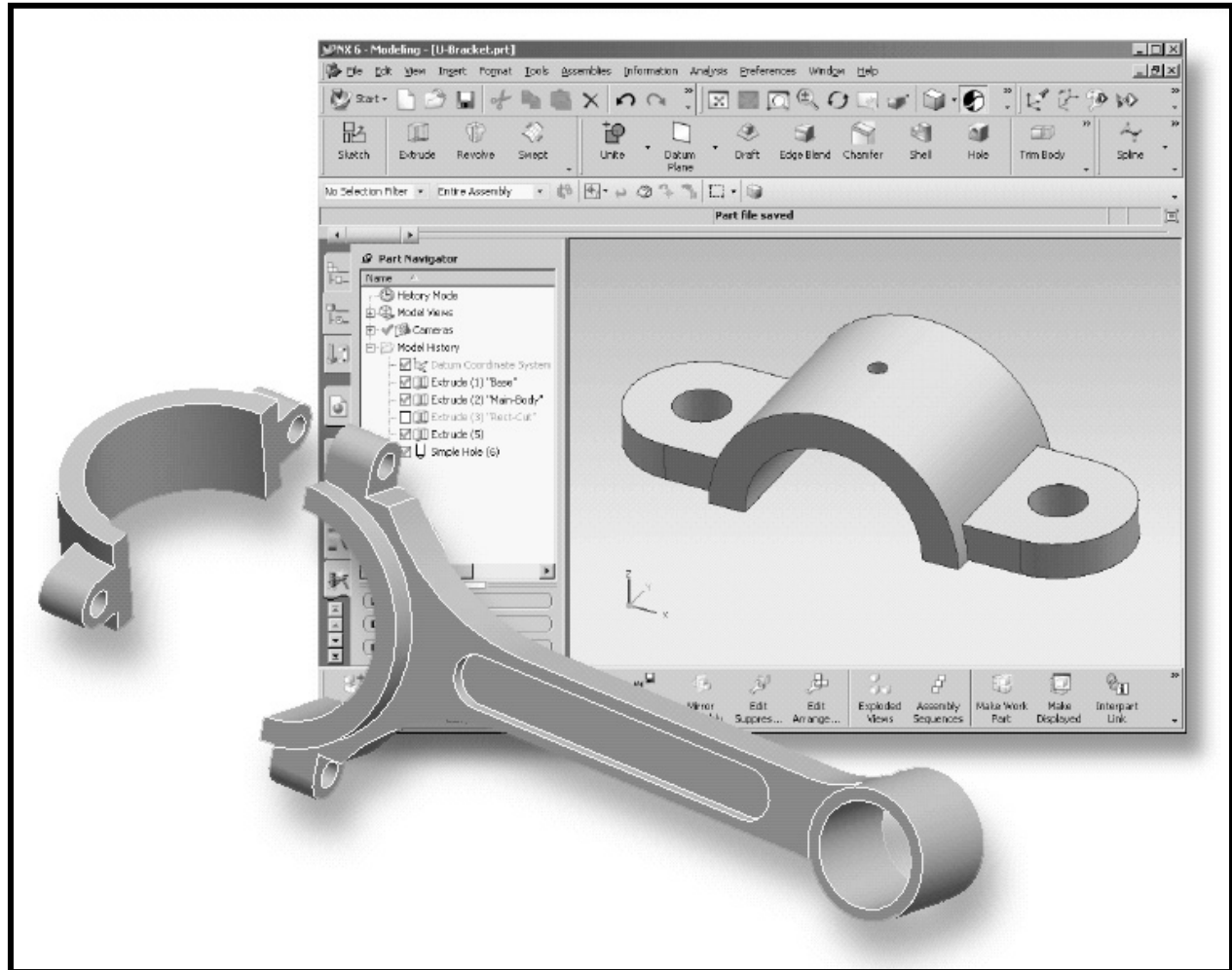


# Parametric Modeling with UGS NX 6



**Randy H. Shih**  
*Oregon Institute of Technology*

**SDC**  
PUBLICATIONS

Schroff Development Corporation  
[www.schroff.com](http://www.schroff.com)

---

Better Textbooks. Lower Prices.

# Table of Contents

## Preface

## Acknowledgments

## Chapter 1

### Introduction - Getting Started

Introduction	1-2
Development of Computer Geometric Modeling	1-2
Feature-Based Parametric Modeling	1-6
Getting Started with UGS NX 6	1-7
The UGS NX Main Window	1-8
UGS NX 6 Screen Layout	1-10
Pull-down Menus	1-11
Standard Toolbar	1-11
View Toolbar	1-11
Utility Toolbar	1-11
Additional Tools	1-11
Selection Toolbar	1-12
Message and Status Bar	1-12
Resource Bar	1-12
Mouse Buttons	1-13
[Esc] - Canceling commands	1-14
On-Line Help	1-14
Leaving UGS NX 6	1-14
Creating a CAD files folder	1-15

## Chapter 2

### Parametric Modeling Fundamentals

Introduction	2-2
The Adjuster design	2-3
Step 1. Starting <i>UGS NX</i> and Units setup	2-3
<i>UGS NX</i> Application Screen Layout	2-5
Step 2: Determine/Set Up the First Solid Feature	2-6
Work Plane – It is an XY CRT, but an XYZ World	2-7
Creating Rough Sketches	2-9
Step 3: Creating a Rough 2D Sketch	2-10
Geometric Constraint Symbols	2-11
Step 4: Apply/Modify Constraints and Dimensions	2-12
Dynamic Viewing Functions – <i>Zoom</i> and <i>Pan</i>	2-17
Step 5: Completing the Base Solid Feature	2-18
Display Orientations	2-19

Dynamic Viewing – Icons, Mouse buttons and Quick keys	2-20
Display Modes	2-22
Step 6-1: Adding an extruded feature	2-23
Step 6-2: Adding a cut feature	2-28
Save the Model and Exit UGS NX	2-32
Questions	2-33
Exercises	2-34

### 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 UGS NX	3-6
Base Feature	3-7
Work plane <i>GRID</i> Display Setup	3-9
Completing the Base Solid Feature	3-11
Creating the next solid feature	3-12
Creating a CUT Feature	3-15
Creating a PLACED FEATURE	3-18
Creating a Rectangular Cut Feature	3-21
Questions	3-24
Exercises	3-25

### Chapter 4

## Model History Tree

Introduction	4-2
The <i>Saddle Bracket</i> Design	4-3
Starting UGS NX 6	4-3
Modeling Strategy	4-4
Creating the Base Feature	4-7
The <i>UGS NX Part Navigator</i>	4-9
Creating the Second Solid Feature	4-10
Using More Meaningful Feature Names	4-14
Adjusting the Width of the Base Feature	4-15
Adding a Placed Feature	4-17
Creating a Rectangular Cut Feature	4-19
History-based Part Modifications	4-23
A Design change	4-24
Assigning and Calculating the associated Physical Properties	4-26
Questions	4-29
Exercises	4-30

**Chapter 5****Parametric Constraints Fundamentals**

The BORN Technique	5-2
CONSTRAINTS and RELATIONS	5-2
Fully Constrained Geometry	5-3
Create a Simple Triangular Plate Design	5-3
Starting UGS NX 6	5-4
Displaying existing constraints	5-7
Applying Geometric Constraints implicitly	5-9
Applying Geometric Constraints Explicitly	5-10
Adding Dimensional Constraints	5-12
A Fully Constrained Sketch	5-14
Over-constraining 2D sketches	5-16
Deleting existing constraints and Dimensions	5-18
2D Sketches with Multiple Loops	5-21
Inferred Constraint Settings	5-23
Parametric relations	5-24
Dimensional Values and Dimensional Variables	5-25
Questions	5-27
Exercises	5-28

**Chapter 6****Geometric Construction Tools**

Introduction	6-2
The Gasket Design	6-2
Modeling Strategy	6-3
Starting UGS NX 6	6-4
Editing the Sketch by Dragging the Entities	6-7
Adding Additional Constraints	6-9
First Construction Method – Trim/Extend	6-10
Creating Fillets and Completing the Sketch	6-13
Completing the Extrusion Feature	6-14
Second Construction Method – Haystack Geometry	6-15
Using the UGS NX Selection Intent option	6-18
Create an Associative OFFSET Cut Feature	6-19
Questions	6-23
Exercises	6-24

## Chapter 7

### Parent/Child Relationships

Introduction	7-2
The U-Bracket Design	7-3
Creating the base feature	7-4
Completing the Base feature	7-7
The Implied Parent/Child Relationships	7-8
Creating the Second Solid Feature	7-9
Fully Constraining the Sketch	7-11
Completing the Extrude Feature	7-13
Creating A Subtract Feature	7-14
Another Subtract Feature	7-15
Examining the Parent/Child Relationships	7-16
A Design Change	7-17
Feature Suppression	7-18
A different approach to the CENTER_DRILL feature	7-20
Examining the Parent/Child Relationships	7-22
Suppress the Rect_Cut feature	7-23
Creating a Hole Feature	7-24
A Flexible Design Approach	7-26
Questions	7-27
Exercises	7-28

## Chapter 8

### Part Drawings and Associative Functionality

Drawings from Parts and Associative Functionality	8-2
Starting UGS NX 6	8-3
Drawing Mode - 2D Paper Space	8-3
UGS NX Drafting Mode	8-4
Adding a Base View	8-5
Drawing Display Option	8-7
Changing the Size of the Drawing Sheet	8-7
Turning Off the Datum Planes and WCS	8-9
Displaying Feature Dimensions	8-11
Adjusting the display of Tangency Edges	8-14
Hiding Feature Dimensions	8-15
Showing the Hidden Dimensions	8-16
Deleting Feature Dimensions	8-17
Adding Center Marks and Center Lines	8-18
Adding Additional Dimensions – Reference Dimensions	8-19
Changing the Dimension Appearance	8-20
Associative Functionality – Modifying Feature Dimensions	8-22
Questions	8-25
Exercises	8-26

## Chapter 9

### Datum Features and Auxiliary Views

Datum Features	9-2
Auxiliary Views in 2D Drawings	9-2
The <i>Rod-Guide</i> Design	9-2
Modeling Strategy	9-3
Starting UGS NX	9-4
Creating the Base feature	9-5
Creating Datum Axes and an Angled Datum Plane	9-8
Creating an Extruded Feature using the Datum Plane	9-10
Apply Proper Constraints	9-11
Creating an Offset Datum Plane	9-14
Creating another cut feature using the new datum plane	9-15
Creating a Title Block Template	9-17
Using the Export File command	9-21
Reopen the Rod Guide Design	9-22
Importing the Title Block	9-23
Adding a Base View	9-24
Creating an Auxiliary View	9-25
Turning Off the Datum Planes and DCS	9-26
Creating another Base View	9-28
Drawing Display Option	9-29
Displaying Feature Dimensions	9-30
Delete and Adding Dimensions	9-32
Questions	9-34
Exercises	9-35

## Chapter 10

### Symmetrical Features in Designs

Introduction	10-2
A Revolved Design: PULLEY	10-2
Modeling Strategy - A Revolved Design	10-3
Starting UGS NX 6	10-4
Completing the Sketch and create the feature	10-6
Mirroring Features	10-8
Joining the Two Solid Features	10-10
Creating A Pattern Leader	10-11
Circular Array	10-13
Create a New drawing in the Drafting Mode	10-15
Importing the Title Block	10-16
Creating 2D Views	10-17
Adding a Section View	10-18
Turning Off the Datum Features	10-20

Adding Dimensions	10-21
Adjusting the Display of the Views	10-23
Associative Functionality – A Design Change	10-25
Questions	10-29
Exercises	10-30

## Chapter 11

### Advanced 3D Construction Tools

Introduction	11-2
A Thin-Walled Design: <i>Dryer Housing</i>	11-2
Modeling Strategy	11-3
Starting UGS NX 6	11-4
Creating the 2-D Sketch for the Base Feature	11-5
Create a Revolved Feature	11-7
Creating the Handle section	11-8
Creating an Swept Feature	11-10
Joining the Two Solid Features	11-14
Hiding the 2D sketches	11-15
Create 3D Rounds and Fillets	11-16
Creating a Shell Feature	11-18
Create a Pattern Leader	11-19
Creating a Rectangular Array	11-23
Creating a Swept Cut Feature	11-25
Define the Sweep Section	11-24
Completing the Swept Feature	11-27
Questions	11-29
Exercises	11-30

## Chapter 12

### Assembly Modeling - Putting It All Together

Introduction	12-2
The Shaft Support Assembly	12-2
Assembly Modeling Methodology	12-3
Additional <i>Parts</i>	12-4
(1) Collar	12-4
(2) Bearing	12-4
(3) Base-Plate	12-5
(4) Cap-Screw	12-5
Starting UGS NX 6	12-6
Loading and Placing the First Component	12-7
Placing the Second Component	12-8
Degrees of Freedom and Assembly Constraints	12-9

---

Apply the First Assembly Constraint	12-13
Apply another Align Constraint	12-14
Constrained Move	12-16
Apply another Assembly Constraint	12-17
Placing the Third Component	12-19
Quick Editing of Applied Constraints	12-22
Assemble the First Cap-Screw	12-23
Placing the second Cap-Screw part	12-26
Exploded View of the Assembly	12-27
Switching the Exploded/Unexploded Views	12-29
Editing the Components	12-30
Setup a Drawing of the Assembly Model	12-33
Importing the Title Block	12-33
Creating a Parts List	12-35
Completing the Assembly Drawing	12-35
Conclusion	12-37
Summary of Modeling Considerations	12-37
Questions	12-38
Exercises	12-39

## **Index**