

INSIDE:

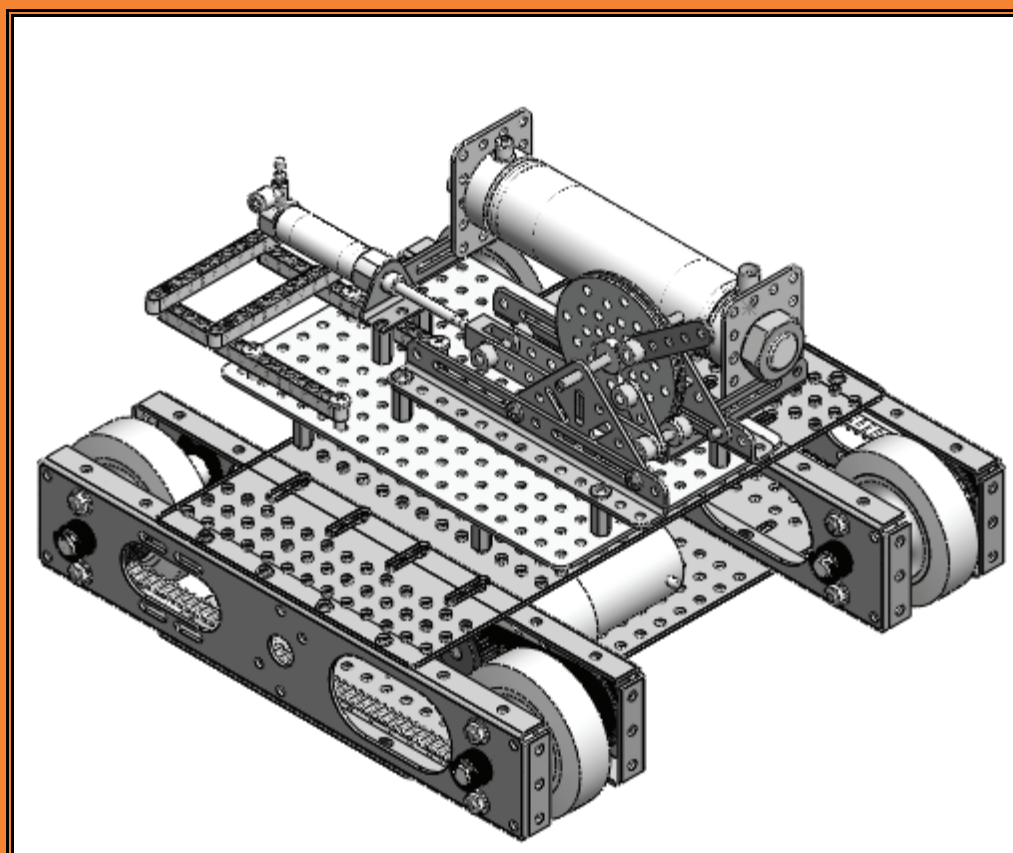
MultiMedia CD

An audio/visual
presentation of the
tutorial projects

SolidWorks 2011 Tutorial

with MultiMedia CD

A Step-by-Step Project Based Approach Utilizing 3D Solid Modeling
Using over 50 feature and sketch tools



David C. Planchard & Marie P. Planchard CSWP



SDC
PUBLICATIONS

www.SDCpublications.com
Schroff Development Corporation

Included in this book:

150 PAGES OF
**SolidWorks
Certification
Exam**

Study Material

New Chapter
Intelligent
Modeling
Techniques

TABLE OF CONTENTS

Introduction	I-1
About the Cover	I-2
About the Authors	I-2
Acknowledgements	I-3
Contact the Authors	I-3
Note to Instructors	I-4
Trademarks, Disclaimer, and Copyrighted Material	I-4
References	I-5
Table of Contents	I-7
What is SolidWorks?	I-16
Design Intent	I-18
Overview of Chapters	I-21
About the Book	I-27
Windows Terminology in SolidWorks	I-28
Chapter 1 - Linkage Assembly	1-1
Chapter Objective	1-3
Chapter Overview	1-4
AXLE Part	1-5
Start a SolidWorks Session	1-6
SolidWorks User Interface and CommandManager	1-7
Menu bar toolbar	1-7
Menu bar menu	1-7
Drop-down menu	1-8
Right-click Pop-up menus	1-8
Consolidated toolbar	1-8
System feedback icons	1-8
Confirmation Corner	1-9
Heads-up View toolbar	1-9
CommandManager	1-11
CommandManager - Default Part tabs	1-11
FeatureManager Design Tree	1-15
PropertyManager tab	1-15
CommandManager tab	1-15
PropertyManager tab	1-15
DimXpertManager tab	1-15
Display Manager tab	1-15
Task Pane	1-18
Design Library	1-18
File Explorer	1-19
Search	1-19
View Palette	1-19
Appearances, Scenes, and Decals	1-20
Custom Properties	1-20
Document Recovery	1-20
Motion Study tab	1-20
New Part	1-22

AXLE Part	1-26
AXLE Part-Extruded Boss/Base Feature	1-27
AXLE Part-Save	1-30
AXLE Part-Edit Color	1-31
AXLE Part-View Modes	1-32
SHAFT-COLLAR Part	1-35
SHAFT-COLLAR Part-Extruded Boss/Base Feature	1-35
SHAFT-COLLAR Part-Extruded Cut Feature	1-38
SHAFT-COLLAR-Modify Dimensions and Edit Color	1-39
FLATBAR Part	1-43
FLATBAR Part-Extruded Boss/Base Feature	1-43
FLATBAR Part-Extruded Cut Feature	1-46
FLATBAR Part-Linear Pattern Feature	1-48
LINKAGE Assembly	1-49
Mate Types	1-50
Standard Mates	1-50
Advanced Mates	1-51
Mechanical Mates	1-51
AirCylinder Assembly-Open and Save As option	1-52
LINKAGE Assembly-Insert FLATBAR Part	1-56
LINKAGE Assembly-Insert SHAFT-COLLAR Part	1-60
Motion Study - Basic Motion tool	1-63
LINKAGE Assembly-Motion Study	1-63
Summary	1-66
Terminology	1-67
Chapter Features	1-68
Engineering Journal	1-69
Questions	1-72
Exercises	1-73
Chapter 2 - Front Support Assembly	2-1
Chapter Objective	2-3
Chapter Overview	2-4
Reference Planes and Orthographic Projection	2-5
HEX-STANDOFF Part	2-9
HEX-STANDOFF Part-Extruded Boss/Base Feature	2-10
HEX-STANDOFF Part-HOLE Wizard Feature	2-14
ANGLE-13HOLE Part	2-15
ANGLE-13HOLE Part-Document Properties	2-17
ANGLE-13HOLE Part-Extruded Thin Feature	2-18
ANGLE-13HOLE Part-Extruded Cut Feature	2-20
ANGLE-13HOLE Part-Linear Pattern Feature	2-22
ANGLE-13HOLE Part-Fillet Feature	2-23
ANGLE-13HOLE Part-Second Extruded Cut and Linear Pattern	2-24
ANGLE-13HOLE Part-Third Extruded Cut Feature	2-26
TRIANGLE Part	2-31
TRIANGLE Part-Mirror, Offset and Fillet Sketch Tools	2-33
TRIANGLE Part-Extruded Boss/Base Feature	2-36
TRIANGLE Part-First Extruded Cut Feature	2-37
TRIANGLE Part-Second Extruded Cut Feature	2-39
TRIANGLE Part-Mirror Feature	2-41

TRIANGLE Part-Third Extruded Cut Feature	2-42
TRIANGLE Part-Circular Pattern Feature	2-44
SCREW Part	2-45
SCREW Part-Documents Properties	2-47
SCREW Part-Revolved Feature	2-47
SCREW Part-Extruded Cut Feature	2-51
SCREW Part-Circular Pattern Feature	2-53
SCREW Part-Fillet Feature	2-53
SCREW Part-Chamfer Feature	2-54
FRONT-SUPPORT Assembly	2-56
FRONT-SUPPORT Assembly-Insert ANGLE-13HOLE	2-57
FRONT-SUPPORT Assembly-Insert HEX-STANDOFF	2-58
FRONT-SUPPORT Assembly-Insert TRIANGLE	2-61
FRONT-SUPPORT Assembly-Insert SCREW	2-64
Chapter Summary	2-66
Chapter Terminology	2-67
Chapter Features	2-68
Engineering Journal	2-70
Questions	2-74
Exercises	2-75
Chapter 3 - Fundamentals of Drawing	3-1
Chapter Objective	3-3
Chapter Overview	3-4
Drawing Template and Sheet Format	3-5
Create a new Drawing	3-7
Drawing-Document Properties	3-9
Title Block	3-10
Create a Title Block	3-11
Company Logo	3-15
Create a Drawing Logo	3-15
Save Sheet Format and Save As Drawing Template	3-18
FLATBAR Drawing	3-21
FLATBAR Drawing-Open the FLATBAR Part	3-21
Move views and Properties of the Sheet	3-25
FLATBAR Drawing-Position views	3-27
Detail Drawing	3-28
FLATBAR Drawing-Dimensions and Annotations	3-30
FLATBAR Drawing-Part Number and Document Properties	3-35
FLATBAR Drawing-Linked Note	3-38
LINKAGE Assembly Drawing-Sheet1	3-41
LINKAGE Assembly Drawing-Exploded view	3-44
LINKAGE Assembly Drawing-Animation	3-47
LINKAGE Assembly Drawing-Bill of Materials	3-48
LINKAGE Assembly Drawing-Automatic Balloons	3-50
LINKAGE Assembly Drawing-Sheet2	3-51
LINKAGE Assembly Drawing-Sheet2 Section view	3-53
LINKAGE Assembly Drawing-Sheet2 Detail view	3-53
FLATBAR Part-Design Table	3-55
FLATBAR Drawing-Sheet2	3-59
FLATBAR-SHAFTCOLLAR Assembly	3-60

Chapter Summary	3-66
Chapter Terminology	3-67
Questions	3-70
Exercises	3-71
Chapter 4 - Advanced Features	4-1
Chapter Objective	4-3
Chapter Overview	4-4
WEIGHT Part	4-6
WEIGHT Part-Loft Feature	4-12
WEIGHT Part-Extruded Cut Feature	4-13
HOOK Part	4-14
HOOK Part-Swept Profile	4-20
HOOK Part-Swept Base Feature	4-21
HOOK Part-Dome Feature	4-21
HOOK Part-Threads with Swept Cut Feature	4-22
WHEEL Part	4-27
WHEEL Part-Extruded Boss/Base Feature	4-30
WHEEL Part-Revolved Cut Feature	4-31
WHEEL Part-First Extruded Cut Feature	4-34
WHEEL Part-Second Extruded Cut Feature	4-36
WHEEL Part-Circular Pattern Feature	4-39
Modify a Part	4-42
HEX-ADAPTER Part	4-42
HEX-ADAPTER Part-Extruded Boss/Base Feature	4-45
HEX-ADAPTER Part-Extruded Cut Feature	4-45
AXLE-3000 Part	4-48
SHAFTCOLLAR-500 Part	4-49
Chapter Summary	4-52
Chapter Terminology	4-52
Questions	4-54
Exercises	4-55
Chapter 5 - PNEUMATIC-TEST-MODULE and ROBOT Assembly	5-1
Chapter Objective	5-3
Chapter Overview	5-4
Assembly Techniques	5-5
PNEUMATIC-TEST-MODULE Layout	5-7
FLATBAR Sub-assembly	5-9
3HOLE-SHAFTCOLLAR Assembly	5-9
WHEEL-FLATBAR Assembly	5-16
WHEEL-FLATBAR Assembly-Insert 3HOLE-SHAFT-COLLAR	5-19
WHEEL-FLATBAR Assembly-Insert 5HOLE-SHAFT-COLLAR	5-21
WHEEL-AND-AXLE Assembly	5-25
WHEEL-AND-AXLE Assembly-Insert HEX-ADAPTER	5-28
WHEEL-AND-AXLE Assembly-Insert SHAFTCOLLAR-500	5-30
PNEUMATIC-TEST-MODULE Assembly	5-32
Modify the LINKAGE Assembly	5-33
PNEUMATIC-TEST-MODULE-Insert LINKAGE Assembly	5-42
PNEUMATIC-TEST-MODULE-Insert AIR-RESERVOIR-SUPPORT	5-44
PNEUMATIC-TEST-MODULE-Component Pattern	5-47

PNEUMATIC-TEST-MODULE-Linear Component Pattern	5-48
PNEUMATIC-TEST-MODULE-Insert FRONT-SUPPORT	5-50
PNEUMATIC-TEST-MODULE-Mirrored Component	5-53
PNEUMATIC-TEST-MODULE-MIRRORFRONT-SUPPORT	5-55
Component Properties	5-56
PNEUMATIC-TEST-MODULE-Insert WHEEL-AND-AXLE	5-56
PNEUMATIC-TEST-MODULE-Remove Rigid State	5-58
PNEUMATIC-TEST-MODULE-Review AirCylinder Configurations	5-59
Final ROBOT Assembly	5-64
Insert the Robot-platform Assembly	5-65
Insert the PNEUMATIC-TEST-MODULE Assembly	5-65
Insert the basic_integration Assembly	5-67
Chapter Summary	5-68
Chapter Terminology	5-68
Engineering Journal	5-70
Questions	5-73
Exercises	5-74
Chapter 6 - SimulationXpress, Sustainability and DFMXpress	6-1
Chapter Objective	6-3
SolidWorks SimulationXpress	6-3
SolidWorks SimulationXpress Interface	6-7
Welcome	6-7
Fixtures	6-7
Loads	6-7
Material	6-7
Run	6-7
Result	6-7
Optimize	6-7
Analyze the Bend Bar Part	6-8
Review of SolidWorks SimulationXpress	6-14
SolidWorks Sustainability	6-15
SolidWorks SustainabilityXpress	6-15
Carbon Footprint	6-15
Energy Consumption	6-15
Air Acidification	6-15
Water Eutrophication	6-15
Life Cycle Assessment	6-16
Raw Material Extraction	6-16
Material Processing	6-16
Part Manufacturing	6-17
Assembly	6-17
Product Use	6-17
End of Life	6-17
Life Cycle Assessment Key Elements	6-17
SolidWorks SustainabilityXpress Wizard	6-17
Material Class	6-17
Material Name	6-17
Manufacturing Process	6-17
Process	6-17
Environmental Impact	6-17

Carbon Footprint	6-18
Energy Consumption	6-18
Air Acidification	6-18
Water Eutrophication	6-18
Generate a Report	6-19
References	6-20
Underlying LCA Technology: PE International	6-20
International LCA Standards	6-20
SolidWorks Sustainability Methodology	6-20
Analyze a Simple Part	6-21
SolidWorks DFMXpress	6-28
Analyze a Simple Part AXLE	6-28
DFMXpress Wizard	6-28
Run	6-28
Settings	6-29
Close	6-29
Help	6-29
Chapter Summary	6-30
Chapter 7 - Intelligent Modeling Techniques	7-1
Chapter Objective	7-3
Design Intent	7-4
Sketch	7-4
Fully Defined Sketch	7-5
SketchXpert	7-8
Equations	7-11
Dimension Driven by Equations	7-11
Equation Driven Curve	7-14
Explicit Equation Driven Curve	7-14
Parametric Equation Driven Curve	7-16
Curves	7-18
Curve Through XYZ Points	7-19
Projected Composite Curves	7-21
Feature - End Conditions	7-23
Along a Vector	7-26
FeatureXpert (Constant Radius)	7-27
Symmetry	7-28
Bodies to Mirror	7-28
Planes	7-30
Angle Plane	7-30
Conic Section and Planes	7-31
Assembly	7-32
Assembly Visualization	7-33
MateXpert	7-34
Drawing	7-34
DimXpert	7-34
Chapter Summary	7-37
Definitions	7-38

Chapter 8 - CSWA Introduction and Drafting Competencies	8-1
Introduction	8-1
Goals	8-5
Objectives	8-6
Identify the Correct Reference Planes	8-7
Identify Material, Measure and Mass Properties	8-8
Assign and Edit Material	8-8
Tutorial: Assign and Edit Material 8-1	8-8
Tutorial: Assign and Edit Material 8-2	8-9
Measure tool	8-9
Tutorial: Measure tool 8-1	8-10
Tutorial: Measure tool 8-2	8-10
Locate the Center of Mass, and Principal Moments of Inertia	8-11
Tutorial: Mass Properties 8-1	8-12
Tutorial: Mass Properties 8-2	8-13
Procedure to Create a Named Drawing view	8-14
Tutorial: Drawing Named procedure 8-1	8-15
Tutorial: Drawing Named Procedure 8-2	8-15
Tutorial: Drawing Named Procedure 8-3	8-15
Tutorial: Drawing Named Procedure 8-4	8-16
Tutorial: Drawing Named Procedure 8-5	8-16
Tutorial: Drawing Named Procedure 8-6	8-17
Tutorial: Drawing Named Procedure 8-7	8-17
Tutorial: Drawing Named Procedure 8-8	8-18
Engineering Documentation Practices	8-18
Document Properties	8-19
Tutorial: Document Properties 8-1	8-20
Tutorial: Document Properties 8-2	8-20
Summary	8-20
Questions	8-21
Chapter 9 - Basic & Intermediate Part Creation and Modification	9-1
Objectives	9-1
Read and Understand an Engineering Document	9-2
Build a Basic Part from a Detailed illustration	9-3
Tutorial: Volume / Center of Mass 9-1	9-3
Tutorial: Volume / Center of Mass 9-2	9-4
Tutorial: Mass-Volume 9-3	9-7
Tutorial: Mass-Volume 9-4	9-8
Tutorial: Simple Cut 9-1	9-11
Tutorial: Mass-Volume 9-5	9-12
Tutorial: Mass-Volume 9-6	9-14
Tutorial: Mass-Volume 9-7	9-16
2D vs. 3D Sketching	9-18
Tutorial: 3DSketch 9-1	9-18
Tutorial: Mass-Volume 9-8	9-20
Tutorial: Mass-Volume 9-9	9-22
Callout Value	9-25
Tolerance Type	9-25
Tutorial: Dimension Text 9-1	9-26
Tutorial: Dimension Text 9-2	9-26

Tutorial: Dimension Text 9-3	9-27
Dimension Text Symbols	9-27
Tutorial: Dimension Text Symbols 9-1	9-28
Tutorial: Dimension Text Symbols 9-2	9-28
Build additional simple parts	9-29
Tutorial: Mass-Volume 9-10	9-29
Tutorial: Mass-Volume 9-11	9-31
Tutorial: Mass-Volume 9-12	9-33
Tutorial: Mass-Volume 9-13	9-34
Tutorial: Mass-Volume 9-14	9-36
Tutorial: Mass-Volume 9-15	9-37
Tutorial: Mass-Volume 9-16	9-39
Tutorial: Basic/Intermediate-Part 9-1	9-41
Tutorial: Basic/Intermediate-Part 9-2	9-44
Tutorial: Basic/Intermediate-Part 9-3	9-47
Tutorial: Basic/Intermediate-Part 9-4	9-50
Summary	9-52
Questions	9-53
Chapter 10 - Advanced Part Creation and Modification	10-1
Objectives	10-1
Build an Advanced Part from a Detailed illustration	10-2
Tutorial: Advanced Part 10-1	10-2
Tutorial: Advanced Part 10-2	10-7
Tutorial: Advanced Part 10-3	10-10
Tutorial: Advanced Part 10-4	10-13
Calculate the Center of Mass Relative to the Coordinate System	10-18
Tutorial: Coordinate Location 10-1	10-18
Tutorial: Coordinate Location 10-2	10-20
Tutorial: Advanced Part 10-5	10-21
Tutorial: Advanced Part 10-5A	10-25
Tutorial: Advanced Part 10-5B	10-26
Tutorial: Advanced Part 10-6	10-28
Tutorial: Advanced Part 10-6A	10-34
Tutorial: Advanced Part 10-7	10-34
Summary	10-40
Questions	10-41
Chapter 11 - CSWA - Assembly Creation and Modification	11-1
Objectives	11-1
Assembly Modeling	11-2
Build an Assembly from a Detailed Dimensioned Illustration	11-3
Tutorial: Assembly Modeling 11-1	11-5
Tutorial: Assembly Modeling 11-2	11-14
Tutorial: Assembly Modeling 11-3	11-21
Mate the First Component with Reference Planes	11-31
Tutorial: Assembly Modeling 11-4	11-31
Tutorial: Assembly Modeling 11-5	11-35
Summary	11-38
Questions	11-40

Appendix

ECO Form

Types of Decimal Dimensions (ASME Y14.5M)

SolidWorks Keyboard Shortcuts

Windows Shortcuts

On-Line Information

CSWA Homework Answers

A-1

A-1

A-2

A-3

A-3

A-4

A-6

Index

I-1