-TR-96-8020
Distribution: LIMITED



Videos

Manufacturing Technology for Advanced Repair Bonding Techniques

Alog Number: 81
Length: 14:42
Distribution: LIMITED

MT for Improved HVPS Packaging

Alog Number: 83
Length: 9:30
Distribution: LIMITED

ManTech Phase VIII Carbon-Carbon Composites for Structural Applications

Alog Number: 84
Length: 27:00
Distribution: LIMITED

Ordering

Wright-Patterson personnel or their contractors may contact the Wright Laboratory (WL) Technical Library, (937) 255-7415. They must be registered with the library in order to obtain reports. Classified or limited documents will be released only to the contract monitor.

Non-Wright-Patterson personnel who wish to obtain any WL documents, and are registered with the Defense Technical Information Center, should contact the center. To register call 1-800-CAL-DTIC.

To obtain unlimited/unclassified documents, contact the National Technical Information Service, (703) 487-4650.

For further information, or to order videos, call the Technology Transfer Center at (937) 256-0194, or visit our www site at: http://www.wl.wpafb.af.mil/mtx/tto/htm/a.htm

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 1006 DAYTON, OH

POSTAGE WILL BE PAID BY ADDRESSEE

ManTech Technology Transfer Center
WL/MTX Building 653
2977 P Street, Suite 6
WPAFB OH 45433-9905

(To mail, remove this page. Fold in half on dotted line, this side facing out. Seal open end with piece of tape at top — DO NOT STAPLE! No postage necessary.)

READER REPLY MAIL

- ❑ I am on the Program Status Report mailing list. Please update my address.
- ❑ Add me to the Manufacturing Technology Program Status Report mailing list.
- ❑ Remove me from the Manufacturing Technology Program Status Report mailing list.

For more information, circle the appropriate reader response number:

1 2 3 4

Please attach current business card or print legibly.

Name____________________

Company____________________

Address____________________

City____________________

State__________ Zip__________

Email Address____________________

Comments:____

____

____

Summer 1997

The USAF Manufacturing Technology

PROGRAM STATUS REPORT

Summer 1997

APPROVED FOR PUBLIC RELEASE

The Manufacturing Technology (MT) Program Status Report is designed to inform you of significant accomplishments, forthcoming events of widespread interest, and to expedite direct exchanges between government and industry management concerned with broadbased MT activities. Recipients are encouraged to route the Status Report to associates and other organizational functions engaged in MT program activities. All comments relating to this Status Report should be directed to WL/MTX (Program Status Report), Building 653, 2977 P Street, Suite 6, Wright-Patterson AFB OH 45433-7739. Telephone: (937) 256-0194. Approved for public release (ASC/PA#97-1213)

FOREIGN DISSEMINATION

Details regarding many specific MT programs are subject to special export controls. Therefore, follow-up from any foreign sources should be processed through embassy channels following normal procedures for request of technical information or technology transfer.

Summer 1997

ManTech Technology Transfer Center
WL/MTX Building 653
2977 P Street, Suite 6
WPAFB OH 45433-7739

Official Business