

# Engineering Design Graphics Using **CADKEY**® 5 and 6

*HUGH F. KEEDY*

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# **Engineering Design Graphics** **Using CADKEY® 5 and 6**

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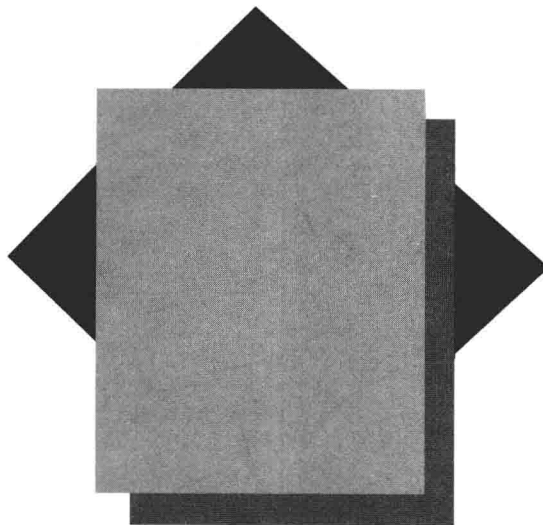
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**CADKEY**

***T***o my wife, Marge, for her supportive patience as the manuscript was being prepared.

H. K.

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G. T.

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# Preface

*Engineering Design Graphics Using CADKEY 5 and 6* is intended for use in an introductory engineering graphics course of one or more semesters. It teaches students effective graphic communication by giving them a solid foundation in the principles, techniques, and standards of engineering graphics and also by instructing them on how CADKEY can be an effective tool for producing accurate 3D models of their designs.

## Scope of the Material

The objective of this book is to give engineering students a thorough understanding of engineering graphics by stressing not only the technological advances in computer-generated design but also the traditional skills of lettering and freehand sketching. This book does not cover the time-consuming skill of drawing with the aid of drafting equipment because the availability of computers and computer-aided design software has made engineering machine drafting virtually obsolete.

Part I of the book covers lettering, scales, pictorial and orthographic sketching, visualization skills, auxiliary views, and dimensioning. Freehand sketching is stressed as a way of conceiving and refining design ideas before entering them into CADKEY. This is a brief introduction to engineering graphics and covers only those topics that are essential for the engineer to be an effective communicator. Parts I and II should be used together. The basic fundamentals of CADKEY contained in the first sections of Part II can be learned at the same time Sections 2 and 3, Lettering and Scales, are covered. You should immediately start developing 3D models with the computer after Section 4, Pictorial Sketching, is covered. Five paper developments are included at the end of the book; these can be cut out and glued together to form 3D paper models. These models can then be manipulated and used as an aid in visualizing the objects they represent. Section 5 deals with Orthographic Views. Computer generated 3D models can be converted into layouts of orthographic views of projection automatically with CADKEY's Picture It feature. Visualization and the identification of points, lines, and planes are covered in Section 6, Visualization. The 3D paper models can be used with the text description of visualizing and identifying features of a solid model. Finding auxiliary views of the true sizes of planes and sectional views of objects is covered in Section 7, Auxiliary Views. The details of dimensioning and tolerancing are in Section 8, Dimensioning.

Part II introduces students to computer-aided design using CADKEY. The 64 sections of this part each relate to a specific feature of CADKEY and are arranged so that the user will first learn the basic concepts of CADKEY and then the construction techniques. An extended preface that opens Part II further describes the organization of the material and the two types of exercises that are included. Students should create the two databases described there for use in the *For Practice* exercises that conclude most sections. The graphics principles of Part I are applied in the longer CADKEY exercises, and the total understanding of the basic CADKEY program prepares the user for its use in advanced applications discussed in Part III.

Part III covers advanced applications in CADKEY such as ANALYSIS, which allows students to give their design concepts a preliminary analysis, and CUTTING EDGE, which can simulate the manufacture of a part and produce the code that can direct a milling machine to produce the part. Though some knowledge of statics and thermodynamics is helpful in using these sections, it is not necessary. Also covered in Part III is the topic of concurrent engineering, a growing trend in industry that seeks to involve the engineer in all aspects of design development and manufacturing. This introduction to concurrent engineering will help students to begin to think beyond the preliminary design phase of a product to also consider design analysis and the product's eventual manufacture.

### Features of the Text

**Emphasis on Sketching:** Traditionally, introductory engineering graphics courses have stressed the use of drafting tools in design rendering. Though these tools help students produce clean, accurate drawings, they also made the drawing process tedious and time-consuming. However, many colleges and universities stress computer use and computer literacy for their engineering students, and a growing number require their engineering students to purchase personal computers. This trend allows students to use CAD software to produce accurate 2D and 3D designs more quickly and effectively than with drafting equipment, and eliminates the need for learning to use these instruments. Therefore, instead of teaching mechanical drafting, this book stresses the importance of strong freehand sketching and visualization skills as a precursor and companion to computer-aided design.

**Cut-Out Paper Models:** The book includes five paper models, which students can cut out and glue together to form 3D models. These models are designed to help students visualize and sketch pictorial and orthographic views of an object.

**CADKEY Aids:** Two tear-out sheets included at the end of the book serve as handy reference cards for CADKEY menus and Immediate Modes. Another tear-out sheet can be cut out and formed into a cube that is useful in visualizing the Views of CADKEY.

**Exercises:** In Part I, most examples use generic units, thus giving instructors the flexibility to assign a particular scale. Part II includes two types of exercises. The *For Practice* exercises that conclude most of the sections focus on fundamentals of CADKEY found in that section and can be completed in a few minutes. The 15 exercises that conclude Part II are more challenging and progress from a simple title block to assembly and exploded views. In Part III, the exercises take the form of hands-on tutorials. Students are able to follow along in the text as they practice the more advanced applications of CADKEY.

### Acknowledgments

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Suggestions and comments about the book's content and features will be valued and given special consideration in the preparation of any future editions.

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# Contents

## PART I      Fundamentals of Engineering Graphics

### Section 1    *Introduction*    3

- 1.1 Approach    3
- 1.2 Coverage    3

### Section 2    *Lettering*    5

- 2.1 Drawing Tools    5
- 2.2 Lettering Style    6
- 2.3 Vertical Capital Gothic Letters    6
- 2.4 Vertical Lowercase Gothic Letters    7
- 2.5 Vertical Gothic Numerals    8
- 2.6 Lettering Technique    9
  - Exercise 1*    10
  - Exercise 2*    11

### Section 3    *Scales*    13

- 3.1 Engineer's Scale    13
- 3.2 Metric Scale    13
- 3.3 Architect's Scale    15
- 3.4 Scale Ratio    15
  - Exercise 1*    16
  - Exercise 2*    17
  - Exercise 3*    18

### Section 4    *Pictorial Sketching*    19

- 4.1 Line Sketching    19
- 4.2 Isometric Sketches    20
- 4.3 Oblique Sketches    26
  - Exercise 1*    31
  - Exercise 2*    32



**Section 5    *Orthographic Views*    33**

- 5.1 Lines 33
- 5.2 Orthographic Projections 34
- 5.3 Sketching Orthographic Views 37
- 5.4 Choosing Views 39
- 5.5 Transferring Information 39
- 5.6 Revolution Conventions 41
  - Exercise 1* 42
  - Exercise 2* 43
  - Exercise 3* 44

**Section 6    *Visualization*    45**

- 6.1 Points 45
- 6.2 Lines 46
- 6.3 Line Comparison 46
- 6.4 Planes 49
  - Exercise 1* 53
  - Exercise 2* 54
  - Exercise 3* 55
  - Exercise 4* 56

**Section 7    *Auxiliary Views*    57**

- 7.1 Inclined Planes 57
- 7.2 Oblique Planes 59
- 7.3 Section Views 61
  - Exercise 1* 66
  - Exercise 2* 67

**Section 8    *Dimensioning*    69**

- 8.1 Dimensioning Principles 69
- 8.2 Geometric Shapes 70
- 8.3 Dimension Representation 73
- 8.4 Fillets and Rounds 73
- 8.5 Finished Surfaces 74
- 8.6 Location Dimensions 74
- 8.7 Machined Holes 74
- 8.8 Limit Dimensions and Tolerances 75
- 8.9 Chain and Datum Dimensions 77
  - Exercise 1* 78
  - Exercise 2* 79

---

**PART II      CADKEY***Preface to CADKEY 83*

---

**Introduction to CAD and CADKEY**

---

**Section 9    *Role of CAD and the Database 87***

- 9.1    Brief History of CAD 87
- 9.2    The Database as the Central Product of CAD 88
- 9.3    Types of CAD 90
- 9.4    Where is CAD Now? 91

---

**Mechanics of Operating CADKEY: Sections 10-19**

---

**Section 10   *Getting CADKEY Started 92***

- 10.1   System Configuration 92
- 10.2   Running CADKEY 93
- 10.3   Cursor Control Using Arrow Keys 94
- 10.4   Cursor Control Using a Mouse or Digitizer 94
- 10.5   Dialog Boxes 94
- 10.6   Concerning External Storage Disks 94
- 10.7   Saving Your Work 95

**Section 11   *The Keyboard and CADKEY 96***

- 11.1   Function Keys 96
- 11.2   ESC Key 96
- 11.3   ALT and CTRL Keys 97
- 11.4   Numeric Keypad 97
- 11.5   Arrow Keys 97

**Section 12   *The CADKEY Screen Display 98***

- 12.1   The System Mode Area 98
- 12.2   The Menu Area 98
- 12.3   The Break Area 100
- 12.4   The Status Window 100
- 12.5   The Cursor Tracking Window 101
- 12.6   The History Line 102
- 12.7   The Prompt Line 102
- 12.8   The Drawing Window 102

**Section 13   *The CADKEY Menus 103***

- 13.1   Selection of Menu Items 103
- 13.2   The Main Menu of Model Mode 103
- 13.3   The Main Menu of Drawing Layout Mode 104

13.4	First-Level Submenus of Model Mode	105
13.5	The Position Menu	106
13.6	The Selection Menu	109
13.7	The “Set Mask” Dialog Box and the Masking Menu	112
Section 14	<b><i>Immediate Modes</i></b>	<b>114</b>
Section 15	<b><i>Dialog Boxes</i></b>	<b>116</b>
Section 16	<b><i>HELP and Tutor</i></b>	<b>118</b>
16.1	HELP	118
16.2	Tutor	119
Section 17	<b><i>On-Line Calculator</i></b>	<b>120</b>
Section 18	<b><i>System Commands (SYSCMD)</i></b>	<b>122</b>
Section 19	<b><i>Macros</i></b>	<b>123</b>
19.1	Overview of Macros	123
19.2	To Create and Use a Macro	124
<hr/> <b>Basic Concepts of CADKEY: Sections 20-29</b> <hr/>		
Section 20	<b><i>Model Mode and Drawing Layout Mode</i></b>	<b>126</b>
20.1	Introduction to the Two Modes	126
20.2	Identifying the Two Modes as You Work	126
20.3	The Drawing Layout Mode Main Menu	127
20.4	Accessing the Main Menu of Model Mode	128
20.5	Steps in Creating a Drawing Using Drawing Layout Mode	128
Section 21	<b><i>Coordinate Systems and Views</i></b>	<b>135</b>
21.1	World Coordinates	135
21.2	View Coordinates and Construction Planes	135
21.3	Conceptualizing World, View, and Construction Systems	136
21.4	Standard Views in CADKEY	137
21.5	User-Defined Views	138
21.6	To Change Views	138
21.7	Display of Coordinate Axes	138
21.8	Points to Remember	139
Section 22	<b><i>Viewports</i></b>	<b>141</b>
22.1	Using Multiple Viewports	141
22.2	To Set Viewport Configuration	142

- 22.3 To Change the Primary Viewport 142
- 22.4 To Select a Viewport Arrangement 143
- 22.5 To Add a Viewport to the Display 143
- 22.6 To Remove a Viewport from the Display 143
- 22.7 To Move a Viewport About on the Display 144
- 22.8 To Resize a Viewport 144

## Section 23 *Levels* 145

- 23.1 To Change the Active Level 146
- 23.2 To Change Visibility of a Level 146
- 23.3 To List Current Visibility of Levels 147
- 23.4 To Move Entities from One Level to Another 147
- 23.5 To Copy Entities from One Level to Another 147
- 23.6 Naming of Levels 148
- 23.7 Masking of Levels 149

## Section 24 *2D and 3D Construction Modes* 150

- 24.1 Understanding the Modes 150
- 24.2 Construction in 3D Mode 150
- 24.3 Differences between 2D and 3D Location of Points 151

## Section 25 *Construction Planes* 153

- 25.1 Standard Construction Planes 153
- 25.2 User-Defined Construction Planes 153
- 25.3 To Define a Construction Plane 154
- 25.4 Use of Construction Planes 155
- 25.5 Construction View Axes 155

## Section 26 *Working Depth* 157

## Section 27 *User-Defined Views* 159

- 27.1 Saving of User-Defined Views 159
- 27.2 Descriptors of Views 160
- 27.3 Plane of Entity Method (ENTITY Option) 160
- 27.4 The Rotation Method (NEW-KEY IN Option) 160
- 27.5 The Three-Point Method (NEW-3 PTS Option) 162
- 27.6 Rotation of Axes Method (NEW-ROT AXES Option) 162
- 27.7 Rotation of Object Method (NEW-ROT PART Option) 163
- 27.8 Defined Normal Method (NEW-2PTS Option) 163

## Section 28 *Grouping* 164

- 28.1 To Define a Group 164
- 28.2 To Add Entities to an Existing Group 165
- 28.3 To Degroup All or Part of an Existing Group 165

- 28.4 To Delete a Group From the Group Table 165
- 28.5 To List All Groups of the Database 165
- 28.6 To Select an Entity from a Group 165

**Section 29 *Snap and Grid* 167**

- 29.1 Snap 167
- 29.2 Grid 168

---

**Basic Manipulations: Sections 30-33**

---

**Section 30 *Display Scaling, Panning and Redraw* 169**

- 30.1 Create Databases Full Size 169
- 30.2 The Screen Scale S 169
- 30.3 To Change Screen Scale to a Specified Value 170
- 30.4 Other Immediate Modes that Change Screen Scale 170
- 30.5 Panning (ALT-P) 171
- 30.6 Redraw (CTRL-R) 171

**Section 31 *Deleting Entities* 172**

- 31.1 Deleting Using CTRL-Q 172
- 31.2 Deleting Coinciding Entities 172
- 31.3 Deleting With Delete (F8) of the Main Menu 173
- 31.4 Deleting by Removing Visibility 176
- 31.5 Concerning Deleted Entities 176
- 31.6 Other Types of Deletion 176

**Section 32 *Recalling Entities and UNDO* 178**

- 32.1 To Recall the Last Entity that Was Displayed 178
- 32.2 To Recall More than One Entity 178
- 32.3 Discussion of Deleted Entities and Their Recall 179
- 32.4 The UNDO Function 179

**Section 33 *Entity Attributes* 181**

- 33.1 Setting Attributes of Entities Not Yet Created 181
- 33.2 Changing Attributes of Existing Entities 183

---

**Entity and Database Creation: Sections 34-42**

---

**Section 34 *Lines* 184**

- 34.1 Restrictions on Line Construction 184
- 34.2 The Lines Submenu 184
- 34.3 Rectangles 188
- 34.4 Line Limit 188

**Section 35 *Circles* 190**

---

Section 36 *Arcs* 193

Section 37 *Points* 197

Section 38 *Fillets and Chamfers* 199

- 38.1 Fillets 199
- 38.2 QTRIM (CADKEY 6 only) 200
- 38.3 Chamfers 200

Section 39 *Polylines and Polygons* 202

- 39.1 POLYLIN 202
- 39.2 POLYGON 203
- 39.3 Filling an Existing Polyline or Polygon 203

Section 40 *Splines* 204

- 40.1 Guidelines to Creation of Splines 204
- 40.2 To Create a Spline 204
- 40.3 Editing a Spline 208

Section 41 *Conics* 209

- 41.1 Conics Using CREATE-CONIC-5 COND (F1-7-1) 209
- 41.2 Conics Using CREATE-CONIC-6 COEFF (F1-7-2) 210
- 41.3 Conics Using CREATE-CONIC-PARABOL (F1-7-3) 211
- 41.4 Conics Using CREATE-CONIC-ELLIPSE (F1-7-4) 212

Section 42 *Mesh* 213

- 42.1 Choosing a Type of Mesh 213
- 42.2 Terminology Related to Mesh Construction 214
- 42.3 Discussion of Methods 214

---

Modifications to Existing Geometry: Sections 43-50

---

Section 43 *Trim and Extend* 218

- 43.1 Trim and Extend Options 218
- 43.2 TRM/EXT and Modes 219
- 43.3 Hints for Users 219

Section 44 *BREAK and AUTOSEG* 222

- 44.1 The Options of Break 222
- 44.2 User Hints for Using BREAK 224
- 44.3 The AUTOSEG Option 225

- Section 45 ***Translation and Rotation of Entities*** 227
- 45.1 Moving Entities Using X FORM 227
  - 45.2 Translation Using Delta 228
  - 45.3 Translation and Rotation Using OLD NEW 228
  - 45.4 Rotation Using ROTATE 230
  - 45.5 The HLX ROT Option 231
  - 45.6 The C-ARRAY Option 232

Section 46 ***Box Move*** 234

Section 47 ***Scaling of Entities*** 237

Section 48 ***Mirror*** 240

Section 49 ***3D Extrusions*** 243

- 49.1 Steps to an Extrusion 243
- 49.2 Observations About Extrusions 244

Section 50 ***Wireframes of Revolution*** 246

---

---

Storage and Communication: Sections 51-55

---

---

Section 51 ***Part and Pattern Files*** 249

- 51.1 Compatibility With Previous-Version Files 249
- 51.2 Part Files 250
- 51.3 Pattern Files 250
- 51.4 Saving Files 251
- 51.5 Retrieving Files 252
- 51.6 The List/Load Feature 253
- 51.7 Other Options of FILE (F5) 253

Section 52 ***Translation Files*** 255

- 52.1 DWG and DXF Translations 255
- 52.2 CADKEY and IGES 256

Section 53 ***Plot and Print*** 257

- 53.1 Hardware Setups 257
- 53.2 To Plot the Screen Display 258
- 53.3 To Print the Screen Display 260

Section 54 ***CADL*** 262

- 54.1 Generation of CADL Files 262
- 54.2 Basics of CADL Structure 262

- 54.3 The CADL Menu 263
- 54.4 To Create a CADL File from a Database 263

Section 55 ***Slides*** 265

- 55.1 Slides in CADKEY 6 265
- 55.2 Slides in CADKEY 5 265

---

---

Modifications to Meet Graphics Standards: Sections 56-67

---

---

Section 56 ***3D to Orthogonal Views*** 266

Section 57 ***Apparent Solid Models*** 269

- 57.1 Removing Edge Lines Not Visible in a Solid Model 269
- 57.2 Adding Apparent Edge Lines to Solid Models 269

Section 58 ***Eliminating Multiple Entities*** 271

- 58.1 The Optimize Feature 271
- 58.2 Delete Method 271
- 58.3 “Copy on a New Level” Method 272
- 58.4 “Create on a New Level” Method 272
- 58.5 “Go To View 7” Method 272

Section 59 ***Adding Centerlines to Drawings*** 273

- 59.1 Two Problems with Centerlines 273
- 59.2 To Construct Centerline Patterns 274
- 59.3 To Use Centerline Patterns 274

Section 60 ***Notes and Labels*** 276

- 60.1 Attributes of Text for a Note or Label 276
- 60.2 To Create a Note 279
- 60.3 To Create a Label 279
- 60.4 To Delete a Note or Label 279
- 60.5 To Change the Position of a Note or Label 280
- 60.6 To Change Attributes of an Existing Note or Label 280
- 60.7 To Edit Text of a Note or Label 281
- 60.8 User Hints Regarding Notes and Labels 282

Section 61 ***Dimensioning*** 284

- 61.1 Some Guidelines for CADKEY Dimensioning 285
- 61.2 Setting the Parameters for Dimensioning 285
- 61.3 User Scale Setting 291
- 61.4 Manual Dimensioning 291
- 61.5 Automatic Centering 292
- 61.6 Arrow and Leader Styles 292



61.7	Angular Dimensions	293
61.8	VER DIM	293
61.9	To Add Basic Linear Dimensions	293
61.10	Serial Dimensions	294
61.11	To Add Ordinate Dimensions	295
61.12	To Dimension Arcs and Fillets	296
61.13	To Dimension a Circle	296
61.14	To Dimension an Angle	297
61.15	Modifying Dimensions	297
<b>Section 62 <i>Tolerances</i> 299</b>		
62.1	Options Related to Tolerances	300
62.2	To Set Tolerances in CADKEY 6	300
62.3	To Set Tolerances in CADKEY 5	301
62.4	To Change Tolerances	302
<b>Section 63 <i>Sectional Views</i> 303</b>		
63.1	Review of Sectioning Types	303
63.2	General Guidelines for Sectioning	304
63.3	Constructing a Two-View Section	305
<b>Section 64 <i>Sections Using a Cutting Plane</i> 306</b>		
<b>Section 65 <i>Crosshatching</i> 309</b>		
65.1	Points to Remember about Crosshatching	309
65.2	A General Procedure for Crosshatching	310
65.3	CADKEY 6: To Add Hatching to an Area	311
65.4	CADKEY 5: To Add Hatching to an Area	312
<b>Section 66 <i>Auxiliary Views and Planes</i> 315</b>		
66.1	To Create the Auxiliary View of a Surface	315
66.2	Graphic Presentation of an Auxiliary View	316
66.3	Drawing Entities in the Plane of the Auxiliary View	317
<b>Section 67 <i>Assembly and Exploded Views</i> 319</b>		
67.1	Assembly Views	319
67.2	Exploded Views	319
67.3	Creating an Assembly View	320
67.4	Creating an Exploded View	322