SimplyRhino

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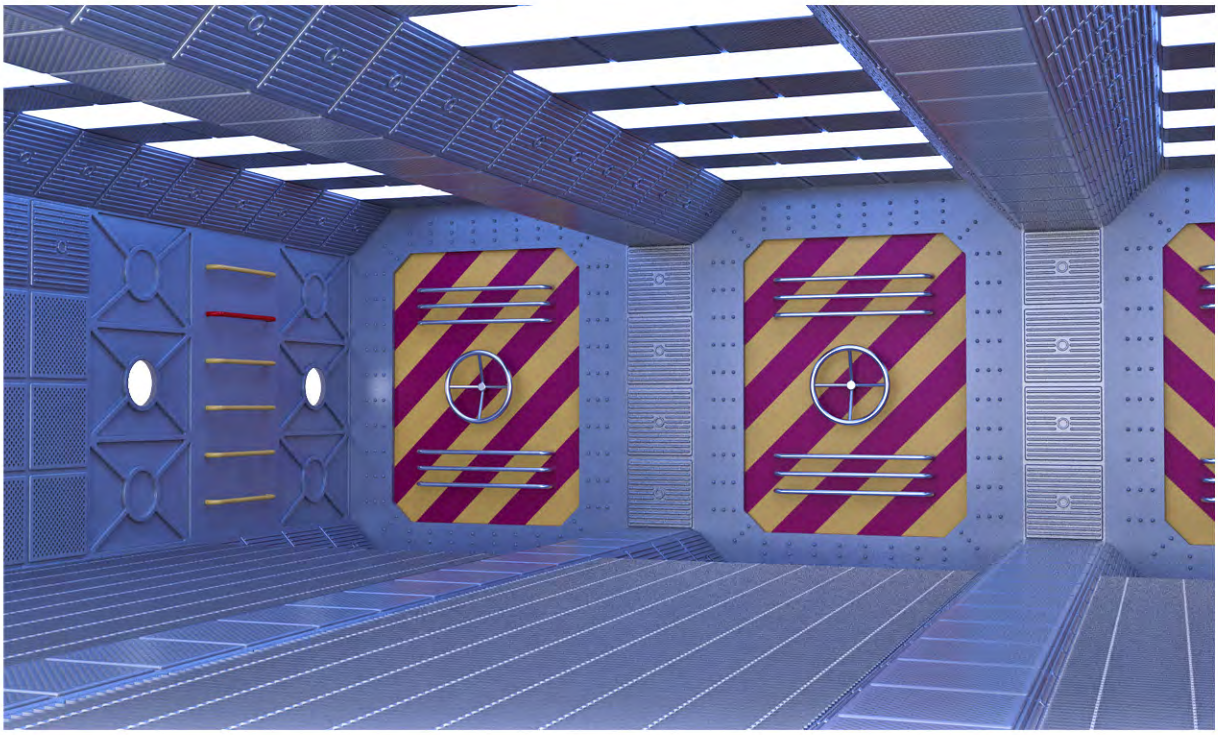


Intermediate/Advanced Rhino

Outline and Objectives

Rhinoceros®
modeling tools for designers

Simply Rhino Limited
0208 498 9900
www.simplyrhino.co.uk
training@simplyrhino.co.uk

Simply Rhino - Intermediate/Advanced Rhino

Course Outline

This course, completely revised for 2014, is geared toward design and engineering professionals of all disciplines who have a good basic understanding of Rhino but wish to improve their overall knowledge become more confident and productive. The course contains both intermediate and advanced level material and concentrates on explaining NURBS topology in more detail before moving on to practical examples demonstrating efficient modelling techniques, modelling strategy and advanced surfacing. Although the class follows a clearly defined structure there is scope for trainees to discuss individual work examples and work on live project examples. This course is the ideal step-up for professionals working in the following industries:

Product Design
Furniture Design
Jewellery Design
Artists and Sculptors
Film and TV
POS and Structural Packaging
Automotive Industries

Structure

This comprehensive three day class starts with a refresher on Rhino basics before moving on to an understanding of NURBS topology. This understanding is then applied to a number of exercises detailing the creation of clean, optimised geometry and controlled freeform shapes. Modelling strategy is covered in a number of ways including an exercise taking a project from initial hand drawn sketches through to a 3D block model and finally a fully detailed shelled model with ribs, bosses and production features. Strategies to manage large models are examined along with tips for exporting and importing data. The creation of 2D drawing information is also explained along with a special section on creating STL files for rapid prototypes and 3D printing. Various presentation and rendering processes are also considered.

Prerequisites

Trainees should have ideally completed the Simply Rhino Level 1 course and have been using Rhino for at least eight weeks.

Curriculum

Introduction

Rhino Refresher

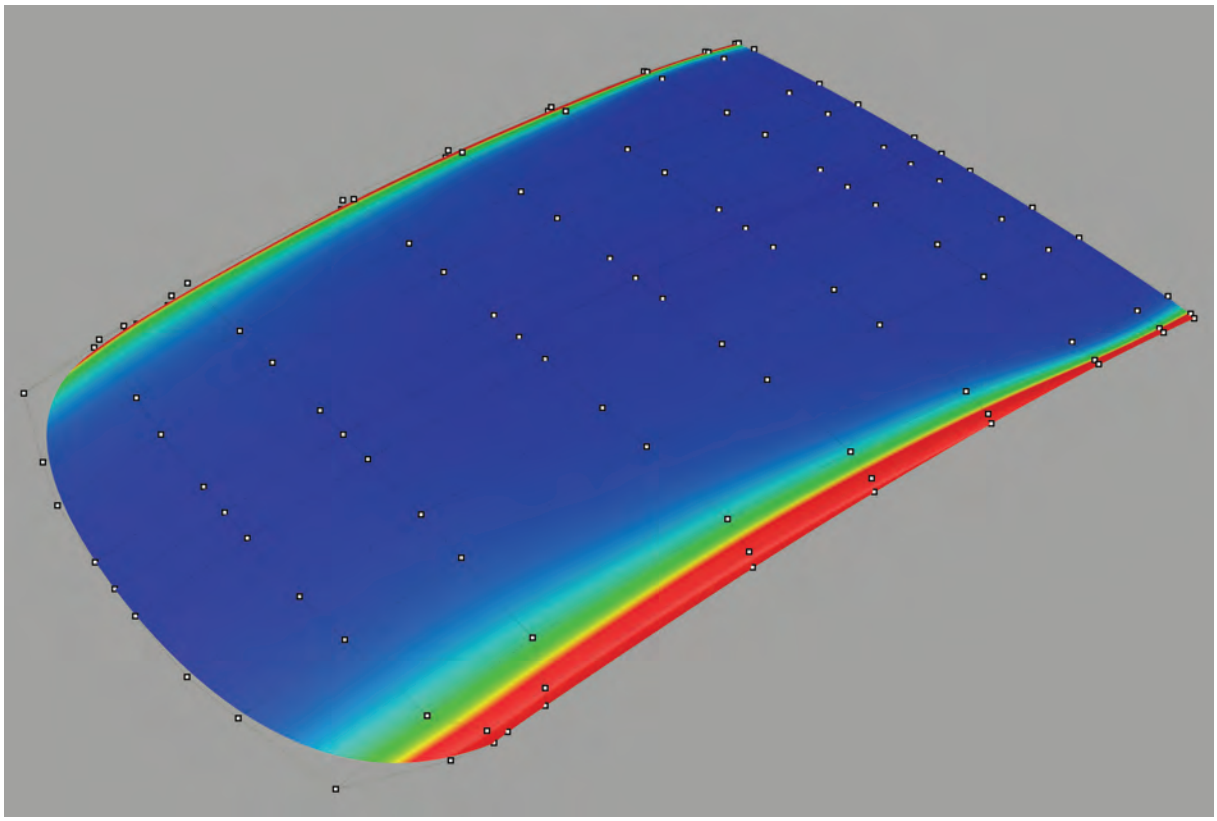
Modelling Constraints
Construction Planes
Modelling History
Viewport Properties

NURBS Topology

NURBS Topology Explained
Curve and Surface Degree
Control Points and Edit Points
Knots
Point Editing and Rebuilding
Rational and Non-Rational Geometry
Four Sided Methodology
Untrimmed and Trimmed Surfaces
Control Point Distribution and Weighting

Evaluation Tools

Curvature Graph and G-Con
Curvature Analysis
Environment Maps and Zebra
Edge Tools
Point Set Deviation



Exercises

Controlled Freeform Shapes

This exercise looks at modelling a closed freeform shape, for example a piece of cutlery or a telephone handset, using simple but exact and controllable surfacing techniques. The shape can easily be adjusted using Rhino's modelling history so that iterations of a concept can be developed quickly and accurately.

The workflow includes:
Optimisation of key construction curves
Understanding the Four-Sided Surface principle
Choosing and appropriate method to build the surfaces
Adjusting and creating iterations with History

Orient & Array Tools

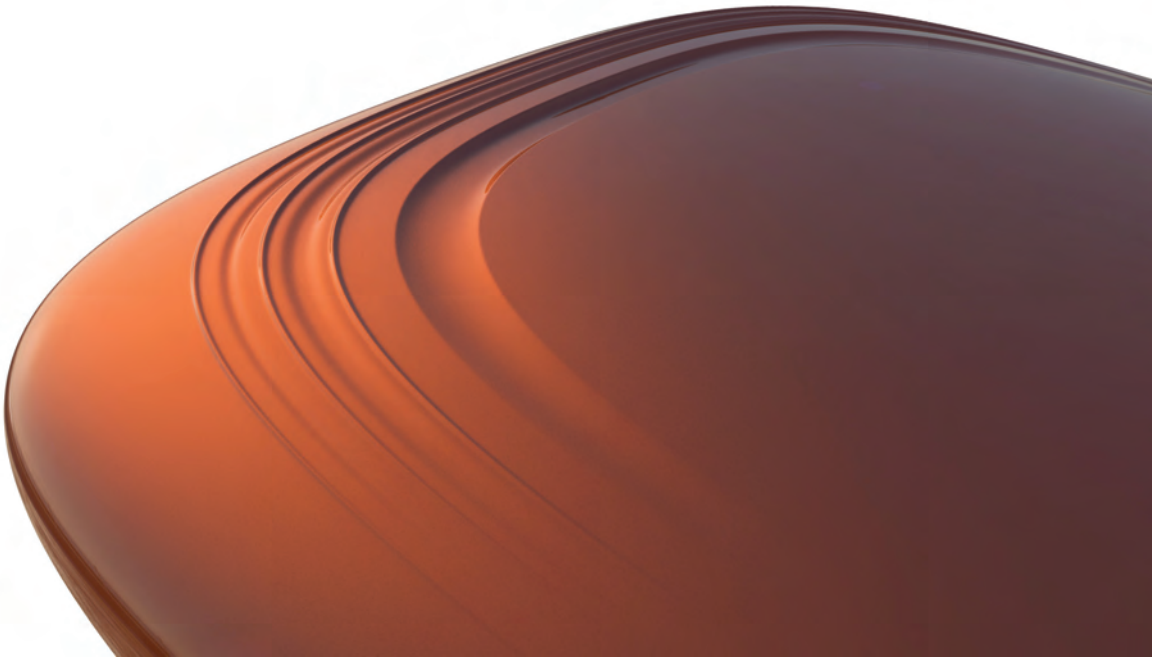
An exercise looking at how the orient and array tools can be used in to apply detail or patterning to a 3D form. This includes some scripted extensions of the built in tools that are supplied as part of the courseware.

The workflow includes:
Project & Project Object
Pullback
Squish and Squishback
Orient on Curve
Orient on Surface
Splop

Audio Pod Concept

There are a number of special case situations where geometry based on a superellipse can be modelled in four identical quadrants. History is used so that just one quadrant can be edited and the remaining three quadrants will update automatically.

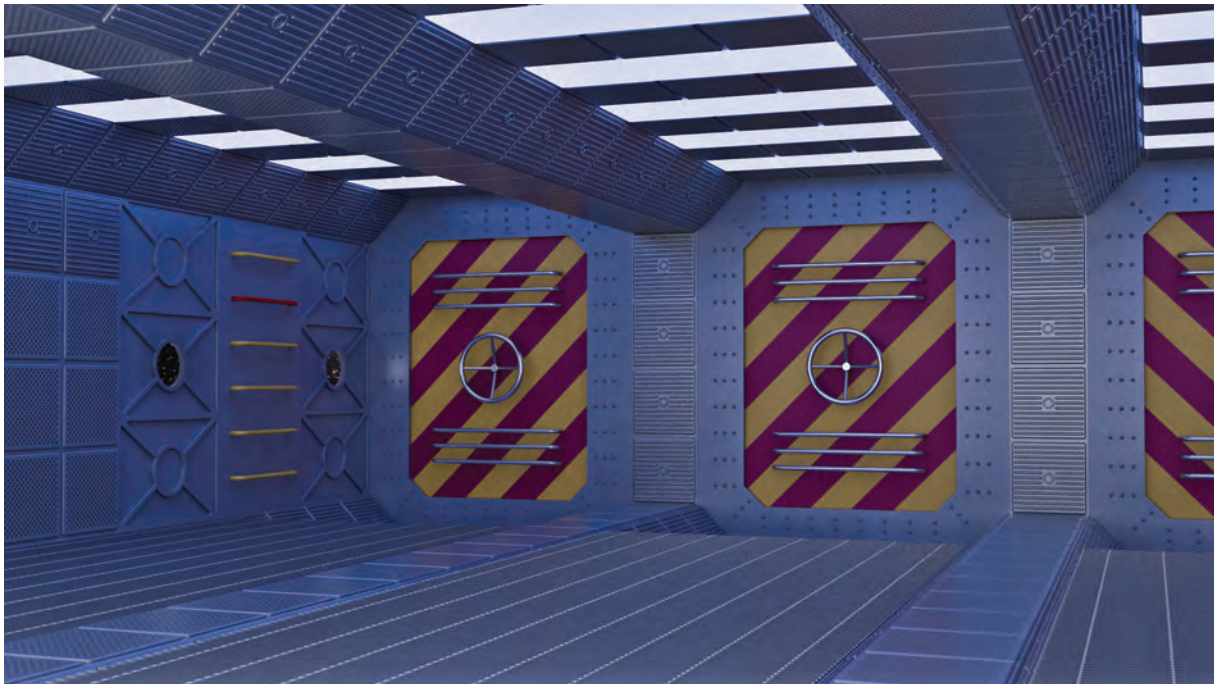
The workflow includes:
Creating a precise shape with Loose Loft
Exploration of the shape with Rhino History
Surface Analysis
Adding surface detail with Knots and Move UVN
Joined vs Merged surfaces



Space Station Storage Dock Assembly

In this exercise Rhino is used to model fast 3D solids from legacy 2D data. Large 2D files can pose some problems for Rhino and we will look at these issues and the process involved in bringing in 2D data into Rhino. The Solid Editing Tools give Rhino a way to work with Simple Planar Solids working with Faces and Edges in such a way that the result is always solid.

The workflow includes:
Importing 2D Data (DWG, DXF, AI etc) into Rhino
Cleaning up the legacy data
Working to a local origin
Gumball Manipulator
Sub Object Selection
Solid Tools



Large Models

Assembling the Space Station Storage Dock from hundreds of modular components can result in an extremely large and unorganised file. Rhino has no 'automatic' organisation and therefore when working with large data sets the responsibility is with the user to organise files in such a way that a large project remains manageable. A number of strategies for working with large files will be examined.

Key areas include:
Layers
Blocks
Worksessions

Modelling Strategy

This exercise uses the example of a moulded keyboard controller assembly and looks at the process of taking initial hand drawn sketches into Rhino and producing an initial block model. The model is then developed by creating cleaner 'A' surfaces with optimised blended transitions before shelling and adding production detail such as ribs and bosses.

The workflow includes:
Working with Sketches
Advanced Picture Frame usage
Quick Conceptual Model Strategy
Checking for Watertight Joints
Filleting and Blending Strategies
What to do when Fillets fail
Shelling Strategies
Adding Lip, Rib and Boss Details

T-Splines

Short Demonstration. T-Splines is a plug-in for Rhino that introduces new modelling workflows more associated with subdivision surface modellers. A NURBS surface can be converted to a T-Splines surface, manipulated and edited and then converted losslessly back into NURBS.

Perfect STL Files

Rhino is used extensively to convert NURBS data to STL mesh files for rapid prototyping and 3D printing. A simple step by step process to generate STL files from Rhino geometry is explained and documented.

Presentation

Aside from rendering there is still a need to present formal two dimensional information. Whilst Rhino does not yet have the automated 2D sophistication of products such as SolidWorks, there are some useful tools to create and annotate 2D information and these can be presented in a 'paper space' environment that will be familiar to AutoCAD users.

Key areas include:
Sections and Contours
Section Tools Plug-In
Curves from Objects
Make 2D
Clipping Planes
Page Layouts
Animation Tools

Exchanging Data

Guidelines for importing and exporting data from the following:

AutoCAD
SolidWorks
Inventor
Creo/ProE
Unigraphics NX
Catia

V-Ray Render Demo *(optional)*

V-Ray is a very popular rendering solution amongst visualisation professionals and V-Ray for Rhino brings fast high quality photorealistic visualisation to Rhino.

In this short demonstration we will look at creating simple studio renders using the Dome Light and V-Ray RT.