
AUTODESK
Official Press
Don Bokmiller
Simon Whitbread
Plamen Hristov
Mastering Autodesk®
Revit® MEP 2014
SYBEX
A Wiley Brand

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Cover Image: iStockphoto.com / Richard Goerg

Published simultaneously in Canada

ISBN: 978-1-118-604199-9
ISBN: 978-1-118-74137-5 (ebk.)
ISBN: 978-1-118-75817-5 (ebk.)

Library of Congress Control Number: 2013935675

10 9 8 7 6 5 4 3 2 1

Dear Reader,

Thank you for choosing *Mastering Autodesk Revit MEP 2014*. This book is part of a family of premium-quality Sybex books, all of which are written by outstanding authors who combine practical experience with a gift for teaching.

Sybex was founded in 1976. More than 30 years later, we're still committed to producing consistently exceptional books. With each of our titles, we're working hard to set a new standard for the industry. From the paper we print on to the authors we work with, our goal is to bring you the best books available.

I hope you see all that reflected in these pages. I'd be very interested to hear your comments and get your feedback on how we're doing. Feel free to let me know what you think about this or any other Sybex book by sending me an email at `nedde@wiley.com`. If you think you've found a technical error in this book, please visit `http://sybex.custhelp.com`. Customer feedback is critical to our efforts at Sybex.

Best regards,

Neil Edde
Vice President and Publisher
Sybex, an Imprint of Wiley

To my wife, family, friends, and coworkers, with much gratitude.
—Don Bokmiller

To my wife and daughter for all their support, all the time, thank you.
—Simon Whitbread

To my family, friends, and coworkers, thank you all.
—Plamen Hristov

Acknowledgments

This is my favorite part of the book to write, where I get to thank my darling wife, Shelley. Thanks also to my family for your kindness and encouragement.

I have had the great opportunity to work with many wonderful people who have influenced my career and provided wisdom, guidance, and friendship. I want to thank my friends and colleagues at Clark Nexsen, where I have been given the opportunity to grow and learn in a terrific working environment, which I could never take for granted. Thanks Johan, Noah, Jeff, Willie, Tim, Creighton, Cheryl, and Larry. Thank you to all the great people I've met at the Revit Technology Conferences, and those I've had the opportunity to work with at Autodesk University, especially Joel and Jarrod. Peer networking is such a great way to learn and develop new ideas.

I cannot bypass the opportunity to thank all the incredible people at Sybex. Thank you, Willem, for once again keeping things moving. Thank you, Dick, Eric, and Sharon, for being such great editors. I'm sure there are many others who have worked hard to bring this book together. Thank you, all!

Thank you, Simon. I truly enjoy working with you on these books. Thanks also for your friendship. Plamen, thank you so much for all that you bring to the table. Thank you, Steve, for doing the dirty work of the technical edit. Your input has proven invaluable. It has been my pleasure to work with you all.

—Don Bokmiller

To my wife, Carole, thank you for your continued support over the past year while I have been working on this and other projects; it doesn't go anywhere near the thanks due for all your hard work and patience during the time I have been either working away from home, or writing late into the night. Your support over the years has helped me achieve so much—what else can I say but thank you and I love you. Thanks also to my daughter, Jess, a beautiful, hardworking, caring person who now knows a man who will forever be known as Disco Bob.

Professionally, thank you to Jasmax architects; their early vision of a collaborative environment meant that I (and they) had an early introduction to Revit. For his encouragement, thank you also goes to Shane Morris, CTO with one of the world's largest Autodesk resellers, A2K Technologies, for whom I provide Revit MEP consulting, teaching and implementation services. Their extended team is the best to work with.

Thank you also to everyone at Sybex who helped to get this edition moving. It seems unfair to single out any one person; suffice it to say that without you, there would be no book.

Finally, a special thanks to Don Bokmiller. What? Again? You wanted my help…again? It's been a pleasure. I think we have a really strong team; let's keep it going!

—Simon Whitbread

To my mother, Krisi, and my dad, Marin, thank you for raising me and, more important, for the encouragement, faith, and love you surrounded me with while guiding me on this journey to the man I have become. I can never thank you enough!

Many thanks to all the people whom I have learned so much from and without a doubt have influenced my personal and professional life—Saeid Berenjian, Shawn Zirbes, Bob Palioca, David Haynes, Glynnis Patterson, Dennis Nunes, Mark Reid, Bryan Johnson, and Lowell Shields. Thanks to my friends Stephanie, Suzie, Jessica, Ethan, and Krinchev.

I also want to thank all my colleagues at Capital Engineering Consultants, Inc. for the great opportunity to be part of an amazing team.

And finally, thanks to Don, Simon, and the entire Sybex team for giving me the opportunity to be part of something I will never forget.

—Plamen Hristov

About the Authors

Don Bokmiller is a CAD/BIM specialist at Clark Nexsen, an architecture and engineering firm in Norfolk, Virginia. He has worked in the AE design industry since 1996, when he started out as a CAD technician in the electrical department. As the company grew, he eventually became one of a few CAD managers, while also participating as an electrical designer on several projects. When Revit Systems came along, he participated in the Autodesk Beta program and has continued to do so for each release. His current position is to optimize the company's use of Revit MEP. He currently works in a team under the direction of the IT department director, tying the software user experience directly to the software, hardware, and network administrators. Don has also worked as an application specialist, supporting clients of various sizes and company structures on their use of Revit MEP. He has taught classes and given presentations to local engineering organizations. Don is an Autodesk User Group International (AUGI) member and has presented at Autodesk University and the Revit Technology Conference USA.

Simon Whitbread, Revit and CAD implementation specialist, started using Revit at release 5.1. He has over 30 years of experience in the building services and architectural industries. Since the early 1990s, he has been involved in developing and managing CAD and IT systems. He moved to New Zealand in 2002, where he led the implementation of Revit Architecture at Jasmax, one of New Zealand's leading architectural practices. More recently he has been providing implementation, support, and training services for AutoCAD and the Revit suite of programs to companies in Australia, Dubai, Indonesia, New Zealand, Singapore, the United States, and the United Kingdom. Simon enjoys spending time with his family, is a frequent speaker at Autodesk University and Revit Technology Conference (RTC) events, is a member of AUGI, is on Twitter, and is part of the Australasian organizing committee for the RTC.

Plamen Hristov is the director of design technology at Capital Engineering Consultants, Inc., where he is leading the implementation of building information modeling (BIM).

Plamen has also worked as an application specialist, actively developing Autodesk Revit implementation strategies, techniques, and procedures for architectural and MEP companies. He has been establishing and updating company standards and best practices, as well as assisting project teams with pilot projects, implementations, on-site project consulting, custom content creation, and training. Plamen is an Implementation Certified Expert (ICE), and he has presented various BIM topics at Autodesk University, the Revit Technology Conference, Ecobuild America, and Revit user groups.

Contents at a Glance

Contents

Introduction

Welcome to *Mastering Autodesk® Revit® MEP 2014*. We have worked diligently to bring you a book that takes you through the core features and functionality of Revit MEP 2014 from both the design and documentation perspectives.

Revit MEP started out as Revit Systems in 2006, and, in just a few years, it has been on a fast-track development pace in order to bring it up to speed with the Revit Architecture and Revit Structure platforms. The 2014 release of Revit MEP provides platform improvements along with MEP-specific features that make this a very exciting edition. When Revit Systems was first released, it was primarily to allow MEP engineers to join the move toward building information modeling (BIM) that was being taken on by architects and structural engineers. The features and functionality were, in the opinion of most, limited to provide a complete MEP project. The development team has been listening to the needs of users, and has delivered tools and features in this release that have been desired by many from the beginning. We now have tools for duct-mounted air terminals, applying lookup table files directly to fittings, temporary visibility overrides, and many other new features.

The primary focus of this book is, of course, on the MEP disciplines, but there is plenty of information that applies to Revit in general. The idea behind the format is to take you through the major points of the design process and requirements for completing a building design and project submittal. This book focuses on building engineering, but it may also be helpful for other types of engineering projects such as process piping design or any others that require a combination of data and model components.

The book is written in five parts, the first of which covers general functionality that is useful for all disciplines. You will find suggestions throughout the book for including features and components in your project templates. The first part does not cover every pick and click available in the software; it approaches the use of Revit from a best-practices standpoint, which we hope will inspire you to think about ways to make Revit MEP 2014 work best for you. Any topics not covered were not omitted to imply that they are unimportant, but simply because you can find information about these features in the documentation provided by Autodesk and in the Revit MEP 2014 Help.

The next three parts of the book are MEP-specific and have been written to cover the key design areas of each individual discipline. Again, we focus on best practices by relating our professional experience with not only the software but also the design industry. In an effort to tie it all together, the fifth part of the book contains information on how to optimize your Revit experience by learning the tools and features available for creating the various components that make up an MEP model.

Who Should Buy This Book

This book is intended for readers who are at least somewhat familiar with Revit MEP. It is not intended to be a "how-to" book by simply explaining picks and clicks; it is more for readers who are looking to find ideas on how to make the software work for them. Engineers, designers, and CAD technicians will all find useful information related to their workflows. If you are looking to move further with your Revit MEP implementation, you should find this book to be a useful resource. Even if you know the topics discussed in this book, we hope you will be inspired to think of new ways to improve your Revit MEP experience.

Free Autodesk Software for Students and Educators

The Autodesk Education Community is an online resource with more than five million members that enables educators and students to download—for free (see website for terms and conditions)—the same software used by professionals worldwide. You can also access additional tools and materials to help you design, visualize, and simulate ideas. Connect with other learners to stay current with the latest industry trends and get the most out of your designs. Get started today at `www.autodesk.com/joinedu`.

What's Inside

Here is a glance at what's in each chapter:

Part 1: General Project Setup

Chapter 1: Exploring the User Interface The ribbon interface is designed for optimal workflow. In this chapter, you will discover the features of the user interface that allow you to work efficiently. Some new features in Revit MEP 2014 improve the user interface dramatically.

Chapter 2: Creating an Effective Project Template The key to success with Revit projects is to have a good template file. Chapter 2 takes you through the major areas of a template file, offering ideas for settings that will make starting a project as simple and efficient as possible.

Chapter 3: Worksets and Worksharing This chapter guides you through the process of setting up a project file in a multiuser environment. The features of a worksharing-enabled file are explained in a manner that promotes ideas for project workflow efficiency.

Chapter 4: Project Collaboration Revit has many features that make project collaboration easy to manage. In this chapter, you will learn about ways to use the power of Revit MEP to coordinate your design and documents with other members of the project team.

Chapter 5: Multiplatform Interoperability: Working with 2D and 3D Data This chapter provides best-use techniques for importing non-Revit data into your projects. You will learn about the data types available and how to use them effectively in your Revit project files.

Chapter 6: Parameters Parameters are the intelligence within a BIM project. This chapter explores how parameters can be used in both projects and families for applying computable data to your Revit models. The creation of shared parameters and their use is also covered.

Chapter 7: Schedules The best way to extract the data contained in your Revit project model is to use the power of schedules. In this chapter, you will learn the tools available for scheduling model components and how to use schedules to manage data within your projects. The panel schedule template feature is also covered in this chapter.

Part 2: Autodesk Revit MEP for Mechanical Design

Chapter 8: HVAC Cooling and Heating Load Analysis Mechanical design must first start with understanding how your building will perform in different weather conditions and climates. In Chapter 8, you will learn that properly produced building loads can ensure that the mechanical design has been sized for maximum efficiency, saving energy and money while reducing the impact on the environment.

Chapter 9: Creating Logical Systems In this chapter, you will learn how to set up logical systems, and how each system is affected by the type of systems you have created. From mechanical systems to fire-protection systems, all have a certain role to play in BIM.

Chapter 10: Mechanical Systems and Ductwork Understanding how to route ductwork successfully can lead to error reduction and better coordination. In Chapter 10, you will learn how to locate mechanical equipment, and how to use the proper routing methods for ductwork.

Chapter 11: Mechanical Piping Routing mechanical piping can be a daunting task. In this chapter, you will learn how to route and coordinate your piping and how, through these techniques, you can speed up production and take full advantage of what Revit MEP 2014 has to offer.

Part 3: Autodesk Revit MEP for Electrical Design

Chapter 12: Lighting In this chapter, you will learn how to place lighting fixtures into your projects, including site lighting. The use of lighting switches is also discussed, along with the relationship between lighting fixtures and the spaces they occupy. This chapter also covers the basics for using Revit MEP for lighting analysis.

Chapter 13: Power and Communications In this chapter, the basics for placing power and communication devices into a model are covered. You will also learn how to place electrical equipment and connections for use in distribution systems. Conduit and cable tray modeling tools are also explored in this chapter.

Chapter 14: Circuiting and Panels Creating systems for your electrical components is just as important as it is for mechanical components. In this chapter, you will learn how to set up your projects to your standards for wiring, create circuits within your model, and create panel schedules to report the loads. The tools for load classification and demand factors are also covered in this chapter.

Part 4: Autodesk Revit MEP for Plumbing

Chapter 15: Plumbing (Domestic, Sanitary, and Other) In this chapter, you will learn how to modify plumbing fixture families and create custom systems to speed up plumbing design. You will also learn how to use the Copy/Monitor features in ways never discussed before.

Chapter 16: Fire Protection Fire-protection systems protect buildings and lives. You will learn how to lay out a fire pump system and assemble components to help in your design process. You will learn how to coordinate with other disciplines and how to enter into the BIM arena effectively through the use of Revit MEP 2014.

Part 5: Managing Content in Autodesk Revit MEP

Chapter 17: Solid Modeling The foundation for custom content creation is having the ability to create the forms required to build component families. In this chapter, you will learn how to use the tools available in Revit MEP to create model geometry. You will also learn how to make geometry parametric, increasing its usability.

Chapter 18: Creating Symbols and Annotations Because so much of MEP design information is conveyed with schematic symbols, it is important to have the symbols and annotative objects commonly used for projects. Revit MEP has the tools needed to create schematic symbols for use in component families or directly in projects. In this chapter, you will learn how to use these tools, and how to create constraints within families for display of the symbols in your projects.

Chapter 19: Creating Equipment Equipment families are an important component of a Revit model because of the space they occupy within a building. In this chapter, you will learn how to use solid modeling tools to create equipment. You will also learn how to add connectors for systems, and how to create clearance spaces for coordination with other model elements.

Chapter 20: Creating Lighting Fixtures Lighting fixture families are special because they can hold photometric data that allow for lighting analysis directly in your Revit model. This chapter covers how to create lighting fixture families and add the data needed for analysis. You will also learn how lighting fixture families can be represented in project model views using detail components, linework, and annotation within the family file.

Chapter 21: Creating Devices This chapter examines the process for creating MEP system devices and how to use annotations to represent them on construction documents. In this chapter, you will also learn how parameters can be used to control and manage symbol visibility.

Chapter 22: Details Although creating a model with computable data is the primary reason for using Revit MEP, you do not want to model every minute detail of the design. The tools for creating detail drawings of your design are examined in this chapter. You will also learn how to use existing CAD details along with strategies for creating a library of Revit details.

Chapter 23: Sheets When it comes time to submit a project, you need to have a set of coordinated construction documents. In this chapter, you will learn the ways you can create and manage your project sheets. You will also learn about how you can print and export your project sheets for submittal or coordination with clients.