



Engineering Design Communications: Conveying Design Through Graphics (2nd Edition)

By Shawna E. Lockhart, Cindy Johnson

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Engineering Design Communication: Conveying Design Through Graphics, Second Edition, offers a new approach to the traditional engineering graphics course. This text is designed for students who are learning to use graphics, especially 3D modeling, as a tool for engineering design. The text takes a streamlined approach, emphasizing the how and why of 2D sketching, reading and visualizing objects from 2D views, and creating 3D models that will function as the design database. Case studies and industry examples illustrate ways that these skills support practicing engineers in their work. Students will learn to develop models that capture the design intent for a product or system, update properly when changes are made, and serve the many purposes associated with their role as the design database. Practical tips and step-by-step instruction support the hands-on nature of the course. The text is designed to be used with any modeling package, but it can be bundled with the SolidWorks Student Design Kit (and the authors point out specific SolidWorks tutorials that coordinate well with the chapters).. A reverse engineering project is continued through the text.

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Editorial Review

From the Inside Flap

Preface

Rationale

Engineering Design Communication is a new approach to the traditional foundation course in engineering graphics. We believe that the role of the CAD database as the hub of the concurrent engineering environment has implications for the way engineering graphics is taught. In the concurrent environment, engineers are expected to communicate effectively with customers as well as other technical personnel and to prepare the CAD database so it will be useful for analysis, manufacturing, and presentation purposes.

New software tools, especially solid and parametric modeling software, have changed the way engineers create drawings. These packages automate much of the work of creating drawing views and offer functions that make it easier to modify and refine a solid model. They also offer many options for viewing the model and exporting it for use in other applications. These software developments have shifted the rationale for CAD modeling from the creation of documentation drawings to the creation of multipurpose models for design visualization and communication. At the same time, the ability of parametric models to capture the design intent for the part or assembly in its geometric relationships puts an added burden on the beginning student to grasp the bigger picture of the design process in order to use these tools effectively.

Approach

Engineering Design Communication addresses this shift in two ways. First, it presents the CAD file as a database of design information that is developed over time. The use of solid and parametric modeling software makes it possible to follow the design process through the course— students first learn to sketch their ideas, to transform 2D sketches into 3D models, to refine the models and use them for analysis, and finally to use the models to document the design. This organization more closely reflects industry practice and gives students a strong framework for understanding why they should learn to sketch, when it is appropriate to use different kinds of models, and what they need to discover in order to prepare a model for manufacture.

Second, it introduces topics that will help students learn to reflect design intent in their models. Building effective models that will update correctly requires some consideration of design goals. For beginning students unfamiliar with design issues, Engineering Design Communication anchors modeling techniques in the context of design to help them build an understanding of design intent as they learn to model. Case histories in the text show how design goals influence the way models are made. The text encourages students to think about the broader context for their models so they are more receptive to rules of thumb being taught in the CAD lab. By presenting the big picture of the many uses of the CAD database— and the power of automatic model updates—the text motivates students to practice building design intent into their models.

Engineering Design Communication is designed to be a true foundation course in graphic communication. From sketching to modeling to documentation drawings, the text emphasizes the nature of visual information. Because the concurrent engineering environment expects engineers who can present ideas and work with nontechnical personnel, EDC presents the wide variety of software and presentation tools that an engineer will use to visualize design. Students will learn what a technique communicates well and when it

might be useful. Each technique is illustrated with real examples. Understanding when to sketch and when to model—and when to use a different medium—will help students use these tools effectively in future courses and the workplace. It will also prepare them to evaluate and adopt new graphics tools as they are developed.

Organization

Engineering Design Communication is designed to be used with a tutorial guide for a specific computer-aided design package. Step-by-step tutorial guides that follow the organization of the text are being prepared for popular parametric modeling packages. As students learn the specifics of CAD modeling in the lab, the text presents the sketching and modeling techniques as they are used in the design process.

Design Framework

Engineering Design Communication introduces students to the process of design in Chapter 1, then uses the design process as an organizing framework for the rest of the book. Each chapter opens with an introduction that explains how the graphic skills presented in the chapter relate to and are used in engineering practice. Numerous examples and illustrations from industry motivate students with real examples of engineering practice and reinforce the connection between the technique and its application.

Industry Cases Case histories at the end of each chapter reinforce key topics by showing students how a practicing engineer applies them. These case histories present specific instances of general principles presented in the text, giving students a clear idea of the contemporary software tools and techniques used to create design. Although focused on the chapter content, most industry cases detail the use of specific graphics tools to solve a design problem.

Sketching

Sketching is the focus of the early chapters (2 through 4) of the text, which correspond to the ideation and visualization stages of the design process. Many topics traditionally taught in the context of documentation drawings are presented in these chapters so that students learn to use a full range of drawing views and projections in their sketches. Actual sketches are used to illustrate these early chapters so that students may compare their efforts with other sketches, not instrument or CAD drawings.

Designer's Notebook

The role of sketches in planning and visualization is reinforced in each chapter through the Designer's Notebook. Each chapter opens with sketches and notes from a practicing engineer's notebook. The excerpt previews the information to be conveyed through graphics in that chapter and gives students real examples of how they might use their own design notebook. (Chapter 1 encourages them to begin and use such a notebook throughout the course.)

Modeling

Modeling—and creating the design database—is the focus of the middle chapters of the book (5 through 10), where it is linked to the process of design refinement and analysis. These chapters begin with an introduction to geometry that takes students from the 2D sketching environment to the 3D environment that they will work with on screen. After a survey of different modeling methods, separate chapters on parametric modeling and assembly modeling introduce modeling considerations unique to 3D solid models. Each general modeling principle is illustrated with real models and examples showing the application of key ideas. A chapter (10) on exporting and using the model data with downstream applications, including rapid

prototyping, presents additional considerations for creating a useful design database.

Documentation

Implementation and documentation are the focus of the latter chapters of the book (11 through 13). Because many students lack an understanding of basic manufacturing processes, an overview of these processes presents key questions to be asked and answered before a design is ready for manufacture. As in the modeling chapters, documentation and presentation techniques are presented in the context of the 3D model that students will use to generate drawings, rendered views, animations, and files for numerically controlled machinery.

Flexibility

Engineering Design Communication is designed to be used in a one- or two-semester sequence in engineering graphics. An instructor teaching a one-semester sequence may choose material from or omit chapters 2, 9,10, 11, or 13 to match the emphasis in the course.

Each chapter opener signals to the student which stage of the design process corresponds to the chapter content. This device makes it possible to cover chapters earlier in the text without losing the link to the design process. A comprehensive glossary is included as an aid to students who choose to read chapters out of order.

The implementation chapter (11) is a stand-alone chapter that may be covered at any point before the documentation chapter. Because manufacturing issues are addressed in the context of modeling in Chapter 8, some instructors may want to assign 11 before 8.

For instructors who wish to ask students to start making drawings from their solid models earlier, the documentation chapter (12) may be covered any time after Chapter 4.

The drawing control chapter (9) may be covered at any point in the text. For courses with more emphasis on rendering and animation, the presentation graphics chapter (13) may be covered any time after Chapter 6.

Annotated Overview

Chapter 1

This introductory chapter presents the many ways that graphics are used in the engineering design process and introduces key themes of the text, such as concurrent engineering, design teams, and the CAD model as a

From the Back Cover

The emphasis of the book reflects the changes that many institutions are incorporating, including the importance of sketching, 3D solid modeling, and the use of design databases throughout the engineering process.

FEATURES/BENEFITS

- **Presents sketching and modeling techniques in the context of the design process**—Organization more closely reflects industry practice.
 - Users first learn to sketch their ideas, to transform 2D sketches into 3D models, to refine the models and

use them for analysis, and finally to use the models to document the design—as they would on a project.

- Gives the user a strong framework for understanding why they should learn to sketch, when it is appropriate to use different kinds of models, and what they need to discover in order to prepare a model for manufacture.
- Includes a chapter on exporting and using the model data for downstream applications, including rapid prototypes, that presents additional considerations for creating a useful design database.
- **Emphasizes sketching and visualization techniques throughout the text**—"Designer's Notebook" feature highlights the use of sketching in the context of industrial practice.
 - Reinforces the role of sketching in each chapter/through the entire design process.
 - Users learn to use a full range of drawing views and projections in their sketches in early chapters.
 - Actual sketches used as illustrations allow the reader to compare their efforts with other sketches, not instrument or CAD drawings.
 - Encourages users to keep a notebook of sketches by showing how practicing engineers use sketching.
- **Emphasizes solid and parametric modeling software as a means to building a design database**—Presents the big picture of the many uses of the CAD database.
 - Anchoring modeling techniques in the context of design helps users build an understanding of design intent as they learn to model.
 - Aids users in evaluating the strengths and weaknesses of the software they are learning to use in lab by providing a comparison of modeling methods.
 - Encourages the reader to think about the broader context for their models so they plan for flexibility, downstream applications, and manufacture as they are learning to model.
- **Fosters a real-world approach to engineering communication**—Through the use of industry cases that profile practice in major corporation.
 - Present specific instances of general principles presented in the text, giving users a clear idea of the contemporary software tools and techniques used to create design.
 - Show how design goals influence the way models are made.
- **Presents a wide variety of software and presentation tools**—That an engineer will use to help visualize design.

About the Author

Cindy Johnson is a writer and editor who has directed the development of software-based learning tools since 1982. In 1992, she developed the first Student Edition of AutoCAD Release 10, and since then has developed tutorial guides for Releases 11, through 14, AutoCAD Designer and Mechanical Desktop. With over 20 years of publishing experience and five years of involvement with the engineering graphics course, she has a clear vision of the course goals and the pedagogical challenges it presents.

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Tamika Sheppard:

What do you concentrate on book? It is just for students because they are still students or that for all people in the world, what best subject for that? Merely you can be answered for that problem above. Every person has different personality and hobby for each other. Don't to be forced someone or something that they don't wish do that. You must know how great in addition to important the book Engineering Design Communications: Conveying Design Through Graphics (2nd Edition). All type of book would you see on many resources. You can look for the internet solutions or other social media.

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Joel Padilla:

Engineering Design Communications: Conveying Design Through Graphics (2nd Edition) can be one of your beginner books that are good ideas. We recommend that straight away because this guide has good vocabulary that will increase your knowledge in vocabulary, easy to understand, but still entertaining but still delivering the information. The author giving his/her effort to put every word into a delightful arrangement in writing Engineering Design Communications: Conveying Design Through Graphics (2nd Edition) although doesn't forget the main position, giving the reader the hottest as well as based on confirmed resource details that maybe you can be among them. This great information may draw you into a completely new stage of crucial pondering.

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