

Modern Cabinetmaking

Sixth Edition



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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 such as lean manufacturing and installing moulding and trim. This edition also includes new career profiles and workplace skills features.

A new chapter has been added that covers the installation of moulding and trim. Topics covered include identifying moulding types and purposes, and tools used for trim carpentry, planning an installation, working efficiently, and installing standing and running moulding.

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 are 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 Objectives, Technical Terms, Summary, Test Your Knowledge questions, Critical Thinking questions, and Suggested Activities. Use these various components to review each chapter and to 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, Working Knowledge tips, step-by-step Procedures, Safety Notes, Workplace Skills, and Safety in Action. These features highlight information that is important for students' awareness and comprehension.

Pay special attention to any Safety Notes and Safety in Action 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.

About the Authors

Mr. Patrick A. Molzahn has been a faculty member at Madison College, located in Madison, Wisconsin, since 1998. He became the director of the Cabinetmaking and Millwork program in 2000. Prior to becoming an educator, 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 art 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. After 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 four decades, he has traveled around the world researching how other cultures train their woodworkers.

He is a founding board member of the Woodwork Career Alliance of North America. In 2018, he became the first individual to earn the WCA's highest honor, the Diamond Credential. His writings have appeared in numerous publications, including *Woodshop News*, *Fine Woodworking*, and *Fine Homebuilding*. He is also a contributing editor to the Architectural Woodwork Institute's ANSI Standards. An avid hiker, Patrick has explored trails on five continents, and in 2016, completed over 1300 miles of the Appalachian Trail.

Dr. William D. Umstatt is 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. Umstatt worked in the education field for 36 years.

Dr. Umstatt 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.

Mr. Charles W. Davis attended the University of Michigan's School of Architecture and received his undergraduate degree from Wayne State University, Detroit. He later attended San Diego State University's graduate school.

Mr. Davis taught courses in computer scheduling at the University of California, Los Angeles, and computer users' classes at International Business Machines. He wrote users' guides for software products and reviewed numerous software publications. He wrote articles published in the *Fine Woodworking* and *Fine Homebuilding* magazines.

Mr. Davis' woodworking experience began in his early teens. He and a friend manufactured unfinished bookcases for Sears during high school. In 1983, he opened Chuck Davis Cabinets in north Monterey County, California. He specialized in the design and fabrication of high-end custom wood and composite casework. Mr. Davis assisted in the design and equipment layout for a woodworking club's new facility.

While every attempt has been made to create an accurate manuscript, the author welcomes feedback in the interest of continuous improvement. He can be reached at pmolzahn@madisoncollege.edu

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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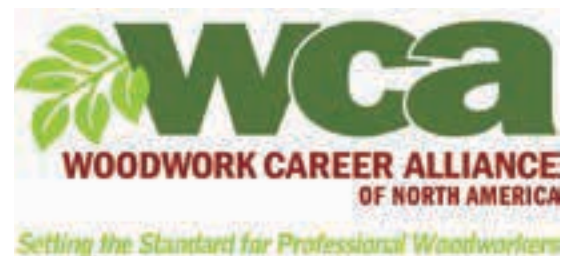
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Woodwork Career Alliance

The content of this text and Lab Workbook correlates to Woodwork Career Alliance (WCA) skill standards. The WCA skill standards help ensure that students are prepared for rigorous industry standards.



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TOOLS FOR STUDENT AND INSTRUCTOR SUCCESS

Student Tools

Student Text

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Lab Workbook

The Lab Workbook that accompanies *Modern Cabinetmaking* provides hands-on practice with questions and activities, along with projects that offer students opportunities to work on various cabinetmaking challenges.

G-W Digital Companion

The G-W Digital Companion is a study reference that contains e-flash cards and vocabulary exercises. It is accessible from any digital device. New digital assets include two types of videos to enrich learning. *See It In Action* videos illustrate the use of various tools and machinery. *Career Profile* videos capture discussions with the professionals featured in the text. They speak in-depth about their careers, educational backgrounds, and interests.

Online Learning Suite

The Online Learning Suite provides the foundation of instruction and learning for digital and blended classrooms. An online student text and lab workbook, along with rich supplemental content, brings digital learning to the classroom. All instructional materials are found on a convenient online bookshelf and accessible at home, at school, or on the go.

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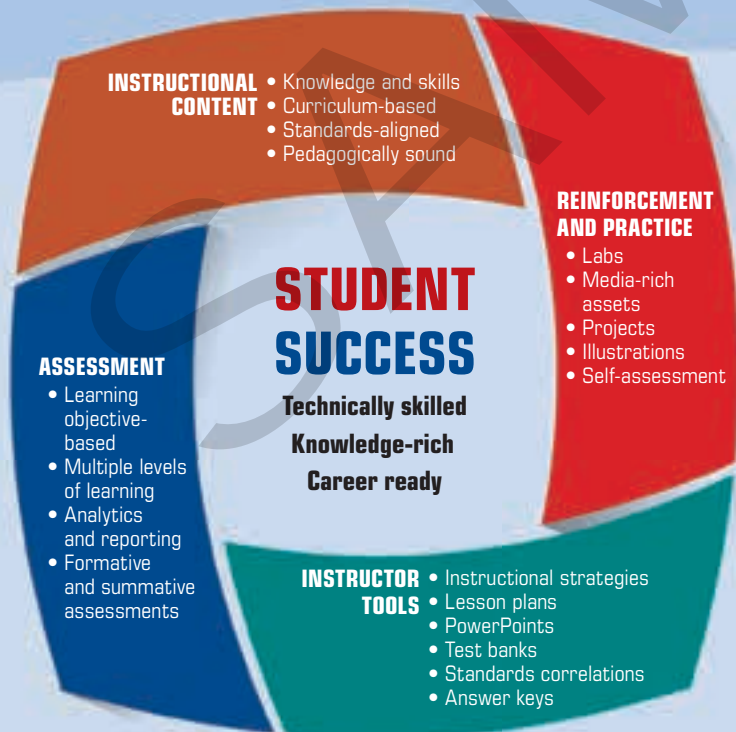
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Features of the Textbook

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

Section Opening Materials

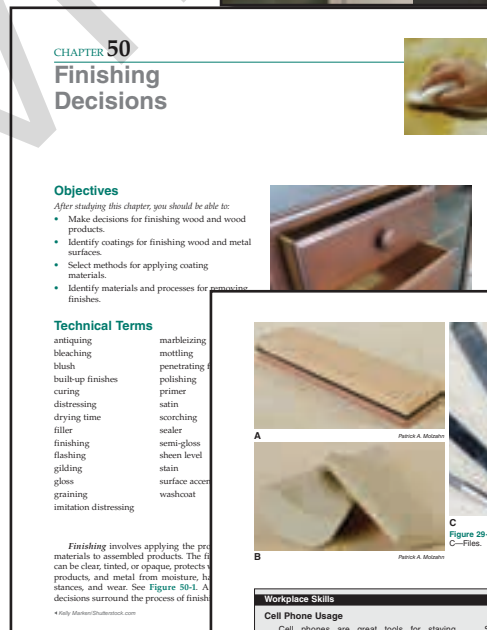
Each section opener contains a list of chapters contained in the section, along with a **Career Profile** of an individual currently employed in the cabinetmaking industry.

Chapter Opening Materials

Each chapter opener contains a chapter outline, a list of learning objectives, and a list of technical terms. **Objectives** clearly identify the knowledge and skills to be gained when the chapter is completed. **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. **Safety in Action** features explain how to safely operate machines, tools, and materials used in various cabinetmaking processes. **Procedures** are highlighted throughout the textbook to provide clear instructions for hands-on activities. **Working Knowledge** provides supplemental information and hints related to the components or procedures discussed in the text.



Illustrations

Illustrations have been designed to clearly and simply communicate the specific topic. Many of the illustrations and photographs have been updated to show the latest processes and equipment.

Expanding Your Learning

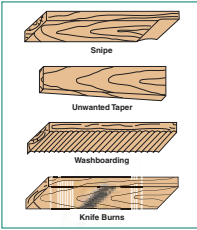
Workplace Skills highlight the professional behaviors and traits that employers look for and that will help you succeed in the workplace. Green Notes highlight key items related to sustainability, energy efficiency, and environmental issues.

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. Test Your Knowledge questions enable you to demonstrate knowledge, identification, and comprehension of chapter material. Critical Thinking questions develop higher-order thinking and problem solving, personal, and workplace skills. Suggested Activities extend your learning and help you apply knowledge.

Chapter 25 Surfacing with Stationary Machines 453

Knives should be ground on proper equipment by experienced technicians. Do not use a standard bench grinder and fixture. They are not accurate enough for the precision required for the jointer. Professionals will also hone the knives for you after grinding them.



Working Knowledge

Many jointers and planers now come with segmented insert cutterheads. See Figures 25-29. When a knife is dull or nicked, simply loosen the gib and rotate or replace the knife. Older jointers can often be retipped with new blades.

Procedure

Removing Jointer Knives

The procedure to remove jointer knives is as follows:

1. With the switch off, disconnect the power and lock out the machine.
2. Remove the guard and fence.
3. Loosen all gib retainer screws 1/8–1/4 turn. Gib retainer screws apply pressure to hold the gib and knife in place. Use a fixture or a wedge to hold the cutterhead and knife steady. Otherwise, place hardboard over the knife. Put up and away from the cutting edge to loosen the screws. Use the proper wrench; start from one end, and proceed across the knife. Apply a penetrating solvent if the screws will not turn.
4. Loosen the screws until the gib (steel bar that holds the knife in place) can be lifted out.
5. Remove the jointer knife.

After removing knives, clean the gib and cutterhead with mineral spirits.

Figure 25-29: These self-loading, carbide inserts can be changed easily by loosening the set screw.

25.9.4 Installing Jointer Knives

Traditional knives need to be sharpened and reinstalled. This requires all knives to be accurately set so that they project the same distance from the cutterhead. You may use:

- A gauge especially designed for setting knives.
- A magnet that is perfectly flat. See Figure 25-30A.
- A straightedge. Figure 25-30B.

Installing Knives

The procedure for installing knives is as follows:

1. Check to see if there are filler adjusting screws in the knife pocket. If there are fillers, make sure they turn easily. Both the gib and knife often sit on fillers.
2. Place the knife in the slot properly with the gib against it.

584 Section 4 Machining Processes

RF Gluing Setup

Before using the RF gluing equipment, read the manufacturer's manual. It contains information on what material types and thicknesses you can bond.

Clamp your assembly together as described in Chapter 32. Be sure the metal clamps will not interfere with movement of the RF gun across the glue line. Touching the electrodes of the gun to the clamps could cause permanent damage to the RF equipment. After clamping, wipe off any excess adhesive.

RF Gluing System Operation

Always follow the manufacturer's procedure when operating the RF equipment. Each machine has specific features that affect its use. If recommended cure times are not given, you can determine them for the piece you are gluing by creating test samples.

Safety Note

Keep your free hand at least one foot from the RF gun while using it. Most skin near the gun could attract an arc from the gun similar to lightning and result in a serious burn.

Procedure

RF Gluing Gun Operation

Most RF gluing guns work as follows:

1. Glue and clamp your assembly.
2. Turn on the welder switch.
3. Keep your free hand at least 12" (305 mm) from the gun electrodes.
4. Position the gun over the joint, one electrode on each side of the glue line.
5. Squeeze the trigger on the gun handle to begin the frequency curing.
6. The glue should heat and bubble from the glue line. Do not hold the trigger for more than 15 seconds per position. Longer times can damage the equipment.
7. Move to another position over the joint.
8. Repeat steps 5 through 7 at about 4" (102 mm) intervals.
9. Remove clamps.

Adhesive Safety

Safety concerns associated with adhesives are identified on container labels. They inform you of toxic, skin-irritating, and flammable ingredients. When using adhesives, follow these precautions:

- Wear safety eyewear to protect yourself from splashing adhesives and solvents.
- Read all adhesive container labels and product instruction sheets. See Figure 31-27.
- Apply toxic adhesives in a well-ventilated area. Forced air exhaust systems are best.
- Extinguish all flames while using flammable adhesives and solvents.
- Protect sensitive skin with rubber or plastic gloves.
- If you experience any adverse symptoms while applying adhesive, contact your physician immediately.
- Touch only the handles of hot-glove or RF guns during use.

Figure 31-27: Read adhesive container labels for important information, such as flammability and toxicity.

Chapter 1 Introduction to Cabinetmaking 13

Summary

- The responsibility of a designer is to create furniture and cabinet designs that meet the needs and desires of their clients.
- Design decisions are choices made about the product design before work begins.
- All design decisions are based on two factors: function and form.
- Function describes the purpose for having a cabinet or piece of furniture.
- Form is the appearance of the cabinet. What will the piece look like?
- Sketches document design ideas and can be used to compare alternate designs.
- Cabinetry is designed and produced based on standards.
- Carefully consider which materials to use throughout the design and production process.
- Production decisions include choosing the tools, tooling, and procedures necessary to build the product in the most efficient manner.
- Planning for production involves making efficient and effective decisions related to materials, tools, tooling, and processes.
- 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.

Test Your Knowledge

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.
2. Design for _____ first, then for _____.
3. Adapting cabinetry for children and adults involves:
A. size charts
B. human factors
C. disabling injuries
D. identifying needs
4. Many types of cabinetry are designed and produced based on _____.
A. size charts
B. human factors
C. disabling injuries
D. identifying needs
5. European hardware is based on a(n) _____ module.
A. 1 mm
B. 25.4 mm
C. 32 mm
D. 37 mm

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?
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?

Suggested 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?
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?
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.

New to This Edition

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

- Lockout/tagout content added to Chapter 2, *Health and Safety*.
- Lean manufacturing content added to Chapter 4, *Cabinetmaking Industry Overview*.
- New Chapter 48, *Installing Moulding and Trim*, provides expanded coverage on trim carpentry skills, tools, planning, and installation.
- Addition of Workplace Skills feature that speaks directly to students and discusses the soft skills required for working successfully in the cabinetmaking field.
- Updated images and figures.
- End-of-chapter materials have been revised and updated. Review Questions include Test Your Knowledge questions and Critical Thinking questions that extend students' learning and develop higher-order thinking skills.
- New assets for digital subscribers include two types of videos to enrich learning. *See It In Action* videos illustrate the use of various tools and machinery. *Career Profile* videos capture discussions with the professionals featured in the text.
- New digital assets include Understanding Measurement Video Clips. The 12 videos, worksheets, and quizzes help students learn and practice fundamental measurement skills they will use in class and on-the-job.

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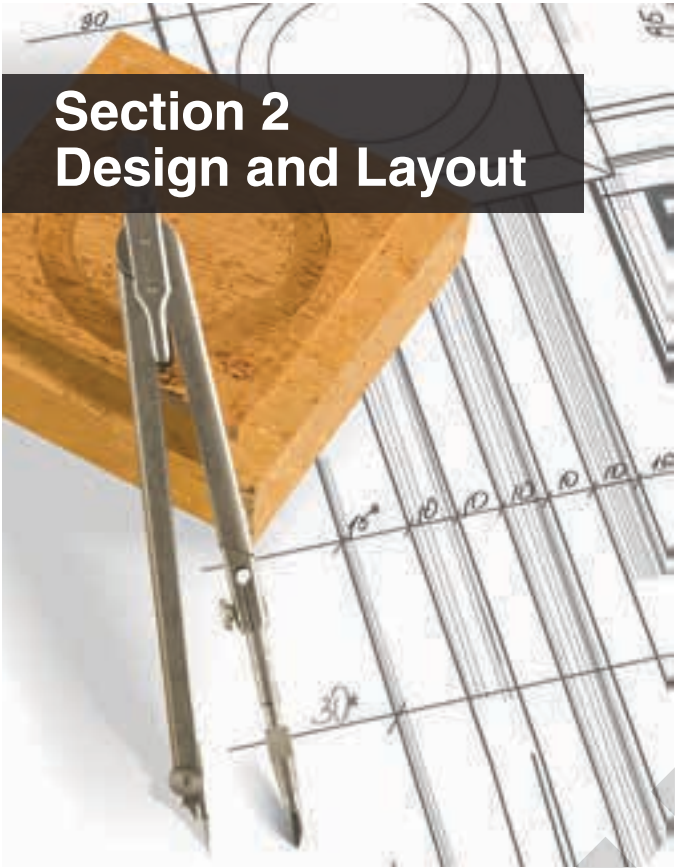
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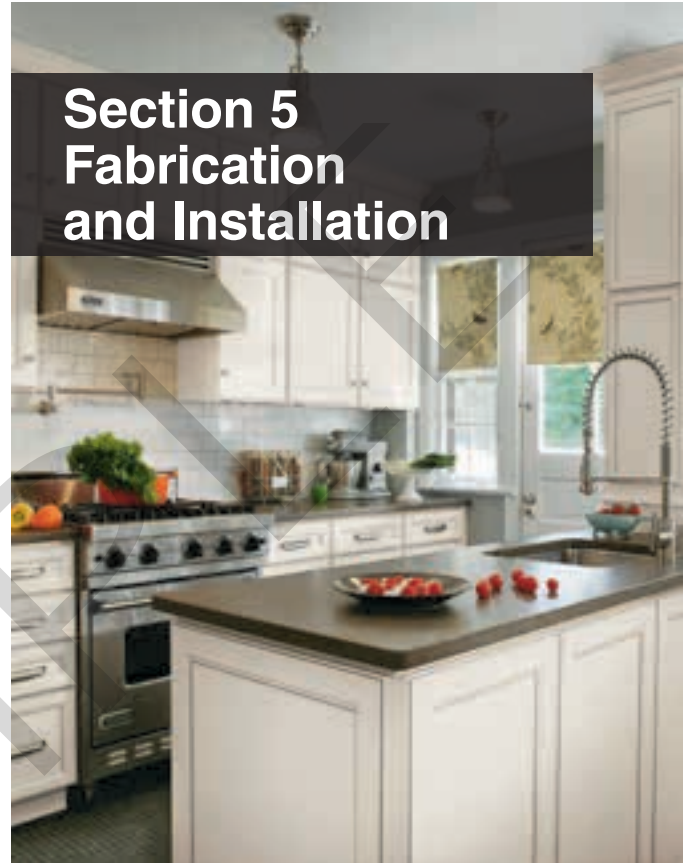
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SAMPLE