

The Plastics Technical Evaluation Center: From Batch to On-Line[†]

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A batch-operated, in-house document database operation has become associated with the Defense Documentation Center's RDT&E on-line system. The PLASTEC database now resides in the DDC files. This allows interactive searching of DDC's literature files as well as PLASTEC's own, on a computer terminal. PLASTEC document records and indexing are input on-line, using the same terminal. The changeover has resulted in more rapid machine-editing of input and reduced costs for cataloging. From this database, PLASTEC plans to generate an abstract bulletin with indexes as well as other products.

The Plastics Technical Evaluation Center (or PLASTEC) is an information analysis center (IAC) specializing in plastics literature. Technical specialists at PLASTEC review a wide range of literature, including government reports, conference proceedings, trade literature, journal articles, and university research. The literature that is chosen is abstracted, indexed, and cataloged for inclusion in an on-line database. Approximately 2000 items are added to the file every year.

PLASTEC is a Department of Defense activity. Similar centers have been established throughout the country for the purpose of providing technical information services to the defense community. This center is located at the Army's Picatinny Arsenal, Dover, New Jersey. The PLASTEC report file is part of the Defense Documentation Center's Research, Development, Test and Evaluation On-Line System. The RDT&E On-Line System is a nationwide computer network set up to provide for the interchange of Department of Defense scientific and technical information.

Documentation and library services of PLASTEC are provided by personnel of Tracor Jitco, Inc., Rockville, Maryland. A contract between this company and The Plastics Technical Evaluation Center specifies the work that the Tracor Jitco staff will perform.

The information stored in the computer and the documents housed in PLASTEC's library are made available to requestors in the form of literature searches, bibliographies, state-of-the-art reports, handbooks, and consultation on specific problems. Consultation and report and handbook production are the responsibility of PLASTEC's subject specialists. Unclassified/nonproprietary material is available to the scientific and technical community outside the Department of Defense.

Subject areas of interest at PLASTEC include military applications of plastic materials in packaging, electrical and electronic devices, deterioration, compatibility, processing, fabrication, and tooling. Other subjects include additives, structures, laminates, elastomers, and rubbers.

BIBLIOGRAPHIC CONTROL

A manual card file is used to control incoming literature and orders. As documents are received, they are recorded in this file under corporate source, author name, and contract number. The document is then routed to a specialist, who decides whether the report should be kept in PLASTEC's system or withdrawn. If the item is to be withdrawn, it is noted on the card, and that card remains in the file. This ensures that the discarded document will not be ordered again, at a later time. This file is consulted before new items are ordered.

Textbooks and reference materials are kept in the reference collection. They are classified according to the Library of Congress scheme and shelved apart from PLASTEC documents entered in the computer system. A small card catalog

file is used to keep author, title, and subject entries for these items. Approximately 150 books are added each year. The main technical library at Picatinny Arsenal provides more extensive collections.

The periodical collection is also shelved separately from the PLASTEC documents. When a journal article is selected for inclusion in the database, it is photocopied, entered in the PLASTEC file, and treated as any other document.

Many items received at the Center are not individually ordered, but are sent on automatic distribution. For example, DDC routinely sends microfiche copies of reports to PLASTEC. These reports fall within subject areas specified in SDI profiles. PLASTEC also asks to be placed on report distribution lists. Form letters are sent to R&D project managers requesting progress reports on their projects.

Future plans involve simplification of our manual files. We hope that much of the paperwork can be eliminated by further use of the computer terminal. Eventually, orders will be searched on-line instead of manually. Paper files will remain necessary for withdrawn documents, reference books, and periodicals.

DOCUMENT PROCESSING-HISTORY

Machine processing of information at PLASTEC was accomplished by batch methods through 1975. Keyboard input of document records was done on the IBM Magnetic Tape Selectric Typewriter (MT/ST) system. The MT/ST cartridges were then converted to multichannel computer-readable tape on special transcription equipment. These magnetic tapes were then read into the PLASTEC file using programs stored on disc. During the update process an error listing was produced. A complicated correction procedure, also a batch method, was required to correct errors.

As a by-product of the MT/ST cartridge input operation, a camera-ready copy of each document record was printed on the typewriter. An abstract bulletin was assembled from these sheets, and copies for distribution were duplicated from this master. The bulletin contained a bibliographic citation and abstract for each document.

On a monthly basis, indexes to the Document Announcement Bulletin (DAB) were produced by running the tape files through a set of output programs. Each issue contained five indexes: (1) subject index, (2) personal author index, (3) corporate author index, (4) report number index, and (5) contract number index.

Literature searches of this file were also produced in a batch fashion. Because the PLASTEC files were stored on tape, they required sequential searching, involving much time and expense. The search strategy was limited to one set of terms. There was no opportunity to edit the search question once the process had been started. The search result was a paper copy, which usually required manual editing before it was turned over to the customer. Interaction with the computer during

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Table I. Comparison of Batch vs. On-Line: Advantages and Disadvantages**BATCH METHOD - ADVANTAGES**

1. Less training
2. Cheaper equipment
3. Customized printed products

BATCH METHOD - DISADVANTAGES

1. No interactive search
2. Search results mailed
3. Less machine editing
4. File maintenance difficult

ON-LINE SYSTEM - ADVANTAGES

1. Interactive search
2. Lower cataloging costs
3. Helpful machine editing
4. Access to other data bases

ON-LINE SYSTEM - DISADVANTAGES

1. Must conform to DDC cataloging format
2. Compatibility requirements
3. More product conformity

Table II. Original Processing vs. Shared Processing for PLASTEC Documents

	Total documents processed	Category 1 Accessioned by PLASTEC	Category 2 Accessioned by PLASTEC & DDC
1971 - 1976	9130	5859 56%	3271 44%
Jan - Dec 1976	1844	1307 71%	537 29%
Jan - Feb 1977	396	290 73%	106 27%

the search process was not possible (Table I).

CURRENT PROCESSING

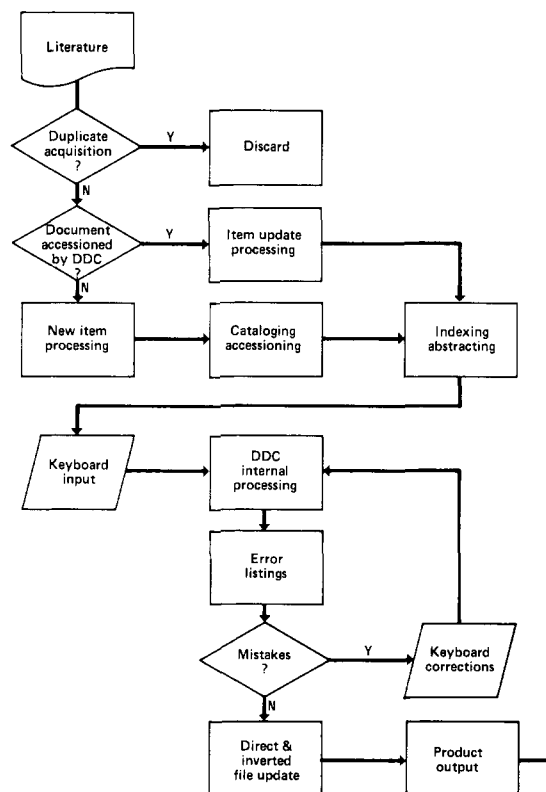
Current processing procedures have been in effect since January 1976. The conversion to the DDC system was made because it offers the following advantages: (1) more direct communication with the agency providing ADP services, (2) costs of shared programming and hardware development being spread among a larger group of users, (3) the existence and successful operation of the system, and (4) the elimination of duplicate cataloging for DOD technical reports.

PLASTEC processes a considerable amount of DOD technical report literature. This literature, which has accounted for as much as 40% of our acquisitions in past years, is also processed by DDC (Table II).

Accordingly, DDC has developed an IAC support package which eliminates duplicate input and reduces processing costs. The IAC no longer has to provide its own ADP capability.

Documents to be processed by PLASTEC are divided into two categories. Category 1 documents are those which are unique to the acquiring IAC. These generally consist of conference papers, journal articles, and non-DOD technical reports. Whenever a DDC citation cannot be found for a document, it is considered to be a Category 1 item. All documents in this category are fully cataloged, abstracted, and indexed, and the complete citation is entered from the IAC's on-line terminal.

Category 2 documents are those already accessioned by DDC. They are primarily DOD documents, and it is part of DDC's mission to collect and process them. For these documents, full cataloging and abstracts are already stored in the computer. Prior to accessioning, Category 2 documents are

**Figure 1.** Document processing at PLASTEC.

DDC accession number
 Title
 Descriptive note
 Personal authors
 Report date
 Pagination
 Source series report number
 Contract number
 Monitoring agency acronym
 Monitor series report number
 Supplementary note
 Limitation/availability statement
 Abstract
 * IAC accession number
 * IAC document type code
 * IAC subject terms

* Data elements supplied by PLASTEC for Category 2 documents. Underlined data elements are searchable.

Figure 2. Record format.

checked against the on-line system to identify their citations. Then the IAC superimposes onto these records their own more specific index terms. No cataloging or extensive data entry efforts are required. To convey the magnitude of the savings involved in data entry alone, eighteen minutes are required to input a Category 1 record, and only five minutes to enter a transaction for a Category 2 document.

After the input is keyboarded and transmitted to DDC's computer, editing programs initiate processing of these items. Computer-printed error listings are generated weekly and mailed to PLASTEC. File maintenance transactions are then entered on-line to correct any errors. All missing or incorrect data elements are reentered and are subjected to the same edit routines (Figure 1).

Correct records are then posted to DDC's direct and inverted files. Records may be searched by DDC accession number, PLASTEC accession number, report or contract number, author, corporate author, and DDC or PLASTEC subject terms (Figure 2). Access to any IAC file is limited to that IAC only. Shared use of these files by other users is not available at the present time.

PROJECTS, PRODUCTS, AND SERVICES

For the future, PLASTEC has the following information

projects, products, and services planned. The major project now under way is a microthesaurus of plastics terms. The first phase is a controlled vocabulary project which will refine a list of terms to be used in the thesaurus. The second phase will involve term selection, classification, and the establishment of relationships between the terms. When the microthesaurus is produced, consideration will be given to computer storage with the ultimate goal of machine-aided indexing.

Now that PLASTEC's conversion to on-line is complete, products from the database are being planned. Starting with the January 1977 issue, PLASTEC now prepares a biweekly abstract bulletin with indexes. The indexes will be cumulated on a quarterly and annual basis. These products will be circulated locally at Picatinny Arsenal until PLASTEC is satisfied that the "bugs" have been worked out of the production system. Then, a commercial publication venture will be investigated, selling subscriptions to the general public. Another product will be off-line printouts of search results. These will be prepared at DDC and mailed to PLASTEC for forwarding to the customer. These products will be available in addition to the specialized reports published by PLASTEC's own subject specialists.

Services offered by PLASTEC will be expanding this year. PLASTEC now has on-line access to its own database as well as the technology and engineering databases offered by DDC. On-line access to the open literature will be possible through the Lockheed DIALOG system and the System Development Corporation ORBIT system. PLASTEC also has on-line access to a database it helped develop called COMPAT, which focuses on compatibility data between plastics, explosives, and propellants. By late 1977, preparation of another on-line service will begin. This database will be a materials property data bank which presents property data in tabular and graphic forms. The system will be interactive, so that engineers may

specify performance requirements to obtain potential candidate materials for a given application.

PLASTEC also maintains complete and current microfilm files of military specifications and standards as well as the commercial and industry standards prepared by ASTM. Extensive collections of periodical and trade literature dating back to the 1950's are also maintained on microfilm.

Above all else there are six subject specialists who provide the really unique capability that makes PLASTEC more than just another information resource. This capability is their service in the evaluation of the literature and the generation of state-of-the-art reports. In addition they offer a wealth of experience in answering technical inquiries and in consultative advice.

REFERENCES AND NOTES

- (1) A. M. Anzalone and G. Cohn, "Computer Techniques Applied to Compiling an Index of Ordnance Data", paper presented at the 142nd National Meeting of the American Chemical Society, Atlantic City, N.J., Sept 12, 1962.
- (2) A. M. Anzalone, C. A. Brokars, and G. Cohn, "A Novel Index Tailored to Plastics Specialists", *Am. Doc.*, **15**, 191-195 (July 1964).
- (3) J. L. Davis, G. Brincka, and D. W. Levi, "Computer Compatibility Data Retrieval Program", in the Conference on Compatibility of Propellants, Explosives and Pyrotechnics with Plastics and Additives, Picatinny Arsenal, Dover N.J., Dec 3-4, 1974, American Defense Preparedness Association, Washington, D.C., 1974.
- (4) Defense Documentation Center, "IAC Input Procedures and Instructions", June 1976, unpublished draft.
- (5) Defense Documentation Center, "Defense RDT & E On-Line System Terminal Operator's Manual", Appendix H, Remote Terminal Input Subsystem, DSAM 4185.13, June 1975.
- (6) J. Nardone, "Computerized Material Property Data Information System", PLASTEC Note N31, Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N.J., June 1976, No. AD-A030675.
- (7) R. S. Tompkins, "The PLASTEC Indexing System: A Consideration of Possible Adjustments Required by the DDC Program for Service Support to PLASTEC", Tracor Jitco 302-059-01, Tracor Jitco, Inc. Rockville, Md., Dec 15 1975, No. AD-A020031.

A Coded Data Bank for Chemical Instrumentation

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A coding system for describing low-temperature x-ray diffraction apparatus and techniques has been developed, along with a computer program which is used to prepare a coded and sorted bibliography. This system facilitates retrieval of various instrumental configurations and experimental techniques from the database. It can be extended to include other fields of chemical instrumentation.

INTRODUCTION

During the course of an experimental investigation, it is not unusual for a researcher to develop a new device or technique or to modify an old one. Very often these contributions do not warrant a separate paper and are included in the "experimental" section of a comprehensive paper which emphasizes the chemical aspects of the investigation. As a result, the apparatus and technique oriented portions of the paper are not abstracted and cannot be retrieved by later investigators. Consequently, one finds a great deal of duplication of effort in the area of instrument development.

In an attempt to alleviate this situation, several specialized bibliographies have been prepared in the past. However, the use of such bibliographies is often hampered by limited or incomplete descriptions of the apparatus and by poor, if any, indexing. The use of a system which encodes the pertinent descriptions of each device would (a) aid in identifying the major features of the particular device, and (b) permit the use

of data handling techniques in locating and indexing various instruments and techniques.

Although computer stored databases have been used extensively for the storage and retrieval of chemical and structural information, e.g., in x-ray crystallography,¹ very little effort appears to have gone into the development of similar systems for the easy retrieval of instrument design and laboratory techniques. However, during the course of preparing a monograph on the apparatus and techniques used in low-temperature x-ray diffraction (LTXRD),² a coding system and associated data-handling computer program were developed. This system, which can be adapted for use with other types of apparatus, is described in this article.

CODING SYSTEM

Six major categories can be used to describe the cooling apparatus used in LTXRD studies³ (Table I). Each low-temperature device can be assigned a six-digit code number,