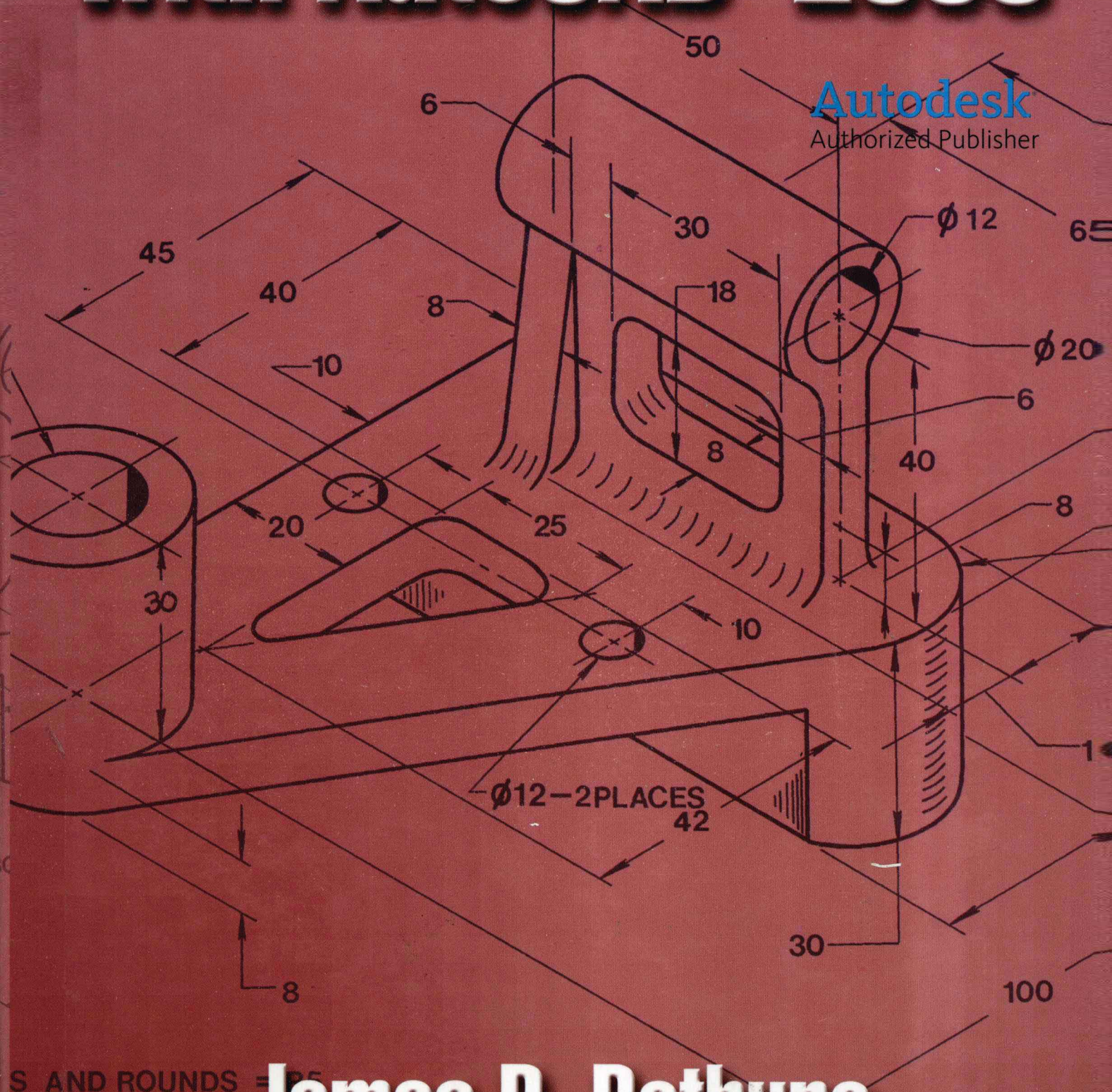
Engineering Graphics with AutoCAD® 2006



Autodesk
Authorized Publisher

James D. Bethune

Engineering Graphics with AutoCAD® 2006

James D. Bethune
Boston University

Upper Saddle River, New Jersey
Columbus, Ohio

Library of Congress Cataloging-in-Publication Data

Bethune,James D., 1941
Engineering graphics with AutoCAD 2006/ James D. Bethune.
p. cm.
Includes index.
ISBN 0-13-171391-4
1. Engineering graphics. 2.AutoCAD. I. title

T357.B464 2006
620'.0042'0285536—dc22 2005050949

Executive Editor: Debbie Yarnell
Managing Editor: Judith Casillo
Production Editor: Louise N. Sette
Production Supervisor: Lisa Garboski, bookworks
Design Coordinator: Diane Ernsberger
Cover Designer: Rod Harris
Art Coordinator: Janet Portisch
Production Manager: Deidra Schwartz
Marketing Manager: Jimmy Stephens

This book was set in Times and Arial by *The GTS Companies*/York, PA Campus and was printed and bound by Banta Book Group. The cover was printed by Coral Graphic Services, Inc.

Disclaimer:
The publication is designed to provide tutorial information about AutoCAD® and/or other Autodesk computer programs. Every effort has been made to make this publication complete and as accurate as possible. The reader is expressly cautioned to use any and all precautions necessary, and to take appropriate steps to avoid hazards, when engaging in the activities described herein.

Neither the author nor the publisher makes any representations or warranties of any kind, with respect to the materials set forth in this publication, express or implied, including without limitation any warranties of fitness for a particular purpose or merchantability. Nor shall the author or the publisher be liable for any special, consequential or exemplary damages resulting, in whole or in part, directly or indirectly, from the reader's use of, or reliance upon, this material or subsequent revisions of this material.

Copyright © 2006 by Pearson Education, Inc., Upper Saddle River, New Jersey 07458. Pearson Prentice Hall. All rights reserved. Printed in the United States of America. This publication is protected by Copyright and permission should be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. For information regarding permission(s), write to: Rights and Permissions Department.

Pearson Prentice Hall™ is a trademark of Pearson Education, Inc.
Pearson® is a registered trademark of Pearson plc
Prentice Hall® is a registered trademark of Pearson Education, Inc.

Pearson Education Ltd.
Pearson Education Singapore Pte. Ltd.
Pearson Education Canada, Ltd.
Pearson Education—Japan
Pearson Education Australia Pty. Limited
Pearson Education North Asia Ltd.
Pearson Educación de Mexico, S. A. de C.V.
Pearson Education Malaysia Pte. Ltd.

10 9 8 7 6 5 4
ISBN: 0-13-171391-4

Preface

This book teaches technical drawing and uses AutoCAD® as its drawing instrument. This book updates *Engineering Graphics with AutoCAD® 2005* for AutoCAD® 2006. It follows the general format of many technical drawing texts and presents much of the same material about drawing conventions and practices, with emphasis on creating accurate, clear drawings. For example, the book shows how to locate dimensions on a drawing so that they completely define the object in accordance with current national standards, but the presentation centers on the Dimension toolbar and its associated tools and options. The standards and conventions are presented and their applications are shown using AutoCAD® 2006. This integrated teaching concept is followed throughout the book.

Most chapters include design problems. The problems are varied in scope and are open-ended, which means that there are several correct solutions. This is intended to encourage student creativity and increase their problem-solving abilities.

Chapters 1 through 3 cover AutoCAD Draw and Modify toolbars and other commands needed to set up and start drawings. The text starts with simple Line commands and proceeds through geometric constructions. The final sections of Chapter 3 describe how to bisect a line and how to draw a hyperbola, a parabola, a helix, and an ogee curve. Redrawing many of the classic geometric shapes will help students learn how to use the Draw and Modify toolbars, along with other associated commands, with accuracy and creativity.

Chapters 2 and 3 also show how to use the new dynamic input options. This is a significant change in the program.

Chapter 4 presents freehand sketching. Simply stated, there is still an important place for sketching in technical drawing. Many design ideas start as freehand sketches and are then developed on the computer. This chapter now includes extensive exercise problems associated with object orientation.

Chapter 5 presents orthographic views. Students are shown how to draw three views of an object using AutoCAD. The discussion includes projection theory, hidden lines, compound lines, oblique surfaces, rounded surfaces, holes, irregular surfaces, castings, and thin-walled objects. The chapter ends with several intersection problems. These problems serve as a good way to pull together orthographic views and projection theory.

Chapter 6 presents sectional views and introduces the Hatch and Gradient commands. The chapter includes multiple, broken-out, and partial sectional views and shows how to draw an S-break for a hollow cylinder.

Chapter 7 covers auxiliary views and shows how to use the Snap, Rotate command to create axes aligned with slanted surfaces. Secondary auxiliary views are also discussed. Solid modeling greatly simplifies the determination of the true shape of a line or plane, but a few examples of secondary auxiliary views help students refine their understanding of orthographic views and eventually the application of UCSs.

Chapter 8 shows how to dimension both two-dimensional shapes and orthographic views. The Dimension command and its associated commands are demonstrated, including how to use the Dimension Styles tool. The commands are presented as needed to create required dimensions. The conventions demonstrated are in compliance with ANSI Y32. The exercise problems for Chapter 8 have been extensively revised and are all presented on grids so that the dimensions can be easily derived.

Chapter 9 introduces tolerances. First, the chapter shows how to draw dimensions and tolerances using the Dimension and Tolerance commands, among others. The chapter ends with an explanation of fits and shows how to use the tables included in the appendix to determine the maximum and minimum tolerances for matching holes and shafts.

Chapter 10 continues the discussion of tolerancing using geometric tolerances and explains how AutoCAD® 2006 can be used to create geometric tolerance symbols directly from dialog boxes. Both profile and positional tolerances are explained. The overall intent of the chapter is to teach students how to make parts fit together. Fixed and floating fastener applications are discussed, and design examples are given for both conditions.

Chapter 11 covers how to draw and design using standard fasteners, including bolts, nuts, machine screws, washers, hexagon heads, square heads, set screws, rivets, and springs. Students are shown how to create wblocks of the individual thread representations and how to use them for different size requirements.

Chapter 12 discusses assembly drawings, detail drawings, and parts lists. Instructions for drawing title blocks, tolerance blocks, release blocks, and revision blocks, and for inserting drawing notes are also included to give students better preparation for industrial practices. Several new exercise problems have been added to the chapter.

Chapter 13 presents gears, cams, and bearings. The intent of the chapter is to teach how to design using gears selected from a manufacturer's catalog. The chapter shows how to select bearings to support gear shafts and how to tolerance holes in support plates to maintain the desired center distances of meshing gears. The chapter also shows how to create a displacement diagram and then draw the appropriate cam profile.

Chapter 14 introduces AutoCAD® 3-D capabilities. It teaches students about AutoCAD® 3-D commands and coordinate system definition before introducing them to surface and solid models. Both WCS and UCS are explained and demonstrated along with Preset and View commands. 3-D primitives are introduced and used to create simple shapes. The chapter concludes by showing how to create orthographic views from the drawn 3-D shapes.

Chapter 15 extends the discussion of Chapter 14 to cover surface modeling. The basic geometric shapes of the Surfaces toolbar are presented as well as the Revsurf, Tabsurf, Rulesurf, 3D Face, and 3D Mesh commands. All the surface commands are demonstrated and used to create 3-D shapes.

Chapter 16 introduces solid modeling and includes the Solids Editing commands. The Solid and Solids Editing toolbars are demonstrated and used with the Union and Subtract commands to create 3-D shapes. Orthographic views are then created from the solid shapes. More complex shapes are created using the Extrude, Section, and Slice commands. The chapter concludes with several exercise problems that demonstrate a solid modeling approach to intersection problems as originally introduced at the end of Chapter 5. The chapter also includes several design exercise problems.

Chapter 17 presents a solid modeling approach to descriptive geometry. For example, a plane is drawn as a solid that is 0.00001 inch thick. AutoCAD®'s solid modeling and other commands are then used to manipulate the plane. The true lengths of lines and shapes of planes, point and plane locations, and properties between lines and planes are discussed. Piercing points and line visibility are also covered.

Online Instructor Materials

To access supplementary materials online, instructors need to request an instructor access code. Go to **www.prenhall.com,** click the **Instructor Resource Center** link, and then click **Register Today** for an instructor access code. Within 48 hours after registering you will receive a confirming e-mail including an instructor access code. Once you have received your code, go the site and log on for full instructions on downloading the materials you wish to use.

Autodesk Learning License

Through a recent agreement with AutoCAD publisher, Autodesk®, Prentice Hall now offers the option of purchasing *Engineering Graphics with AutoCAD 2006* with either a 180-day or a 1-year student software license agreement. This provides adequate time for a student to complete all the activities in this book. The software is functionally identical to the professional license, but is intended **for student or faculty personal use only.** It is not for professional use. For more information about this book and the Autodesk Learning License, contact your local Pearson Prentice Hall sales representative, or contact our National Marketing Manager, Jimmy Stephens at 1 (800) 228-7854 x3725 or at Jimmy_Stephens@prenhall.com. For the name and number of your sales rep, please contact Prentice Hall Faculty Services at 1 (800) 526-0485.

此为试读,需要完整PDF请访问: www.ertongbook.com

ACKNOWLEDGMENTS

I would like to thank the following reviewers. Their comments and suggestions were most helpful in creating this and previous editions: Anthony Duva, Wentworth Institute of Technology; Dale M. Gerstenecker, St. Louis Community College at Florissant; John Loebach, Spoon River College; N. S. Malladi, Ph.D., University of South Alabama; and Jack Zhou, Drexel University.

Thanks to Debbie Yarnell and Judy Casillo, the managing editor who pulled it all together; to Lisa Garboski; and to David, Maria, Randy, Lisa, Hannah, Wil, Madison, Jack, Luke, and Cheryl for their continued support.

James D. Bethune
Boston University

Contents

Chapter 1—Getting Started

1-1 Introduction 2
1-2 Toolbars 3
1-3 The Command: Line Box 7
1-4 Command Tools 8
1-5 Starting a New Drawing 8
1-6 Naming a Drawing 8
1-7 Drawing Units 10
1-8 Drawing Limits 12
1-9 Grid and Snap 13
1-10 Sample Problem SP1-1 15
1-11 Save and Save As 16
1-12 Open 16
1-13 Exit 16
1-14 Exercise Problems 18

Chapter 2—Fundamentals of 2-D Construction

2-1 Introduction 21
2-2 Line—Random Points 21
2-3 Erase 23
2-4 Line—Snap Points 24
2-5 Line—Coordinate Values 25
2-6 Line—Dynamic Inputs 26
2-7 Construction Line 27
2-8 Circle 30
2-9 Circle Centerlines 32
2-10 Polyline 34
2-11 Spline 36
2-12 Ellipse 37
2-13 Rectangle 40
2-14 Polygon 40
2-15 Point 42
2-16 Text 42
2-17 Move 46
2-18 Copy 46
2-19 Offset 47
2-20 Mirror 48
2-21 Array 48
2-22 Rotate 50
2-23 Trim 50
2-24 Extend 51
2-25 Break 52
2-26 Chamfer 53
2-27 Fillet 54
2-28 Table 54
2-29 Exercise Problems 57

Chapter 3—More Advanced Commands

3-1 Introduction 69
3-2 Osnap 69
3-3 Osnap—Endpoint 71
3-4 Osnap—Snap From 71
3-5 Osnap—Midpoint 72
3-6 Osnap—Intersection 73
3-7 Osnap—Apparent Intersection 73
3-8 Osnap—Center 74
3-9 Osnap—Quadrant 74
3-10 Osnap—Perpendicular 74
3-11 Osnap—Tangent 75
3-12 Osnap—Nearest 76
3-13 Sample Problem SP3-1 76
3-14 Sample Problem SP3-2 77
3-15 Grips 78
3-16 Grips—Extend 79
3-17 Grips—Move 80
3-18 Grips—Rotate 80
3-19 Grips—Scale 81
3-20 Grips—Mirror 81
3-21 Blocks 82
3-22 Working with Blocks 84
3-23 Wblock 87
3-24 Dynamic Blocks 89
3-25 Layers 96
3-26 Attributes 104
3-27 Title Blocks with Attributes 109
3-28 Edit Polyline 111
3-29 Edit Spline 111
3-30 Edit Text 112
3-31 Constructing the Bisector of an Angle—Method I 113
3-32 Constructing the Bisector of an Angle—Method II 114
3-33 Constructing an Ogee Curve (S-Curve) with Equal Arcs 114
3-34 Constructing a Parabola 115
3-35 Constructing a Hyperbola 115
3-36 Constructing a Spiral 116
3-37 Constructing a Helix 117
3-38 Designing Using Shape Parameters 117
3-39 Exercise Problems 120

Chapter 4—Sketching

4-1 Introduction 139
4-2 Establishing Your Own Style 139
4-3 Graph Paper 139
4-4 Pencils 140
4-5 Lines 140
4-6 Proportions 141
4-7 Curves 142
4-8 Sample Problem SP4-1 143
4-9 Isometric Sketches 144
4-10 Sample Problem SP4-2 146
4-11 Oblique Sketches 147
4-12 Perspective Sketches 148
4-13 Working in Different Orientations 150
4-14 Exercise Problems 151

Chapter 5—Orthographic Views

5-1 Introduction 163
5-2 Three Views of an Object 163
5-3 Visualization 164
5-4 Hidden Lines 166
5-5 Hidden Line Conventions 166
5-6 Drawing Hidden Lines 167
5-7 Precedence of Lines 171
5-8 Slanted Surfaces 171
5-9 Projection Between Views 172
5-10 Sample Problem SP5-1 172
5-11 Compound Lines 173
5-12 Sample Problem SP5-2 174
5-13 Oblique Surfaces 175
5-14 Sample Problems SP5-3 176
5-15 Rounded Surfaces 177
5-16 Sample Problem SP5-4 178
5-17 Holes 178
5-18 Holes in Slanted Surfaces 181
5-19 Cylinders 183
5-20 Sample Problem SP5-5 184
5-21 Cylinders with Slanted and Rounded Surfaces 185
5-22 Sample Problem SP5-6 186
5-23 Drawing Conventions and Cylinders 187
5-24 Irregular Surfaces 188
5-25 Sample Problem SP5-7 188
5-26 Hole Callouts 191
5-27 Castings 192
5-28 Sample Problem SP5-8 194
5-29 Thin-Walled Objects 195
5-30 Sample Problem SP5-9 196
5-31 Intersections 197
5-32 Sample Problem SP5-10 197
5-33 Sample Problem SP5-11 199
5-34 Sample Problem SP5-12 199
5-35 Designing by Modifying an Existing Part 202
5-36 Exercise Problems 204

Chapter 6—Sectional Views

6-1 Introduction 235
6-2 Cutting Plane Lines 237
6-3 Section Lines 240
6-4 Hatch 241
6-5 Sample Problem SP6-1 243
6-6 Styles of Section Lines 244
6-7 Sectional View Location 244
6-8 Holes in Sections 245
6-9 Gradients 246
6-10 Offset Sections 247
6-11 Multiple Sections 248
6-12 Aligned Sections 248
6-13 Drawing Conventions in Sections 248
6-14 Half, Partial, and Broken-out Sectional Views 249
6-15 Removed Sectional Views 250
6-16 Breaks 250
6-17 Sectional Views of Castings 252
6-18 Exercise Problems 254

Chapter 7—Auxiliary Views

7-1 Introduction 269
7-2 Projection Between Normal and Auxiliary Views 270
7-3 Sample Problem SP7-1 272
7-4 Transferring Lines Between Views 273
7-5 Sample Problem SP7-2 275
7-6 Projecting Rounded Surfaces 276
7-7 Sample Problem SP7-3 276
7-8 Projecting Irregular Surfaces 277
7-9 Sample Problem SP7-4 277
7-10 Sample Problem SP7-5 277
7-11 Partial Auxiliary Views 279
7-12 Sectional Auxiliary Views 279
7-13 Auxiliary Views of Oblique Surfaces 280
7-14 Secondary Auxiliary Views 281
7-15 Sample Problem SP7-6 284
7-16 Secondary Auxiliary View of an Ellipse 285
7-17 Exercise Problems 286

Chapter 8—Dimensioning

8-1 Introduction 302
8-2 Terminology and Conventions 302
8-3 Linear Dimension 304
8-4 Dimension Styles 308
8-5 Units 311
8-6 Aligned Dimensions 313
8-7 Radius and Diameter Dimensions 313
8-8 Angular Dimensions 317
8-9 Ordinate Dimensions 318
8-10 Baseline Dimensions 320
8-11 Continue Dimension 322
8-12 Quick Dimension 323
8-13 Center Mark 324
8-14 Quick Leader 324
8-15 Dimension Edit 327
8-16 Tolerances 328
8-17 Dimensioning Holes 328
8-18 Placing Dimensions 331
8-19 Fillets and Rounds 331
8-20 Rounded Shapes (Internal) 331
8-21 Rounded Shapes (External) 332
8-22 Irregular Surfaces 332
8-23 Polar Dimensions 334
8-24 Chamfers 334
8-25 Knurling 335
8-26 Keys and Keyseats 336
8-27 Symbols and Abbreviations 337
8-28 Symmetry and Centerline 337
8-29 Dimensioning to Points 337
8-30 Coordinate Dimensions 338
8-31 Sectional Views 339
8-32 Orthographic Views 339
8-33 Very Large Radii 340
8-34 Exercise Problems 341

Chapter 9—Tolerancing

9-1 Introduction 359
9-2 Direct Tolerance Methods 359
9-3 Tolerance Expressions 360
9-4 Understanding Plus and Minus Tolerances 360
9-5 Creating Plus and Minus Tolerances Using AutoCAD 361
9-6 Limit Tolerances 363
9-7 Creating Limit Tolerances Using AutoCAD 364
9-8 Angular Tolerances 365
9-9 Standard Tolerances 366
9-10 Double Dimensioning 366
9-11 Chain Dimensions and Baseline Dimensions 367
9-12 Tolerance Studies 369
9-13 Rectangular Dimensions 369
9-14 Hole Locations 370
9-15 Choosing a Shaft for a Toleranced Hole 370

9-16 Sample Problem SP9-1 371
9-17 Sample Problem SP9-2 372
9-18 Standard Fits (Metric Values) 372
9-19 Nominal Sizes 374
9-20 Hole and Shaft Basis 374
9-21 Sample Problem SP9-3 375
9-22 Standard Fits (Inch Values) 375
9-23 Sample Problem SP9-4 375
9-24 Preferred and Standard Sizes 376
9-25 Surface Finishes 376
9-26 Surface Control Symbols 379
9-27 Design Problems 380
9-28 Exercise Problems 384

Chapter 10—Geometric Tolerances

10-1 Introduction 397
10-2 Tolerances of Form 398
10-3 Flatness 398
10-4 Straightness 398
10-5 Straightness (RFS and MMC) 399
10-6 Circularity 401
10-7 Cylindricity 402
10-8 Geometric Tolerances Using AutoCAD 403
10-9 Tolerances of Orientation 409
10-10 Datums 409
10-11 Perpendicularity 410
10-12 Parallelism 412
10-13 Angularism 412
10-14 Profiles 412
10-15 Runouts 414
10-16 Positional Tolerances 415
10-17 Virtual Condition 416
10-18 Floating Fasteners 417
10-19 Sample Problem SP10-1 418
10-20 Sample Problem SP10-2 418
10-21 Fixed Fasteners 419
10-22 Sample Problem SP10-3 420
10-23 Design Problems 421
10-24 Exercise Problems 423

Chapter 11—Threads and Fasteners

11-1 Introduction 443
11-2 Thread Terminology 443
11-3 Thread Callouts (Metric Units) 443
11-4 Thread Callouts (English Units) 444
11-5 Thread Representations 445
11-6 Orthographic Views of Internal Threads 450
11-7 Sectional Views of Internal Thread Representations 450
11-8 Types of Threads 451
11-9 How to Draw an External Square Thread 452
11-10 How to Draw an Internal Square Thread 453
11-11 How to Draw an External Acme Thread 453
11-12 Bolts and Nuts 455
11-13 Screws 455
11-14 Studs 455
11-15 Head Shapes 456
11-16 Nuts 459
11-17 Sample Problem SP11-1 462
11-18 Sample Problem SP11-2 462
11-19 Standard Screws 463
11-20 Set Screws 464
11-21 Washers 465
11-22 Keys 466
11-23 Rivets 466
11-24 Springs 468
11-25 DesignCenter 470
11-26 Exercise Problems 473

Chapter 12—Working Drawings

12-1 Introduction 483
12-2 Assembly Drawings 484
12-3 Drawing Formats (Templates) 486
12-4 Title Block 489
12-5 Revision Block 490
12-6 Tolerance Block 491
12-7 Release Block 491
12-8 Parts List (Bill of Materials) 492
12-9 Detail Drawings 493
12-10 First-Angle Projection 494
12-11 Drawing Notes 495
12-12 Design Layouts 495
12-13 Sample Problem SP12-1 496
12-14 Exercise Problems 500

Chapter 13—Gears, Bearings, and Cams

13-1 Introduction 521
13-2 Types of Gears 521
13-3 Gear Terminology—Spur 521
13-4 Spur Gear Drawings 523
13-5 Sample Problem SP13-1 524
13-6 Sample Problem SP13-2 526
13-7 Sample Problem SP13-3 528
13-8 Selecting Spur Gears 528
13-9 Center Distance Between Gears 528
13-10 Sample Problem SP13-4 528

13-11 Combining Spur Gears 531
13-12 Gear Terminology—Bevel 533
13-13 How to Draw Bevel Gears 534
13-14 Worm Gears 535
13-15 Helical Gears 537
13-16 Racks 538
13-17 Ball Bearings 539
13-18 Sample Problem SP13-5 539
13-19 Bushings 541
13-20 Sample Problem SP13-6 542
13-21 Cam Displacement Diagrams 543
13-22 Cam Motions 544
13-23 Cam Followers 547
13-24 Sample Problem SP13-7 548
13-25 Exercise Problems 550

Chapter 14—Fundamentals of 3-D Drawing

14-1 Introduction 559
14-2 The World Coordinate System 559
14-3 Viewpoints 561
14-4 User Coordinate Systems (UCSs) 564
14-5 Working with UCSs 566
14-6 Sample Problem SP14-1 568
14-7 Orthographic Views 573
14-8 Elev 576
14-9 Using the Elev Command to Create Objects 577
14-10 Exercise Problems 581

Chapter 15—Surface Modeling

15-1 Introduction 587
15-2 Box 589
15-3 Wedge 589
15-4 Pyramid 590
15-5 Cone 593
15-6 Sphere 594
15-7 Dome 595
15-8 Dish 596
15-9 Torus 596
15-10 3-D Face 597
15-11 3-D Mesh 598
15-12 Revolved Surface 599
15-13 Tabulated Suface 601
15-14 Ruled Surface 602
15-15 Edge Surface 604
15-16 Combining Surfaces 605
15-17 Using Surfaces with a UCS 606
15-18 Sample Problem SP15-1 611
15-19 Exercise Problems 618

Chapter 16—Solid Modeling

16-1 Introduction 630
16-2 Box 630
16-3 Sphere 632
16-4 Cylinder 632
16-5 Cone 633
16-6 Wedge 634
16-7 Torus 636
16-8 Extrude 637
16-9 Revolve 638
16-10 Slice 639
16-11 Section 640
16-12 Interfere 643
16-13 Union and Subtract 644
16-14 Solid Modeling and UCSs 645
16-15 Combining Solid Objects 647
16-16 Intersecting Solids 652
16-17 Solid Models of Castings 656
16-18 Thread Representations in Solid Models 661
16-19 List 661
16-20 Massprop 663
16-21 Face and Edge Editing 663
16-22 Design Problem 668
16-23 Exercise Problems 675

Chapter 17—Descriptive Geometry

17-1 Introduction 703
17-2 Orthographic Projection 703
17-3 The True Length of a Line 706
17-4 The True Shape of a Plane 710
17-5 Locating a Line in a Plane 714
17-6 Locating a Point in a Plane 716
17-7 Visibility of a Line 718
17-8 Piercing Points 719
17-9 Distance Between a Line and a Point 723
17-10 Distance Between Two Lines 725
17-11 Angle Between a Plane and a Line 726
17-12 Angle Between Two Planes 728
17-13 Intersection 730
17-14 Exercise Problems 732

此为试读,需要完整PDF请访问: www.ertongbook.com

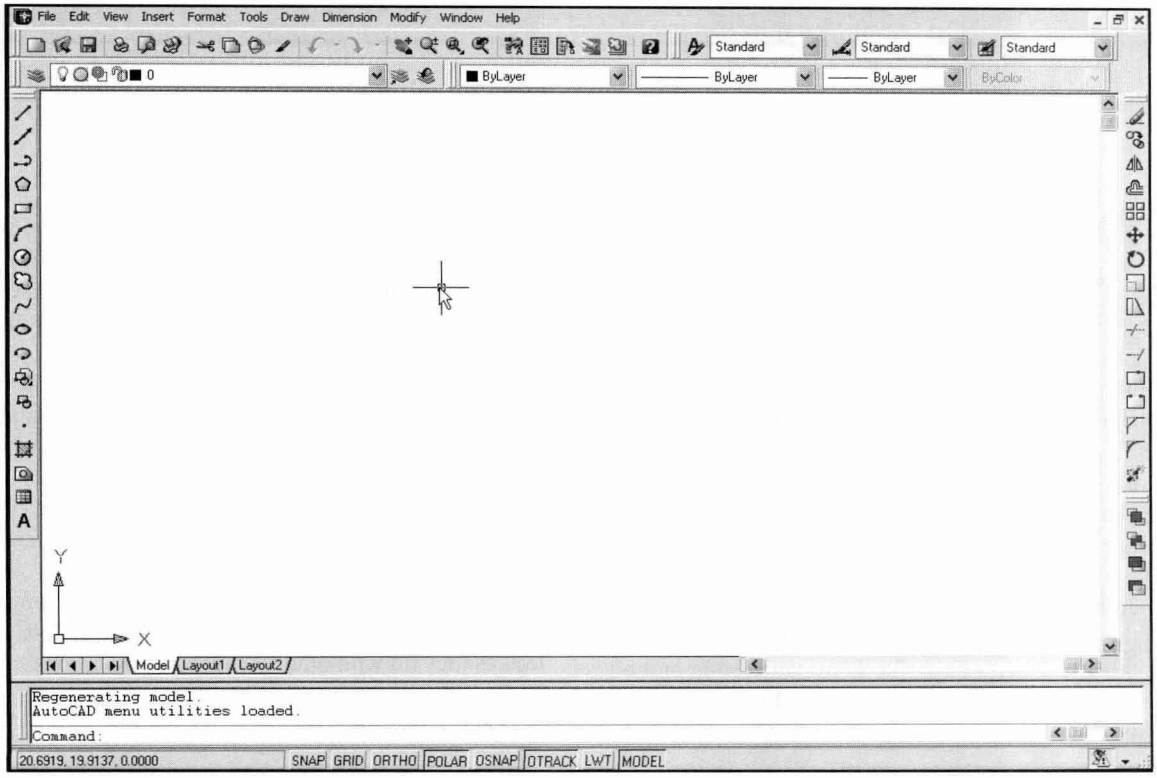
Appendix

A-1 Wire and Sheet Metal Gauges 743
A-2 American Standard Clearance Locational Fits 744
A-3 American Standard Running and Sliding Fits 745
A-4 American Standard Transition Locational Fits 746
A-5 American Standard Interference Locational Fits 747
A-6 American Standard Force and Shrink Fits 747
A-7 Preferred Clearance Fits—Cylindrical Fits 748
A-8 Preferred Transition and Interference Fits—Cylindrical Fits 749
A-9 Preferred Clearance Fits—Cylindrical Fits 750
A-10 Preferred Transition and Interference Fits—Cylindrical Fits 751
A-11 American National Standard Type A Plain Washers 752
A-12 American National Standard Helical Spring Lock Washers 753
A-13 American National Standard Internal–External Tooth Lock Washers 753
A-14 British Standard Bright Metal Washers—Metric Series 754
A-15 American National Standard and Unified Standard Square Bolts 755
A-16 American National Standard and Unified Standard Hex Head Screws 756
A-17 Coarse-Thread Series, UNC, UNRC, and NC—Basic Dimensions 756
A-18 Fine-Thread Series, UNC, UNRC, and NC—Basic Dimensions 757
A-19 American National Standard General-Purpose Acme Thread Form—Basic Dimensions 758
A-20 60° Stub Threads 758
A-21 American National Standard Slotted 100° Flat Countersunk Head Machine Screws 759
A-22 American National Standard Slotted Truss Head Machine Screws 760
A-23 American National Standard Plain and Slotted Hexagon Head Machine Screws 761
A-24 Slotted Round Head Machine Screws 762
A-25 American National Standard Square Head Setscrews 763
A-26 American National Standard Square Head Setscrews 764
A-27 American National Standard Slotted Headless Setscrews 765
A-28 Lengths for Threaded Fasteners 766
A-29 Lengths for Metric Threaded Fasteners 766
A-30 American National Standard Square and Hexagon Machine Screw Nuts 767
A-31 Standard Twist Drill Sizes (Inches) 768
A-32 Standard Twist Drill Sizes (Millimeters) 768

Index 769

CHAPTER 1

Getting Started



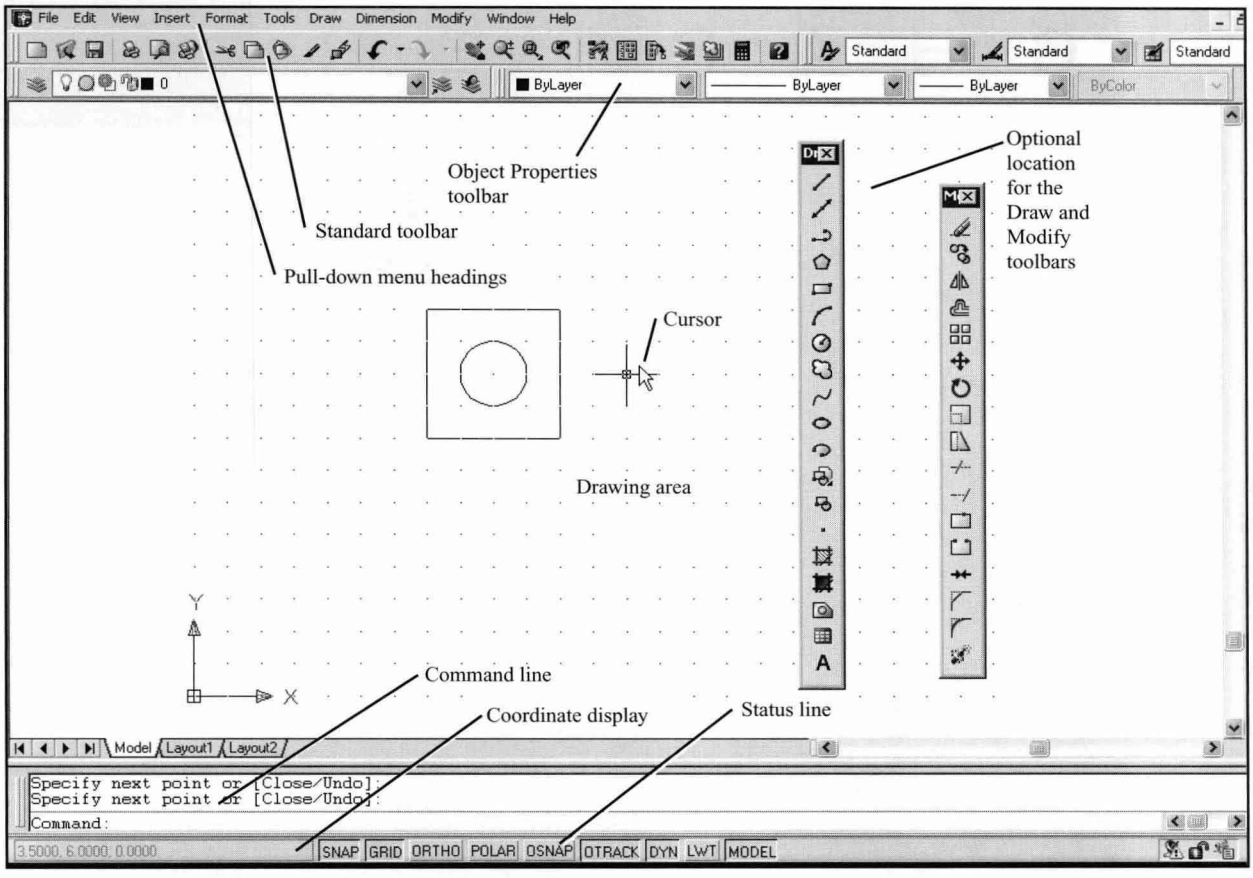


Figure 1-1

1-1 INTRODUCTION

This chapter explains the various aspects of the AutoCAD 2006 for Windows drawing screen and shows how they can be manipulated. Figure 1-1 shows a typical initial AutoCAD Windows screen. Your screen may look slightly different because of your selected screen resolution values.

The top line displays the Windows pull-down menus for exiting a program and changing a program. It is assumed that the reader is familiar with basic Windows operations.

The second line is the Standard toolbar and contains a group of the most commonly used commands.

The third line contains some command icons and an area that shows the current, or docked, object properties that are active.

The line below the drawing portion of the screen displays the name of the current drawing. Since no drawing has been named, the line reads "Drawing1.dwg". Once a drawing name has been defined, it will appear at the bottom of the screen.

The bottom left corner of the drawing screen shows the coordinate display position of the horizontal, vertical crosshairs in terms of an X,Y coordinate value, whose origin is the lower left corner of the drawing screen.

The commands listed on the bottom line (status line) are displayed in light gray when they are off, and in black when they are on.

The horizontal and vertical scroll bars can be used to move the drawing screen up, down, right, or left; they function as they do with other Windows applications.

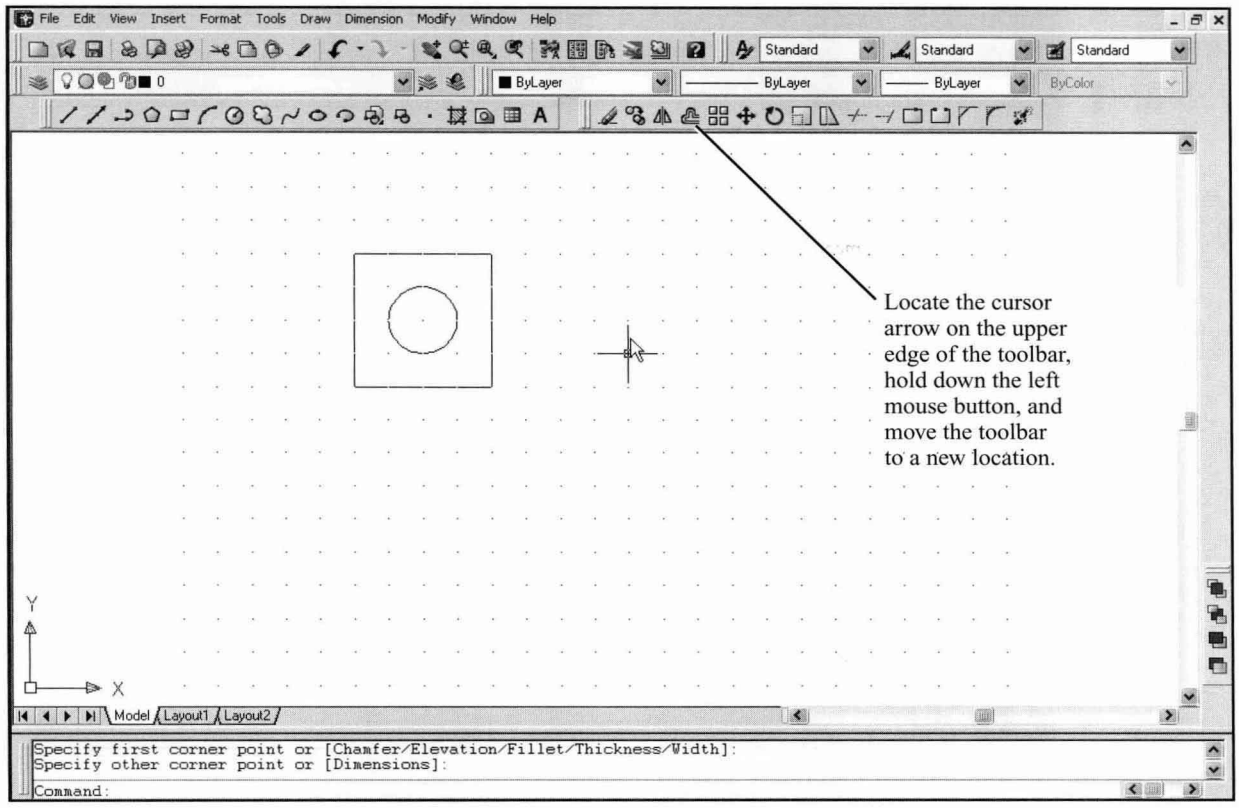


Figure 1-2

The large open area in the center of the screen is called the *drawing screen,* or *drawing editor.* The two rectangular boxes of command icons located along the left edge of the drawing screen are the Draw and Modify toolbars. They can be moved around the screen as shown in Figure 1-2.

1-2 TOOLBARS

An AutoCAD toolbar contains a group of command icons located under a common heading. The initial AutoCAD as screen, shown in Figure 1-1, contains six toolbars: Layers, Standard, Object Properties, Styles, Draw, and Modify. There are 24 additional predefined toolbars, and you can create your own user-specific toolbars as needed.

To move a toolbar

See Figure 1-2.

1. Locate the cursor arrow on the heading Modify.
2. Press and hold down the left mouse button.

A light gray broken-line box appears around the edge of the toolbar.

3. Still holding the left mouse button down, move the gray outline box to a new location on the screen.
4. Release the left button.

The toolbar will appear in the new location.

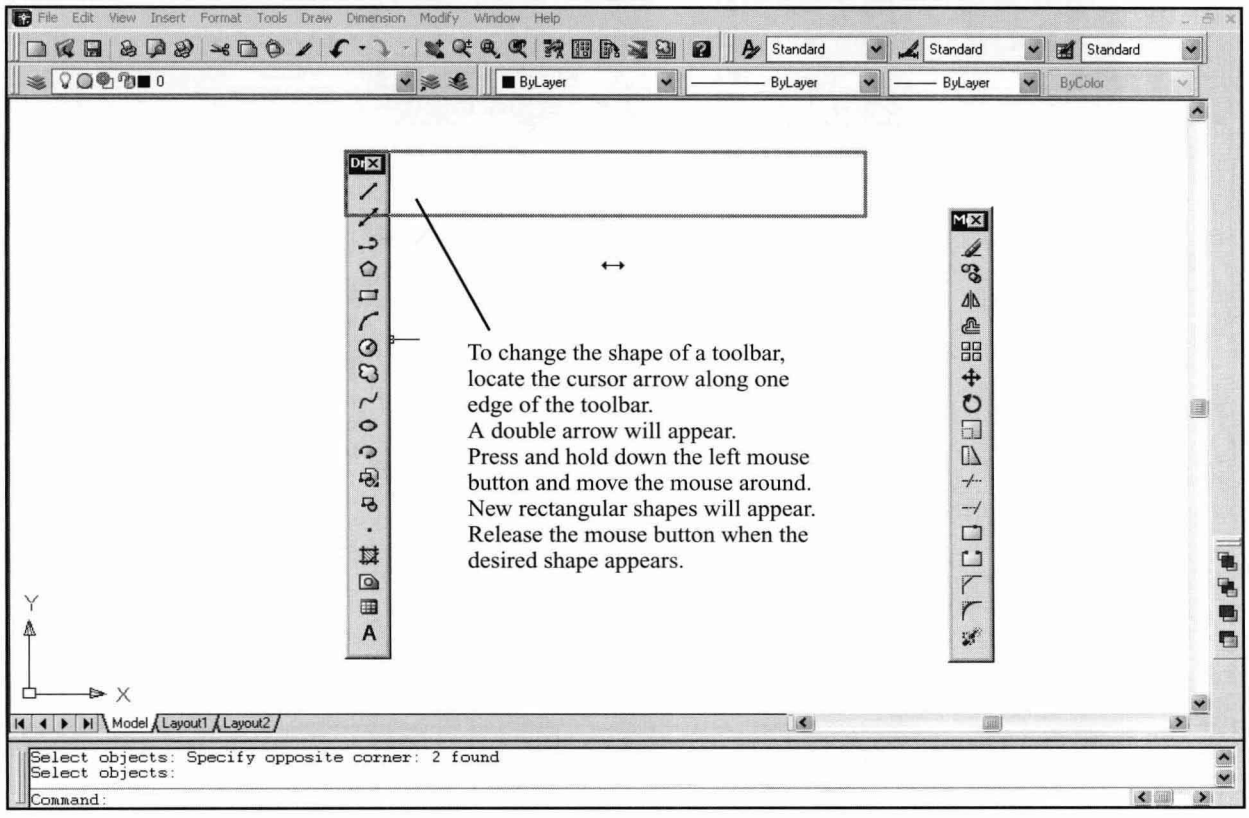


Figure 1-3

To change the shape of a toolbar

See Figure 1-3.

1. Locate the cursor arrow along the right edge of the Modify toolbox.

   A double arrow will appear.

2. Press and hold the left mouse button.

   A light gray broken-line box will appear around the outside of the toolbar.

3. Still holding the left mouse button down, move the mouse around and watch how the gray box changes shape.

4. When the gray toolbar shape is a long, vertical rectangle, release the left mouse button.

   A reshaped toolbar will appear.

To return the toolbar to its original location and shape

1. Locate the cursor arrow along the bottom or edge lines of the toolbar and return the toolbar to its original shape using the procedure outlined in Figure 1-3.
2. Move the reshaped toolbar to its original location along the left side of the drawing screen using the procedure outlined in Figure 1-2.

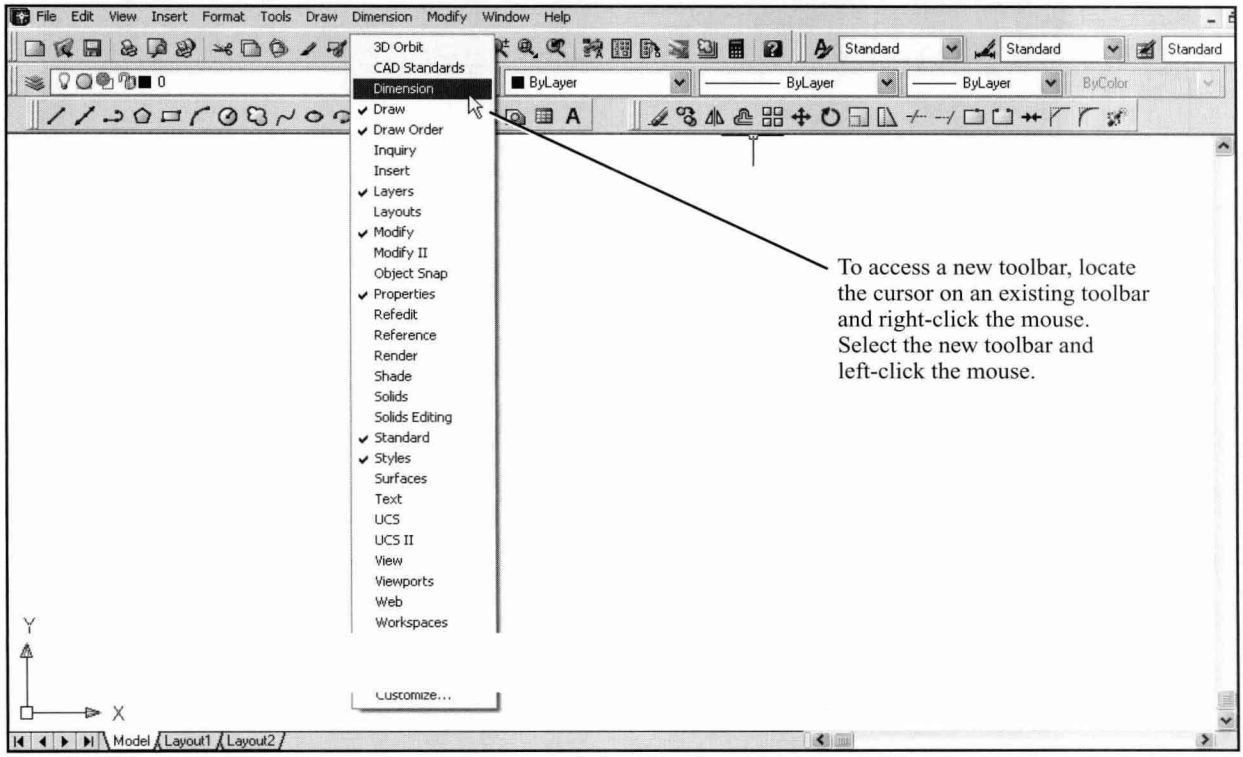


Figure 1-4

To add a new toolbar to the screen

See Figures 1-4 and 1-5.

1. Locate the cursor on any one of the existing toolbars and press the right mouse button. In this example the Standard toolbar was selected.

A list of the available toolbars will cascade down the screen.

2. Select a new toolbar and click the left mouse button. In this example, the Dimension toolbar was selected.

The selected toolbar will appear on the drawing screen. See Figure 1-5. You can move any toolbar or change its shape as described in Figures 1-2 and 1-3.

To remove a toolbar from the screen

1. Locate the cursor arrow on the check mark located in the upper right corner of the toolbar and press the left mouse button.

Figure 1-5 shows the Draw and Modify toolbars docked horizontally at the top of the drawing screen. The Dimension toolbar will initally appear within the drawing area of the screen, as will any other toolbar activated. Toolbars can then be moved to different locations, as explained. If the toolbar is located close to either the top or sides of the drawing screen, it will blend into the area surrounding the drawing area and will no longer be within the drawing area.

此为试读,需要完整PDF请访问: www.ertongbook.com