Operation of the Defense Metals Information Center*

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Received September 1, 1961

The Defense Metals Information Center was established at Battelle Memorial Institute in 1958. The Center resulted from the expansion of its predecessor, the Titanium Metallurgical Laboratory, which was established in early 1955. DMIC, as was TML, is monitored by the Department of Defense and is operated under an Air Force contract.

The need for the TML-DMIC information center began in 1954, as a result of growing concern that the introduction of titanium into military applications was proceeding too slowly in view of the performance advantages that might be achieved through its use. As a result of recommendations by the then Assistant Secretary of Defense Research and Engineering, the Department of Defense invited several actions to support the development of titanium. Among them was the establishment of the Titanium Metallurgical Laboratory.

Because of the successful operation of the Titanium Metallurgical Laboratory and the increased interest in the introduction of other new metals in military applications, the Department of Defense broadened the scope of TML in April, 1958, and changed the name to the Defense Metals Information Center.

During the same period of time, the name of the monitoring office in the Department of Defense also was changed. DMIC is now monitored from the Office of the Director of Defense Research and Engineering (Fig. 1).

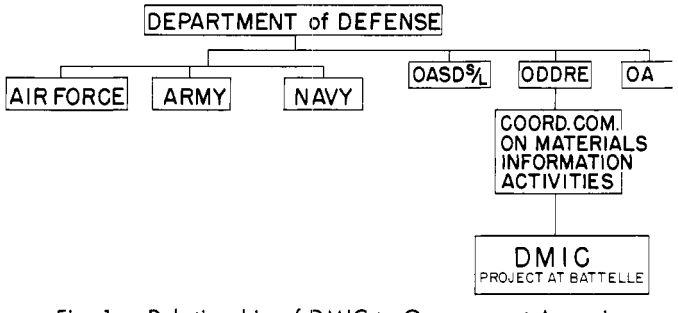

Fig. 1.—Relationship of DMIC to Government Agencies.

Responsibilities of DMIC.—The Defense Metals Information Center, as an engineering group, has several responsibilities: (1) direct work with the Department of Defense and Armed Services; (2) information services; (3) technical assistance; (4) laboratory work. Of these various responsibilities, information services is the major activity.

Organization Within Battelle.—In order to operate an information center of the DMIC type, it is necessary to have available the services of a professional staff with a wide scope of subject coverage and experience, and whose members understand the significance of the information being handled. Such a staff was available at Battelle. The operation of DMIC depends upon the services of this technical staff. The technical knowledge in DMIC resides primarily with the staff.

*Presented before the Division of Chemical Literature, ACS National Meeting, St. Louis, Mo., March, 1961.

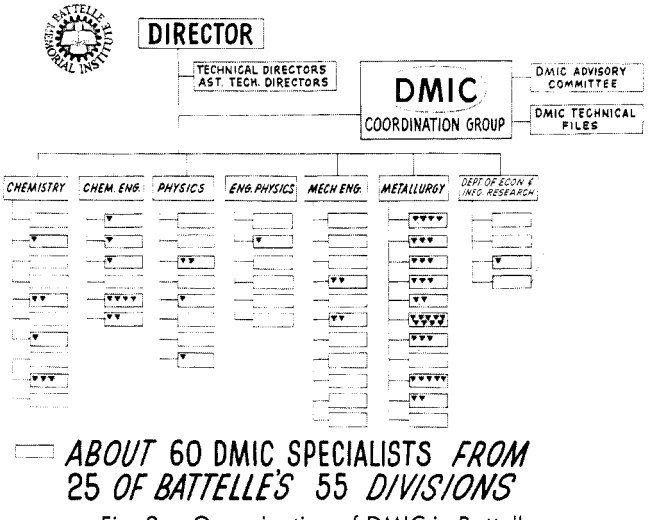

Fig. 2.—Organization of DMIC in Battelle.

A brief outline of the organization of the technical staff at Battelle is shown in Fig. 2. The technical staff is divided into seven departments, which in turn are subdivided into fifty-five divisions. The divisions represent research units that carry out research and development tasks in various areas that are specifically defined for each division. DMIC employs the part-time services of approximately sixty specialists who are members of these divisions. These specialists spend, on the average, about 10 to 25% of their time on information work for DMIC; they continue to spend the major part of their time on active research work in their divisions. Incoming technical information is routed to them, and they are called upon to assist in organizing and filing this information in the DMIC technical information files. They answer specific inquiries for information and prepare the technical reports issued by DMIC.

As is indicated in Fig. 2, the entire operation is managed by a small Coordination Staff. The Technical Information File, or "special DMIC library," is managed by trained information specialists who are members of the Information Research Division of Battelle. It is the responsibility of this group to design and operate a suitable system for routing, storing, and retrieving the technical data and information required by the technical staff.

Scope.—DMIC is primarily a materials information center. Furthermore, most of the materials within the DMIC scope are metals. In addition, DMIC collects and disseminates information on a number of nonmetallic materials because of special assignments, the most prominent being to collect and disseminate information on the development of inert parts of solid-propellant rocket motors.

The common denominator of the materials within the DMIC scope, however, is that they be of special interest for military applications and that there be a need for rapid dissemination of information on current developments. This latter factor is, of course, generally a direct result of the potential importance of the materials in

current military systems. It is, therefore, a prime function of DMIC to handle current information.

A somewhat detailed outline of the technical areas of interest to DMIC is shown in Fig. 3. It may be noted that each intersection of a metal and a property category results in the definition of a technical area. For example, joining of molybdenum is defined as a technical area. Each technical area is indicated by a triangle in Fig. 3. These areas can be grouped, of course, into broader categories, for example, joining of all refractory metals, which is covered by four triangles, *i.e.*, tungsten, tantalum, molybdenum, and columbium (niobium). These areas are assigned to specialists in the different research divisions in the Institute, so the triangles or groups of triangles in Fig. 3 correspond in effect with the triangles of Fig. 2. In the DMIC organization, one engineer covers joining of refractory metals, another joining of high-strength alloys, *etc.* These welding specialists actually work with the metals of interest to them, and have, for years, conducted research on welding of these metals. Consequently, they are not only interested but informed and, with their DMIC activities, they become outstanding specialists in their areas. They are more than just "paper specialists, they know how the material "feels" from actual experience.

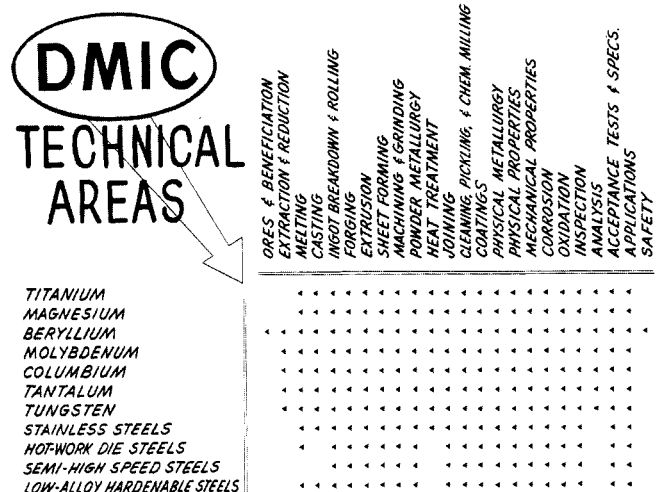

Fig. 3.—Areas of interest.

The entire DMIC scope is divided among specialists in the manner just described. It is to these specialists that the Coordination Office routes all incoming information. These technical specialists, with the help of their respective information specialists, organize and maintain the technical files which contain the information of interest to them. The technical specialists, in turn, supply information that answers technical inquiries.

FUNCTIONS OF INFORMATION AGENCIES

There are numerous technical information agencies in operation. They differ from each other, of course, in the technical areas covered. However, they also differ from each other in the functions or types of service supplied.

The function of all information agencies is to supply information, but different organizations do this in different ways, depending upon their purpose, available funds, and the needs of their users. Several general types of information agencies can be recognized: (1) conventional libraries; (2) report supply or exchange services; (3) indexing, abstracting, and bibliographic services; (4) information centers for specialized information; (5) complete information and engineering services (DMIC type).

An information agency is concerned with five principal functions in handling information: (1) collection; (2) storage (filing and indexing); (3) recovery (finding what is filed); (4) interpretation; (5) dissemination.

It is the emphasis on interpretation that distinguishes the DMIC type of engineering service from many other types of information activities. In order to supply interpretation, however, it is necessary to have available a qualified staff of technical specialists, a situation which exists at Battelle. DMIC puts strong emphasis on the application of expert technical judgments in interpreting the information it handles. DMIC balances this function with strong emphasis on all of the other functions and with special emphasis on both collection and dissemination.

Collection of Information.—DMIC collects information from current and past published literature as do other types of information centers, but it exists principally because of its efforts to collect new information as soon as possible after it has been generated. In the normal flow of technical information, a year or two usually elapses between the time useful information has been generated and the time that extensive publication of the information has occurred. DMIC first attempts to learn of the sources of new information, *i.e.*, the existence of research and development projects that may generate information in the field of interest. It then contacts these sources for the information as soon as it can be released. One of the ways in which DMIC locates areas where current information may be generated is by determining Government-sponsored contracts in the areas of interest. DMIC personnel then identify the people and companies who work in these areas of interest and contact them. At least two people spend full-time and thirty to forty people part time in collecting information. This is done by visitor contacts, by attendance at symposia, and by verbal and written requests for documents containing desired information. Much of the current information in DMIC files is reported in trip reports, visitor reports, and telephone memoranda.

DMIC collects approximately 10,000 documents per year. Of these, approximately 50% are rejected because of duplication or lack of pertinence to the areas of interest. The remainder are extracted, cross indexed, and filed. DMIC now has about 40,000 documents in its technical files.

Experience has indicated that an aggressive effort to collect information is necessary in order to keep the information center up to date.

Storage and Retrieval.—The routing of information in DMIC, preparation of extracts, storage, retrieval, and general philosophy of the card system used by DMIC is described in considerable detail in the papers by John Murdock and Gustavus Simpson.

DMIC does, where the type of information permits, file data on IBM cards as well as on the 5 × 8 extract cards described in the above-mentioned papers. Machine systems, however, are relatively limited in their ability to handle the very broad categories of information processed by DMIC. Data, as contrasted with information, however, can be filed effectively on machine systems, and DMIC collects and files data generated on a program known as the Titanium Sheet Rolling Program on an IBM system. This can be done effectively because the data generated fall into preconceived and defined categories. Furthermore, the data to be retrieved are desired in terms of statistical concepts. Computers can effectively carry out the calculations necessary to reduce these data to the terms desired.

Interpretation of Information.—When information is requested, whether by an engineer in an aircraft plant, a Government agency, or for dissemination as a DMIC report or technical memorandum, it is supplied by the specialists charged with the technical areas of interest. The specialists must not only organize the information desired but must interpret its meaning. This analysis of information supplies the user with the information he desires, rather than with mere references or reports which he must assimilate himself.

Dissemination of Information.—As was stated previously, the Defense Metals Information Center is monitored by the Department of Defense through an Air Force contract. As a result of this arrangement, DMIC reports and services are available without charge to Government agencies, Government contractors, subcontractors, their suppliers, and to others, such as universities and research institutes, in a position to contribute to Government programs. DMIC reports and memoranda also are made available to the general public and to persons outside the United States through the Office of Technical Services, Department of Commerce.

DMIC actively seeks out the people for whom its services are intended and solicits their needs for information. The technical staff participates both in the collection and dissemination of information, so they acquire a "feel" for the current status of the problems for which information is needed.

DMIC supplies information by personal contact, by telephone, by letters written in reply to specific inquiries, and by four series of reports: (1) technical notes; (2) selected accessions; (3) informal memoranda; (4) formal reports.

The technical notes represent very informal collections of information data, often organized as a result of a specific inquiry. These technical notes are distributed to persons known to have a specific need for the data. Generally only 50 to 100 copies of these are made. As soon as possible, the information in technical notes is incorporated into memoranda or formal reports.

A list of selected accessions in DMIC technical files is prepared monthly. As is indicated by the title, this is a list of the most important and current items received by DMIC. This list is cross indexed by author and by subject matter, and is distributed to interested organizations, primarily to the technical libraries of various Government organizations and defense industries.

The latter two items, memoranda and formal reports, are distributed to a mailing list of over 2600 addresses of important people in Government agencies, defense plants, universities, and research institutes which require technical information within the DMIC scope. These people are located by personal visit, by their association with technical societies, publications, Government-sponsored projects, *etc.*, that identify their work in the DMIC scope. The mailing list is coded according to the recipients' specific areas of interest.

Formal reports represent comprehensive summaries of topical information. They vary in length from about 50 to 300 pages. Formal reports, however, generally require several months to prepare. Informal memoranda, therefore, are needed to supply immediate needs for the most current information, even though the information may not be comprehensive or complete. Memoranda also may be issued to distribute special papers or talks prepared by DMIC specialists.

DMIC answers an average of about 75 to 80 major technical inquiries per month. The total for 1960 was 938. DMIC publishes an average of more than two formal reports and three informal memoranda per month. The totals for 1960 were 27 and 38, respectively. In addition to the 2600 addresses on the mailing list, DMIC supplies several hundred additional copies of each report to qualified receivers who make special requests of DMIC. Several hundred copies of each report are also distributed through the Office of Technical Service. In all, DMIC distributes about 3000 to 4000 copies of each report published.

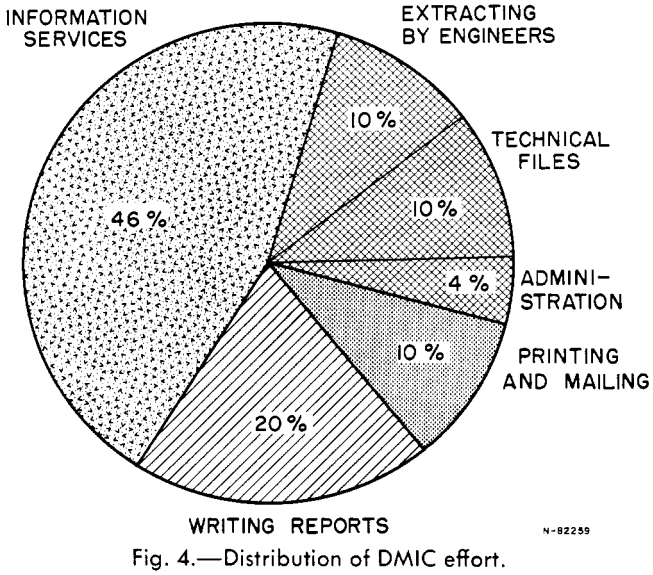

Fig. 4.—Distribution of DMIC effort.

How DMIC Funds Are Spent.—An approximate distribution of DMIC effort is shown in Fig. 4. Since DMIC is an engineering service, only a relatively small percentage of its funds, about 20%, is spent on the technical files. DMIC could, of course, collect and file many times as many documents related to the areas of interest as it now does. However, it is the primary purpose of DMIC to serve the needs of engineers who are interested principally in a sound body of useful information, rather than in an exhaustive literature search. The latter may be desired principally by research groups, and when it is, DMIC may make literature searches. Extensive literature searches, however, are made only as the need arises. DMIC files not only the most pertinent documents, but avoids repetition of information already filed. Consequently,

repeated publications of a given body of information and review articles are usually rejected to avoid unnecessary expenditures for extracting, reproducing, and filing information already in the files.

Of the 20% of DMIC funds spent on the technical files, about half is spent by the technical specialists (engineers) in studying and extracting reports. The other half is spent by information specialists who are specialists on the system employed. All of the extracting could, of course, be done by the information specialists and this would be cheaper than having it done by the technical specialists. However, it is not only important to have the technical specialists throughly examine the pertinent documents selected for the DMIC files, but it is desirable to have them participate in the arrangement of the files. This is done most effectively by requiring them to contribute to the extracts.

The major portion of DMIC effort, over 40%, is expended in information services, *i.e.*, the activities associated with collection and dissemination of information. This is done by consultations between technical specialists and users, whether the contacts are at Battelle or in the organizations contacted, and by answers to specific inquiries for technical information received by telephone, telegraph, or mail. Part of these funds also support other functions of DMIC, such as special surveys or other direct work with the DOD and Armed Services, and laboratory work or technical services for defense organizations. However, only a small part of the total DMIC effort is spent on these functions. The number of specific inquiries answered per month, as was stated above, is about 75 to 80. In addition to these answers, during 1960 DMIC specialists made 288 visitor contacts at Battelle and 388 contacts by visit to company plants or offices.

Blended with this information activity is the interpretation and organization of the information into summary reports. Approximately 20% of the total DMIC effort is expended in specific report efforts. The study phase of this activity cannot be sharply defined as a separate activity from the study phase of the other types of dissemination described, but there is an extra effort associated specifically with each formal report. During 1960, DMIC published 27 formal reports, as was stated earlier. These represented a total of 2321 pages of technical information. The 38 memoranda published represented 813 pages of technical information. At least 3000 copies of each of these reports and memoranda were distributed in 1960. This represents a grand total of 9,402,000 pages of technical information printed and distributed. This operation consumed approximately 10% of the DMIC expenditures.

BOOK REVIEWS

Solid Surfaces and the Gas-Solid Interface. Advances in Chemistry Series, No. 33, American Chemical Society, Washington, D. C., 1961. 381 + vii pp. $9.00.

This book comprises the papers presented at the National ACS Meeting symposia in St. Louis, 1961, before the Division of Colloid and Surface Chemistry in honor of the 1960 Kendall Award recipient, Dr. Stephen Brunauer. Although the papers do not constitute a continuous development or interrelationship, they are separately excellent and combine to cover the literature, background information, and current theories thoroughly. This book will play an important role as a reference work for many years to come.

Borax to Boranes. Advances in Chemistry Series, No. 32, American Chemical Society, Washington, D. C., 1961. 244 + viii pp. $5.00.

Composed of twenty-seven papers presented at two recent National ACS Meeting symposia before the Division of Inorganic Chemistry, this book summarizes the results of the intensive, government-sponsored research effort begun toward the end of World War II. For a period of slightly over a decade, boron was studied as few elements have been in recent chemistry. The impetus behind the program was the potential promise of boron compounds as high energy fuels for jet aircraft and rockets. Although the application objective was not achieved, an important product of the program was the development of a fundamental knowledge of the chemistry of boron. There is no doubt that from the tremendous amount of information accumulated in this research and development effort many unforseen applications will arise. This book neatly ties together the chemistry of boron from the time it was an element of curiosity through the government-sponsored program to its present state of popularity.

Specialized Science Information Services in the United States. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 1961. 530 pp. $1.75.

This directory describing 427 information centers, was compiled as a result of a study made for NSF by the Battelle Memorial Institute, Columbus, Ohio. For each information center listed, it contains a brief description of the area of scientific specialization, the types of information services provided, and publications issued by the organization. A subject index is provided to assist in locating sources of specific information.