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**Bill Fane
David Byrnes**



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**by Bill Fane
and
David Byrnes**

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AutoCAD® 2014 For Dummies®

Published by
John Wiley & Sons, Inc.
111 River Street
Hoboken, NJ 07030-5774
www.wiley.com

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Published by John Wiley & Sons, Inc., Hoboken, New Jersey

Published simultaneously in Canada

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Library of Congress Control Number: 2013935678

ISBN 978-1-118-60397-0 (pbk); ISBN 978-1-118-62786-0 (ebk); ISBN 978-1-118-65195-7 (ebk); ISBN 978-1-118-65215-2 (ebk)

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

About the Authors

Bill Fane is a recovering doorknob designer. He was a product engineer and then product engineering manager for Weiser Lock in Vancouver, Canada, for 27 years and holds 12 U.S. patents. He has been using AutoCAD for design work since Version 2.17g (1986) and Inventor since version 1.0 beta (1996). He is a retired professional engineer and an Autodesk Authorized Training Center (ATC) certified instructor.

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.

He has lectured on a wide range of AutoCAD and Inventor subjects at Autodesk University since 1995 and at Destination Desktop since 2003. He is the AUGI CAD Camp National Team instructor for the manufacturing track. He has written over 220 “The Learning Curve” columns for *CADalyst* magazine since 1986 and claims to be a close personal friend of Captain LearnCurve. He also writes software product reviews for *CADalyst*, *Design Product News*, and *Machine Design*. He is an active member of the Vancouver AutoCAD Users Society, “the world’s oldest and most dangerous.”

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.

David Byrnes is one of those grizzled old-timers you'll find mentioned every so often in *AutoCAD 2014 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 15 years at Emily Carr University of Art + Design and British Columbia Institute of Technology in Vancouver. Dave has authored or coauthored over a dozen AutoCAD books and was sole author of this title from *AutoCAD 2008 For Dummies* to *AutoCAD 2012 For Dummies*.

Publisher's Acknowledgments

We're proud of this book; please send us your comments at <http://dummies.custhelp.com>. For other comments, please contact our Customer Care Department within the U.S. at 877-762-2974, outside the U.S. at 317-572-3993, or fax 317-572-4002.

Some of the people who helped bring this book to market include the following:

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Introduction



elcome to the wonderful world of AutoCAD and to the fame and fortune that awaits you (would we lie to you?) as an AutoCAD user.

Believe it or not, AutoCAD is 30 years old, having been born in December 1982, 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 scary is that many of today's hotshot AutoCAD users, and most of the readers of this book, weren't even born when the program first hit the street and the grizzled old-timers writing these words began using it.

AutoCAD remains the king of the microcomputer CAD hill by a tall margin, making it one of the longest-lived computer programs ever. 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, so AutoCAD will be where the CAD action is for the foreseeable future.

You may have heard that AutoCAD is complex and difficult 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 its limitations. A car with no accelerator, one forward gear, no steering, and no brakes would be easy to use until you reached a hill, a curve, or a stop sign or you needed to back out of a parking space.

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 most people use the same basic 5 percent and 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. If you follow our advice, we think you will find that using AutoCAD is as simple and intuitive as driving a car.

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

About This Book

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

covers every AutoCAD topic would need a forklift to move it. Literally. They stopped shipping paper instruction manuals with the software somewhere around 1995, when the full documentation package grew to about a dozen volumes and more than 30 pounds.

In *AutoCAD 2014 For Dummies*, we occasionally mention differences from previous releases so that everyone gains some context and so that upgraders can more readily understand the differences; plus, you're bound to encounter a few of the billions and billions of drawings that were created using older methods. We also mention the important differences between AutoCAD and AutoCAD LT so that you're aware of the LT-related topics that you (or your colleagues) won't find in this book: AutoCAD LT has no programming language and is nearly devoid of 3D capabilities.

This book does *not* cover the discipline-specific features in AutoCAD-based nor vertical market products, such as AutoCAD Electrical or AutoCAD Mechanical, although most of the information in this book applies to the general-purpose features of those programs as well.

Foolish Assumptions

AutoCAD has a large, loyal, dedicated group of longtime users. *AutoCAD 2014 For Dummies* is not for you if you've been using AutoCAD for a decade or more, if you plan your vacation time around Autodesk University, if you use AutoCAD to create wedding invitations, or if you read 1,200-page technical tomes about AutoCAD for pleasure. This book *is* for you if you want to get going quickly with AutoCAD, and you understand the importance of developing proper CAD techniques from the beginning.

However, you do need to have an 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 2014 version). A printer or plotter and a connection to the Internet are helpful, 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. You should be familiar with the basics of your operating system before you start using AutoCAD.

Late in 2010, Autodesk released the first non-Microsoft Windows version of AutoCAD in 20 years. Although AutoCAD for Mac is now available, *AutoCAD 2014 For Dummies* covers only the Windows version. The two versions are

file-compatible, but they differ in many ways in how they look and what they can do. If you have AutoCAD for Mac, you should be able to grasp basic 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) or *What's Inside? AutoCAD for Macintosh*, by Ralph Grabowski, available as an e-book at www.upfrontezine.com/wiam.

Here are some conventions that you'll run across in this book.

Using the command line

Text that we want you to type into the program at the command line, in a dialog box, in a text box, or elsewhere appears in **boldface type**, like the 0 at the end of the following line.

```
Specify starting width <0.0000>: 0
```

Examples of AutoCAD prompts appear in a `special` typeface, as does any other text in the book that replicates a message, a word, or text that appear onscreen. Sequences of prompts that appear on the AutoCAD command line have a shaded background, like this:

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

When there is a specific action we want you to take at one of these prompts, look for the italic passage at the end of this line, where we want you to press Enter:

```
Specify ending width <5.0000>: Press Enter
```

Many figures in this book also show AutoCAD command-line sequences that demonstrate AutoCAD's prompts and sample responses.

Using aliases

Many AutoCAD commands have *aliases* — these shortcut versions have fewer letters than their full commands, in case you like to type commands at the AutoCAD command line. In this book, we show aliases in uppercase as part of the command names. To start a command, you have to type only its uppercase letters. For example, to draw a line, type either **LINE** (the official command for the Line command), or just **L** (its alias) and then press Enter to execute the command.

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:



Herein lies a pointed insight that can save you time and trouble as you use AutoCAD. In many cases, Tip information acts as a funnel on AutoCAD's impressive but sometimes overwhelming flexibility: After telling you many of 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 information that most people don't need to know most of the time. These paragraphs definitely are not required reading, so if you see one at a point when you've reached your techie-detail threshold, feel free to skip it.



Warnings 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.



You have 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.



This icon points to new stuff in AutoCAD 2014 (and, sometimes, in AutoCAD LT 2014). It's designed mostly for people who are somewhat familiar with an earlier version of AutoCAD and want to be alerted to what's new or different in this release. New users of AutoCAD who are starting out their CAD working lives with AutoCAD 2014 will also find this information interesting, especially when they can show off their new book-learnin' to those 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 and AutoCAD LT. If you're using AutoCAD LT, you'll find out what you're missing compared to the full version of AutoCAD. If your friend is using AutoCAD LT, you'll know where to look to find features in AutoCAD to brag about.

Beyond the Book

We have written a lot of extra content that you won't find in this book. Go online to find

✓ **AutoCAD drawings that you can use in conjunction with this book at**

www.dummies.com/go/autocad2014fd

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, which are named according to chapter, contain one or more drawing files. For example, `afd03.zip` contains the versions of the drawing in Chapter 3. Note that not all chapters have associated drawing files.

✓ **Online articles covering additional topics at**

www.dummies.com/extras/autocad2014

Here you'll find out how to create a custom profile, discover the differences between AutoCAD and AutoCAD LT, amid other details to aid you in your AutoCAD journey.

✓ **The Cheat Sheet for this book is at**

www.dummies.com/cheatsheet/autocad2014

Here you'll find a roadmap to setting up your drawings and keyboard shortcuts.

✓ **Updates to this book, if we have any, are at**

www.dummies.com/go/autocad2014fdupdates

Where to Go from Here

If you're reading 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 the drawing environment to outputting your masterworks on hard copy to sharing your work with others.

If you're an experienced user, you'll probably be an index-flipper who looks for the missing information needed to complete a specific task. You can probably find the index on your own, but we encourage you to browse through this book anyway, with a highlighter or sticky notes in hand, so that you can find those particularly important places when you need them again. If you're competent in most areas of AutoCAD and you're familiar with the previous version, look for the New In 2014 icons in the margins to find out about the latest features that you never realized you can't live without.

Whichever route you choose, we hope that you enjoy your time with *AutoCAD 2014 For Dummies*. A-a-and, you're off!

Part I

Getting Started with AutoCAD 2014



Visit <http://www.dummies.com> for more great *For Dummies* content online.

In this part . . .

- ✓ Find your way around the AutoCAD screen, and see where the tools you use most often, like the Ribbon, graphic screen, and command line, are at.
- ✓ Discover the half-dozen commands that account for much of your AutoCAD activities.
- ✓ See the big picture — start to finish — how to start a drawing to printing it.
- ✓ Correctly set up AutoCAD and create templates to have drawing success.
- ✓ Navigate through your drawing by panning and zooming.

Introducing AutoCAD and AutoCAD LT

In This Chapter

- ▶ Determining what AutoCAD can do for you
 - ▶ Opening AutoCAD
 - ▶ Creating your first drawing in AutoCAD
 - ▶ The complete picture
 - ▶ The difference between pixels and vectors
 - ▶ Comprehending the Cartesian Coordinate System
 - ▶ The DWG file format
-

This chapter helps ease you into using AutoCAD to create engineering drawings and how to get started. Although it's not uncommon to feel overwhelmed the first time you see AutoCAD, rest assured that you don't need to learn all of the controls that you see in the default environment to be an efficient user of the program.

After a brief introduction of the program, we show you just how easy it can be to use AutoCAD with an exercise. The exercise is followed up with some key concepts that you should understand when using AutoCAD, including how it differs from most other computer applications.



When you're starting out with AutoCAD, heed this quote from *The Hitchhiker's Guide to the Galaxy*: Don't panic!

Checking Out What AutoCAD Can Do for You

AutoCAD is, first and foremost, a program for creating *two-dimensional technical drawings* — in which measurements and precision are important because these kinds of drawings are often used to build something. And AutoCAD's 3D

capabilities have grown by leaps and bounds over the past several releases, with 3D modeling becoming a common way to check designs *before* they're drafted.

The upfront investment to use AutoCAD (not only your money if you paid for it, but your time to learn it) is certainly more expensive than the investment needed to use pencil and paper, and the learning curve is much steeper, too. But this book is here to help you with that learning curve.

Whether you're choosing to use AutoCAD for your computer-aided drafting (CAD) needs or the software was foisted upon you, you'll appreciate these attributes, which make the program easier to use than the pencil and paper you may have used in the past:

- ✓ **Precision:** Creating lines, circles, and other shapes with exact dimensions is easier using AutoCAD than a pencil.
- ✓ **Modifiability:** Drawings are much easier to modify on the computer screen than on paper. CAD modifications are a lot cleaner, too.
- ✓ **Efficiency:** Creating many kinds of drawings is faster with a CAD program, especially drawings that involve repetition, such as floor plans in a multistory building.
- ✓ **Popularity:** Everyone is using it. Several flavors are available from Autodesk to suit specific markets such as mechanical, electrical, architectural, and civil. There are far more copies of AutoCAD in use than all other CAD programs combined.

Opening AutoCAD

The first thing you need to do to start using AutoCAD is launch AutoCAD (well, duh!) and, if necessary, maximize its screen display. AutoCAD has so many tools and palettes that you'll always want to use it in full-screen mode. Follow these steps:

1. Double-click the AutoCAD shortcut on the Windows desktop.

If you don't have an AutoCAD shortcut on your desktop, choose Start⇨[All] Programs⇨Autodesk⇨AutoCAD 2014 English⇨AutoCAD 2014 English, if you are using Windows XP or Windows 7. If you're using Windows 8, click AutoCAD 2014 – English on the start screen. The exact wording of the selections vary between the different versions of AutoCAD and Windows, but it isn't difficult to figure out what you're looking for.

2. Click the Close button in the lower-right corner of the Welcome screen.

If you don't want to encounter the Welcome screen again, select the Display at Startup check box in the lower-left corner.



3. Expand AutoCAD to full-screen mode by clicking the middle Windows button in the upper-right corner of the application window.
4. Expand the graphic area (the big, gray area in the middle) to full-screen size by clicking the middle button in the upper-right corner, near the compass rosette.
5. If the Design Feed palette is displayed, close it by clicking the X at its top-left corner.



AutoCAD remembers how it was last closed and opens the same way the next time you open it.

6. Place the cursor in the gray graphics area (midscreen) and then press the Esc key twice to make sure that no commands are active.

Now you're ready to start drawing in AutoCAD, as shown in Figure 1-1. You can find out how to create a custom profile and how to reset AutoCAD back to its default configuration in the online extras for this book. (See the Introduction for more details on how to find the online extras.)



Your screen should be dark gray as in Figure 1-1, but our screen shots in the rest of the book have a white background so they're easier to see on the page.

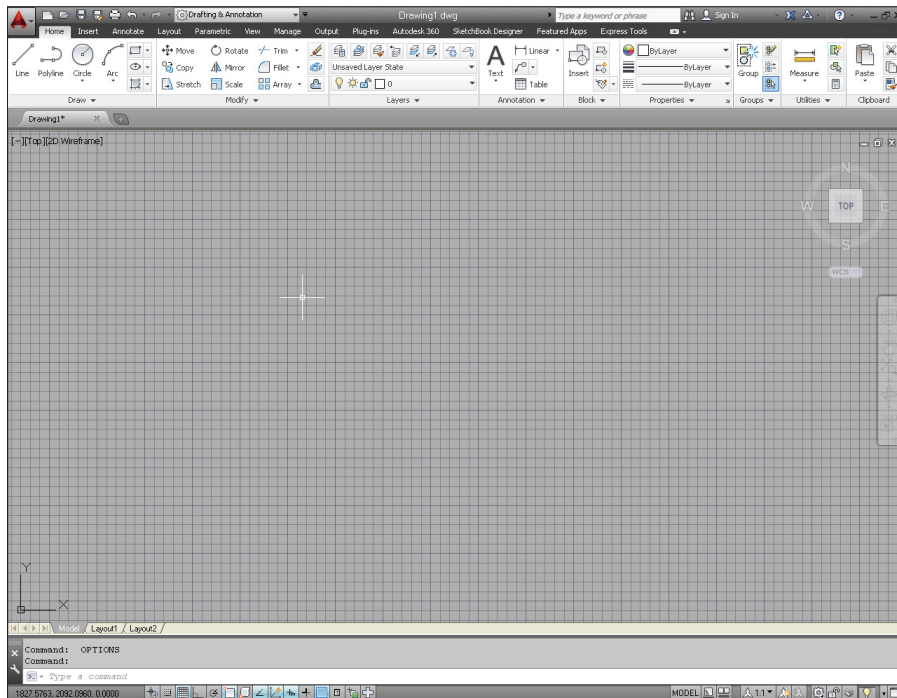


Figure 1-1: AutoCAD 2014, ready to draw!

Drawing in AutoCAD

AutoCAD offers a wide range of commands to create, modify, and annotate 2D designs. Don't feel like you need to learn and master every command that AutoCAD offers to be a proficient drafter, as even the most veteran drafter will tell you that they only use around 50 commands to complete the most common drafting tasks.

The following exercise introduces a few of the commonly used commands to establish the size of the drawing area you will be working in, and then the commands you will use for creating straight line segments and circles. The lines and circles that you create will make up a simple bicycle.

You always start commands by clicking a button in the application window, or by entering its name in a text entry area called the *command line*.

In this exercise and others in this book, AutoCAD's command line entries look like this, and you type the commands and responses shown in **bold**. Press Enter after each command or response that you type.



Don't add spaces on either side of a commas! AutoCAD treats pressing the spacebar the same as pressing Enter in most situations. This makes keyboard entry fast and easy, but messes things up if you do it at the wrong time.

1. Set up an appropriate size for the drawing:

LIMITS

Reset Model space limits:

Specify lower left corner or [ON/OFF] <0.0000,0.0000>:
0,0

Specify upper right corner <12.0000,9.0000>: **60,40**

Zoom A

2. Disable Dynamic Input mode to work with the command line:

Dynmode

Enter new value for DYNMODE <3>: **-3**

3. Draw the frame and seat of the bicycle:

Line

Specify first point: **26,12**

Specify next point or [Undo]: **13,12**

Specify next point or [Undo]: **22,24**

Specify next point or [Undo]: **40.5,24**