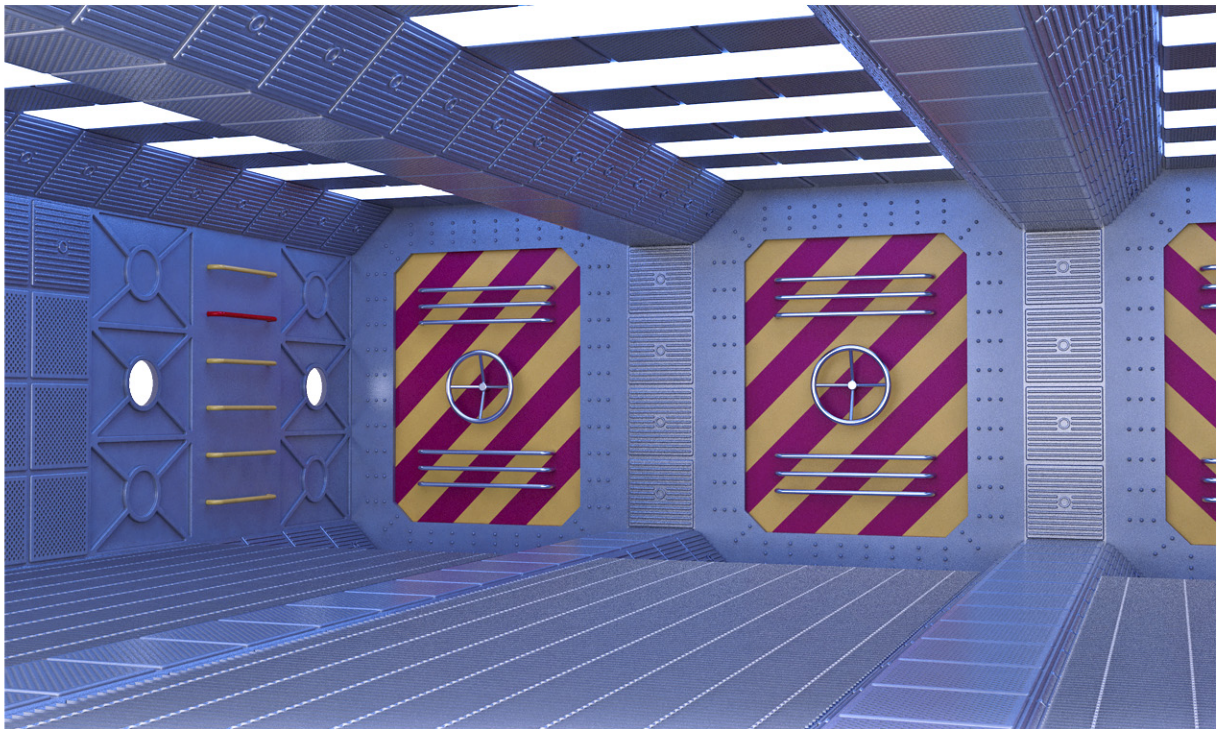


# SimplyRhino

*sales, training and support*



## Rhino Level 2 Outline and Objectives



**RhinoCeros**<sup>®</sup>  
modeling tools for designers

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## **Simply Rhino - Rhino Level 2**

### **Course Outline**

This course, completely revised for 2020, 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 and 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

The course is suitable for both Windows and Mac users and will be delivered on Rhino v6 for Windows. We will, however, be looking at new 'in development' features for the upcoming Rhino v7 including SubD Surfaces and Quad Remesh.

### **Structure**

Delivered either as a 3 day classroom course or 7 x 3 hour online sessions, this comprehensive 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

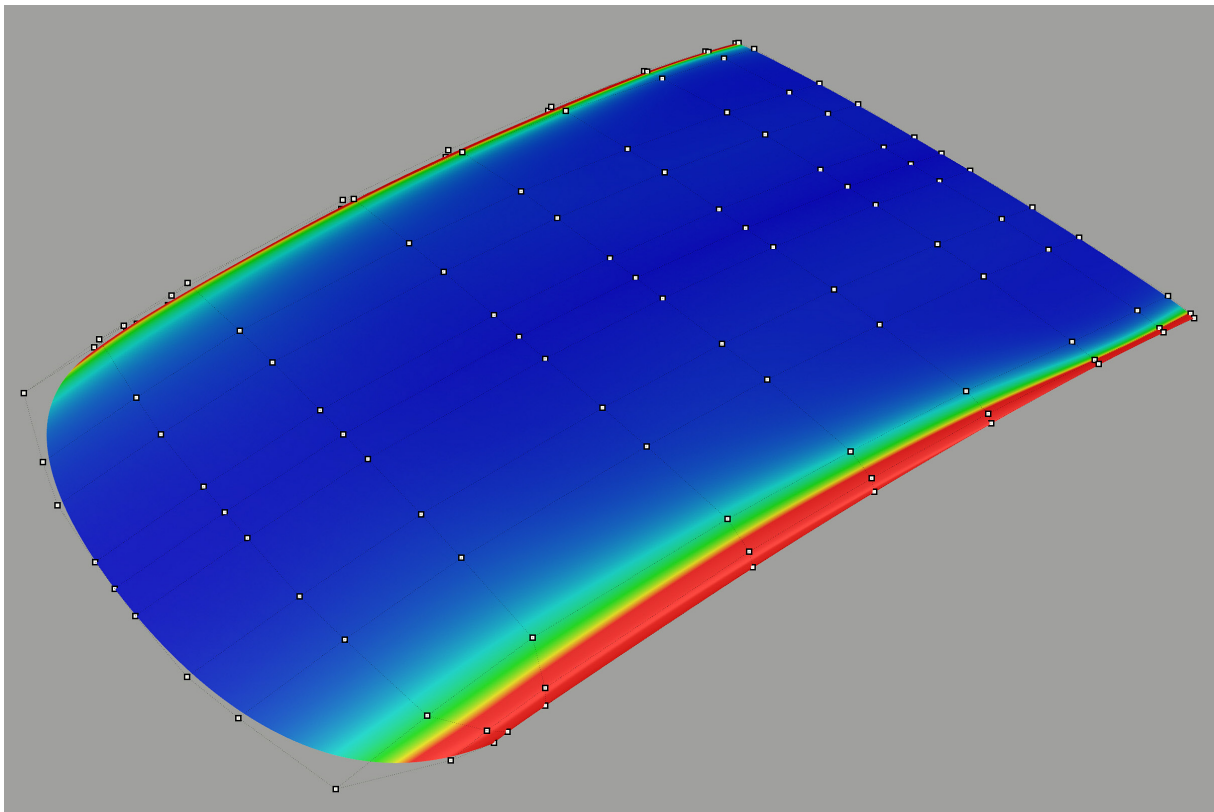
- NURBS Topology Explained
- Curve and Surface Degree
- Control Points , Edit Points and Knots
- Point Editing and Rebuilding
- Rational and Non-Rational Geometry
- Four Sided Methodology
- Untrimmed and Trimmed Surfaces
- Control Point Distribution and Weighting

#### SubD Topology

- SubD Topology Explained
- Interpolation vs Control Point Layout
- Maintaining a Simple Topology
- Sharp Corners and Creasing

#### 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

*We'll also look at using SubD as an alternative workflow.*



### 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
- Fitted vs 'Loose' Options
- Squish and Squishback
- Orient on Curve
- Orient on Surface

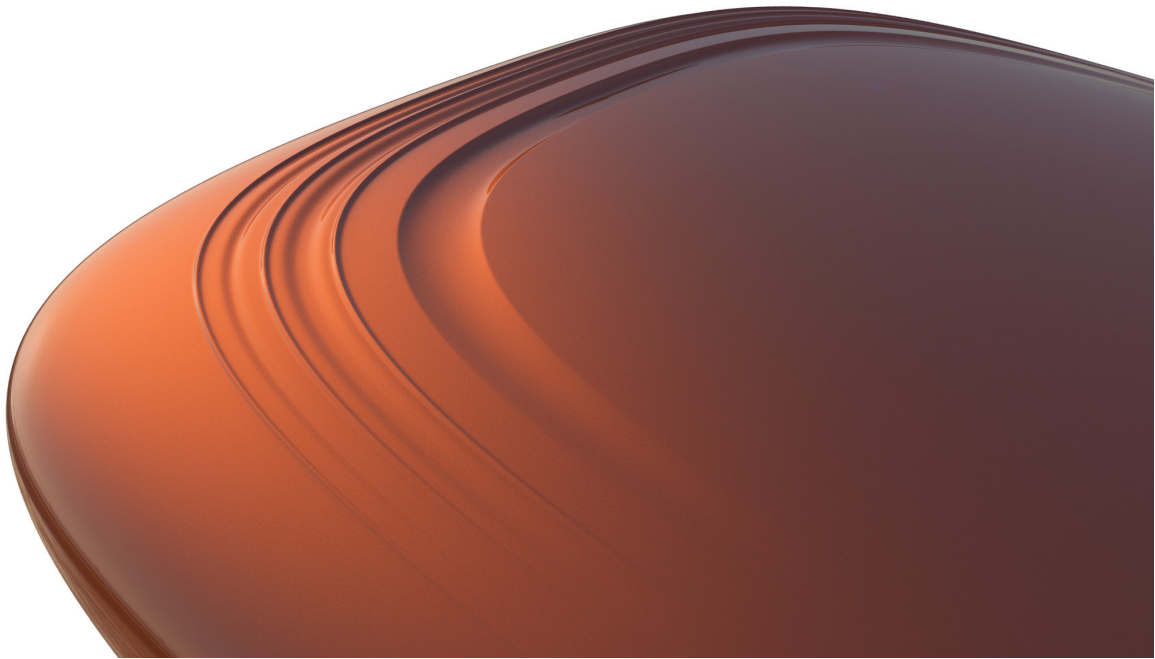


## Audio Pod Concept

There are a number of special case situations where geometry based on, for example, a superellipse can be modelled in four identical quadrants. History is used so that just one quadrant can be edited allowing 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

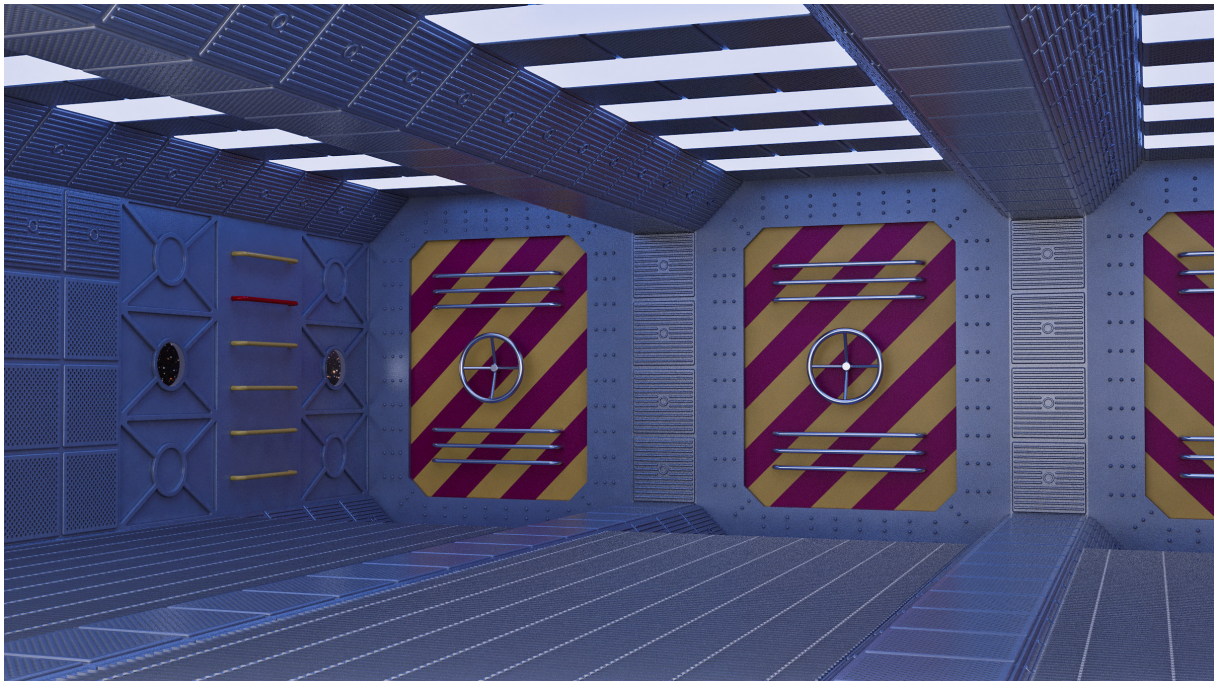


## Space Station Storage Dock Assembly

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

### 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. There are many 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
- Viewport Mode Customisation

**Exchanging Data**

Guidelines for importing and exporting data from the following:

- AutoCAD
- SolidWorks
- Inventor
- Creo/ProE
- Unigraphics NX
- Catia

**Rendering in Rhino**

Creating visuals using both the Rendered and Raytraced modes. Considerations for reflective, translucent and transparent materials and modelling requirements necessary for physically correct refractions and reflections.

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