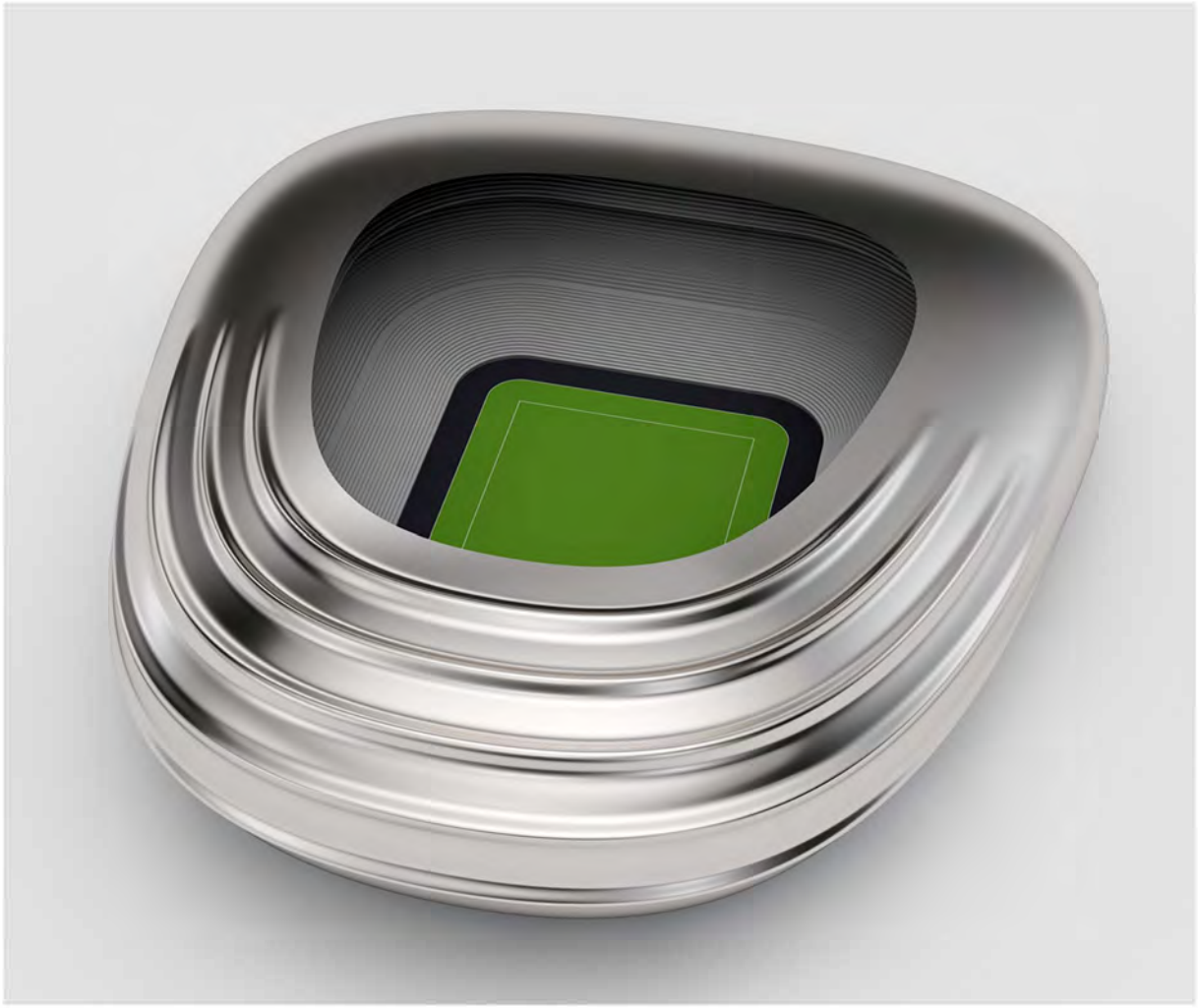
SimplyRhino

sales, training and support



Rhino v7 Level 2 Training Course for Architecture and Engineering

Outline & Objectives

Rhinoceros®

authorised training centre

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Simply Rhino - Rhino 7 - Level 2 - Architecture & Engineering

This course is aimed at architectural and engineering professionals who are looking to use Rhino with more efficiency, accuracy and confidence. Suitable for architects; structural engineers, urban designers, building envelope engineers, and landscape architects amongst others, this course introduces and explains industry standard Rhino workflows.

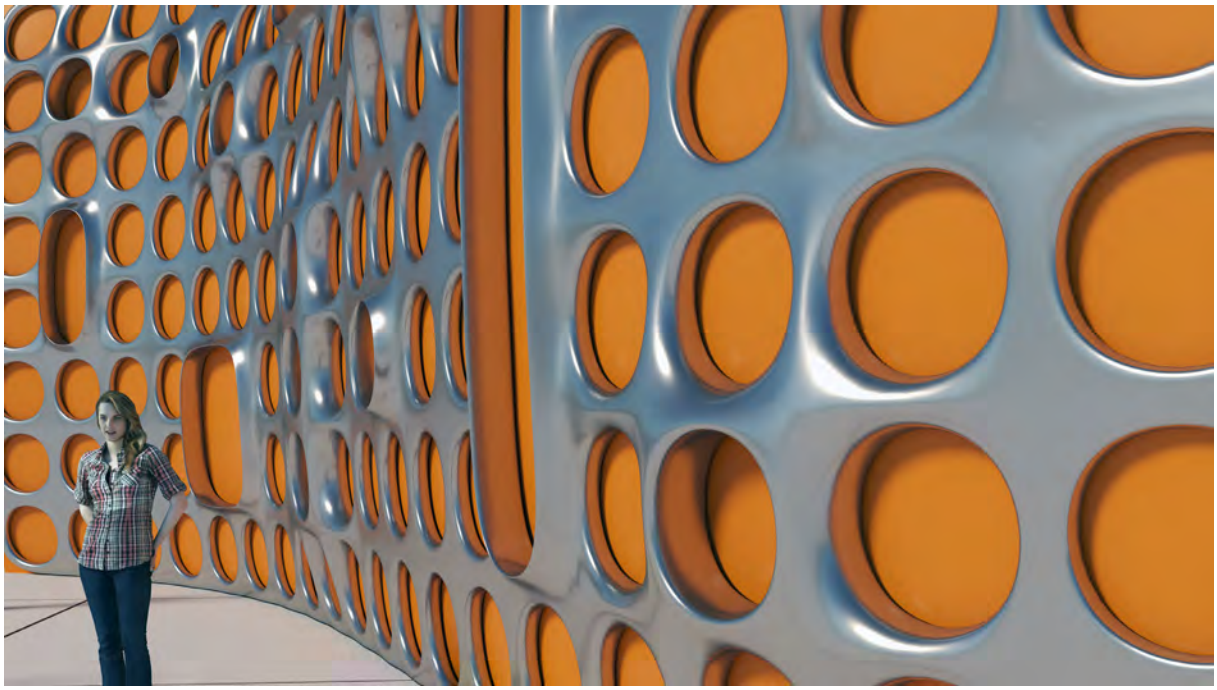
Completely revised and updated for Rhino 7, this course contains both intermediate and advanced content, the balance of which can be adjusted to suit attendees. Although the class follows a clearly defined structure there is scope for trainees to discuss individual work examples and workflows.

Structure

This online course is delivered over 6 x 3.5 hour sessions. The course starts with a brief introduction as to how, when and why Rhino is used in professional architectural studios. A Rhino refresher then follows before the course moves on to discuss NURBS topology in detail. The aim is to deliver a core understanding of the principals of NURBS so that both the advantages and limitations of the topology can be utilized in building clean, efficient and editable geometry. These principals are then put into practice with several architectural exercises during which a range of tools and strategies are utilised. Subdivision surface modelling, new in Rhino v7, is also explained in detail.

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 is used by a diverse cross section of the construction industry from concept design stage (RIBA stage B and C) onwards to develop, visualise and communicate work on projects ranging in scale from master plans and complete bridges to cladding modules and discrete building components. In this short introduction we will examine what differentiates Rhino from other architectural CAD products and examine example uses of Rhino in Architecture.

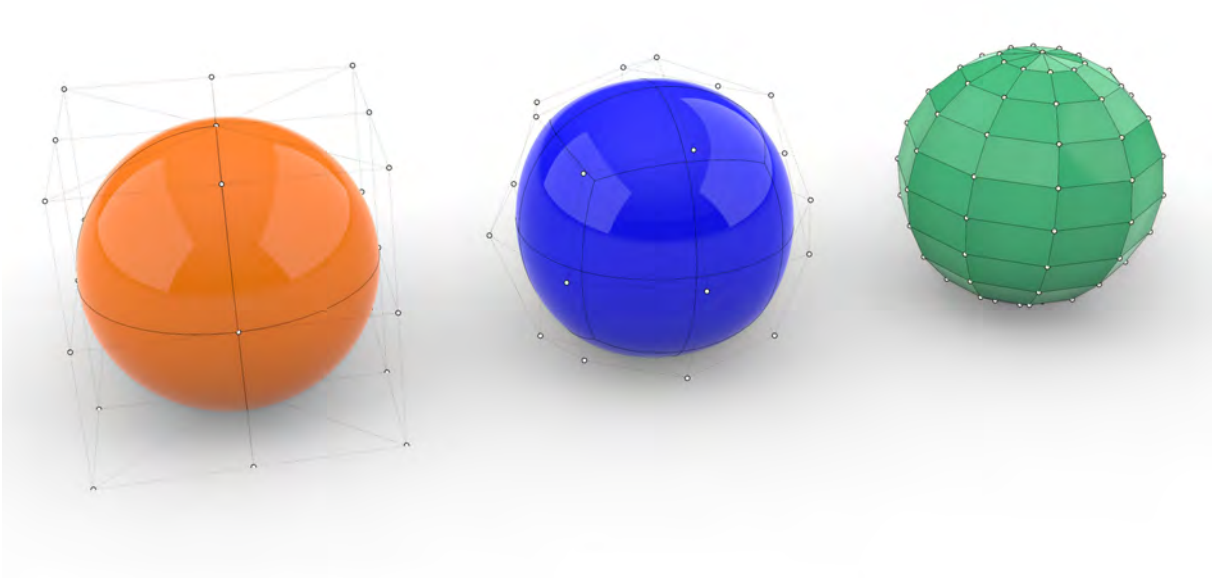
Rhino Refresher

Accuracy

Object Snaps
Modelling Constraints
Advanced Object Snaps
Construction Planes
Modelling History
History v Grasshopper
Object & Viewport Properties

Geometry Types

Curves
Surfaces
Polysurfaces
Extrusions
Meshes
SubD



NURBS Explained

Topology	NURBS Geometry Explained Curve Degree Control Points Knots and Edit Points Point Editing and Rebuilding Analytical v Non-Rational Geometry
Evaluation Tools	Curvature Graph and G-Con Curvature Analysis Environment Maps and Zebra
SubD	Degree Equivalent - Advantages and Disadvantages Topology Creased and Smoothed Edges Editing Metaphors NURBS conversion and options

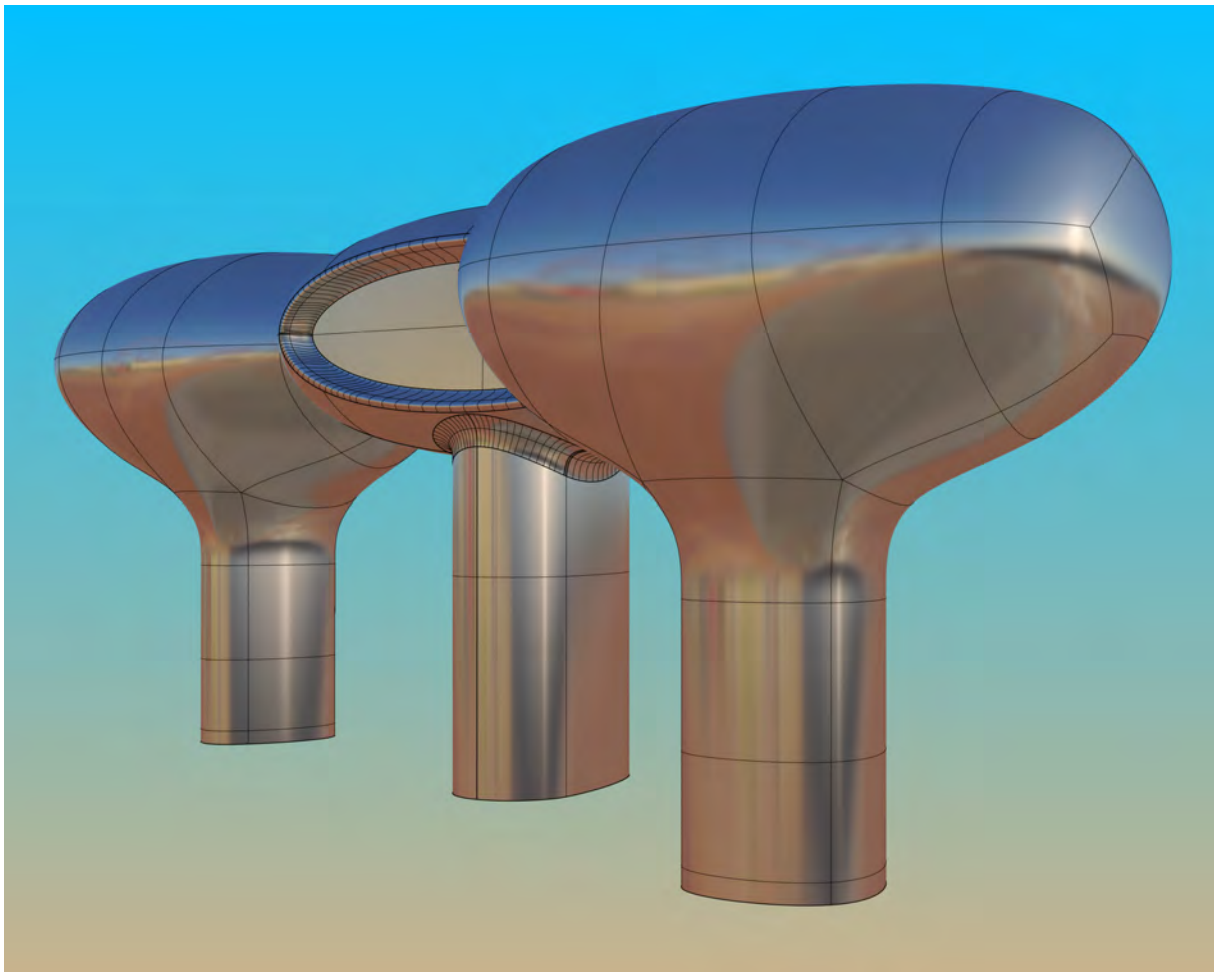
Exercises

Pavilion

This exercise looks at a modelling a closed organic form in an accurate yet efficient manner, putting into practice the NURBS topology principles outlined above. Once the main form has been established, a number of ways of creating the blends between the body and the glazing and the pavillion body and stem will be investigated. The method of aligning the porthole feature normal (perpendicular) to the pod surface will also be detailed along with the use of History to interactively update these features.

The workflow includes:

Optimisation of key construction curves
Choosing and appropriate method to build the major surfaces
Transitions from sharp edges
Transitions across a gap
Checking and maintaining Continuity
Orienting components on the curved building shell
Alternative Strategies

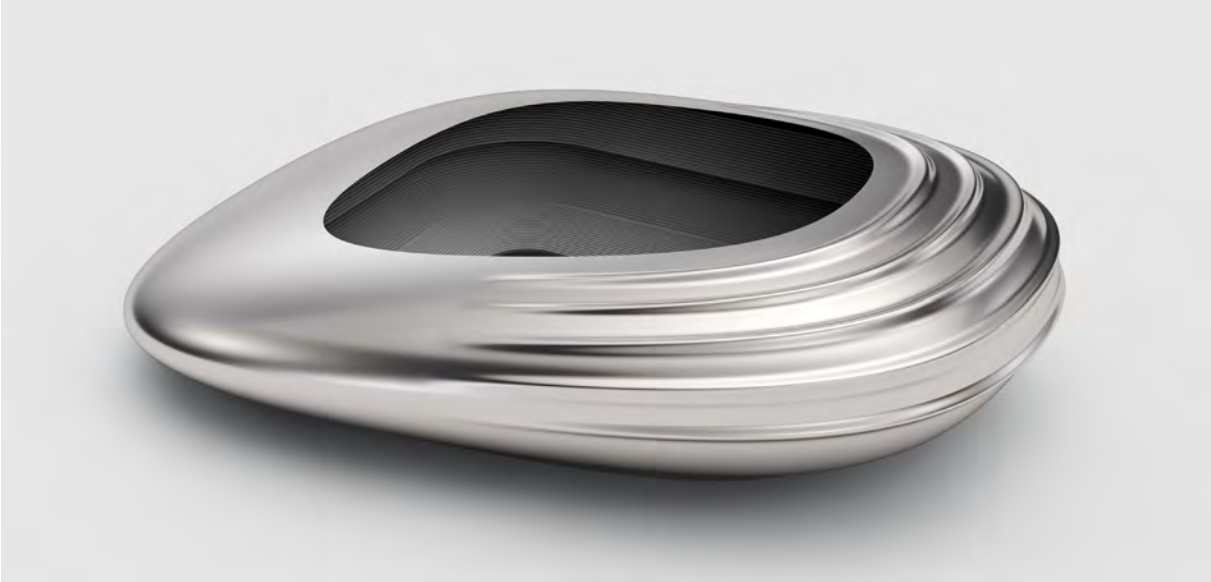


Stadium Concept

Rhino excels in the production of quick and accurate concept models (RIBA stages B-C) and this exercise shows how a freeform stadium canopy can be easily created and then modified as the design concept is evaluated. Initially the canopy is modelled in four identical quadrants and Rhino's 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 and efficient shape with Loose Loft
Exploration of the canopy shape with Rhino History
Surface Analysis
Adding surface detail with Knots and Move UVN
Joined vs Merged surfaces



Panelling Tools

The Panelling Tools plug-in will be introduced and a variety of options explored on the above canopy.

Orient & Array Tools

An exercise looking at how the orient and array tools can be used in an architectural context. This is further expanded upon in a subsequent SubD exercise.

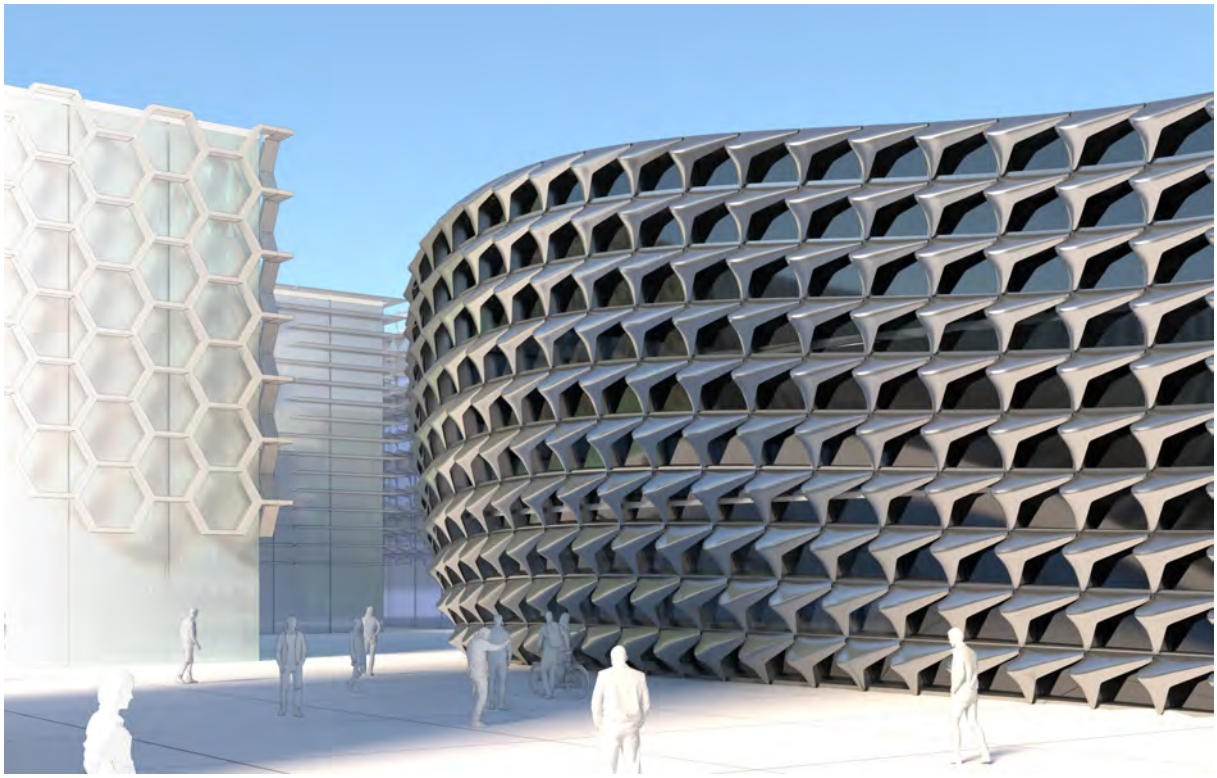
Problem Solving

Looking at common problems and how to rectify them including:

Bad Objects
Naked Edges
Filleting Problems
Tolerance Issues

SubD Exercise

Using the example of a curtain wall or cladding, we'll look at how, the structure can be modelled very simply as a series of lines laid out on a repetitive grid before being converted to a smooth SubD form that is then edited and modified. The smooth cladding structure is then applied to a freeform surface.



2D Legacy Data

Whilst there is a general push towards working in three dimensions much information available to architectural professionals is still firmly based in two dimensions and a good example of this would be a site plan.

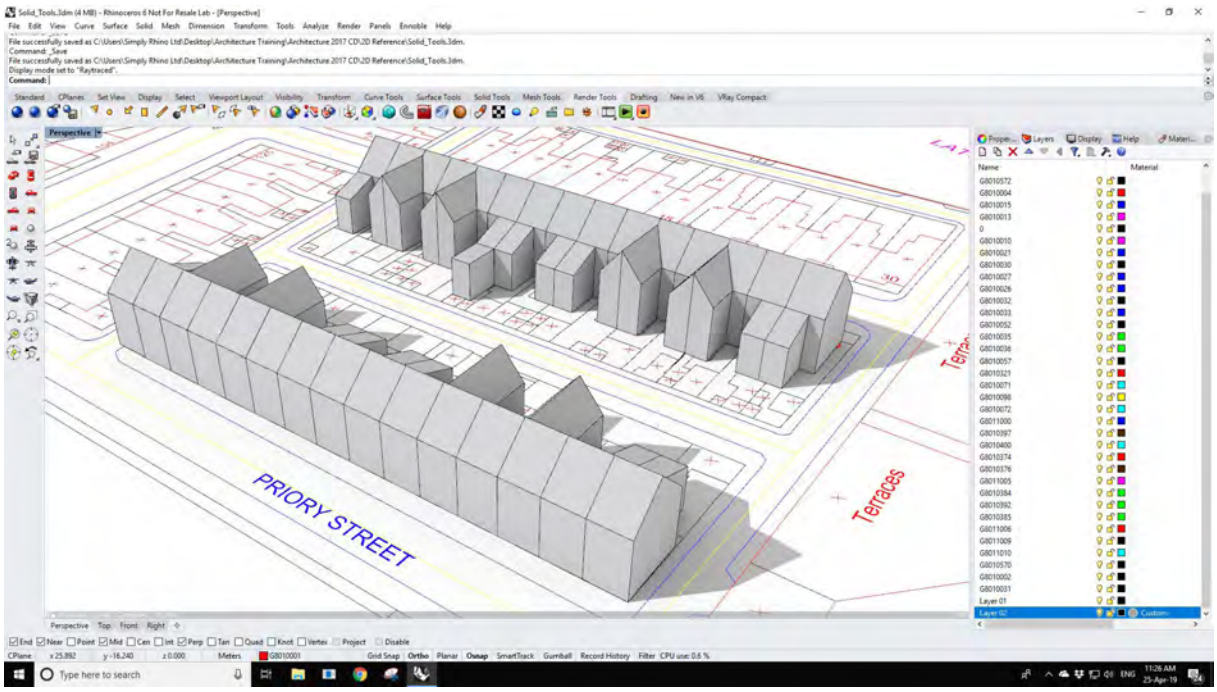
Some 2D files from other software can contain geometry than poses problems for Rhino and in this exercise we will look at these issues and the process involved in bringing 2D data into Rhino and then cleaning up this data to remove duplicates, bad objects, orphaned blocks etc.

Origin

All CAD modelling software becomes less accurate the further one moves away from the absolute origin or 0,0,0. Because of this the industry standard way of working is to model around a local origin - i.e. close to 0,0,0. There remains, however, a need to place geometry into real world site coordinates and, conversely, to move geometry from site to local coordinates. The process of doing this in Rhino will be examined both by moving the geometry and by referencing around different base coordinates.

Massing Study

Rhino can be used to quickly model volumes for massing studies or context in a similar fashion to programs such as SketchUp. There are now three clearly different metaphors for editing solid geometry in Rhino v7. These metaphors will be examined in the context of a massing study.



STL for 3D Printing

Creating and checking an STL file from within Rhino. Best practice and tips for succesful 3D printing.

Section Tools

The Section Tools plug-in for Rhino gives functionality beyond the built in Section and Contour tools. Geometry created with Section Tools remains 'live' in Rhino in that sections placed in 3D space will update if the geometry they reference is modified. The advantages and limitations of this method will be demonstrated and discussed. Nested 2D layouts of the 3D sections can be created automatically and Section Tools also provides a powerful way of documenting 2D cut sections.

Interoperability

Using Rhino with other commonly used architectural CAD eg:

AutoCAD
Revit
Microstation

Terrain

Rhino v7 introduces QuadRemesh a new command that is extremely useful for reverse engineering particularly, when as in the case with typical terrain meshes, the reference geometry is too complex to edit. This exercise shows how a dense terrain mesh can be quickly retopologised in a controlled manner before being converted into a smooth editable SubD surface.

Large Datasets

Rhino is not a BIM solution and does not impose any method of organisation upon the user. 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. Using the example of an apartment block and a surrounding development following will be discussed and demonstrated:

Layers
Layer State Manager
Layer Filters
Understanding Block References
Worksessions
Combining Blocks and Worksessions

2D Layouts

Aside from rendering there is still a need to present formal two-dimensional building information for planning, engineering details, subcontractor communication etc. Rhino v7 has all the tools necessary to create accurate, detailed 2D drawings and these are presented in a 'paper space' environment that will be familiar to AutoCAD users amongst others.

Key areas include:

Section and Countours
Curves from Objects
Make 2D
Clipping Planes
Page Layouts
Detail Views
Controlling Line Weights
Hatching
Dimensions & Annotation
Annotation Scaling

Presentation

Rhino v7 introduces a wealth of new features in terms of the display pipeline and therefore many new presentation possibilities The following topics will be discussed and demonstrated.

Pen Display
Rendered Display
Raytaced Render Mode
Materials and Textures
Texture Mapping
Controlling and Saving Camera Positions
Named Views
Named Positions
Snapshots
Animation Tools