

Lesson 4 – Rhino, 2D Output and Rendering

1. 2D Printing - Paper or Laser cutter. Two Choices – Viewport or Layout:

Viewport – Using “Print...” (Print Setup):

Printer, Paper Size, Orientation, Vector (lines) or Raster (shaded)

If orthographic – Choose a scale or “scaled to fit”

If perspective – No scale. Use “current” viewport, extents or window.

Layout (and Detail) – Paper-sized view, printed full scale (1:1 or 1” = 1”).

“AutoCAD-like” – Layout is “paper space” and Detail is “model space”

To create:

“View/Layout/New Layout” or click “+” viewport tab

Choose - Name (i.e. “Plan”), Printer, Media size and Orientation

Includes one (or more) scaled views of model (called “details”)

Detail – Layout view into “model space”. Detail (viewport) must be scaled:

Click on detail border to set scale in property panel or crop (resize)

“Lock” to avoid changing layout scale (zooming)

To toggle between Layout and Detail:

Right-click on tab, choose “Layout” or “Detail”

Double click in either region

Annotation Style – Settings for dimensioning (scale, linework, etc...)

Can name and save different “styles”

Annotation scale (scale of dimension lines & text):

If using “viewports” - Need to set “Model space scale”

If using “layouts”, “Model space scale” does not matter

Font/Text – Height relative to model space scale

Dimension, Arrow(head)s, Leaders – graphical settings

Dimensioning Commands

Linear – Horizontal or Vertical

Aligned – Angled dimensions

Radial/Angular – Circles, arcs, etc...

Text Block – Placing lines of text for notes

Leader – Click arrow point, then line(s). Enter opens text block.

Scale	Scale factor
1/16" = 1'-0"	192
1/8" = 1'-0"	96
3/16" = 1'-0"	64
1/4" = 1'-0"	48
3/8" = 1'-0"	32
1/2" = 1'-0"	24
3/4" = 1'-0"	16
1" = 1'-0"	12
1 1/2" = 1'-0"	8
3" = 1'-0"	4

Lesson 4 – Rhino, 2D Output and Rendering (cont...)

1. 2D Printing

Adobe Illustrator (AI) – 2D line work from orthographic views only.

“File/Export Selected”:

Select geometry

Choose “AI” format

Set Rhino model size (i.e. 12”) then Illustrator size (i.e. 1/8” or 1/8”)

Laser Cutter – Vector-based.

Direct from Rhino, AutoCAD, Illustrator, etc...

Media must be less than ¼” thick (need to check current shop rules)

Chipboard, Paper, some plastics. No MDF. Check with shop.

Depth of cut controlled by “Power” setting. Watch Double lines!

Requires 1 hour general shop orientation and appointments

2. Rendering – Five topics: Geometry, Camera, Lights, Exposure Control & Materials

Geometry – Model in 3D space

Camera - Integral to viewport. Two ways to adjust. Activate view, and...

1. Viewport Properties - Use F3. Position, Lens, Projection.

2. Visual Tool – Viewport options (“Set Camera/Show Camera” or F6)

“Set View/Named views” – Saves the view

Clipping Planes - “Removes” geometry between camera and clipping plane

Control which viewports in Property Panel

Layer controls “Sections Style” on objects (pattern, color, etc...)

“ClippingPlane” (viewport menu) - Infinite (cuts through all geometry)

“ClippingSection” – Select objects to section. NOT global

“ClippingDrawings” – Select clipping plane. Place. Dynamic.

“EditClippingDrawings” – Editing

Lesson 4 – Rhino, 2D Output and Rendering (cont...)

Rendering Engine – Geometry (vectors) into pixels. *"Render/Current Renderer"*

"Rhino Render" - Default

"VRay" (Plug-In) - 3rd party (also available for MAX, Sketchup, etc...)

Rhino Renderer (default) - Simple Lighting and Materials.

Lights

Sun – "Sun" panel or "*Sun*". Manual control or Date, Time & Location

Artificial - Light Objects, Create with "Render".

Spotlight (cone),

Rectangular (area)

Linear (line)

Adjusting

Position - Light and Target are "control points" (F10/F11)

Settings - Properties (F3)

"Render" panel - Settings

Resolution – Presets or Custom. Number of pixels (@72 or 96 dpi)

Print size = Pixels/DPI. Likely need Photoshop.

Quality – Draft-Final. More "samples" = better quality = more time

Background – Environmental. Ground Plane.

Ground Plane – Default (receives shadows, Z=0). Can use material

Materials Editor - "Render/Material Editor" or "Panel/Materials"

New material - Click "+" and then Select template or "Library"

Settings – Depend on material type

1. Color - THE color

2. Gloss &/or Reflectivity - How much reflection and intensity of

3. Transparency

Assign – "Drag and drop" or Right-click on material to:

1. Object - Materials assigned to single objects, regardless of layer.

2. Layer - Everything on that layer gets the same material.

Lesson 4 – Rhino, 2D Output and Rendering (cont...)

2. Rendering (cont...)

Texture mapping – Two steps: Mapped Material and Mapping Coordinates

Mapped Material - Replaces material's settings. Click on “checker” button.

Bitmap – Choose file. Others are procedurals.

Texture Placement – “Repeat U/V” tiles within single mapping coordinate.

Mapping coordinates – Default type is “Surface” coordinate. Property Panel.

Surface – Single coordinate covers entire surface or polysurface.

Use “UVW Repeat” to adjust map size. For “Real-World Scale”:

“Analyze” to find length of “U” and “V” edges

Divide map dimensions by edge length, enter under “Repeat”

Planar, Box – Works with orthographic surfaces/solids (i.e plane or box)

Must draw coordinates - Check Command prompt.

Can re-adjust dimensions in property panel

For “Real-World Scale”: Size coordinates to match map

For example, make coordinates = 64” x 64” x 64” (brick)

Unwrap – Works with more complex surfaces & non-modular textures

Select seams (typically edges).

Adjusts to best fit.

“Apply” to reapply

Complex surfaces require further adjustments with UV Editor:

UV Editor – For further adjustment of “unwrapped” coordinates

Click and drag to place bitmap proxy

Unwrapped UV coordinates will be inside (mesh)

Adjust with transforms, etc... Use vertex for snap

Click apply to place adjusted coordinates

Lesson 4 – Rhino, 2D Output and Rendering (cont...)

2. Rendering (cont...)

V-Ray (Plug-in – Also available for MAX, Sketchup, etc...) - chaosgroup.com

V-Ray pulldown, V-Ray toolbar and textual commands (type “vray”)

“Asset Editor” contains most V-Ray tools (materials, settings, etc...)

V-Ray Objects – V-Ray specific objects

Infinite Plane – Groundplane (places on current layer)

V-Ray Lights – V-Ray Sunlight. All others are artificial lights.

Sunlight System - “*sunlight*” (**NOTE: different from Rhino “Sun”**)

Sun takes time and date Rhino started, although not location

Manual control – Graphically set sun position

Date and Time (uncheck “Manual Control”)

Use sliders for date and time

Click on Map, scroll through list or click “Here” for location,

Click in viewport to place sun (anywhere is fine, settings are global)

To modify position

Select “sun object” and in Property panel (F3):

Property tab, Light button, then “Edit”, next to “Sun”

Sun settings in Asset Editor – See below

Others (artificial light)

Rectangular, Point, Sphere, Dome, Spot

IES

Direct, Dome

Lesson 4 – Rhino, 2D Output and Rendering (cont...)

2. Rendering (cont...)

Asset Editor – Main V-Ray tool

Right and Left-hand arrows expand for detailed/additional settings
Buttons (right-left):

1. VFB (Virtual Frame Buffer) & Render

Virtual Frame Buffer – Rendering view

Render – Render button (or “Render” pull-down)

V-Ray Interactive – Real-time rendering

2. Settings (main):

Camera – Standard Camera.

Exposure Value (EV) – Comparable to 3ds (i.e. sun is 14-ish)

Render Output

Safe Frame – Shows proportion of rendering size in viewport.

Image Width/Height – Rendering Size

Aspect Ratio – Preset or “Custom”

Save Image – Image file, format and location.

Environment – Background Color/Image

Others – Advanced tools and quality settings

3. Textures – For texture maps & procedurals (used in materials)

Environmental Sky – 360° sky background. Required for Sun/Sky

Environmental Texture – Background map (i.e. HDRI)

4. Geometry – Settings for V-Ray specific geometry.

5. Lights – Settings for lights in scene.

For Sun – Must use “Sun Light”, NOT “Rhino Document Sun”

Sun – Manual sun position

Sky – Sky model (“Improved” best)

Ground Albedo – Color and Horizon offset (moves)

Lesson 4 – Rhino, 2D Output and Rendering (cont...)

2. Rendering (cont...)

6. Materials – Materials Editor. Can:

1. Choose from library – Click left arrow. Drag to “Material List”
2. “Import vrmat” (or “vismat”) file
3. Create a new material - “Create Asset/Material”

“Generic” is the basic V-Ray material. Right-click to rename.

Main parameters:

Diffuse - The material color.

Solid color - Click the swatch.

Texture map – Click the “checker” button

Reflection – The shininess/reflection of the surface

Color of reflection (or map). Black = min, White = max

Glossiness – Amount of color. 1.0 = max

Refraction – The transparency of the surface

Black = min, White = max

Glossiness – Amount of color. 1.0 = max

IOR – Index of Refraction. Bending of light.

(air=1, glass=1.5, non-metals=2, metal=10+)

Fog Color – Attenuation (i.e. Thickness of transparency)

Opacity – Transparency without glass-like properties

Bump – Bump (texture) map

How to Assign - Right-click on material and:

1. “Apply to Selection” - Materials assigned to selected geometry.
2. “Apply to Layer” - Everything on that layer gets that material.

Can also assign as an object’s property.