

Visit the following websites to learn more about this book:



[amazon.com](https://www.amazon.com)

[Google books](https://books.google.com)

[BARNES & NOBLE](https://www.barnesandnoble.com)

## Table of Contents

<b>Introduction</b>	<b>I-1</b>
About the Author	I-2
Acknowledgements	I-3
Contact the Author	I-3
Note to Instructors	I-3
Trademarks, Disclaimer and Copyrighted Material	I-3
References	I-4
Table of Contents	I-6
Overview of Projects	I-16
What is SolidWorks?	I-23
About the Book	I-25
Windows Terminology in SolidWorks	I-26
<b>Project 1 - Overview of SolidWorks and the User Interface</b>	<b>1-1</b>
Project Overview	1-1
Project Objective	1-3
Start a SolidWorks Session	1-4
SolidWorks UI and CommandManager	1-5
Menu bar toolbar	1-5
Menu bar menu	1-5
Drop-down menu	1-6
Create a new Part	1-6
Novice Mode	1-7
Advanced Mode	1-7
Graphic Interface	1-8
Open a Part	1-9
FeatureManager	1-10
Rollback Bar	1-10
Heads-up View toolbar	1-12
Zoom to Fit	1-12
Zoom to Area	1-12
Zoom in	1-12
Rotate	1-12
Standard Views	1-13
SolidWorks Help	1-13
SolidWorks Tutorials	1-14
Additional User Interface Tools	1-14
Right-click Context toolbar	1-15
Consolidated toolbar	1-15
System feedback icons	1-15
Confirmation Corner	1-16
Heads-up View toolbar	1-16
CommandManager	1-19
Part (default tab)	1-19
Drawing (default tab)	1-20
Assembly (default tab)	1-21
Float/Dock	1-22
Selection Enhancements	1-22

FeatureManager Design Tree	1-23
Fly-out FeatureManager	1-25
Task Pane	1-26
SolidWorks Resources	1-26
Design Library	1-27
File Explorer	1-27
Search	1-28
View Palette	1-28
Appearances, Scenes and Decals	1-29
Custom Properties	1-29
SolidWorks Forum	1-29
Motion Study tab	1-30
3D Views tab	1-31
Dynamic Reference Visualization	1-31
Mouse Movements	1-32
Single-click	1-32
Double-click	1-32
Right-click	1-32
Scroll	1-32
Summary	1-33
<b>Project 2 - Fundamentals of Part Modeling</b>	<b>2-1</b>
Project Objective	2-3
Project Situation	2-4
Project Overview	2-6
File Management	2-7
Start a SolidWorks Session	2-8
System Options	2-8
Part Document Template and Document Properties	2-10
PLATE Part Overview	2-13
PLATE Part - New SolidWorks Document	2-15
PLATE Base Feature	2-16
Machined Part	2-17
Reference Planes and Orthographic Projection	2-18
PLATE Part - Extruded Boss/Base Feature	2-22
PLATE Part - Modify Dimensions and Rename	2-22
Display Modes, View Modes, View tools, and Appearances	2-33
PLATE Part - Extruded Cut Feature	2-35
PLATE Part - Fillet Feature	2-41
PLATE Part - Hole Wizard	2-43
ROD Part Overview	2-46
ROD Part - Extruded Boss/Base Feature	2-48
ROD Part - Hole Wizard Feature	2-50
ROD Part - Chamfer Feature	2-51
ROD Part - Extruded Cut Feature & Convert Entities Sketch Tool	2-52
ROD Part - View Orientation, Named Views & Viewport option	2-57
ROD Part - Copy/Paste Function	2-58
ROD Part - Design Changes with Rollback Bar	2-59
ROD Part - Recover from Rebuild Errors	2-61
ROD Part - Edit Part Appearance	2-65
GUIDE Part Overview	2-67

GUIDE Part - Extruded Boss/Base Feature and Dynamic Mirror Feature	2-69
GUIDE Part - Extruded Cut Slot Profile	2-72
GUIDE Part - Mirror Feature	2-76
GUIDE Part - Holes	2-77
GUIDE Part - Linear Pattern Feature	2-80
GUIDE Part - Materials Editor and Mass Properties	2-82
Manufacturing Considerations	2-84
Sketch Entities and Sketch Tools	2-87
Project Summary	2-88
Questions/Exercises	2-90
<b>Project 3 - Fundamentals of Assembly Modeling</b>	<b>3-1</b>
Project Objective	3-3
Project Situation	3-4
Project Overview	3-5
Bottom-up Assembly Modeling Approach	3-5
Linear Motion and Rotational Motion	3-6
GUIDE-ROD Assembly	3-7
GUIDE-ROD Assembly - Insert Components	3-11
FeatureManager Syntax	3-13
Mate Types	3-16
Standard Mates	3-16
Advanced Mates	3-17
Mechanical Mates	3-18
Quick Mate	3-18
GUIDE-ROD Assembly - Mate the ROD Component	3-19
GUIDE-ROD Assembly - Mate the PLATE Component	3-22
GUIDE-ROD Assembly - Mate Errors	3-26
Collision Detection	3-29
Modify Component Dimension	3-30
SolidWorks Design Library	3-31
GUIDE-ROD Assembly - Insert Mates for Flange bolts	3-34
Socket Head Cap Screw Part	3-38
SmartMates	3-44
Coincident/Concentric SmartMate	3-45
Tolerance and Fit	3-47
Exploded View	3-52
Section View	3-56
Analyze an Interference Problem	3-58
Save As Copy Option	3-59
Save as	3-59
Save as copy and continue	3-59
Save as copy and open	3-59
GUIDE-ROD Assembly-Pattern Driven Component Pattern	3-62
Linear Component Pattern Feature	3-64
Folders and Suppressed Components	3-66
Make-Buy Decision-3D ContentCentral	3-67
CUSTOMER Assembly	3-69
Copy the CUSTOMER Assembly - Pack and Go	3-75

Point at the Center of Mass	3-77
Project Summary	3-79
Questions/Exercises	3-80
<b>Project 4 - Fundamentals of Drawing</b>	<b>4-1</b>
Project Objective	4-3
Project Situation	4-4
Project Overview	4-4
Drawing Template and Sheet Format	4-5
Sheet Format and Title Block	4-12
Company Logo	4-17
Save Sheet Format and Save As Drawing Template	4-18
GUIDE Part - Modify	4-22
GUIDE Part - Drawing	4-23
Move Views and Properties of the Sheet	4-26
Auxiliary View, Section View and Detail View	4-29
Auxiliary View	4-30
Section View	4-31
Detail View	4-32
Partial Auxiliary View - Crop View	4-33
Display Modes and Performance	4-35
Detail Drawing	4-37
Move Dimensions in the Same View	4-40
Move Dimensions to a Different View	4-44
Dimension Holes and the Hole Callout	4-45
Center Marks and Centerlines	4-48
Modify the Dimension Scheme	4-50
GUIDE Part - Insert an Additional Feature	4-54
General Notes and Parametric Notes	4-56
Revision Table	4-59
Part Number and Document Properties	4-61
Exploded View	4-67
Balloons	4-69
Bill of Materials	4-71
Insert a Center of Mass Point into a drawing	4-76
Project Summary	4-78
Questions/Exercises	4-78
<b>Project 5 - Extrude and Revolve Features</b>	<b>5-1</b>
Project Objective	5-3
Project Overview	5-4
Design Intent	5-6
Project Situation	5-9
Part Template	5-11
BATTERY Part	5-15
BATTERY Part - Extruded Boss/Base Feature	5-17
BATTERY Part - Fillet Feature Edge	5-21
BATTERY Part - Extruded Cut Feature	5-23
BATTERY Part - Fillet Feature Face	5-25
BATTERY Part - Extruded Boss/Boss Feature	5-26
Injection Molded Process	5-32

BATTERYPLATE Part	5-33
Save As, Delete, Edit Feature and Modify	5-34
BATTERYPLATE Part - Extruded Boss/Base Feature	5-36
BATTERYPLATE Part - Fillet Features-Full Round, options	5-37
Multi-body Parts and the Extruded Boss/Base Feature	5-40
LENS Part	5-42
LENS Part - Revolved Base Feature	5-43
LENS Part - Shell Feature	5-46
Extruded Boss Feature and Convert Entities Sketch tool	5-47
LENS Part - Hole Wizard	5-48
LENS Part - Revolved Boss Thin Feature	5-50
LENS Part - Extruded Boss/Boss Feature and Offset Entities	5-52
LENS Part - Extruded Boss/Boss Feature and Transparency	5-54
BULB Part	5-56
BULB Part - Revolved Base Feature	5-57
BULB Part - Revolved Boss Feature and Spline Sketch tool	5-59
BULB Part - Revolved Cut Thin Feature	5-61
BULB Part - Dome Feature	5-63
BULB Part - Circular Pattern Feature	5-64
Customizing Toolbars and Short Cut Keys	5-68
Design Checklist and Goals before Plastic Manufacturing	5-70
Mold Base	5-72
Applying SolidWorks Features for Mold Tooling Design	5-72
Manufacturing Design Issues	5-82
Project Summary	5-83
Questions/Exercises	5-84
<b>Project 6 - Swept, Lofted and Additional Features</b>	<b>6-1</b>
Project Objective	6-3
Project Overview	6-4
Project Situation	6-5
O-RING Part - Swept Base Feature	6-7
O-RING Part - Design Table	6-9
SWITCH Part - Lofted Base Feature	6-13
SWITCH Part - Dome Feature	6-18
Four Major Categories of Solid Features	6-20
LENSCAP Part	6-20
LENSCAP Part - Extruded Boss/Base, Extruded Cut and Shell Features	6-21
LENSCAP Part - Revolved Cut Thin Feature	6-24
LENSCAP Part - Thread, Swept Feature and Helix/Spiral Curve	6-25
HOUSING Part	6-31
HOUSING Part - Lofted Boss Feature	6-34
HOUSING Part - Second Extruded Boss/Base Feature	6-38
HOUSING Part - Shell Feature	6-39
HOUSING Part - Third Extruded Boss/Base Feature	6-40
HOUSING Part - Draft Feature	6-41
HOUSING Part - Thread with Swept Feature	6-43
HOUSING Part - Handle with Swept Feature	6-48
HOUSING Part - Extruded Cut Feature with Up To Surface	6-53
HOUSING Part - First Rib and Linear Pattern Feature	6-55
HOUSING Part - Second Rib Feature	6-58

HOUSING Part - Mirror Feature	6-61
FLASHLIGHT Assembly	6-64
Assembly Template	6-65
LENSANDBULB Sub-assembly	6-65
BATTERYANDPLATE Sub-assembly	6-70
CAPANDLENS Sub-assembly	6-72
FLASHLIGHT Assembly	6-76
Addressing Interference Issues	6-82
Export Files and eDrawings	6-83
Project Summary	6-86
Questions/Exercises	6-87
<b>Project 7 - Top-Down Assembly Modeling and Sheet Metal Parts</b>	<b>7-1</b>
Project Objective	7-3
Project Situation	7-4
Top-Down Assembly Modeling	7-5
BOX Assembly Overview	7-8
InPlace Mates and In-Context features	7-10
Part Template and Assembly Template	7-12
Box Assembly and Sketch	7-13
Global variables and Equations	7-17
MOTHERBOARD - Insert Component	7-22
POWERSUPPLY - Insert Component	7-28
Sheet Metal Overview	7-34
Bends	7-34
Relief	7-37
CABINET - Insert Component	7-37
CABINET - Rip Feature and Sheet Metal Bends	7-40
CABINET - Edge Flange	7-42
CABINET - Hole Wizard and Linear Pattern	7-45
CABINET - Sheetmetal Design Library Feature	7-49
CABINET - Louver Forming tool	7-53
Manufacturing Considerations	7-54
Additional Pattern Options	7-60
CABINET - Formed and Flat States	7-62
CABINET - Sheet Metal Drawing with Configurations	7-64
PEM Fasteners and IGES Components	7-70
Pattern Driven Component Pattern	7-74
MOTHERBOARD - Assembly Hole Feature	7-76
Assembly FeatureManager and External References	7-77
Replace Components	7-79
Equations	7-82
Design Tables	7-86
BRACKET Part - Sheet Metal Features	7-89
BRACKET Part - In-Content Features	7-91
BRACKET Part - Edge, Tab, Break Corner and Miter Features	7-93
BRACKET Part - Mirror Component	7-98
MirrorBRACKET Part - Bends, Fold, Unfold and Jog Features	7-101
Project Summary	7-106
Questions/Exercises	7-109

<b>Project 8 - SolidWorks Simulation</b>	<b>8-1</b>
Project Objective	8-1
Basic FEA Concepts	8-1
Simulation Advisor	8-3
Simulation Help & Tutorials	8-5
Linear Static Analysis	8-6
Sequence of Calculations in General	8-10
Stress Calculations in General	8-10
Overview of Yield or Inflection Point in a Stress-Strain curve	8-10
Material Properties in General	8-11
Connections in General	8-12
Restraint Types	8-12
Loads and Restraints in General	8-14
Meshing in General	8-15
Meshing Types	8-16
SolidWorks Simulation Meshing Tips	8-19
Running the Study	8-21
Displacement Plot - Output of Linear Static Analysis	8-21
Adaptive Methods for Static Studies	8-22
Sample Exam Questions	8-23
FEA Molding Section	8-37
Tutorial: FEA Model 8-1	8-37
Tutorial: FEA Model 8-2	8-41
Tutorial: FEA Model 8-3	8-45
Tutorial: FEA Model 8-4	8-49
Tutorial: FEA Model 8-5	8-52
Definitions	8-54
<b>Project 9 - Intelligent Modeling Techniques</b>	<b>9-1</b>
Project Objective	9-3
Design Intent	9-4
Sketch	9-4
Geometric Relations	9-4
Full Defined Sketch tool	9-5
SketchXpert	9-8
Equations	9-11
Dimension Driven by Equations	9-11
Equation Driven Curve	9-14
Explicit Equation Driven Curve	9-14
Parametric Equation Driven Curve	9-16
Curves	9-18
Curve Through XYZ Points	9-19
Projected Composite Curves	9-21
Feature - End Conditions	9-23
Along a Vector	9-26
FeatureXpert (Constant Radius)	9-27
Symmetry	9-28
Bodies to mirror	9-28
Planes	9-30
Conic Sections	9-31



Assembly	9-32
Assembly Visualization	9-32
SolidWorks Sustainability	9-33
MateXpert	9-34
Drawing	9-34
DimXpert	9-34
Project Summary	9-38
<b>Project 10 - Additive Manufacturing - 3D Printing</b>	<b>10-1</b>
Project Objective	10-3
Additive Manufacturing	10-3
Saving a SolidWork Model to STL File Format	10-4
Preparing the 3D Printer	10-6
Non-Headed Build Plate	10-6
Heated Build Plate	10-6
Clean Build Surface	10-7
Smooth Build Surface	10-7
Level Build Plate	10-7
Control Build Area Temperature	10-7
3D Printer Filament	10-8
Preparing the Part for 3D Printing	10-10
Add/Insert	10-10
Scale	10-10
Part Orientation - Example 1	10-11
Part Orientation - Example 2	10-13
Key 3D Printing Terms	10-15
Rafts	10-15
Supports	10-16
Resolution	10-17
Slicer Engine	10-17
Slicer Quality	10-17
Infill	10-17
Shells	10-17
Layer Height	10-18
Slicer Temperature	10-18
Slicer Speed	10-18
Create Profile	10-18
3D Printer Filament Materials	10-19
ABS - Storage	10-19
ABS - Smell	10-19
ABS - Part Accuracy	10-19
PLA - Storage	10-20
PLA - Smell	10-20
PLA - Part Accuracy	10-20
Summary of ABS and PLA Material	10-20
ABS	10-20
PLA	10-20
Removing the Part from the 3D Printer	10-21
Knowing the Printer's Limitation	10-21

Understanding Fit Tolerances for Interlocking Parts	10-21
General Printing Tips	10-21
Summary	10-24

**Appendix**

ECO Form	A-1
Types of Decimal Dimensions (ASME Y14.5 2009)	A-2
SolidWorks Keyboard Shortcuts	A-3
Windows Shortcuts	A-4
SolidWorks Certification	A-5
Sustainable Design Associate (CSDA) Certification	A-5
Simulation Associate Finite Element Analysis (CSWSA-FEA) Certification	A-6
Helpful On-Line information	A-7
SolidWorks Document types	A-8

**Glossary**

**G-1**

**Index**

**I-1**



Instructor's information contains over 45 classroom presentations, along with helpful hints, what's new, sample quizzes, avi files of assemblies, projects, and all initial and final SolidWorks models.

- Alphabet of lines and Precedent of Line Types
- Annotations in Drawings
- Assembly Envelope
- Baseline vs Chain dimensioning
- Boolean Operation
- Calipers - General
- Create an Assembly document
- Design Intent
- Different Sketch types
- Dimensioning Rules
- Drafting Standards & Dimensioning Systems
- Drawing Dimension Alignment tool - Dimension Palette
- Equations in General
- Fasteners in General
- Flex Feature
- Freeform Feature
- Gears using SolidWorks
- General 2D Sketch Tips
- General GDT information
- General Mate Tips

- General Modeling Strategy and 3D Modeling Features
- General SolidWorks Tips
- General Tolerance and Fit
- Global vs. Local Coordinate system
- Hidden vs. Suppress in an Assembly
- History of Engineering Graphics
- Intersect Feature
- Layout Assembly Design
- Mate Types in SolidWorks
- Materials in General
- Measurement and Scale
- Multi-body Parts
- Non-Standard Drawing View Types
- Open a Drawing Document
- Open an Assembly Document
- Part and Drawing Dimensioning
- Planes, Design Tables and Configurations
- Primitives - Basic Shapes
- Projected Curve Feature
- Projection, Arrangement and Visualization of Views
- Save As Copy in SolidWorks