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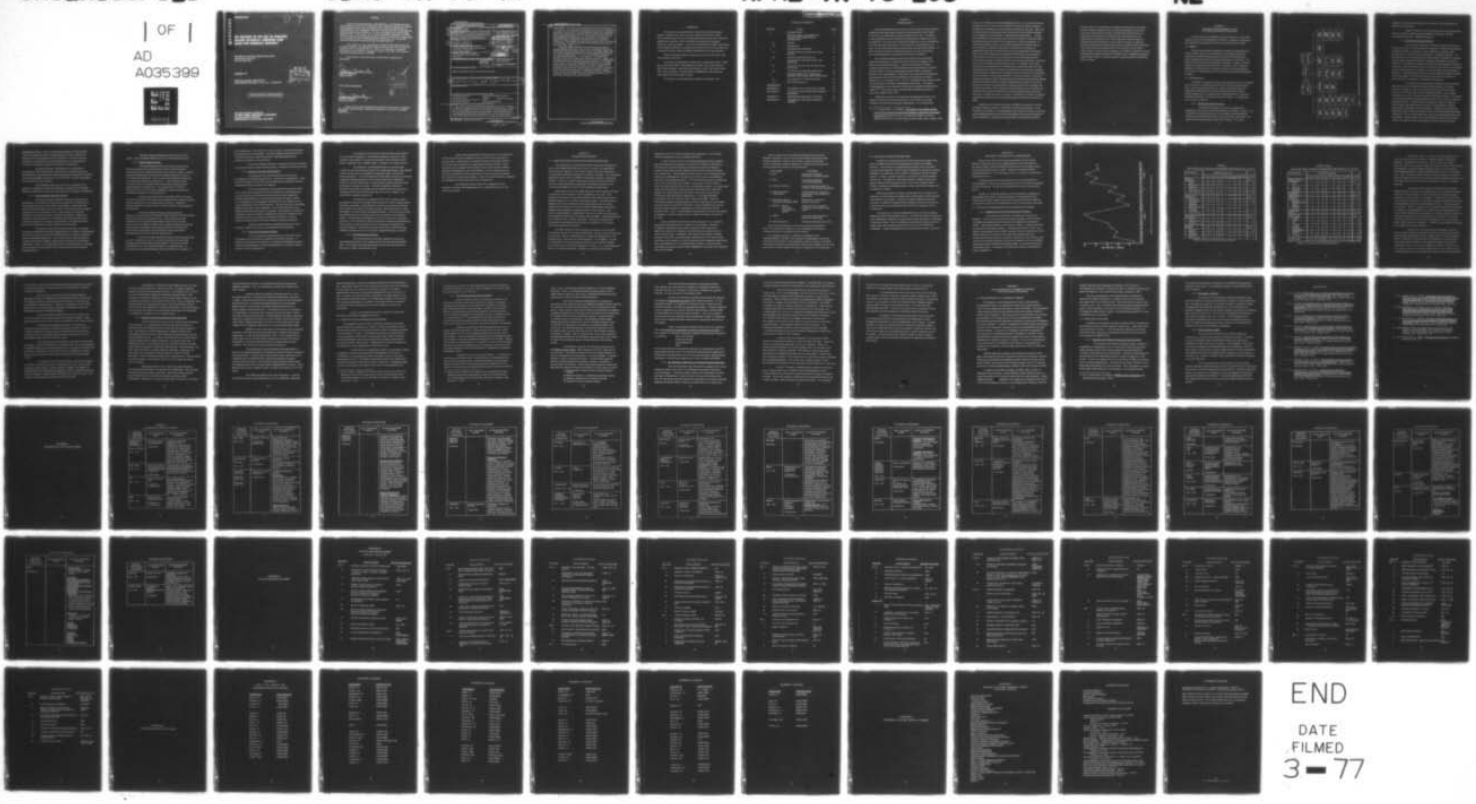

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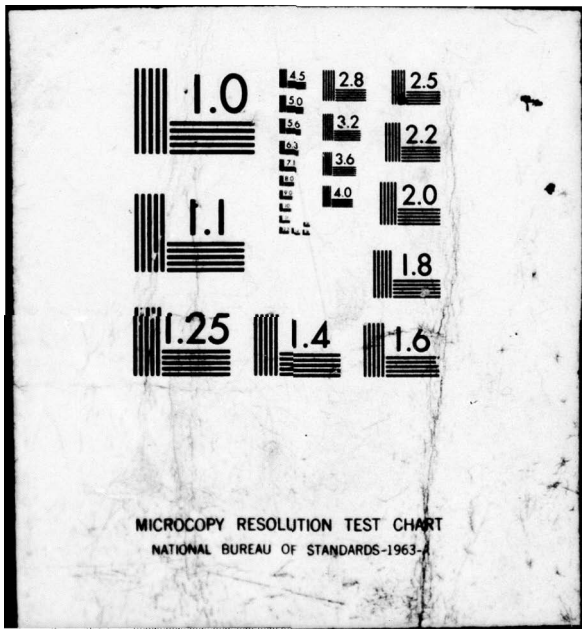
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AN ANALYSIS OF THE USE OF AVAILABLE ON-LINE TECHNICAL LITERATURE DATA BASES FOR MATERIALS RESEARCH

UNIVERSITY OF DAYTON RESEARCH INSTITUTE
3200 COLLEGE PARK AVE.
DAYTON, OHIO 45469

DECEMBER 1975

TECHNICAL REPORT AFML-TR-75-206
FINAL REPORT FOR PERIOD 1 JULY 1974 – 30 JUNE 1975

AIR FORCE MATERIALS LABORATORY
AIR FORCE WRIGHT AERONAUTICAL LABORATORIES
Air Force Systems Command
Wright-Patterson Air Force Base, Ohio 45433

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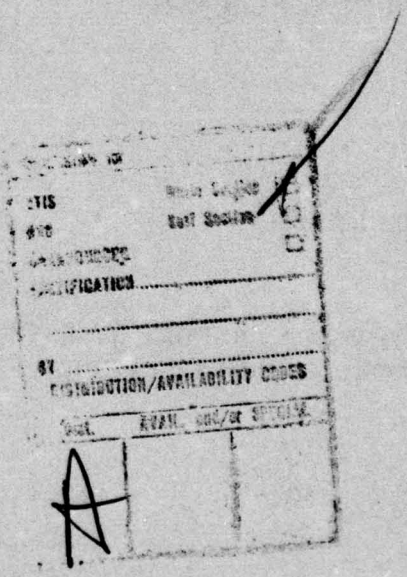

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On-line literature searching has been offered for over two years to scientists and engineers of the Air Force Materials Laboratory. Initially, it took several months to get the on-line literature searching program well started through publicity and use by key people. Now on-line literature searching has become firmly established as a vital and integral part of the range of information services provided by the Materials Documentation

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Center (MDC). To provide some understanding of how on-line services are being used, the organization and missions of the Air Force Materials Laboratory are described. The searches performed over the reporting period were analyzed by Division and Branch in terms of the major data bases used and the frequency of use. As expected, the more research and development-oriented groups were heavy users. The Systems Support Division, an applications-oriented group, was the heaviest overall user. Other support and applications groups used on-line services less frequently, but sufficiently often to demonstrate the value of these services to them.

Statistics on data base use showed that Government Reports available through NTIS represented the most frequently used data base. Engineering Index and Chemical Abstracts were used about equally often. The limited or classified Department of Defense Documents (DDC) data base was used infrequently. The role of the information specialist in interacting with the end user is very important. The information specialist is seen as an advisor and a retrieval specialist. Ideally, the information specialist works directly with the end user in (a) defining the user's query, (b) recommending appropriate data bases, (c) designing a proper search strategy, (d) "sampling" retrievals by printing limited records on-line, (e) modifying the search strategy as needed, and (f) ordering the final results as off-line printout. As a result of increased literature searching activity and the subsequent demand for original items, the MDC has established a small technical library with some key periodicals, reference books, and special technical bulletins, etc. to serve better the needs of the AFML personnel.

FOREWORD

This report was prepared by the University of Dayton Research Institute, Dayton, Ohio under Air Force Contract F33615-75-C-5005. The work described herein was accomplished under Project 7381 "Materials Applications" and Task 738103 "Materials Information Development, Collection, and Processing." The effort was administered under the direction of the Computer Division of the Operations Office of the Air Force Materials Laboratory with Mr. Dennis Wisnosky (AFML/DOC) as Project Monitor.

This is an annual summary report and covers the work from 1 July 1974 through 30 June 1975.

The authors acknowledge the efforts and contributions of Mrs. Judith Hecht, Miss Paula Wark, Miss Pamela Forrester, Mrs. Mary Brooks, Miss Cheryl Bolinger, Miss Becky Fleischmann, Mrs. Mary Ellen Lloyd, Mrs. Barbara Santner, and Miss Barbara Huddleston in the operations of the Materials Documentation Center.

This report was submitted by the authors in December 1975.

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SECTION 1

INTRODUCTION

The Information Systems Section of the University of Dayton Research Institute has been operating the Materials Documentation Center (MDC) of the Air Force Materials Laboratory (AFML) since 1960. In response to new capabilities and new information requirements, changes have been incorporated. One of the most significant changes has been the introduction of on-line literature searching. As experience has been gained in this area, the use of on-line literature searching has become more efficient. It has also been of interest to determine patterns of use of various data bases and techniques for more effective literature searching.

The Information Systems Section has established and presently maintains and operates a document retrieval system in support of the Materials Documentation Center. This document retrieval system contains approximately 75,000 documents concerning materials research and development, with new acquisitons being processed continually. Reports on the establishment, modification, and operation of the Materials Documentation Center and the document retrieval system are listed References 1-10 on Pages 33-34. In 1973, arrangements were made to offer on-line literature searching of bibliographic data bases. The impact of implementing on-line literature searching was reported in the previous report.[11] The present report describes the work performed from 1 July 1974 through 30 June 1975.

The primary mission of the Materials Documentation Center is to support scientific and technical personnel in the AFML by providing scientific and technical documentary information. In carrying out its

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11. J. F. March and F. L. Scheffler, The Impact of the Implementation of an On-Line Literature Searching Program in a Research Laboratory Environment AFML-TR-74-212, AD #A-004 301/8SL, Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433, October 1974.

mission, the MDC performs the following activities: (1) provides information scientists with a in-house located terminal connected to remote computers through which immediate on-line literature searches can be made. More than 50 commercially available data bases with access to the world's knowledge can be tapped from the premises. Interactive searching with the ability to print out anwers at the terminal and evaluate the results on site give AFML personnel instant information for drawing up new research proposals, or researching problem areas; (2) has AFML information scientists who can assist Avionics Laboratory information scientists in the selection of appropriate materials-oriented keywords and the formulation of strategies based on the DDC Thesaurus in running classified Defense Documentation Center (DDC) searches on-line through the Avionics dedicated terminal; (3) processes materials-related scientific and technical documents, maintained in the Air Force Materials Information Center, by indexing, abstracting and otherwise preparing them for computerized storage and retrieval of the information they contain; formulates strategies for recovering this computer-stored information; updates the controlled-vocabulary thesaurus and maintains an error control on the indexing keywords; (4) orders searches of technical literature through the DDC, Energy Research Development Corporation (ERDA), and the National Aeronautics and Space Administration (NASA); (5) provides profiles for selective dissemination of information (SDI) from scientific and technical literature on-line to specific research groups within the AFML and distributes the citations and abstracts; and (6) provides specific MDC-held documents to AFML personnel on request, and obtains for qualified requesters through inter-library loan or by purchase specific documents not held by the MDC.

In addition to its primary functions, the MDC also performs a number of support functions related to information and document handling. These functions are as follows: (1) maintaining on-line document control, monitoring and tracking procedures as a part of the Scientific and Technical Information Office (STINFO) for contractor-generated and in-house-generated AFML

technical reports; (2) maintaining a computer-based distribution list system by which computer-prepared labels are printed on demand for distribution of technical reports and other items; (3) preparation and distribution of a Reports Received Bulletin which announces new MDC acquisitions; (4) preparation of the Abstracts of Air Force Materials Laboratory Reports; (5) preparation of the Abstracts of Active AFML Contracts; (6) obtaining abstracts from Chemical Abstracts publications in response to SDI references; (7) providing document copying facilities and microfiche and microfilm reader-printers; and (8) clerical assistance to the Office of Computer Activities in keypunching computer programs for MASIS or other management programs; typing letters, reports, or research papers; preparing graphic presentations, charts or slides.

SECTION 2

ORGANIZATION AND MISSION OF THE AIR FORCE MATERIALS LABORATORY

In order to provide a perspective on the information services made available to the Air Force Materials Laboratory, its mission, organization, and research and development activities are described in this section.

2.1 MISSION

The Air Force Materials Laboratory, located at Wright-Patterson Air Force Base, Ohio, is the principal Air Force Systems Command organization charged with planning and executing the United States Air Force exploratory and advanced development program for materials. The AFML provides technical and management assistance in support of studies, analyses, development planning activities, acquisition, test, evaluation, modification, and operation of aerospace systems and related equipment. The AFML also manages the entire Air Force Direct Manufacturing Methods Program.

2.2 ORGANIZATION

The AFML is organized into seven major divisions by area of research, and each division is organized by specific area within the major research area. The seven major divisions are: Metals and Ceramics Division, Nonmetallic Materials Division, Electromagnetic Materials Division, Systems Support Division, Manufacturing Technology Division, Advanced Development Division, and Technical Services Division. An organization chart is shown in Figure 1.

2.2.1 Metals and Ceramics Division

The Metals and Ceramics Division is responsible for providing the Air Force with needed technology in the metals, ceramics, and related areas of materials sciences. This division develops programs focused on materials problems which concern the design, fabrication, and operation of the next generation of Air Force systems. The major

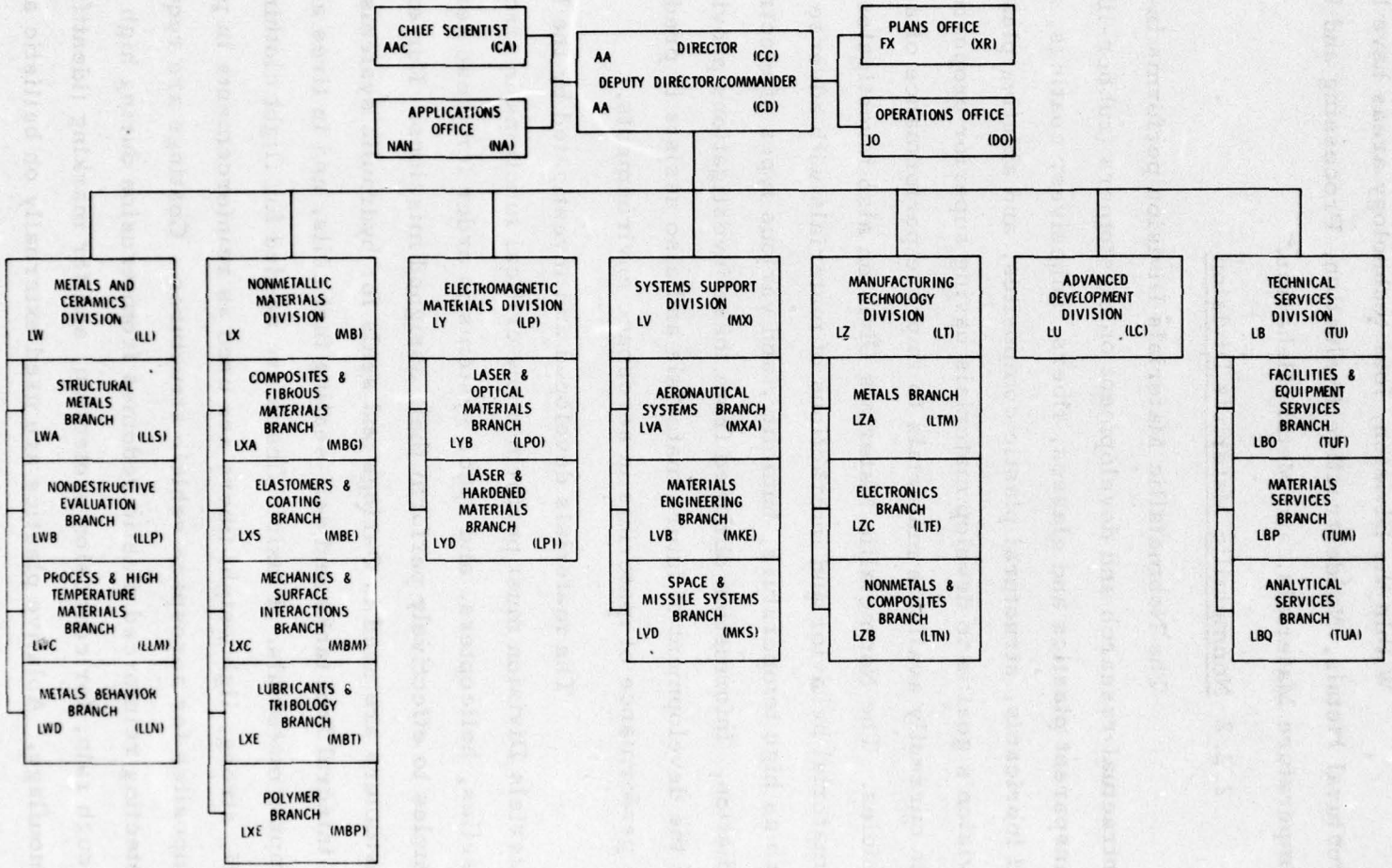

Figure 1. Organizational Structure of the Air Force Materials Laboratory.

objective of the Division's programs is the utility of the end product and efficiency of the process.

Within the Division, four technology areas have been defined: Structural Metals, Nondestructive Evaluation, Processing and High Temperature Materials, and Metals Behavior.

2.2.2 Nonmetallic Materials Division

The Nonmetallic Materials Division performs in-house and contractual research and development on elastomers (rubber-like materials), transparent plastics and glasses, fibers, adhesives, coatings, fluids and lubricants, structural plastic composites, and ablative plastics. The Division's goal is to develop materials having superior properties compared with currently available materials to improve performance of aerospace vehicles. The Nonmetallic Materials Division also investigates mechanisms of material behavior and interactions of materials with adverse environments such as high temperature, humidity, and various types of electromagnetic radiation. Information obtained from these investigations provides guidance for the development of future materials and also assists in predicting the performance of materials in aerospace environments.

The materials developed and investigated by the Nonmetallic Materials Division must perform many critical functions in aircraft, missiles, helicopters, and space systems in order for these aerospace vehicles to effectively perform their assigned missions. For example, elastomers are used in O-rings and seals for hydraulic systems, as sealants for integral fuel tanks and self-sealing fuel cells, and in tires and vibration damping materials. Flexible fibers are needed for flight clothing, and stiff, strong, lightweight fibers are used as reinforcements in plastic composites for aerospace vehicle structures. Coatings are required for protecting reinforced plastic radomes from erosion during high speed flight through rain, for corrosion protection, and for marking (identification) and camouflage. Ablative plastics are used externally on ballistic and lifting vehicles entering the earth's atmosphere to protect them from intense

aerodynamic heating. They are also used in nozzles of solid propellant rockets and thrust chambers of liquid propellant rockets. Many of the improvements in the properties of these materials, such as increased resistance to degradation at elevated temperature, are made possible by advances in polymer synthesis performed by the Division.

Accelerated speeds, increasingly severe operational environments, and the progressive sophistication in systems design are accompanied by requirements for higher-performance nonmetallic materials. Thus, the development and testing of such materials is of great importance for advanced Air Force systems.

The Nonmetallic Materials Division is composed of five branches: Composites and Fibrous Materials, Elastomers and Coatings, Mechanics and Surface Interactions, Lubricants and Tribology, and Polymers.

2.2.3 Electromagnetic Materials Division

The Electromagnetic Materials Division encompasses the development of all materials having potential application to advanced Air Force electrical and electronic devices and systems. Within this wide scope are included single crystals for lasers and associated electro-optics; semiconductors for integrated circuits, light emitters and detectors; magnets for traveling wave tubes, navigation and guidance components, and special motors; dielectrics for radomes and antenna windows; superconductors; ferrites for isolators, phase shifters, and other parametric devices; and materials for radar absorption and camouflage.

The advent of solid-state electronics and laser technology has opened tremendous technological opportunities for significant improvement of Air Force systems and for the establishment of new systems capabilities that were heretofore impossible. On the other hand, foreign development of lasers and advanced weapon systems poses new threats to our military capabilities. Hence, it is equally important to consider materials technology and techniques for protecting Air Force systems from hostile advanced weapons systems.

The Electromagnetic Materials Division consists of two groups: Laser and Optical Materials and Laser and Hardened Materials.

2.2.4 Systems Support Division

The Systems Support Division provides the essential link between materials which emerge from the research and development laboratories and their ultimate utilization in an aerospace system. Candidate materials resulting from research and development programs of the Air Force Materials Laboratory, as well as those from industrial laboratories, are continuously examined for potential use. Those which pass initial screening criteria are evaluated under simulated environments closely approximating their projected use. The final product is a complete characterization of the new material outlining its engineering properties, performance parameters, and specifications.

Continuous personal liaison is maintained with the aerospace industry to advise them of the status of new materials and to obtain information about their experience in working with these materials. Information obtained through this medium provides valuable feedback to AFML engineers and scientists.

The Systems Support Division maintains materials engineers co-located in Air Force System Program Offices to furnish full-time technical assistance in the materials area. These engineers provide consultation concerning materials problems which arise on aerospace systems during the acquisition stage; ensure optimum utilization of materials and processes in the design, construction and operation of advanced Air Force systems; and promote early translation of advanced materials technology into the Air Force systems being acquired.

Operational weapon systems also require materials engineering services. Failures occur due to a variety of causes and the origin must be established by AFML failure analysis experts. If the cause of failure is determined to be a basic materials defect or a design deficiency, an entire fleet may be grounded pending retrofit of the defective component. If

poor maintenance is determined the cause of failure, improved procedures and practices are recommended. Increased emphasis has been placed on corrosion control and improved methods of applying nondestructive inspection techniques to real hardware.

The Systems Support Division is organized into three branches: Aeronautical Systems, Materials Engineering, and Space and Missile Systems.

2.2.5 Manufacturing Technology Division

The Manufacturing Technology Division promotes the development of manufacturing processes, techniques, and equipment. These activities comprise the Air Force Direct Manufacturing Methods Program undertaken by direct contracts with industry.

The overall objectives of the manufacturing methods effort are to assure that end items of Air Force material are manufactured by the most economical and efficient methods and that widely applicable manufacturing methods are economically developed and made available to all manufacturers and designers well before they are required for the actual manufacture of Air Force materiel. This practice aids in preventing duplicate effort and "crash" programs. The specific objectives are to develop manufacturing processes, techniques, and equipment in advance of production to ensure economic availability of materials, components and systems; to reduce unit production manhour and material costs; to improve fabrication processes; and to enhance materials utilization.

Within the Manufacturing Technology Division are three branches: Metals, Electronics, and Nonmetals and Composites.

2.2.6 Advanced Development Division

The Advanced Development Division is concerned with the development of new structural materials for Air Force systems. In addition to developing new materials, the Advanced Development Division conclusively demonstrates the high payoff potential in selected aerospace systems structural applications.

The majority of the new structural materials being worked on are advanced composites. An advanced composite consists of a high-strength, high-modulus, low-density filamentary reinforcement (such as boron or graphite) with a suitable organic, inorganic, or metallic matrix.

The Advanced Development Division is concerned with economical and reproducible processes for making high-quality, high-modulus reinforcements and the development of improved organic and metallic matrix composites. These developments include improvements in mechanical properties and improvements in the elevated temperature capabilities needed for selected applications in aeropropulsion systems and future high performance aerospace vehicles. Process development entails new fabrication techniques and equipment with emphasis directed toward those techniques which have production potential for low cost, reliable, and reproducible composite structures.

The structures development effort has the primary task of investigation and solution of engineering problems to result in improvements in design, fabrication, and performance of advanced composite structures. This includes the evolution of design concepts, and the generation of valid, meaningful, and useful design and engineering data. This area also provides the advances which are necessary prior to the initiation of new hardware efforts. The structures development work is also concerned with quality assurance. This includes the initial development of materials specifications and in-process control standards and the assessment of nondestructive testing techniques. These quality assurance procedures ensure the high-confidence production and use of advanced composite primary structures.

2.2.7 Technical Services Division

The Technical Services Division supports the other line organizational divisions in the conduct of their research and development work. This division provides specialized facilities and laboratories for fabrication, testing, and analytical work.

Many unique experimental laboratories have been established. These range from those equipped for micro-scale chemical synthesis of new molecular compositions to a complete extrusion and rolling research facility for large-size billets of experimental refractory metals. Other laboratories are equipped with ultrahigh vacuum and ultraviolet radiation equipment simulating the space environment, a neutron radiation source, and other specialized research apparatus such as an electron microscope and a soft x-ray vacuum spectrometer. Much of the special purpose equipment was designed and built by personnel in the laboratories.

The Technical Services Division is composed of three branches: Facilities and Equipment Services, Materials Services, and Analytical Services.

SECTION 3
INFORMATION SERVICES

3.1 COMPUTER-BASED LITERATURE SEARCHING SERVICES

The information services provided by the University of Dayton for the Air Force Materials Laboratory serve the needs of an organization whose interests represent a wide range of topics from microelectronics to large-scale structural components of aerospace systems. The information specialists must be able to respond to information requests on numerous subjects. Further, a variety of information services must be provided in order to make information easily and conveniently accessible to the scientists and engineers of the Air Force Materials Laboratory.

Historically, the in-house MDC document retrieval system has been in operation with retrospective search capabilities since 1963. The purpose of the system is to provide scientific and technical information to qualified requesters in a timely and efficient manner. The information is supplied in the form of abstracts of documents pertinent to the search request; these abstracts also contain complete bibliographic information, including access numbers, generating agency, report number, title, author, contract number (if applicable), and date of issue of the document. The documents themselves are available from the MDC. Hardcopy documents are available on loan to AFML requesters. Microfiche documents are reproduced, and the duplicate microfiche are provided to the requester if he desires permanent retention.

The MDC document retrieval system is primarily concerned with the materials aspect of the technical documents. Because of the concentration on materials, retrieval capabilities from a materials standpoint are very comprehensive. Retrieval can be quite specific. For example, a request for information on the alloy Aluminum 2024-T6 can be readily satisfied; on the other hand, retrieval can be general in nature, e.g., high temperature fatigue of all metals and alloys. Similarly, a requester could ask for

information on boron-reinforced Epon epoxy composites, or for aircraft structural applications of any composite material.

In 1973, on-line literature searching capabilities became available and were offered to the personnel of the Air Force Materials Laboratory. The Chemical Abstracts data base of chemical literature and National Technical Information Service (NTIS) data base of Government documents were offered first. The availability of these services was announced through conferences describing the new services and what could be accomplished with them, and through newsletters. Our most effective means of introducing users to the on-line services, however, was to offer to run an on-line search for them when they came in for an information request. As researchers would come to the MDC to request specific documents or for some other purpose, we would suggest that they make a trial on-line search of the NTIS and/or CAC data bases as appropriate, even though literature searching was not the reason for their coming to the MDC. With the information specialist working together with the researcher on an individual personal basis, the researcher was able to see for himself how the on-line literature search could be accomplished to retrieve documents of real interest to him. Also, we could explain that the failure to retrieve documents in response to a search request tends to confirm the need for research in the area.

Once we had been successful in performing good on-line literature searches for key initial users, a pattern of use emerged. Generally, the pattern consisted of repeat search requests for the researchers followed by requests for literature searches from other members of the same research group. Eventually, more and more personnel, including personnel from other research groups, became aware of on-line literature searching, and requests for on-line literature searches expanded significantly. Since about October 1973, six months after initiation, on-line literature searching services have become firmly implanted as a primary and continuing activity of the MDC.

Since the advent of on-line literature searching in the Air Force Materials Laboratory, more on-line literature data bases have been made available continually. Today we have access to nearly 50 data bases. These are described in detail in Appendix A. Of particular interest to the Air Force Materials Laboratory are the following:

DATA BASES	CONTENTS
(1) DDC	Department of Defense Documents (classified/limited)
(2) NTIS	Government Documents (unclassifed/unlimited)
(3) Chemical Abstracts	Journal and patent literature in chemistry and chemical engineering
(4) Engineering Index (Compendex)	Journal literature, conference proceedings in all disciplines of engineering
(5) Smithsonian Science Information Exchange (SSIE)	Summaries of research in progress (all areas)
(6) INSPEC - Physics Electronics Computers and Control	Journal literature in physics, electronics, and computers and control
(7) ISMEC	Journal and other literature in mechanical engineering
(8) Metals Abstracts	Introduced toward the end of 1975

With these many data bases, we now can provide the personnel of the Air Force Materials Laboratory a very comprehensive coverage of worldwide literature in all subject areas of interest.

As a continuing activity, we distribute a newsletter called "CUDOS CONTACT"; CUDOS is our acronym for Comprehensive University of Dayton On-line Services. This newsletter is sent to everyone in the AFML. The newsletter describes new data bases as they become available, new services being offered, and any changes which may be significant for the researchers.

3.2 AUXILIARY INFORMATION SERVICES

In addition to performing literature searches using computer data bases, the MDC also provides complementary auxiliary information services. The searches of computerized data bases result in printouts of citations and abstracts of the documents identified by the search strategy employed. The MDC has on file a number of materials-related technical reports. Further, the MDC responds to requests for items not actually held on-site. The MDC has established numerous contacts with various special libraries and information centers from which original journal articles, conference proceedings papers, books, and technical reports can be obtained on request.

When the printouts of citations and abstracts are reviewed by the requester, he often needs the original source documents of certain specific items listed in the printout. In order to provide complete information services, the MDC has established these auxiliary services to provide the requesters with all the information they need with a minimum of effort on their part.

In the past year, two new developments have occurred regarding additional auxiliary information services. The MDC has made arrangements with "Information Unlimited," an organization which specializes in obtaining "hard to get" items. Also, the MDC has established a technical library to further serve the professional personnel in the Air Force Materials Laboratory. These developments are described in more detail in Section 5.

SECTION 4

ANALYSIS OF THE USE OF ON-LINE SERVICES

The use of on-line services by the personnel of the Air Force Materials Laboratory has grown significantly since their introduction. As Figure 2 shows, there are periods during the year when usage is quite heavy, other periods when it is light. However, the general trend is toward increased use. Over the period 1 JAN 74 - 30 JUN 75, 528 on-line searches were run.

In analyzing the use of on-line services, we were interested in several aspects. First, we were interested in the use of on-line information services by division. We were also interested in the use of various data bases.

Second, as we gained experience in the searching of computerized bibliographic data bases we learned techniques in interacting with the requester and with the system which were useful and which have helped us to increase our efficiency and capabilities with on-line literature searching.

4.1 USE OF ON-LINE SERVICES AND DATA BASES BY DIVISION

4.1.1 Analysis of Use of On-Line Services by Division

The divisions and branches of AFML were described in Section 2. The use of on-line services by these groups is shown in Table 1. The MDC occasionally performs searches for organizations outside the AFML. These organizations are also shown in Table 1. Certain data bases are used with fairly high frequency. The data bases listed in Table 1 are: Defense Documentation Center (DDC); National Technical Information Service (NTIS); Chemical Abstracts Service (CAS); Engineering Index (EI); International Science Abstracts in Physics, Electronics, and Computers and Control of the British Institution of Electrical Engineers, known as INSPEC; Smithsonian Science Information Exchange (SSIE), and Abstracted Business Information (ABI). A complete list of data bases and their descriptions is given in Appendix A.

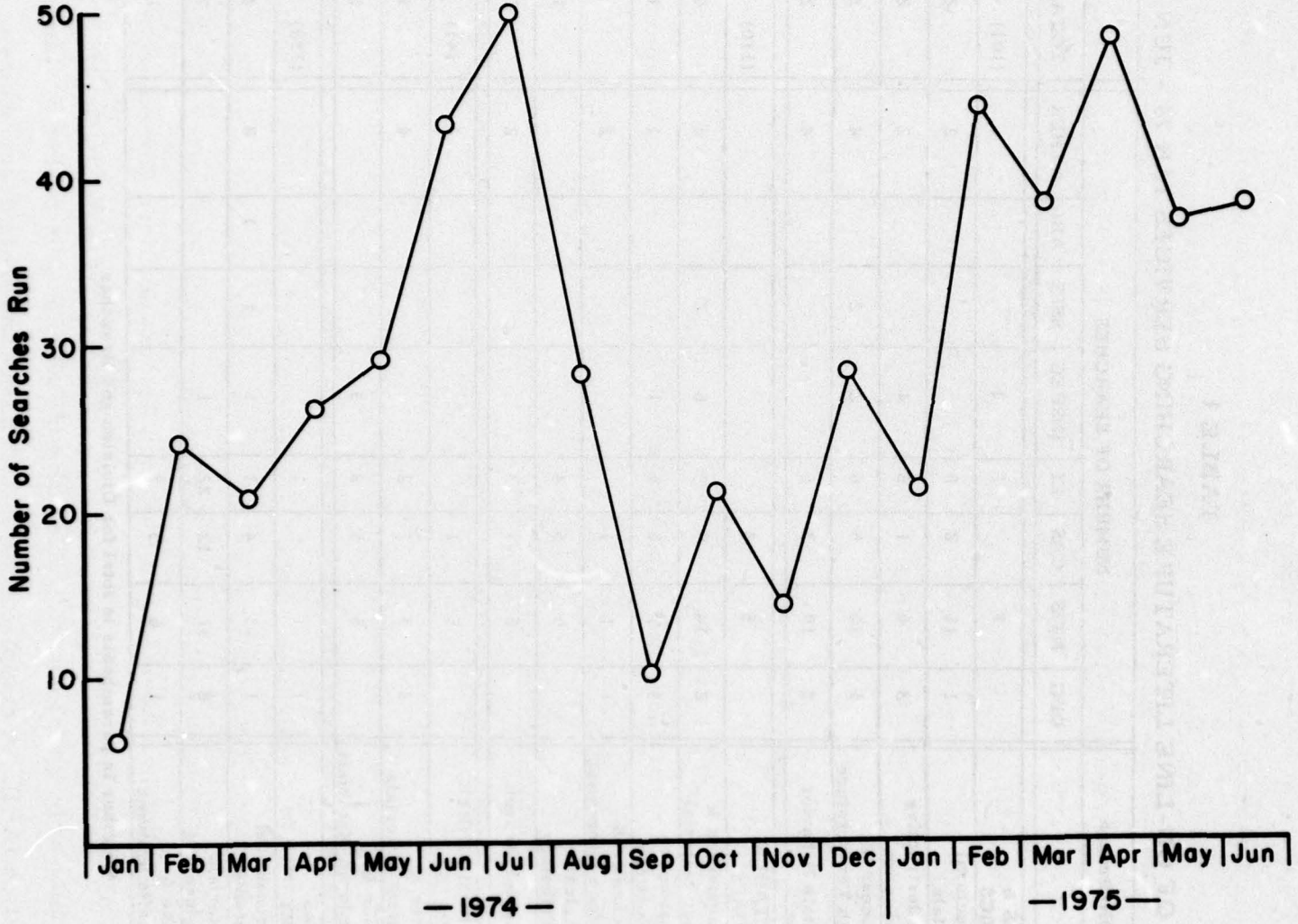

Figure 2. On-Line Literature Searches Run for AFML Requesters.

TABLE 1

USE OF ON-LINE LITERATURE SEARCHING SERVICES JAN 74 - JUN 75

DIVISION/Branch	NUMBER OF SEARCHES								
	DDC	NTIS	CAS	EI	INSPEC	SSIE	ABI	OTHER	TOTAL*
METALS & CERAMICS		1		1	1				(101) 3
Structural Metals	1	11	2	6				2	22
Nondestructive Evaluation	3	6	1	5	4			2	21
Process & High Temperature	1	10	5	6	2	2		4	30
Metals Behavior	2	10	3	6				4	25
NONMETALLIC MATERIALS		5	3						(110) 8
Composition & Fiber Materials	2	14	9	9	6	2		4	46
Elastomers & Coatings	3	7	6	1	1			1	19
Mechanics & Surface Interaction	1	1	1					2	5
Lubricants & Tribology		6	5	4					15
Polymer Branch		5	7	3				2	17
ELECTROMAGNETIC MATERIALS		5	1					2	(41) 8
Laser & Optical Materials	2	3	7	2				4	18
Laser & Hardened Materials		5	5	2	3				15
SYSTEMS SUPPORT	1	1		1					(130) 3
Aeronautical Systems	1	13	4	11	1	1	1	8	40
Materials Engineering	8	31	12	22	1				74
Space & Missile Systems	1	6	3	3					13

*Number in parenthesis is total for Division and Branches

TABLE 1 (Cont.)

USE OF ON-LINE LITERATURE SEARCHING SERVICES JAN 74 - JUN 75

DIVISION/Branch	NUMBER OF SEARCHES								
	DDC	NTIS	CAS	EI	INSPEC	SSIE	ABI	OTHER	TOTAL*
MANUFACTURING TECHNOLOGY	1								(31) 1
Metals		6	2	6	1				15
Electronics		2			6	2			10
Nonmetals, Composites		2	1	2					5
ADVANCED DEVELOPMENT		1		1					(2) 2
TECHNICAL SERVICES									(2) 2
Facilities, Equipment Services									—
Material Services									—
Analytical Services								2	2
OPERATIONS OFFICE		9	2	5	5	2	1	13	(37) 32
CONTRACTORS Other WPAFB									(74)
Aerospace Medical			1					5	6
AFIT		4	1	2				1	8
Air Force Avionics		1		1	1			1	4
Air Force Flight Dynamics	2		1					1	4
Aeronautical Systems	1	2				1		2	6
Contractors		22	7	3	2	2		10	46
GRAND TOTAL	30	189	89	102	34	12	2	70	528

*Number in parenthesis is total for Division and Branches

Referring to Table 1, we can see that the majority of the searches came from three Divisions: Systems Support, Nonmetallic Materials, and Metals and Ceramics. These are the three largest divisions, and it is reasonable to expect most searches from these divisions. Interestingly, the Systems Support Division, which is more oriented toward applications than research and development work, is the heaviest user. The Metals and Ceramics Division and the Nonmetallic Materials Division, both of which are more research-/and development-oriented , are also heavy users of on-line literature searching services, as would be expected.

The type of search request received from the Systems Support Division is usually quite different from search requests received from the other two Divisions. Many searches for the Systems Support Division are rather urgent. For example, a contractor may want to use a certain type of material for a particular aerospace application and ask for recommendations from the Systems Support Division. A rapid response is necessary. Often the engineer from the Systems Support Division wants to support his recommendation with relevant literature information and data. Another important type of problem is to analyze material failures of aerospace components and determine the cause of failure. Technical literature often provides an excellent starting point for such a problem. Again, rapid response is important. The MDC on-line capabilities provide the instantaneous response required.

Requests for searches from the Nonmetallic Materials Division and the Metals and Ceramics Division are generally concerned with obtaining information related to ongoing research and development efforts. Searches are also run prior to establishing a new program to ensure that research efforts are not duplicated and that the technical background in the new area is as complete as possible. Another use of the on-line services is to provide a background in a new subject area for a person joining the Air Force Materials Laboratory or being transferred

into a new area. The on-line literature searching services permit a person to "come up to speed" in a new area much more quickly than is possible with manual techniques.

The use of literature services by the Electromagnetic Materials Division, the Manufacturing Technology Division, the Advanced Development Division, and Technical Services Division is less than that of the Divisions mentioned above. However, the missions of these latter divisions are of a different nature than those of Nonmetallic Materials, Metals and Ceramics, and Systems Support.

The Electromagnetic Materials Division is working in an area where much of the work is sensitive to the national defense. Hence, open literature is not as useful a source of information as for other divisions.

The Advanced Development Division is working at the forefront of the technology of composites and other materials. This is a relatively limited area and personnel in this Division are better able to stay abreast of new technology through personal contact than is the case for technical areas which are broader in scope.

The Manufacturing Technology Division deals with materials processing. They are concerned with developing state-of-the-art techniques for manufacturing either materials themselves or aerospace components and structures. This Division is therefore much more application-oriented than research-oriented, and their need for literature searching support is less.

The mission of the Technical Services Division is to support the efforts of the other divisions in conducting their work. They provide materials testing support, chemical analytical support, and support by building specialized equipment and apparatus. Since the Technical Services Division responds to requirements established by the other divisions, their need for on-line literature searching is relatively small.

In summary, all divisions of the AFML make use of on-line literature searching services. Most use comes, as would be expected, from the research and development divisions. The extensive use of on-line services by the Systems Support Division shows that personnel in this Division are "literature conscious" and have found rapid-response on-line literature searching to be very useful in their work. Also, as expected, those divisions which are concerned with narrow areas of technology or those whose work involves applications, process development, or technical support have relatively less need for on-line literature searching to be worthwhile as evidenced by repeated use over a period of time.

4.1.2 Analysis of Use of On-line Services by Data Base

Table 2 shows the frequency of use of the six most frequently used data bases. It is interesting to note that the National Technical Information Service (NTIS) data base is by far the most heavily used data base. This data base contains Department of Defense unlimited and unclassified reports as well as other Federal Government Agency research and development reports. In contrast, the DDC data base of limited and/or classified Department of Defense documents is relatively little used. In talking with users, we learned that the effort required to handle classified and/or limited documents is often more than the value of the documents, also batch mode searches are ordered regularly from DDC. Apparently, the users prefer the unclassified unlimited aspects of NTIS for on-line searching. They are satisfied to handle their requirements for DDC documents by batch searching, even though the delivery of the results may require two to six weeks.

Engineering Index covers world-wide journal literature and conference proceedings in all disciplines of engineering. This data base is being used more and more extensively. Most of the results obtained from this data base are relevant to the types of questions asked. Furthermore, although the coverage is world-wide, the majority of citations

are from American, British, or international journals whose primary language is English. Thus, the requesters can obtain the original items fairly readily.

Chemical Abstracts includes world-wide journal, patent, and report literature in chemistry and chemical engineering. Reference to Table 1 shows that this data base is used most heavily by the Nonmetallic Materials Division, the Materials Engineering Branch of the Systems Support Division, and the Laser and Optical Materials Branch of the Electromagnetic Materials Division. This pattern of use is in accordance with expectations, since these are the groups whose work tends to involve chemistry and chemical phenomena. Considering that the scope of Chemical Abstracts is significantly narrower in terms of subject matter than that of either NTIS or Engineering Index, the heavy use of this data base is good evidence for its usefulness, particularly for certain groups within AFML.

INSPEC is a set of data bases of world-wide journal literature in physics, electrical and electronic engineering, computers and control engineering. As with Chemical Abstracts, this is a more specialized set of data bases and has not been used as extensively as some of the others. Nonetheless, the search results from this set of data bases have been excellent. This data base is also receiving increased use.

The Smithsonian Science Information Exchange (SSIE) is a data base containing descriptions of Federal and private research in progress before publication. Journal articles and technical reports generally cover completed work; the SSIE data base contains descriptions of ongoing current research projects. This data base has proved particularly useful for keeping abreast of new research and avoiding duplication of effort. Since SSIE has only become available in 1975, we expect increased use of it in the future.

The AFML also makes use of other data bases. A total of 70 searches was run on other data bases, such as, TOXLINE, Abstracted

Business Information, Predicasts Chemical/Electronics Market Abstracts, etc. Although no single one of these data bases has large use, the availability of many data bases in a number of disciplines permits us to respond appropriately to unusual or specialized requests which occur from time to time. Overall, the excellent results, flexibility, and rapid response of on-line literature searching has been overwhelmingly accepted by the scientific and engineering personnel of the AFML, and on-line literature searching has become firmly established as an essential support service for the Laboratory.

A list of on-line literature search requests by subject and data base is presented in Appendices B and C.

4.2 THE ROLE OF THE INFORMATION SPECIALIST

Our experience at the Air Force Materials Laboratory has shown that the optimum arrangement for effective scientific and technical on-line literature searching is for the actual requester and the information specialist to work together as a team. The information specialist can then interact with the requester to determine his information needs, and the requester can provide feedback as the search progresses regarding citations which are useful and those which are not. Modifications in retrieval strategy can be employed to achieve appropriate results for the user.

In many library or information centers, an information request is handled by the information specialist independently of the end user. According to a recent national survey of the impact of the use of on-line information services,[12] only 20% of information requests are handled with the end user present at the time the search is being run. Although the MDC has also run searches in this way in cases where it was impractical for

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12 Cuadra, Carlos "Report on the Impact of On-Line Retrieval Services" sponsored by the Ohio College Library Center at the Fawcett Center for Continuing Education, The Ohio State University, Columbus, Ohio November 7, 1975.

the end user to be present, the advantages gained by end user-information specialist interaction are such that, whenever possible, the end user should be present during the search process.

4.2.1 The Information Specialist as an Advisor

When a requester comes to the information specialist, the information specialist must be able to assist the requester in properly defining his information need, in the data bases available for searching, and in preparing a specific search strategy. In order to be an effective advisor, the information specialist must be familiar with the data bases as well as general techniques for information retrieval. In Cuadra's report on a nationwide survey,[12] it was indicated that in well over 50% of the searches the information specialist decides which data base(s) to use. However, for about 13% of the searches, the end user specifies the data base.

Information specialists at the MDC regularly make use of a number of literature data bases. These data bases vary not only in their subject content, but also in the methods of indexing and retrieval, and in their formats. Thus, the information specialist must be thoroughly familiar with a number of retrieval techniques and document record formats. Because of this special searching expertise, it is possible to set up a search strategy, and with a save/search command transfer it across half a dozen data bases. This time-saving device also insures exhaustive examination of all possible information sources.

Differences in retrieval by subject matter can arise from the fact that, for certain data bases, retrieval terms are initially assigned as index terms by an indexer from a controlled vocabulary. For other data bases, retrieval terms are derived from the natural English text of the abstract, or both text and controlled index terms may be sources of retrieval

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12 Cuadra, Carlos "Report on the Impact of On-Line Retrieval Services" sponsored by the Ohio College Library Center at the Fawcett Center for Continuing Education, The Ohio State University, Columbus, Ohio November 7, 1975.

terms. Also, various subject category schemes are in use for different data bases. Hence, the information specialist must be aware of how to employ subject categories, index terms, and text-derived retrieval terms appropriately in order to perform effective searches.

One of the continuing responsibilities of an information specialist is to keep informed about the changing technology of his/her specialty. The formats of the queries and commands vary for each particular search system. News releases, instructional sessions and workshops are scheduled frequently by suppliers of on-line data bases to provide the newest procedures for computerized, interactive information retrieval. On-line searching is a dynamic service, just emerging, and undergoing constant change. Keeping up with these innovations is almost a full-time occupation, and it is necessary if comprehensive coverage of the existing literature is the search goal. By remaining informed, the information specialist is able to provide correct access to these data sources, and to produce replies to all inquiries, instantly. Since he is always close to the on-line operation, the information specialist is in a position to know which data sources would be richest for the individual inquiry, thereby effecting a cost and time savings.

In advising the requester, the information specialist must first define the user's needs. Many requesters have only a vague idea of what they want. The information specialist must ask leading questions to ensure an appropriate level of precision. In a recent example, a requester asked for a search on "polyvinyl chloride." The information specialist asked if he wanted applications of polyvinyl chloride, or properties or manufacturing of the polymer. With an interchange between the information specialist and requester the search was defined in several topics as follows:

(1) Polymerization of vinyl chloride to produce polyvinyl chloride

(2) Molecular structure, crystallinity of polyvinyl chloride

(3) Additives, pigments used in polyvinyl chloride

(4) Plasticizers used in polyvinyl chloride

(5) Glass transition temperature in polyvinyl chloride

The requester was not interested in objects or components made from polyvinyl chloride nor in forming or fabrication techniques for polyvinyl chloride. He was interested in the polymer itself.

Second, the information specialist must advise the requester concerning the appropriate data bases which could be searched. For the preceding example, the requester was advised to have a search run with Chemical Abstracts and NTIS but not Engineering Index. Chemical Abstracts would be appropriate for polymer synthesis and structure, and from NTIS he would obtain the Government report literature. But, since he did not want information concerning fabrication of polyvinyl chloride or components made from it, Engineering Index would not be an appropriate data base for his request.

Third, the information specialist must advise the requester concerning alternative expressions or terms for the topics of interest. In this example, the information specialist suggested that polyvinyl chloride be expressed as:

'poly vinyl chloride'
'polyvinyl chloride'
'polyvinylchloride'
'PVC'

It was learned that the most common expression in the data base was PVC. In proceeding with the search, the information specialist also suggested the British form 'polymerisation' as well as the American form 'polymerization. Truncation, or searching on segments of a word, is another possibility.

4.2.2 The Information Specialist as the Retrieval System Specialist

Once the information specialist and the requester have clearly defined the topics of the search, the information specialist establishes a "search strategy." A search strategy consists of an enumeration of terms and logical combinations of terms to effect retrieval from the data base. Here the information specialist applied his knowledge of the system command language and special system features to translate the user's request into

a form that can be processed by the computer. The MDC uses five different computer systems, each one of which has its own operational characteristics.

The on-line system permits the information specialist to display some of all of the bibliographic records retrieved at any point. Here, the team aspect of requester and information specialist is again vitally important. When the retrieval results in a manageable number of document references, a sample can be printed on-line for evaluation. The AFML requesters are able to recognize what they are looking for. They can also recognize and reject the retrieved items which are not of interest. By working together as a team, the information specialist and requester can take full advantage of the interactive aspects of on-line literature searching. The contents of the retrieval can suggest alternative search terms, may suggest certain terms which should be negated to prevent retrieving undesired items, or may suggest different levels of retrieval. The information specialist is able to use his knowledge of search strategy formulation techniques as well as his technical background to achieve the desired search results for the requester.

A feature which has been added to the Lockheed DIALOG system now permits the searcher to "save" his search strategy. Using this feature, the information specialist can store his strategy, either as a complete search strategy or on a topic by topic basis. He can then recall and execute the strategy on demand. This feature is highly useful when searching several different data bases for the same request. Before this feature became available, it was necessary to re-enter the strategy completely when changing data bases. We use the "save" feature regularly, and it has permitted us to perform on-line literature searches much more efficiently.

Once the requester is satisfied with the results of the search made, using the data bases of interest, the full bibliographic records including abstracts are ordered as an off-line printout through the computer terminal. The off-line printout is produced by the high-speed printer at the computer facility, and the printout is mailed to the AFML. The requester

then reviews the printout and selects those items which are of sufficient interest to him to get copies of the entire report or journal article.

The information specialist now takes on the task of acquiring those items for which the requester requires complete original copy. Often the holdings of the MDC contain the needed original documents. Occasionally, however, it is necessary to order the document from a supplying agency such as NTIS, to make use of interlibrary loan, or to obtain the item directly from the author. The use of on-line literature searching services has resulted in increased demand for obtaining original documents.

In summary, the information specialist works closely with the requester and advises him regarding the most appropriate search strategy and data bases for obtaining information on his request. Working together as a team, the requester and the information specialist identify those sets of documents which answer the request. Document citations and abstracts are ordered to be printed and mailed, and the requester reviews the results. He then indicates those items for which he needs complete original copies, and the information specialist uses appropriate channels to obtain them.

SECTION 5

DEVELOPMENT OF A TECHNICAL LIBRARY AND OTHER MDC OPERATIONS

5.1 DEVELOPMENT OF A TECHNICAL LIBRARY

In response to needs indicated by the users of the Materials Documentation Center, we established a small local technical library in the Air Force Materials Laboratory as part of the MDC. The development of this technical library became feasible when the Aerospace Research Library was discontinued. Shelving and racks for periodicals were obtained and installed in an area adjacent to the main working area of the MDC. Some holdings particularly applicable to materials research and development have been requested. A number of holdings in individual offices of personnel in the Air Force Materials Laboratory have been consolidated in the MDC technical library. A partial list of holdings is presented in Appendix D. One advantage of consolidating periodical holdings is to provide a single centralized and convenient area where people can come to review several periodicals all related to subjects of interest. Prior to the establishment of the library and the consolidation of periodicals, some people were unaware of the existence of some of these periodicals within the Materials Laboratory.

Another important advantage of providing key periodicals in the MDC is that often the results of literature searches are periodical citations. By having key periodicals immediately on hand, often the original article can be located, just as many of the technical reports found on a literature search are on hand and immediately available to the user through the MDC.

In addition to periodical holdings, the MDC keeps a number of important reference books. Recent editions of older reference books are being acquired for those reference books which are used frequently. Recent additions include the 56th Edition of the Handbook of Chemistry and Physics 1975-1976; the Handbook of Soviet Alloy Compositions, February 1975; The

Concise Chemical and Technological Dictionary, 1975; Tables of Thermophysical Properties of Liquids and Gases in Normal and Dissociated States (2nd Edition), 1975; and the Merck Index, 8th Edition, 1968.

Since the establishment of the technical library immediately adjacent to the MDC working area, a number of users have expressed their appreciation for the library area. The library permits them to look at items on-site. Also, microfiche and hardcopy copying equipment allows them to obtain hardcopy of what they need for permanent retention. In developing the MDC technical library, we found helpful guidelines in a book on building library collections.[13]

5.2 OTHER MDC ACTIVITIES

In addition to its primary literature-related activies, the Materials Documentation Center provides support in other areas. These other areas were mentioned in Section 1. They include such activities as providing distribution lists, preparing an announcement bulletin of new accessions, and operating the STINFO office.

5.2.1 Scientific and Technical Information Office (STINFO)

The Scientific and Technical Information Office (STINFO) is responsible for managing the flow of in-house and contractor-generated AFML technical reports from initial preparation through editing and clearance to final production and distribution. Within the reporting period, this function has been automated and made available through an on-line system. In this way, update information concerning all reports in process can be entered instantaneously. The status of any report in process can be determined immediately by on-line searching. Also, the number of reports at any stage of processing can be ascertained. If a problem develops

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13 M. C. Carter and J. B. Wallace, Building Library Collections (3rd Edition) Scarecrow Press, 1969.

at any stage of processing, the problem can be identified and appropriate corrective action taken. The automation resulted in increased efficiency in this operation.

5.2.2 Information Unlimited

In response to the demand for obtaining information items which are difficult to obtain through traditional channels, such as interlibrary loan, ordering from agencies, or writing for reprints, the MDC has made arrangements with Information Unlimited, one of the "Information on Demand" companies which has specialized channels and contacts for obtaining items which are hard to get. The services of Information Unlimited have been used successfully on several occasions. The arrangement with Information Unlimited further expands the scope of information services which the Materials Documentation Center can offer to the scientists and engineers in the Air Force Materials Laboratory.

5.2.3 MDC Thesaurus Update

The accessions received by the Air Force Materials Laboratory are indexed using thesaurus-controlled vocabulary. The index records are integrated into the automated document retrieval system maintained for MDC-held technical reports. The advantage of the system is that it was designed to accommodate materials terminology. With the MDC system, it is possible to retrieve highly specific material designations more satisfactorily than is possible with the commercial on-line systems available to us. Further, the MDC system specifically retrieves documents in our own collection.

Over a period of time, the vocabulary of such a system requires additions and modifications to keep it up-to-date with new technology and changes in the terms appearing in new accessions. During the reporting period, the thesaurus was completely revised and updated to incorporate appropriate changes in terminology. The revised thesaurus provides for more appropriate indexing and retrieval from the MDC document retrieval system.

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APPENDIX A

ALPHABETICAL LIST OF DATA BASES

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NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
ABSTRACTED BUSINESS INFORMATION (ABI) or INFORM 1971 - 1976	Business Literature and Management. (1 data base)	AMERICAN BUSINESS INSTITUTE, INC. INFORM is a business management data base produced by ABI, Inc. ABI provides comprehensive coverage of the literature in such areas as finance, management, econmics, statistics, business law, and marketing. Major feature articles are abstracted from over 280 journals.
AIM & ARM 1966 - 1976	Abstracts of Instructional Materials and Abstracts of Research on Materials (2 data bases)	CENTER FOR VOCATIONAL AND TECHNICAL EDUCATION, OHIO STATE UNIVERSITY 7,000 abstracts of instructional and research materials.
ASI 1974 - 1976	American Statistics Index (1 data base) 20,000 Records	U.S. GOVERNMENT STATISTICAL PUBLICATIONS Congressional Information Service -- Periodicals, reports, annuals, surveys of federal agencies subject matter, sources of data, time periods, geographical breakdowns, titles, pages, analytics.
BEIC 1972 - 1976	Battelle Energy Information Center (1 data base) 14,000 Records	BATTELLE COLUMBUS LABORATORIES Journal articles, reports, separate publications, title, author, date, source, index terms, type of item.

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
BIO. ABST. 1972 - 1976	Biological Abstracts (1 data base) 850,000 Items	BIOSIS PREVIEWS Contains citations from BIOLOGICAL ABSTRACTS and BIORESEARCH INDEX. Botany, Zoology, Medical Research, Social Ecology, Public Health, and the Environment. Examples: aquaculture; effects of hormones on cell aging; sickle-cell anemia.
CANCERLINE or CCALINE 1967 - 1974	Cancer Research On-Line (1 data base)	NATIONAL CANCER INSTITUTE Cancer Chemotherapy Abstracts Carcinogenesis Abstracts On-Going Cancer Research Projects
CHEMCON 1972 - 1976 CHEMABS 1970 - 1976 CHEM 7071 1970 - 1971	Chemical Abstracts Condensates (2 data bases)	AMERICAN CHEMICAL SOCIETY <u>Biochemistry</u> Pharmacodynamics, Hormone Pharmacology, Biochemical Interactions, Toxicology, General Biochemistry, Enzymes, Radiation Biochemistry, Nonmammalian Biochemistry, Mammalian Biochemistry, Mammalian Pathological Biochemistry, Immunochemistry, Fermentations, Foods, Animal Nutrition, Fertilizers, Soils, and Plant Nutrition, History, Education, and Documentation. <u>Organic Chemistry</u> General Organic Chemistry, Physical Organic Chemistry, Aliphatic Compounds, Alicyclic

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
CHEMCON CHEMABS CHEM 7071 (Continued)		Compounds, Noncondensed Aromatic Compounds, Condensed Aromatic Compounds, Heterocyclic Compounds (One Hetero Atom), Heterocyclic Compounds (More than One Hetero Atom), Organometallic and Organometalloidal Compounds, Terpenoids, Alkaloids, Steroids, Carbohydrates, Synthesis of Amino Acids, Peptides, and Proteins. Macromolecular Chemistry Synthetic High Polymers, Plastics Manufacture and Processing, Plastics Fabrication and Uses, Elastomers, including Natural Rubber, Textiles, Dyes, Fluorescent Whitening Agents, Photosensitizers, Leather and Related Materials, Coatings, Inks and Related Products, Cellulose, Lingnin, Paper and Other Wood Products, Industrial Carbohydrates, Fats and Waxes, Surface Active Agents and Detergents. Applied Chemistry and Chemical Engineering Apparatus and Plant Equipment, Unit Operations and Processes, Industrial Inorganic Chemicals, Propellants and Explosives, Petroleum, Petroleum Derivatives and Related Products, Coal and Coal Derivatives, Mineralogical and Geological Chemistry, Extractive

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
CHEMCON CHEMABS CHEM 7071 (Continued)		Metallurgy, Ferrous Metals and Alloys, Nonferrous Metals and Alloys, Ceramics, Cement and Concrete Products, Air Pollution and Industrial Hygiene, Sewage and Wastes, Water, Essential Oils and Cosmetics, Pharmaceuticals, Pharmaceutical Analysis. Physical and Analytical Chemistry General Physical Chemistry, Surface Chemistry and Colloids, Catalysis and Reaction Kinetics, Phase Equilibriums, Chemical Equilibriums, Solutions, Thermodynamics, Thermochemistry and Thermal Properties, Crystallization and Crystal Structure, Electric Phenomena, Magnetic Phenomena, Spectra by Absorption, Emission, Reflection, or Magnetic Resonance, and Other Optical Properties, Radiation Chemistry, Photochemistry and Photographic Processes, Nuclear Phenomena, Nuclear Technology, Electrochemistry, Inorganic Chemicals and Reactions, Inorganic Analytical Chemistry, Organic Analytical Chemistry.
CHEMLINE 1975 - 1976	Chemical Dictionary On-Line (1 data base)	NATIONAL LIBRARY OF MEDICINE Chemical Abstracts Service Registry Numbers, Molecular Formulae, Substance Names, Wiswesser Line Notations (WLN)

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
CIS INDEX 1970 - 1976	Congressional Information Service	U.S. CONGRESS PUBLICATIONS Committee Hearings Committee Prints House and Senate Reports House and Senate Documents House and Senate Special Publications Senate Executive Reports Senate Executive Documents --- Cataloging-subject indexing, descriptive abstracts
CLAIMS 1950 - 1976	Patents (1 data base)	IFI/PLENUM DATA COMPANY Chemical and Chemically related index patents, U.S. patent nos. (searchable) chemical abstracts reference equivalent patents in France, Great Britian, Belgium, Germany and the Netherlands.
CLAIMS/GEM January 1975 - 1976	General, Electrical Mechanical Patents (1 data base)	IFI/PLENUM DATA COMPANY General, Electrical, and mechanical patents (U.S.)
DOMESTIC STATISTICS INTERNATIONAL STATISTICS 1971 - 1976	Economic and Industrial Statistics (2 data bases) 190,000 Citations 17,000 time series	PREDICASTS, INC. Composite forecasts (70,000) to 1985 Data for production, prices, income, wages, shipments, sales, foreign trade, product name, growth rate, and quote source.

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
EIS PLANTS Current	Economic Information Systems, Inc. (1 data base) 117,000 Citations	PREDICASTS, INC. U. S. industrial economy Industrial establishments or plants or facilities: name, address, telephone number, employment size, value of shipments, share of market, parent company, geographical control, product codes, etc.
ENGINEERING INDEX or COMPENDEX 1970 - 1976	Engineering Index (1 data base)	COMPENDEX, produced by Engineering Index, is a data base corresponding to the monthly issues of THE ENGINEERING INDEX MONTHLY. EI examines over 3,500 journals and other types of publications, including proceedings of conferences, to provide world-wide literature coverage in all disciplines of engineering.
ERIC 1966 - 1976	Educational Resources Information Center (3 data bases)	NATIONAL INSTITUTE OF EDUCATION Career Education; Counseling and Personnel Services; Disadvantaged; Early Childhood Education; Educational Management; Exceptional Children; Higher Education; Information Resources; Junior Colleges.
GEO-REF 1967 - 1976	Geosciences Literature References (1 data base)	AMERICAN GEOLOGICAL INSTITUTE Areal Geology, Economic Geology; Engineering-Environmental Geology; Extraterrestrial Geology; General Geology; Geochemistry;

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
GEO-REF (Continued)		Mineralogy; Oceanography; Geochronology; Geomorphology; Hydrogeology; Soils; Solid Earth Geophysics; Stratigraphy; Structural Geology; Igneous & Metamorphic Petrology; Paleobotany, Paleontology; Sedimentary Petrology. The data base covers approximately 3,000 journals and includes additional coverage of conference and symposia and major monographs.
ISMEC 1973 - 1976	Information Service in Mechanical Engineering (1 data base) 30,000 Abstracts	INFORMATION SERVICES DIVISION OF THE INSTITUTION OF ELECTRICAL ENGINEERS (INSPEC), AND THE INSTITUTION OF MECHANICAL ENGINEERS (LONDON) Management and Production; Measurement and Control; Mechanics, Materials, and Devices; Production Processes; Tools and Equipment; Energy and Power; Transport and Handling; Mechanical Engineering and Natural Resources; Mechanical Engineering in Science and Engineering.
INSPEC 1969 - 1976	International Science Abstract in Physics Electronics Computers (3 data bases)	INSTITUTE OF ELECTRICAL ENGINEERS Physics Abstracts - over 400,000 abstracts from 120 journals covering world-wide literature.

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
INSPEC (Continued)		Electrical and Electronics Abstracts - over 200,000 abstracts covering 300 subject areas encompassing electrical and electronic engineering. Computers and Control Abstracts - over 100,000 abstracts embracing all areas of computers and control engineering.
LIBCON LIBCON/C LIBCON/E LIBCON/F LIBCON/S LIBDEMO 1965 - 1976	Library of Congress (5 data bases)	LIBRARY OF CONGRESS Cataloging, Titles, Authors, Bibliographic References - Domestic and International
LIBCON/M 1965 - 1976	Library of Congress (M) M - MARC, the Machine Readable Cataloging Record (1 data base)	INFORMATION DYNAMICS CORPORATION (IDC) Contains MET (Main Entry Title) records, imprint data, L. C. card number, series added entries, and Library of Congress (L. C.) call number (or the Dewey call number), and subject-added entries.
MATRIX 1973 - 1976	Public Welfare Community Problems (1 data base)	ORBA INFORMATION LIMITED Communications, Ecology, and Urban Planning, Domestic & Foreign

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
MEDLINE and MEDCOMP 1970 - 1976	Medical Literature Analysis and Retrieval System (2 data bases)	NATIONAL LIBRARY OF MEDICINE The MEDLINE (MEDLARS ON-LINE) data base is a special subset of the MEDLARS file, developed by the National Library of Medicine through their screening and analysis of the world's biomedical literature. MEDLINE covers over 1,100 biomedical journals.
NAL/CAIN 1970 - 1976	Agricultural Literature and Food and Nutrition (Cataloging & Indexing) (2 data bases)	NATIONAL AGRICULTURAL LIBRARY General Agriculture & Rural Sociology; Agricultural Economics; Consumer Protection, Human Nutrition, and Home Economics; Agricultural Products; Animal Science; Veterinary Medicine; Forestry; Plant Science; Plant Diseases, Insect Pests, and their Control; Information Science; Entomology; Agricultural Engineering; Natural Resources Management; Natural Resources (General) & Environmental Pollution; Life Science; Physical Sciences & Mathematics; Chemistry; Technology; Economics & Administration; Social Sciences & Humanities.
NTIS 1963 - 1976	National Technical Information Service (1 data base)	U.S. DEPT. OF COMMERCE The complete Government Reports Announcements file from the National Technical Information Service. Over 400,000 abstracts of government

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
NTIS (Continued)		research from over 240 agencies including NASA, DOD, AEC, HEW, HUD, DOT, Commerce and many others. Citations contained in the NTIS data base are announced in the Weekly Government Abstracts (WGA) and the semi-monthly Government Reports Announcements (GRA). Subject areas covered include: Aeronautics; Agriculture; Astronomy and Astrophysics; Atmospheric Sciences; Behavioral and Social Sciences; Biological and Medical Sciences; Chemistry, Earth Sciences and Oceanography; Electronics and Electrical Engineering; Energy Conversion (non-propulsive) Materials; Mathematical Sciences; Mechanical, Industrial, Civil, and Marine Engineering; Methods and Equipment; Military Sciences; Missile Technology; Navigation, Communications, Detection, and Countermeasures; Nuclear Science and Technology; Ordnance; Physics; Propulsion and Fuels; Space Technology.
PATS CMA-EMA 1972 - 1976	Predicast Abstract Terminal System Chemical Market Abstracts (CMA) and Electronic Market Abstracts (EMA) (2 data bases)	PREDICASTS, INC. Domestic and international company, product, and industry information. Electronic Market Abstracts (EMA) includes aerospace. Chemical Market Abstracts (CMA) includes over 28,000 abstracts

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
PATS CMA-EMA (Continued)		of domestic and foreign information on all chemical process industries.
PATS F&S 1972 - 1976	Predicast Abstract Terminal System (Formerly Funk & Scott Indexes) (1 data base)	PREDICASTS, INC. Corporate Activity Economic Factors Population, wages, consumer spending, business investment, constructions outlays, government spending.
PATS Mkt. Abst. Weekly Current	Predicast Abstract Terminal System Market Abstracts Weekly (1 data base)	PREDICASTS, INC. Marketing Abstracting
PATS SOURCE 1972 - 1976	Predicast Abstract Terminal System Source Directory of Business Information (1 data base)	PREDICASTS, INC. Geographic data, newspapers, trade journals, government reports, bank reviews, government plans.
P/E NEWS 1975 - 1976	Petroleum/Energy Business News Index (1 data base)	AMERICAN PETROLEUM INSTITUTE Trade Journals-Business Aspects of Petroleum and Energy.
POLLUTION 1970 - 1976	Pollution and Environment (1 data base)	POLLUTION OF AIR, LAND, OR SEA Air Pollution; Water Pollution; Marine Pollution; Land Pollution; Patents; Pesticides; Thermal Pollution; Noise Pollution; Sewage and Waste

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
POLLUTION (Continued)		Treatment; Contracts; Legal Developments. The citations are drawn from foreign and domestic technical reports, journals, newspapers, contracts, symposia, government documents (e.g., executive actions, treaties, legislation and court decisions), and patents.
PSYCH. ABS. 1972 - 1976	Psychological Abstracts (1 data base)	AMERICAN PSYCHOLOGICAL ASSOCIATION Over 125,000 abstracts of journal articles in psychology.
SCISEARCH 1972 - 1976	Searching the Life Sciences (1 data base)	INSTITUTE FOR SCIENTIFIC INFORMATION Animal & Plant Science; Behavioral Science; Biochemistry; Biology & Zoology; Botany & Entomology; Chemistry; Clinical Medicine; Cytology & Pathology; Dental & Bone Research; Dermatology; Drug Research; Endocrinology; Experimental Medicine; Physiology; Genetics & Pediatrics; Geriatrics & Gerontology; Hematology; Medicinal Chemistry; Microbiology & Virology; Molecular Biology; Nutrition; Organic Chemistry; Pharmaceutical Chemistry; Pharmacology; Radiation Science; Surgery.

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
SOCSCISEARCH 1971 - 1976	Social Sciences Citation Index (SSIE) (1 data base)	INSTITUTE FOR SCIENTIFIC INFORMATION Anthropology; Archaeology; Area studies; Business & finance; Communication; Community health; Criminology & penology; Demography; Economics; Educational research; Ethnic group studies; Geography; History; Information & library sciences; International relations; Law; Linguistics; Management; Marketing; Philosophy; Political science; Psychology; Psychiatry; Sociology; Statistics; Urban planning and development.
SOURCE	Source of Directory of Materials or Services (1 data base) 5,000 Records	PREDICASTS, INC. Title, publisher, address, language, price, industries covered, events.
SSIE Current	Smithsonian Science Information Exchange (1 data base)	SMITHSONIAN SCIENCE INFORMATION EXCHANGE, INC. Research in Progress (Federal and Private) Environmental Sciences Air Pollution, Solid Wastes, Noise, Sonic Boom, Buildings & Land Use (Bridges, Energy Conservation) Hydraulics Soil Mechanics Surveying

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
SSIE (Continued)		Transportation Highway Safety, Runways, Parking, Urban Traffic Control Structures Aero-And Fluid Dynamics Marine Engineering & Naval Architecture Military Science & Ordnance Construction Astronautics Fabrication & Processing of Materials Paper; coatings; composites; corrosion & deterioration; fire retardants; lubricants; ceramics & glass; metal alloys; nondestructive testing; plastics; elastomers & adhesives; mechanical properties; physical properties Electronics Computers & subsystems Communication systems Display systems Geology Geophysics Waste Water Treatment Chemical Engineering Physics Energy Housing Urban Renewal Studies

APPENDIX A (CONTINUED)

NAME OF DATA BASE (TIME SPAN)	WHAT THE NAME MEANS	FIELDS OF INTEREST COVERED
TOXLINE 1966 - 1976	Toxicity On-Line (5 data bases)	NATIONAL LIBRARY OF MEDICINE Toxicology; Adverse effect of Drugs; Chemicals; Pesticides; Pollutants of Human, Animal and Plant Life
TRIS-ON-LINE 1973 - 1976	Transportation Research Information Services Network (1 data base)	DEPT. OF TRANSPORTATION DOT work in progress, Abstracts of DOT - sponsored technical reports, Transportation Noise Research Information Service (TNRIS), Highway Research Information Service Abstracts (HRIS), Railroad Research Information Service Abstracts (RRIS)

APPENDIX B
ON-LINE SEARCHES PROCESSED

APPENDIX B

ON-LINE SEARCHES PROCESSED

1 July 1974 - 30 June 1975

Date 1974	Topic of Search	Data Base(s) Searched
Jul 10	Elastomer Research and Cost Information	CMA/EMA
12	Ultraviolet & Electron Beam Curing of Polymers, Paints, Acrylics, Castings, Adhesives	NTIS, CA, EI
12	Aluminum Alloys, State-of-the-Art Forecasts, New Trends	NTIS, EI, FTD, CMA/EMA
12	Fatigue Crack Growth in Titanium Alloys; Crack Growth Rate	NTIS
17	Stress or Strain Analysis of Composite Materials; Structural Analysis; Structural Design of Graphite	NTIS
17	Polymerization of Plastics and Polymers by Radiation	CA
18	Search for Specific Author	NTIS, CA
18	Stress or Strain Analysis of Composite Materials; Structural Analysis; Structural Design of Graphite	
19	Surfaces and Surface Characterization	NTIS, DDC, MASIS
19	Search for Specific Author	CA, NTIS
19	Elastomer Research and Cost Information	DDC
23	Aircraft Windshields Composition	NTIS, COMPENDEX
23	Optical Constants of ZnSe, CdTe Thin Films	NTIS, INSPEC, CHEMCON, COMPENDEX

APPENDIX B (Continued)

Date 1974	Topics of Search	Data Base(s) Searched
Jul 23	Infrared Measurements, SnSe, CdTe, KCl, RbCl, Multiphonon Absorption Calorimetry	NTIS
23	High Strain Rate Loading of Polyurethane Foam	NTIS, CA
24	Composition of Aircraft Windshields	NTIS, COMPENDEX
26	Nondestructive Testing of Tungsten, Tungsten Alloys	NTIS, EI, CA
26	High Strain Rate Loading of Polyurethane Foam	NTIS, COMPENDEX, CA
26	Air Force, Army, & Navy Involvement in Fatigue Improvement Fasteners, Fatigue Rated Fasteners, and Interference Fit Fasteners	NTIS, COMPENDEX, DDC
28	Carbon Fabric Reinforced High Char Resin Composites for Missile Heat Shields	NTIS
29	Benzenediazonium Hydroxide	CHEMLINE, TOXLINE, CA
29	Multilayer Thin Film Coatings on Infrared Filters. Herpin Equivalent Indices.	INSPEC, NTIS, DDC
29	Acoustic Emission as a Tool to Determine Environmental Effects on Composite Materials	NTIS, INSPEC, EI, DDC
Aug 2	Effect of Alloy Density as a Result of Hot Isostatic Pressing	NTIS, CA, EI
2	Directionally Solidified Eutectic Composites	DDC, NTIS, CA, EI
2	Application of Advanced Fracture Mechanics to Crack Growth in Turbine Discs	NTIS, EI

APPENDIX B (Continued)

Date 1974	Topics of Search	Data Base(s) Searched
Aug 5	Durability of Drainage Pipe -- Foreign Sources	NTIS, FTD, CA
7	Relationship of Lubricant Rheological Properties with Servo-Motor Bearing Performance	NTIS, EI
14	Hydraulic Fluids and Elastohydrodynamics	NTIS, CHEMCON, EI
16	Aircraft Runway Markings; Reflective Markings; Paints; Pavement Markings; Reflective Paints	NTIS, EI, MDC, DDC
19	Shear-spinning Titanium Technology for Ti-6Al-4V Marking and Forming	NTIS, EI, CA, INSPEC
20	Lubrications Viscoelastic, Elastohydrodynamic Traction; Film Thickness; Lubricant Properties...	NTIS
26	Powder Metallurgy of Magnesium 292-A-T6; Fatigue and Bending Data for 350 Forging	NTIS, EI
26	Benzanilide, Kelvar, Paraminobenzamide Poly-steel, PRD49, Aromatic Benzanilides	CA
28	Glasses & Porcelain Enamels; Glass Coatings; Coefficient of Thermal Expansion	NTIS, C CMA/EMA
Sep 18	Titanium: Shear Spinning and Shear Forming	NTIS, EI, CA
20	Plastic Bands on Ammunition for Gun Barrels	NTIS
20	Atmospheric Durability of Glass Fibers and Aluminum Foil as Fallout From Radar Jamming	NTIS, CA, INSPEC, DDC
30	High Temperature Polyimide Radomes	NTIS, EI
Oct 2	Iron-Nickel Alloys	NTIS

APPENDIX B (Continued)

Date 1974	Topics of Search	Data Base(s) Searched
Oct 2	Manganese Alloys, Manganese Modules	CA
3	Manganese Alloys and Properties	NTIS, EI
18	Ring Laser Gyroscopes	NTIS, EI, INSPEC, FTD
21	Manufacture of Tungsten Rocket Nozzles by the Wire Wrap Process	NTIS, EI
23	Manufacture of Tungsten Rocket Nozzles by the Wire Wrap Process	NTIS, EI
23	Aerospace Control	INSPEC
23	High Temperature Strain Measurement	NTIS, EI, CA, INSPEC
25	Radiation Effects on Viscoelastic Materials PVC	NTIS, DDC
25	Ultrasonic Imaging	NTIS
31	Phobia of Flying or Height	TOXLINE
Nov 1	Phobia of Flying or Height	PSYCH AB
4	Rubidium, Strontium, Yttrium, and Zirconium	INSPEC
4	Hot Salt Stress Corrosion of Titanium Aluminides; I13A1, Intermetallic Compounds	NTIS, IE, CA, SDC
5	Chopped Fibers Reinforcing Epoxy Polymer Composites	NTIS
6	Short or Chopped Fiber Fiberglass Composites	NTIS
8	Nondestructive Testing of Electronic Components	INSPEC, NTIS, EI

APPENDIX B (Continued)

Date 1974	Topics of Search	Data Base(s) Searched
Nov 8	Nickel-Tin-Cobalt Brazing Alloys, Nickel-Tin-Silicon Brazing Alloys, Nickel-Tin-Palladium-Silicon Brazing Alloys	NTIS, CA, EI
11	German Patent 2,242,476	CHEMCON
13	Computer-Aided Manufacturing in East Germany, Japan, Soviet Union	NTIS, CMA/EMA
18	Development of Design Data for Graphite Reinforced Epoxy Polyimide Composites	NTIS, EI, NTIS
18	Fire Fighting Foams	CA, NTIS, INSPEC 12
19	Lightning Protection Devices on Aircraft	NTIS
20	Loss of Resolution and Picture Quality Line-of-Sight Motion Due to Vibration of Airplane (Airframe)	INSPEC 12, NTIS, EI
20	Styrene-Acrylonitrile copolymers	CA, TOXLINE
20	AFML Research on Corrosion	NTIS, EI
20	Nitrogen Steels and Laminated Steels; Manganese Alloys	NTIS
Dec 3	S-N Curves for Aluminum 2219	NTIS, CA
4	S-N Curves for Aluminum 2219	EI
4	Surgical Implants	MEDLINE, TOXLINE, NTIS, CA
5	Tungsten, Rhodium-Indium, Rhenium Thermocouples	NTIS, CA, MCIC
6	Stress Corrosion Cracking of High Strength Steels	NTIS, EI
11	Effect of Pressure on Epoxies	CA

APPENDIX B (Continued)

Date 1974	Topics of Search	Data Base(s) Searched
Dec12	Hydraulic Fluids -- Research by McPherson	EI, NTIS
12	Epoxy Resin Systems	NTIS
13	Polyphthalamides, Polymers of phthalamides	NTIS
13	State of the Art - Acoustic Emmission	NTIS, EI, INSPEC
13	Patents by Heffelfinger	CA
13	Physical and Chemical Properties of Mylar and Polyethyleneterephalate	CA, NTIS, EI
13	Syntactic Foams	NTIS, EI, CA
27	Short Fiber Composites	NTIS
January 1975		
9	Space or Vacuum Exposure Effects on Polymer Films	TRIS, CHEMLINE, TOXLINE, NTIS, CHEMCON
15	Vastbinder - Find AST-TR-74-34 (Gunfire Effectiveness for the Navy)	NTIS, EI
15	Physical Properties of Inconel 718, Ti-6AL-4 V.	NTIS
15	Solar Absorptance	NTIS
16	Physical Properties of Inconel 718, Ti-6Al-4 V.	EI
16	Uranium Oxide Coatings on Tungsten, Rhenium, Thin Films	NTIS
20	DuPont Patents on Fluorine Chemistry	CA
22	Ti-4Al-4Mo-2Sn, 0.5% Si Short Transverse Properties and How They Effect Heat Treatment and Processing; Hylite 50	NTIS

APPENDIX B (Continued)

Date 1975	Topics of Search	Data Base(s) Searched
Jan 24	Computer Aided Design; Computer Aided Manufacturing	INSPEC 14, NTIS, CA
27	Artificial Intelligence Computer Languages for Designs	ERIC, CMA/EMA, INSPEC 14
29	Fracture Mechanics, J-Integral, Mathematical Models, Crack Tip Opening of Al, Ti, Steel Alloys done by NAVAL RESEARCH LAB, Authors Krofft, etc.	NTIS
29	Productivity, Economics, and Priority. Industrial Robots.	CMA/EMA, INFORM
Feb 3	Impact Strength of Composites	NTIS, EI
3	Stainless Steel Pipe Welds	NTIS, CA, EI, MCIC
7	Author Search (University of Denmark Fatigue Article)	NTIS, CA, INSPEC 12
10	Antistatic or Conductive Coatings, Solar Cell Coating	NTIS
11	Bonding Adhesives, Durability Test	NTIS, EI, CA
12	Blade Repair, Turbine Engines	NTIS, EI
14	Ethylene Terpolymer (for airplane windows)	CA
19	Bonding Adhesives, Durability Test	DDC
19	Innovative Ideas in Weapon System Concepts	DDC
21	Obtain Documents from Previous Search by Ordering On-Line	SDC
21	Mold and Core Material for Metal Alloy Processing	NTIS
26	Glassy Metal Alloys	NTIS, EI

APPENDIX B (Continued)

Date 1975	Topics of Search	Data Base(s) Searched
Feb 26	Fracture Mechanics, J Integral	NTIS, EI
26	Elements 104-107, Chemical-Physical Properties	CA
26	Identification of contents of data bases; instruction on use of data bases	EI, CMA/EMA, INSPEC-PHYSICS, ELECTRONICS, COMPUTERS, PSYCH ABS, SOCSCI SEARCH, AIM & ARM, NAL/CAIN, ABI, PATS F&S, PATS SOURCE, ERIC, CLAIMS, CA, NTIS
28	Audiovisual Aids for On-Line Training	ERIC, PSYCH ABS, SOCSCI SEARCH
Mar 3	Contract NAS-1-12079 (Polyimides, Molding, Thermoplastic)	NTIS, CA
3	Stress Corrosion Cracking of 18% Ni Maraging Steel	NTIS, CA
7	Laser Hardening of Composites	INSPEC 12
10	Laser Hardening of Composites	INSPEC 12
10	Diseases of Fish	TOXLINE, CA, SCISEARCH
10	Hepatic Microsomal Enzymes	TOXLINE, MEDLINE
12	Lubricant Failure in Slip Ring Assemblies for Space Applications	NTIS
12	Refractory Coatings on Tungsten Nuclear Shielding	NTIS, EI

APPENDIX B (Continued)

Date 1975	Topics of Search	Data Base(s) Searched
Mar 12	Doped Silicon Arrays	INSPEC 12
19	Author Search	NTIS
21	Toxicity in Fish	CA
24	Fuming Nitric Acid -- Report by Phelps	NTIS
24	Helium Shipping Containers	NTIS, CA, CMA/EMA
24	Sleeve Fasteners	NTIS, EI
26	Helium Cylinders for Transport	SSIE, NTIS, INFORM, CMA/EMA, ABI/INFORM
27	Solar Energy (Energy Research Development Administration)	NTIS, EI, SSIE
28	Solar Energy	NTIS, EI, SSIE
28	Germanium Corrosion	NTIS, EI
Apr 3	Proposed Space Shuttle Program; Physical and Psychological Requirements	SSIE
4	Proposed Space Shuttle Program; Physical and Psychological Requirements	FTD
4	Testing of Jet Fuels	NTIS, EI, SSIE, CA, FTD, SCISEARCH
10	Aluminum Castings	NTIS, EI, FTD
11	Computer-Aided Design, Manufacturing Design, Product Management, Manufacturing, Management Information Systems	INSPEC 14

APPENDIX B (Continued)

Date 1975	Topics of Search	Data Base(s) Searched
Apr 16	Low-Loss End-Connectors for Pulse Discharge Capacitors	SDC, NTIS, INSPEC 12 & 13, SSIE
17	Solar Energy	INSPEC 13
17	Low-Loss End-Connectors	SDC, NTIS, INSPEC 12 & 13, SSIE
18	Computer-Aided Manufacturing/ Management	INSPEC
18	Find Author, Title, Etc. of an article on Alpha-Hydrohexafluoroisobutyric acid, Alpha-hydrohexafluoroisobutyronitrile	FTD
18	Broad Goods (Composites) of Graphite Epoxy, Plastics with Fiber Reinforcement	FTD
18	Fluorine Containing Elastomers	NTIS, SDC
18	Adhesive Titanium Weld Bonding	FTD, NTIS, COMPENDEX, SDC
18	Survey on Fused Silica	EI
23	Synthesis of Polyphenylsulfones	CLAIMS 23, CA, CHEMLINE
30	Physiological and Psychological Effects of Charged Ion Environments on Mammals	PSYCH ABS
30	Ethnic Groups	SOCSCISEARCH, NTIS, SSIE
May 5	Crosslinking of Polymers	CA
5	The Design of Computers which Design Computers	INSPEC 14
7	Nitinol Fasteners	NTIS, EI

APPENDIX B (Continued)

Date 1975	Topics of Search	Data Base(s) Searched
May 9	Diffusion of Water in Plastics	CA, NTIS
9	High Temperature Crack Propagation	NTIS, EI
9	Diffusion Bonding or Welding of Ti Alloys	NTIS, EI, CA
14	Thorium Dioxide Thermocouples	CA
14	Low Cycle Fatigue, Crack Initiation or Nucleation in Metals	NTIS, CA, EI
14	Service Problems of C-141 and C-130 Aircraft Windshields	NTIS, EI, CA
14	Compatibility of Liquid Oxygen with Ti	CA, NTIS, EI
20	Mechanical Properties of Inconel 718	NTIS, CA, EI
20	Solder, Intermetallic Joints and Materials	NTIS, CA, EI
23	Effects of Rhenium on Nickel Base Alloys	NTIS, EI, SSIE
23	Policies and Procedures for Designing College Level Engineering Courses	ERIC, PSYCH ABS.
28	Cryogenic Properties of Ti Alloys	NTIS, EI
28	Ti Suitability for Storage Tanks	NTIS, EI
30	Nonferrous Metals and Alloys	SSIE
Jun 2	Chemiluminescence	NTIS, CLAIMS, CA, CMA/EMA INSPEC 12, TOXLINE
6	Kevlar Epoxy Composites	NTIS, CMA/EMA
6	Lasers and Composites	NTIS
9	Hollow Glass Fibers - Epoxy Resin Composites	NTIS, CMA/EMA

APPENDIX B (Continued)

Date 1975	Topics of Search	Data Base(s) Searched
Jun 10	Aircraft Jet Fuels: Integral Tankage, Pollution, Contamination	POLLUTION, NTIS, EI, CA, CMA/EMA
10	Inertial Navigation, Strapdown	NTIS (SDC)
11	Effect of Pulsed Lasers on Aircraft Materials, Radomes, Skins, Composites, Hardening of Materials	NTIS, CA, INSPEC
13	High Temperature Measurement Techniques - Non-Metals and Metals	NTIS, EI
13	Target Identification	NTIS
13	Human Performance	NTIS
13	Coatings for Polystyrene Foams (Styrofoam)	NTIS, CA, EI
16	Research on SDI On-Line and Save Search	SDI
20	Interfacial Diffusion in Epoxy and Al or Graphite Fibers	CA, NTIS, EI
20	Adhesive Joints in Stress	INSPEC 12 & 14, CA, EI, NTIS

APPENDIX C

REQUESTERS SERVED BY THE MDC

APPENDIX C

JULY 1, 1974 - JUNE 30, 1975

REQUESTERS SERVED BY THE MDC

REQUESTER	ORGANIZATION
Adams, W.	AFML/MBT
Allinikov, S.	AFML/MXE
Arnold, Dr.	AFML/MBP
Arvay, E.	AFML/MBC
Babjak, S.	AFML/LC
Bahjah, S.	AFML/LC
Bania, P.	AFML/LLS
Bartel, Lt.	AFML/LLS
Baun, W.	AFML/MBM
Becker, D.	AFML/LLM
Bentley, F.	AFML/MBP
Bhansali, K.	AFML/LLN
Blau, Lt.	AFML/LLS
Bradstreet, S.	Netco
Brisbane, A.	AFML/MXE
Brock, Capt.	AFAL/RWM
Brooks, F.	AFML/MBT
Browning, C.	AFML/MBC
Budde, Capt.	AFML/MXS

REQUESTER	ORGANIZATION
Cannon, C.	AFML/LLN
Carder, Col.	AMRL/THE
Chakrabarti, A.	AFML/LLS
Childers, S.	AFML/MXA
Cochoy, Capt.	AFML/MBE
Cohen, B.	AFML/MXA
Craig, Dr.	AFML/MBC
Dimiduk, P.	AFML/LPJ
Drzal, Lt.	AFML/MBM
Dunco, Capt.	AFML/LLM
Eff, K.	AFML/DOT
Gegel, Dr.	AFML/LLM
Geisendorfer, R.	AFML/LLM
Gerber, Capt.	AFML/MXS
Gonzalez, J.	Martin-Marietta Corp.
Graves, B.	UDRI
Greenfield, M.	AFML/LLM
Griffin, W.	AFML/MBE
Griffith, W.	AFML/MBE
Gulley, L.	AFML/MXA
Gunderson, A.	AFML/MXE
Gurney, F.	AFML/LTM

REQUESTER	ORGANIZATION
Hager, Lt.	AFML/LTM
Hanley, T.	AFML/MBT
Hanna, Lt. Col.	ASD/RW
Harris, R.	AFAL/SY
Harris, W.	AFFDL/PTS
Harris, W. A.	AFML/LTM
Hartness, T.	AFML/MBC
Harry, Prof.	Miami University
Headrick, Mr.	AFML/MBM
Henderson, J.	AFML/LLN
Hinnerichs, Lt.	AFML/LLN
Hollenberg, Lt.	AFML/MXS
Hovey, P.	AFML/MXA
Hubert, S.	AFML/MX
Hurley, C.	AFML/MBE
Hyzak, J.	AFML/LLN
Jacobsen, D.	AFAL/POE-2
Jaeger, Capt.	AFML/LPL
Jaques, Capt.	AFML/LLP
Jeffreary, Mr.	USC (Australia)
Jones, F.	AFAL/TSR-6
Jones, W.	AFML/MBC

REQUESTER	ORGANIZATION
Kaftor, M.	Contractor
Koenigsberg, H.	FTD
Kojola, K.	AFML/LLM
Kordenet, Dr.	Cox Heart Institute
Lazus, P.	ASD/ENASA
Lehn, Dr.	AFML/MBE
Little, Dr.	Systems Research Labs
Macha, D.	AFML/LLN
March, J.	AFML/DO
Marolo, S.	AFML/MXE
Mazdiyasni, K.	AFML/LLM
Metzger, G.	AFML/MXA
Meyers, F.	AFML/MXA
Morris, G.	AFML/MBT
Morrisey, E.	AFML/MXE
Mullins, F.	AFML/LLP
Murphy, J.	AMRL/THT
O'Brien, Capt.	AFML/LPT
Olevitch, A.	AFML/MXE
Owens, S.	AFML/MXA

APPENDIX C (Continued)

REQUESTER	ORGANIZATION
Pedersen, M.	U. S. Army
Picklesimer, L.	AFML/MBC
Pleshek, L.	ASD/XRT
Price, Lt.	AFML/MBE
Quigley, D.	FTD
Reimann, W.	AFML/LLN
Reinhart, T.	AFML/MBC
Rhodehamel, J.	AFML/MXE
Roth, G.	UDRI
Ruschau, J.	AFML/MXE
Rutner, Dr.	AFML/LPJ
Santner, Lt.	AFML/LLS
Scardino, W.	AFML/MXE
Schmid, Dr.	U.D.
Schmidt, D.	AFML/MBC
Slonim, Dr.	AFML/THE
Spry, Dr.	AFML/LPE
Starks, D.	AFML/LTN
Strecker, Sgt.	AFML/LPO
Summit, Dr.	AFML/LLN
Talcott, D.	ASD/ENCTH
Tamborski, Dr.	AFML/MBT
Tarrants, E.	AFML/LTE

APPENDIX C (Continued)

REQUESTER	ORGANIZATION
Velkoff, T.	ASD/ENAM
Ward, W.	AFML/MBT
Wiff, Dr.	AFML/MBT
Wilbeck, Lt.	AFML/LLN
Williamson, J.	AFML/LTM
Wisnosky, D.	AFML/DO
Yarrington, Dr.	AFML/LTE
Zoeller, H.	AFML/MXA

APPENDIX D

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APPENDIX D

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SCIENTIFIC JOURNALS

Acta Crystallographica
Adhesives Age
Aerospace Facts
American Scientist
Applied Physics Letters
Applied Spectroscopy
Aviation Week & Space Technology
Ceramic Society Bulletin
Chemical & Engineering News
Chemistry
Cobalt Abstracts
Corrosion
Corrosion Abstracts
Dimension-National Bureau of Standards
Dupont Magazine
Electronic Products
Engineering Fracture Mechanics
Glass & Ceramics
Glass Technology
IEEE Journal of Quantum Electronics
Journal of the American Chemical Society
Journal of Physical Chemistry
Journal of Physics & Chemistry of Solids
Journal of Physics Category D Applied Physics
JPL (Jet Propulsion Lab) Quarterly
Laser Focus
Materials Engineering
Materials Performance
Materials Research Bulletin
National Bureau of Standards Technical News Bulletin
Nuclear Safety
OMR -- Organic Magnetic Resonance
Physics & Chemistry of Glasses
Plastics Engineering
Plastics World
Products Finishing
Report of NRL Progress
Reports of the Research Institute for Strength & Fracture of Materials
Rubber Age
Rubber World
Sampe Journal
Science

Scientific American
Scripta Metallurgica
Shock & Vibration Digest
SID Journal
Solid State Slectronics
Southern Research Institute Bulletin
Transactions & Journal of the British Ceramic Society

REPORTS & BULLETINS

Commerce Business Daily (holdings kept for 4 months)
Defense Metals Information Center (MIC)
- Memorandums
- Reports
- Review of Recent Developments. 1970-71

Focus on Titanium. February 1975 -
Forging Topics. 1974
Metals & Ceramics Information Center (MCIC)
- Newsletter. 1972 -
- Review of Ceramic Technology. 1972 -
- Review of Metals Technology. 1972

NMAB Reports. National Materials Advisory Board. 1952 -
NTIAC Bulletins. Nondestructive Testing Information Analysis Center
RAC Newsletters. Reliability Analysis Center
Thermophysical Properties of Matter. Volumes 1-10
Thomas Register 1970
Thermophysical Properties of High-Temperature Solid Materials, Volumes 1-6, 1966
Thermophysical Properties Research Literature Retrieval Guide, Volumes 1-3, 1967
Electronic Properties of Materials - A Guide to the Literature, Volumes 1-3, 1967-71
ASTM Standards of American Society for Testing Materials 1970
Air Force Scientific Research Bibliography, Volumes 1-8, 1950-65
AFSC Air Force Systems Command Design Handbooks 20 Volumes
Government Reports Index, 1967-75
Government Reports Announcement, 1969-75
TAB-Technical Abstracts Bulletin. 1962-71
STAR-Scientific & Technical Aerospace Reports. 1969-75
International Aerospace Abstracts. 1970-73

Aeronautical Engineering -- a special bibliography. 1972-75
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Many specific technical reports are received and maintained by the MDC. Most of these are the AD series, but we also have some PB series and NASA N number series. All in-house AFML reports are maintained. Altogether about 75,000 technical reports are available.

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