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Jewellery Design in Rhino: A Technical & Creative Workflow



Concept & Creation by:

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1. Introduction

About Me:

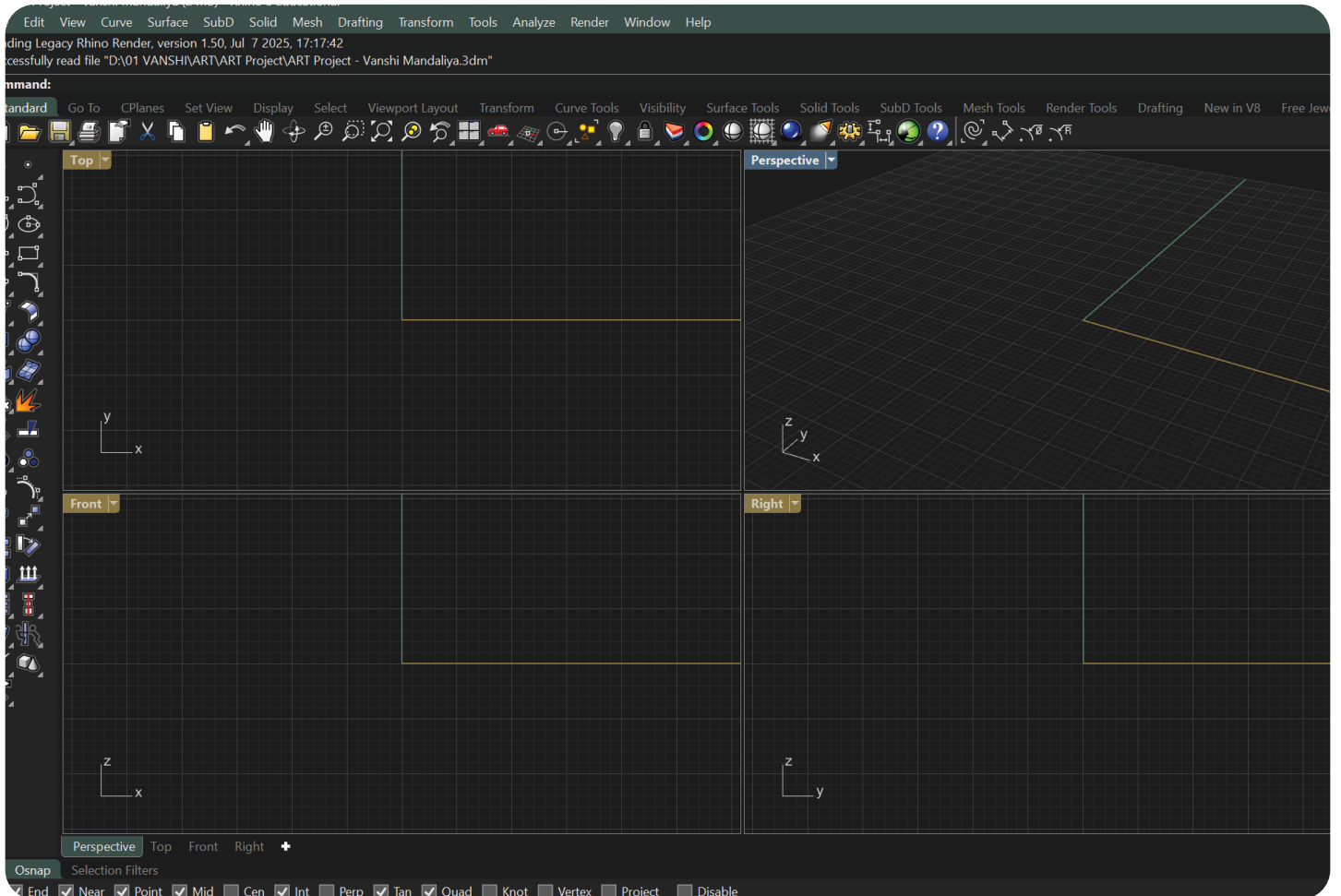
I am Vanshi Mandaliya, a jewelry CAD designer and educator from India, and the 7th generation in my family's jewelry legacy. Skilled in Rhino 3D, digital design and manual design, I am passionate about teaching and helping designers grow their creative and technical skills.

Project Goals:

- Teach essential Rhino 3D tools and workflows for jewelry design.
- Demonstrate precision techniques for clean curves and surfaces.
- Share efficient methods for organizing layers and tools.
- Guide in creating realistic jewelry renders for presentation.
- Provide practical tips to enhance both creativity and technical skills.

2. File Setup in Rhino

1) Setting up the User Interface



1. What's the Best Way to Customize Your UI?

-> Units & Template

- For jewellery design modelling, always work in millimeters unit.
- Check units via File - Properties - Units, before modeling.
- For template, Stavith Small Objects - Millimeters template to avoid tolerance issues.

-> Customising the User Interface

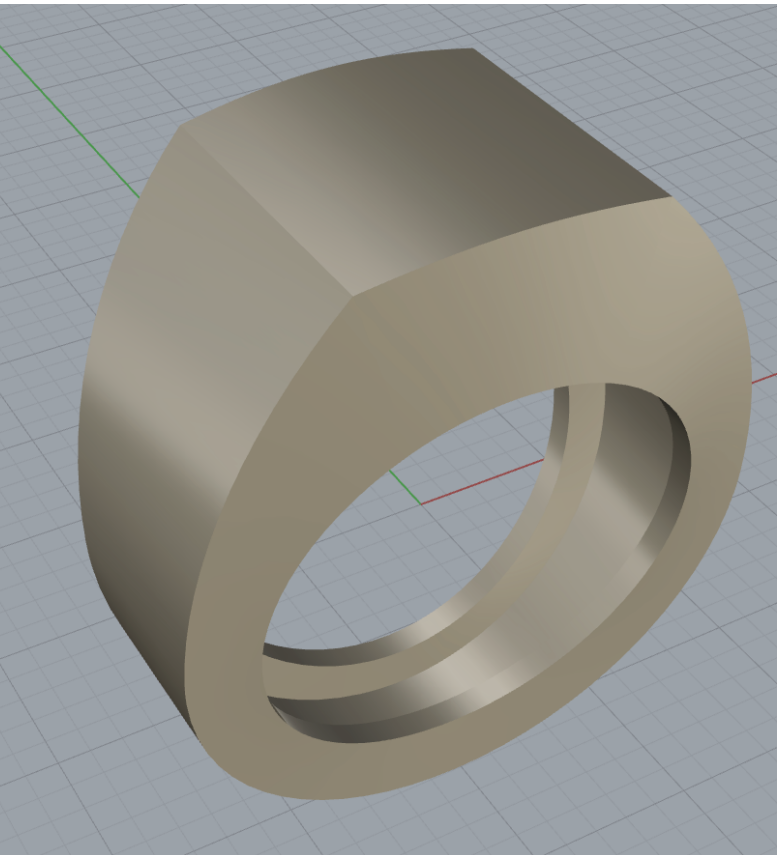
- As you can see above, I've customized the UI - you can do the same by following the following steps:
 - > Go to Tools - Options - Appearance, and choose a UI color theme that suits your style.

2. Why Customize the Appearance?

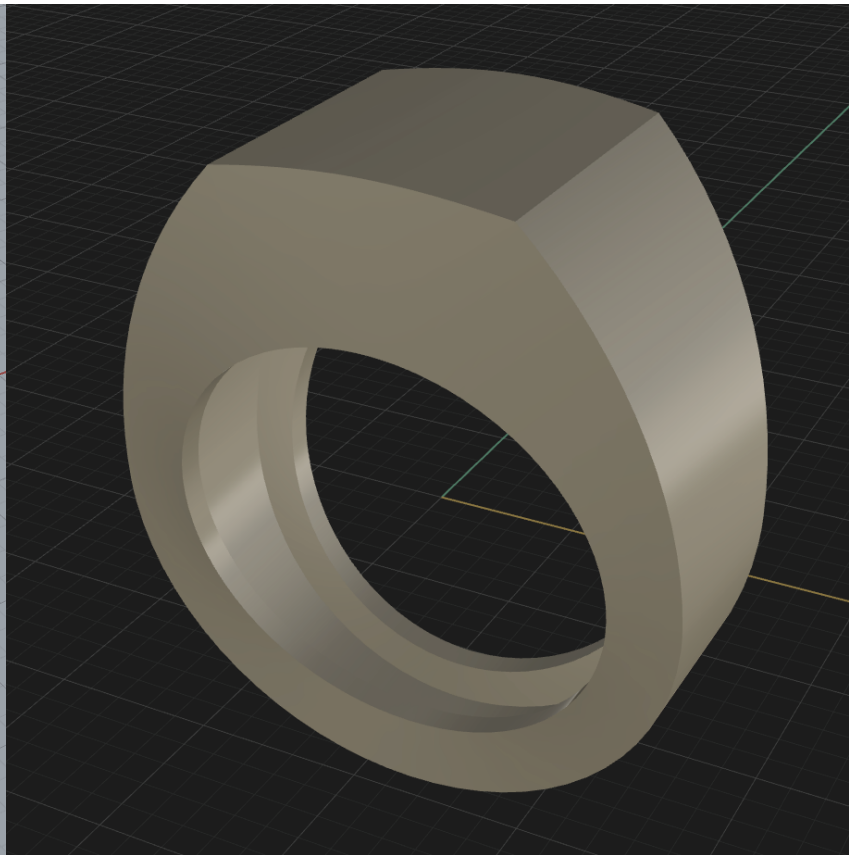
-> Points you must consider

- The right UI setup ensures metal and gem details are crystal clear, and Rhino gives you the customization options to achieve it.
- Reduces eye strain during long work sessions.
- Makes key elements stand out.
- Matches your personal workflow style.

Before - Workspace



After - Workspace



Guess what: A well-arranged UI can save up to 20% of your working time.

3. Layer Organization

1. Why Layer Organization Matters?

- > • Keeps different parts of your design (band, stones, settings, prongs) separate.
- Makes editing faster without affecting other components.
- Improves file readability for you and anyone else who works on it.

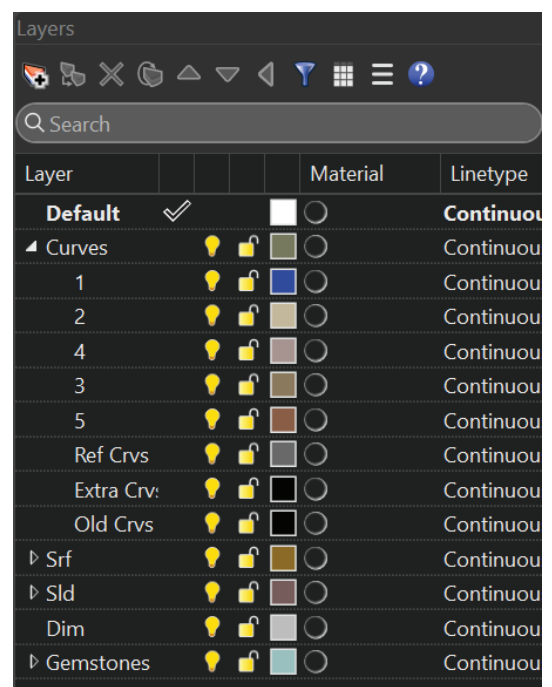
2. How to organize layers?

-> Steps for Creating Layers:

- Open the Layers Panel (F7 or Panels - Layers).
- Create separate layers for each jewelry component.
- Give each layer a clear, descriptive name.
- Use parent and child layers for grouping similar elements.
- Assign distinct colors for quick identification.
- Lock or hide layers when needed to prevent editing mistakes.

-> Layer Structure I Prefer:


- I organize layers by separating metals, gemstones, and decorative elements into parent layers, with child layers for specific parts like center stones, side stones, and prongs. This keeps my workflow clear, speeds up edits, and reduces the risk of mistakes during design and production.

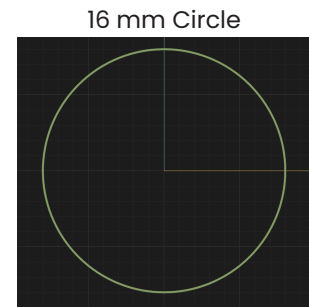


4. Signet Ring

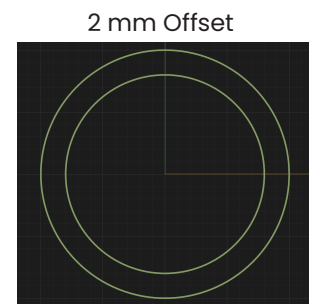
1. Starting with the curves

1) Starting with creating Inner and Outer Diameter of the ring

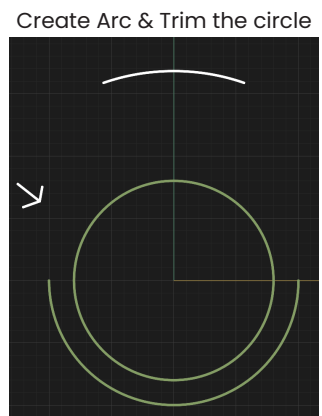
-> Make a 16 mm (Diameter) circle from '0' origin in FRONT view. (Make sure to use the dimension tool  to cross check the circle's diameter.)



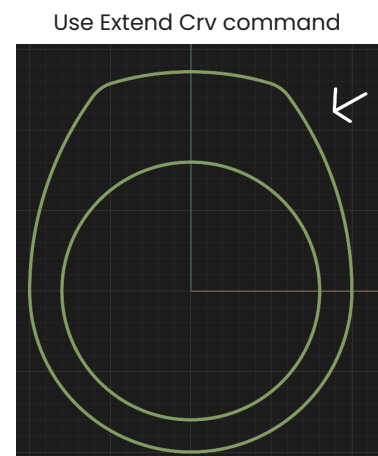
-> Use offset curve to create parallel circle of the 16 mm circle and offset distance will be 2 mm.



-> Then, create arc at the top of the circle at a distance & make sure it is at the centre. Trim the upper part of the outer circle. (As shown in the image)



- > To complete the outer curve:
- Go to Curve -> Extend Curve.
 - Choose 'Arc' as the boundary object.
 - Select the 'Outer Circle' as the curve to extend.
 - From the command-line prompt, select 'To Point'.
 - Click the end of the arc to create a continuous curve.
 - Repeat the same process on the other side of the curve.
 - Last step is to Join both the curves & fillet the corners.

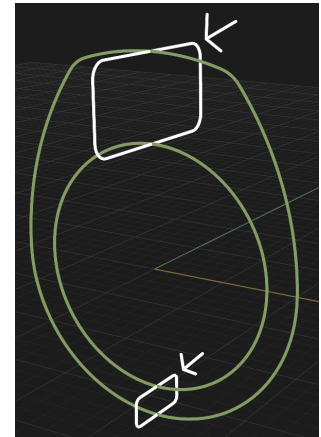


2) Now we'll create Profile Curve for the ring

- > Create a rectangle in top center of both the curves, you can use SmartTrack to create one. Repeat the same process for the bottom part as well. Make sure to fillet the curves to get a smooth surface.

(After creating the curves use Analyze -> Curve -> Curvature Graph on, to check the curvature of the curves & to check how smooth the curve is.)

Creating profile curves

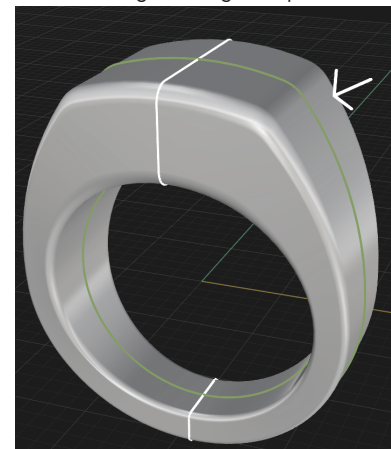


2. Onto Surface Creation & Analysis

3) Next step is to use our curves to create a clean, continuous surface

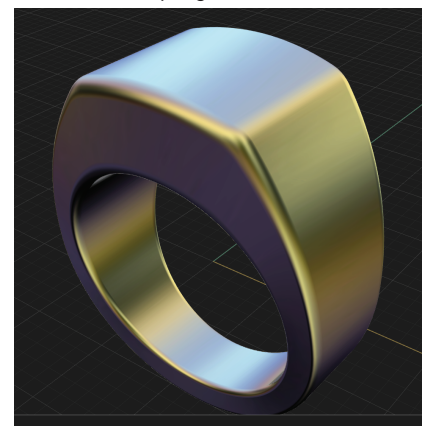
- > To create the surface:
 - Use the Sweep 2 Rail command.
 - Select both ring curves as the rails.
 - Use the rectangles as the profile curves.
 - Align the seam points in the same direction.
 - Press Enter after selecting.
 - In the dialog box, check Maintain Height and Closed Sweep to achieve the correct result.
 - Press Enter to complete the surface.

Creating Srf using Sweep2 Rail



- > Your ring is almost ready, but make sure to analyze your surface to ensure it is smooth and free of irregularities. Use Analysis tools such as Zebra or Environment Map (Emap) to check for surface flow and reflections. Any distortions you see here can indicate bumps or mismatches in the curves used, so correct them before moving to the detailing stage.

Analyzing the Surface



3. Rendering & Presentation

4) Now we'll render the Signet Ring for final presentation

-> Steps for Rendering the Ring:

- Switch to **Rendered** Viewport.
- Apply Metal material from the **Materials** panel.
- Add lighting or use an HDRI environment.
- Set a clean background.
- Position the model nicely.
- Check render settings.

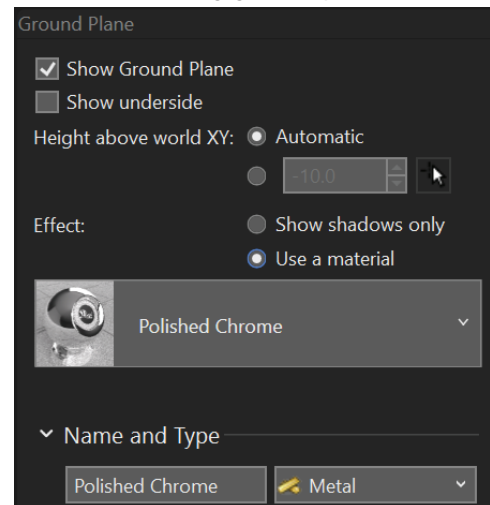
Applying Material



-> Steps for Setting the Ground Plane:

- Go to **Ground Plane Panel**.
- Under **Effect**, select Use material.
- Select **Import from Material Library**.
- Then, select the material you want as a background.
- I added the **Polished Chrome** metal material, you can play around with the render settings to find what works best for your design.

Adding ground plane



4. Here is the final result!



5. Understanding Boolean Failures

1. Why Boolean Commands Fail in Rhino?

- Note these 5 common reasons causing Boolean union to fail in 3D modeling:
 - > **1. Non-Intersecting Objects**
 - The objects do not physically intersect or touch each other.
 - Boolean Union requires some overlapping geometry to combine the volumes.
 - 2. Open or Invalid Geometry**
 - One or both objects are not closed solids (they have holes, naked edges, or bad joins).
 - Boolean operations require valid, watertight solids to work correctly.
 - 3. Coplanar or Overlapping Faces**
 - Objects share exactly overlapping faces or edges, causing the Boolean to fail.
 - 4. Tiny Gaps or Tolerances Issues**
 - There are small gaps or misalignments between the objects, often due to tolerance settings.
 - The software may not recognize the objects as touching or intersecting.
 - 5. Self-Intersecting Geometry**
 - One or both objects have self-intersecting surfaces (like a twisted or folded surface).

2. Quick Boolean Checklist

- Before using Boolean, ask yourself:
 - > 1. Are both objects closed solids?
 - 2. Do they intersect properly?
 - 3. Are there any naked edges or gaps?
 - 4. Is the geometry unnecessarily complex?

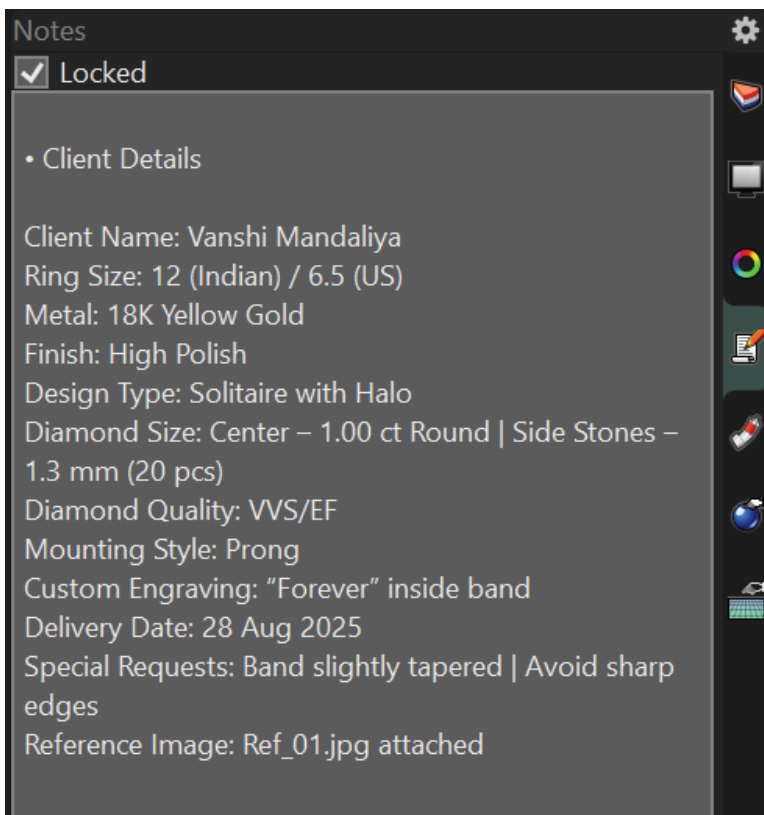
Guess what: Always keep a copy of your model on a separate "Master" layer, it's a smart backup for future edits or changes.

6. Quick Tips for Smooth Workflow

1. Using Notes Panel

- Adding a notes panel in Rhino is a quick yet powerful way to keep track of essential project details. It helps ensure you don't miss client requirements or design specifics, and it's as easy as typing directly into the Notes tab! This is something I personally use all the time to streamline the process.

-> Check the image below to understand it better:

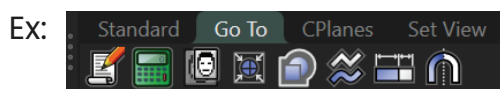


2. Easy Access to Commands

- Just like popup toolbars and aliases make it easy to access commands, here's another helpful method worth knowing.

-> The following method of creating custom 'Go-To' toolabr adds another level of ease to your workflow:

- Right click on the standard toolbar -> select 'New Toolbar' to create one and rename & add your go-to commands for easy workflow.

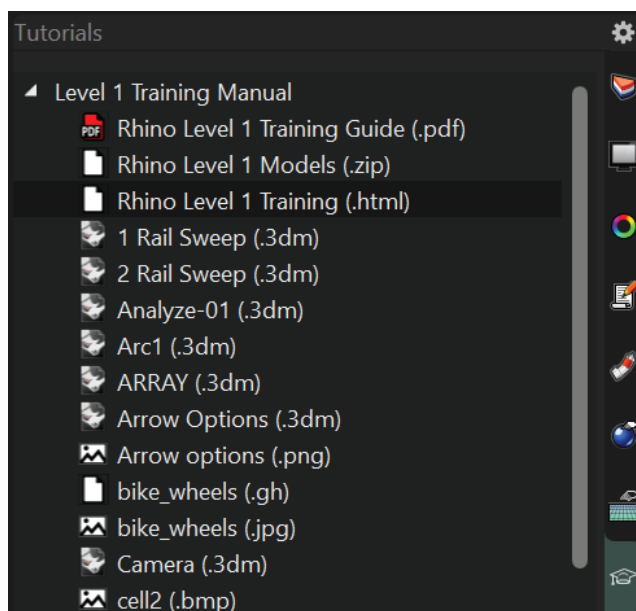


3. Smart Moves in Rhino

- Must-Follow Tips to Excel in Rhino, Work Faster & Achieve Better Results:
 - > • Always start your design from **center**.
 - **Rebuild curves** at every step to achieve smoother surface.
 - Rebuild **offset curves** to reduce control points and keep the geometry clean.
 - Layer your objects step by step for **better clarity and control**.
 - Keep the **Gumball active** for quick edits.
 - Use **Analyze tools** to check surface quality before proceeding.
 - Save **incrementally** to avoid losing progress.
 - Use the **keyboard** for commands and aliases, it **speeds up** your workflow significantly.

4. Use Rhino Tutorials for better practice

- Practice modeling using Rhino models - as it builds speed, confidence, and deeper command understanding.
 - > • Go to Tutorials panel.
 - Choose a specific command or model to practice with.
 - Try resolving errors on your own first, it builds confidence and problem-solving skills.
- > Check the following image to find Rhino Models:



Thank You for Being a Part of This Journey

This project was more than just modeling a ring - it was about understanding the workflow, organizing thoughtfully, and learning to approach each step with intention. From setting up layers to analyzing surfaces and refining details, every action contributed to a cleaner, smarter design process. Rhino becomes more intuitive the more you explore it. The key is to stay curious, experiment often, and not fear mistakes - they're often your best teachers.

This is just one design. There's always more to create, more to refine, and more to learn.



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