Level 1 – NURBS Modeling with Rhino

Course Outline

In this comprehensive 3-day class you'll learn to create and edit accurate free-form 3-D NURBS models. This fast-moving class covers most of Rhino's functionality, including the most advanced surfacing commands.

Structure

In this class, you will systematically move through the user interface, command access, creation and editing curves, surfaces and solids.

Expected Outcomes

After this course the student is expected to be able to:

- Utilize the features of the Rhino user interface
- Customize your modeling environment
- Create basic graphic objects—lines, circles, arcs, curves, solids, and surfaces
- Model with precision using coordinate input, object snaps, and SmartTrack™ tools
- Modify curves and surfaces with edit commands and Gumball
- Use control point editing to modify curves and surfaces
- Analyze your model
- Display any portion of the model
- Export and import models to and from different file formats
- Render the model using Rhino Render
- Dimension and annotate model with test and hatch
- Use Layouts to arrange views of model on paper for printing

Target Audience

This course is for the design professional who wants to efficiently learn the concepts and features of the Rhinoceros modeling software at an accelerated pace in an instructor-lead environment.

Prerequisites

Windows skills and a desire to model are desired. Previous drafting and modeling experience helpful but not required.

Curriculum

Day 1—AM

The Foundation

After a brief introduction, the following concepts will be covered:

- Get acquainted with the Rhino screen and menus
- Navigate around the Rhino model
- Create 2-D lines, polylines, and NURBS curves
- Modeling setup and mode functions: ortho, grip, snap, and planar
- Fast 3-D solids and surfaces
- The Rhino layering system
- Delete objects
- Discover display commands used to view different parts of the model.
- Pan, zoom and reset model views

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Precision Modeling

Use coordinates and constraints to model easily and accurately. Move off the x-y plane and use viewports to establish the current construction plane. Draw polygons and ellipses. Draw free-form curves and compare interpolated and control points curve.

- Draw with absolute, relative rectangular, and polar coordinates
- Distance and angle constraints
- Using object snaps
- Analysis commands: length, distance, angle, radius
- Smart tracking and constraints
- Viewports, construction planes, and modeling in 3-D space
- Elevator mode
- Drawing circles, arcs, rectangles, ellipses and polygons
- Model free-form curves
- Create helix and spiral curves

Day 2—AM

Basic Editing

Use edit commands to produce complex and detailed variations on the curves. Loft and extrude curves into surfaces and solids. Learn additional editing commands and use them to build practice models. Reinforce concepts of model setup and drawing accurate 2-D geometry to build precision 3-D shapes.

- Edit curves with fillet and chamfer
- Loft and extrude curves
- General editing: move, copy, rotate, mirror, scale
- Use the Gumball to move, copy, rotate, scale
- Array polar and rectangular
- Boolean union, difference, and intersection
- Offset curves and surfaces
- Trim and split for curves and surfaces
- Extend and extend to surface
- Practice modeling and editing

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Intermediate Edit and Surfacing Commands

Learn additional editing commands and use them to build practice models. Reinforce concepts of model setup and drawing accurate 2-D geometry to build precision 3-D shapes.

- Introduction to NURBS modeling concepts and terminology
- Free-form curves
- Control point editing of curves and surfaces
- Rebuild curves and surfaces
- Use the nudge modeling aid
- Create deformable shapes
- Curve creation through projection
- Split surfaces with curves and surfaces
- Blend between two surfaces
- Create solid primitives and solid text

Day 3—AM

Solids and Surfacing

Learn how to model with solids and solid text. Use Booleans to shape your model. Extrude, loft, and revolve curves into surfaces. Use sweeps to create surfaces. Use advanced surfacing techniques like blend, match, and surface from network of curves.

- Model with pipe and extrude
- Modifying solids with Booleans
- Extrude and loft surfaces
- Generate curves from objects—contour, duplicate edge, project, section
- Revolve curves into surfaces
- Sweep 1 and 2 rail curves
- Surface with network of curves

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Let's Model

Reinforce the commands and skills gained in the class by creating several models: the hammer and the chocolate syrup bottle. Add texture, bump and materials to the Rhino model for rendering. Annotate the Rhino model by adding dimensions. Work with the Options dialog box to refine the Rhino modeling environment. Generate 2-D views of a model for detailing and exporting. Output wireframe images directly to printers and plotters from Rhino.

Time permitting: Customize Rhino toolbars and workspaces. Use the Flamingo plug-in to render a model and compare the finished rendering with Rhino's renderer.

- Setup the hammer model
- Create the hammer construction lines with precision and build the hammer surfaces
- Setup the syrup bottle model
- Create the syrup bottle construction lines and build the syrup bottle surfaces
- Add the threads
- Lighting and rendering
- Import and export models
- Generate 2-D drawings from 3-D model and export
- Create layout for printing the model
- Transform geometry (time permitting)