

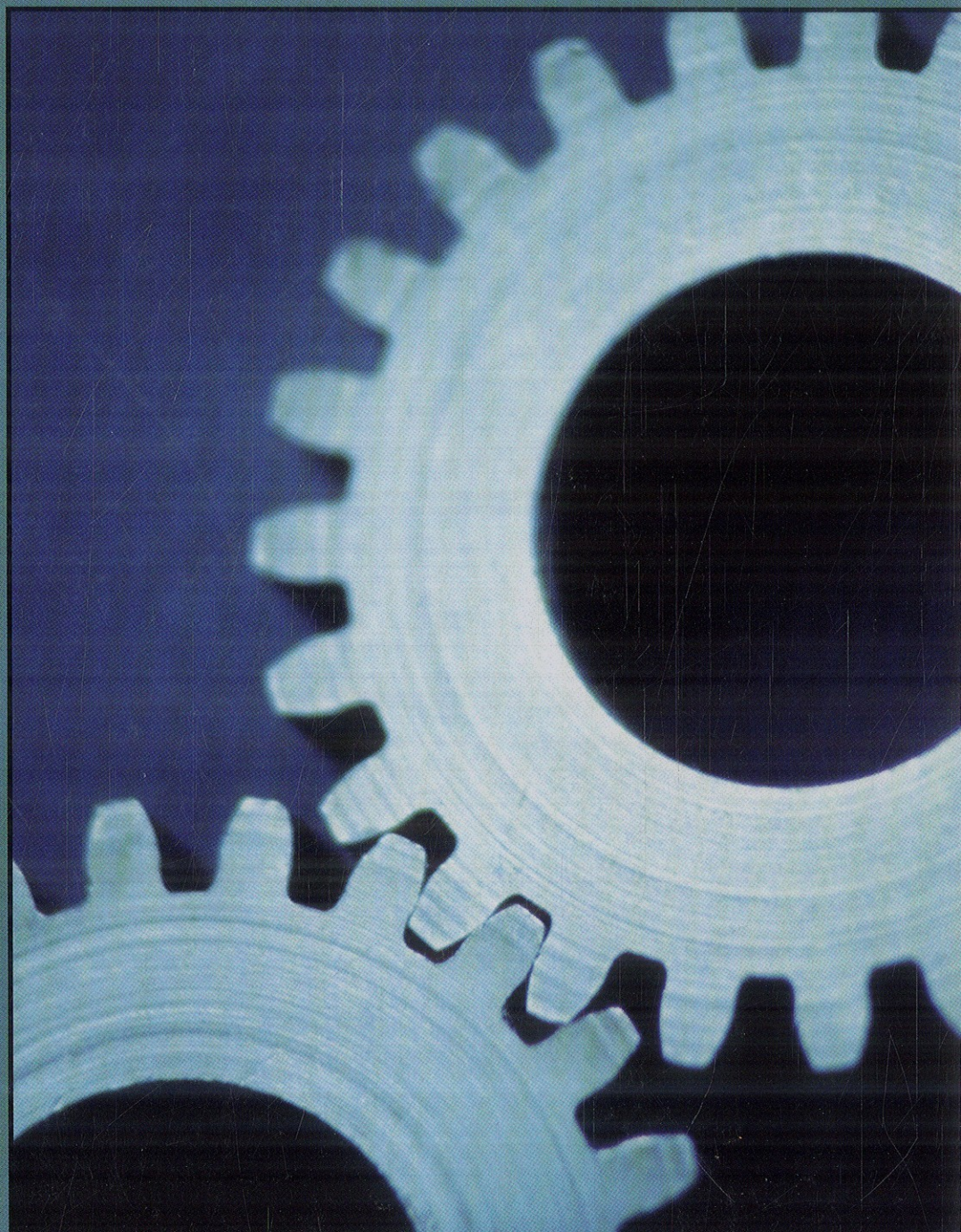


International
Edition

Machine Tool Practices

Ninth Edition

Richard R. Kibbe
Roland O. Meyer
John E. Neely
Warren T. White



PEARSON

Contents

- Preface, vi
- Guided Tour, viii
- Acknowledgments, xi
- About the Authors, xiii

SECTION A

Introduction, 1

- Unit 1** Shop Safety, 6
- Unit 2** Mechanical Hardware, 14
- Unit 3** Reading Drawings, 26

SECTION B

Hand Tools, 35

- Unit 1** Arbor and Shop Presses, 37
- Unit 2** Work-Holding and Hand Tools, 45
- Unit 3** Hacksaws, 54
- Unit 4** Files, 57
- Unit 5** Hand Reamers, 63
- Unit 6** Identification and Uses of Taps, 67
- Unit 7** Tapping Procedures, 72
- Unit 8** Thread-Cutting Dies and Their Uses, 77
- Unit 9** Off-Hand Grinding, 81

SECTION C

Dimensional Measurement, 87

- Unit 1** Systems of Measurement, 103
- Unit 2** Using Steel Rules, 107
- Unit 3** Using Vernier, Dial, and Digital Instruments for Direct Measurements, 116
- Unit 4** Using Micrometer Instruments, 125

- Unit 5** Using Comparison Measuring Instruments, 146
- Unit 6** Using Gage Blocks, 166
- Unit 7** Using Angular Measuring Instruments, 174
- Unit 8** Tolerances, Fits, Geometric Dimensions, and Statistical Process Control (SPC), 183

SECTION D

Materials, 193

- Unit 1** Selection and Identification of Steels, 197
- Unit 2** Selection and Identification of Nonferrous Metals, 203
- Unit 3** Hardening, Case Hardening, and Tempering, 209
- Unit 4** Annealing, Normalizing, and Stress Relieving, 221
- Unit 5** Rockwell and Brinell Hardness Testers, 225

SECTION E

Layout, 235

- Unit 1** Basic Semiprecision Layout Practice, 244
- Unit 2** Basic Precision Layout Practice, 250

SECTION F

Preparation for Machining Operations, 263

- Unit 1** Machinability and Chip Formation, 266
- Unit 2** Speeds and Feeds for Machine Tools, 275

- Unit 3** Cutting Fluids, 279
- Unit 4** Using Carbides and Other Tool Materials, 284

SECTION G

Sawing Machines, 301

- Unit 1** Using Reciprocating and Horizontal Band Cutoff Machines, 313
- Unit 2** Abrasive and Cold Saws, 323
- Unit 3** Preparing to Use the Vertical Band Machine, 326
- Unit 4** Using the Vertical Band Machine, 335

SECTION H

Drilling Machines, 341

- Unit 1** The Drill Press, 346
- Unit 2** Drilling Tools, 349
- Unit 3** Hand Grinding of Drills on the Pedestal Grinder, 358
- Unit 4** Operating Drilling Machines, 362
- Unit 5** Countersinking and Counterboring, 374
- Unit 6** Reaming in the Drill Press, 377

SECTION I

Turning Machines, 383

- Unit 1** The Engine Lathe, 391
- Unit 2** Toolholders and Toolholding for the Lathe, 399
- Unit 3** Cutting Tools for the Lathe, 405
- Unit 4** Lathe Spindle Tooling, 413
- Unit 5** Operating the Machine Controls, 420
- Unit 6** Facing and Center Drilling, 425
- Unit 7** Turning between Centers, 435
- Unit 8** Alignment of the Lathe Centers, 448
- Unit 9** Other Lathe Operations, 451
- Unit 10** Sixty-Degree Thread Information and Calculations, 465
- Unit 11** Cutting Unified External Threads, 470
- Unit 12** Cutting Unified Internal Threads, 481
- Unit 13** Cutting Tapers, 485
- Unit 14** Using Steady and Follower Rests, 496

- Unit 15** Additional Thread Forms, 502
- Unit 16** Cutting Acme Threads on the Lathe, 507

SECTION J

Vertical Milling Machines, 511

- Unit 1** Vertical Spindle Milling Machines, 514
- Unit 2** Cutting Tools and Cutter Holders for the Vertical Milling Machine, 517
- Unit 3** Setups on the Vertical Milling Machine, 523
- Unit 4** Vertical Milling Machine Operations, 530
- Unit 5** Using the Offset Boring Head, 540

SECTION K

Horizontal Spindle Milling Machines, 545

- Unit 1** Horizontal Spindle Milling Machines, 549
- Unit 2** Types of Spindles, Arbors, and Adapters, 553
- Unit 3** Arbor-Driven Milling Cutters, 556
- Unit 4** Work-Holding Methods and Standard Setups, 562
- Unit 5** Machine Setup and Plain Milling, 567
- Unit 6** Using Side Milling Cutters, 577
- Unit 7** Using Face Milling Cutters on the Horizontal Milling Machine, 581

SECTION L

Grinding and Abrasive Machining Processes, 585

- Unit 1** Selection and Identification of Grinding Wheels, 598
- Unit 2** Truing, Dressing, and Balancing of Grinding Wheels, 606
- Unit 3** Grinding Fluids, 612
- Unit 4** Horizontal Spindle Reciprocating Table Surface Grinders, 617
- Unit 5** Work Holding on the Surface Grinder, 621

- Unit 6** Using the Surface Grinder, 625
Unit 7 Problems and Solutions in Surface Grinding, 632
Unit 8 Center-Type Cylindrical Grinders, 635
Unit 9 Using the Cylindrical Grinder, 641
Unit 10 Universal Tool and Cutter Grinder, 645

SECTION M

Computer Numerical Control and Other Advanced Machining Processes, 659

- Unit 1** CNC Machine Tool Programmable Axes and Position Dimensioning Systems, 668
Unit 2 CNC Programming, 673
Unit 3 CNC Tooling, 705
Unit 4 Other Advanced Machining Processes, 718

APPENDIX 1

Answers to Self-Tests, 726

APPENDIX 2

General Tables, 751

- Table 1** Decimal Equivalents of Fractional Inches, 752
Table 2 Inch/Metric Conversion Table, 753

- Table 3** Tap Drill Sizes, 755
Table 4 Metric Tap Drill Sizes, 756
Table 5A Tapers, 757
Table 5B Tapers and Angles, 758
Table 6 General Measurements, 759
Table 7A Density or Specific Gravity of Metals and Alloys, 761
Table 7B Approximate Melting Points of Metals and Various Substances, 762
Table 8 Right-Triangle Solution Formulas, 763
Table 9 Wire Gages and Metric Equivalents, 764
Table 10 Cutting Speeds for Commonly Used Materials, 765
Table 10A Feeds for High-Speed Steel End Mills, 765
Table 10B Coolants and Cutting Oils Used for General Machining, 765

APPENDIX 3

Precision Vise Project Drawings, 766

- Glossary, 771
 Index, 781