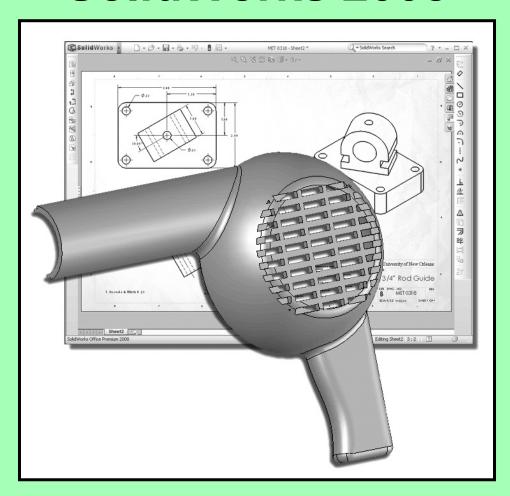
Parametric Modeling

With

SolidWorks 2008



Randy H. Shih

Oregon Institute of Technology

Paul J. Schilling

University of New Orleans



Schroff Development Corporation

www.schroff.com

1-2

Table of Contents

Preface Acknowledgments

Chapter 1 Getting Started

Introduction

Development of Computer Geometric Modeling	1-2
Feature-Based Parametric Modeling	1-6
Getting Started with SolidWorks	1-7
Units Setup	1-9
SolidWorks Screen Layout	1-11
Mouse Buttons	1-15
[Esc] - Canceling Commands	1-15
On-Line Help	1-16
Leaving SolidWorks	1-16
Creating a CAD Files Folder	1-17
Chapter 2	
Parametric Modeling Fundamentals	
Introduction	2-2
The Adjuster design	2-3
Starting SolidWorks	2-3
SolidWorks Screen Layout	2-4
Units Setup	2-5
Creating Rough Sketches	2-6
Step 1: Creating a Rough Sketch	2-7
Graphics Cursors	2-7
Geometric Relation Symbols	2-9
Step 2: Apply/Modify Relations and Dimensions	2-10
Changing the Dimension Standard	2-11
Viewing Functions – Zoom and Pan	2-12
Modifying the Dimensions of the Sketch	2-13
Step 3: Completing the Base Solid Feature	2-14
Isometric View	2-15
Rotation of the 3-D Model – Rotate View	2-15
Rotation and Panning – Arrow keys	2-17
Viewing – Quick Keys	2-18
Viewing Tools – Heads-up View Toolbar	2-20
View Orientation	2-21
Display Style	2-22
Orthographic vs. Perspective	2-22
Customizing the Heads-up View Toolbar	2-22

Sketch Plane	2-23
Step 4-1: Adding an Extruded Boss Feature	2-25
Step 4-2: Adding an Extruded Cut Feature	2-28
Save the Model	2-30
Questions	2-31
Exercises	2-32
Chapter 3	
Constructive Solid Geometry Concepts	
Introduction	3-2
Binary Tree	3-3
The Locator Design	3-4
Modeling Strategy – CSG Binary Tree	3-5
Starting SolidWorks	3-6
GRID and SNAP Intervals Setup	3-7
Base Feature	3-8
Modifying the Dimensions of the Sketch	3-10
Repositioning Dimensions	3-10
Completing the Base Solid Feature	3-11
Creating the Next Solid Feature	3-12
Creating an Extruded Cut Feature	3-15
Creating a Hole with the Hole Wizard	3-18
Creating a Rectangular Extruded Cut Feature	3-21
Questions	3-24
Exercises	3-25
Chapter 4	
Feature Design Tree	
Introduction	4-2
Starting SolidWorks	4-3
Creating a User-Defined Part Template	4-4
The Saddle Bracket Design	4-8
Modeling Strategy	4-9
The SolidWorks FeatureManager Design Tree	4-10
Creating the Base Feature	4-10
Adding the Second Solid Feature	4-13
Creating a 2D sketch	4-14
Renaming the Part Features	4-16
Adjusting the Width of the Base Feature	4-17
Adding a Hole	4-18
Creating a Rectangular Extruded Cut Feature	4-20
History-Based Part Modifications	4-21
A Design change	4-22
Questions	4-25
Evercises	4-26

Chapter 5		
Geometric	Relations	Fundamentals

DIMENSIONS and RELATIONS	5-2
Create a Simple Triangular Plate Design	5-2
Fully Defined Geometry	5-3
Starting SolidWorks	5-3
Displaying Existing Relations	5-4
Applying Geometric Relations/Dimensional Constraints	5-5
Over-Defining and Driven Dimensions	5-10
Deleting Existing Relations	5-11
Using the Fully Define Sketch Tool	5-12
Adding Additional Geometry	5-13
Relation Settings	5-16
Parametric Relations	5-17
Dimensional Values and Dimensional Variables	5-19
Parametric Equations	5-20
Viewing the Established Equations	5-21
Adding Linked Dimensions	5-23
Saving the Model File	5-27
Questions	5-28
Exercises	5-29
Chapter 6	
Geometric Construction Tools	
Introduction	6-2
The Gasket Design	6-2
Modeling Strategy	6-3
Starting SolidWorks	6-4
Creating a 2D Sketch	6-5
Editing the Sketch by Dragging the Entities	6-7
Adding Additional Relations	6-9
Using the <i>Trim</i> and <i>Extend</i> Commands	6-10
Adding Dimensions with the Fully Define Sketch Tool	6-13
Fully Defined Geometry	6-15
Creating Fillets and Completing the Sketch	6-16
Profile Sketch	6-17
Redefining the Sketch and Profile	6-18
Create an OFFSET Extruded Cut Feature	6-21
Questions	6-25
Exercises	6-26

Chapter 7 Parent/Child Relationships and the BORN Technique

Introduction	7-2
The BORN Technique	7-2
The U-Bracket Design	7-3
Starting SolidWorks	7-3
Applying the BORN Technique	7-4
Creating the 2-D Sketch of the Base Feature	7-5
Creating the First Extrude Feature	7-11
The Implied Parent/Child Relationships	7-11
Creating the Second Solid Feature	7-12
Creating the First Extruded Cut Feature	7-15
Creating the Second Extruded Cut Feature	7-16
Examining the Parent/Child Relationships	7-18
Modify a Parent Dimension	7-19
A Design Change	7-20
Feature Suppression	7-21
A Different Approach to the CENTER DRILL Feature	7-22
Suppress the Rect Cut Feature	7-23
Creating a Circular Extruded Cut Feature	7-24
A Flexible Design Approach	7-26
Save Part File	7-27
Questions	7-28
Exercises	7-29
Chapter 8	
Part Drawings and Associative Functionality	
Drawings from Parts and Associative Functionality	8-2
Starting SolidWorks	8-3
Drawing Mode	8-3
Setting Document Properties	8-6
Setting Sheet Properties using the Pre-Defined Sheet Formats	8-7
Open the Drawing Toolbar	8-7
Creating Three Standard Views	8-8
Repositioning Views	8-8
	0 0
	8-9
Adding a New Sheet	8-9 8-10
Adding a New Sheet Adding a Base View	8-10
Adding a New Sheet Adding a Base View Adding an Isometric View using the View Palette	8-10 8-12
Adding a New Sheet Adding a Base View Adding an Isometric View using the View Palette Adjusting the View Scale	8-10 8-12 8-13
Adding a New Sheet Adding a Base View Adding an Isometric View using the View Palette Adjusting the View Scale Displaying Feature Dimensions	8-10 8-12 8-13 8-14
Adding a New Sheet Adding a Base View Adding an Isometric View using the View Palette Adjusting the View Scale Displaying Feature Dimensions Repositioning, Appearance, and Hiding of Feature Dimensions	8-10 8-12 8-13 8-14 8-15
Adding a New Sheet Adding a Base View Adding an Isometric View using the View Palette Adjusting the View Scale Displaying Feature Dimensions Repositioning, Appearance, and Hiding of Feature Dimensions Adding Additional Dimensions – Reference Dimensions	8-10 8-12 8-13 8-14 8-15 8-17
Adding a New Sheet Adding a Base View Adding an Isometric View using the View Palette Adjusting the View Scale Displaying Feature Dimensions Repositioning, Appearance, and Hiding of Feature Dimensions	8-10 8-12 8-13 8-14 8-15

	Table of Contents
Completing the Drawing Sheet Property Links Associative Functionality – Modifying Feature Dimensions Saving the Drawing File Saving a Drawing Template Questions Exercises	8-23 8-25 8-30 8-33 8-33 8-35 8-36
Chapter 9 Reference Geometry and Auxiliary Views	
Reference Geometry Auxiliary Views in 2D Drawings The Rod-Guide Design Modeling Strategy Starting SolidWorks Applying the BORN Technique Creating the Base Feature Creating an Angled Reference Plane Creating a 2D sketch on the Reference Plane Using the Convert Entities Option Completing the Solid Feature Creating an Offset Reference Plane Creating an Offset Reference Plane Creating another Extruded Cut Feature using the Reference Plane Starting a New 2D Drawing and Adding a Base View Creating an Auxiliary View Displaying Feature Dimensions Adjusting the View Scale Repositioning, Appearance, and Hiding of Feature Dimensions Tangent Edge Display Adding Center Marks and Center Lines Controlling the View and Sheet Scales Completing the Drawing Sheet Editing the Isometric view Questions Exercises	9-2 9-2 9-2 9-3 9-4 9-4 9-5 9-7 9-10 9-10 9-14 9-15 9-16 9-18 9-19 9-21 9-22 9-23 9-25 9-26 9-28 9-29 9-31 9-32 9-33
Chapter 10 Symmetrical Features in Designs	
Introduction A Revolved Design: PULLEY Modeling Strategy - A Revolved Design Starting SolidWorks Creating the 2-D Sketch for the Base Feature Creating the Revolved Feature	10-2 10-2 10-3 10-4 10-4 10-8

vii

Mirroring Features Creating an Extruded Cut Feature using Construction Geometry Circular Pattern Drawing Mode – Defining a New Border and Title Block Creating a New Drawing Template Creating Views Retrieve Dimensions – Model Items Command Save the Drawing File	10-9 10-10 10-15 10-17 10-20 10-21 10-24 10-25
Associative Functionality – A Design Change Adding Center lines to the Pattern Feature Completing the Drawing Questions Exercises Chapter 11	10-26 10-28 10-29 10-32 10-33
Advanced 3D Construction Tools	
Introduction A Thin-Walled Design: Dryer Housing Modeling Strategy Starting SolidWorks Creating the 2-D Sketch for the Base Feature Create a Revolved Boss Feature Creating Offset Reference Planes Creating 2D Sketches on the Offset Reference Planes Creating a Lofted Feature Creating an Extruded Boss Feature Completing the Extruded Boss Feature Create 3D Rounds and Fillets Creating a Shell Feature Create a Rectangular Extruded Cut Feature Creating a Linear Pattern Creating a Swept Feature Questions Exercises	11-2 11-2 11-3 11-4 11-4 11-7 11-8 11-9 11-12 11-14 11-15 11-16 11-17 11-18 11-20 11-23 11-28 11-29
Chapter 12 Assembly Modeling - Putting It All Together	
Introduction Assembly Modeling Methodology The Shaft Support Assembly Parts (1) Collar (2) Bearing (3) Base-Plate (4) Cap-Screw	12-2 12-2 12-3 12-3 12-3 12-4 12-4 12-5

Index