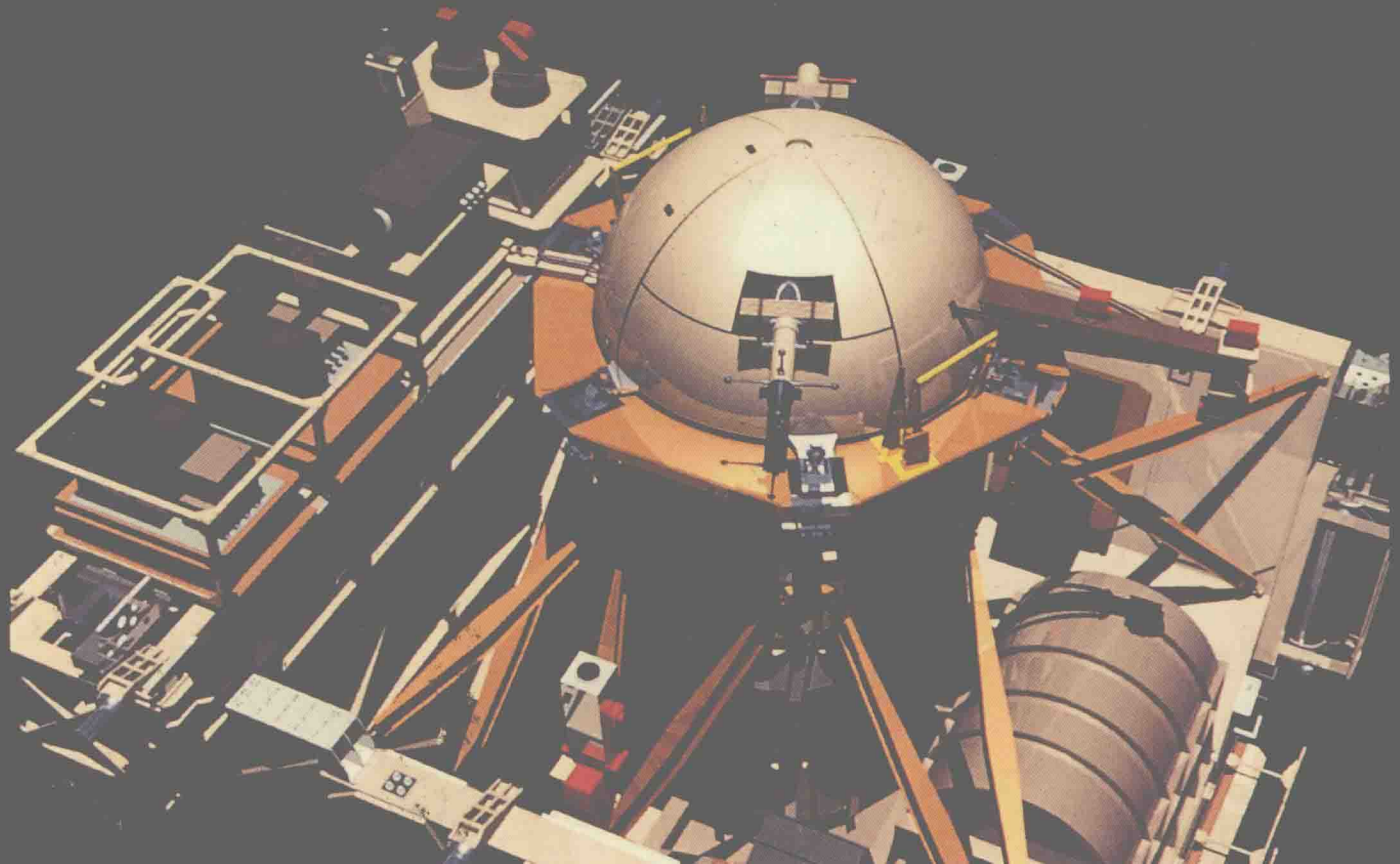
ENGINEERING DESIGN GRAPHICS

AutoCAD® Release 12 • Eighth Edition

James H. Earle



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AutoCAD® Release 12
Eighth Edition

JAMES H. EARLE

Texas A & M University

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Dedicated to my father,
Hubert Lewis Earle,
October 25, 1900–October 22, 1967

Preface

This eighth edition of *Engineering Design Graphics* has been revised to keep pace with the needs of education and industry. It is a significant modification of the seventh edition that retains the classroom-tested sequence of presentation and its tried and true teaching features while adding many new features to help students and teachers. *Engineering Design Graphics* covers the principles of:

- engineering drawing,
- computer graphics,
- descriptive geometry,
- design, and
- problem solving.

Objective

The objective of this book is to support a course in which the student learns:

- ANSI standards and techniques of preparing engineering drawings
- How to improve spatial analysis skills (descriptive geometry)
- How to prepare drawings on the drawing board
- How to prepare drawings by computer
- How to use graphics as a medium of design

Above all, this textbook is designed to help students expand their creative talents and communicate their ideas in an effective manner.

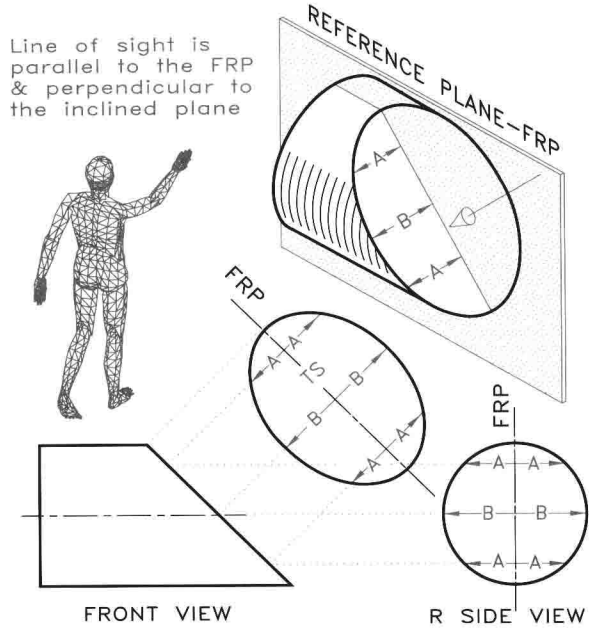
Revision Features

Engineering Design Graphics, Eighth Edition has been made as teachable as possible. All aspects of the book have been designed to help teachers in their presentations and students in learning on their own when necessary.

Some features included to help the student are:

- Several hundred new illustrations
- Almost 1,000 revised or redrawn illustrations

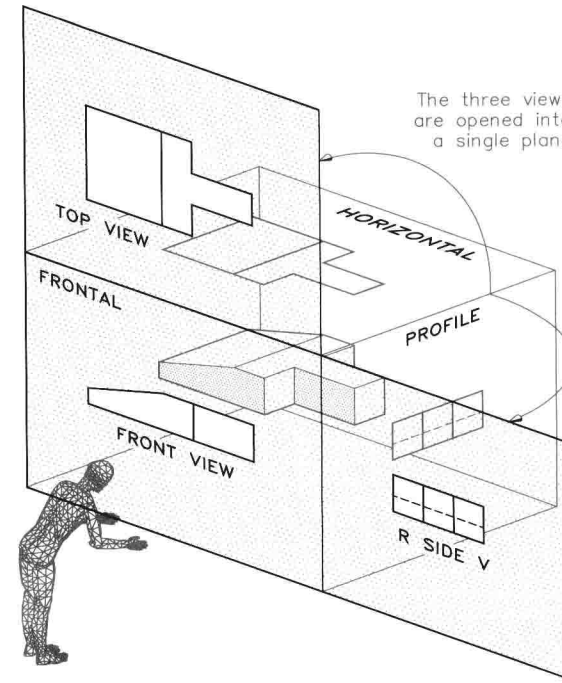
- Use of human figures to show viewpoints



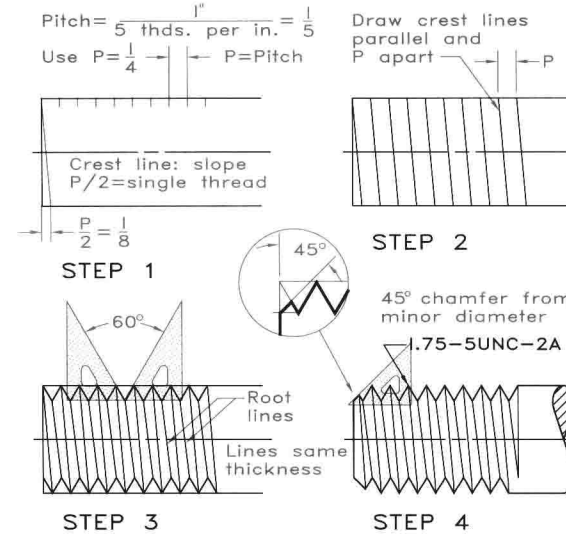
- Notes within the figures to highlight key points
- Use of rotational art where appropriate to illustrate how revolving a view changes the way objects are seen and drawn
- More accessible page design with clearer separation of art and text; color is used only to enhance the pedagogical effectiveness of figures
- New working drawing problems in Chapter 23
- Updated and expanded AutoCAD® coverage, including Release 12

Format

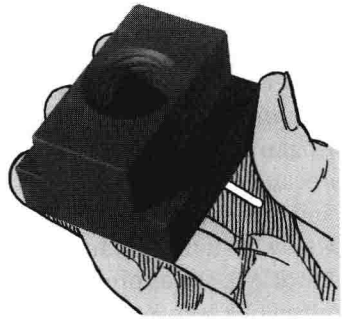
Engineering Design Graphics, Eighth Edition retains the proven features that have made it a time-tested teaching and learning textbook. Its self-instructional examples enable students to work independently with a minimum of assistance from the instructor. Clear, teachable examples assist with visualization.



Most instructional examples are presented in a step-by-step sequence to illustrate how problems are solved.



Industrial applications and illustrations are used to make the examples and problems meaningful to the student.



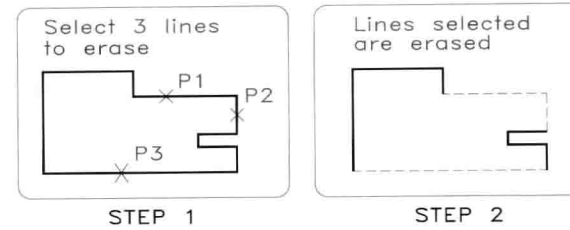
A second color is used to emphasize sequential steps, key points, and explanatory notes in the figures. Computer graphics examples have been boxed in color to identify them on the page; these examples and their supporting text are preceded by a mouse icon.

Key points and terms appear in bold face type. Figure references in the text also are in bold type for easier referencing.

Computer-Aided Design (CAD)

The main purpose of this book is to help the student learn the principles of graphics, whether done on the drawing board or on the computer. *Engineering Design Graphics* has been designed to be as applicable for courses not using CAD as for courses that do. However, students will benefit from reading about computer graphics even if CAD is not used in the course. For courses that do use CAD, this book gives computer-graphics instruction as an integrated part of most chapters.

AutoCAD software is the featured software because it has the largest market share (approximately 75%) and consequently is the software that students are most likely to encounter in industry. Chapter 35 gives a general overview of hardware and software used for computer graphics. Chapter 36 covers AutoCAD Release 12, and Chapter 37 gives an introduction to solid modeling using AutoCAD's AME extension.



All computer graphics principles have been presented as two-step, three-step, or four-step illustrations. Each step illustrates what the computer user would see on the screen. Commands and prompts for these steps conveniently appear beneath these illustrations.

A Career Reference Book

Some material in this book may not be covered in the course for which it is used due to time limitations or the emphasis of the course by the instructor. Because the course may be the only graphics course that a student will encounter, this book should be retained for reference.

A Teaching System

This book used in combination with the supplements listed below comprises a complete teaching system.

Textbook Problems

Over 500 problems are offered to aid the student in mastering important principles.

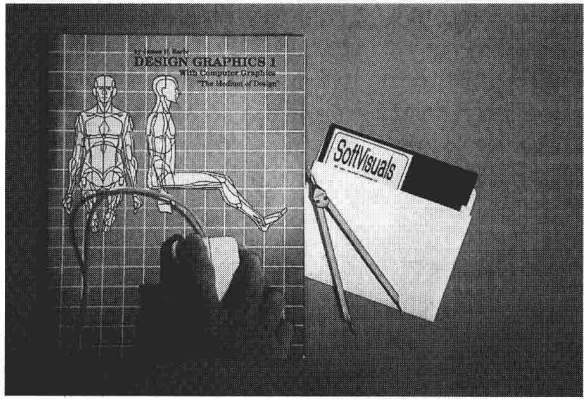
Problem Manuals

Nineteen problem books and teachers' guides (with outlines, problem solutions, tests, and test solutions) are available for use with this book, and new problem books will be introduced in the future. Fifteen of the manuals have computer graphics problems on the backs of the problem sheets, which allows the solution of the problems

by both computer and pencil. A listing of these books and their source appears in the endpapers.

Visual Aids

Sixteen modules of *SoftVisuals* are available on disks from which multicolored overhead transparencies can be plotted on transparency film for classroom presentations. Transparency selection can be made from over 500 *SoftVisuals* keyed to this textbook that can be plotted with AutoCAD.



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Professor Tom Pollock provided valuable information on various metals for Chapter 19. Professor Leendert Kersten of the University of Nebraska, Lincoln, kindly provided his descriptive geometry computer programs for inclusion, and his cooperation is appreciated.

We are indebted to Neal Alen, Rodger Payne, and Jimm Meloy of Autodesk, Inc., for their assistance with AutoCAD. We appreciate the assistance and cooperation of Karen Kershaw of MegaCADD, Inc. David Ratner of Biomechanics Corporation was helpful in providing HUMANCAD® software.

Matthew Whiteacre and Larry Tucker were especially helpful in reviewing and critiquing the manuscript.

We are appreciative of the many institutions that have thought enough of our publications to adopt them for classroom use. It is an honor for one's work to be accepted by his colleagues. We are hopeful that this textbook will fill the needs of engineering and technology programs. As always, comments and suggestions for improvement and revision of this book will be appreciated.

College Station, Texas *Jim Earle*

Brief Contents

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