



AutoCAD®

SECRETS EVERY USER SHOULD KNOW

DAN ABBOTT



WILEY PUBLISHING, INC.



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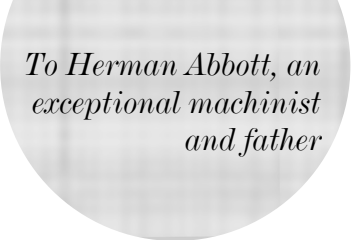
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*To Herman Abbott, an
exceptional machinist
and father*

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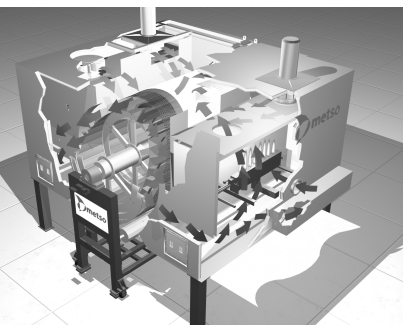
This book also benefited greatly from Monica Wood's willingness to put her own writing on hold whenever I needed writing advice, which was shockingly often. I couldn't have finished (or started) without her support. I was also fortunate to have a wonderful team at Sybex. Willem Knibbe's enthusiasm was a surprise and a delight to me. Heather O'Connor, Jon McFarland, and Martine Dardignac kept the project moving relentlessly along, meeting a series of deadlines that seemed daunting to me at the beginning. I am especially grateful to Tiffany Taylor, whose astonishing skill raises copy editing to a fine art.

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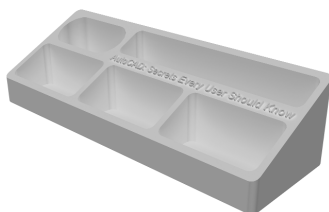
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Introduction

A program as ubiquitous as AutoCAD shouldn't have any secrets. But if you don't know something, it's a secret to you. I hope that *AutoCAD: Secrets Every User Should Know* will take some of the mystery out of AutoCAD and AutoCAD LT, and also remind you of some traditional knowledge that I fear is being slowly eroded.

This book includes useful tips, detailed instructions, general guidance, a few tutorials, many solutions to problems of all kinds—and yes, even some secrets—that can be applied to AutoCAD in any application.

Who Is This Book For?

I wrote this book for two groups: experienced users with some gaps in their knowledge, and recent users who want to maximize their understanding of this complicated and multifaceted tool. The more familiar you are with AutoCAD or AutoCAD LT, the more this book will help you avoid common problems and produce work that is consistent, reliable, and accurate.

For most of you, AutoCAD is just one of the many tools you use, and you don't have time to become an expert at it. You don't have to. In my professional life, I've worked with a wide range of AutoCAD users in a remarkable array of disciplines. I've done AutoCAD training for companies, presented workshops for vendors, offered expertise in corporate disputes, and taught college courses in AutoCAD for nearly 20 years. This book is a result of that experience, and I hope you'll use it to expand your knowledge and improve your efficiency.

What Release of AutoCAD Is Covered?

This book isn't release-specific, although AutoCAD 2007 is used throughout for the graphics. Many offices don't upgrade immediately to new releases, and I understand why. Upgrades cost money and take time, and the law of unintended consequences often kicks in at exactly the wrong time. Most of the material in this book applies to any release of AutoCAD or AutoCAD LT. Where it doesn't, I make that clear. The most obvious distinction occurs in Chapter 3, "Customizing AutoCAD's Interface," because of the introduction of the Customizable User Interface in AutoCAD 2006.

AUTOCAD OR AUTOCAD LT?

Despite the *AutoCAD* of the title, most of the advice in this book can apply to AutoCAD LT. And who knows? After you look over the AutoCAD-only chapters, you may find enough ammunition to get at least one seat of AutoCAD installed at your workplace.

What's Included?

Much of the material in this book was developed for the Advanced AutoCAD course at Southern Maine Community College and then used in presentations at Autodesk University over the past decade. The topics derive from the kinds of questions I've been asked over the years by people who use AutoCAD every day.

This isn't meant to be a comprehensive book about AutoCAD. I've tried to identify common problem areas and provide some advice on how to approach them. I'm also trying to preserve some traditional knowledge that is often overlooked by users: knowledge as simple as making proper centerlines, as arcane as using DOS to improve efficiency, as exciting as programming, and as dramatic as 3D modeling. Here's a brief review of what's covered in each chapter.

Chapter 1: AutoCAD Productivity In this chapter, you'll find general rules for using AutoCAD that I believe should be universal. The chapter includes a review of often-overlooked AutoCAD features, many with options or applications that you may have missed.

Chapter 2: Managing Your System Most AutoCAD users are computer savvy, but if you're not, this chapter's for you. In addition to information about how to make your computer work well with AutoCAD, you'll get some advice on the AutoCAD search path, see the settings in Options that I consider the most significant, and find out how to actually use SV\$ files.

Chapter 3: Customizing the AutoCAD Interface You can make a lot of simple changes to your interface that will improve your efficiency with AutoCAD or AutoCAD LT. Here's where you'll learn about the CUI, quick keys, creating macros, and so on.

Chapter 4: Applying Graphics Standards AutoCAD is used distressingly often to produce documentation that doesn't meet the most fundamental requirements of technical graphics. This chapter is a primer on how to make AutoCAD do the right thing, with a review of the kinds of standards that drafters used to know and that AutoCAD users still should.

Chapter 5: Symbols, Tables, and Fields This is an area that bedevils a lot of users. You'll find information about blocks, the WBLOCK command, adding attributes, extracting attribute values, and managing external references as well as helpful tips on AutoCAD Tables and Fields.

Chapter 6: Plotting Being able to control the output from an AutoCAD drawing can set you apart from the crowd. If you have any confusion about plotting, layouts, or Paper Space, this expansion of the "Lost in Paper Space" workshop I've been doing for years at Autodesk University should help you out.

Chapter 7: AutoCAD Scripts This often-overlooked tool is the basis for the biggest productivity tip in this book: the ability to modify thousands of drawings automatically. The lowly script has some other great applications as well. Don't skip this chapter—it could save you a bundle and make you the office hero.

Chapter 8: AutoLISP by Example: Getting Started AutoLISP is the programming language for users. Jump in. This chapter will have you programming in minutes.

Chapter 9: AutoLISP by Example: Getting Better Chapter 8 was designed to get you started, but I'm betting that once you see how logical, fun, and easy it is to create programs in AutoLISP, you'll want to get better. In this chapter you'll see examples of debugging techniques, error handling and annotation, creating and using new AutoLISP functions, getting and converting input, using conditional expressions, manipulating entities, opening and creating text files of data, and more than a few other tricks. The chapter doesn't cover everything about AutoLISP, but it'll keep you going for a long time.

Chapter 10: 3D for Everyone Any AutoCAD user will be able to create models after going through this tutorial. And there are two suggestions for using legacy data—one architectural, one mechanical—that may surprise you.

Chapter 11: AutoCAD Puzzlers I loved writing this chapter. It addresses 35 questions from puzzled AutoCAD users. If you're even a little bit of an AutoCAD geek, you'll have fun trying to figure them out. Don't peek, but solutions are at the end.

The Book's Website Check out this book's website at www.sybex.com/go/autocadsecrets where I've placed several other tools to help you utilize and understand AutoCAD. In Web Appendix A, I review the features I consider most significant in each release since AutoCAD 2000. Web Appendix B contains a DOS command reference, and Web Appendix C provides

a listing of all the AutoCAD file extensions. You'll also find all the scripts, DOS files, and AutoLISP code used in this book; and, in particular, a useful script for restoring the default settings for AutoCAD variables.

Finally, if you have any new puzzlers, differences of opinion, suggestions, or comments, you can find my contact information on this book's site.

AutoCAD Productivity

Considering the complexity of AutoCAD, it's not surprising that many people who use it miss something important along the way. Many users had little training on the software before being expected to start producing useful work, and these users in turn have trained others based on what they figured out on their own. Even the most experienced AutoCAD users have likely forgotten some useful things they once knew.

This chapter is the result of the many questions I've been asked by AutoCAD users over the years while teaching, training, consulting, and responding to e-mails and phone calls. Here I'll offer advice on using AutoCAD, with an emphasis on features and techniques that are often overlooked or forgotten by users. I'll include general design advice that applies to the use of any CAD system, providing my recommendations for universal standard practice in using AutoCAD, reviewing techniques and commands that apply to all releases of AutoCAD.

This chapter isn't meant to be a comprehensive review of AutoCAD—many excellent books already provide that—nor is it a replacement for learning how to use the software. What I've selected here are items that people often overlook.

- **Design Standards**
- **AutoCAD Best Practices**
- **Feature Review (All Releases)**

Design Standards

CAD software is used in so many fields of design that it would be impossible to develop extensive standards that apply to all of them. I've trained people who use AutoCAD to design quilts, hearing aids, doll clothes, houses, barns, commercial buildings, M16s, submarine hatches, and the myriad components of machinery. But there are some foundational rules that represent a consensus among serious users of CAD. You'll find exceptions to these rules, of course, but think of them the way you think of the rules for dimensioning drawings: You follow them *if possible*. The fact that a rule has rare exceptions doesn't reduce its value as a guide. You certainly follow the rules requiring you to drive on the proper side of the road all the time—except when a dog darts out in front of you, or the road is washed away by a flash flood, or you're passing someone. So, here are some of my rules for using AutoCAD.

Draw Everything Actual Size

Unless you have a very good reason not to, draw everything at its actual size. Even details can be drawn full size, if you use layouts. They may not look right to you in the Model Space tab, but you can display them in Paper Space viewports and give them any scale you want. At one time, you would have used the SCALE command and then set DIMLFAC to compensate for dimensions, but that's *not* a good idea now. You know why. At some point, you'll forget that your dimension style is multiplying every dimension by 2; or you'll dimension a detail and forget to change DIMLFAC, and all the dimensions will be half their actual size. You have a complex enough job as it is, keeping track of so many details. Why not simplify your life by drawing everything the size it's supposed to be? You're not at a drafting table. Worry about how something will plot when you set up a layout.

I've done a lot of training for different industries and have looked for situations where it was impossible to draw full size; I haven't found an instance yet that couldn't be addressed using Paper Space. At one shop I worked for, two groups of designers who used AutoCAD had a difference of opinion about full size versus scale. One group of designers thought they couldn't draw full size because they were designing long pieces with almost no detail along their lengths but a lot of detail at the ends. They only drew the ends, and then they broke the piece with a conventional break and plotted it for the fabricators. The dissenting designers wanted to draw parts at their actual lengths so they could use them in assembly drawings without re-creating them.

The solution I offered was to draw the pieces full length, with proper end detail, and then create a layout with two viewports to represent each end of the object. As long as the two viewports were at the same scale and aligned, they could be separated for a break symbol to be added in Paper Space. Even the dimension of the overall length was correct, because it was in Model Space (where I think it normally

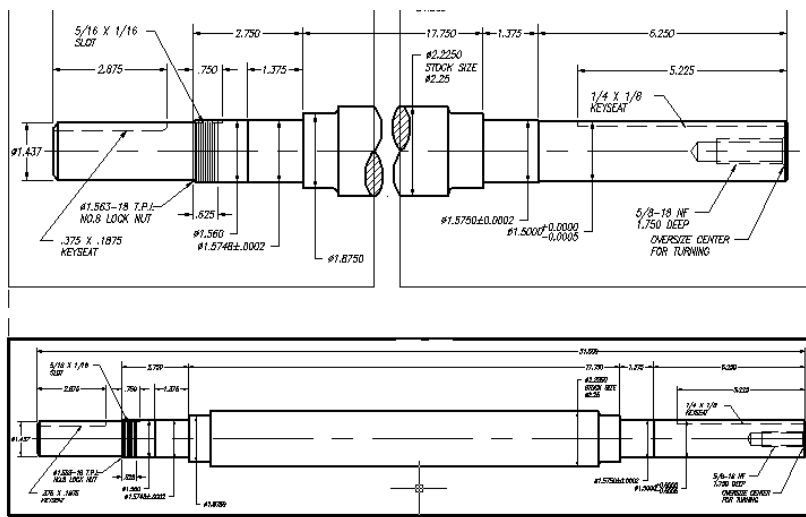


Figure 1.1
Conventional break
for long part

belongs). They could drag the value right or left so it could be seen in one of the viewports. (See Figure 1.1.) The entire part is shown at the bottom, with the conventional break created with two floating viewports above.

Draw Existing Features “as Built”

This tip probably seems obvious, but I’ve been asked more than once what I recommend when designing for renovations or additions to existing structures. The question is usually in this form: “I have the original drawings of the building. Should I use them to create an AutoCAD drawing of the existing structure, or should I create the AutoCAD geometry ‘as-built’?”

Clearly, creating geometry “as built” rather than “as designed” permits you to solve problems in the software instead of in the field, because few actual structures didn’t change in some way from the original plans. You can use the original plans to create a base drawing and then check key locations and dimensions for changes. This is one of the great benefits of using such a precise design system. You can reduce what some builders call *on-site engineering* by drawing everything as accurately as you possibly can. That way, the results are much more likely to match the plans. Who knows: Someday “as built” and “as designed” may become the same thing.

Draw Mechanical Parts at MMC

My advice to draw mechanical parts at Maximum Material Condition (MMC) may be less obvious than my “as-built” advice, because mechanical parts always have a specified