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AutoCAD® 2013

FOR

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IN FULL COLOR!

David Byrnes
Bill Fane



AutoCAD® 2013 FOR **DUMMIES®**

by David Byrnes and Bill Fane



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About the Authors

David Byrnes is one of those grizzled old-timers you'll find mentioned every so often in *AutoCAD 2013 For Dummies*. He began his drafting career on the boards in 1979, and first learned AutoCAD with version 1.4. Dave is based in Vancouver, British Columbia, where he works as a civil/structural drafter. He taught AutoCAD for fifteen years at Emily Carr University of Art + Design and British Columbia Institute of Technology in Vancouver. Dave has authored or co-authored over a dozen AutoCAD books and was sole author of this title from *AutoCAD 2008 For Dummies* to *AutoCAD 2012 For Dummies*.

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He began teaching mechanical design in 1996 at the British Columbia Institute of Technology (BCIT) in Vancouver, including such courses as AutoCAD, Mechanical Desktop, Inventor, SolidWorks, machine design, term projects, manufacturing processes, and design procedures. He retired from this position in 2008.

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In his spare time he skis, water skis, windsurfs, scuba dives, sails a Hobie Cat, rides an off-road motorcycle, drives his '37 Rolls-Royce limousine, or his wife's '89 Bentley Turbo R, travels extensively with his wife, and plays with his grandchildren.

Dedication

From Dave: I left the bohemian lifestyle of the AutoCAD consultant at the beginning of 2008 and rejoined the engineering company I last worked for in 1988 (luckily they'd forgotten all about that chandelier). Working full-time (oh! the horror!) and keeping up with AutoCAD so I can revise this book has made me somewhat inaccessible for three months a year, and I'm forever grateful to Annie and Delia, still and always the two women in my life, who remind me there are other things besides keyboards and mice (and sometimes they have to try *really* hard).

From Bill: Back in the last millennium I wrote a book about AutoCAD 13, after which my wife Bev swore "Never again!" This time around she was smart enough to go on a two-week South Pacific cruise while I worked on the final author review files, and so our marriage stands a chance of surviving another 46 years.

Authors' Acknowledgments

Dave thanks former author Mark Middlebrook for bringing him into the *AutoCAD For Dummies* world by asking him first to tech edit *AutoCAD 2000 For Dummies*, then to join him as co-author of *AutoCAD 2006 For Dummies*, and finally to take over the title altogether.

Bill was both honored and flattered when Dave invited him to co-author this edition of the prestigious *AutoCAD For Dummies* title, with a view to his taking it over completely next year. Dave's support and assistance through Bill's teething period on this project know no bounds, and no matter where the book goes from here, there will always be parts of Dave's soul lurking in it somewhere.

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Introduction



Let's get something straight upfront. You may have heard that AutoCAD is difficult, complex, or hard to learn and use. Well, it has been our observation that the easier any software is to learn and use, the sooner you bump up against the software's limitations. Yes, AutoCAD is complex, but that's the secret to its success. Some claim that few people use more than 10 percent of AutoCAD's capabilities. Closer analysis reveals that pretty much everyone uses the same basic 5 percent, but everyone else uses a different 5 percent after that. The trick is to find *your* 5 percent, the sweet spot that suits your particular industry.

It should also be perfectly clear that if your career path has put you in a position where you need to learn AutoCAD, then you're no dummy!

It's amazing to think that AutoCAD came into being more than a quarter of a *century* ago, back in the last millennium, at a time when most people thought that personal computers weren't capable of industrial-strength tasks like CAD. (The acronym stands for Computer-Aided Drafting, Computer-Aided Design, or both, depending on whom you talk to.) What's equally amazing is the fact that many of today's hotshot AutoCAD users weren't even born when the program first hit the street and the grizzled old-timers writing these words began using it! It's almost as amazing that, 29 years and counting after its birth in December of 1982, AutoCAD remains the king of the micro-computer CAD hill by a tall margin, making it one of the longest-lived PC programs ever, and it will probably be a year older next year. It's conceivable that the long-term future of CAD may belong to special-purpose, 3D-based software such as the Autodesk Inventor and Revit programs, or to specialized market-specific variations built on top of AutoCAD. At any rate, AutoCAD's .DWG file format is the de facto standard, and so AutoCAD will be where the CAD action is for the foreseeable future.

AutoCAD has grown more complex over the years, in part to keep up with the increasing complexity of the design and drafting processes that AutoCAD is intended to serve. It's not enough just to draw nice-looking lines anymore. If you want to play CAD with the big boys and girls, you need to carefully organize the objects you draw, their properties, and the files in which they reside. You need to coordinate your CAD work with other people in your office who will be working on or making use of the same drawings. You need to be savvy about shipping drawings around via the Internet. You may even need to be a little cognizant of working with AutoCAD in three dimensions.

AutoCAD provides the tools for doing all these things, but it's not always easy to figure out which hammer to pick up or which nail to bang on first. With this book, you have an excellent chance of creating a presentable, usable, printable, and sharable drawing on your first (or at least your second) try without putting a T-square through your computer screen in frustration.

What's Not (And What Is) in This Book

This book is not *Drafting For Dummies*, or *Engineering For Dummies*, or *Crash-Testing For Dummies*, or anything similar. We cover the basic principles of how to use AutoCAD to create and edit the objects (lines, circles, arcs, and so on) that make up engineering, architectural, and similar technical drawings. We do not cover drafting standards and practices for any particular industry or profession. For example, we teach you how to create dashed lines, but don't tell you specifically how and when they should be used to indicate hidden edges in solid objects.

Unlike many other *For Dummies* books, this one often *does* tell you to consult the official software documentation. AutoCAD is just too big and complicated for a single book to attempt to describe it completely.

AutoCAD is also too big and complicated for a book like this to cover every feature. We don't address advanced topics, like database connectivity, customization, or programming, in the interest of bringing you a book of a reasonable size — one that you'll read rather than stick on your shelf with those other 1,000-page tomes! The ultimate book that covered *everything* to do with AutoCAD would need a fork truck to move it.

Autodesk likes to keep its users (and us authors!) guessing about new features in future releases of the software. AutoCAD 2009 surprised users and authors alike with a totally revamped user interface, replacing the drop-down menus and toolbars of previous versions with a Microsoft Office 2007-style Ribbon (happily, Autodesk doesn't *force* its users to adopt the new look the way Microsoft does — there's still an "AutoCAD Classic" interface available). AutoCAD's interface gets some tweaking in each succeeding release, if for no other reason than to include new functionality, so even seasoned users will always find something that's a little different. This book focuses on AutoCAD 2013 and addresses its slightlyless-capable but much-lower-priced sibling, AutoCAD LT 2013.

We do occasionally mention differences with previous releases so that everyone has some context and upgraders can more readily understand the differences, and you are bound to encounter a few of the millions and millions of drawings out there that were created with older methods. We also mention

the important differences between AutoCAD and AutoCAD LT so you'll know what you — or your LT-using colleagues — are missing so far as this book is concerned; the major difference is the almost-total absence of 3D capabilities in AutoCAD LT.

This book does *not* cover the discipline-specific features in AutoCAD-based products such as AutoCAD Architecture or AutoCAD Mechanical (except for some general discussion in Chapter 1), but most of the information in this book applies to the general-purpose AutoCAD features in the AutoCAD-based versions of those programs as well.

Mac attack!

Late in 2010, Autodesk released the first non-Microsoft Windows version of AutoCAD in 20 years. AutoCAD for Mac is out there today, but this book covers the Windows versions only. Although the two versions are file compatible, there are many differences in how they look and what they can do. If you have AutoCAD for Mac, you should be able to gain some understanding of concepts, but you might be better off with a Mac-specific book such as *Mastering AutoCAD For Mac* by George Omura and Rick Graham (Sybex Publishing).

Who Do We Think You Are?

AutoCAD has a large, loyal, dedicated group of longtime users. This book is not for the sort of people who have been using AutoCAD for a decade or more, who plan their vacation time around Autodesk University, or who consider 1,000-page-plus technical tomes about AutoCAD to be pleasure reading. This book *is* for people who want to get going quickly with AutoCAD but who also know the importance of developing proper CAD techniques from the beginning.

However, you do need to have some idea of how to use your computer system before tackling AutoCAD — and this book. You need to have a computer system with AutoCAD or AutoCAD LT (preferably the 2013 version). A printer or plotter and a connection to the Internet will be big helps, too.

You also need to know how to use your version of Windows to copy and delete files, create a folder, and find a file. You need to know how to use a mouse to select (highlight) or to choose (activate) commands, how to close a window, and how to minimize and maximize windows. Make sure that you're familiar with the basics of your operating system before you start with AutoCAD.

How This Book Is Organized

Appearances can be deceptive. For example, had you wandered into our office and seen the apparently random piles of stuff that covered our desks while we were writing this book, you might wonder how we could possibly organize a sentence, let alone an entire book. But — given a suitable degree of concerted thought — Bill knows *exactly* where to put his hands on that list of new dimension variables, and Dave can always find that bagel and cream cheese he started at coffee break yesterday. In the words of the philosopher, “A tidy desk is the sign of a sick mind.” Boy, are we healthy!

We hope you find that the book also reflects some concerted thought about how to present AutoCAD in a way that’s both easy-to-dip-into and smoothly-flowing-from-beginning-to-end.

The organization of this book into parts — collections of related chapters — is one of the most important, uh, *parts* of this book. You really can get to know AutoCAD one piece at a time, and each part represents a group of closely related topics. The order of parts also says something about priority; yes, you have our permission to ignore the stuff in later parts until you master most of the stuff in the early ones. This kind of building-block approach can be especially valuable in a program as complex as AutoCAD.

The following sections describe the parts that the book breaks down into.

Part I: AutoCAD 101

Need to know your way around the AutoCAD screen? Why does AutoCAD even exist, anyway? What are all the different AutoCAD-based products that Autodesk sells, and should you be using one of them — for example, AutoCAD LT — instead of AutoCAD? Is everything so slooow because it’s supposed to be slow, or do you have too wimpy a machine to use this wonder of modern-day computing? And why do you have to do this stuff in the first place?

Part I answers all these questions and more. This part also includes what may seem like a great deal of excruciating detail about setting up a new drawing in AutoCAD. But what’s even more excruciating is doing your setup work incorrectly and then feeling as if AutoCAD is fighting you every step of the way. With a little drawing setup work done in advance, it won’t.

Part II: Let There Be Lines

In this part, you discover some essential concepts, including object properties and CAD precision techniques. We know you're rarin' to make some drawings, but if you don't get a handle on this stuff early on, you'll be terminally confused when you try to draw and edit objects. If you want to make drawings that look good, plot good, and *are* good, read this stuff!

After the concepts preamble, the bulk of this part covers the trio of activities that you'll probably spend most of your time in AutoCAD doing: drawing objects, editing them, and zooming and panning to see them better on the screen. These are the things that you do in order to create the *geometry* — that is, the CAD representations of the objects in the real world that you're designing. By the end of Part II, you should be pretty good at geometry, even if your ninth-grade math teacher told you otherwise.

Part III: If Drawings Could Talk

CAD drawings don't live on lines alone — most of them require quite a bit of text, dimensioning, and hatching in order to make the design intent clear to the poor chump who has to build your amazing creation. (Whoever said “a picture is worth a thousand words” must not have counted up the number of words on the average architectural drawing!) This part shows you how to add these essential features to your drawings.

After you've gussied up your drawing with text, dimensions, and hatching, you'll probably want to create a snapshot of it to show off to your client, contractor, or grandma. Normal people call this process *printing*, but CAD people call it *plotting*. Whatever you decide to call it, we show you how to do it.

Part IV: Advancing with AutoCAD

A good CAD user, like a good kindergartner, plays well with others. AutoCAD encourages this behavior with a host of drawing- and data-sharing features. Blocks, external reference files, and raster images encourage reuse of parts of drawings, entire drawings, and bitmap image files. You can create symbols with changeable text or appearance, and you can apply parametric “rules” to drawing objects so they help maintain design intent. This part of the book ends by explaining how to use AutoCAD's Internet features to enable sharing of drawings well beyond your hard drive and local network.

The drawing- and data-sharing features in AutoCAD take you way beyond old-style, pencil-and-paper design and drafting. After you've discovered how to apply the techniques in this part, you'll be well on your way to full CAD nerd-hood. (You may want to warn your family beforehand.)

Part V: On a 3D Spree

In this part, you learn the basics of 3D modeling in AutoCAD 2013. Beginning with the 3D environment — how to change its appearance, how to move around in it, how to examine the model itself in different ways — the chapters introduce different modeling techniques, from solid models to generating 2D working drawings from your 3D models.

Part VI: The Part of Tens

This part contains a concise catalog of differences between AutoCAD and AutoCAD LT, and lists of resources and settings that can make the time you spend in AutoCADland more enjoyable. There's a lot of meat packed into these three chapters — juicy tidbits from years of drafting, experimentation, and fist-shaking at things that don't work right — not to mention years of compulsive list-making. We hope that these lists help you get on the right track quickly and stay there.

But wait . . . there's more!

AutoCAD 2013 For Dummies has a companion website. Point your browser at www.dummies.com/go/autocad2013fd to find many of the drawing files we use to demonstrate commands and procedures in this book. The drawings are posted to the website in Zip format; just download and unzip them and they're ready to open in AutoCAD. The Zip files are named for the chapters and contain one or more drawing files. For example, `afd03.zip` contains the versions of the drawing for the base plate exercise in Chapter 3 of the book (refer to the downloadable Read Me file for an explanation of the naming conventions used for the drawing files). Note that not all chapters have associated drawing files.

Most of the drawing files are saved in AutoCAD 2010 format and can be opened in AutoCAD 2010 or any later release.

The reverse is *not* true. AutoCAD 2013 files *cannot* be opened in earlier releases. You can SAVEAS all the way back to Release 11 (1990), but features added later won't be supported and may translate poorly.



If you don't have *any* AutoCAD release and just want to get a taste of the program before you buy, you can also download a free 30-day trial version of either AutoCAD 2013 or AutoCAD LT 2013. Just browse to

www.autodesk.com/autocad or www.autodesk.com/autocadlt

and look for the Product Trial button.

You can also find the cheat sheet that's mentioned here and there in the book at

www.dummies.com/cheatsheet/autocad2013

Icons Used in This Book

Throughout this book, we point out certain morsels of particularly important or useful information by placing handy little icons in the margin. Naturally, different icons indicate different types of information:



This icon tells you that herein lies a pointed insight that can save you time and trouble as you use AutoCAD. In many cases, Tips act as a funnel on AutoCAD's impressive but sometimes overwhelming flexibility: After telling you all the ways that you *can* do something, we tell you the way that you *should* do it in most cases.



The Technical Stuff icon points out places where we delve a little more deeply into AutoCAD's inner workings or point out something that most people don't need to know most of the time. These paragraphs definitely are not required reading the first time through, so if you come to one at a time when you've reached your techie-detail threshold, feel free to skip over it.



This icon points out text that tells you how to stay out of trouble when living close to the edge. Failure to heed its message may have unpleasant consequences for you or your drawing — or both.



There's a lot to remember when you're using AutoCAD, so we've remembered to remind you not to forget about some of those things that you should remember. These paragraphs usually refer to a crucial point earlier in the chapter or in a previous chapter. So if you're reading sequentially, a Remember paragraph serves as a friendly reminder. If you're not reading sequentially, this kind of paragraph may help you realize that you need to review a central concept or technique before proceeding.



This icon points to new stuff in AutoCAD 2013 (and sometimes AutoCAD LT 2013). It's mostly designed for people who are somewhat familiar with a previous version of AutoCAD and want to be alerted to what's new or different in this release. New AutoCAD users starting out their CAD working lives with AutoCAD 2013 will find this stuff interesting, too — especially when they can show off their new book-learnin' to the grizzled AutoCAD veterans in the office who don't yet know about all the cool new features.



This icon highlights text that shows the differences between AutoCAD LT and AutoCAD. If you're using AutoCAD LT, you'll find out what you're missing compared to "full" AutoCAD. If your friend is using LT, you'll know where to look to find stuff in AutoCAD to brag about.



This icon points out places where you don't have to draw stuff from scratch. Just visit the book's companion website at

www.dummies.com/go/autocad2013fd

and download the specified file or files.

A Few Conventions — Just in Case

You can probably figure out for yourself all the information in this section, but here are the details just in case.

Commanding from the keyboard

Text you type into the program at the command line, in a dialog box, in a text box, and so on appears in **boldface type**. Examples of AutoCAD prompts appear in a special typeface, as does any other text in the book that echoes a message, a word, or one or more lines of text that actually appear on-screen. Sequences of prompts that appear in the AutoCAD command-line area have a shaded background, like so:

Specify lower left corner or [ON/OFF] <0.0000,0.0000>:

Many of the figures — especially in Chapters 8 through 11 — also show AutoCAD command-line sequences that demonstrate AutoCAD's prompts and example responses.

Many AutoCAD commands have *aliases* — shortcut (fewer-letter) versions for the benefit of those who like to type commands at the AutoCAD command line, and in the long run, this is the way the real power users work. In this book, we show command names in uppercase letters. Chapters throughout the book include tables listing the most commonly used drawing and editing commands, and for each table we list both the full command name and its alias in parentheses; for example, LINE (L), ARRAY (AR), and so forth. If you're using the keyboard to enter commands, this means that you can type either **LINE** or simply **L**, and then press Enter to execute the command. Command input is not case-sensitive, so LINE, line, Line, liNe, LiNe, and so on will all work. You can view a list of all the command aliases in both AutoCAD and AutoCAD LT by clicking Edit Aliases on the Manage tab's Customization panel — *but just look, and be careful not to change anything!*

Typing things up with the Ribbon

As you've noticed if you've skimmed through the book and looked at a few of the figures, AutoCAD uses an Office 2007–style Application Menu and Ribbon interface. The Ribbon is organized into a series of task-based tabs, and each tab has a number of panels containing specific tool buttons. We tell you where to find each command.

Where to Go from Here

If you read this Introduction, you're like us — you like to read. (The cut-to-the-chase people tend to flip to the index right away and look up what they need to know at that instant.) If you're a total AutoCAD newbie, you can read this book in order, from front to back; it follows a straightforward route from setting up your drawing environment, to outputting your masterworks to hard copy, to sharing your work with others.

If you're an experienced user, you'll probably be one of those index-flippers looking for the missing information you need to complete a specific task. You can probably find the index on your own, but we encourage you to browse through the book anyway, with a highlighter or sticky notes in hand, so you can find those particularly important places when you need them again. If you're competent in most areas of AutoCAD and pretty familiar with the previous version, look for the New In 2013 icons in the margins to find out the latest features you never knew you couldn't live without.

Whichever route you choose, we hope you enjoy your time with *AutoCAD 2013 For Dummies*. And . . . you're off!

Occasionally, we have updates to our technology books. If this book does have technical updates, they will be posted at:

www.dummies.com/go/autocad2013fdupdates