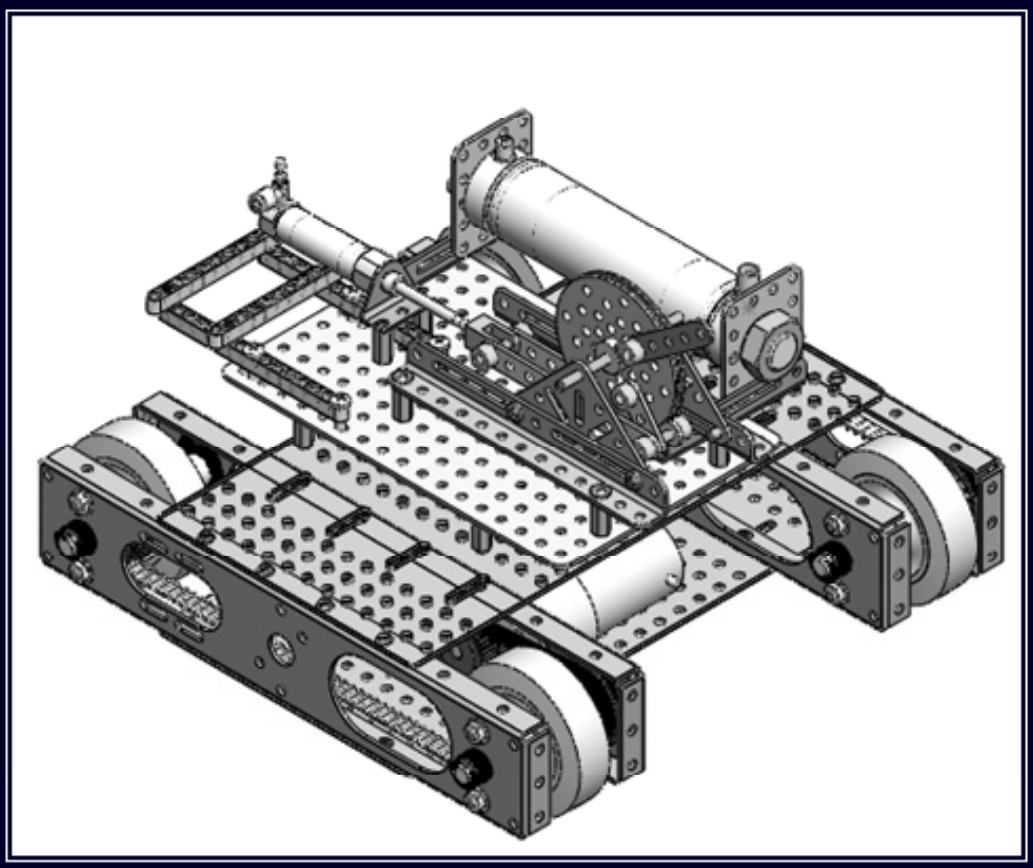
INSIDE:

MultiMedia CD

An audio/visual presentation of the tutorial projects

SolidWorks 2009 Tutorial

Introductory Level ♦ Project Based Tutorials ♦ Video Instruction



David C. Planchard & Marie P. Planchard, CSWP

Included in this book:

Exercises and models to prepare for the

SolidWorks Certification Exam

SDC PUBLICATIONS

Schroff Development Corporation

www.schroff.com

Better Textbooks Lower Prices

SolidWorks Solution Partner

TABLE OF CONTENTS

Introduction **I-1**
About the Cover I-2
About the Authors I-2
Dedication I-3
Contact the Authors I-3
Note to Instructors I-3
Trademarks, Disclaimer, and Copyrighted Material 1-4
References I-4
Table of Contents I-5
What is SolidWorks? I-9
Design Intent I-12
Overview of Projects I-16
About the Book I-20
Windows Terminology in SolidWorks I-20

Project 1 - Linkage Assembly **1-1**
Project Objective 1-3
Project 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
Fly-out tool buttons 1-8
System feedback icons 1-8
Confirmation Corner 1-9
Heads-up View toolbar 1-9
CommandManager 1-10
CommandManager - Default Part tabs 1-11
FeatureManager Design Tree 1-12
Task Pane 1-15
Design Library 1-15
File Explorer 1-16
Search 1-16
View Palette 1-16
Appearances/Scenes 1-17
Custom Properties 1-17
Document Recovery 1-17
Motion Study tab 1-17
New Part 1-18
AXLE Part 1-22
AXLE Part-Extruded Base Feature 1-23
AXLE Part-Save 1-26
AXLE Part-Edit Color 1-27
AXLE Part-View Modes 1-28

SHAFT-COLLAR Part 1-31
SHAFT-COLLAR Part-Extruded Base Feature 1-31
SHAFT-COLLAR Part-Extruded Cut Feature 1-34
SHAFT-COLLAR-Modify Dimensions and Edit Color 1-35
FLATBAR Part 1-38
FLATBAR Part-Extruded Base Feature 1-39
FLATBAR Part-Extruded Cut Feature 1-43
FLATBAR Part-Linear Pattern Feature 1-44
LINKAGE Assembly 1-45
Mate Types 1-46
Standard Mates 1-46
Advanced Mates 1-47
Mechanical Mates 1-47
AirCylinder Assembly-Open and Save As option 1-48
LINKAGE Assembly-Insert FLATBAR Part 1-52
LINKAGE Assembly-Insert SHAFT-COLLAR Part 1-56
Motion Study - Physical Simulation tool 1-59
Project Summary 1-62
Project Terminology 1-63
Project Features 1-64
Engineering Journal 1-65
Questions 1-68
Exercises 1-69

Project 2 - Front Support Assembly 2-1
Project Objective 2-3
Project Overview 2-4
Reference Planes and Orthographic Projection 2-5
HEX-STANDOFF Part 2-9
HEX-STANDOFF Part-Extruded 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 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
Project Summary 2-66
Project Terminology 2-67
Project Features 2-68
Engineering Journal 2-70
Questions 2-74
Exercises 2-75

Project 3 - Fundamentals of Drawing 3-1
Project Objective 3-3
Project 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
Project Summary 3-66
Project Terminology 3-67
Questions 3-70
Exercises 3-71

Project 4 - Advanced Features **4-1**
Project Objective 4-3
Project 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 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 Parts 4-42
HEX-ADAPTER Part 4-42
HEX-ADAPTER Part-Extruded Boss Feature 4-45
HEX-ADAPTER Part-Extruded Cut Feature 4-45
AXLE-3000 Part 4-48
SHAFTCOLLAR-500 Part 4-49
Project Summary 4-52
Project Terminology 4-52
Questions 4-54
Exercises 4-55

Project 5 - PNEUMATIC-TEST-MODULE and ROBOT Assembly **5-1**
Project Objective 5-3
Project 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
Project Summary 5-68
Project Terminology 5-68
Engineering Journal 5-70
Questions 5-73
Exercises 5-74

Project 6 – Introduction to the Certified SolidWorks Associate Exam 6-1
Project Objective 6-3
Introduction 6-3
Intended Audience 6-3
CSWA Exam Content 6-5
Why the CSWA exam? 6-8
Obtain the CSWA Certification 6-9
Prepare to pass the CSWA exam 6-9
How does an institution become a CSWA Provider 6-9
Exam day 6-10
What do I get when I pass the exam? 6-10
Basic Theory and Drawing Theory 6-13
Sample questions 6-13
Part Modeling 6-18
Sample questions 6-18
Advanced Part Modeling 6-25
Sample questions 6-25
Assembly Modeling 6-31
Sample questions 6-32
Advanced Modeling Theory and Analysis 6-36
Sample questions 6-37
Definition review 6-40

Appendix
ECO Form A-1
Types of Decimal Dimensions (ASME Y14.5M) A-2
SolidWorks Keyboard Shortcuts A-3
Windows Shortcuts A-3
On-Line Information A-4

Index