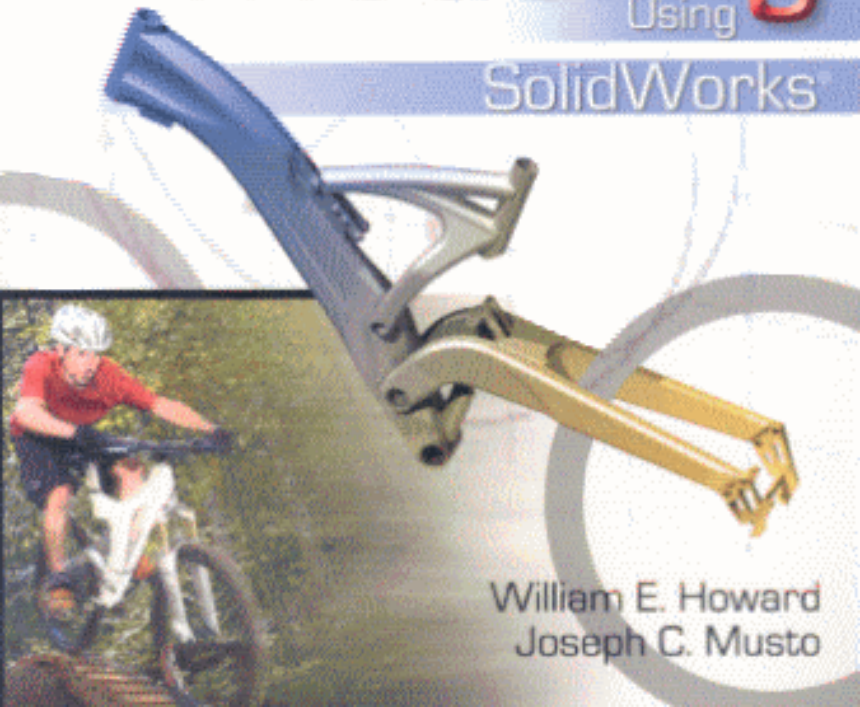
Introduction to Solid Modeling Using SolidWorks



William E. Howard
Joseph C. Musto

Contents

preface vii

1 Basic Part Modeling Techniques 1

1.1 Engineering Design and Solid Modeling 1
1.2 Part Modeling Tutorial: Flange 2
1.3 Modifying the Flange 19
1.4 An Alternate Method of Modeling the Flange 20
Problems 32

2 Engineering Drawings 37

2.1 Drawing Tutorial 37
2.2 Creating a Drawing Sheet Format 54
2.3 Creating an eDrawing 58
Problems 62

3 Additional Part Modeling Techniques 65

3.1 Customizing the SolidWorks Environment 65
3.2 Part Modeling Tutorial: Bracket 71
Problems 82

4 Use of Parametric Modeling Techniques 87

4.1 Modeling Tutorial: Molded Flange 88
4.2 Creation of Parametric Equations 97
4.3 Modeling Tutorial: Cap Screw with Design Table 100
4.4 Incorporating a Design Table in a Drawing 108
Problems 114

5 Advanced Concepts in Part Modeling 121

5.1 A Lofted and Shelled Part 121
5.2 A Part Created with a Swept Geometry 130
5.3 A Part Created with a 3-D Sketch as the Sweep Path 132
Problems 137

6 Building Assembly Models from Part Models 141

6.1 Creating the Part Models 141
6.2 Creating a Simple Assembly of Parts 144
6.3 Creating a Complex Assembly of Subassemblies and Parts 150
Problems 155

7 Advanced Assembly Operations 159

7.1 Adding Features at the Assembly Level 159
7.2 Adding Fasteners Using the Smart Fasteners Tool 163
7.3 Creating an Exploded View 165
7.4 Detecting Interferences and Collisions 170
Problems 171

8 Creating Assembly Drawings 175

8.1 Creating an Assembly Drawing 175
8.2 Adding an Exploded View 178
8.3 Creating a Bill of Materials 180
8.4 Investigating Associativity 183
Problems 188

9 Using SolidWorks for the Generation of 2-D Layouts 189

9.1 A Simple Floor Plan Layout 189
9.2 Finding the Properties of 2-D Shapes 198
Problems 202

10 Application of SolidWorks to Vector Mechanics 205

10.1 Vector Addition 205

10.2 Vector Addition with SolidWorks 206

10.3 Modifying the Vector Addition Drawing 208

10.4 Further Solution of Vector Equations 211

10.5 Kinematic Sketch of a Simple Mechanism 213

Problems 217

11 Using SolidWorks in the Design and Analysis of Mechanisms 219

11.1 Approaching Mechanism Design with SolidWorks Assemblies 220

11.2 Development of Part Models of Links 221

11.3 Development of the Assembly Model of the Four-Bar Linkage 222

Problems 229

12 The Use of SolidWorks as a Tool for Manufacturing: Mold Design and Sheet Metal Parts 235

12.1 A Simple Two-Part Mold 235

12.2 A Core-and-Cavity Mold 239

12.3 A Sheet Metal Part 246

Problems 251

13 The Use of SolidWorks to Accelerate the Product Development Cycle 255

13.1 Rapid Prototyping 255

13.2 Finite Element Analysis 259

13.3 Product Data Management 260

13.4 Some Final Thoughts 262

Index 263