The Beret-Palette Ring

Designed by Luiz Maia

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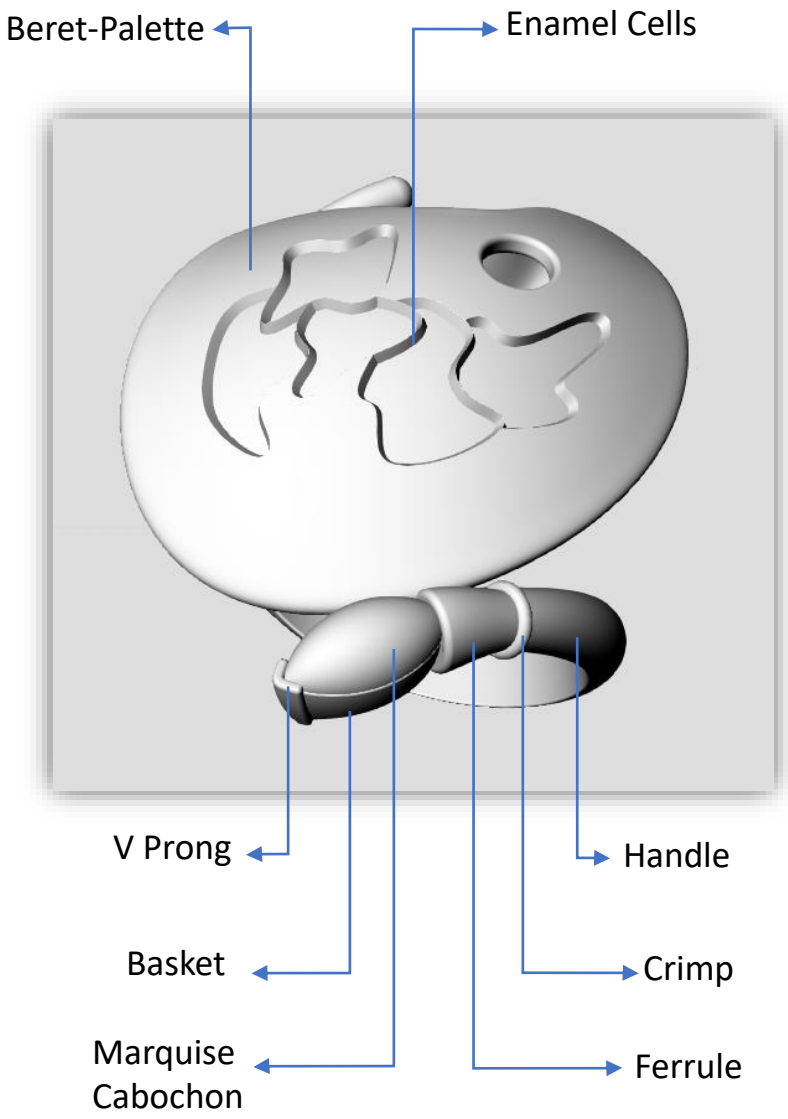
The idea of this model is to create a ring combining three elements typical of the apparel of a traditional French painter: the beret, the palette and the paintbrush.



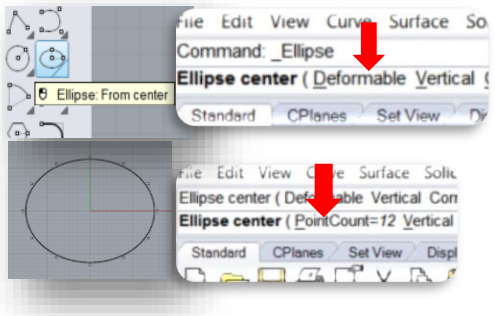
The Beret-Palette

The top of the ring has the form of a beret, and also functions as the painting palette. A deformable ellipse is used to draw a curve in the shape of the palette. The deformable option on the command line will create a degree 3 ellipse, which is suitable for smooth curve editing without kinks.

This model was built using the Small Objects – Millimeters template.

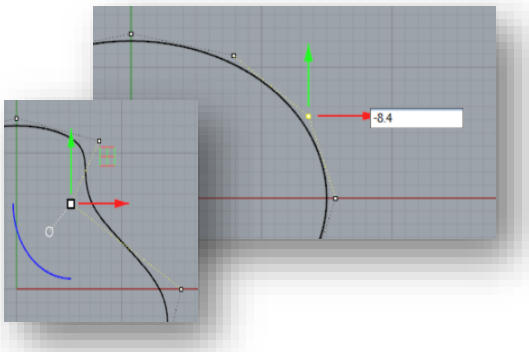
1. On the Top Viewport, draw a *deformable* ellipse, 30mm x 24mm

Keep PointCount=12, with the ellipse center at 0 (center of the CPlane)

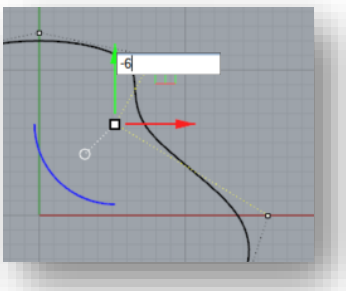


2. Enable the control points of the ellipse and select the 2 o'clock control point

Using Gumball, click on the red arrow (X axis) and type -8.4mm to move the control point inwards in the ellipse

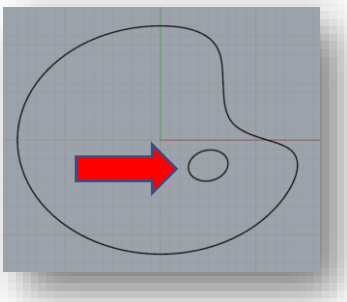


3. Click on the green arrow (Y axis) and type -6mm to move the control point downwards in the ellipse, forming the shape of the painting palette



4. Draw a small ellipse 4.2mm X 3.2mm to open a thumbhole

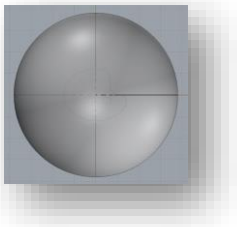
Position it by moving and rotating with Gumball to look like the picture



Part II: Building the ring: The beret-palette

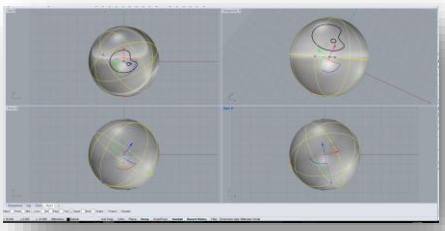
Now, the palette curve will split a sphere. Splitting a sphere with the palette curve is a fast way to get a convex surface for the top of the beret.

1. Create a sphere, typing 0 for the center and 76 for diameter



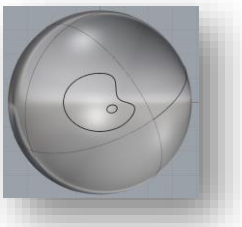
2. In Ghosted display, select the sphere and with Gumball, rotate it in the Top, Front and Right Viewports to position the palette curves in between the isocurves and the seam of the sphere

Make sure to not place the palette curve onto the sphere's seam, to prevent the resultant surface from breaking into 2 pieces



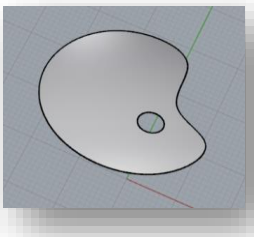
3. On the Top Viewport, split the sphere using the palette and thumbhole curves as the cutting objects. Set Shrink=Yes on the command line

Shrinking the split surface will bring its control points closer to its edges, making it easier to manipulate control points in later steps



4. Delete the bigger portion of the sphere, and the inner portion of the small ellipse (thumbhole) and the bottom split surfaces

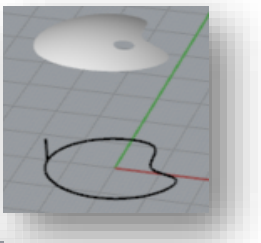
Keep the original curves and the surface resultant from the split



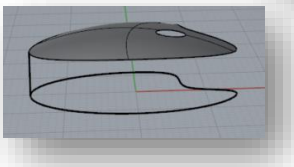
Part II: Building the ring: The beret-palette

In these next steps, move the top of the palette into an optimal beret position, in preparation of building the bottom of the beret on the construction plane in later steps.

1. Draw a vertical line 6.3mm from the original palette curve's Quad, as shown in the picture



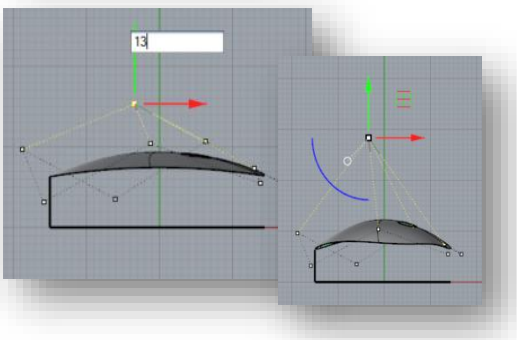
2. Move the palette surface from its Quad to the top end of the vertical line



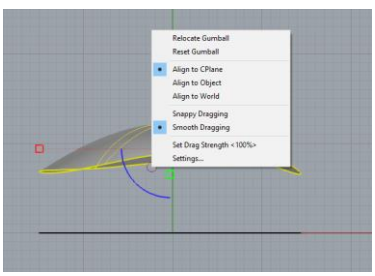
3. On the Front Viewport, enable the control points of the palette and select the highest control point on the middle of the palette

Click on the green arrow on Gumball and type 13mm to reshape the palette

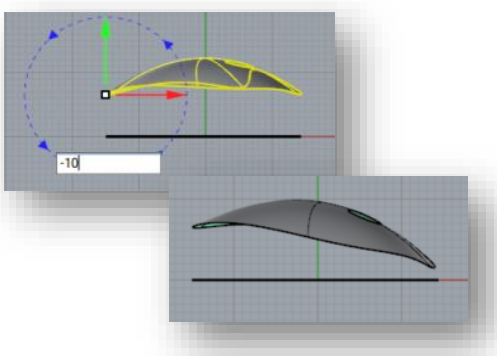
Delete the 6.3mm vertical line from Step 1



4. Staying in Front Viewport, relocate Gumball to the palette's left Quad, making sure to select ***Align to CPlane***



5. Click on Gumball's rotation arc and type -10 to lower the right side of the palette



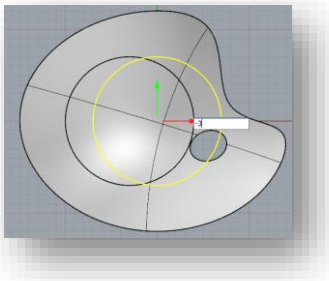
Part II: Building the ring: The beret-palette

Now build the bottom part of the beret on the construction plane, starting with the brim.

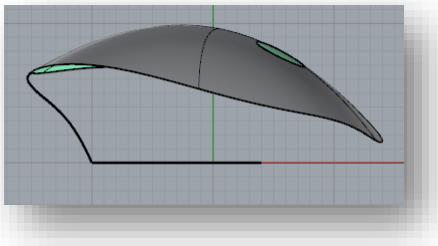
1. Delete original palette curves

Draw a 14mm diameter circle at 0,0 in the Top Viewport that will be the brim of the beret

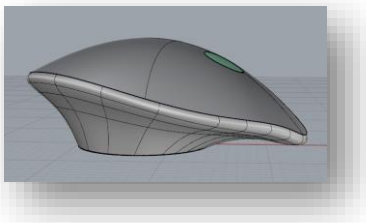
With Gumball, position the circle at the center of the palette by clicking on the red arrow and type -3, as shown



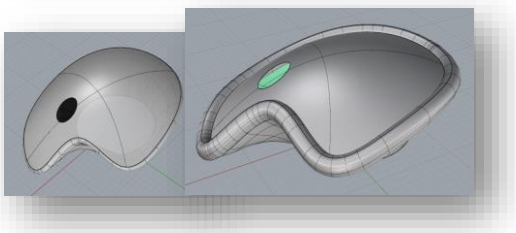
2. Move to Front Viewport and draw a profile curve with a shape similar to the picture, starting from the Quad of the polysurface to the Quad of the circle



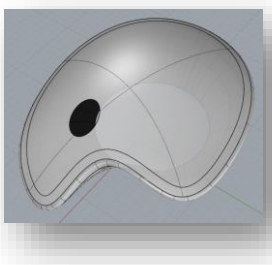
3. Move to Perspective Viewport
Create the bottom of the beret with **Sweep with 2 Rails**, using the circle and the edge of the top surface as the rail and the profile curve as the cross section



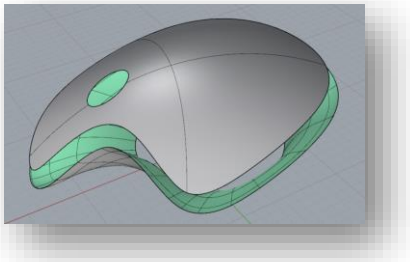
4. Pipe (round caps) the edge of the top surface with a 2mm diameter



5. Split the borders of the top and bottom surfaces with the pipe

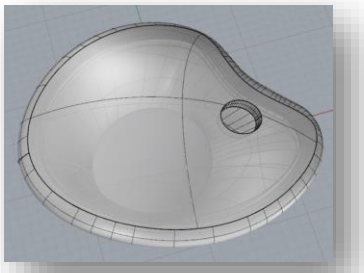


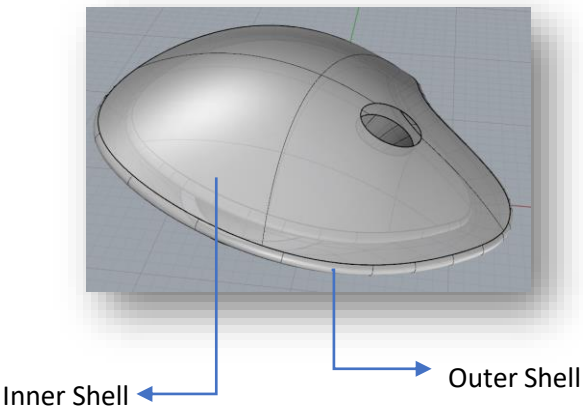
6. Delete the pipe and the 2 resultant borders



7. Merge the top edge of the bottom surface, if needed. Then blend the top and the bottom surfaces, using **Add Shapes** to straighten the isocurves on the blending strip

Join all three sections, copy the resultant outer polysurface of the beret ***in place*** and hide one copy

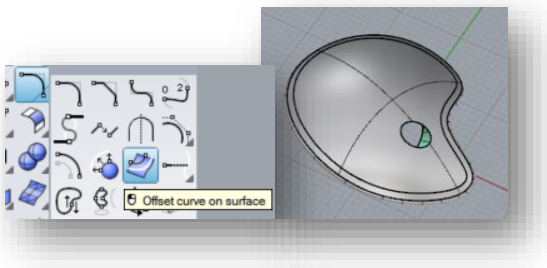




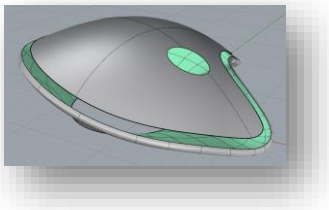
In the next section, create thickness for the beret by building a smaller version (inner shell) of the outer shell.

Given the characteristics of the outer shell polysurface, *offset surface* command is not suitable for creating the inwards thickness in this particular instance.

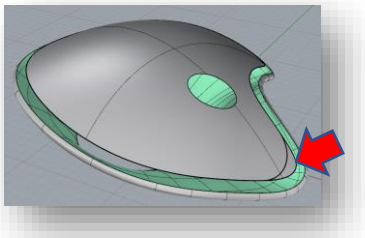
1. Explode the polysurface and using ***offset curve on surface***, offset the edge around the top surface 1mm inwards



2. Split the top surface with the offset curve, then delete the resultant border

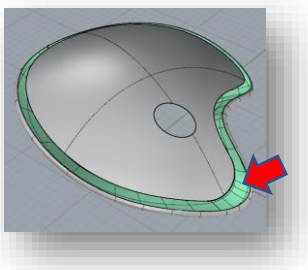


3. With **Arc: Tangent to curve**, draw an arc on the tip of the top surface as shown

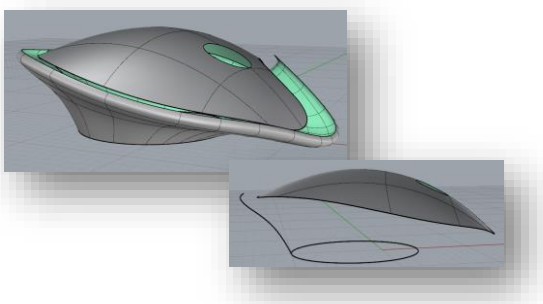


4. Split the tip of the surface with the arc, then delete the split tip, the arc and the offset curve

Removing this tip of the edge will allow a smoother blending transition in further steps

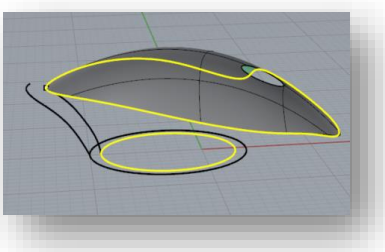


5. Offset the top surface 1mm downwards (Solid=No) and delete the original top palette surface and the bottom portion of the beret, including the blend



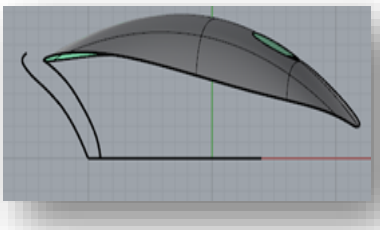
6. Offset the bottom circle 1mm inwards and duplicate the edge of the top surface

Rebuild the offset circle with 12 points and degree 3, and rebuild the duplicated edge curve with 20 points and degree 3



7. In Front Viewport, draw a curve from the left Quad of the curve on the edge of the surface to the Quad of the offset circle as shown

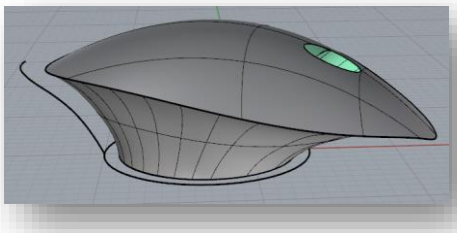
Some curve debris is left behind for reference purposes



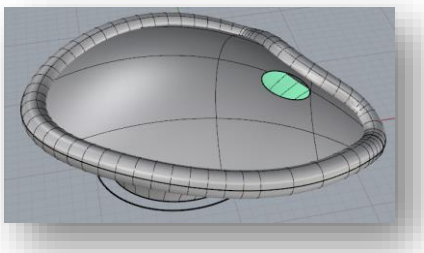
8. Move to Perspective Viewport
Using **Sweep 2 Rails**, create the bottom section of the inner polysurface of the beret-palette

Use the curve from the duplicated edge (Step 6, page 9) of the palette as the first rail, the offset circle as the second rail, and the new drawn profile curve as the cross section curve

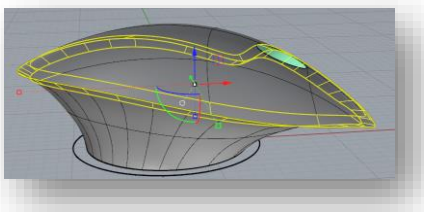
Delete the profile curves



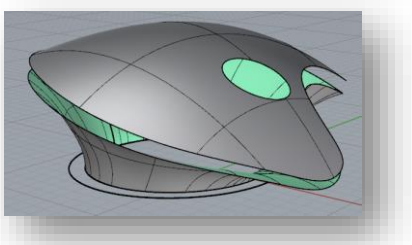
9. Pipe the curve on the edge of the top surface with 1mm diameter



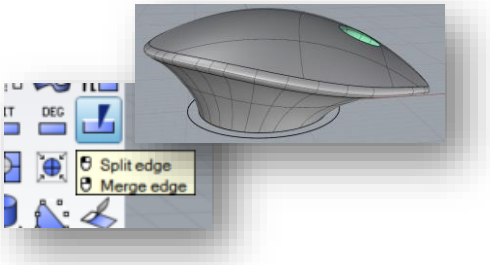
10. Split the edges of the top and bottom parts with the pipe



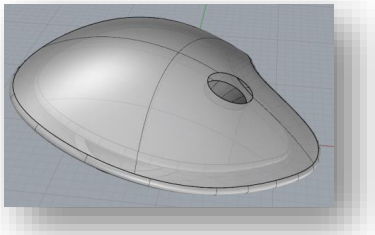
11. Delete the pipe, the split borders and the duplicated edge curve



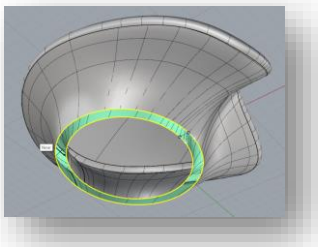
12. Merge the top edges of the bottom surface and blend the top and bottom surfaces, adding shapes to straighten the blending section isocurves



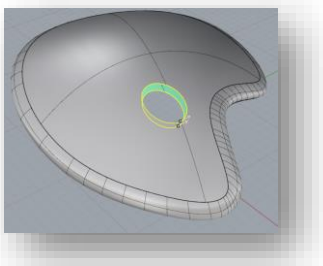
13. Join the blended parts and show the hidden outer polysurface of the beret from step 7 on page 8



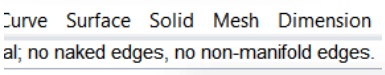
14. Loft the 2 circles on the bottom of the beret



15. Loft the 2 inner and outer ellipses (thumbhole) on the top of the beret

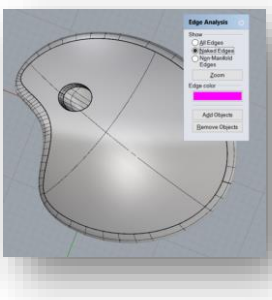


16. Join all parts, check for Naked Edges



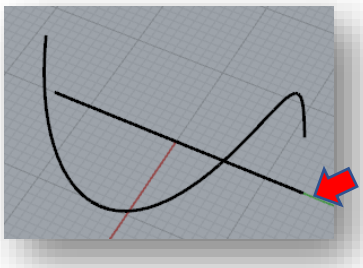
Create a layer for the beret-palette and disable it

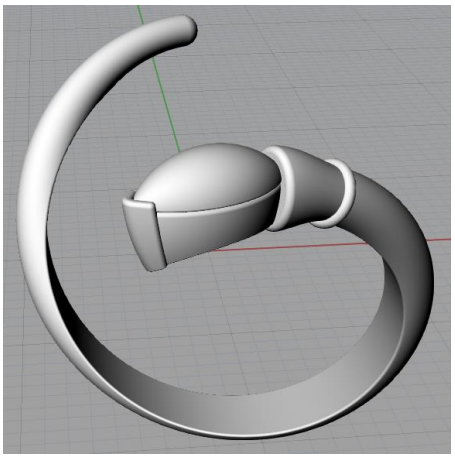
Delete the 2 remaining bottom circles



The Shank/Paintbrush

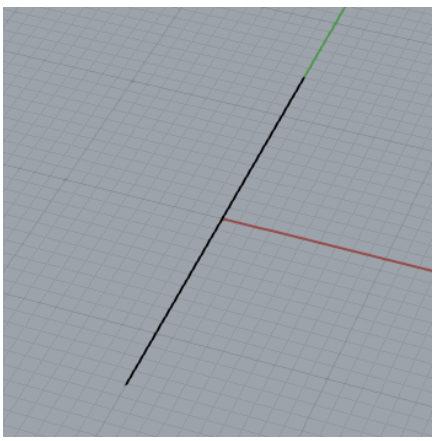
The shank of the ring is a paintbrush. The handle is formed from a helix. An initial straight line establishes the length of the helix, which is calculated so that later the shank will attach to the top part of the ring. Once the helix is done, it will be piped, forming the handle of the paintbrush. The helix will have a diameter of 17.73, which is equivalent to finger size 7½. Adding the bristles and ferrule complete the paintbrush look.



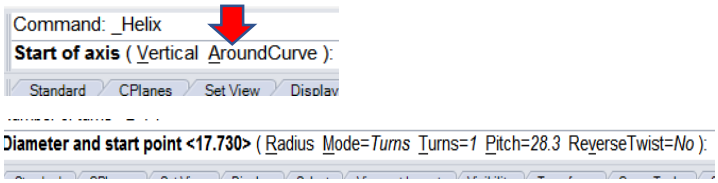


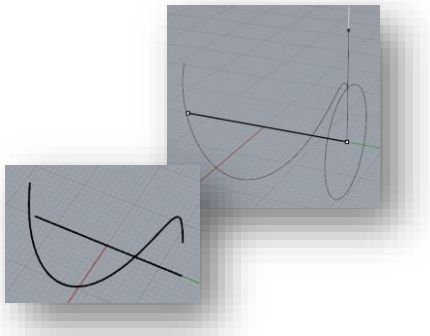
The handle

1. In Perspective Viewport, draw a line from the midpoint 28.3mm at 0,0 (center of the CPlane), on the Y axis



2. Create a helix ***around the curve***, with 17.73mm diameter and 1 turn

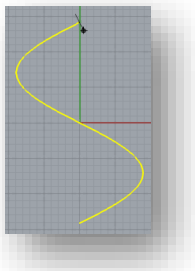




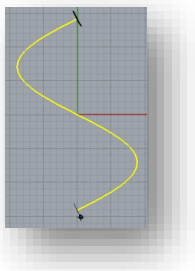
Hold the cursor upwards (Z axis) on the Perspective Viewport and snap to finish the helix

Delete the 28.3mm line

3. In the Top Viewport, start a **Pipe** command (round caps) snapping on the top end and typing 2.5mm

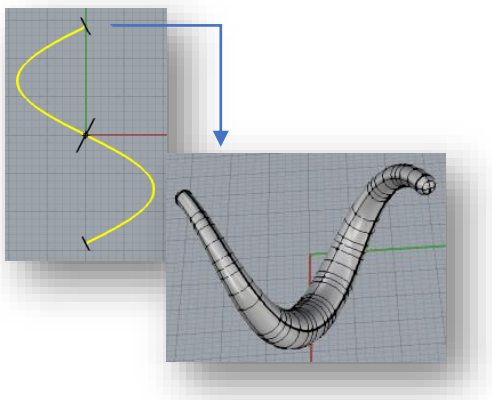


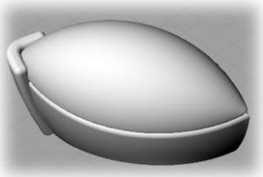
4. Type 2mm diameter for the other end of the helix



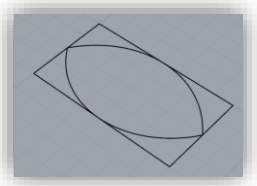
5. Finish the pipe snapping on the bottom Quad, halfway in the helix and type 5mm for diameter

Create a layer for the pipe and helix and name it "Handle"





The bristles
The bristles of the brush are represented by a marquise cabochon stone.

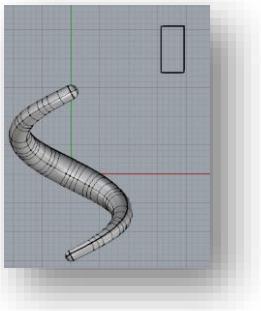


In the next steps, an eye-shaped geometry (biconvex arcs) is used to create the marquise cabochon stone and its basket.
The rectangle establishes the width and length of the eye-shaped geometry and provides osnaps for the arc command as well.

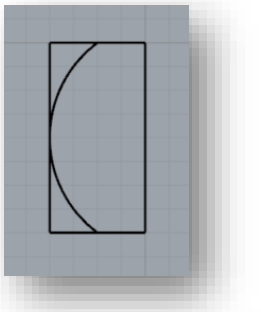
The marquise cabochon

1. In Top Viewport, draw a rectangle 8mm x 4mm as shown

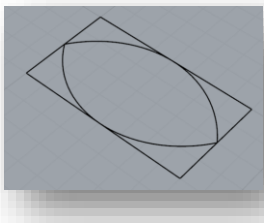
Disable the handle layer



2. With **Arc: start, end, point on arc**, draw an arc snapping on the top and bottom Mids, finishing by snapping on the Mid of the left side of the rectangle



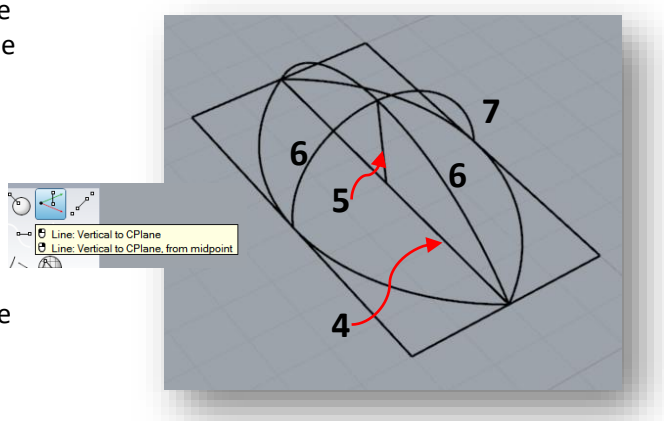
3. Mirror the arc snapping on its ends



4. In Perspective Viewport, draw a line lengthwise on the center between the 2 arcs, snapping on the ends

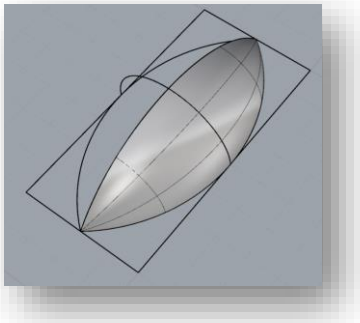
5. Draw a 2mm long ***line vertical to Cplane*** from Mid of the center line

6. With **Arc: start, end, point on arc**, draw 2 vertical arcs snapping on the Mids of the rectangle and the top end of the vertical line

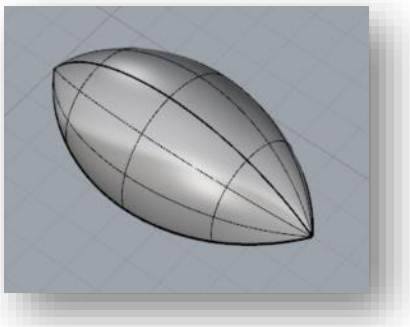


7. Split the smaller vertical arc on its center using the vertical line as the cutter

8. Create a **Surface from a Network** using the right arc on the Cplane, the lengthwise vertical arc and the half split vertical widthwise arc



9. Mirror the surface snapping on the ends, Join it and delete the rectangle

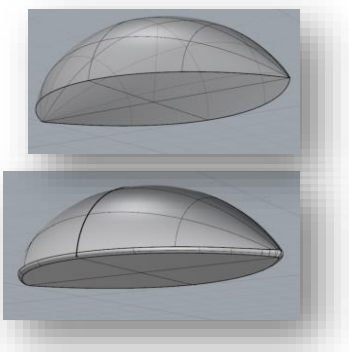


10. Cap the created polysurface (the gemstone) and *fillet its bottom edges with 0.1mm radius

Create a layer for the stone and disable it

Delete the vertical arcs and the vertical and center lines

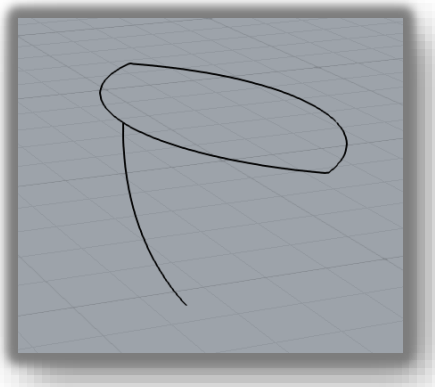
Keep the mirrored arcs and join them

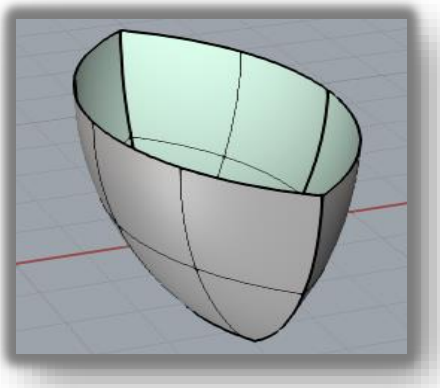


The basket

Next, the same eye-shaped geometry will be used as a rail to sweep the drawn basket profile curve.

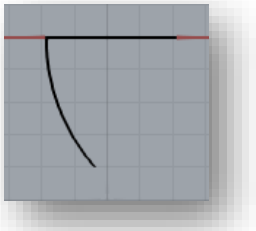
Make sure to enable **planar** while drawing the profile curve to keep it perpendicular to the rail.



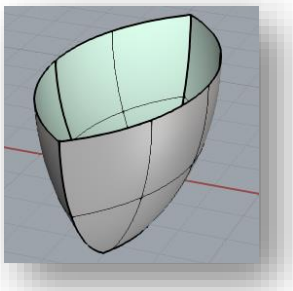


*In this project, closed polysurfaces will be filleted with VARIABLE RADIUS FILLET

1. Enable Planar and, in the Front Viewport, using **Arc: Start, end, direction at start**, snap on the left arc's Quad and enter coordinates r1.5,-4
Press Shift and hold the cursor downwards, perpendicular to the arcs, and click, to draw a profile curve as shown.



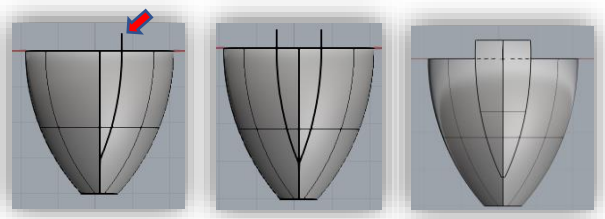
2. Move to Perspective Viewport
Create a basket polysurface with ***Sweep 1 Rail***, using the joined arcs as the rail and the drawn profile as the cross section curve



The V prong

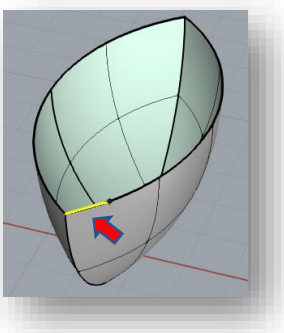
A V prong holds the tip of the stone, keeping it secure while allowing most of the stone to be visible. The input curve for creating the V prong is an extracted isocurve from the side of the basket.

The *Extract isocurve* command is handy at this step to easily get a curve that matches the shape of, and is oriented to, the side of the basket, without needing to draw it. This curve is extended and mirrored, then both curves are swept over the same eye-shaped geometry as in earlier steps, forming the V prong polysurface.



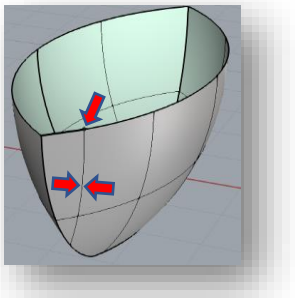
1. Draw a 0.8mm line starting on the end point of the top edge of the basket and ending on the right edge, using ***Int*** as the Osnap, as shown

The 0.8mm line drawn on the edge of the basket determines a specific width for the V prong.

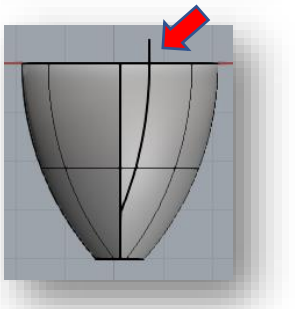


2. Extract an isocurve (V direction) from the polysurface on the right hand side

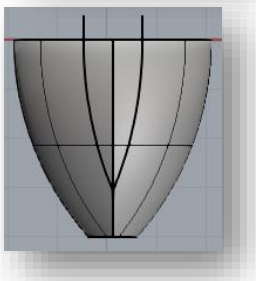
Drag the isocurve and snap it on the right hand ***End*** of the line created in the previous step.



3. Move to <u>Front Viewport</u>
With ***Extend Curve by Line***, extend the extracted isocurve 0.5mm upwards



4. Mirror the extended curve, snapping on the top end of the basket and the bottom end of the extended curve

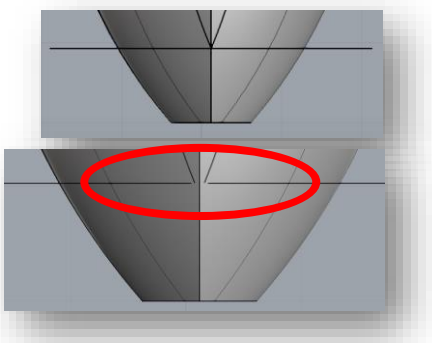


Notice that after mirroring the extended curve on step 4 it is important to trim the bottom tip of the v shaped curve, to prevent sweep 1 rail failure in the next step of the project.

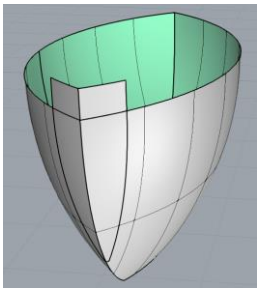
5. Create a horizontal ***line from midpoint*** at the ***End,Int*** of the two curves, and use Gumball to move the line 0.1mm upwards as shown

Trim away the "v" formed by the ends of the two curves with the last drawn line as the cutter

Delete the cutting line

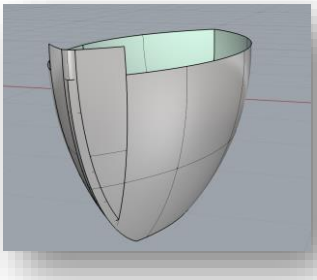


6. In Perspective Viewport**,** form a V prong sweeping with 1 rail, using the 2 joined arcs as the rail (click on the rail in between the 2 mirrored curves) and the 2 mirrored curves as the cross section



7. Fillet the V prong using **Fillet Surface** command, with radius 0.2mm

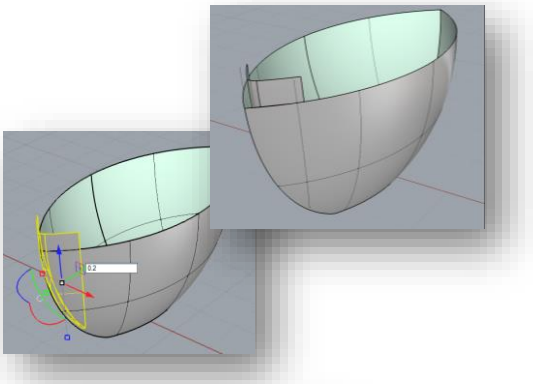
Join the 3 resultant pieces



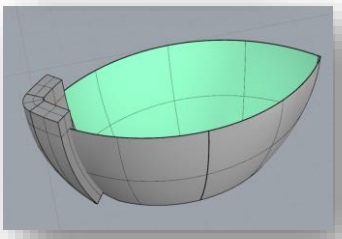
Next, the V prong is moved inwards towards the basket, and then offset outwards. This way, in later steps, when the stone is enabled, the offset prong will be over the tip of the stone, making it look like it is set.

8. Using Gumball, move the V prong inwards 0.2mm

Delete the extended curves and 0.8mm line from page 17, V prong, step 1



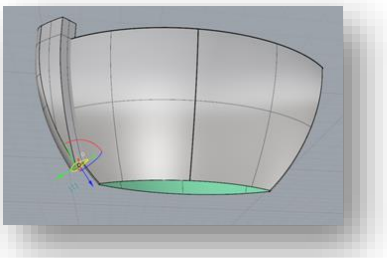
9. Offset the V prong ***solid*** outwards with 0.5 mm for distance



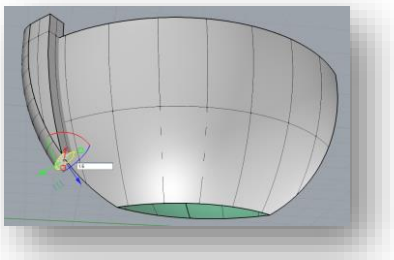
The V prong needs to be extended downwards so it will have extra length, necessary for the ring-sizing process later on.

10. Sub-object select the **bottom face** of the offset V prong by pressing and holding Ctrl-Shift and clicking on it

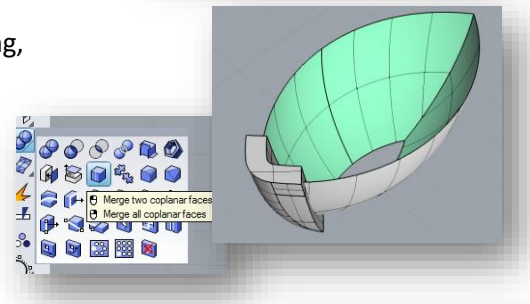
Make sure Gumball is aligned to the object (bottom face)



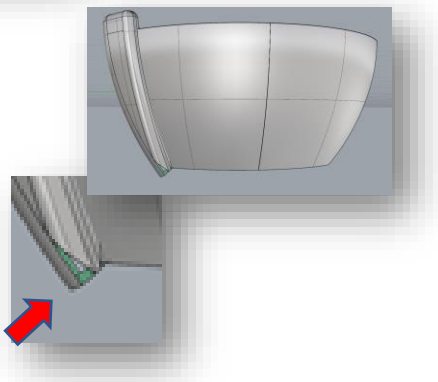
11. Click the Gumball blue arrow and type 1.6 to extend the prong to the bottom of the basket



12. Now fillet will be applied on the edges of the prong, but first, apply ***merge all coplanar faces*** command to the prong to merge its top faces. This will prevent creation of naked edges on the top of the V prong

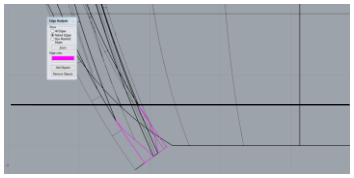


13. Fillet the edges of the V prong (except its bottom edges) with 0.2mm radius



Notice that some naked edges resulted on the lower end of the prong after filleting the edges.

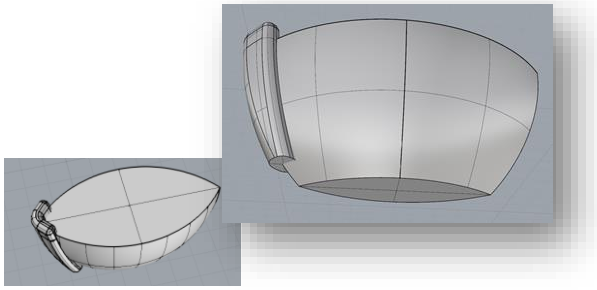
14. Change to Wireframe display in Right Viewport and activate the **Show Edges** command to see the naked edges on the prong



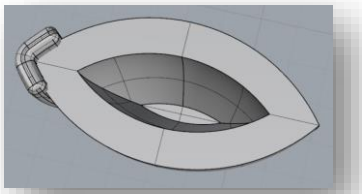
Draw a straight line across the bottom of the prong, just high enough to trim the naked edges (do not trim the basket)

Trim off the naked edges with the line as the cutter, then delete the cutting line

15. ***Cap*** the basket and the prong

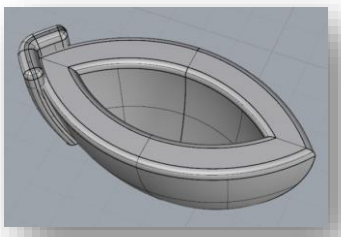


16. Shell the closed basket polysurface with 1mm thickness



17. Fillet the top edges of the basket with 0.2mm radius

Delete the 2 joined arcs and the profile curve from Step 1, the basket, page 17



Placing the bristles on the handle

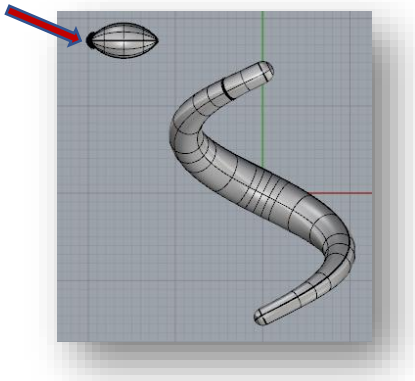
In this step, with *orient perpendicular to curve* command, assemble the set (marquise/basket) on the thicker end of the handle, using the helix as the orientation curve.

1. In the Top Viewport enable the layer of the stone (marquise cabochon)

Group the basket, the V prong and the stone

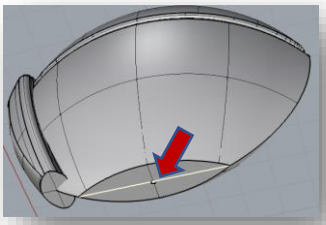
Enable the handle layer

With Gumball, rotate and move the group to position it as shown (V prong faces left)



In preparation of assembling the paintbrush, a point is now placed in a specific spot. This point is used as the base point while running the *orient perpendicular to curve* command. It determines how much the set hangs off the thicker end of the pipe, as will be seen in Step 5, page 23.

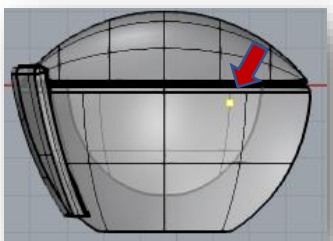
2. Move to Perspective Viewport
Draw a straight line lengthwise on the bottom of the basket from end to end and add a point in the Mid of the line



3. Move to Front Viewport and switch to Ghosted display

With Gumball, move the point up 3.5mm and then 1.8mm to the right

Delete the straight line from the previous step

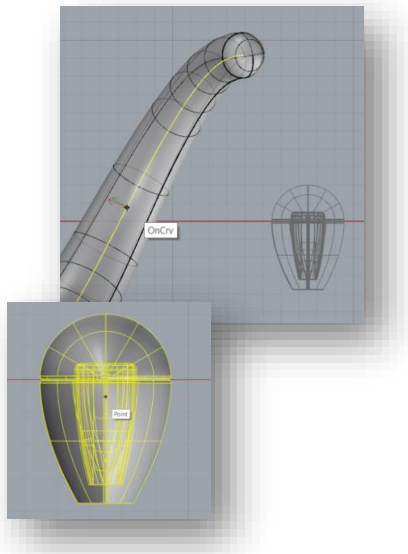


4. In Right Viewport (Ghosted display) position the "set" (the Grouped basket, prong and stone) at the thicker end of the pipe using the ***orient perpendicular to curve*** command

For objects to orient, select the set group and
for base point, snap on the point

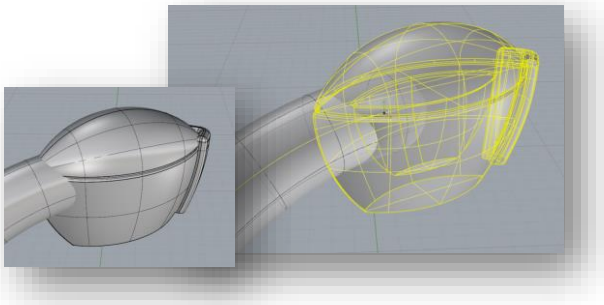
Snap on the helix as orientation curve (in the command line Copy=No) and switch to Perspective Viewport

Guide the set along the helix, all the way to its end on the thicker side of the pipe



5. Snap on the end of the helix to position the set as shown in the picture

Delete the point

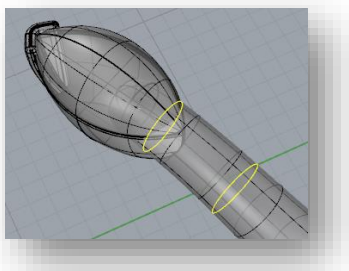


The ferrule and crimp

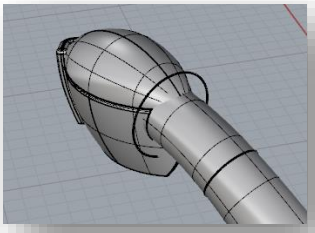
A ferrule on a paintbrush holds the bristles to the handle, which is then crimped to keep everything in place. In this model, it is used to trap the edge of the stone on the opposite side of the V prong.

The ferrule is formed by sweeping 2 isocurves (circles) extracted from the pipe over the helix as the rail.

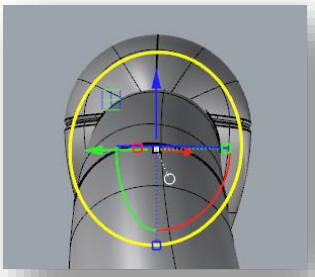
1. Extract 2 isocurves on the V direction on the pipe and position them as shown in the picture, to create the ferrule



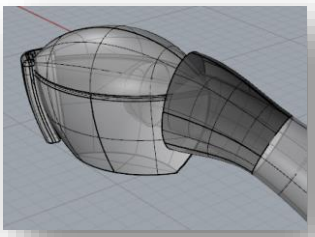
2. Offset the circle on the corner of the stone outwards with 0.7mm for distance



3. Using Gumball, scale 1D -0.8mm the offset circle into a vertical oval, as shown. This will better conform the ferrule's shape to the set (stone/basket) and keep the top high enough to trap the stone

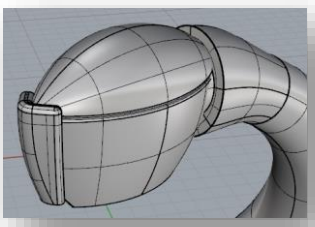


4. With **Sweep 1 Rail** command, create a polysurface using the helix as a rail and the offset oval and the extracted circle as the cross section

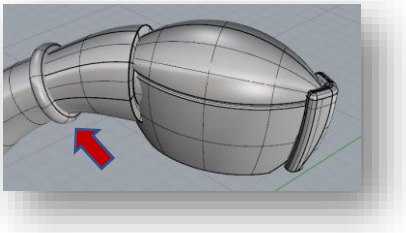


Using *extract isocurve* command is a convenient way to form the ferrule already in place, in an optimal position on the end of the pipe.

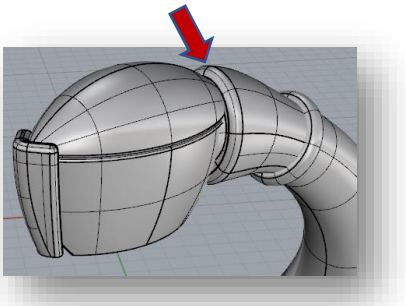
5. Cap the swept polysurface, turning it into a closed polysurface



6. Pipe the extracted circle with 0.6mm diameter to make the ferrule "crimp" and delete the circle



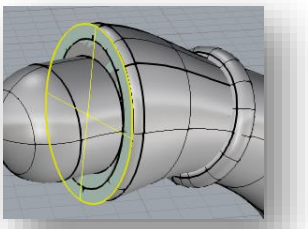
7. Fillet the edge of the ferrule with 0.3mm for radius



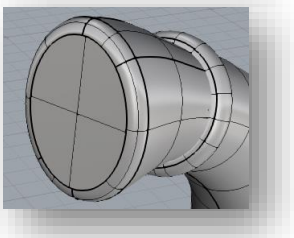
8. Hide the grouped set

With Gumball, to trim the excess of the pipe, move the oval curve 0.1mm backwards

With ***surface from planar curve*** command, create a surface with the oval curve and use it as a cutting object to split the extra piece of the pipe



Delete the extra piece of pipe, then cap the pipe



Delete the helix, the extracted circle, the oval curve and the cutting surface

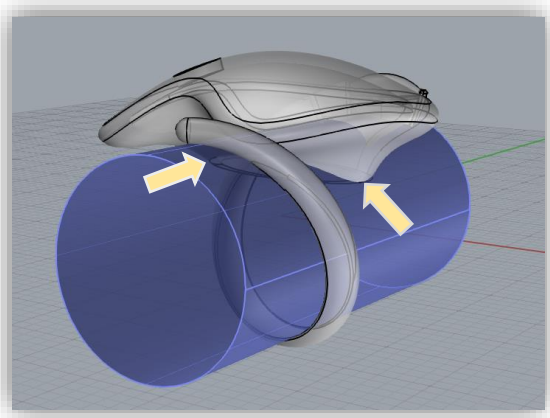
Crete a layer for the ferrule and crimp and name it "Ferrule"

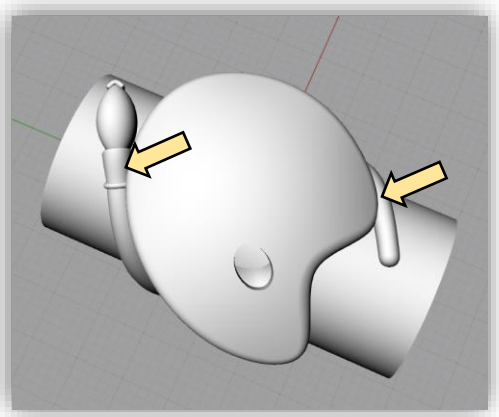
Part III: Assembling the ring

In the following steps, the ring is assembled and has the finger size fitted.

After assembling the top and bottom pieces, a cylinder is used to cut through the assembled ring to open a clearance for fitting the ring size.

The top of the ring (beret-palette) is assembled in between the ferrule and the other end of the handle. The optimal height of the beret is just enough to be higher than the shank and still be able to sink the bottom edges (the brim) into the cylinder, and sink the side edges into the ferrule and the other end of the pipe.

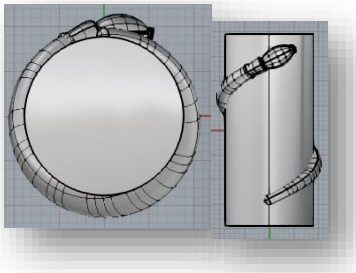




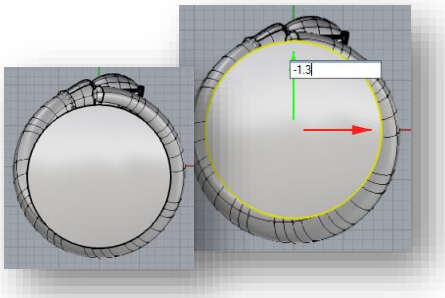
Positioning the beret-palette on the shank

1. Show the grouped set

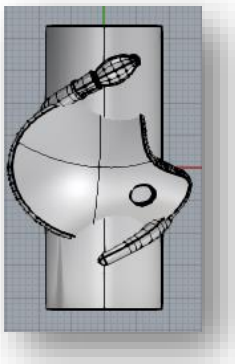
Create a 17.73 diameter cylinder in the Front Viewport at 0,0, with the total length longer than the ring including the brush (switch briefly to Top Viewport to establish the length)



2. Using Gumball, move the cylinder downwards 1.3mm



3. Enable the beret-palette layer

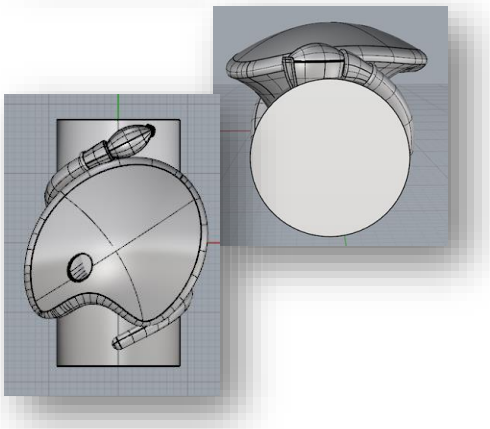


4. Switch to Perspective Viewport

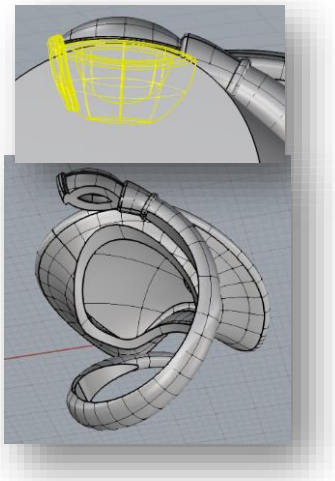
With Gumball, move the beret-palette up and down, back and fourth, and rotate to relocate it as shown

Make sure to deepen it just enough to fully sink its bottom edges into the cylinder and its side edges into the ferrule and the other side of the pipe

If needed, use Ghosted display



Sizing

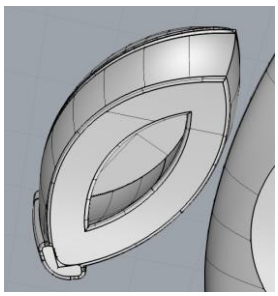


1. Ungroup the set

With the **Boolean difference** command, open a clearance for the finger size by selecting the beret-palette, the pipe (handle) and the V prong and basket as ***polysurface to subtract from*** (DeleteInput=Yes), and the cylinder as ***polysurface to subtract with***

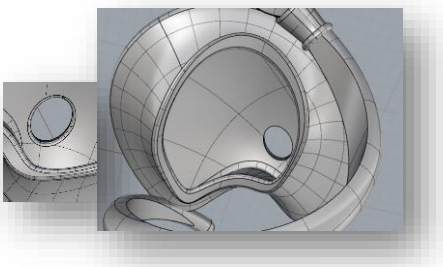
Leave the ferrule and crimp as is

Filleting edges on this model is important for comfort and for rendering purposes. Jewelry with sharp edges is uncomfortable to wear, and makes the render look unrealistic, since polished jewelry won't have edges that are totally sharp.



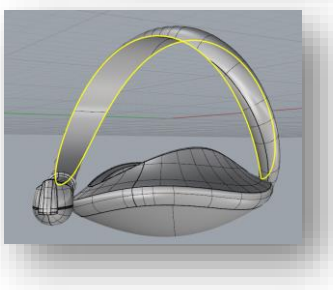
2. Disable the handle and the ferrule layers

Fillet the edges of the bottom of the basket and V prong with 0.1mm for radius



3. Enable the handle and the ferrule layers

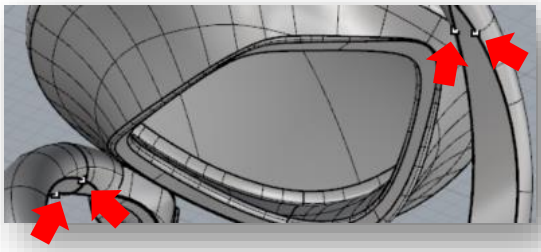
Fillet the bottom edges of the palette with 0.3mm for radius, and fillet the top and bottom edges of the oval thumbhole with 0.2mm for radius



4. Duplicate the edges of the pipe (shank)

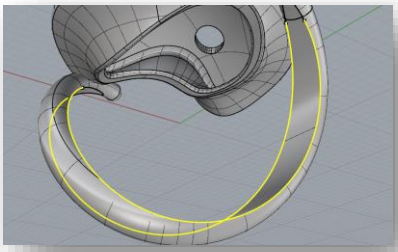
5. Make sure ***Near*** Osnap is checked

Place 4 points in the specific spots as shown

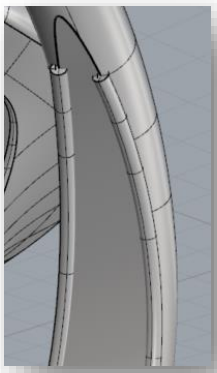


6. Using the points as cutting objects, Split away the end loops of the duplicated edge

Delete the end loops and the points and keep the resultant 2 curves



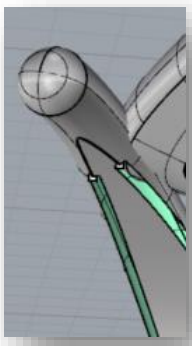
7. Pipe (flat caps) the 2 split curves with 0.2mm radius



8. Split the edges of the shank using the pipes as cutting objects

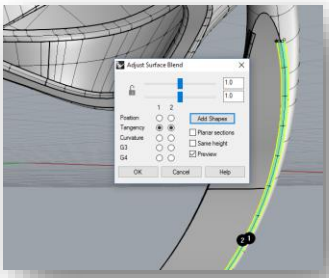
Delete the pipes, the split sections and the 2 curves from step 6

Merge any split edges that may result after this step



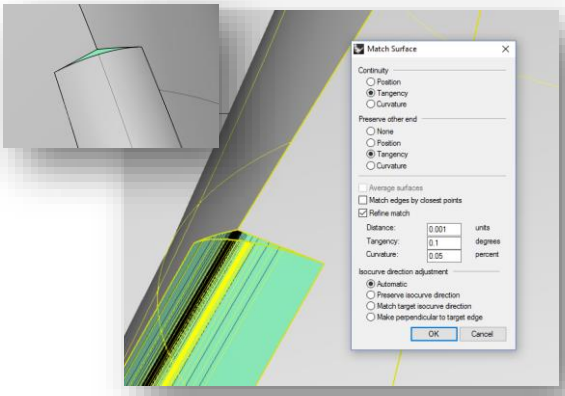
9. Blend the gaps on both edges of the shank using **Blend Surface** command

In the Adjust Surface dialog box, check Tangency for both edges (columns 1 and 2)

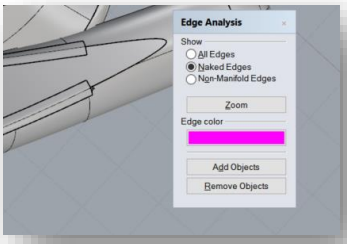


10. Using **Match Surface** command, match the gaps at each end of the 2 blend strips (4 gaps total)

In the Match dialog box, check Refine Match and make sure Tangency is selected under **Continuity** and **Preserve Other End**

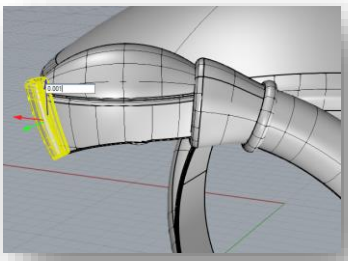


11. Join the blended edges and the shank and check for Naked Edges



12. Now, give the V prong a nudge 0.001mm upwards using Gumball, then Boolean union all the parts of the ring except the stone

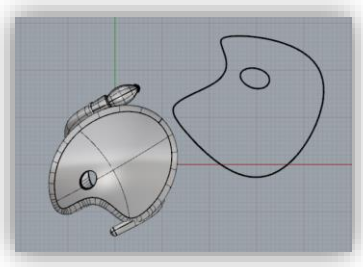
Nudging the V prong up troubleshoots potential failure of the Boolean union by dislocating any overlapping surface areas between the V prong and the basket.

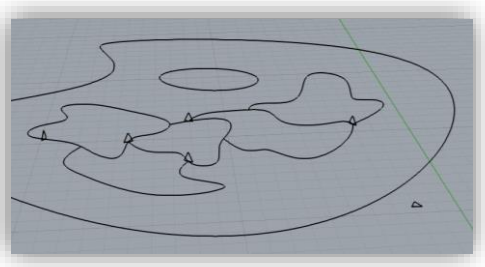


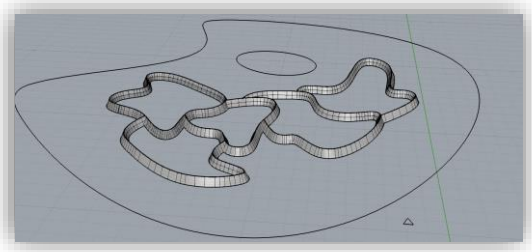
Adding enamel
The enamel cell structure is built on the Cplane and works like an embosser to recess the cells into the top surface of the palette, applying Flow Along Surface command.

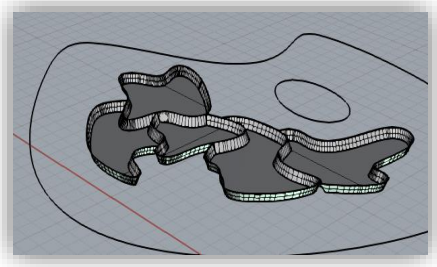
Start the process by projecting the boundary of the top palette surface onto the Cplane with the *Create UV curve* command. This boundary works as a map to position the enamel on the top of the palette. It also serves as input to create planar surfaces needed to build and flow the cells on the top of the palette in steps ahead.

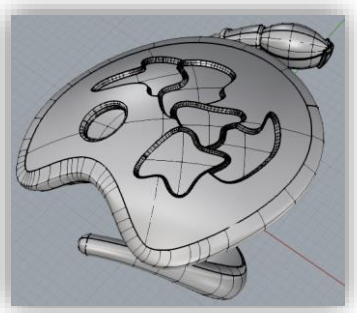
The walls of the enamel cells are created by sweeping triangle geometry on freeform curves that are drawn inside the boundary of the created UV curve.





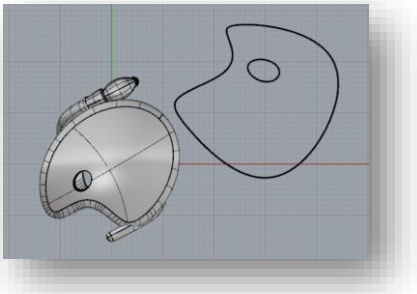






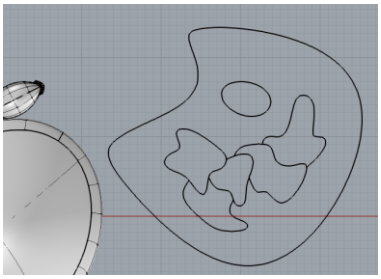
Forming the Enamel Cells walls

1. Create a UV curve with the top of the palette

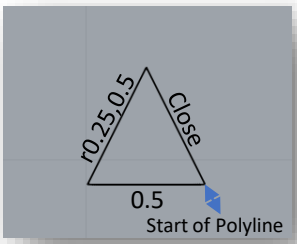


2. Draw freeform curves intersecting each other inside the resultant curve boundary (see picture for example – use your own design)

Create a layer for the curves named “Freeform Curves”

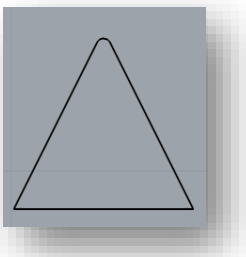


3. In the Top Viewport draw a triangle 0.5mm wide and 0.5mm tall, with the coordinates as shown



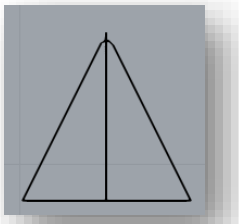
Filleting the top edge of the triangle will form sweeps without sharp top edges, giving the area a smooth look while rendering.

4. With the **Fillet Curves** command, fillet the top point of the triangle with 0.02mm radius



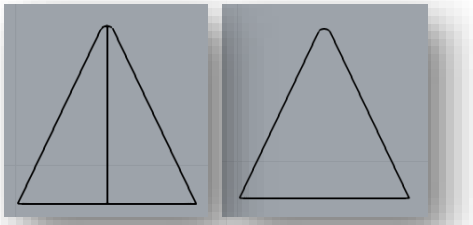
After applying fillet to its top, the triangle becomes shorter. Scale the triangle back to 0.5mm tall in the next steps.

5. Draw a 0.5mm line from the Midpoint of the triangle's base directly upwards



6. Scale 1D the triangle, using the Mid of the triangle base as the Origin point, the Quad of the filleted top of the triangle as the first reference point, and the top End of the 0.5mm line as the second reference point

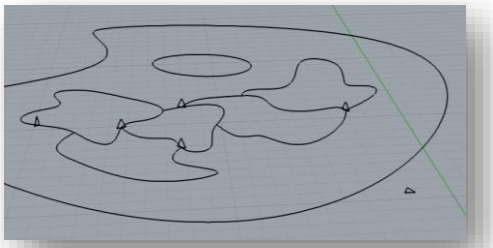
Delete 0.5mm line



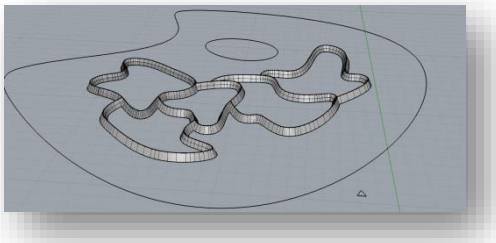
7. Change to Perspective Viewport
With the ***orient perpendicular to curve*** command, (in the command line Copy=Yes) orient the triangle vertically on each freeform curve

Use the Midpoint of the base of the triangle as the Base point and a freeform curve as the Orientation Curve, finish by snapping on only one End of the curve, as shown

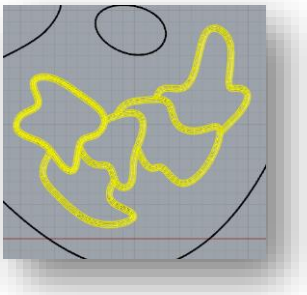
Repeat process for as many freeform curves as you drew – in case there is a closed curve, orient the triangle anywhere along the curve



8. Sweep the triangles using the curves as rails, and cap the resultant sweeps



9. Boolean Union all the sweeps



Create a layer for the result, name it “Enamel Cells” and disable it

The sweeps are the walls of the enamel cells and they will be worked on in later steps

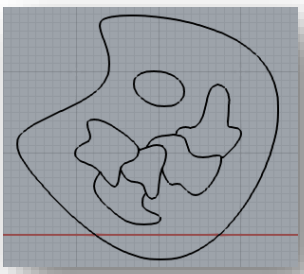
Delete triangles

Forming the Enamel Glass

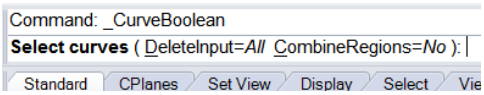
In this section, the pieces that represent the enamel glass are created. In the final steps of the model, these will be applied to the top of the ring.

In the following steps, the Curve Boolean command is a good tool for using the freeform curves to form the enamel glass and the enamel cells, creating and eliminating boundaries in between the curves.

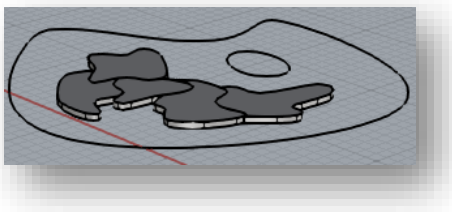
1. With **Curve Boolean** command, close all the open freeform curves



In the Command line, keep DeleteInput=All and CombineRegions=No



2. Extrude (Bothsides=No) the closed curves solid -0.5mm **downwards** (this will bring the top faces of the enamel glass flush with the top of the palette in the final step)



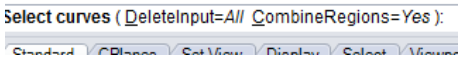
Group the enamel glass pieces

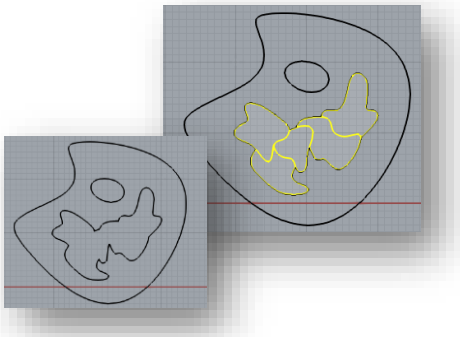
Create a layer for them, name it “Enamel,” then disable it

Constructing the enamel cells

1. With the **Curve Boolean** command, create one closed curve (outline) from the closed freeform curves

In the Command line, select DeleteInput=All, CombineRegions=Yes

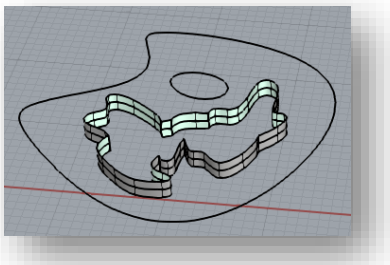




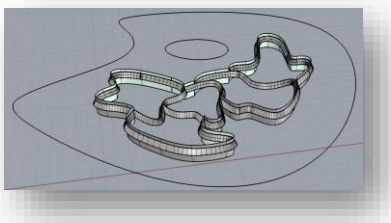
2. Extrude the resultant outline curve with 0.8mm distance

In the Command line, select BothSides=Yes, Solid=No

Create a layer and call it “Outline Extrusion”



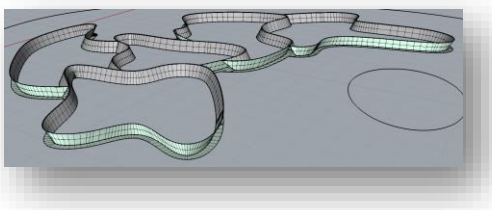
3. Enable the Enamel Cells layer



4. Split the Enamel Cells using the Cells as the object to split and the outline extrusion as the cutting object

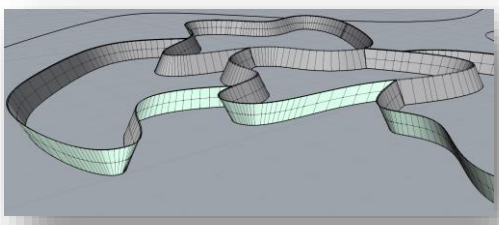
Disable the Outline Extrusion layer

Delete the split external walls of the Enamel Cells, as well as the original closed curve outline



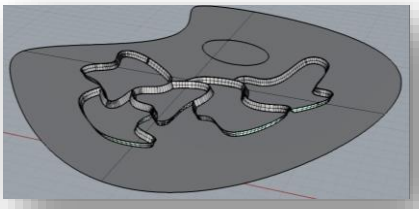
5. Explode the Enamel Cells and delete only the bottom surfaces

Join all the remaining surfaces



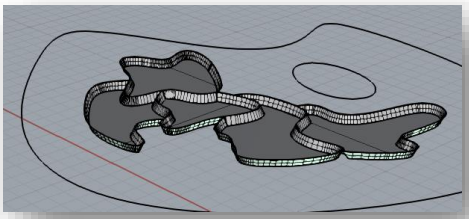
6. Using ***surface from planar curves***, create a surface with the palette UV curve

This planar surface will be used to create the floor of the enamel cells



7. Split the planar surface, using the Enamel Cells as the cutting object

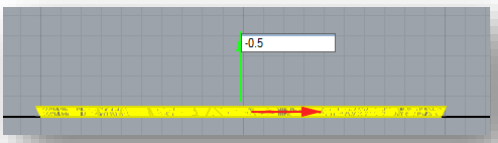
Delete the outer split portion of the surface and join all remaining surfaces



8. Create another surface from the UV curve, as in Step 6

In the Front Viewport, use Gumball to move the Enamel Cells downwards -0.5mm (this will bring the top edges of the Cells flush with the top of the palette after flowing along the surface in Step 3, page 37)

Hide the Enamel Cells

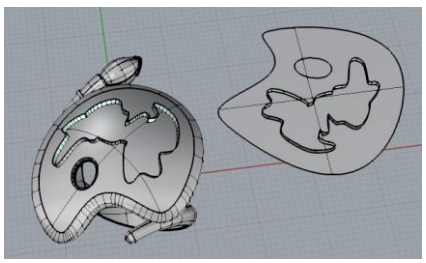


Flowing the enamel detail on the top of the ring

1. Enable the Outline Extrusion layer

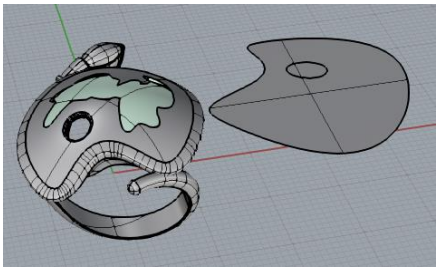
With **Flow Along Surface** command, flow it along the top of the palette

Select the Outline Extrusion as the object to flow (in the command line Copy=No), click on one of the corners of the UV planar surface as the base surface, and click on the matching corner on the top of the beret-palette ring as the target surface



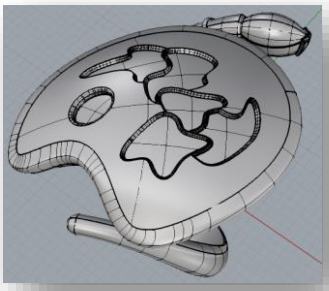
2. Split the top of the palette using the flowed Outline Extrusion as the cutting object

Delete the resulting split surface on the top of the palette as well as the Outline Extrusion layer

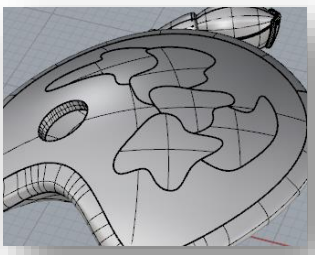


3. Show the Enamel Cells and use **Flow Along Surface** to flow it on the top of the palette as in Step 1, page 36 (in the command line, Copy=No)

Join the Cells and the palette



4. Enable the Enamel layer
Flow it along the palette's top surface as in Step 1, page 36



5. Preview final ring
Render as desired