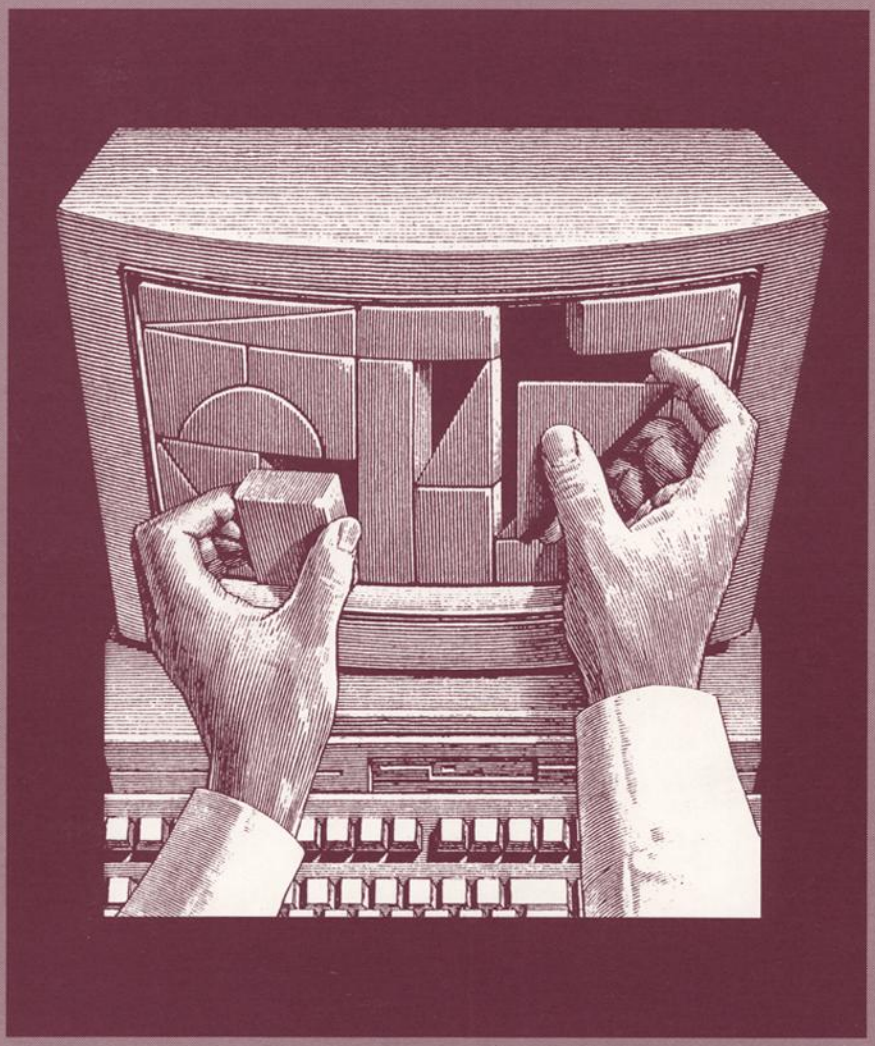
ASTM Manual on

The BUILDING of MATERIALS DATABASES



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Manual on the *Building of Materials Databases*

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NOTE: This manual does not purport to address (all of) the safety problems associated with its use. It is the responsibility of the user of this manual to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

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Foreword

THIS MANUAL WAS prepared to address a need perceived by ASTM Committee E-49 on Computerization of Material and Chemical Property Data for guidance in using standards for assistance in developing material property databases, but is not to be considered a standard. This manual, and the standards it discusses, often cannot provide final answers as these are dependent on the database application. What this manual does provide is guidance to help database design teams address the questions for particular materials database applications. In addition, the manual may serve as a focal point for the developing technology and standardization in the material property database community.

This publication was sponsored by ASTM Committee E-49. Several members of ASTM Committee E-49 contributed to the development of the manual concept and outline; the efforts of John R. Rumble, Jr., Bert J. Moniz, Keith W. Reynard, and Jack H. Westbrook are acknowledged. The reviewers, who played an essential role in the development of the manual, also deserve recognition.

Crystal H. Newton
Editor

Contents

Overview

THIS MANUAL FOCUSES on the building of material property databases and the standards that are available to assist in the process. The building of databases has been discussed in general terms in many references. What is important to consider here are the steps in the database building process that are different for material property databases. What are the key decision points? Where can you find resources for help at those key decision points? Most importantly, how can standards help with the process of building a materials database? This manual, and the standards it discusses, often cannot provide final answers as these are dependent on the database application. What this manual does provide is guidance to help database design teams address the questions for particular materials database applications.

Chapter 1 provides an introduction to the development of material property databases. The value of material property databases is discussed. Key concepts that are used throughout the manual are introduced. The standards organizations involved in materials property databases are discussed. This manual focuses on the use of standards developed by or in cooperation with ASTM Committee E-49 on the Computerization of Material and Chemical Property Data. ASTM Committee E-49 is at the forefront in developing standards in this area. The final section of this chapter introduces the steps involved in the design of a materials property database. The steps highlight the use of the ASTM E-49 standards and the other chapters in the manual.

Chapter 2 discusses the functions of the personnel involved in building a database and considerations regarding the system architecture particularly applicable to materials databases. Chapter 3 addresses the different types of material property data and database applications, which influence the system architecture. The data dictionary can be developed with the help of ASTM standard guides. ASTM Committee E-49 has divided materials data into two areas: the identification of the material and the recording of test results. Chapter 4 discusses the nomenclature and standards for identification of engineering materials, and Chapter 5 discusses nomenclature and standards for recording test results and material properties.

Chapter 6 contains information on evaluating data and database quality. Again, depending on the type of data, the application area, and the use of the database, data quality may be indicated as part of each record in the database, once for each record, or as a general indicator of the quality of an entire database. Chapter 7 discusses the operation and maintenance of databases for computers ranging from PCs to mainframes. Chapter 8 considers the transfer of data between databases. The last chapter, Chapter 9, includes example data records from a composite material database, developed with the assistance of the ASTM E-49 standards.

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CURRENTLY a project engineer for Materials Sciences Corporation in Fort Washington, Pennsylvania, Dr. Crystal Newton has served there for seven years. Her areas of interest include data management and standardization, including development of composite material databases, the interaction between expert systems and material property databases, and analysis of hybrid composite materials.

From 1984 to 1986, Dr. Newton was a research engineer in the Materials Research Center at Lehigh University, performing research on near-threshold fatigue of metals, fatigue and fracture of polymers and composites, and the viscoelastic properties of elastomers.

The editor holds a B.S. degree in mechanical engineering from Carnegie-Mellon University, and an M.S. in applied mechanics and a Ph.D. in mechanical engineering from Lehigh University.

Dr. Newton is an active member of ASTM's Committees E-49 on Computerization of Mechanical and Chemical Property Data and D-30 on High-Modulus Fibers and Their Composites and participates on several other committees. She is also a member of Sigma Xi and Pi Tau Sigma.

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