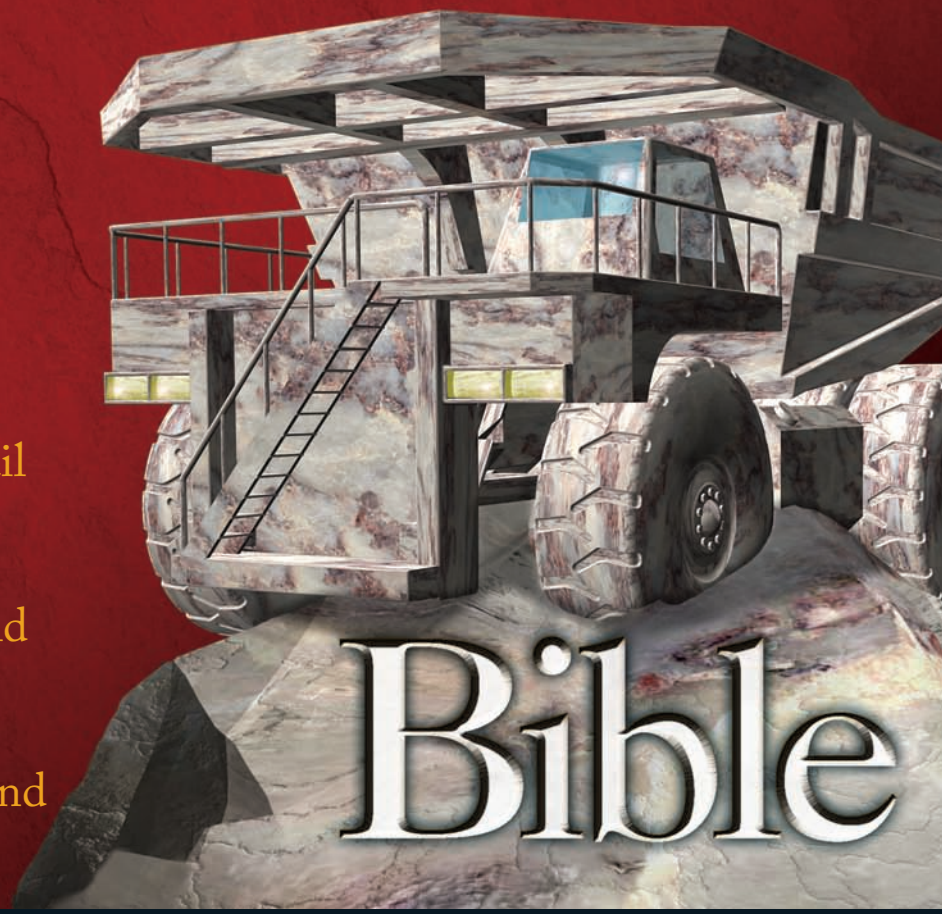
Matt Lombard

SolidWorks® 2011 Assemblies



Bible

Get the in-depth detail you've been seeking

Find new ways to build better assemblies

Learn best practices and advanced techniques

The book you need to succeed!

SolidWorks® 2011 Assemblies Bible

SolidWorks® 2011 Assemblies Bible

Matt Lombard

Wiley Publishing, Inc.

SolidWorks® 2011 Assemblies Bible

Published by
Wiley Publishing, Inc.
10475 Crosspoint Boulevard
Indianapolis, IN 46256
www.wiley.com
Copyright © 2011 by Wiley Publishing, Inc., Indianapolis, Indiana

Published by Wiley Publishing, Inc., Indianapolis, Indiana

Published simultaneously in Canada

ISBN: 978-1-118-00276-6

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 646-8600. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, 201-748-6011, fax 201-748-6008, or online at http://www.wiley.com/go/permissions.

LIMIT OF LIABILITY/DISCLAIMER OF WARRANTY: THE PUBLISHER AND THE AUTHOR MAKE NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE ACCURACY OR COMPLETENESS OF THE CONTENTS OF THIS WORK AND SPECIFICALLY DISCLAIM ALL WARRANTIES, INCLUDING WITHOUT LIMITATION WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. NO WARRANTY MAY BE CREATED OR EXTENDED BY SALES OR PROMOTIONAL MATERIALS. THE ADVICE AND STRATEGIES CONTAINED HEREIN MAY NOT BE SUITABLE FOR EVERY SITUATION. THIS WORK IS SOLD WITH THE UNDERSTANDING THAT THE PUBLISHER IS NOT ENGAGED IN RENDERING LEGAL, ACCOUNTING, OR OTHER PROFESSIONAL SERVICES. IF PROFESSIONAL ASSISTANCE IS REQUIRED, THE SERVICES OF A COMPETENT PROFESSIONAL PERSON SHOULD BE SOUGHT. NEITHER THE PUBLISHER NOR THE AUTHOR SHALL BE LIABLE FOR DAMAGES ARISING HEREFROM. THE FACT THAT AN ORGANIZATION OR WEBSITE IS REFERRED TO IN THIS WORK AS A CITATION AND/OR A POTENTIAL SOURCE OF FURTHER INFORMATION DOES NOT MEAN THAT THE AUTHOR OR THE PUBLISHER ENDORSES THE INFORMATION THE ORGANIZATION OR WEBSITE MAY PROVIDE OR RECOMMENDATIONS IT MAY MAKE. FURTHER, READERS SHOULD BE AWARE THAT INTERNET WEBSITES LISTED IN THIS WORK MAY HAVE CHANGED OR DISAPPEARED BETWEEN WHEN THIS WORK WAS WRITTEN AND WHEN IT IS READ.

For general information on our other products and services or to obtain technical support, 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.

Library of Congress Control Number: 2011932103

Trademarks: Wiley and related trade dress are registered trademarks of Wiley Publishing, Inc., in the United States and other countries, and may not be used without written permission. SolidWorks is a registered trademark of Dassault Systèmes SolidWorks Corporation. All other trademarks are the property of their respective owners. Wiley Publishing, Inc., is not associated with any product or vendor mentioned in this book.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.

About the Author

Matt Lombard is an independent engineering consultant specializing in plastic parts and complex shapes. He also writes a blog on SolidWorks, which you can find at `www.dezignstuff.com/blog`. Matt lives in the picturesque Shenandoah Valley of Virginia, where he enjoys reading the classics and fishing.

Credits

Senior Acquisitions Editor
Stephanie McComb

Project Editor
Jade L. Williams

Technical Editor
Charles Culp

Copy Editor
Marylouise Wiack

Editorial Director
Robyn Siesky

Business Manager
Amy Knies

Senior Marketing Manager
Sandy Smith

Vice President and Executive Group Publisher
Richard Swadley

Vice President and Executive Publisher
Barry Pruett

Senior Project Coordinator
Kristie Rees

Graphics and Production Specialists
Ana Carillo
Jill A. Proll

Quality Control Technician
Laura Albert

Proofreading
Christine Sabooni

Indexing
BIM Indexing & Proofreading Services

Media Development Project Manager
Laura Moss

Media Development Assistant Project Manager
Jenny Swisher

Media Development Associate Producer
Marilyn Hummel

Contents

Acknowledgments . . . . . **xxiii**

Introduction . . . . . **xxv**

Part I: Introducing Assembly Basics 1

Chapter 1: Understanding Assemblies. 3

Understanding the Purpose of Assemblies 4
Identifying types of assemblies 5
Driving an assembly with base part and mates 5
Driving an assembly with sketches and planes 7
Modeling parts in place 8
Modeling parts as multi-bodies 10
Inserting a master model 11
Excluding some parts 12
Creating an alternative to multiple assemblies 12
Creating Assembly Templates 13
Putting Parts into Assemblies 15
Understanding External References 16
Referencing external files in-context 17
Referencing external files from a part 18
Summary 19

Chapter 2: Navigating the Assembly Interface 21

Identifying Elements of the SolidWorks Assembly Interface 22
Using the CommandManager and toolbars 23
Introducing the assembly tools 24
Using the Heads-Up View toolbar 25
Using the Shortcut "S" toolbar 26
Working in the assembly FeatureManager 27
Working with multiple document windows 29
Managing open windows 29
Understanding the Interface for Moving and Mating 31
Using the Move Component interface 32
Free Drag 33
Along Assembly XYZ 33

Along Entity 34
By Delta XYZ 34
To XYZ Position 35
Selecting Move Component options 35
Dynamic Clearance 36
Using the Mate interface 36
Considering workflow 36
Looking at the rest of the Mate interface 38
Summary 40

Chapter 3: Visualizing Assemblies 41

Manipulating the View 41
Using arrow keys 42
Using the middle mouse button 42
Clicking the triad 42
Using mouse gestures 43
Using the Magnifying Glass 44
Investing in a 3D mouse device 45
Controlling Appearances 45
Removing appearances and overrides 47
Using the Display Pane 48
Using the DisplayManager 50
Controlling Appearances with the DisplayManager 51
Applying decals 52
Controlling Scene, Lights, and Cameras 56
Creating a walk-through 56
Using Display States 59
Using Edge and Wireframe Settings 61
Making the case for shaded with edge display 61
Using tangent edge display 63
Using Assembly Visualization 64
Tutorial: Using Assembly Visualization 65
Summary 66

Part II: Working with Assemblies 67

Chapter 4: Building Efficient Assemblies 69

Identifying the Elements of an Assembly 69
Understanding standard reference geometry items 70
Working with assembly equations 71
Solving external references 72
Understanding link values and global variables 72
Renaming 72
Recommendations 73
Using an assembly layout sketch 73

Working with virtual components 75
Creating assembly reference geometry 75
Comparing history-based and non-history-based portions of the assembly tree 75
Understanding parts and subassemblies 76
Creating folders 77
Organizing mates 77
Applying assembly features 77
Using component patterns and mirror components 78
Looking at in-context reference Update Holders 78
Using Smart Fasteners 79
Applying the Hole Series 79
Using SpeedPaks 80
Using ghosts 80
Sharing self-contained data 80
Using SpeedPaks with drawings 80
Using Subassemblies 82
Creating subassemblies from existing parts 82
Inserting a new subassembly 83
Dissolving subassemblies 83
Organizing for performance 84
Solving mates 84
Using flexible subassemblies 84
Working with legacy data 84
Organizing for the Bill of Materials 85
Grouping subassemblies by relative motion 86
Organizing groups of purchased components 87
Depicting an assembly process 87
Influencing item numbering 87
Separating steps 87
Patterning considerations 88
Using Folders 88
Creating folders in the FeatureManager 89
Using Add To New Folder 89
Using Create New Folder 89
Adding items to existing folders 89
Reordering items in the tree 90
Working with Tree Display Options 91
Showing feature names and descriptions 91
Showing component and config names and descriptions 92
Using names other than the part filename in the assembly FeatureManager 92
Using Component Reference per Instance 93
Viewing features, mates, and dependencies 94
Working with Assembly Tools 95
Using Sensors 96
Using the AssemblyXpert 96

Tutorial: Arranging Assemblies....97
Tutorial: Managing the FeatureManager....101
Summary....102

Chapter 5: Getting More from Mates. 103

Applying Mates....104
Mating through the Mate PropertyManager....104
Understanding the mate workflow....105
Changing the view and model position....105
Applying the Select Other command....106
Using Multiple Mate mode....107
Taking advantage of SmartMates....107
Alt+dragging a SmartMate....107
Dragging between windows....110
Using Mate references....110
Mating with macros....110
Mating for Motion....111
Analyzing degree of freedom....111
Setting up successful motion....113
Working with Advanced and Mechanical Mate Types....114
Symmetric mate....115
Cam mate....116
Width mate....117
Gear mate....118
Rack and Pinion mate....119
Limit mates....120
Screw mate....120
Path mate....121
Linear Coupler mate....123
Hinge mate....123
Belt/Chain....124
Editing and Troubleshooting....124
Editing existing mates....125
Troubleshooting assembly mates....126
Troubleshooting warnings and errors....127
Examining Mate Options....128
Reviewing Mate Best Practices....129
Tutorial: Mating for Success....130
Summary....135

Chapter 6: Working with Assembly Sketches and Layouts. 137

Looking at the Techniques....138
Using the assembly layout sketch....138
Using master model....143

Using the Layout Feature 144
Using the Layout workflow 145
Working with virtual components 147
Balancing advantages and limitations 147
Tutorial: Working with a Layout 148
Summary 154

Chapter 7: Using Assembly Tools 155

Placing Parts without Mates 155
Using the Move Component options 156
Using Free Drag 157
Moving with Along Assembly XYZ 158
Moving with Along Entity 158
Using By Delta XYZ 158
Using To XYZ Position 159
Using the For Positioning Only option 160
Building parts in place 161
Using Proximity Tools 162
Using Interference Detection 162
Displaying the results 163
Ignoring interferences 163
Using Component view 164
Selecting options 164
Displaying options for non-interfering components 164
Working with Clearance Verification 164
Using Dynamic Clearance 166
Working with Collision Detection 167
Using Physical Dynamics 168
Using Sensors 168
Selecting Components 170
Selecting with a volume 171
Selecting suppressed components 172
Choosing hidden components 172
Selecting parts mated to another part 172
Selecting internal components 172
Choosing Toolbox parts 172
Using the Advanced Select options 172
Reading AssemblyXpert Results 173
Using Defeature 175
Using the Hole Alignment Tool 176
Working with Large Assemblies 177
Using special techniques to improve large assembly performance 178
Working locally 178
Organizing data into subassemblies 178
Avoiding in-context references 178

Avoid fancy display settings ... 179
Repairing errors ... 179
Avoiding unnecessarily complex geometry ... 179
Using special tools to improve large assembly performance ... 179
Using simplified configurations ... 179
Using SpeedPak ... 180
Using Display States instead of configurations ... 180
Using Lightweight options ... 180
Using Large Assembly Mode ... 180
Using detached drawings ... 180
Suspending automatic rebuilds ... 180
Summary ... 181

Chapter 8: Controlling Assembly Configurations and Display States . . . 183

Using Display States ... 183
Controlling display states and configurations ... 184
Using display states with drawings ... 186
Using part display states in parts ... 187
Understanding Assembly Configurations ... 187
Applying configurations for performance ... 187
Suppressing components and features ... 187
Configuring SpeedPaks ... 188
Using part configurations for speed ... 188
Getting familiar with the Advanced Component Selection ... 190
Taking a look at the Isolate function ... 191
Finding features with the Simplify Assembly tool ... 191
Controlling display performance ... 192
Using configurations for positions ... 194
Positioning with mates ... 194
Positioning with sketches ... 195
Applying configurations for product variations ... 197
Using design tables for assembly configurations ... 197
Working with Modify Configurations and the Configuration Publisher ... 198
Looking at assembly configuration dos and don'ts ... 199
Tutorial: Working with Assembly Configurations ... 199
Summary ... 204

Chapter 9: Patterning and Mirroring Components 205

Using Local Component Patterns ... 206
Creating local pattern references ... 206
Patterning the seed only ... 207
Using the Instances to Skip option ... 209
Using Mirror Components ... 210
Setting the orientation ... 210
Creating opposite-hand versions ... 210
Completing the task ... 212

Using Feature-Driven Component Patterns 213
Understanding Other Pattern Options 214
Tutorial: Creating Component Patterns 216
Summary 218

Chapter 10: Modeling in Context 219

Understanding In-Context Modeling 219
Working through a simple in-context example 220
Starting a new assembly 220
Inserting a new part 221
Introducing virtual components 222
Creating the part geometry 222
Saving a virtual component 222
Creating an in-context part 223
Editing the driving part of an in-context reference 226
Weighing the advantages of in-context modeling 228
Anticipating problems with in-context modeling 228
Identifying alternatives to in-context modeling 229
Using Assembly layout modeling 229
Using Multi-body modeling 230
Dealing with the Practical Details of In-Context Modeling 230
Understanding the in-context process 230
Starting out in-context 230
Working in-context 232
Looking at in-context best practices 239
Working with multiple contexts 240
Using in-context with configurations 243
Using in-context with motion 243
Working with in-context with multiple instances 245
Using in-context and file management 245
Using in-context and mates 245
Working with circular references 245
Using skeletons and layouts 246
Using in-context in libraries 247
Removing relations 247
Deciding whether to use mating or in-context 248
Communicating design intent 248
Using Other Types of External References 248
Using inserted parts 248
Working with split parts 249
Using mirror parts 249
Using the Layout Feature 249
Using the Layout workflow 250
Understanding virtual components 252
Balancing advantages and limitations 252

Tutorial: Working In-Context 253
Summary 259

Chapter 11: Creating Assembly Features 261

Creating Assembly Cuts 262
Using the Feature Scope 264
Propagating features to parts 264
Making Fillets and Chamfers in Assemblies 266
Creating Weld Beads 267
Working with Envelopes 270
Summary 272

Chapter 12: Using Parametric Links in Assemblies 273

Using Equations in an Assembly 273
Tracking external references 274
Renaming documents referenced by equations 274
Sharing equations 275
Driving equations between parts 276
Following best practices 277
Using Link Values and Global Variables in Assemblies 277
Working with Derived Sketches in Assemblies 277
Using Inserted Parts to Communicate Parametric Control 278
Summary 280

Chapter 13: Editing, Evaluating, and Troubleshooting Assemblies 281

Working with Mates 281
Listing mates in the Mates folder 282
Listing mates under the component 283
Replacing features with mates 284
Working with the View Mates tool 285
Using the View Mate Errors window 287
Using the MateXpert 287
Editing mates 289
Editing File Management Issues 292
Using Save options and Pack and Go 292
Replacing components 294
Forming and dissolving subassemblies 296
Moving parts in and out of subassemblies 296
Moving mates from an assembly to a subassembly 297
Evaluating Assemblies 298
Using the AssemblyXpert 298
Identifying FeatureManager symbols 300
Using the Isolate function 300
Using Reload 301
Summary 302

Part III: Creating and Using Libraries 303

Chapter 14: Using Toolbox 305

Understanding Toolbox....305
Comparing configurators and libraries....306
Taking a look at how Toolbox works....307
Looking at the database....307
Taking precautions when installing configurations....308
Organizing the Toolbox parts....311
Choosing configurations or parts....312
Deciding which option is better....313
Using Toolbox....314
Turning on Toolbox and the Toolbox Browser....315
Populating holes....315
Exploring Smart Fasteners....318
Organizing Toolbox parts in an assembly....319
Working recommendations....320
Working with the simplest setup that works....320
Using a complete setup that works....321
Considering the most popular arrangement....321
Using the Hole Wizard....322
Exploring the Hole Series interface....323
Looking at Hole Series quirks....326
Tutorial: Gaining Experience with the Hole Wizard and Toolbox....327
Summary....335

Chapter 15: Working with Libraries 337

Setting Up a Library....338
Building the Design Library....339
Adding to the library....340
Adding a file location....341
Creating a new folder....343
Using the Design Library....343
Adding Mate References to library parts....343
Placing parts with Mate References into assemblies....345
Exploring Other Design Library Functions....347
Using Annotations in the library....347
Using sheet metal–forming tools in the library....348
Using assemblies in the library....348
Routing....348
Understanding Smart Components....349
Using Smart Components....349
Getting started with a simple Smart Component....350
Auto-sizing Smart Components....353

Making Smart Components 355
Getting started with a simple Smart Component 355
Creating an auto-sizing Smart Component 358
Managing files with Smart Components 363
Editing Smart Components 364
Tutorial: Working with Smart Components 365
Summary 368

Part IV: Creating Assembly Drawings 369

Chapter 16: Creating Assembly Drawings 371

Combining Parts and Assemblies on the Same Drawing 371
Dimensioning assembly features 372
Assigning the document driving the custom properties 372
Using Multi-Page Templates 373
Using Views with Special Assembly Functions 375
Using the Alternate Position View 375
Creating views of an exploded assembly 376
Adding explode lines 380
Showing exploded view 381
Creating section views 382
Excluding parts from section views 382
Aligning the view 382
Adjusting the hatching 383
Broken-Out Section View 384
Drawing the closed loop 385
Selecting the depth 385
Editing the view 386
Using Color in Assembly Drawing Views 387
Setting Up Drawings of Large Assemblies 388
Using detached drawings 388
Working with lightweight drawings 390
Using SpeedPak with drawings 390
Using draft quality views 391
Tutorial: Creating a Simple Assembly Drawing 392
Summary 394

Chapter 17: Working with Tables and Drawings 395

Driving the Bill of Materials 395
Examining the SolidWorks table-based BOM 396
Creating table-based BOM templates 397
Setting a table anchor 398
Using BOM types 399

Using configurations 399
Locating the Keep Missing Items option 399
Choosing Zero Quantity Display options 400
Assigning item numbers 400
Displaying the BOM contents 401
Controlling the appearance of the table-based BOM 401
Dissolving, combining, numbering, and restructuring for indented BOMS 402
Adding columns or rows 403
Editing BOMs 404
Retiring the Excel-based BOM 405
Using Design Tables 406
Placing Hole Tables on Drawings 408
Using Revision Tables 410
Using General Tables 413
Working with Tables in Models 413
Tutorial: Using BOMs 414
Tutorial: Using Hole Tables 418
Tutorial: Using Revision Tables 420
Summary 421

Part V: Using Specialized or Advanced Techniques 423

Chapter 18: Using DriveWorks Xpress 425

Introducing DriveWorks Xpress 426
Exploring DriveWorks Xpress for your products 427
Aligning expectations with some estimates 428
Building the Original Model 429
Automating an Example 430
Getting Started: Automating a Design 431
Activating DriveWorks Xpress 431
Creating a database 432
Capturing models 433
Adding features and dimensions 434
Creating fields for the form 436
Building rules 436
Building a rule to suppress a component pattern 438
Building a rule to change filenames 438
Using custom properties with DWX rules 438
Building a rule for custom properties 440
Running the example job 440
Working with drawings 443
Summary 443

Chapter 19: Employing Master Model Techniques 445
Using Pull Functions 447
Understanding the Insert Part feature 447
Understanding the Insert Into New Part feature 451
Using Push Functions 452
Working with the Split feature 452
Splitting a body 452
Assigning names automatically 453
Creating an assembly 454
Working with the Save Bodies feature 454
Tutorial: Working with Master Model Techniques 455
Summary 459
Chapter 20: Using Weldments 461
Sketching in 3D 462
Navigating in space 462
Understanding sketch relations in 3D sketches 463
Creating planes in space 465
Limiting path segments 466
Using dimensions in 3D sketches 467
Using the Weldment Tools 467
Using the Weldment feature 467
Introducing the Structural Member feature 468
Grouping selected path segments 470
Locating and orienting the profile 471
Using disjoint sketch segments 472
Using custom profiles 472
Adding corner treatments 473
Using arc segments 474
Patterning bodies and sketching with symmetry 475
Creating configurations 475
Using the Trim/Extend feature 475
Using the End Cap feature 477
Working with the Gusset feature 477
Using Non-Structural Components 478
Using Sub-Weldments 479
Working with Cut Lists 479
Using Cut-List Properties 480
Excluding and reordering cut list items 482
Using weld beads and fillet beads in weldments and assemblies 482
Creating Weldment Drawings 485
Tutorial: Working with Weldments 487
Summary 495

Chapter 21: Using Mold Tools 497
Working with the Mold Tools Process 498
Preparing the plastic part for Mold Tools 500
Shelling the part and applying draft 501
Adding the plastic part to a blank part 501
Using the Scale feature 501
Inserting Mold folders 502
Parting lines 503
Initiating the shut-off surfaces 506
Parting surface 508
Working example 509
Using the manual options 509
Repairing the manual mode parting surface 512
Tooling split 514
Using the Core feature 515
Intervening Manually with Mold Tools 516
Passing shut-offs 516
Creating non-planar parting surfaces 517
Summary 519

Chapter 22: Working with Large Scale Design 521
Creating a Walk-Through 522
Creating a GridSystem 524
Starting the GridSystem feature 525
Creating the sketch 526
Using the GridSystem PropertyManager 526
Understanding the GridSystem output 527
Viewing the Grid Components 528
Transferring Data with the IFC File Type 529
Summary 530

Chapter 23: Animating with the MotionManager 531
Familiarizing Yourself with the MotionManager 532
Understanding the terminology 532
Driving an animation 533
Planning an animation 534
Identifying elements of the MotionManager 535
Using display options 536
Using the MotionManager interface 536
Formatting output 536
Using the Animation Wizard 537
Creating a rotating animation 537
Creating an exploded view animation 540

Animating an assembly 540
Creating an explode 541
Putting the rotate into an animation timeline 543
Adding the explode to the animation 544
Making a part look flexible 544
Collapsing the exploded assembly 545
Animating a zoom 545
Animating a changing mate 546
Animating the View 547
Driving the view with key points 548
Using the Orientation and Camera Views feature 548
Disabling playback of view keys 549
Introducing the timebar 549
Creating key points 550
Zooming and free view manipulation 550
Using Interpolation modes 551
Correcting mistakes 552
Using paths to control cameras 552
Recalling the Walk-through feature 552
Rotating the model using a path 553
Going beyond 100 percent or 360 degrees 555
Animating with Key Points 556
Getting started 556
Using the timebar with key points 558
Copying and mirroring motion 559
Adjusting the speed of actions 559
Outputting the animation 560
Looking at other options 561
Running test animations 561
Selecting a compressor 562
Animating with Basic Motion 562
Using gravity and contact 562
Using motors and springs 563
Animating a chain and a spring using motors 564
Summary 566

Part VI: Appendixes 567

Appendix A: Finding Help 569

SolidWorks Help 569
SolidWorks Web Help 570
Contents 570
Index 570
Search 570

SolidWorks Website 571
Graphics Cards Links 571
Customer Portal 572
SolidWorks Forums 572
Knowledge Base 572
Software downloads 572
Release Notes 573
What's New 573
Installation and administration guides 573
PDMWorks Workgroup Vault Debug Guide 573
FLEXlm End Users Guide 573
User Groups 574
Online Forums 574
Blogs 574
Forums 575
Non-Commercial Websites 575

Appendix B: What's on the DVD 577

System Requirements 578
Using the DVD with Microsoft Windows 578
Windows versions 579
SolidWorks versions 579
What's on the DVD 580
Using the author files folder 580
Using the video tutorials folder 580
Using the TechSmith Screen Capture Codec 580
Accessing additional author videos 580
Troubleshooting 580
Customer Care 581

Index 583

Acknowledgments

I would like to acknowledge the efforts of the staff at Wiley for their dedication in editing the text of these books. It can be a difficult job making sure that a technical subject is treated properly. I'd also like to thank Charles Culp, the technical editor, for taking the time out of his schedule to make sure the material is accurate. Thanks also to Kim and Zoey, who help with the details in life allowing me to do this kind of work.

Introduction

SolidWorks is a huge, sprawling topic. There is a lot for you, the reader, to know, and for me to write about. As a result, with the 2011 edition, I have taken this book from a single volume of an immense scope to two individual volumes, each still fairly large, one covering parts and part drawings, and the other covering assemblies and assembly drawings. There is some overlap between these topics, but I have tried to divide the material evenly and in a way, that makes the most sense for the reader. Depending on your needs, you will probably find both volumes to be very useful references.

This book is primarily meant as an encyclopedic desk reference for SolidWorks Standard users who want a more thorough understanding of the software and process than can be found in other available documentation. As such, it is not necessarily intended to be a guide for beginners, although it has elements that beginners would find useful. Nor is it necessarily intended as a classroom guide, but I have seen people use it for that as well.

Beginners will find the step-by-step tutorials useful. However, because you are only a beginner for a short period of time, the book is intended to be most useful when you reach an intermediate level, as it takes a more conceptual approach to explaining functionality. I try to help you make the decisions about how to apply the tools to your tasks rather than demonstrating simple tasks that you will never need to do again. You will not learn to model a teapot in this book, because in your work, knowing how to model a teapot will probably not help you. However, you will learn how to make decisions that should enable you to model just about anything you want, including teapots.

To keep the size of the book manageable, I have tried to avoid topics found only in SolidWorks Professional or Premium, although I do talk about these topics when they are relevant.

While the book does point out limitations, bugs, and conceptual errors in the software, and from time to time ventures into the realm of opinion, in every case this is meant to give you a more thorough understanding of the software, and how it is applied in the context of everyday design or engineering practice.

The overall goal of this book is not to fill your head with facts, but to help you think like the software, so that you can use the tool as an intuitive extension of your own process. As your modeling projects become more complex, you will need to have more troubleshooting and work-around skills available to you. Along with best practice recommendations, these are the most compelling reasons to use this book.

Thank you for your interest.

About This Book

You will find enough information here that this book will grow with your SolidWorks needs. I have written tutorials for most of the chapters with newer users in mind, because for them, it is most helpful to see how things are done in SolidWorks step by step. The longer narrative examples give more in-depth information about features and functions, as well as the results of various settings and options.

This book includes many details that come from practical usage and is focused on the needs of professional users, not on student learners. My approach is to teach concepts rather than how to push buttons.

How This Book Is Organized

This book is divided into six parts.

Part I: Introducing Assembly Basics

This part explores basic concepts and terminology used in SolidWorks. You need to read this section if you are a new SolidWorks user, especially if you are new to 3D modeling or parametric history-based design.

Part II: Working with Assemblies

This part takes a deeper look at creating parametric relations to automate changes.

Part III: Creating and Using Libraries

This part examines the functionality within the 2D drawing side of the software. Whether you are creating views, making tables, or customizing annotations, you will find these chapters useful.

Part IV: Creating Assembly Drawings

This part examines several types of advanced techniques, such as surface modeling and multi-body modeling. This is information you won't find in other SolidWorks books, and is explained here by someone who uses the functionality daily.

Part V: Using Specialized or Advanced Techniques

Specialized functionality, such as sheet metal and plastics, requires detailed information. This part includes the topics that are key to unlocking all the power available in SolidWorks.

Part VI: Appendixes

The Appendixes in this book contain additional information, such as the contents of the DVD and other sources of help.

Icons Used in This Book

This book uses a set of icons to point out certain details in the text. While they are relatively self-explanatory, here is what each of these icons indicates:

Caution

The Caution icon warns you of potential problems before you make a mistake.

Cross-Reference

The Cross-Reference icon points out where you can find additional information about a topic elsewhere in the book.

New Feature

The New Feature icon highlights features and functions that are new to SolidWorks 2011.

Note

The Note icon highlights useful information that you should take into consideration, or an important point that requires special attention.

On the DVD

This icon points you toward related material on the book's DVD.

Tip

Each Tip provides you with additional advice that makes the software quicker or easier to use.

The *SolidWorks 2011 Assemblies Bible* is unique in its use of the following two icons:

Best Practice

The Best Practice icon points out recommended settings or techniques that are safe in most situations.

Performance

Each Performance icon elaborates on how certain settings, features, or techniques affect rebuild speed or file size.

These icons point out and describe techniques and settings that are either recommended or not recommended for specific reasons. Best practice is usually considered very conservative usage, where the stability of the parametrics and performance (another way of saying *rebuild speed*) are the ultimate goals. These two aspects of SolidWorks models are usually weighed against modeling speed (how long it takes you to create the model).

You should take Best Practice and Performance recommendations seriously, but as guidelines rather than as rules. When it comes right down to it, the only hard and fast rule about SolidWorks is that there are no hard and fast rules. In fact, I believe that the only reason to have rules in the first place is so that you know when you can break them. Parametric stability and modeling speed are not always the ultimate goals and are often overridden when work-around techniques are used simply to accomplish a geometric goal.

Because not everyone models with the same goals in mind, a single set of rules can never apply for everyone. You must take the best practice suggestions and apply them to your situation using your own judgment.

Because I actually use the software in my work, I viewed it from a practical standpoint while writing this book. I approached the software objectively as a tool, recognizing that complex tools are good at some things and not so good at others. Knowing the strengths and limitations of the software is helpful to you. Pointing out negatives in this context should not be construed as criticizing the SolidWorks software, but rather as preparing you for real-world use of the software. Any tool this complex is going to have imperfections. I hope that some of my enthusiasm for the software also shows through and is to some extent contagious.

Terminology

An important concept referred to frequently in SolidWorks is *design intent*. As a practical matter, I use the phrase *design for change* to further distinguish design intent from other design goals.

You will need to be familiar with some special terminology before continuing. In many cases, I use a SolidWorks vernacular or slang when the official terminology is either not descriptive enough or has multiple meanings. For example, the word *shortcut* can mean several things in the SolidWorks interface; it is used to describe right mouse button (RMB) menus as well as hotkeys. As a result, I have chosen not to use the word *shortcut* and instead substitute the words *RMB* and *hotkey*.

I frequently use RMB to refer to right mouse button menus, or other data that you access by clicking the right mouse button on an item. The word *tree* refers to the list of features in the FeatureManager.

Differences are frequently found between the names of features on toolbars and the names in the tool tips, menus, or PropertyManager titles. In these cases, the differences are usually minor, and either name may be used.