

Table of Contents

Dedication	iii
Preface	xvii

Chapter 1: Getting Started with Autodesk Alias Design

Introduction to Alias Design	1-2
Basic Terms Used in Alias Design	1-3
Representation of Curves	1-4
Cubic Spline	1-4
Bezier Curve	1-4
B-Spline Curve	1-4
NURBS	1-4
Representation of Surfaces	1-5
Bicubic Surface	1-5
Bezier Surface	1-5
B-Spline Surface	1-5
NURBS Surface	1-5
Autodesk Alias Products	1-5
Autodesk Alias Design	1-5
Autodesk Alias Automotive	1-5
Autodesk Alias Surface	1-6
System Requirements	1-6
Starting Alias Design 2015	1-6
Alias Design 2015 Interface	1-7
Menu Bar	1-7
Promptline	1-8
Promptline History	1-8
Layer Bar	1-8
Work Area	1-9
Palette	1-9
Control Panel	1-10
Shelves Window	1-10
Status Bar	1-10
History View	1-10
Alias Design Windows/Layouts	1-10
Types of Windows	1-11
Navigating the Windows	1-11
Controlling the Window Display	1-11
Using Marking Menus	1-14
Viewing Panel	1-16

ViewCube	1-19
Snapping Tools	1-22
Snap to CV/Edit Point	1-23
Snap to Grid	1-23
Snap to Curve	1-23
Workflows in Alias Design	1-24
Default	1-24
Paint	1-24
Modeling	1-25
Visualize	1-25
Understanding Symbols in Menu, Palette, and Shelves Window	1-25
Hotkeys	1-26
Creating Customized Shelves	1-27
Object Lister Window	1-28
Different States of Node	1-30
Scene Block Diagram (SBD)	1-30
Starting a New File	1-31
Opening an Existing File	1-32
Opening Recent Files	1-33
Saving Files	1-33
Printing the Output	1-36
Exiting the Application	1-38
Controlling the Display of Windows	1-38
Controlling the Display of the Title Bar	1-38
Toggling the Window Components	1-39
Controlling the Display of Window Components	1-39
Changing Preferences in Alias Design	1-40
Color Schemes	1-44
Self-Evaluation Test	1-46

Chapter 2: Working with Basic Tools

Introduction to Basic Tools	2-2
Invoking Tools	2-2
Methods of Creating Objects	2-2
Creating Keypoint Curves	2-3
Creating a Line	2-3
Creating Polylines	2-5
Creating a Parallel Line	2-5
Creating a Line at Angle	2-6
Creating a Circular Arc	2-7
Creating an Ellipse	2-8
Creating a Rectangle	2-10
Creating a Three Point Arc	2-10
Creating a Two Point Arc	2-12
Creating an Arc Tangent to a Curve	2-12
Creating a Concentric Arc	2-13

Creating a Line Tangent to a Curve	2-13
Creating a Line Tangent from/to Curves	2-14
Creating a Line Perpendicular to a Curve	2-14
Creating Linearcs	2-16
Creating Text	2-17
Features of a Curve	2-18
Control Vertices	2-18
Edit Points	2-18
Hulls	2-19
Creating Curves	2-19
Creating a Circle	2-19
Creating a CV Curve	2-20
Creating an Edit Point Curve	2-23
Creating a Freeform Curve	2-23
Creating Primitives	2-24
Creating a Sphere	2-25
Creating a Torus	2-26
Creating a Cylinder	2-28
Creating a Cone	2-29
Creating a Cube	2-30
Creating a Plane	2-30
Pick Tools	2-31
Picking Objects	2-31
Picking Components	2-32
Picking Templates	2-34
Picking Edit Points	2-34
Picking CVs	2-35
Picking Hulls	2-35
Picking Curves-on-surface	2-35
Picking all Objects	2-35
Picking Objects by Shaders	2-36
Picking Locators	2-36
Picking Visible Objects	2-37
Picking Nothing	2-37
Transform Tools	2-37
Moving an Object	2-37
Rotating Objects	2-39
Scaling an Object	2-40
Scaling Objects Non-proportionally	2-41
Setting the Pivot Point	2-42
Creating Array of an Object	2-44
Creating Path Array of an Object	2-46
Creating Surface Array of an Object	2-49
Setting the Pivot Point at the Center	2-51
Rotating the Local Axes of the Object	2-52
Resetting the Transformation of Objects	2-53
Shading Objects in View Windows	2-53

Diagnostic Shading	2-54
Hardware Shading	2-56
Tutorial 1	2-58
Tutorial 2	2-65
Self-Evaluation Test	2-72
Review Questions	2-72
Exercise 1	2-73
Exercise 2	2-74

Chapter 3: Working with Surfaces-I

Creating Surfaces	3-2
Creating a Revolved Surface	3-2
Creating an Extruded Surface	3-6
Creating a Skin Surface using the Skin 2012 Tool	3-9
Creating a Skin Surface using a Skin Tool	3-14
Creating a Planar Surface	3-17
Editing Features	3-18
Removing an Object	3-18
Copying an Object	3-18
Pasting an Object	3-18
Reverting to the Previous Command	3-19
Re-applying the Previous Command	3-19
Reinvoking the Last Command	3-19
Editing Keypoint Curves	3-19
Moving the Keypoints	3-20
Breaking the Keypoint Curves	3-20
Joining the Keypoint Curves	3-20
Modifying the Attributes of a Keypoint Curve	3-21
Construction Objects	3-21
Placing a Point	3-21
Creating a Vector	3-22
Creating a Reference Plane	3-24
Setting the Construction Plane	3-28
Toggling between the Planes	3-29
Presetting the Grid	3-29
Working with Layers	3-31
Assigning the Objects to Layers	3-31
Selecting the Objects	3-31
Controlling the Visibility of Objects	3-32
Setting the Symmetry of Objects	3-32
Deleting the Layers	3-32
Controlling the State of Objects	3-32
Applying the Colors to Layers	3-33
Toggling between the Visibility States of Layers	3-33
Controlling the Display of Objects	3-33
Controlling the Visibility of Objects	3-34

Turning off the Visibility of Objects	3-34
Turning on the Visibility of Objects	3-34
Turning Objects into Templates	3-35
Changing the Appearance of Data	3-35
Tutorial 1	3-36
Tutorial 2	3-45
Self-Evaluation Test	3-54
Review Questions	3-55
Exercise 1	3-56
Exercise 2	3-56

Chapter 4: Working with Surfaces-II

Secondary Surfaces	4-2
Creating a Fillet Surface	4-2
Creating a Freeform Blend Surface	4-12
Creating a Profile Blend Surface	4-17
Modifying the Objects Proportionally	4-18
Moving the CVs Normally	4-21
Tutorial 1	4-23
Tutorial 2	4-33
Self-Evaluation Test	4-43
Review Questions	4-44
Exercise 1	4-45
Exercise 2	4-46

Chapter 5: Editing Surfaces

Generating Curves-on-surface	5-2
Projecting Curves on the Surface	5-2
Generating Curves-on-surface at the Intersection of Surfaces	5-6
Mapping Curves on Surface	5-7
Trimming Surfaces	5-8
Untrimming Surfaces	5-12
Creating Round Surfaces	5-13
Creating Variable Radii Round	5-18
Duplicating Objects	5-19
Creating Duplicate Copies	5-19
Mirroring Objects	5-24
Grouping Objects	5-26
Ungrouping Objects	5-27
Tutorial 1	5-29
Tutorial 2	5-39
Self-Evaluation Test	5-46
Review Questions	5-46
Exercise 1	5-47
Exercise 2	5-48

Chapter 6: Advanced Surface Modeling Tools-I

Advanced Surfaces	6-2
Creating a Rail Surface	6-2
Creating a Square Surface	6-15
Creating N-Sided Surfaces	6-18
Creating Multi-Surface Drafts	6-22
Transforming the CVs and Hulls	6-27
Tutorial 1	6-33
Tutorial 2	6-40
Self-Evaluation Test	6-48
Review Questions	6-49
Exercise 1	6-50
Exercise 2	6-50

Chapter 7: Editing Tools-I

Editing Curves	7-2
Duplicating a Curve	7-2
Combining Curves	7-7
Adding a Fillet Between Curves	7-8
Modifying a Curve	7-11
Adding Points to an Existing Curve	7-12
Transforming a Curve	7-12
Stretching a Curve	7-14
Breaking and of Curves	7-15
Breaking a Curve at Inflections	7-16
Intersecting and Detaching Curves	7-16
Rebuilding a Curve	7-17
Planarizing a Curve	7-18
Sectioning a Group of Curves	7-20
Tutorial 1	7-26
Tutorial 2	7-39
Self-Evaluation Test	7-50
Review Questions	7-50
Exercise 1	7-52
Exercise 2	7-52

Chapter 8: Editing Tools-II

Editing Objects	8-2
Attaching Objects	8-2
Detaching an Object	8-5
Inserting Edit Points into an Object	8-6
Extending an Object	8-7
Offsetting Objects	8-10
Setting the Surface Orientation	8-15

Unifying the Normals of Surfaces	8-16
Reversing the Orientation of Surfaces	8-17
Reversing the U and V Parameters of a Surface	8-19
Reversing the Direction of a Curve	8-21
Editing an Object	8-22
Closing an Object	8-24
Editing a Comment	8-26
Editing a Query	8-27
Editing Isoparametric Curves	8-28
Symmetric Modeling	8-28
Fit Curve	8-29
Tutorial 1	8-31
Tutorial 2	8-47
Self-Evaluation Test	8-55
Review Questions	8-56
Exercise 1	8-57
Exercise 2	8-57

Chapter 9: Advanced Surface Modeling Tools-II

Advanced Modeling	9-2
Aligning Objects	9-2
Using Manipulators to Align Objects	9-11
Aligning Objects across the Symmetry Plane	9-12
Creating a Bevel Surface	9-13
Refining the Edges of Surfaces	9-16
Creating a Fillet Flange Surface	9-16
Creating a Tube Flange Surface	9-24
Creating a Tubular Offset Surface	9-25
Tutorial 1	9-29
Self-Evaluation Test	9-44
Review Questions	9-45
Exercise 1	9-46

Chapter 10: Advanced Modeling and Editing Tools

Dynamic Shape Modeling	10-2
Advantages of Dynamic Shape Modeling	10-2
Disadvantages of Dynamic Shape Modeling	10-2
Dynamic Shape Modeling Tools	10-2
Dynamic Shape Modeling Using the Lattice Rig Tool	10-2
Lattice States	10-7
Lattice Rig Toolbox	10-8
Understanding Curve Networks	10-11
Terminology Used in Curve Networks	10-11
Valid and Invalid Regions	10-12
Creating Surfaces from Curve Network	10-13

Curve Network Toolbox	10-14
Working with Shells	10-20
Applications of Shells	10-20
Disadvantages of Shells	10-21
Conversion of Surfaces/Shells	10-21
Stitching the Shell	10-21
Unstitching the Shells	10-23
Boolean Operations	10-23
Shell Subtraction	10-24
Shell Intersection	10-24
Shell Union	10-25
Labeling Objects and Measuring the Distance	10-25
Annotating or Labeling Objects	10-26
Editing and Moving the Locators	10-26
Measuring the Dimensions	10-27
Measuring the Linear Distance between Objects	10-27
Measuring the Angular Distance	10-29
Measuring the Radius	10-30
Measuring the Diameter	10-30
Measuring the Arc Length	10-31
Measuring the Deviation	10-31
Measuring the Closest Point Deviation	10-32
Measuring Deviation between Two Curves at Single Location	10-33
Measuring the Deviation between Two Curves	10-33
Measuring the Deviation between Two Surfaces	10-35
Measuring the Deviation between a Curve and a Surface	10-35
Measuring the Deviation between a Mesh and a Surface	10-36
Displaying the Curvature of a Curve	10-36
Tutorial 1	10-40
Tutorial 2	10-49
Self-Evaluation Test	10-60
Review Questions	10-60
Exercise 1	10-62

Chapter 11: Advanced Editing Tools

Dynamic Shape Modeling	11-2
Modifying an Object Using the Twist Rig Tool	11-2
Twist Rig Toolbox	11-4
Modifying an Object Using the Bend Rig Tool	11-4
Bend Rig Toolbox	11-8
Modifying an Object Using the Conform Rig Tool	11-8
Conform Rig Toolbox	11-13
Introduction to Meshes	11-14
Generating Meshes	11-14
Saving Meshes	11-15
Working on Meshes	11-16

Creating Meshes from NURBS or Shells	11-16
Projection on Mesh	11-19
Projecting the Curve on the Mesh	11-19
Projecting the Curve Normal to the Mesh	11-20
Creating Curves on Mesh Boundaries	11-20
Mesh Partitioning Operations	11-21
Subsetting of Meshes	11-21
Merging Meshes	11-22
Cutting Meshes	11-22
Reversing the Orientation of Mesh	11-24
Defects in Meshes	11-24
Repairing Meshes	11-25
Mesh Information	11-26
Mesh Topology Checks	11-26
Stereolithography Validation Checks	11-27
Display	11-27
Tutorial 1	11-27
Tutorial 2	11-36
Self-Evaluation Test	11-44
Review Questions	11-44
Exercise 1	11-45
Exercise 2	11-46

Chapter 12: Basics of Rendering

Introduction to Rendering	12-2
Types of Renderers	12-2
Commonly used Terms in Rendering	12-3
Applying Shaders to Surfaces	12-8
Shader Name	12-9
Shading Model	12-9
Blinn Shading Parameters	12-9
Common Shader Parameters	12-9
Special Effects	12-10
Ambient Occlusion	12-11
Glow	12-12
Raytrace Parameters	12-12
Hidden Line Rendering Parameters	12-13
Shading Parameters	12-13
Blinn Shading Parameters	12-13
Phong Shader Parameters	12-14
Lambert Shader Parameters	12-15
Mapping Textures on a Surface	12-15
Texture Procedures	12-16
Texturable Values	12-16
Adding Lights to a Scene	12-17
Editing Cameras	12-18

Camera	12-19
Camera Properties	12-19
Image Planes	12-22
Using Mouse Buttons to Apply Shaders	12-22
Left Mouse Button	12-23
Middle Mouse Button	12-23
Right Mouse Button	12-23
Using the Multi-Lister	12-25
The Title Bar	12-25
The Swatch Display Area	12-26
The Multi-lister Menu	12-26
Rendering Parameters	12-27
Global Rendering Parameters	12-27
Object Rendering Parameters	12-29
Rendering a Scene	12-33
Rendering Objects Directly	12-38
Tutorial 1	12-39
Tutorial 2	12-53
Self-Evaluation Test	12-61
Review Questions	12-62
Exercise 1	12-63
Exercise 2	12-63

Chapter 13: Surface Evaluation and Painting

Surface Evaluation	13-2
Evaluating the Continuity of Surfaces	13-2
Evaluating the Continuity of Curves	13-5
Evaluating the Min/Max Curvature	13-8
Evaluating Mass Properties	13-9
Checking Models for Data Transfer	13-11
Evaluating the Deviations	13-16
Creating Parting Lines by Horizon	13-18
Sketching/Painting in Alias Design	13-20
Working with Sketching/Painting Window	13-20
Components of Sketching/Painting Window	13-20
Creating a New Canvas/Paint Window	13-22
Introduction to Canvas Layers	13-24
Image Layers	13-24
Mask Layers	13-24
Shape Layers	13-24
Organizing Canvas Layers	13-25
Working on Layers	13-28
Creating a New Image Layer	13-28
Creating a New Mask Layer	13-28
Creating a New Invisibility Mask Layer	13-29
Creating a New Layer Folder	13-29

Duplicating a Layer	13-29
Merging Layers	13-29
Merging the Visible Layers	13-30
Merging All Layers	13-30
Color Schemes	13-30
RGB	13-30
CMY	13-30
HSL and HSV	13-31
Importing Images	13-31
Exporting Images	13-32
Tutorial 1	13-33
Tutorial 2	13-39
Self-Evaluation Test	13-46
Review Questions	13-47
Exercise 1	13-48

Student Projects

Project 1	SP-2
Project 2	SP-9
Index	I-1