Preface

Modern Cabinetmaking is a comprehensive text that focuses on the information, techniques, processes, and procedures used by professional cabinetmakers and novice woodworkers. This revised edition covers the industry, design and layout, materials, machining processes, fabrication and installation, and finishing. While preserving important information on traditional techniques, the text has been revised to include the latest in technology, materials, and processes.

Modern Cabinetmaking follows the logical order of the design and construction process. It begins with an industry overview. A chapter on careers introduces students to the careers related to cabinetmaking skills and a chapter discussing industrial organizations helps students learn how to become more involved and prepare for lifelong learning. This is followed by a review of furniture styles, design, and layout. Instruction on preparing sketches, drawings, and procedural plans follows to provide students with a solid working foundation.

Modern Cabinetmaking covers materials and processes affecting the quality of your final product. You will learn the how, what, why, and when of selecting the appropriate materials whether they are fine hardwoods, softwoods, manufactured panel products, plastics, glass, or other composite materials. Selection of hardware, abrasives, adhesives, and finishing supplies is also discussed in detail.

Modern Cabinetmaking also includes procedures and techniques used in fine cabinetmaking and furniture making. The use of hand and power tools and machines is thoroughly covered. As the text guides you through the processes, it shows how your decisions will affect the final product. Detailed information about finishing materials and processes is also included, enabling you to finish products with lasting beauty.

Components that appear in every chapter include Learning Outcomes, Technical Terms, Summary bullet points, Know and Understand questions, Apply and Analyze questions, Critical Thinking questions, and Activities. Use these various components to review each chapter and assess your understanding of the materials covered in the chapter.

There are a variety of features used in the new edition, including Career Profiles, Green Notes, Trade Tips, Procedures, Safety Notes, and Workplace Skills. These features highlight information that is important for students' awareness and comprehension.

Pay special attention to any Safety Note features. Safety is very important. Protect yourself and others against risk of accidents and injuries. These features point out how to safely perform various procedures and also highlight hazardous conditions.

Nearly everyone has an appreciation for fine cabinets and furniture. Whether your motivation for pursuing the study and practice of cabinetmaking is for personal or professional advancement, this text provides the tools for you to achieve your goals. The information in *Modern Cabinetmaking*, along with the experience and skills developed, will help you become successful in your cabinetmaking pursuits.

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About the Authors

Mr. Patrick A. Molzahn is a Faculty Emeritus at Madison College, located in Madison, Wisconsin, where he served as director of the Cabinetmaking and Millwork program from 2000–2023. Prior to his career in education, Mr. Molzahn ran his own woodworking business for several years. A graduate of The School of the Art Institute of Chicago, he received degrees in both fine arts and architecture. After beginning his career working for an architectural firm in Chicago, Patrick and his wife moved to Japan where they researched Japanese art and architecture during their three-year stay.

Believing that if you can build a boat, you can build anything, Patrick returned to the United States to study traditional wooden boat building at the Northwest School of Wooden Boatbuilding in Washington State. Upon completing the program, he moved to the Madison area to set up his own shop, specializing in architectural millwork and custom furniture. Over the past five decades, he has traveled around the world researching how other cultures train their woodworkers.

As a founding board member of the Woodwork Career Alliance of North America, he helped author hundreds of standards on the operation of woodworking equipment. In 2018, he became the first individual to earn the WCA's highest honor, the Diamond Credential. Patrick is the author of the fifth, sixth, and seventh editions of *Modern Cabinetmaking*. His writings have appeared in numerous publications, including *Woodshop News*, *Fine Woodworking*, and *Fine Homebuilding*. He was a contributing editor to the Architectural Woodwork Institute's ANSI Standards. An avid hiker, Patrick has explored trails on six continents, with his most recent journeys taking him to Patagonia, Everest Base Camp, and the summit of Mount Kilimanjaro.

Mr. Zachary L. DeWerd is a full-time Cabinetmaking and Millwork instructor and curriculum developer at Madison College located in Madison, Wisconsin. He guides students in developing skills ranging from fundamental woodworking techniques to designing, crafting, and installing custom furniture and cabinetry.

Zachary received a diploma in Cabinetmaking and Millwork from Madison College, complemented by an associate's degree from Life Pacific University in San Dimas, California. At Madison College, he studied under the mentorship of Patrick Molzahn, the coauthor of this text, gaining a deep passion for craftsmanship and design.

Zachary began his professional career in a small cabinet shop, working closely with clients across southern Wisconsin to build and install custom furniture and cabinetry. During this time, he gained expertise in kitchen and bath remodels and finish carpentry. He later returned to Madison College as the Cabinetmaking program's senior lab coordinator before transitioning into his current instructor role. Zachary believes cabinetmaking is more than a trade; it is an art form. This philosophy carries into his classroom, encouraging new woodworkers to pursue their creative ideas. Outside of teaching, Zachary is a father of three young children. He spends his time with family and welcomes every adventure.

Dr. William D. Umstattd was an Emeritus Associate Professor of Technology Education from The Ohio State University. He received his bachelor of science in education degree with a major in industrial arts from Central Missouri State University, his master of arts degree with major emphasis in education from the University of Northern Colorado, and his doctorate of education degree in Industrial Education from Texas A&M University. Dr. Umstattd worked in the education field for 36 years.

Dr. Umstattd also participated in and received many awards and accolades from a number of professional associations: International Technology Education Association, the Council on Technology Teacher Education, and The Ohio Technology Education Association. He was also a member of and received a distinguished service award and laureate citation from the Epsilon Pi Tau educational fraternity.

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Reviewers

The author and publisher wish to thank the following industry and teaching professionals for their valuable input into the development of *Modern Cabinetmaking.*

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New to This Edition

The following changes have been made to the seventh edition of *Modern Cabinetmaking* to strengthen the integrated learning solution and provide up-to-date information on the latest technology.

- Updated images and figures to reflect current practices and aid student learning.
- **Chapter 28**, *Computer Numerically Controlled (CNC) Machinery.* Added new content on handheld and tabletop CNC machines to keep students informed of latest technologies.
- **Chapter 40**, *Framed Case Construction.* Consolidated framed case construction content into one chapter for easy reference and instruction.
- **Chapter 41**, *Frameless Case Construction.* Consolidated the 32mm System content into one chapter for easy reference and instruction.
- **Chapter 49**, *Project Planning.* Strengthened project planning content based on reviewer feedback to help students prepare for various types of projects.
- All learning outcomes, summary bullets, and end-of-chapter questions and activities were reviewed and aligned with each one-head section in every chapter, allowing for instructor flexibility in presenting and assigning textbook content in the classroom.

Credentialing Partners and Support

Goodheart-Willcox appreciates the value of industry credentials, certifications, and accreditation. We are pleased to partner with leading organizations to support students and programs in achieving credentials. Integrating industry-recognized credentialing into a career and technical education (CTE) program provides many benefits for the student and for the institution. By achieving third-party certificates, students gain confidence, have proof of a measurable level of knowledge and skills, and earn a valuable achievement to include in their résumés. For educators and administrators, industry-recognized credentials and accreditation validate learning, enhance the credibility of programs, and provide valuable data to measure student performance and help guide continuous program improvement.

Modern Cabinetmaking is correlated to credentials offered by the Woodwork Career Alliance (WCA), NOCTI, and SkillsUSA.

Woodwork Career Alliance

Modern Cabinetmaking is correlated to cabinetmaking and woodworking credentials offered by the Woodwork Career Alliance (WCA). The WCA skill standards help ensure that students are prepared for rigorous industry standards.

NOCTI Certifications

Goodheart-Willcox is pleased to partner with NOCTI and Nocti Business Solutions (NBS), a leading provider of industry certification solutions for skill verification across the nation. With over 55 years of experience, NOCTI/NBS is a valuable partner both within the CTE community and industry to improve America's workforce. Goodheart-Willcox has created correlations between select products and the standards and competencies that are the basis for NOCTI/NBS credentials, to the benefit of states, instructors, and students working toward NOCTI/NBS credentials.

NOCTI/NBS certifications (knowledge-based and skill-based) are developed by national teams of subject matter experts as part of the process that meets personnel accrediting standards and requirements under ISO 17024, resulting in credentials measuring skills and competencies critical for learner success outside the classroom. NOCTI/NBS offers test development, test delivery, and psychometric services to support skill verification, using the latest tools and methods to provide relevant and helpful solutions for workforce development. For more information about NOCTI, visit www.nocti.org.

To see how *Modern Cabinetmaking* correlates to credentialing and certification standards, visit the Correlations tab at www.g-w.com/modern-cabinetmaking-2028.

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Features of the Textbook

The instructional design of this textbook includes student-focused learning tools to help you succeed. This visual guide highlights these features.

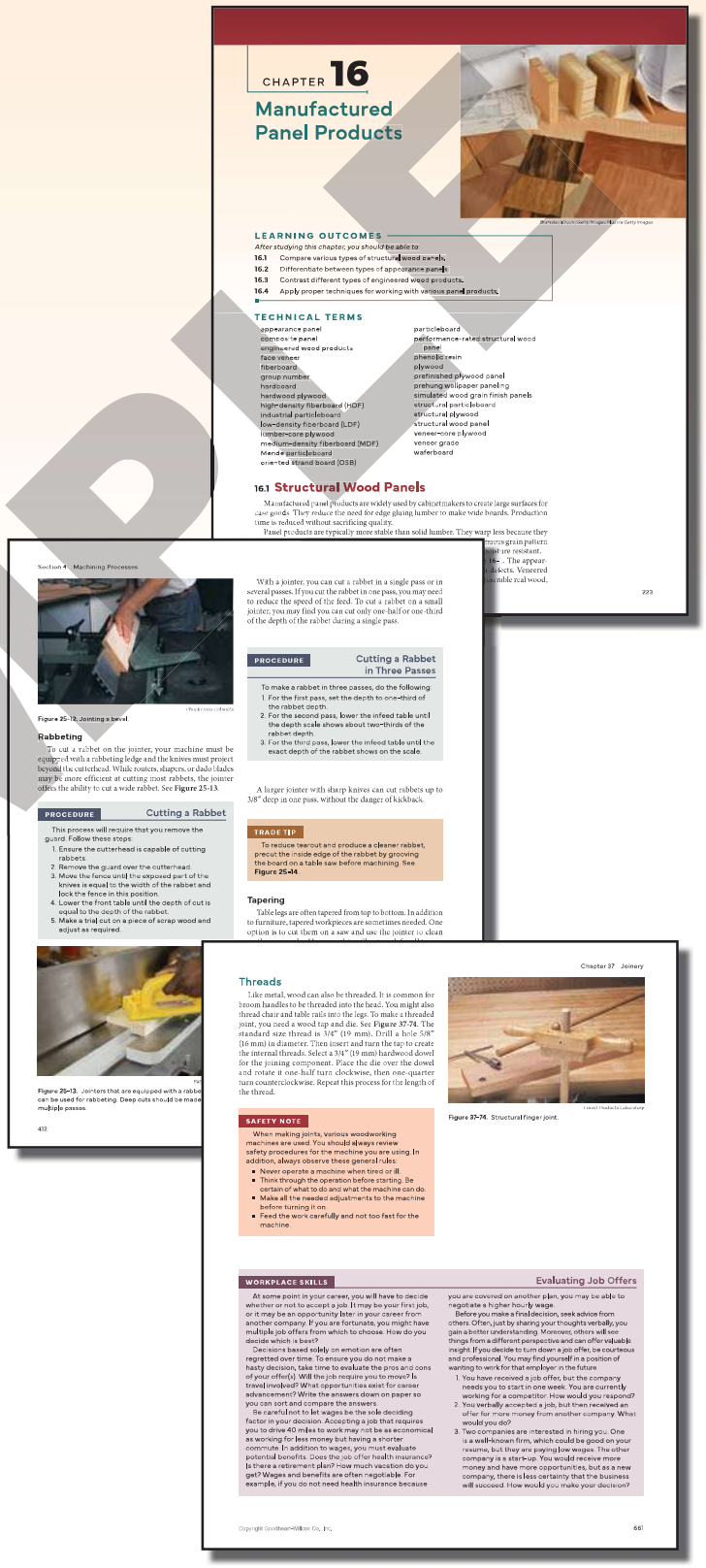
Section and Chapter Opening Materials

Each section opener contains a list of chapters contained in the section, along with a **Career Profile** of an individual in the cabinetmaking industry.

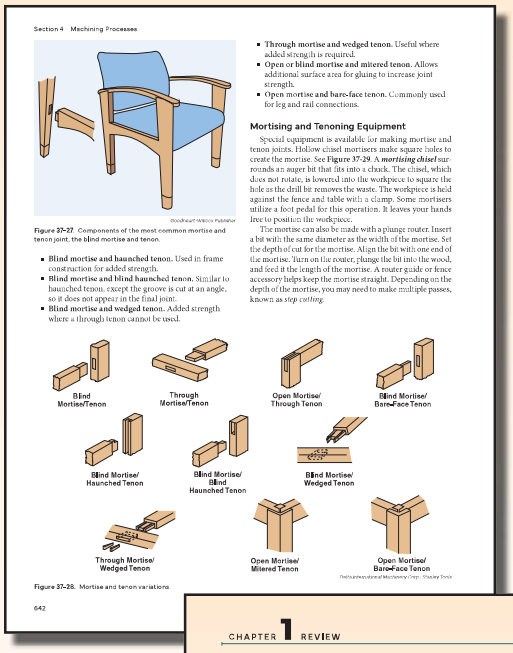
Each chapter opener contains a chapter outline, a list of learning objectives, and a list of technical terms. **Learning Outcomes** clearly identify the knowledge and skills to be gained when the chapter is completed. These outcomes are labeled and correlated to related assessment elements to facilitate reporting and remediation. **Technical Terms** list the key words to be learned in the chapter.

Additional Features

Additional features are used throughout the body of each chapter to further learning and knowledge. **Safety Notes** alert you to potentially dangerous materials and practices. **Procedures** are highlighted throughout the textbook to provide clear instructions for hands-on service activities. **Trade Tips** provide advice and guidance that is especially applicable for on-the-job situations. **Green Note** features highlight key items related to sustainability, energy efficiency, and environmental issues. **Workplace Skills** help you understand what you can anticipate and expect in the workplace.


CHAPTER 16
Manufactured Panel Products
LEARNING OUTCOMES
TECHNICAL TERMS
16.1 Structural Wood Panels
Section 4 Machining Processes
Rabbeting
PROCEDURE Cutting a Rabbet
PROCEDURE Cutting a Rabbet in Three Passes
TRADE TIP
Tapering
Chapter 37 Joinery
Threads
SAFETY NOTE
WORKPLACE SKILLS Evaluating Job Offers

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Section 4 Machining Processes

Figure 37-27. Components of the most common mortise and tenon joint, the blind mortise and tenon.

- **Blind mortise and haunched tenon.** Used in frame construction for added strength.
- **Blind mortise and blind haunched tenon.** Similar to haunched tenon, except the groove is cut at an angle, so it does not appear in the final joint.
- **Blind mortise and wedged tenon.** Added strength where a through tenon cannot be used.
- **Through mortise and wedged tenon.** Useful where added strength is required.
- **Open or blind mortise and mitered tenon.** Allows additional surface area for gluing to increase joint strength.
- **Open mortise and bare-face tenon.** Commonly used for leg and rail connections.

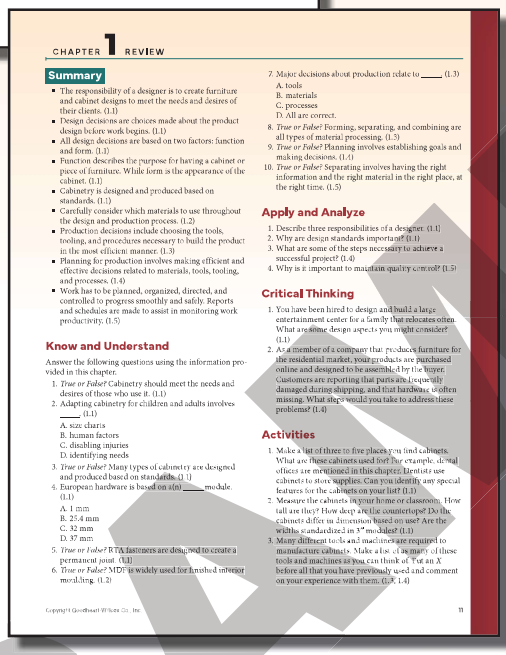
Mortising and Tenoning Equipment

Special equipment is available for making mortise and tenon joints. Hollow chisel mortisers make square holes to create the mortise. See **Figure 37-29**. A ***mortising chisel*** surrounds an auger bit that fits into a chuck. The chisel, which does not rotate, is lowered into the workpiece to square the hole as the drill bit removes the waste. The workpiece is held against the fence and table with a clamp. Some mortisers utilize a foot pedal for this operation. It leaves your hands free to position the workpiece.

The mortise can also be made with a plunge router. Insert a bit with the same diameter as the width of the mortise. Set the depth of cut for the mortise. Align the bit with one end of the mortise. Turn on the router, plunge the bit into the wood, and feed it the length of the mortise. A router guide or fence accessory helps keep the mortise straight. Depending on the depth of the mortise, you may need to make multiple passes, known as *step cutting*.

Figure 37-28. Mortise and tenon variations

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CHAPTER 1 REVIEW

Summary

- The responsibility of a designer is to create furniture and cabinet designs to meet the needs and desires of their clients. (1.1)
- Design decisions are choices made about the product design before work begins. (1.1)
- All design decisions are based on two factors: function and form. (1.1)
- Function describes the purpose for having a cabinet or piece of furniture. While form is the appearance of the cabinet. (1.1)
- Cabinetry is designed and produced based on standards. (1.1)
- Carefully consider which materials to use throughout the design and production process. (1.2)
- Production decisions include choosing the tools, tooling, and procedures necessary to build the product in the most efficient manner. (1.3)
- Planning for production involves making efficient and effective decisions related to materials, tools, tooling, and processes. (1.4)
- Work has to be planned, organized, directed, and controlled to progress smoothly and safely. Reports and schedules are made to assist in monitoring work productivity. (1.5)

Know and Understand

Answer the following questions using the information provided in this chapter.

1. *True or False?* Cabinetry should meet the needs and desires of those who use it. (1.1)
2. Adapting cabinetry for children and adults involves ____. (1.1)
   A. size charts
   B. human factors
   C. disabling injuries
   D. identifying needs
3. *True or False?* Many types of cabinetry are designed and produced based on standards. (1.1)
4. European hardware is based on the ____ module. (1.1)
   A. 1 mm
   B. 25.4 mm
   C. 32 mm
   D. 37 mm
5. *True or False?* RTA fasteners are designed to create a permanent joint. (1.1)
6. *True or False?* MDF is widely used for finished interior moulding. (1.2)
7. Major decisions about production relate to ____. (1.3)
   A. tools
   B. materials
   C. processes
   D. All are correct.
8. *True or False?* Forming, separating, and combining are all types of material processing. (1.3)
9. *True or False?* Planning involves establishing goals and making decisions. (1.4)
10. *True or False?* Separating involves having the right information and the right material in the right place, at the right time. (1.5)

Apply and Analyze

1. Describe three responsibilities of a designer. (1.1)
2. Why are design standards important? (1.1)
3. What are some of the steps necessary to achieve a successful project? (1.4)
4. Why is it important to maintain quality control? (1.5)

Critical Thinking

1. You have been hired to design and build a large entertainment center for a family that relocates often. What are some design aspects you might consider? (1.1)
2. As a member of a company that produces furniture for the residential market, your products are purchased online and designed to be assembled by the buyer. Customers are reporting that parts are frequently damaged during shipping, and that hardware is often missing. What steps would you take to address these problems? (1.4)

Activities

1. Make a list of three to five places you find cabinets. What are these cabinets used for? For example, dental offices are mentioned in this chapter. Dentists use cabinets to store supplies. Can you identify any special features for the cabinets on your list? (1.1)
2. Measure the cabinets in your home or classroom. How tall are they? How deep are the countertops? Do the cabinets differ in dimension based on use? Are the widths standardized in 3" modules? (1.1)
3. Many different tools and machines are required to manufacture cabinets. Make a list of as many of these tools and machines as you can think of. Put an *X* before all that you have previously used and comment on your experience with them. (1.3, 1.4)

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Illustrations

Illustrations have been designed to clearly and simply communicate the specific topic. Illustrations have been completely replaced and updated for this edition. Photographic images have been updated to show the latest equipment.

End-of-Chapter Content

End-of-chapter material provides an opportunity for review and application of concepts. A concise **Summary** provides an additional review tool and reinforces key learning objectives. This helps you focus on important concepts presented in the text. **Know and Understand** questions enable you to demonstrate knowledge, identification, and comprehension of chapter material. **Apply and Analyze** questions extend learning and develop your abilities to use learned material in new situations and to break down material into its component parts. **Critical Thinking** questions develop higher-order thinking and problem-solving abilities. **Activities** extend your learning and help you apply knowledge.

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