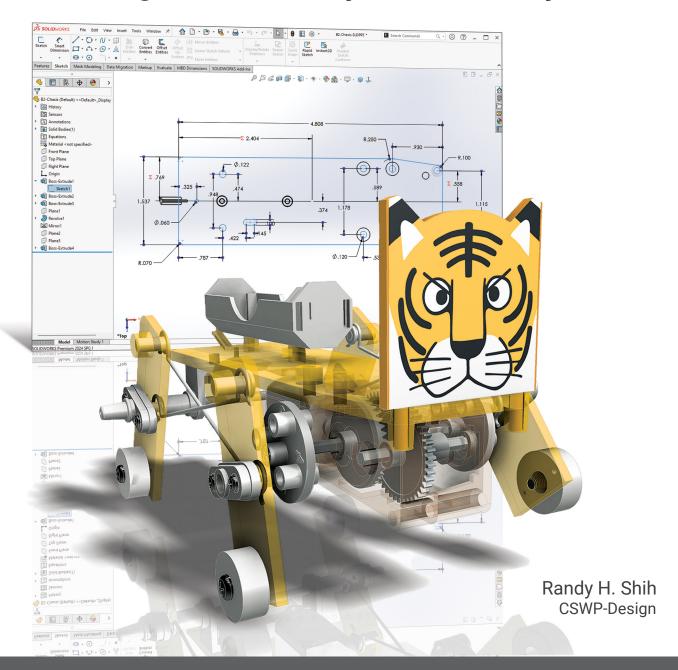
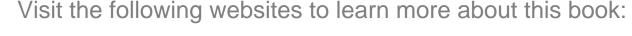
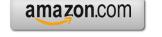
# Learning SOLIDWORKS 2024

Modeling, Assembly and Analysis













### **Table of Contents**

Preface Acknowledgments Table of Contents	i ii iii
Chapter 1 Introduction – Getting Started	
Introduction Development of Computer Geometric Modeling Feature-Based Parametric Modeling Getting Started with SOLIDWORKS Starting SOLIDWORKS SOLIDWORKS Screen Layout Menu Bar Pull-down Menus Heads-up View Toolbar Features Toolbar Sketch Toolbar Property Managers Graphics Area Reference Triad Origin Confirmation Corner Graphics Cursor or Crosshairs Message and Status Bar Using the SOLIDWORKS Command Manager Mouse Buttons [Esc] - Canceling Commands SOLIDWORKS Help System Leaving SOLIDWORKS Creating a CAD files folder	1-2 1-2 1-6 1-7 1-7 1-10 1-11 1-11 1-11 1-12 1-13 1-13 1-13 1-13
Chapter 2 Parametric Modeling Fundamentals	
Introduction The Tiger Head Design Starting SOLIDWORKS SOLIDWORKS Part Modeling Window Layout Step 1: Determine/Set up the Base Solid Feature Sketching Plane – It is an XY CRT, but an XYZ World	2-2 2-3 2-3 2-4 2-6 2-6

Creating Rough Sketches Step 2: Creating a Rough Sketch Graphics Cursors Geometric Relation Symbols Step 3: Apply/Modify Constraints and Dimensions Viewing Functions – Zoom and Pan Delete an Existing Geometry of the Sketch Use the 3-Point Arc Command Step 4: Complete the Base Solid Feature Isometric View Rotation of the 3D Model – Rotate View Rotation and Panning –Arrow Keys Dynamic Viewing - Quick Keys Viewing Tools – Heads-up View Toolbar View Orientation Display Style Orthographic vs. Perspective Customizing the Heads-up View Toolbar Step 5-1: Add an Extruded Feature Step 5-2: Add a Cut Feature Step 6: Add Additional Features Add a Decal Save the Model Review Questions Exercises	2-8 2-9 2-9 2-10 2-11 2-16 2-17 2-17 2-19 2-20 2-20 2-22 2-23 2-25 2-26 2-27 2-27 2-27 2-27 2-28 2-34 2-36 2-39 2-40 2-41
Chapter 3 CSG Concepts and Model History Tree	
Introduction Binary Tree	3-2 3-3
Model History Tree	3-4
The A6-Knee Part	3-5
Starting SOLIDWORKS	3-5
Modeling Strategy	3-6
The SOLIDWORKS Feature Manager	3-7
Base Feature	3-7
Units Setup	3-8
Create the Base Feature	3-9
Adding the Second Solid Feature	3-13
Renaming the Part Features	3-15
Adjust the Dimensions of the Base Feature	3-15
History-Based Part Modifications	3-18
Add a Placed Feature Create an Offset Extruded Feature	3-19 3-22
Add another Hole Feature	3-22 3-25

	Table of Contents
Assign and Calculate the Associated Physical Properties Review Questions Exercises	3-27 3-30 3-31
Chapter 4 Parametric Constraints Fundamentals	
DIMENSIONS and RELATIONS Create a Simple Triangular Plate Design Fully Defined Geometry Starting SOLIDWORKS Create a User-Defined Part Template Start a New Model using the New Template Display/Hide Applied Geometric Relations Apply Geometric Relations/Dimensional Constraints Geometric Editing with Drag and Drop Create Fully Constrained Sketches Over-Defining and Driven Dimensions Delete the Fix Constraint Use the Fully Define Sketch Tool Add Additional Geometry Relations Settings Model the B3-Leg Part Create the 2D Sketch for the Base Feature Parametric Relations Use the Equations Command Complete the Base Feature Sketches vs. Profiles Redefine the Profile with Contour Selection Create an Extrusion with the Taper Angle Option A Profile Containing Multiple Closed Regions The Convert Entities Option Add a Feature using Existing Geometry Save the Model File Use the Measure Tools Create a Metric Part Template The Boot Part Review Questions Exercises	4-2 4-2 4-3 4-3 4-4 4-8 4-9 4-10 4-14 4-16 4-17 4-19 4-20 4-22 4-26 4-27 4-28 4-29 4-31 4-32 4-34 4-37 4-38 4-41 4-43 4-45 4-45 4-45 4-45 4-45 4-45 4-50 4-53 4-54
Chapter 5 Pictorials and Sketching	
Engineering Drawings, Pictorials and Sketching Isometric Sketching	5-2 5-7

Isometric Sketching Exercises Oblique Sketching Oblique Sketching Exercises Perspective Sketching SOLIDWORKS Orthographic vs. Perspective Display One-point Perspective Two-point Perspective Perspective Sketching Exercises Review Questions Exercises	5-9 5-19 5-20 5-26 5-27 5-28 5-29 5-30 5-36 5-37
Chapter 6 Symmetrical Features and Part Drawings	
Drawings from Parts and Associative Functionality The A12- Rear Axle Support Design	6-2 6-3
Starting SOLIDWORKS	6-3
Modeling Strategy	6-4
Create the Base Feature	6-5
Create a Symmetrical Cut Feature	6-8
Create a Revolved Feature	6-10
Create another Extruded Feature	6-15
Create a Cut Feature	6-18
Create a Mirrored Feature	6-20
Drawing Mode – 2D Paper Space	6-21
The Drawing Sheet Properties	6-22
Add a Base View	6-24
Add Centerlines	6-26
Display Feature Dimensions	6-29
Add Additional Dimensions – Reference Dimensions	6-31
Complete the Drawing Sheet	6-32
Associative Functionality – Modify Feature Dimensions	6-34
Review Questions	6-37
Exercises	6-38
Chapter 7 Datum Features in Designs	
Reference Features	7-2
The B2-Chassis Part	7-2 7-2
Modeling Strategy	7-2
Starting SOLIDWORKS	7-3 7-4
Create the Base Feature	7-4
Create the Base Feature Create the Second Extruded Feature	7-8
Create a Tapered Extruded Feature	7-10

Table of Contents

vii

Starting SOLIDWORKS	9-4
Create the Base Feature	9-5
Create a Cut Feature	9-7
Create a Shell Feature	9-11
Create a Cut Feature	9-12
Create another Extruded Feature	9-14
Create another Cut Feature	9-16
Mirror the Last Feature	9-18
Create another Cut Feature	9-19
Complete the Model	9-20
A Thin-Wire Design: Linkage Rod	9-22
The Sweep Operation	9-22
Start a New Model	9-22
Complete the Swept Feature	9-27
Create a Mirrored Feature	9-28
The Gear Box Right Part	9-29
The Gear Box Left Part	9-34
Review Questions	9-38
Exercises	9-39
Chapter 10 Planar Linkage Analysis using GeoGebra	
Introduction to Four-Bar Linkages	10-2
Introduction to GeoGebra	10-5
Hide the Display of Objects	10-14
Add a Slider Control	10-16
Use the Animate Option	10-19
Tracking the Path of a Point on the Coupler	10-20
Exercises	10-25
Encloses	10 23
Chapter 11	
Design Makes the Difference	
Engineering Analysis – How does this work?	11-2
Identify the Six-bar Linkage of the Mechanical Tiger	11-4
Starting GeoGebra	11-6
Add a Slider Control	11-14
Create the Second Four-bar Mechanism	11-16
Use the Animate Option	11-20
Tracking the Paths of the Feet	11-21
Adjusting the Crank Length	11-23
The Jansen Mechanism	11-24
The Klann Mechanism	11-25
Exercises	11-27

## **Chapter 12 Assembly Modeling and Basic Motion Analysis**

Introduction	12-2
Assembly Modeling Methodology	12-3
The Mechanical Tiger Assembly	12-4
Additional Parts	12-4
Creating the Leg Subassembly	12-6
Starting SOLIDWORKS	12-6
Document Properties	12-7
Place the First Component	12-8
Place the Second Component	12-9
Degrees of Freedom and Assembly Relations	12-10
Assembly Mates	12-11
Apply the First Assembly Mate	12-12
Apply a Second Assembly Mate	12-14
Constrained Move	12-15
Place the Third Component	12-16
Apply a Coincident Mate	12-17
Apply another Aligned Mate	12-19
Edit Parts in the Assembly Mode	12-21
Assemble the <i>Boot</i> Part	12-25
Use the Design Library and Assemble Two Screws	12-27
Start the Main Assembly	12-29
Assemble the <i>Gear Box Right</i> Part	12-32
Assemble the <i>Motor</i> and the <i>Pinion Gear</i>	12-35
Assemble the G1 Gear	12-38
SOLIDWORKS Basic Motion Study	12-41
Assemble the <i>G2 Gear</i>	12-43
Assemble the G3 Gear	12-46
Assemble the Hex Shafts	12-48
Assemble the <i>Crank</i> Parts	12-51
Assemble the Rear Shaft and Legs	12-55
Assemble the Linkage-Rods	12-57
Complete the Assembly Model	12-62
Record an Animation Movie	12-63
Conclusion	12-64
Summary of Modeling Considerations	12-64
Review Questions	12-65
Exercises	12-66
Chapter 13 Introduction to 3D Printing	
introduction to 3D i mitting	
What is 3D Printing? Development of 3D Printing Technologies	13-2 13-3
	15 5

Primary types of 3D Printing processes	13-6
Stereolithography	13-6
Fused Deposition Modeling & Fused Filament Fabrication	13-7
Laser Sintering / Laser Melting	13-8
Primary 3D Printing Materials for FDM and FFF	13-9
From 3D model to 3D printed Part	13-11
Starting SOLIDWORKS	13-12
Export the Design as an STL file	13-13
Using the 3D Printing software to create a 3D Print	13-18
Questions	13-26

#### Index