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A REVIEW OF THE MECHANICAL PROPERTIES DATA CENTER OPERATION AND EXPANSION

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C. S. WRIGHT

BELFOUR ENGINEERING CO.

TECHNICAL REPORT AFML-TR-65-193

SEPTEMBER 1965

AIR FORCE MATERIALS LABORATORY
RESEARCH AND TECHNOLOGY DIVISION
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

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BELFOUR ENGINEERING CO.

FOREWORD

This report was prepared by the Technical Information Systems Division of the Belfour Engineering Company, Suttons Bay, Michigan, under U.S.A.F. Contract No. AF33(615)-1061. The work described herein was accomplished under Project No. 7381, Material Application, Task No. 738103, Data Collection and Correlation. This effort has been administered under the direction of the Research and Technology Division, Air Force Materials Laboratory, Materials Information Branch, Wright-Patterson Air Force Base, with R. F. Klinger as project engineer.

This report reviews the operation of the Mechanical Properties Data Center during the period March 1, 1965 through February 28, 1965.

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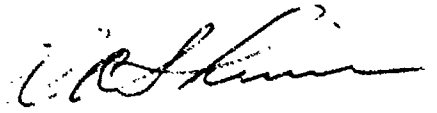
This technical report has been reviewed and is approved.



D. A. SHINN
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ABSTRACT

This report reviews the content and use of the Mechanical Properties Data Center. The growth and expansion of the Center since the initiation of formal search services in March 1961 through February 1965 is summarized by means of graphic and tabular displays. Principal topics are inventories of stored data, frequency of data search requests, identification of users (corporate) and frequency of use.

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I. INTRODUCTION

A. Purpose

The Mechanical Properties Data Center has functioned as a part of the Air Force Materials Center (AFMIC) for the past four years. This group, comprised of eight specialized Information Centers, has as its principal responsibility, "the efficient interchange of scientific and technical information of value to the defense research and development community". Six of the eight specialized centers sponsored by the Air Force Materials Laboratory, including the Mechanical Properties Data Center, are now identified as part of the DoD network of twenty-two Information Centers.

B. Scope

The specific responsibilities of the Mechanical Properties Data Center within the framework established by the Air Force and DoD are to acquire, store, retrieve, and disseminate mechanical properties data of metals and reinforced plastics.

Previous reports (1,2,3)* of the Center have discussed design concepts, storage media, equipment, formats, extraction-encoding techniques, and output forms. This report will be primarily concerned with a review of system use including identification of agency, corporate, society, and other requesters, along with a summary of the Centers' responses to inquiries (searches). A comparison of the costs of data retrieval versus data generation is also included.

The growth in content, use and services of the Center is reflected by the description of inquiries, variety of responses, identification of users and frequency of use.

II DISCUSSION

The capability of the data to answer specific as well as general questions regarding the mechanical properties and behavior of structural materials for defense and aerospace applications, has increased to the point where more than 90% of all inquiries received are answered with pertinent numerical data and/or other information. The small percentage of unanswerable inquiries generally fall in one of the following categories; (1) the materials and/or properties of interest are not within the scope of the Mechanical Properties Data Center, or (2) no data, or very little data exists for the requested material-property-environment combination.

*Underlined numbers in brackets refer to the Reference List.

A. Data Card Storage

The data card storage of the Center has increased from approximately 46,000 cards, in the original fatigue data storage file, to a present total of over 370,000 cards incorporating the measured results and associated definitive information of most static and dynamic mechanical properties tests.

Table I, Mechanical Properties Data Inventory - Metals and Alloys, presents a current accounting of the data available in response to specific inquiries regarding the strength and behavior of metals and alloys under various conditions of loading and environment.

Data cards representing alloys (metals) and properties of current or near future interest are being added to the data storage file at the rate of 13,000 - 14,000 cards per month. It is estimated, rather conservatively, that this represents approximately thirty percent of the original reliable and available data being generated. No criteria have been established by which this input rate may be evaluated, however, based on the percentage of successful searches, data depth, and the results of a moderately aggressive acquisition program, this input for metals and alloys appears to be approaching an optimum rate.

B. Materials-Properties Coverage

The first efforts of the Center to provide properties data in response to inquiries were limited to the fatigue properties of alloys. Since that time the Center has acquired and stored a full spectrum of mechanical properties data for most metals of current or near future structural importance. Data for over 1,500 materials designations (trade names, numbers, etc.) representing approximately 800 metals alloys have been incorporated in the mechanical properties storage file. An additional 1,930 material designations have been encountered in the technical literature of the Mechanical Properties Data Center library. These designations represent 1100 alloys, the major number of which are experimental, discontinued, or alloys of unknown composition.

In addition to this, appreciable progress has been made with the storage of reinforced plastics information. A pilot storage system for reinforced plastics data has been developed which contains in excess of 20,000 mechanical properties data cards (1, 5). The Center is presently involved in a program of revising and updating this pilot system. It is anticipated that revision and further

stocking of this data storage file during the next two years, or less, will probably place the plastics data file at or near a level of completeness comparable to the metals data file. This is based on the assumption that reliable well documented plastics test data are generated at a rate of approximately 290,000 tests annually.

Table II presents a listing of properties and measurements presently incorporated in the data storage file. The most recent additions to this listing have been the Tensile Fracture Toughness and Pressure Vessel Burst tests. It has been, and will continue to be, the practice of the Center to incorporate data for all types of mechanical properties tests that are sufficiently standardized to contribute to a better understanding of the behavior of structural materials. Adequate descriptive information on test procedures, environment and materials are prerequisites of data selected for storage.

C. Reference Accessibility

The paragraphs above have referred to the storage of materials information and data in a machine retrievable punched card system. All the useful materials information does not, however, lend itself to processing and manipulation as do the well described results of a carefully planned materials test program. Valuable information on processes, failure mechanics, test techniques and phenomena of material behavior are presented without supporting data. Properties summaries, handbooks and other documents containing typical or average results are examples of another type of information that contributes to the information pool but cannot be merged with raw data without destroying their value as reliable operands in statistical or design studies. Recognizing the need for access to such information the Mechanical Properties Data Center has devised a punched card indexing system based on descriptors pertaining to properties, materials, environment, processes, etc. that rapidly identifies documents containing non-numeric information and numeric data not yet incorporated in the data storage file. This system utilizes codes developed for the regular machine retrievable data storage system.

III. SYSTEM USE AND USERS

A. User Stimulation

To publicize the availability of metals fatigue data and encourage designers and others to utilize this information the Mechanical Properties Data Center prepared and disseminated a

series of Technical Notes. Five of these were prepared, each presenting a small segment of the fatigue data file in graphic form. As the storage file of the Center began to grow, including new materials, other mechanical properties and greater depth in most areas, it became apparent that the Technical Notes were not fulfilling their intended purpose. Preparation and printing were time consuming and the Notes were contributing to, rather than alleviating, the congestion created by "too much" information. To correct this situation the "Inventory Report" was conceived. The intent of this publication is twofold in that it is designed to inform the readers (past and potential users) of the multitude of materials and/or properties data available from the Center and to demonstrate various types of presentations which can be obtained. As has been stressed many times the Center's desire is not only to seek out all available data representing the requested material-property combination but also, to transmit the data to the requester in a form which can be most usefully applied to his particular problem or area of study. It is felt that the Inventory Report is an excellent means of conveying details of what the Center has to offer. Table III, Special Reports published by the Mechanical Properties Data Center, lists all reports generated by the Center.

B. Search Activity

A search is loosely defined as any attempt by the Center to provide data and/or information in response to each requested material-property combination. Measured and computed values generated as the result of the same test such as ultimate tensile strength, tensile yield strength, percent reduction in area, etc. are not, of course, considered separately. A request for information (data) on the yield strength of a material is relatively meaningless without further description of the variables and the associated properties. Although this definition may vary under some circumstances, it is generally employed to establish and initiate searches. As a result of this definition the average search currently produces results and descriptive information from three hundred tests. These data represent an average of five documents and are normally supplemented by the identification of eight to ten documents containing additional pertinent information.

Figure I, a graphic display of search activity on a quarterly basis, shows a dramatic increase in search activity, from twelve searches in 1961 to 301 in 1964. This growth can be, in part, attributed to efforts to formally publicize the Center. However, much of the growth is accounted for by the re-use of the Center by a previous user.

C. Users and Frequency of Use

As previously stated, the goal of the Center is to provide data and information in response to specific inquiries regarding the strength and behavior of structural materials. The effectiveness of efforts toward this goal can be measured not only by the increase in the total number of successful searches but also by the frequency of re-use. The number of requesters and the number of requests (searches) for each organization, agency or individual consultant are displayed in Table IV. From this display it can be seen that 34 percent of the agencies, organizations or consultants that used the services of the Center did so more than once. Re-use by individuals (requesters) within these organizations is also evident from the Table.

Table V summarizes the detail of Table IV and displays search activity by requester classification. A brief description of the inquiries and responses processed by the Center are given in Appendix I. The diversity of these requests and answers are only an indication of the potential capability of this Center.

To evaluate the services of the Center the two primary factors are cost and effectiveness. The first of these, can be examined very realistically since investigators of materials properties are fully aware of the expense involved in even a moderately extensive test program. Using current average search costs, average search output and a generally accepted approximation of testing costs the comparison can be made as follows:

Current average search cost for a data producing search by M.P.D.C.	$150.00
Average number of tests (results) provided in response to a search requesting data.	300
Approximate cost of actual testing per specimen.	$50
Cost of testing to produce results of average search.	$15,000
Average search cost versus approximate cost of testing.	$150/15,000

It is recognized by the Center that few, if any, searches completely satisfy a requesters' need for information relative to

his particular investigation. It would be naive, therefore, to assume that every completed search saves the government and/or industry ninety-nine percent of the cost of generating the original data. In a recent survey conducted by the Mechanical Properties Data Center, of several frequent users, it was established that fifty to seventy percent of the data furnished by the Center is directly pertinent and the savings in time ranged from weeks to several months. Even greater economy and effectiveness will be realized as proposed equipment and processing techniques are incorporated.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

The Mechanical Properties Data Center is capable of efficiently processing two to three searches per day with present equipment and personnel. Peak loads above this can also be assimilated, for periods of short duration, without seriously effecting other areas of Project activity. However, a search projection based on the rate of increase over the past four years indicates that an average output rate of three per day will be exceeded early in 1966 and that by mid-1967 the Center can expect to receive an average of four requests per day. To provide a facility capable of meeting these increased demands the Mechanical Properties Data Center has placed an order for a general purpose random access (IBM 1440) computer. This equipment, including disc pack storage and tape read-in, is scheduled to be operational before 1966. In addition to providing a search capability nearly ten times greater than that of the present facility, the proposed system will permit rapid processing, manipulation and display of data for special reports and records for internal use. At a rate of three searches per day the computerized search processing will cost no more than present processing and at five per day, anticipated by 1969, a decrease of twenty percent is predicted. The availability of well defined materials test data at 0.8% of the cost of generation can be a reality! The Center is experiencing no difficulties that cannot be overcome by the continuous input of reliable well documented test results and by maintaining an efficient and accurate retrieval service.

The Mechanical Properties Data Center will, as in the past, endeavor to provide mechanical properties data at the lowest possible cost, consistent with the high standard expected and required by the aerospace and defense industry. Evidence that progress has been made in the past is presented in Table VI. A similar display of a previous report (1), shows

the ratio of expended engineering time to all other (technician and clerical) expended time to be about one to one. The present display, Table VI, shows the relationship to be about thirty percent to seventy percent.

B. Recommendations

The utilization of information from the Data Centers by DoD contractors should be increased and conversely, information generated by DoD contractors should be directed to the appropriate Centers for storage. Contractual requirements in this direction might well implement a two way savings by assuring more efficient use of available information and a reduction in the costs of data acquisition by the Centers.

The projected increase in Data Center use suggests another situation that can be best solved by a coordinated effort between the Data Centers and their sponsors. Efforts to provide responses to inquiries as rapidly as possible must include the consideration of a means for rapid transmission of information after retrieval. TWX has been suggested, in the past, as a means of improving transmission from the Mechanical Properties Data Center. It still appears to be a most practical improvement for this Center. This transmission method, however, does not satisfy equally well the needs of all the Centers because of the diverse forms of output. With this in mind the Data Center will maintain an awareness of the developments in the equipment and techniques of transmission. The Center will attempt to be prepared to assist in the evaluation of a transmission network when conventional methods of long distance communication, such as the telephone and mail service, are judged to be inadequate.

REFERENCE LIST

1. Development of a Materials Property Data Processing System, R. C. Braden, C. S. Wright, Belfour Engineering Company, Suttons Bay, Mich. ASD TDR 63-128, Cont. AF33(616)-7238, January 1963, AD 401 358, January 1963.

2. Mechanical Properties Data Center Design and Operation, F. L. Stulen, Belfour Engineering Company, Suttons Bay, Mich. ASD TDR 63-566, Part I, Cont. AF33(657)-9149, May 1963.

3. The Mechanical Properties Data Center Operation and Expansion, R. C. Braden, C. S. Wright, Belfour Engineering Co., Suttons Bay, Mich. ML TDR 64-235, Cont. AF33(615)-1061, August 1964.

4. A System for Automatic Processing of Fatigue Data, A. J. Belfour, Parsons Corp., W. S. Hyler, Battelle Memorial Institute, WADC Tech. Rept. 58-461, AD 207 792, January 1959.

5. An Evaluation of Data Collections for Plastics, Gunther Cohn, Carol Carr, The Franklin Institute. Rept. I-B2104-1, Cont. DA-36-034-501-AMC-0119A, May 1964.

TABLE I

MECHANICAL PROPERTIES DATA INVENTORY

TOTAL CARDS BY CARD TYPE

Data Card Types	No. of Cards
Specimen Test and Failure Description Cards	244,344
Supplementary Specimen Test and Failure Description Cards	24,366
Chemical Composition Cards	30,593
Heat Treatment History Cards	22,612
TOTAL CARDS IN SYSTEM	321,915*

SPECIMEN TEST AND FAILURE DESCRIPTION CARDS BY TEST TYPES

Test Type	No. of Cards
Bearing	12,118
Compression	8,955
Creep	16,069
Fatigue	44,801
Impact or Fracture Toughness	25,459
Pressure Vessel Burst	164
Shear	10,820
Tensile	125,958
TOTAL	244,344

* Excluded from the above card counts are 52,087 data cards of the pilot storage systems for metals and plastics.

Table I - MECHANICAL PROPERTIES DATA INVENTORY - continued

SPECIMEN TEST AND FAILURE DESCRIPTION CARDS
BY MATERIAL TYPES

Material Type	No. of Cards
Low Alloy Wrought Carbon	39,094
Stainless Steels	25,896
Tool Steels	13,267
Maraging, Super Alloys	27,286
Cast Irons, Special Purpose	113
Nickel or Chrome Base	18,624
Aluminum	29,490
Titanium	67,873
Magnesium	7,761
Cobalt Base	2,009
Copper Base	773
Tungsten Base	2,030
Plutonium or Uranium Base	56
Tantalum Base	1,599
Columbium Base	2,376
Molybdenum Base	3,118
Beryllium Base	1,890
Zirconium Base	320
Vanadium Base	72
Dissimilar Metals (Joined)	529
Others	168
TOTAL	244,344

~~TABLE II~~

MECHANICAL PROPERTIES AND MEASUREMENTS

Static Properties

- Ultimate Strength
  - Tension
  - Compression
  - Shear-Torsion
  - Bearing
  - Flexure
  - Impact
  - Fracture Toughness
  - Burst
- Yield Strength
  - Tension
  - Compression
  - Bearing
  - Flexure
  - Torsion
- Proportional Limit
  - Tension
  - Compression
  - Flexure
  - Torsion
- Modulus of Elasticity
  - Tension
  - Compression
  - Flexure
  - Torsion
  - Tangent Modulus

Dynamic Properties

- Fatigue (Axial, Rotary, Torsional, Combined)
  - Conventional S-N Test
  - Damage Test
  - Sequential Loading Test
  - Random Loading Test
  - Prot Test

Creep Properties

- Time-Deformation
- Stress Rupture

Miscellaneous Properties and Measurements

- Hardness, all types
- Elongation, gage length
- Reduction of Area
- Poissons Ratio
- Stress-Strain relations
- Damping Constants

TABLE III

SPECIAL REPORTS PUBLISHED BY THE MPDC

Inventory Reports

Report 613 - Rene' 41 Nickel Base Alloy, September 1963

Report 616 - Titanium Alloy 6A1-4V, December 1963

Report 620 - AISI H-13-Hot Work Die Steel, August 1964

Report 622 - Titanium & Titanium Alloys, October 1964 - AD 607 488

Report 623 - Fracture Toughness Data, March 1965

Technical Documentary Report

ML-TDR (Number Unassigned) - Fatigue Life Data Displayed With A Single Parameter Relating Alternating and Mean Stresses, Contract No. AF33(615)-1061, January 1965.

Technical Notes

ASD-TN 61-117 - Part I --- AD 281 874
Fatigue of Metals - Aluminum - Section I, June 1961.

ASD-TN 61-117 - Part II --- AD 268 412
Fatigue of Metals - Corrosion & Heat Resistant Metals - Section I, November 1961.

ASD-TN 61-117 - Part III --- AD 273 689
Fatigue of Metals - Low Alloy Steel - Section I, February 1962.

ASD-TN 61-117 - Part IV --- AD 278 355 - (NASA) N63-18721
Fatigue of Metals - Aluminum - Section II, May 1962

ASD-TN 61-117 - Part V --- AD 406 145
Fatigue of Metals - Aluminum - Section III, May 1963.

Defense Documentation Center Accession (AD) Numbers included when available.

FIGURE 1

SEARCH FREQUENCY

(QUARTERLY)

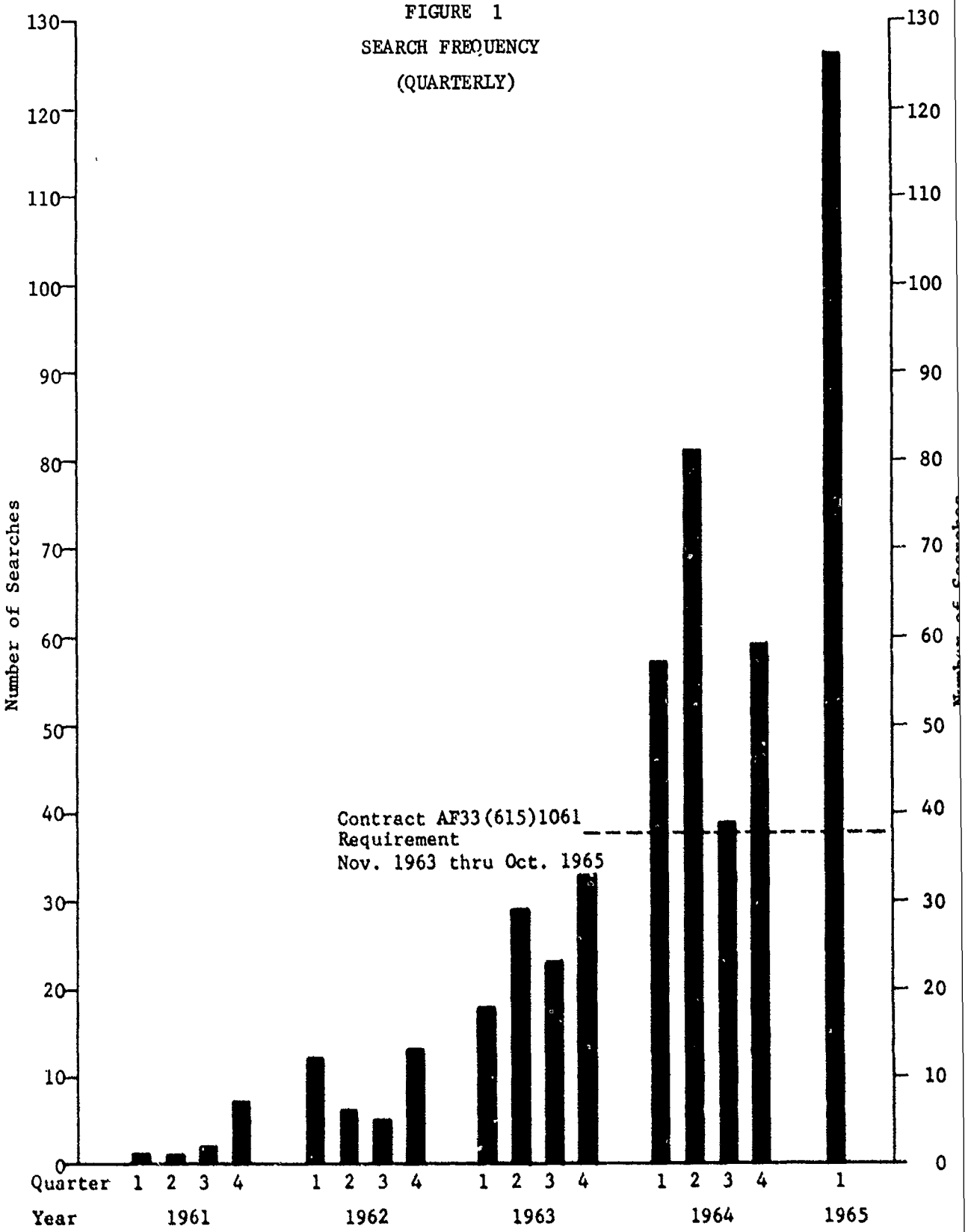

TABLE IV

REQUESTERS OF DATA CENTER SERVICES

(Oct. 1961 thru Feb. 1965)

INDUSTRIAL

Organization	Location	No. of Requesters	No. of Requests
Aerojet General Nucleonics	San Ramon, California	2	2
AiResearch Manufacturing Company	Phoenix, Arizona	1	4
Aerospace Research Associates	West Covina, California	1	1
Allied Research Association	Concord, Massachusetts	1	1
Allison Division, General Motors	Indianapolis, Indiana	4	10
American Metal Products	Ann Arbor, Michigan	1	1
Arvin Industries, Incorporated	Columbus, Indiana	1	1
Atlantic Research Corporation	Alexandria, Virginia	1	1
AVCO	Boston, Massachusetts	3	5
Bendix	South Bend, Indiana	5	17
Bell Aerosystems	Buffalo, New York	2	2
Bell Helicopter	Fort Worth, Texas	1	1
Boeing-Seattle	Seattle, Washington	6	25
Boeing-Vertol	Morton, Pennsylvania	1	1

Industrial - continued

Organization	Location	No. of Requesters	No. of Requests
Boeing-Wichita	Wichita, Kansas	1	1
CBS Laboratories	Stanford, Connecticut	1	1
Canadair	Montreal, Canada	1	1
Chance-Vought (LTV)	Dallas, Texas	2	2
Chrysler Missile Division	Detroit, Michigan	1	1
Chrysler Space Division	New Orleans, Louisanna	1	1
Continental Aviation	Detroit, Michigan	2	6
Cosmodyne Corporation	Torrance, California	1	1
Curtiss-Wright Corporation	Caldwell, New Jersey	1	6
Curtiss-Wright Corporation	Woodridge, New Jersey	2	38
Enstrom Corporation	Menominee, Michigan	1	2
Esso	Linden, New Jersey	1	1
General American Transportation	Niles, Illinois	1	1
General Dynamics	Fort Worth, Texas	2	3
General Dynamics/Astronautics	San Diego, California	1	1
General Dynamics/Convair	San Diego, California	1	1
General Electric	Cincinnati, Ohio	3	10
General Electric	Evansdale, Ohio	2	2
Geodynamics	Alexandria, Virginia	1	2
Giannini Controls Corporation	Duarte, California	1	1
Goodrich, B. F.	Brecksville, Ohio	1	1

Industrial - continued

Organization	Location	No. of Requesters	No. of Requests
Grumman Aircraft Engineering Corporation	Long Island, New York	1	1
Hadley, B. H. Incorporated	Pamona, California	1	1
Hamilton Standard	Windsor Locks, Connecticut	1	7
Ingersoll-Rand	Bedminster, New Jersey	1	1
Lear-Siegler	Grand Rapids, Michigan	1	4
Lockheed	Sunnyvale, California	2	5
Lockheed-Georgia	Marietta, Georgia	2	13
Martin Company	Baltimore, Maryland	1	4
Martin Company	Orlando, Florida	1	2
Martin Metals	Wheeling, Illinois	1	1
McDonnell Aircraft Corporation	St. Louis, Missouri	3	3
Melpar Incorporation	Falls Church, Virginia	1	1
Metcut Research Associates	Cincinnati, Ohio	1	1
Minnesota Mining & Manufacturing	St. Paul, Minnesota	1	1
Marquardt Corporation	Van Nuys, California	1	1
Norair (Northrop)	Hawthorne, California	3	4
North American Aviation	Los Angeles, California	1	1
North American Aviation	Columbus, Ohio	5	11
North American Aviation	Downey, California	2	4
North American Aviation	Tulsa, Oklahoma	1	23

Industrial - continued

Organization	Location	No. of Requesters	No. of Requests
North American Aviation	Thousand Oaks, California	1	1
North American Aviation - Rocketdyne	Canoga Park, California	1	1
Parsons Corporation	Traverse City, Michigan	4	8
Philco Corporation	Newport Beach, California	1	1
Pittsburgh Tool Steel Wire Company	Monaca, Pennsylvania	1	1
Pittsburgh Plate Glass Company	Pittsburgh, Pennsylvania	1	1
Republic Aviation	Farmingdale, New York	2	2
Sikorsky Helicopter	Stratford, Connecticut	2	9
Solar	San Diego, California	1	3
Sperry Gyroscope Company	Great Neck, New York	1	1
Steel Products Company	Springfield, Ohio	1	1
Sundstrand Corporation	Rockford, Illinois	1	1
Teletype Corporation	Skokie, Illinois	1	1
Thompson-Ramo-Wooldrige	Cleveland, Ohio	1	1
Union Carbide Corporation	Oak Ridge, Tennessee	1	1
United States Steel Corporation	Pittsburgh, Pennsylvania	1	1
Universal American Corporation	Elk Rapids, Michigan	1	1
Westinghouse Electric Company	Lima, Ohio	6	6
Westinghouse Electric Company	Pittsburgh, Pennsylvania	1	1

GOVERNMENT AGENCIES
and
ORGANIZATIONS

Organization	Location	No. of Requesters	No. of Requests
A.F. Materials Laboratory, Materials Application Division	Wright-Patterson AFB Dayton, Ohio	12	50
AFSC Scientific & Technical Liaison Office Research and Technology Division	U.S.A.F., New York, N.Y.	1	1
F. A. A.	Washington, D. C.	1	1
Headquarters Electronics Systems Division Hanscom Field	Bedford, Massachusetts	1	1
Highway Department, State of Alaska	Juneau, Alaska	1	1
Los Alamos Science Laboratory	Los Alamos, New Mexico	1	1
McClellen AFB	McClellen, California	1	1
Naval Air Engineering Center	Philadelphia, Pennsylvania	3	5
Naval Shipyard	Philadelphia, Pennsylvania	1	1
PLASTEC	Dover, New Jersey	1	1
U. S. Department of the Air Force	Washington, D. C.	1	1
U. S. Department of Commerce	Washington, D. C.	1	1
U. S. Army Engineers Research & Development Laboratory	Ft. Belvoir, Virginia	1	1
U. S. Army Missile Command (Redstone Arsenal)	Redstone Arsenal, Alabama	1	2
U. S. Department of the Navy	Washington, D. C.	1	1

Government Agencies - continued

Organization	Location	No. of Requesters	No. of Requests
Watertown Arsenal	Watertown, Massachusetts	2	9
Watervliet Arsenal	Watervliet, New York	1	1
UNIVERSITIES and COLLEGES			
British Columbia, University of	Vancouver, Canada	1	1
Dayton, University of	Dayton, Ohio	1	1
Indiana University (Aerospace Research Application Center)	Bloomington, Indiana	1	4
Michigan, University of (Institute of Science & Technology)	Ann Arbor, Michigan	1	1
Ohio State University	Columbus, Ohio	1	2
Massachusetts Institute of Technology	Cambridge, Massachusetts	1	1
Penn State University	University Park, Pennsylvania	1	1
Syracuse University	New York, New York	1	2
Texas A & M University	College Station, Texas	1	1
RESEARCH INSTITUTES			
Battelle Memorial Institute	Columbus, Ohio	3	47
Southwest Research Institute	San Antonio, Texas	1	1

INDIVIDUALS

(CONSULTANTS, STUDENTS, etc.)

Organization	Location	No. of Requesters	No. of Requests
W. H. Gitzen (Consultant)	Belleville, Illinois	1	1
Rudolph Haug (Student)	Belleville, Illinois	1	1
J. J. O'Brien (Consultant, NASA)	San Diego, California	1	1
K. D. Wood (Consultant, Martin-Denver)	Boulder, Colorado	1	1
Ashvin M. Shah (Student)	Lawrence, Kansas	1	1
SOCIETIES			
ASTM E-9 Committee	Washington, D. C.	1	1
FOREIGN (ALL)			
A.T.V. (Denmark)	Lyngby, Denmark	1	1
Centre National	Belgium	1	1
Japan Infcrmation Center	Tokyo, Japan	1	1
Laboratorium Fur Betriebsfestigkeit	Germany	1	1
Thai National Documentation Center	Thailand	1	1
Institute of Scientific Information Academy of Sciences	USSR	1	1
Westland Aircraft	England	1	1

TABLE V

SUMMARY OF MECHANICAL PROPERTIES
DATA CENTER USERS BY CLASSES

(Oct. 1961 thru Feb. 1965)

Request Origin (Class)	Number of Originating Organizations	%	Number of Requesters	%	Number of Requests	%
Industrial	74	64.4	118	67.5	296	65.4
Government Agencies & Organizations	17	14.8	31	17.7	79	17.4
Universities & Colleges	9	7.8	9	5.1	14	3.1
Research Institutes	2	1.7	4	2.3	48	10.6
Individuals (Consultants, etc.)	5	4.3	5	2.8	8	1.8
Societies	1	0.9	1	0.6	1	0.2
Foreign (All)	7	6.1	7	4.0	7	1.5
TOTAL	115		175		453	

TABLE VI

LABOR DISTRIBUTION
(Apr. 1964 thru Feb. 1965)

Project Area	Distribution of Expended Time - Percentages by Area -				
	Engineering	Technicians		Clerical	Total
		Materials Information	Data Processing		
Administration - All effort expended on administrative records, reports, correspondence, conferences, planing, etc.	6.7	.4	.8	.8	8.7
Library & Literature Acquisition - Time expended acquiring and indexing documents.	1.8	2.0	1.2	4.6	9.6
Data Input - All phases of data reduction-conversion from encoding through storage.	2.2	28.3	14.0	.6	45.1
Data Output - All study, analysis, machine processing, tabulating, etc., necessary to produce an answer, solution or other end product.	10.3	4.0	5.2	.6	20.1
Dissemination - Non-technical work associated with the preparation, presentation and distribution of Output.	.1	.3	.2	2.4	3.0
Methods & Systems - All effort expended on study, evaluation, design and development of methods or procedures necessary to the accomplishment of project goals.	8.0	3.0	.4	1.0	12.4
Equipment & Facilities - Time expended on the study, evaluation and maintenance of equipment or facilities.	.3	-	.7	.1	1.1
TOTAL	29.4	38.0	22.5	10.1	100.0

APPENDIX I

A brief description of data inquiries and responses for the period April 1, 1964 through February 28, 1965

APPENDIX I

SEARCH REQUEST LOG

Search Request No.	Information Requested	Output
959	Room temperature properties of unnotched 2024-T3 and T4 (clad and bare) aluminum.	Two tabulations with summary data sheet and reference list.
960	Room temperature tensile properties of 6061 (bare) aluminum unnotched specimens.	Tabulation with code sheet and reference list.
961	Room temperature tensile properties of 7075-T6 unnotched aluminum.	Two tabulations with code sheets and reference lists.
962	Room temperature tensile properties of the magnesium alloy AZ31B-F & H24.	No information meeting the exact requirements was available from the data file. Nine references cited which contain applicable information. Contents of each document were outlined.
963	Room temperature tensile properties of the magnesium alloy ZK60 A-T5.	No information meeting the exact requirements was available from the data file. Four references cited which contain applicable information. Contents of each document were outlined.

Search Log - continued

964	Temperature and atmospheric conditions in the annealing of Zircaloy-2 and Niobium-Zircaloy-2.	Nine references cited which contain applicable information.
965	Room temperature compressive properties of Ti-4Al-3Mo-1V.	Two tabulations with code sheets and reference list.
966	Room temperature compressive properties of Ti-2.5Al-16V.	Two tabulations with code sheets and reference lists.
967	Room temperature compressive properties of Ti-6Al-4V.	Two tabulations with code sheets and reference lists.
968	Room temperature compressive properties of 2024-T3 and T4 sheet (bare and clad)	No data meeting requirements of request is available from data file. Applicable references were cited.
969	Room temperature compressive properties of 6061T4-T6 bare sheet.	No data meeting requirements of request is available from data file. Applicable references were cited.
970	Room temperature compressive properties of 7075-T6 sheet, bare, clad and extrusions.	No data meeting requirements of request is available from data file. Applicable references were cited.
971	Room temperature compressive properties of 31B-H24 sheet and AZ 31B-F extrusions.	No data meeting requirement of request is available from data file. Applicable references were cited.

Search Log - continued

972	Room temperature compressive properties of AK60A-T5 Extrusions.	No data meeting requirements of request is available from data file. Applicable references were cited.
973	Technical literature drawings, etc. on mechanical properties of mild steels under dynamic loading.	Discussion of Center and how mechanical properties data file and library may be of most help to requester. Copy of a six page ASTM paper on the behavior of materials in a dynamic environment.
974	Tensile data for round and/or flat welded and heat treated (-T5 or -T6) specimens of alloys AZ91C, AZ9Z and EZ33.	No information meeting the exact requirements was available from the file. Three documents containing applicable information were cited.
975	Tensile and creep rupture properties of D6ac and H-11 steels.	Tabulation of room temperature tensile properties of D6ac and H-11 with code sheet and reference list. Also included was a copy of a document containing tensile properties of H-11 not yet incorporated in the file.
976	Elevated temperature tensile, compression and shear properties of 2024-T86 Aluminum.	Two tabulations with code sheets and reference lists.

Search Log - continued

977	Stress-rupture and creep data Rene'41.	Three tables of stress rupture values and supplementary information. Two tables of creep data and supplementary information.
978	Tensile and creep data of Udimet 700.	One table creep data, one tensile tabulation and supplementary information.
979	Creep and stress rupture data of Astroloy.	One tabulation with codes and references.
980	Fatigue, Creep and/or Stress Rupture Properties of Ti-7Al-4Mo.	No data meeting requirement of request available at this time.
981	Creep,stress rupture and fatigue data of 6Al-4V-Ti.	Twelve references with applicable data cited.
982	Continuation of preceding search.	One table each of creep and fatigue data and supplementary information.
983	Fatigue, creep and stress rupture data of Nimonic 115.	No data meeting requirement of request available at this time.
984	Fatigue, creep and stress rupture data of Inco 718.	No data meeting requirement of request available at this time.

Search Log - continued

985	Fatigue, creep and stress rupture data of Inco 700.	Twelve references cited with applicable information.
986	Information on the services, charges, etc., of the Mechanical Properties Data Center.	Letter describing services and user qualifications. List of publications.
987	Placed on mailing list for future mechani-properties publications of the Center.	List of publications.
988	Tensile properties of Inconel 718.	One tabulation with supplementary information and eight references cited.
989	Fatigue properties of refractory metals and unalloyed cobalt and nickel.	Copies of three pertinent reports and four additional references identified.
990	Tensile and compressive yield of 2024-T3 and T4 aluminum, less than ½" thick, at temperatures from -400° to 400°F.	Four tabular displays with descriptive information and reference list.
991	Room temperature compressive properties of hot rolled 3Al-13V-11Cr-Ti.	Two tables with codes and references.
992	Corrosion fatigue of 6Al-4V-Ti.	No data or references available from the Center.
993	Information on nature of service, publications and eleigibility for publications of the Center.	Letter describing services and user qualifications.

Search Log - continued

994	Room temperature tensile properties of D6ac steel and Tens-50 aluminum.	One tabulation each D6ac and Tens-50 with codes and references.
995	Stress corrosion properties of H-11 Steel (any form except sheet).	Copy of one document containing information meeting the requirements of the request. Also Summary Reference list (8 documents) provided.
996	Elevated temperature tensile, creep and stress rupture data for the Alloys L-605 and Hastelloy X.	Copied portions of five documents containing applicable information. A Supplementary Reference List of eight documents was also provided.
997	Information on services, objective, and functions of the Mechanical Properties Data Center.	Description of the Mechanical Properties Data Center services and scope. Two Summary Reports describing development and operation of the Center.
998	Mechanical Properties of Ceramic Oxides.	Copied portions of one document and Supplementary Reference List of thirteen other documents containing applicable data.
999	Fatigue Information (high stress, low cycles) on 8135 steel.	Copies of fatigue displays from previous search output. Also seventeen documents listed which contain applicable information.

Search Log - continued

1000	Room and cryogenic temperature fatigue properties of welded 2219-T81, T87.	Copied portions of two documents containing application information. Also reference made to a previous search conducted for same requester wherein similar information was sought.
	Information on services, objectives etc. of the Mechanical Properties Data Center.	Description of the Mechanical Properties Data Center's services, etc. An Inventory Report and two Summary Reports describing development and operation of the Center were included.
1002	Tensile properties of SM-200.	No information meeting requirements of request was available from data file. Manufactures brochure describing typical properties was included.
1003	Creep and/or stress rupture properties of SM-200.	No information meeting requirements of request was available from data file. Manufacturers brochure describing typical properties was included.

Search Log - continued

1004	Fatigue properties of SM 200.	No information meeting requirements of request was available from data file. Manufacturers brochure describing typical properties was included.
1005	Tensile properties of SM 211.	No information meeting the requirements of request was available from the data file or reference library.
1006	Creep and/or stress rupture properties of SM 211.	No information meeting the requirements of request was available from the data file or reference library.
1007	Fatigue properties of SM 211.	No information meeting the requirements of request was available from the data file or reference library.
1008	Load deformation and fatigue characteristics of neoprene, butyl, and chloro-butyl pads at temperature of -70°F.	Four references cited which contain applicable data.
1009	Information on high temperature Poisson's Ratio (and techniques utilized in measuring the data) on alloys of columbium, tantalum, cobalt and nickel.	Copied portions of four references which contain applicable information.

Search Log - continued

1010	Properties of Armor Plate materials.	Nine references cited which contain applicable information.
1011	Tensile properties of Duplex annealed Ti-8Al-1Mo-1V.	Two tabulations with code sheets and reference lists. Also, five supplementary references were cited which contain applicable information.
1012	Creep and/or stress rupture properties of Ti-8Al-1Mo-1V.	One tabulation with code sheets and reference lists. Also, two supplementary references were cited which contain applicable information.
1013	Fatigue properties of Ti-8Al-1Mo-1V.	Three documents cited which contain applicable information. Also, three supplementary references cited which contain applicable information.
1014	Tensile properties of D-979.	One tabulation with code sheet and reference list. Also, two supplementary references were cited which contain applicable information.
1015	Creep and/or stress rupture properties of D-979.	No data meeting requirements of the request were available from the data file.

Search Log - continued

1016	Fatigue properties of D-979.	No data meeting requirements of the request were available from the data file.
1017	Tensile properties of R-235.	One tabulation with code sheets and reference list. Also, seven references were cited which contain applicable information.
1018	Creep rupture properties of R-235.	One tabulation with code sheets and reference list.
1019	Fatigue properties of R-235.	Two tabulations with code sheets and reference lists. One supplementary reference was cited which contains applicable information.
1020	Tensile properties of W-545.	One tabulation with Summary Information Sheet and references noted. Also, one supplementary reference was cited which contains applicable information.
1021	Creep rupture properties of W-545.	One tabulation with Summary Information Sheet and references.
1022	Fatigue properties of W-545.	No information meeting the requirements of the request was available from the data file or reference library.

Search Log - continued

1023	Fatigue of plastic laminates (181 cloth & epoxy resin).	Seven documents cited which contain applicable information.
1024	Elevated temperature mechanical properties of pearlitic and ferritic ductile irons. Also, fatigue and static properties of high strength steel spline shafts.	Three references cited which contain applicable information.
1025	Impact properties (-65°F) of SAE AISI S-5 tool steel heat treated to Rc 50-60. Fatigue properties of unalloyed steel induction hardened gears. Rolling contact fatigue properties of high carbon steels. Notch toughness properties of medium carbon construction steels and mechanical properties of continuous cast and basic oxygen plain carbon and alloy steels.	Three graphic displays of code sheet and reference list.
1026	Room temperature fatigue properties of notched and unnotched cast steel QQ-S-681 and A356-T6 cast aluminum.	Copied portions of four references and/or brochures containing applicable data.

Search Log - continued

1027	Tensile, creep and/or stress rupture properties 2024 T-81 alclad aluminum.	Five tabulations with summary information sheet and references. Also, three supplementary references cited which contain applicable data.
1028	Low cycle axial fatigue data of unnotched materials.	One tabulation with code sheet and reference list.
1029	Literature and/or references on "Electric Discharge Machining".	Seven references cited which contain applicable information.
1030	Stiffness constants and temperature coefficients for alpha quartz.	No information meeting the requirements of the request was available from the data file or reference library.
1031	Fatigue of 356 cast aluminum.	Information from three references relayed to requester. Also, four supplementary references cited which contain applicable information.
1032	Inventory of 7000 series aluminum.	Inventory of 7000 series aluminum available from data file.
1033	Creep and/or stress rupture data for aluminum alloy types 3003,5052 and 2219.	Tabulation of 2219-T6 creep data and copies of two documents containing applicable data.

Search Log - continued

1034	Fatigue data of 4340 steel. To support a new theory in fatigue failures.	Six graphs plotted and two tabulations and references.
1035	Mechanical properties of T-1 tool steels and austenitic manganese steels.	Copies of two documents containing applicable data.
1036	Tensile properties of Ti-6Al-6V-2Sn.	Tabulation with definitive information and a Supplementary Reference List of seven documents containing applicable information.
1037	Shear properties of Ti-6Al-6V-2Sn.	Tabulation with definitive information.
1038	Impact properties of Armor Plate Material.	Twelve references transmitted by phone.
1039	Information on services of the Mechanical Properties Data Center and request to be placed on the mailing list.	Placed on mailing list, copy of an Inventory Report sent.
1040	Inventory of Titanium Alloys in Mechanical Properties Data Center card file.	Inventory of Titanium Alloys.
1041	Physical properties of AISI 8640 and AISI 8650.	Seven data sheets from Materials in Design Engineering. Also, eight references containing additional or substitute data.

Search Log - continued

1042	Request for information on operating procedures, etc., of Mechanical Properties Data Center.	Description of Center activities and scope. Copy of Inventory Report #616 included.
1043	Request for mechanical properties of Zircaloy 2.	Eight documents cited which contain applicable information.
1044	Information concerning capabilities of the Mechanical Properties Data Center and type of output which can be requested.	Description of Mechanical Properties Data Center capabilities and scope. Type of output outlined for requester.
1045	Coefficient of thermal expansion for Aluminum Alloys 7075 and 2024, and carbon steels 1040 and 1060.	Information meeting the requirements of the request from three references cited by phone.
1046	Fatigue properties of AMS 4037.	Nine graphs, and four references cited with applicable information.
1047	Information concerning operating procedures of the Center.	Description of Center activities and scope. Copy of Inventory Report #616 included.
1048	Fatigue properties of AMS 4037.	Six graphs and (5) five references with applicable information.
1049	Fatigue data of AMS 4041, 4152, 4120.	Five graphs and seven refernces.

Search Log-continued

1050	Fatigue data Titanium 6Al-4V.	Four graphs and two references with information regarding request.
1051	Elevated temperature of mechanical properties of reinforced plastics.	Seventy seven references listed pertinent to the request.
1052	List of titles or abstracts of reports that the Mechanical Properties Data Center issued to date.	Titles of five reports with AD numbers and three Inventory Reports. One report and one Inventory Report sent.
1053	Fatigue due to shock of 75 ST6.	Unable to supply requested information. Requester directed to a source where information may be available.
1054	Mechanical properties of electrical materials.	Inventory Report #622 sent to requester.
1055	Information about Mechanical Properties Data Center.	Description of Center and its facilities supplies. Also, enclosed Inventory Report #616 and #620 and TN 61-117 Pt. IV.
1056	Name to be placed on our mailing list.	Inventory Report #620 .

Search Log - continued

1057	Tensile properties of Ti-5Al-2.5Sn.	Five tables and 26 pages of codes applicable to the request. Also a list of 26 references used in the tabulations.
1058	Compression properties of Ti-5Al-2.5Sn.	Six pages of tabular displays, a code sheet and reference list.
1059	Shear of Ti-5Al-2.5Sn.	Four tables with codes and references applicable to request.
1060	Pin bearing tests of Ti-5Al-2.5Sn.	Three tables with code sheet and reference list of applicable information.
1061	Creep properties of Ti-5Al-2.5Sn.	Six pages of tabular display and code sheets and reference list with information pertaining to the request.
1062	Fatigue properties of Ti-5Al-2.5Sn.	Five pages of tabulation plus code sheets and reference list to describe displays.
1063	Information on services of the Mechanical Properties Data Center.	Two reports describing the services available sent to the requester. ML-TDR 64-235 and Inventory Report 620.

Search Log - continued

1064	Information on services of the Mechanical Properties Data Center.	Two reports describing the services available sent to requester. ML-TDR-64-235 and Inventory Report #620.
1065	Mechanical properties of EZ33A Magnesium.	Three pages of tabulation with descriptive code sheets and reference list. Copes of the EZ33A data sheets from Air Weapons Materials Application Hdbk (ARDC TR 59-66).
1066	Request for Inventory Report #616.	Answer to request sent to Foreign Release Officer for approval along with Inventory Report #616.
1067	Charpy impact of Ti-5Al-2.5Sn.	Tabulation and code and reference sheet with requested data.
1068	General information about the Center.	Description of the function of the Center. Also enclosed Inventory Report #620.
1069	General information about the Center.	Description of the function of the Center. Also enclosed Inventory Report #620.

Search Log - continued

1070	General information about the Center.	Two reports sent describing the services of the Center.
1071	General information about the Center.	Answer to request sent to Foreign Release Officer for approval along with Inventory Report #622, ASD-TDR 63-566 and ML-TDR-64-235.
1072	Room temperature and elevated temperature compressive tests of Ti-8Al-1Mo-1V.	Tabular display and code information and references of material.
1073	Room and elevated temperature bearing tests Ti-8Al-1Mo-1V.	Tabular display and code sheet and references.
1074	Creep properties of unnotched Ti-8Al-1Mo-1V.	Five pages of tabular display, plus code sheets and references pertaining to the request.
1075	Room temperature compression of Ti-6Al-6V-2Sn.	Tabulation and code and reference sheet pertaining to request.

Search Log - continued

1076	Shear strength of Ti-6Al-6V-2Sn	Tabular display plus code and reference sheet enclosed.
1077	Room temperature bearing tests of Ti-6Al-6V-2Sn.	Enclosed tabular display and code sheet.
1078	Tooling for hot-forming of Ti-8Al-1Mo-1V.	List of possible sources for this information.
1079	Shear strength of Ti-6Al-4V.	Four tables of 17 pages with informa- pertaining to the request.
1080	Tensile fracture toughness and charpy impact strength of Ti-13V-11Cr-3Al.	Two tables and codes pertaining to request.
1081	Tensile fracture toughness and charpy impact toughness Ti-6Al-4V.	Enclosed three pages of tabular display plus reference and code sheets. Also, copies of portions from pertinent documents.
1082	Room and elevated bearing of Ti-6Al-4V.	Two tables 16 pages of tabulations pertaining to the request.
1083	Creep and stress rupture properties of Ti-6Al-4V.	Seven tabular displays and codes and references enclosed pertaining to request.

Search Log - continued

1084	Mechanical, physical and thermal properties of Haynes Alloy No. 25.	Seven tabulations and code sheets pertaining to request. Also, reference properties summary sheet.
1085	Request for general information about the Center.	Description of the function of the Center enclosed.
1086	Creep properties of Ti-13V-11Cr-3Al.	Tabulations and code sheets pertaining to the request.
1087	Room and elevated temperature fatigue properties of Ti-6Al-4V.	Three tables, 16pages of tabulations and code sheets.
1088	Fatigue properties of shot peened 4340 low alloy steel.	Table and code sheet with references.
1089	Mechanical properties of 7075-T73.	Unable to supply requested information.
1090	Compression properties of Ti-13V-11Cr-3Al.	Two tables, 11 pages of tabulations and code sheets.
1091	Compression properties of Ti-6Al-4V.	Three tables, 13 pages of tabulations and code sheets.
1092	Room and elevated temperature bearing properties of Ti-13V-11Cr-3Al.	Two tables, 36 pages of tabulations and code sheets.
1093	Room and elevated shear properties of Ti-13V-11Cr-3Al.	Four tables, 18 pages of tabulations and code sheets.

Search Log - continued

1094	Information about the Mechanical Properties Data Center.	Description of the function of Center. Inventory Report and Summary Technical Report provided.
1095	Fracture toughness and impact properties of Ti-6Al-4V.	Five tables, 15 pages of tabulation and code sheets.
1096	Tensile and fatigue properties of fusion welded 6Al-6V-2Sn sheet. Fatigue properties of 6Al-4V bars and forgings.	Tables and code sheets.
1097	Fatigue properties of several stainless steels and Ti-6Al-4V.	List of 14 references sent for study.
1098	Impact and fracture toughness data for 9Ni-4Co-0.45C steel.	Five tables, 23 pages and code sheets.
1099	Elastic limits of metallic materials used in gyroscopic devices.	Enclosed Summary Technical Report and request for more specific information as to material.
1100	Aluminum Alloys 5086 and 5456.	Two references plus a copy of material from one document.
1101	Analytical treatment of forming processes.	Seven references listed.

Search Log - continued

1102	Creep rupture or long time stability data of reinforced plastics.	Nine references abstracted containing requested information.
1103	Information about the Mechanical Properties Data Center.	Two Inventory Reports and a list of publications by the Mechanical Properties Data Center.
1104	Modulus of elasticity of Rene'41 at temperature of 1300 - 1600°F.	Five references with copies of tables and graphs from each.
1105	Ductility of Inconel X, Inconel 625 and Waspalloy.	Twelve tables and code sheets.
1106	Information about the Mechanical Properties Data Center.	Two Inventory Reports and ML-TDR 63-235 enclosed.
1107	High stress - low cycle fatigue data.	Copied portions of two reports. Copy of NASA Tech Note D-1574.
1108	Information about the Mechanical Properties Data Center.	Inventory Report and three Center Publications.
1109	Long term room temperature creep characteristics of Styrofil G 37-20, heat resistant catalin polystyrene and Styrene Acryloniprile.	Three references cited.

Search Log - continued

1110	Tensile properties of D6ac (225 KSI F_{tu} level) at room and elevated temperatures.	Two tables, 14 pages of tabulations and code sheets.
1111	General information about Mechanical Properties Data Center.	Description of the function of the Center. Inventory Report and TDR-64-235 and Publication List of documents provided.
1112	General information about Mechanical Properties Data Center.	Description of the function of the Center. Inventory Report provided.
1113	Information on Inconel 625.	Copy of a table from a document with requested material.
1114	Request for technical notes prepared by this Center.	Publication List and ML-TDR 64-235 report provided.
1115	Creep and/or stress rupture properties of Ti-8Al-1Mo-1V.	Tabulations and code sheets provided.
1116	Hydrogen embrittlement of steel.	Reference list and copy of a document with pertinent data.
1117	Fatigue properties of vacuum melted low alloy steels.	Graphic displays, code sheets and reference list.

Search Log - continued

1118	Fatigue of 4340	Graphic displays, code sheet and reference list.
1119	Fatigue of H-11	Graphic displays, code sheet and reference list.
1120	Fatigue properties of vacuum melte low alloy steels.	Graphic displays, list of references.
1121	ZK60A - Magnesium Forgings	Reference list with pertinent data outlined.
1122	AZ80A - Magnesium	Reference list with pertinent data outlined.
1123	AZ91C - Magnesium	Reference list with pertinent data outlined.
1124	Aluminum Casting 356 or A356.	Reference list with pertinent data outlined.
1125	Fatigue properties of leaded brass in the ½ hard condition and 4160 modified 200-220 KSI.	Reference list pertaining to request.
1126	Fatigue of 12Cr Steel @ room and elevated temperatures.	Graphic displays and reference list.

Search Log - continued

1127	Stress corrosion of Anodized Titanium Alloy.	Abstract from document having information of request.
1128	4340 Fatigue Data requested.	Copies of graphs from document with pertinent information. Also graphic displays and reference list.
1129	Tensile properties, including elastic limit of several alloys.	Reference list with pertinent data outlined.
1130	Tensile properties, elastic limit-stainless steel.	Reference list with pertinent data outlined.
1131	Tensile properties, elastic limit-miscellaneous alloys.	Reference list with pertinent data outlined.
1132	Mechanical properties (primarily fatigue) of 2024-T351 plate - up to 3.0" thick.	Reference list with pertinent data outlined.
1133	Low temperature impact properties of 9Ni-4Co steel.	Tabulations, code sheets and references.
1134	Impact properties of D6ac and 9Ni-4Co.	Reference list with pertinent data outlined.
1135	Fatigue of chrome plated 7075-T73 aluminum.	A possible source for obtaining information was cited.
1136	Roll forming (hot or cold) of sections such as Zees, channels, etc., from titanium strip.	Reference list with pertinent data outlined.

Search Log - continued

1137	Haynes Alloy No. 25 (L-605)	Reference list sent, tabulation at a later date.
1138	Information about the Mechanical Properties Data Center.	Description of the function of the Center. Publication list supplied.
1139	Information about the Mechanical Properties Data Center.	Description of the function of the Center. Publication list supplied.
1140	Creep strength of cast Udimet 700.	Copied portions of documents with request material also reference list supplied.
1141	Fatigue of Ti-6Al-4V	Tables and graphs and reference list with requested data.
1142	Fatigue of Ti-8Al-1Mo-1V.	Reference list supplied with applicable information.
1143	Fatigue of 6Al-6V-2Sn	Thirty pages of copied portions of documents containing request data.
1144	Fatigue properties of Ti-13V-11Cr-3Al.	Reference list supplied with applicable information.
1145	Tensile properties of Hy-Tuf ultra high strength steel.	Tabulation and supplementary reference list.
1146	Mechanical properties of Hy-Tuf	Reference list of additional documents containing requested data.

Search Log - continued

1147	4330V modulus alloy steel	Tabulation and supplementary reference list.
1148	Shear strength of 4330V	Tabulation list, code sheets and references.
1149	Fatigue properties of 4330V steel.	Data sheets with applicable information.
1150	Mechanical properties of 4330V steel.	Reference list supplied with applicable data.
1151	Room temperature tensile properties of 4335V.	Tabulations with codes and references supplied.
1152	Mechanical properties of 4335V steel.	Reference list with applicable data furnished.
1153	Room and elevated temperature tensile properties of D6ac.	Four tabulations, 22 pages of codes with references.
1154	Expandable Polystyrene	Sources of reference listed to obtain information on material.
1155	Fatigue information on aluminum alloys 7079-T6 and T651, 7075-T73 and T-7351 and 2014-T6.	Copies of references with applicable data.
1156	Fatigue properties of 7075-T73 and 7351.	References cited with applicable information.

Search Log - continued

1157	Fatigue properties of 2014-T6.	Four documents cited with applicable information.
1158	General information about the Mechanical Properties Data Center.	Description of the function of the Center and Inventory Report #623 and ML-TDR 64-235 supplied.
1159	Fatigue properties of 4340 steel tested corrosive environment.	Reference list of documents with the material and ASD Tech Note 61-117.
1160	General information about the Mechanical Properties Data Center.	Inventory report and a complete breakdown of the services supplied.
1161	Short-term tensile properties of 304 stainless steel sheets.	Several data sheets with typical data.
1162	Mechanical properties of Invar at -290 to -430^{o}F.	Graphic displays from Cryogenic Materials Data Handbook.
1163	General information about the Mechanical Properties Data Center.	Description of procedures of Center.
1164	Tensile and fatigue properties of Ti-5Al-2.5Sn.	Tabulations, code sheets and references.
1165	Mechanical properties of SM302, Inconel 718 and Inconel 722.	Copies of documents with pertinent information.

Search Log - continued

1166	Fatigue properties of Epoxy faced HRP core sandwich.	Photo copies of documents with pertinent information.
1167	Tensile and fracture toughness properties of highly cold worked carbon steel.	Tabulations, code sheets and references.
1168	Effect of specimen preparation on mechanical properties of Ti-alloys.	Reference list with pertinent information.
1169	General information about the Mechanical Properties Data Center.	Summary technical report and Inventory Report.
1170	Fatigue properties of Ti-6Al-4V.	Four tables, 14 pages of pertinent data.
1171	Compiled list of sources requested pursuing research and development programs in the materials area.	List of potential data sources.
1172	Stress rupture properties of Inco 718 and 310 stainless steel.	Tabulations and code sheets.
1173	Stress rupture properties of Inco 718 and stainless steel 310.	Tabulations and code sheets.
1174	Tensile properties of Inco 718.	Four tables, 10 pages of pertinent data plus code sheets.
1175	Tensile properties of 310 stainless steel.	Four tables and code sheets.

Search Log - continued

1176	Room temperature shear properties of D6ac.	Tabulation and references.
1177	Fatigue properties of D6ac.	Tabulations and code sheets.
1178	Fracture toughness properties of D6ac.	Tabulations and code sheets.
1179	Elastomers and descriptive informa- about the Center.	List of references with pertinent information.
1180	Fatigue properties of Ti-7Al-4Mo.	Copies of 2 documents with information requested.
1181	Creep and/or stress rupture properties of Ti-6Al-4V.	Tabulations and code sheets.
1182	Tensile properties of Ti-6Al-4V.	Three tables, 41 pages code sheets.
1183	Tensile properties of Ti-7Al-4Mo.	Tabulations and code sheets.
1184	Stress rupture properties of Ti-7Al-4Mo.	Tabulations and code sheets.

Search Log - continued

432	Tensile modulus of Ti-8Al-1Mo-1V	Tabulation and reference list.
433	Stainless steel and super alloys. Stress strain data and testing procedures for 2-4 mil foil.	Copies from document with pertinent information forwarded.
434	Mechanical properties of TD Nickel.	Plotted data and reference list.
435	Fatigue of 2618 T61 aluminum.	References with pertinent data cited.
436	Effect of rapid loading (strain rates 10^3 - 10^6 in./in./min.) and/or rapid heat up short exposure time (2 min. or less) on mechanical properties of several materials.	List of references with pertinent data.
437	Mechanical properties of pure Cadmium.	Copies from document with pertinent information forwarded.
438	Impact properties of low alloy steels with 5.0% or less nickel content.	Three tabulations, codes and references.
439	Impact properties of low-alloy steels with 5.0% or less nickel content also fatigue	Plotted data with supplementary information sheet describing allied details.
440	Optimization of cutting tool ductility and wear properties.	List of documents with pertinent information.

Search Log - continued

441	Request for information on the theory of rolling variables on the application of rolling variables to superalloys, refractory metals or titanium.	List of programs with requested material described.
442	Effects of processes on superalloy sheet development.	List of documents with pertinent information.
443	Tensile yield and fracture toughness properties of 7075-T6 and T651, bare and clad.	Tabulations with code sheets and references.
444	Tensile yield and fracture toughness properties of 7075-T6 and T651, bare and clad.	Property summary sheet and references.
445	Creep and/or stress rupture properties of type 304 and 316 austenitic stainless steels.	Tabulation with code sheets and references.
446	Tensile and stress rupture properties of TIG welded Rene'41.	Tabulations with code sheets and references.
447	Tensile properties of TIG and/or MIG welded Ti-6Al-4V.	Tabulation with code sheets and references.

Search Log - continued

448	Tensile and fracture toughness properties of 9Ni-4Co steel.	Tabulations with code sheets and references.
449	Tensile and fracture toughness properties of TIG welded 18Ni-Co-Mo Maraging steel.	Tabulations, code sheets and references.
450	Effect of space atmosphere (environment) on properties of Balsa wood.	References cited for information.
451	Non-destructive adhesive bond tests.	Reference list pertinent to request.

Search Log - continued

619	Handbook Data Sheet Design	Printout materials and material codes. Selection of typical material and properties. Work up a typical data sheet.
620	Routine dissemination	Inventory Report No. 620 on H-13 Tool Steel, for distribution.
621	Inventory	Inventory of entire data card file for distribution.
622	Routine dissemination	Inventory Report No. 622 on Titanium and Titanium Alloys, for distribution.
623	Routine dissemination	Inventory Report No. 623, fracture toughness properties - all materials inventory.

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13. ABSTRACT

This report reviews the content and use of the Mechanical Properties Data Center. The growth and expansion of the Center since the initiation of formal search services in March 1961 through February 1965 is summarized by means of graphic and tabular displays. Principal topics are inventories of stored data, frequency of data search requests, identification of users (corporate) and frequency of use

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
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Data Center						
Structural Materials						
Management						
Operation						
Costs						
List of Properties						
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