Up and Running with AutoCAD® 2012

2D Drawing and Modeling
Up and Running with AutoCAD® 2012

2D Drawing and Modeling

Elliot Gindis
CONTENTS

ACKNOWLEDGMENTS ........................................................................................................... xiii
ABOUT THE AUTHOR ........................................................................................................... xv
PREFACE ............................................................................................................................... xvii

LEVEL 1 ● Chapters 1–10 ........................................................................................................... 1

CHAPTER 1 AutoCAD Fundamentals: Part I ................................................................. 3

1.1 Introduction and Basic Commands ........................................................................ 4
1.2 The AutoCAD Environment .................................................................................... 5
1.3 Interacting with AutoCAD ....................................................................................... 9
   Method 1. Type in the Commands on the Command Line ........................................ 9
   Method 2. Select the Commands from the Drop-Down Cascading Menus .......... 9
   Method 3. Use Toolbar Icons to Activate the Commands ..................................... 10
   Method 4. Use the Ribbon Tabs, Icons, and Menus .......................................... 10
1.4 Practicing the Create Objects Commands ........................................................... 13
   Line .............................................................................................................................. 13
   Circle ......................................................................................................................... 14
   Arc ............................................................................................................................. 15
   Rectangle .................................................................................................................. 16
1.5 View Objects ........................................................................................................ 19
   Zoom ......................................................................................................................... 19
   Pan .............................................................................................................................. 19
   Regen ......................................................................................................................... 19
1.6 Practicing the Edit/Modify Objects Commands ................................................... 20
   Erase .......................................................................................................................... 20
   Move .......................................................................................................................... 20
   Copy ........................................................................................................................... 21
   Rotate ......................................................................................................................... 22
   Scale .......................................................................................................................... 23
   Trim ............................................................................................................................. 24
   Extend ........................................................................................................................ 25
   Offset ........................................................................................................................ 26
   Mirror ....................................................................................................................... 27
   Fillet .......................................................................................................................... 28
1.7 Selection Methods ............................................................................................... 29
1.8 Drawing Accuracy—Part 1 .................................................................................... 30
   Ortho (F8) ................................................................................................................ 30
1.9 Drawing Accuracy—Part 2 .................................................................................... 30
   OSNAPs .................................................................................................................... 30
1.10 OSNAP Drafting Settings ..................................................................................... 33
   Summary ................................................................................................................... 33
CONTENTS

CHAPTER 2  AutoCAD Fundamentals: Part II ................................................................. 39
  2.1  Grips .................................................................................................................. 40
  2.2  Units and Scale ............................................................................................... 41
  2.3  Snap and Grid .................................................................................................. 42
      To Set Snap ....................................................................................................... 42
      To Set Grid ....................................................................................................... 43
  2.4  Cartesian Coordinate System .......................................................................... 43
  2.5  Geometric Data Entry ..................................................................................... 44
      Dynamic Input .................................................................................................. 44
      Manual Input .................................................................................................... 47
  2.6  Inquiry Commands ......................................................................................... 48
      Area ................................................................................................................... 49
      Distance .......................................................................................................... 49
      List ..................................................................................................................... 50
      ID ....................................................................................................................... 51
      Radius and Angle ............................................................................................ 52
  2.7  Additional Drafting Commands ...................................................................... 52
      Explode ............................................................................................................. 53
      Polygon ............................................................................................................. 53
      Ellipse .............................................................................................................. 55
      Chamfer ............................................................................................................ 56
      Templates .......................................................................................................... 57
      Limits ............................................................................................................... 58
      Save ............................................................................................................... 58
      Help Files ....................................................................................................... 58
      TANgent OSNAP ............................................................................................. 60
  Summary .............................................................................................................. 61

CHAPTER 3  Layers, Colors, Linetypes, and Properties ........................................ 67
  3.1  Introduction to Layers .................................................................................... 68
      What Are Layers? ............................................................................................. 68
      Why Use Them? ............................................................................................... 68
      Creating and Deleting Layers ....................................................................... 68
      Making a Layer Current .................................................................................. 69
      Assigning Layer Colors ................................................................................ 69
      Layer Freeze/Thaw and On/Off ..................................................................... 72
      Layer Lock/Unlock ......................................................................................... 72
  3.2  Introduction to Linetypes ............................................................................... 73
  3.3  Introduction to Properties ............................................................................... 74
      Properties Palette ............................................................................................. 75
      Match Properties ............................................................................................. 76
      Layers Toolbar ................................................................................................. 76
  3.4  In-Class Drawing Project: Floor Plan Layout ............................................... 77
      Basic File Preparation ..................................................................................... 77
      Starting the Floor Plan .................................................................................... 78
      Drawing the Inner Wall Geometry ................................................................. 79
      Drawing the Doors and Windows ................................................................. 80
  Summary .............................................................................................................. 83

SPOTLIGHT ON: ARCHITECTURE ............................................................................. 87

CHAPTER 4  Text, Mtext, Editing, and Style .......................................................... 93
  4.1  Introduction to Text and Mtext ...................................................................... 94
  4.2  Text ................................................................................................................... 94
      Editing Text ...................................................................................................... 95
CHAPTER 6 Dimensions.................................................................131
  6.1 Introduction to Dimensions ...................................................132
  6.2 Types of Dimensions ............................................................132
    Linear Dimensions ...............................................................133
    Aligned Dimension .............................................................134
    Diameter Dimension ...........................................................135
    Radius Dimension ...............................................................136
    Angular Dimension .............................................................137
    Continuous Dimensions ......................................................138
    Baseline Dimensions .........................................................139
    Leader and Multileader .......................................................140
    Secondary Dimensions .......................................................143
  6.3 Editing Dimensions ............................................................145
  6.4 Customizing Dimensions ....................................................145
    Dimstyle .............................................................................146
  6.5 In-Class Drawing Project: Adding Dimensions to Floor Plan Layout...............................................150
    Summary ............................................................................151

SPOTLIGHT ON: MECHANICAL ENGINEERING........................................157

CHAPTER 7 Blocks, Wblocks, Dynamic Blocks, Groups, and Purge..............161
  7.1 Introduction to Blocks ..........................................................162
    Difference between Blocks and Wblocks ..............................162
    Creating a Block ................................................................162
  7.2 Insert ..................................................................................164
  7.3 Purge ..................................................................................166
  7.4 Wblocks .............................................................................167
    Inserting Wblocks ...............................................................168
  7.5 Dynamic Blocks ..................................................................168
  7.6 Groups ..............................................................................172
    Summary ............................................................................176
## CONTENTS

### CHAPTER 8  
**Polar, Rectangular, and Path Arrays**
- Polar Array ➟ 182
  - Steps in Creating a Polar Array ➟ 182
  - Additional Operations with Polar Array ➟ 184
  - Legacy Polar Array (Pre-AutoCAD 2012) ➟ 187
- Rectangular Array ➟ 187
  - Steps in Creating a Rectangular Array ➟ 188
  - Additional Operations with Rectangular Array ➟ 189
  - Legacy Rectangular Array (Pre-AutoCAD 2012) ➟ 191
- Path Array ➟ 192
  - Steps in Creating a Path Array ➟ 192
  - Additional Operations with Path Array ➟ 193
- In-Class Drawing Project: Mechanical Device ➟ 194
- Summary ➟ 198

### CHAPTER 9  
**Basic Printing and Output**
- Introduction to Printing and Plotting ➟ 203
- The Essentials ➟ 204
  - What Printer or Plotter to Use ➟ 204
  - What Paper Size to Use ➟ 205
  - What Area to Plot ➟ 205
  - At What Scale to Plot ➟ 206
  - What Pen Settings to Use ➟ 206
  - What Orientation to Use ➟ 207
  - What Offset to Use ➟ 207
  - Miscellaneous ➟ 207
- The Plot Dialog Box ➟ 207
  - Preview ➟ 209
- Page Setup Manager ➟ 210
- Summary ➟ 211

### SPOTLIGHT ON: INTERIOR DESIGN ➟ 215

### CHAPTER 10  
**Advanced Output—Paper Space**
- Introduction to Paper Space ➟ 219
- Paper Space Concepts ➟ 220
  - What Is Paper Space? ➟ 220
- Paper Space Concepts ➟ 221
  - Layouts ➟ 221
  - Viewports ➟ 227
  - Scaling ➟ 230
  - Layers ➟ 233
  - Text and dims ➟ 237
  - Annotation ➟ 240
- Summary ➟ 242

## LEVEL 1  
- Answers to Review Questions ➟ 247

## LEVEL 2  
- Chapters 11–20 ➟ 255

### CHAPTER 11  
**Advanced Linework**
- Introduction to Advanced Linework ➟ 257
- Pline (Polyline) ➟ 258
  - Pedit ➟ 259
  - Exploding a Pline ➟ 260
  - Additional Pline Options ➟ 260

- Preview ➟ 209
- At What Scale to Plot ➟ 206
- What Paper Size to Use ➟ 205
- What Printer or Plotter to Use ➟ 204
- Additional Operations with Legacy Polar Array (Pre-AutoCAD 2012) ➟ 187
- Additional Operations with Legacy Rectangular Array (Pre-AutoCAD 2012) ➟ 191
- Additional Operations with Legacy Path Array (Pre-AutoCAD 2012) ➟ 193
CONTENTS

11.3 Xline (Construction Line) ................................................................. 262
11.4 Ray ................................................................. 263
11.5 Spline ........................................................................ 264
11.6 Mline (Multiline) ........................................................................ 266
    Modifying the Mline ................................................................ 267
    Mstyle (Multiline Style) .......................................................... 267
    Medit (Multiline Edit) ............................................................. 271
    Other Mline Properties .......................................................... 272
11.7 Sketch ........................................................................ 273
    Applications of Sketch .......................................................... 275
Level 2 Drawing Project (1 of 10): Architectural Floor Plan ......................... 276
Summary ............................................................................... 277

CHAPTER 12  Advanced Layers ............................................................ 281
12.1 Introduction to Advanced Layers ..................................................... 281
12.2 Script Files ........................................................................ 282
12.3 Layer State Manager ................................................................ 283
12.4 Layer Filtering ........................................................................ 286
Level 2 Drawing Project (2 of 10): Architectural Floor Plan ......................... 289
Summary ............................................................................... 290

CHAPTER 13  Advanced Dimensions ..................................................... 293
13.1 Introduction to Advanced Dimensions ........................................... 294
13.2 Dimension Style Manager ............................................................ 294
    Lines Tab ........................................................................... 295
    Symbols and Arrows Tab ...................................................... 296
    Text Tab ............................................................................ 296
    Fit Tab .............................................................................. 298
    Primary Units Tab .............................................................. 299
    Alternate Units Tab ............................................................ 300
    Tolerances Tab .................................................................. 302
13.3 Introduction to Constraints ............................................................ 303
13.4 Geometric Constraints ................................................................. 304
    Types of Geometric Constraints .......................................... 304
    Adding Geometric Constraints .......................................... 305
    Hiding, Showing, and Deleting Geometric Constraints ......... 307
13.5 Dimensional Constraints .............................................................. 307
    Working with Dimensional Constraints ................................ 309
13.6 Dimension Driven Design .............................................................. 310
Level 2 Drawing Project (3 of 10): Architectural Floor Plan ......................... 311
Summary ............................................................................... 312

SPOTLIGHT ON: ELECTRICAL ENGINEERING ........................................ 315

CHAPTER 14  Options, Shortcuts, CUI, Design Center, and Express Tools ..................... 319
14.1 Options ........................................................................ 320
    Files Tab ........................................................................... 320
    Display Tab ...................................................................... 322
    Open and Save Tab ........................................................... 324
    Plot and Publish Tab .......................................................... 326
    System Tab ...................................................................... 328
    User Preferences Tab .......................................................... 329
    Drafting Tab .................................................................... 331
    3D Modeling Tab ............................................................... 332
    Selection Tab ................................................................... 332
CONTENTS

14.2 Shortcuts ................................................................. 335
  pgg File .................................................................. 335
  Altering the pgg File .............................................. 336

14.3 Customize User Interface ...................................... 337

14.4 Design Center ...................................................... 341

14.5 Express Center ...................................................... 343
  Blocks .................................................................. 345
  Text ..................................................................... 345
  Layout Tools .......................................................... 347
  Dimension ............................................................. 347
  Selection Tools ...................................................... 347
  Modify .................................................................... 348
  Draw ........................................................................ 349
  File Tools .............................................................. 349
  Web Tools .............................................................. 349
  Tools ....................................................................... 350
  Layer Express Tools ............................................... 351

Level 2 Drawing Project (4 of 10): Architectural Floor Plan ........................................ 354
Summary.................................................................. 354

CHAPTER 15  Advanced Design and File Management Tools ........................................ 357

15.1 Introduction to Advanced Design and File Management Tools ......................... 358

15.2 Align ..................................................................... 358

15.3 Audit and Recover ............................................... 360

15.4 Blend .................................................................... 361

15.5 Break and Join ..................................................... 362
  Break, Method 1 .................................................. 362
  Break, Method 2 .................................................. 363
  Join ....................................................................... 363

15.6 CAD Standards .................................................... 364

15.7 Calculator ............................................................ 365

15.8 Defpoints ............................................................... 367

15.9 Divide and Point Style .......................................... 368

15.10 Donut .................................................................. 369

15.11 Draw Order .......................................................... 369

15.12 eTransmit ............................................................ 370

15.13 Filter ................................................................... 372

15.14 Hyperlink ............................................................ 374

15.15 Lengthen .............................................................. 375

15.16 Object Tracking (OTRACK) .................................. 376

15.17 Overkill ............................................................... 377

15.18 Point and Node .................................................... 378

15.19 Publish ............................................................... 378

15.20 Raster ................................................................. 379

15.21 Revcloud ............................................................. 380

15.22 Sheet Sets ........................................................... 381

15.23 Selection Methods ............................................... 384

15.24 Stretch ............................................................... 386

15.25 System Variables ............................................... 387

15.26 Tables ................................................................. 387

15.27 Tool Palette ......................................................... 390

15.28 UCS and Crosshair Rotation .................................. 391
  Method 1 .............................................................. 391
  Method 2 .............................................................. 392
15.29 Window Tiling ................................................................. 393
15.30 Wipeout................................................................. 394
Level 2 Drawing Project (5 of 10): Architectural Floor Plan ................. 398
Summary................................................................. 399

CHAPTER 16  Importing and Exporting Data ............................................. 403
16.1 Introduction to Importing and Exporting Data............................. 403
16.2 Importing and Exporting to and from MS Office Applications ...... 404
  Word into AutoCAD ............................................ 404
  AutoCAD into Word ............................................ 404
  Excel into AutoCAD ............................................ 405
  AutoCAD into Excel ............................................ 406
  PowerPoint into AutoCAD .................................... 406
  AutoCAD into PowerPoint ................................... 407
16.3 Screen Shots ............................................................. 407
16.4 JPG................................................................. 407
16.5 PDFs ............................................................. 407
16.6 Other CAD Software ................................................... 409
16.7 Exporting and the Save As Feature ......................................... 411
16.8 Inserting and OLE ..................................................... 412
Level 2 Drawing Project (6 of 10): Architectural Floor Plan .................. 414
Summary............................................................. 416

SPOTLIGHT ON: AEROSPACE ENGINEERING .................................................. 417

CHAPTER 17  External References (Xrefs) ............................................. 421
17.1 Introduction to Xrefs ............................................................. 422
  What is an Xref? ................................................... 422
  Why Do We Need an Xref? What is the Benefit? ....................... 422
17.2 Using Xrefs ............................................................. 423
  Xref Menu .......................................................... 425
17.3 Layers in Xrefs ............................................................. 426
17.4 Editing and Reloading Xrefs ................................................ 427
17.5 Multiple Xrefs ............................................................. 428
17.6 Ribbon and Xrefs .......................................................... 429
Level 2 Drawing Project (7 of 10): Architectural Floor Plan .................. 430
Summary............................................................. 430

CHAPTER 18  Attributes ........................................................... 433
18.1 Introduction to Attributes .......................................................... 433
18.2 Creating the Design ............................................................. 434
18.3 Creating the Attribute Definitions ............................................ 434
18.4 Creating the Attribute Block .................................................. 437
18.5 Attribute Properties and Editing ............................................. 438
  Exploding Attributes ............................................. 438
  Inserting Attributes .............................................. 439
18.6 Attribute Extraction ............................................................ 439
18.7 Invisible Attributes ............................................................ 444
Level 2 Drawing Project (8 of 10): Architectural Floor Plan .................. 445
Summary............................................................. 445

CHAPTER 19  Advanced Output and Pen Settings .................................... 449
19.1 Introduction to Advanced Output and Pen Settings ...................... 450
19.2 Setting Standards ............................................................. 450
A textbook of this magnitude is rarely a product of only one person's effort. I thank all the early and ongoing reviewers of this text and Chris Ramirez of Vertical Technologies Consulting for research and ideas when most needed as well as using the text in his classroom. A big thank you also to Karen Miletsky at Pratt Institute of Design, Russell and Titu Sarder at Netcom Information Technology, and everyone at New York Institute of Technology, RoboTECH CAD solutions, and other premier training centers for their past and present support.

Extensive gratitude also goes to Joseph P. Hayton, Jeff Freeland, Michael Joyce, Maria Alonso, Becky Pease, Gnomi Gouldin and the rest of the team at Elsevier for believing in the project and for their invaluable support in getting the book out to market.

Finally, I would like to thank my friends and family, especially my parents, Boris and Tatyana Gindis, for their patience and encouragement as well as standing by me as months of work turned into years.

This book is dedicated to the hundreds of students who have passed through my classrooms and made teaching the enjoyable adventure it has become.
Elliot Gindis started out using AutoCAD professionally in a New York City area civil engineering company in September 1996, moving on to consulting work shortly afterward. He has since drafted in a wide variety of fields, ranging from all aspects of architecture and building design to electrical, mechanical, civil, structural, and rail design. These assignments, including lengthy stays with IBM and Siemens Transportation Systems, have totaled over 60 companies to date.

In 1999, Elliot began teaching part-time at Pratt Institute of Design, followed by positions at Netcom Information Technology, RoboTECH CAD solutions, and more recently at the New York Institute of Technology. In 2003, Elliot formed Vertical Technologies Consulting and Design (www.VTCDesign.com), an AutoCAD training firm that has trained numerous corporate and government clients as diverse as environmental engineering firms and the FBI in using and optimizing AutoCAD.

Elliot holds a bachelor’s degree in aerospace engineering from Embry Riddle Aeronautical University. He currently resides in the Atlanta area and continues to be involved with AutoCAD education and CAD consulting. Up and Running with AutoCAD 2012, which carefully incorporates lessons learned from nearly 16 years of teaching and industry work, is his third textbook on the subject.
WHAT IS AUTOCAD?

AutoCAD is a drafting and design software package developed and marketed by Autodesk®, Inc. As of 2011, it has been around for approximately 29 years—several lifetimes in the software industry. It has grown from modest beginnings to an industry standard, often imitated, sometimes exceeded, but never equaled. The basic premise of its design is simple and is the main reason for AutoCAD’s success. Anything you can think of, you can draw quickly and easily. AutoCAD remains a superb electronic drafting board, replacing the pencil and paper for an entire generation of technical professionals.

The software has a rather steep learning curve to become an expert but a surprisingly easy one to just get started. Most important, it is well worth learning. This is truly global software that has been adopted by millions of architects, designers, and engineers worldwide. Over the years, Autodesk expanded this reach by introducing add-on packages that customize AutoCAD for industry-specific tasks, such as electrical, civil, and mechanical engineering. However, underneath all these add-ons is still plain AutoCAD. This software remains hugely popular. Learn it well, as it is still one of the best things you can add to your resume and skill set.

ABOUT THIS BOOK

This book is not like most on the market. While many authors certainly view their particular text as unique and novel in its approach, I rarely reviewed one that was clear to a beginner student and distilled AutoCAD concepts down to basic, easy to understand explanations. The problem may be that many of the available books are written by either industry technical experts or teachers but rarely by someone who is actively both. One really needs to interact with the industry and the students, in equal measure, to bridge the gap between reality and the classroom.

After years of AutoCAD design work in the daytime and teaching nights and weekends, I set out to create a set of classroom notes that outlined, in an easy to understand manner, exactly how AutoCAD is used and applied, not theoretical musings or clinical descriptions of the commands. These notes eventually were expanded into the book that you now hold. The rationale was simple: I need this person to be up and running as soon as possible to do a job. How do we make this happen?

TEACHING METHODS

This book has its roots in a certain philosophy I developed while attending engineering school many years ago. While there, I had sometimes been frustrated with the complex presentation of what in retrospect amounted to rather simple topics. My favorite quote was, “Most ideas in engineering are not that hard to understand but often become so upon explanation.” The moral of that quote was that concepts can usually be distilled to their essence and explained in an easy and straightforward manner. That is the job of a teacher: Not to blow away students with technical expertise but to use experience and top-level knowledge to sort out what is important and what is secondary and to explain the essentials in plain language.
Such is the approach to this AutoCAD book. I want everything here to be highly practical and easy to understand. There are few descriptions of procedures or commands that are rarely used in practice. If we talk about it, you will likely need it. The first thing you must learn is how to draw a line. You see this command on the first few pages of Chapter 1. It is essential to present the “core” of AutoCAD, essential knowledge common to just about any drafting situation, all of it meant to get you up and running quickly. This stripped down approach proved effective in the classroom and was carefully incorporated into this text.

TEXT ORGANIZATION

This book comes in two parts: Level 1 and Level 2:

**Level 1** (Chapters 1–10) is meant to give you a wide breadth of knowledge on many topics, a sort of “mile wide” approach. These ten chapters comprise, in my experience, the complete essential knowledge set of an intermediate user. You then can work on, if not necessarily set up and manage, moderate to complex drawings. If your CAD requirements are modest or if you are not required to draft full time, then this is where you stop.

**Level 2** ( Chapters 11–20) is meant for advanced users who are CAD managers, full-time AutoCAD draftspersons, architects, or self-employed and must do everything themselves. The goal here is depth, as many features not deemed critically important in Level 1 are revisited to explore additional advanced options. Also introduced are advanced topics necessary to set up and manage complex drawings.

Throughout the book, the following methods are used to present material:

- Explain the new concept or command and why it is important.
- Cover the command step by step (if needed), with your input and AutoCAD responses shown so you can follow and learn them.
- Give you a chance to apply just-learned knowledge to a real-life exercise, drawing, or model.
- Test yourself with end-of-chapter quizzes and drawing exercises that ask questions about the essential knowledge.

You will not see an extensive array of distracting “learning aids” in this text. You will, however, see some common features throughout, such as

**Commands:** These are presented in almost all cases in the form of a command matrix, such as the one shown here for a Line. You can choose any of the methods for entering the command.

**Tips and tricks:** These are seen mostly in the first few chapters and one is shown here. They are very specific, deliberate suggestions to smooth out the learning experience. Do take note.

**TIP 1:** The Esc (Escape) key in the upper left-hand corner of your keyboard is your new best friend. It gets you out of just about any trouble you get yourself into. If something does not look right, just press the Esc key and repeat the command. Mine was worn out learning AutoCAD, so expect to use it often.
Step-by-step instructions: These are featured whenever practical and show you exactly how to execute the command, such as the example with line here. What you type in and what AutoCAD says are in the default font: Courier New. The rest of the steps are in the standard print font.

Step 1. Begin the line command via any of the previous methods.
- **AutoCAD says:** Specify first point:

Step 2. Using the mouse, left-click anywhere on the screen.
- **AutoCAD says:** Specify next point or [Undo]:

Step 3. Move the mouse elsewhere on the screen and left-click again. You can repeat Step 2 as many times as you wish. When you are done, click Enter or Esc.

Learning objectives and time for completion:
Each chapter begins with this, which builds a “road map” for you to follow while progressing through the chapter, as well as sets expectations of what you will learn if you put in the time to go through the chapter. The time for completion is based on classroom teaching experience but is only an estimate. If you are learning AutoCAD in school, your instructor may choose to cover part of a chapter or more than one at a time.

In this chapter, we introduce AutoCAD and discuss the following:
- Introduction and the basic commands
- The Create Objects commands
- The Edit and Modify Objects commands
- The View Objects commands, etc.

By the end of the chapter, you will...
Estimated time for completion of chapter: 3 hours.

Summary, review questions, exercises: Each chapter concludes with these. Be sure to not skip these pages and to review everything you learned.

**WHAT YOUR GOAL SHOULD BE**

Just learning commands is not enough; you need to see the big picture and truly understand AutoCAD and how it functions for it to become effortless and transparent. The focus after all is on your design. AutoCAD is just one of the tools to realize it.

A good analogy is ice hockey. Professional players do not think about skating; to them it is second nature. They are focused on strategy, scoring a goal, and getting by the defenders. This mentality should be yours as well. You must become proficient through study and practice, to the point where you are working with AutoCAD, not struggling against it. It then becomes “transparent” and you focus only on the design, to truly perform the best architecture or engineering work of which you are capable.

If you are in an instructor-led class, take good notes. If you are self-studying from this text, pay very close attention to every topic; nothing here is unimportant. Do not skip or cut corners, and complete every drawing assignment. Most important, you have to practice, daily if possible, as there is no substitute for sitting down and using the software. Not everyone these days has the opportunity to learn while working and getting paid; companies want ready-made experts and do not want to wait. If that is the case, you have to practice on your own in the evening or on weekends. Just taking a class or reading this book alone is not enough.

It may seem like a big mountain to climb right now, but it is completely doable. Once on top, you will find that AutoCAD is not the frustrating program it may have seemed in the early days but an intuitive software package that, with proficiency of use, becomes a natural extension of your mind when working on a new design. That, in the end, is the mark of successful software; it helps you do your job easier and faster. You can contact me at Elliot.Gindis@gmail.com. Good luck!