

Lesson 2 – Rhino, Surfaces and Solids

3. Surfaces - Renders

1. Surface objects (primitive)

Plane ("Surface") - Corner to Corner, 3 Points, etc...

Concepts

Edge curve - Defines surface

Iso curve – Helps to visualize surface

Polysurface - More than one joined surface

2. Surface from Curves

Straight ("Surface/Extrude Curve")

Extrudes perpendicular to curves' construction plane or "Direction"

To Point ("Surface/Extrude Curve") – Makes "cone".

Tapered ("Surface/Extrude Curve") – Makes (truncated) cone. Draft angle

Ribbon ("Surface/Extrude Curve/..") - Curve then offset distance/direction

Planar Curves ("Surface") – Any and all curves must lie in the same plane

Edge Curves ("Surface") - 2, 3, 4 edge (open) curves

Curve Network ("Surface") – Select curves. Must have two directions

Surfaces use **ALL** curves (Edge + Interior)

Revolve ("Surface") - Curve, Axis of revolution (point 1 then point 2), Angle

Loft ("Surface") - 2 or more curves (curves only, no path)

Check curve directions (flip if necessary)

Choose "Styles" – Normal, Loose, Tight, Straight, Uniform

"Closed Loft" – Makes "solid" if closed curves

Lesson 2 – Rhino, Surfaces and Solids (cont...)

3. Surfaces from Curves + Rail (path).

Curves should be oriented to path.

Use “Transforms/Orient/Perpendicular to curve...”

Along Curve ("Surface/Extrude Curve") - Curve maintains orientation (XY)

Sweep 1 Rail ("Surface") – select “rail” (path), then 1 or more curves

Sweep 2 Rail ("Surface") - "rail1", "rail2", then 1 or more curves

Rail revolve ("Surface") - Curve, Rail, Axis of revolution (center)

4. Surfaces from Surfaces

Blend Surface ("Surface") - Pick edges and then adjust sliders

Offset Surface ("Surface") - Pick surface and then offset direction
Command Prompt - Distance, Solid

Normal to Surface ("Surface/Extrude Curve")
Extrudes curve perpendicular to surface normals

Unroll Developable Srf ("Surface/Surface Flattening")
Unwraps surface at (0,0)
“Developable” surface is curved in one direction only

Squish ("Surface/Surface Flattening")
Unwraps surface and curves at (0,0)
Both “Developable” and “Non-Developable” surfaces
Less accurate

SquishBack (Command line only)
Places curves back on “Squished” surfaces

Lesson 2 – Rhino, Surfaces and Solids (cont...)

Curves from Objects (typically Surfaces)

Interpolate on Surface ("Curve/Freeform/...") - Draws curve on selected surface
Select surface. Cursor remains on surface.
Watch Osnaps and Perspective viewport-only

Sketch on Surface ("Curve/Freeform/...") - Sketches on selected surface
Select surface. Cursor remains on surface.
Watch Osnaps and Perspective viewport-only

Dupedge ("Curve/Curve from Objects/...") - Curve from single edge of surface
Dupborder ("Curve/Curve from Objects/...") – Edge curves

Silhouette ("Curve/Curve from Objects/...") - Curve(s) visible against background

Section - ("Curve/Curve from Objects/...") - Select surface, draw sections lines

Intersection ("Curve/Curve from Objects/...") - Select surfaces that intersect

Extract ("Curve/Curve from Objects/...")
Isocurve - curve from isocurves (U, V or both)
Points - Points from surfaces or curves control points
Wireframe - Curves from edges + isocurves

Curve - Curve from Polycurve sub curve

UV Curves ("Curve/Curve from Objects/...")

Create UV Curves - Extracts *planar* curve from surface. Places at 0,0

Apply UV Curves - Applies *planar* curve(s) to surface

Project to Surface ("Curve/Curve from Objects/...") - Select curve, then surface
New curve is perpendicular to original curve

Pullback - ("Curve/Curve from Objects/...") - Select curve, then surface
New curve is perpendicular to surface normal

Lesson 2 – Rhino, Surfaces and Solids (cont...)

Solids - Surface that encloses a volume

Primitives ("Solid") - Boxes, Sphere, etc.... NOT parametric

From Curves ("Solid/Extrude Planar Curve/..") - **Must** be closed to be solid

Straight - Perpendicular

Along Curve - Shape, then curve

Extruded surfacing commands have option to create solid. Check prompt

From Surfaces ("Solid/Extrude Surface/..")

Straight - Perpendicular

Along Curve - Shape, then curve

Cap Planar Holes ("Solid")

Turns open surface into a solid

Must be planar

Pipe ("Solid") - Select curve and then radii (start and end)

Solid Tools

Booleans ("Solid") - **Solids**

Union

Intersection

Difference - 1st pick stays behind

Boolean Two Objects - Select then click to cycle through options

Holes ("Solid/Solid Edit Tools/Holes/..") - **Curves**

Make Hole

1. Select curve
2. Select surface
3. Direction/depth