

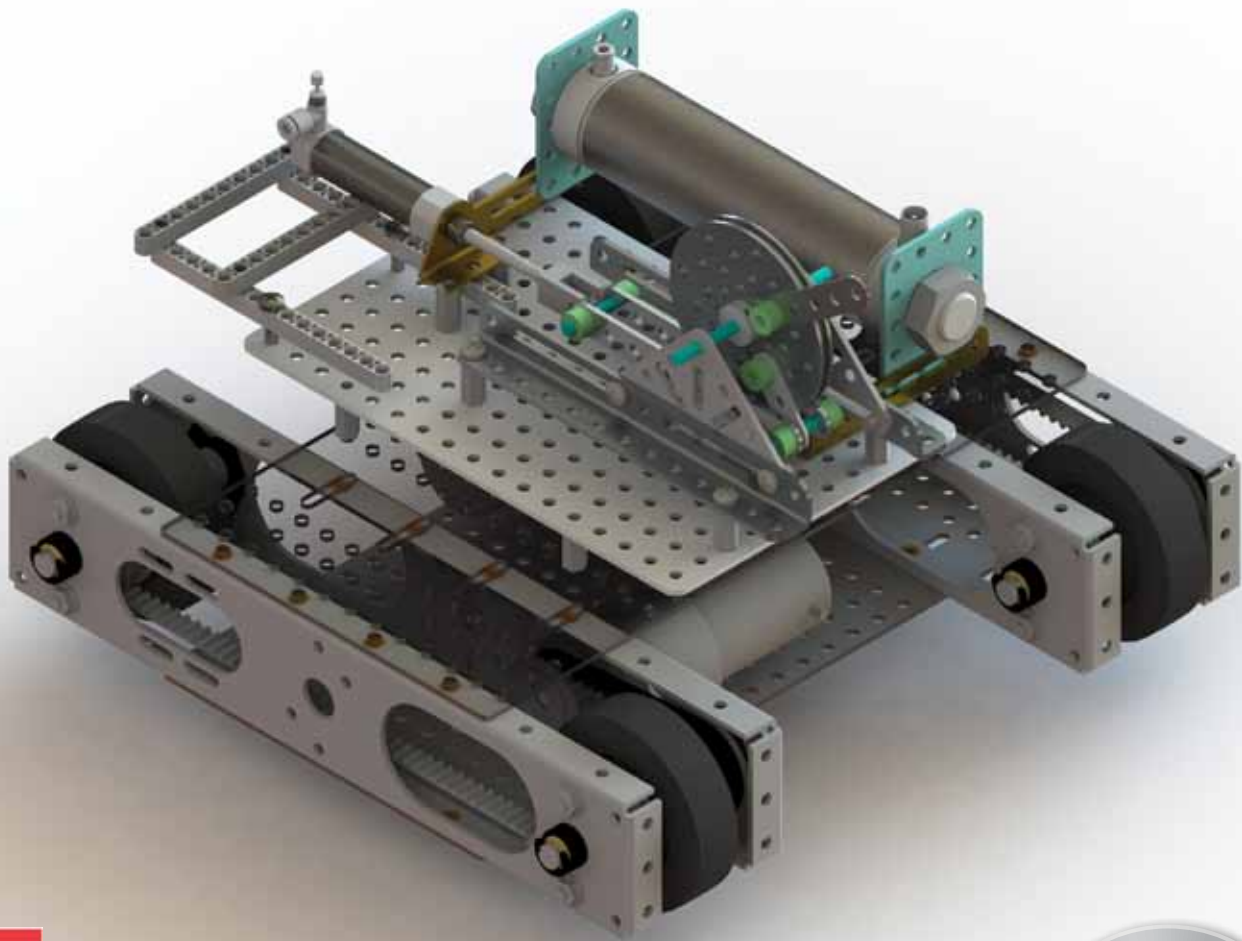
SolidWorks® 2012 Tutorial with Video Instruction

New
Additional Term Projects
and Student Exercises

A Step-by-Step Project Based Approach Utilizing
3D Solid Modeling

David C. Planchard CSWP

Marie P. Planchard CSWP



Visit the following websites to learn more about this book:



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

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

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

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
Questions	1-69
Exercises	1-70

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-Documents 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
Questions	2-70
Exercises	2-71
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	3-65
Chapter Terminology	3-66
Questions	3-69
Exercises	3-70

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	4-53
Exercises	4-54
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
SolidWorks Sustainability	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
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

DFMExpress 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
Summary	7-38
Definitions	7-38
Chapter 8 - CSWA Introduction and Drafting Competencies	8-1
Introduction	8-1
Goals	8-5
Objectives	8-6
Procedure to Create a Named Drawing view	8-7
Tutorial: Drawing Named Procedure 8-1	8-8
Tutorial: Drawing Named Procedure 8-2	8-8
Tutorial: Drawing Named Procedure 8-3	8-8
Tutorial: Drawing Named Procedure 8-4	8-9
Tutorial: Drawing Named Procedure 8-5	8-9
Tutorial: Drawing Named Procedure 8-6	8-10

Tutorial: Drawing Named Procedure 8-7	8-10
Tutorial: Drawing Named Procedure 8-8	8-11
Summary	8-11
Questions	8-12
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: Mass-Volume 9-5	9-12
Build additional Basic Parts	9-15
Tutorial: Mass-Volume 9-6	9-15
Tutorial: Mass-Volume 9-7	9-15
Tutorial: Basic/Intermediate-Part 9-1	9-19
Tutorial: Basic/Intermediate-Part 9-2	9-20
Summary	9-25
Questions	9-26
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
Calculate the Center of Mass Relative to the Coordinate System	10-10
Tutorial: Coordinate Location 10-1	10-10
Tutorial: Coordinate Location 10-2	10-12
Tutorial: Advanced Part 10-3	10-13
Tutorial: Advanced Part 10-3A	10-17
Tutorial: Advanced Part 10-3B	10-18
Tutorial: Advanced Part 10-4	10-20
Tutorial: Advanced Part 10-4A	10-26
Summary	10-27
Questions	10-28
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	11-11
Tutorial: Assembly Modeling 11-3	11-16
Mate the First Component with Reference Planes	11-21
Tutorial: Assembly Modeling 11-4	11-21
Tutorial: Assembly Modeling 11-5	11-25
Summary	11-28
Questions	11-29


Appendix

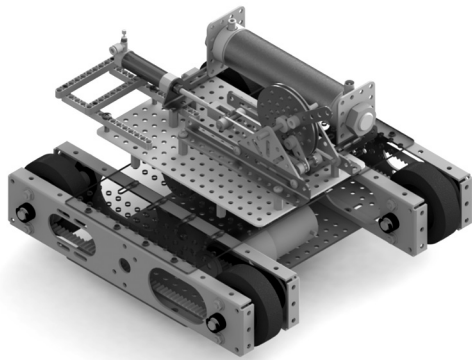
ECO Form
Types of Decimal Dimensions (ASME Y14.5M)
SolidWorks Keyboard Shortcuts
Windows Shortcuts
On-Line Information
CSWA Homework Answers




























A-1
A-1
A-2
A-3
A-3
A-4
A-6

Index

I-1

 The Instructors DVD contains PowerPoint presentations, Adobe files along with avi files, Term Projects, quizzes with initial and final SolidWorks models.



 Term Project folder
 avi folder
 Gears using SolidWorks
 SolidWorks Drawings Documents in General
 General Tolerancing and Fits
 Non-Standard Drawing View Types
 Assemblies and Mates in General
 Weldments
 Surface Finish
 Design Intent
 Part and Drawing Dimensioning
 Drafting and Dimensioning Standards
 Fundamental ASME Y14.5 Dimensioning Rules
 Fasteners in General
 Alphabet of lines and Precedent of Line Types
 Multiview_Visualization
 Annotations in Drawings
 Tolerance, Weld and Texture Symbols
 Open a Drawing Document 2012
 Open an Assembly Document 2012
 Boolean Operation
 Open an Assembly Document 2011
 Split Line tool for a Static load analysis using SimulationXpress
 Planes, Measurement tool, Equations, Design Tables and Configurations
 3D Modeling Features and Strategy
 Basic Sketching
 SolidWorks Basic Concepts