Machine Tool Practices

NINTH EDITION

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Preface

As a definitive text in the field for more than 30 years, *Machine Tool Practices*, 9th edition, is geared toward successfully training computer numerical control (CNC) and conventional machine operators, general machinists, and tool and die makers. It is ideal for those enrolled in apprenticeship training, community college courses, or vocational programs. Presented in a student-friendly manner, the book lends itself well to classes that take a combined lecture/laboratory approach, as well as to a self-paced instructional environment.

THE STORY BEHIND THE BOOK

This text grew out of a desire on the part of the coauthors to develop a richly illustrated national publication that could fit into both a self-paced instructional environment and a traditional lecture laboratory system. In 1968 the state of Oregon established community colleges to provide training in the skills that local industries required, as well as to establish a lower-cost alternative to completing the first two years of a four-year college degree. The Oregon Department of Education financed and encouraged instructors to develop new teaching materials. As a result, John Neely and Roland Meyer at Lane Community College in Eugene, Oregon, created a ground-breaking methodology—a highly successful self-paced instructional program in machine shop technology. Warren White initiated a similar curriculum development project backed by the California Department of Education at DeAnza College, Cupertino, California, namely, the Individualized Machinist's Curriculum. Richard Kibbe and Roland Meyer were participating writers in this effort. Patterned after the self-paced curriculum in machine shop technology at Lane College and the California Community Colleges' Individualized Machinist's Curriculum project, the text has been successfully embraced nationally since 1979 and continues to be one of the leading books in the market today.

STRENGTHS AND UNIQUE SELLING POINTS

With more than 400 line drawings and 1,200 photographs, *Machine Tool Practices* is the best-illustrated book in this field. The text emphasizes practical knowledge shop and machine tool technology throughout and superbly illustrates the tools, equipment, and techniques that students are most likely to encounter in an actual industrial machine shop environment.

CLASSICAL PRACTICE/CURRENT TRENDS

Machine tools and machining practices have changed drastically over the past few years with advances in technology. No matter what directions the field of machine tools and machining practices take in the future, *Machine Tool Practices* offers classical practice that is timely and essential to the basic foundation a student requires to participate effectively in the machining area of manufacturing technology. With the solid background in standard practice this text provides, students will confidently understand, appreciate, and operate computer-controlled and computer-supported machining as well as other high-tech manufacturing processes.

ORGANIZATION OF THE BOOK: TOTAL FLEXIBILITY TO SUIT YOUR TEACHING STYLE

The book is divided into 13 major sections and provides total flexibility to suit your teaching style. Appendix 1 contains Answers to Self-Tests, Appendix 2 offers practical General Tables, and Appendix 3 showcases Precision Vise Project Drawings. For the student, this project embodies many setups and techniques used in general

precision machine shop work. The text also contains a Glossary and an Index. Many units are designed around specific projects that provide performance experience for students. The book structure makes it easy for instructors to include additional projects more applicable to specific individual programs.

NEW TO THIS EDITION

Updated to reflect the very latest trends and technology in the machine tool field, the art program in the ninth edition has been modernized to reflect the real-world environment and includes:

- More than 600 new color photos that depict the finer aspects of machine tools practice, including CNC
- Approximately 400 revised line drawings that provide easy comprehension and visually reinforce learning

In addition, this edition has been accuracy checked and also features:

- Expanded CNC content
- Additional computer-aided manufacturing (CAM) coverage
- A new self-test question set in each chapter
- A list of useful websites at the end of appropriate units that refer the reader to state-of-the-art information on cutting tools and machine shop equipment

Guided Tour

Machine Tool Practices is divided into sections comprised of several units. To tool up, we invite you to take the Guided Tour.

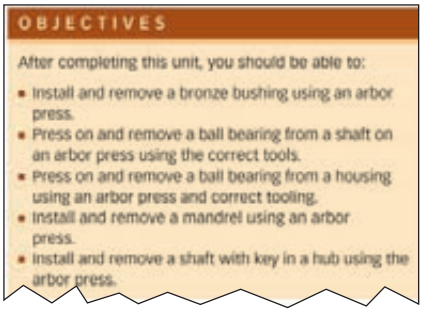
HALLMARK FEATURES

Introductory Overview

Introductions summarize and provide an overview of the main themes in each major section and help reinforce topics.

Objectives

Clearly stated objectives enable you to focus on what you should achieve by the end of each unit.


OBJECTIVES

After completing this unit, you should be able to:

- Install and remove a bronze bushing using an arbor press.
- Press on and remove a ball bearing from a shaft on an arbor press using the correct tools.
- Press on and remove a ball bearing from a housing using an arbor press and correct tooling.
- Install and remove a mandrel using an arbor press.
- Install and remove a shaft with key in a hub using the arbor press.

Photographs

Extensive use of color photographs provides you with views of actual machining operations.


Figure 8-19 Pressure being applied to straighten shaft.

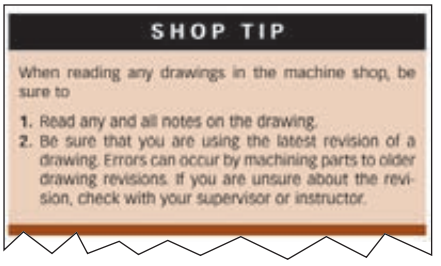
Other straightening jobs on flat stock and other shapes

Graphic Explanations

These detailed explanations highlight important concepts, common errors, and difficulties that machinists encounter.

Shop Tip

Shop Tip and **Shop Tip–Craftsmanship** boxes offer helpful tips and techniques to make the student a better and more intuitive machinist.


SHOP TIP

When reading any drawings in the machine shop, be sure to

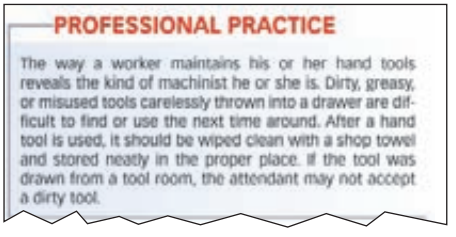
1. Read any and all notes on the drawing.
2. Be sure that you are using the latest revision of a drawing. Errors can occur by machining parts to older drawing revisions. If you are unsure about the revision, check with your supervisor or instructor.

New Technology

Directs students to the latest technology in the field.

Professional Practice

Professional Practice provides tips from professional work environments.


PROFESSIONAL PRACTICE

The way a worker maintains his or her hand tools reveals the kind of machinist he or she is. Dirty, greasy, or misused tools carelessly thrown into a drawer are difficult to find or use the next time around. After a hand tool is used, it should be wiped clean with a shop towel and stored neatly in the proper place. If the tool was drawn from a tool room, the attendant may not accept a dirty tool.

Safety First

Safety First boxes provide safety warnings related to handling and working with various pieces of equipment.


SAFETY FIRST

The primary danger in operating the vertical band machine is accidental contact with the cutting blade. Workpieces are often hand guided. One advantage in sawing machines is that the pressure of the cut tends to hold the workpiece against the saw table. However, hands are often in close proximity to the blade. If you should contact the blade accidentally, an injury is almost sure to occur. You will not have time even to think about withdrawing your fingers before they are cut. Keep this in mind at all times when operating a band saw.

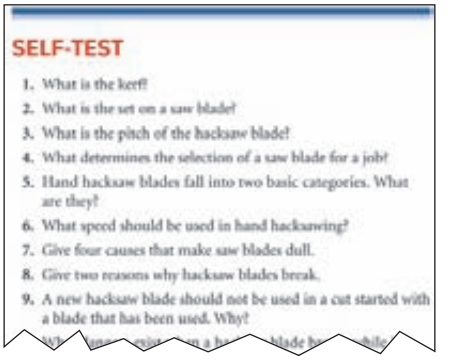
Always use a pusher against the workpiece whenever possible. This will keep your fingers away from the blade. Be careful when you are about to complete the cut: As the blade clears through the work, the pressure that you are applying is suddenly released, and your hand or finger can be carried into the blade. As you approach the end of the cut, reduce the feeding pressure as the blade cuts through.

Operating Tip

Advice on how to operate machinery students may come across in their studies or careers.

Self-Test

End-of-unit self-tests gauge how well you mastered the material.


SELF-TEST

1. What is the kerf?
2. What is the set on a saw blade?
3. What is the pitch of the hacksaw blade?
4. What determines the selection of a saw blade for a job?
5. Hand hacksaw blades fall into two basic categories. What are they?
6. What speed should be used in hand hacksawing?
7. Give four causes that make saw blades dull.
8. Give two reasons why hacksaw blades break.
9. A new hacksaw blade should not be used in a cut started with a blade that has been used. Why?

Internet References

The end of each unit lists pertinent Internet sites.


INTERNET REFERENCES

http://en.wikipedia.org/wki/Engineering_drawing
http://design-technology.info

COMPREHENSIVE TEACHING AND LEARNING PACKAGE

For the Instructor

Blackboard or WebCT Platforms

At the request of customers, this new edition offers instructors the flexibility of using Blackboard (ISBN–10: 0-13-506843-6) or WebCT (ISBN–10: 0-13-506844-4) platforms to streamline efficiencies in course management, including testing. Sign up for either platform and empower your teaching.

Instructor's Guide with Lesson Plans

This handy manual contains suggestions on how to use the text for both conventional and competency-based education. It also includes unit post-tests and answer keys (ISBN–10: 0-13-501509-X).

PowerPoint and DVD Video Presentations

Twenty-five PowerPoint presentations and ten DVD videos feature topics of general interest to students of machine tool technology (ISBN–10: 0-13-505718-3).

TestGen (Computerized Test Bank)

TestGen contains text-based questions in a format that enables instructors to select questions and create their own examinations (ISBN–10: 0-13-505605-5).

To access supplementary materials online, instructors need to request an instructor access code. Go to **www.pearsonhighered.com/irc,** where you can register for an instructor access code. Within 48 hours of registering, you will receive a confirming e-mail, including an instructor access code. Once you have received your code, log on to the site for full instructions on downloading the materials you wish to use.

For the Student

NEW! Companion Website

Prentice Hall's **Companion Website** provides support resources and an interactive learning environment for students. Tap into this robust site at **www.prenhall.com/kibbe** to enrich your learning experience.

The Companion Website is organized by chapter and includes:

- Chapter Objectives
- Quizzes
- Internet Links to Other Machine Tool Websites
- PowerPoint Presentations
- Student Workbook: Containing process worksheets with projects, alternative projects, and additional tables, this indispensable workbook plays an important part in maximizing learning. When completed, the projects serve as useful devices for helping motivate and encourage students.

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Walker Magnetics
Weldon Tool–A Dauphin Precision Tool Brand
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About the Authors

Richard R. Kibbe served his apprenticeship in the shipbuilding industry and graduated as a journeyman marine machinist. He holds an associate in arts degree in applied arts from Yuba Community College with an emphasis in machine tool technology. He also holds bachelor's and master's degrees from the California State University with an emphasis in machine tool manufacturing technology.

Mr. Kibbe has considerable machine shop experience as well as community college and industrial teaching experience and is the author and co-author of several publications in the machine tool manufacturing field.

Roland O. Meyer spent the first 20 years of his career in the metal-working industry as a tool and die maker and machinist in machine design and manufacturing. He completed his apprenticeship as a tool and die maker at Siemens in Germany and then worked in die shops in Toronto and Windsor, Canada, before moving to Chicago, where he worked as a gage maker at Ford Motor Company. He was in charge of the U.S. Army machine shops in Korea and Italy for five years. When he returned to the United States, he worked in a manufacturing company designing and building experimental machines used in the timber and plywood industry.

He next entered academia and became the lead instructor at Lane Community College's manufacturing technology program in Eugene, Oregon, where he taught for 25 years. As CNC became the new method in machining, he developed a CNC curriculum and program. When CAM became available, he also developed a state-of-the-art CAM program with the assistance of a local software company.

John E. Neely (Late) grew up in the Pacific Northwest and entered the Army to serve in World War II. He became a master machinist, a mechanical engineer, a hydraulic engineer, and eventually an instructor at Lane Community College in Eugene, Oregon.

During his time as an instructor, he collaborated with others to develop highly successful course materials based on the individualized instruction approach. He and his collaborators wrote and published several textbooks based on those materials. Those books continue to be in use nationally and internationally.

Warren T. White apprenticed as an optical instrument maker with Land-Air, Inc. After military service with the Army Air Defense Board, he obtained a graduate degree in psychology at Clark University. His interest in both learning theory and machine tools led to employment at Foothill College in the engineering department.

He initiated the machine tool technology program at De Anza College after an extensive survey of Silicon Valley manufacturing firms. He was the director of a California state-funded program to develop an individualized machinist curriculum in conjunction with several California community colleges and Lane Community College in Oregon. He also initiated the California community colleges' Multimediamobile, which operated between several California community colleges to develop individualized instructional media in several technical disciplines. He later taught industrial engineering classes at San Jose State University. He is certified by the Society of Manufacturing Engineers as a manufacturing engineer.