

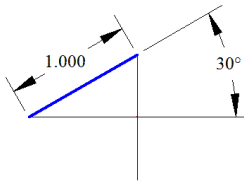
# Drawing a Isometric Knurl on Cylindrical Objects

The object of this tutorial is to show the Deltacad User how to apply a knurl to a cylinder that has been drawn as an isometric image.

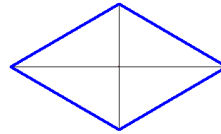
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Draw a parallelogram to define an ellipse. We will call our object a "knob"

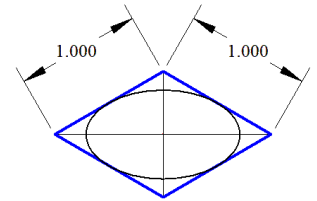
## Step 1



Create a diagonal line that is angled 30° with a length of 1". Then draw a horizontal and vertical line from the ends of that line as shown.



Select the diagonal line (blue) and mirror (copy) it along the vertical and horizontal lines. This will create the parallelogram needed to draw our ellipse.

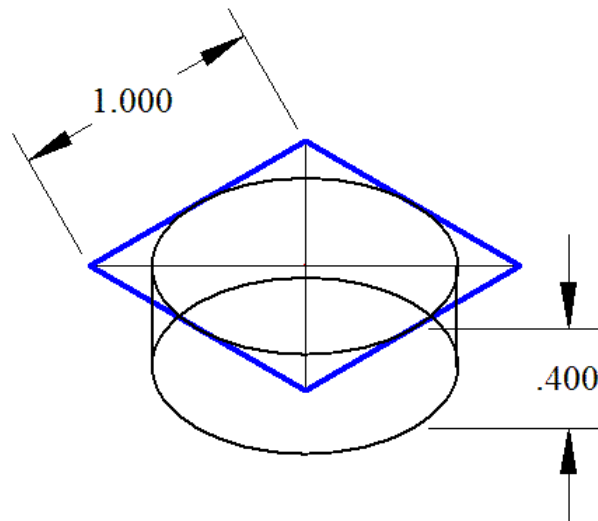


Select "draw an ellipse within a parallelogram" from the CIRCLE tab. Draw the ellipse as shown. The ellipse now represents the top of the 1" diameter knob.

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## Step 2

Apply depth to the knob

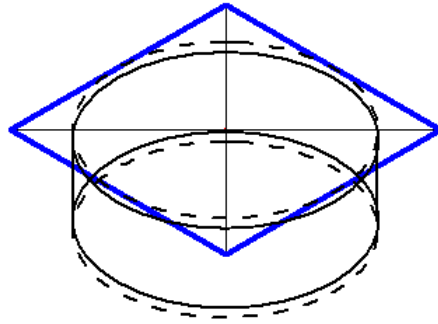


Since we know the knob is also .400" thick we should select the ellipse and copy/move it .400 below the existing ellipse.  
Include outside lines to connect both ellipses

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### Step 3

Recess the Major diameter to create a .040 chamfer on both sides

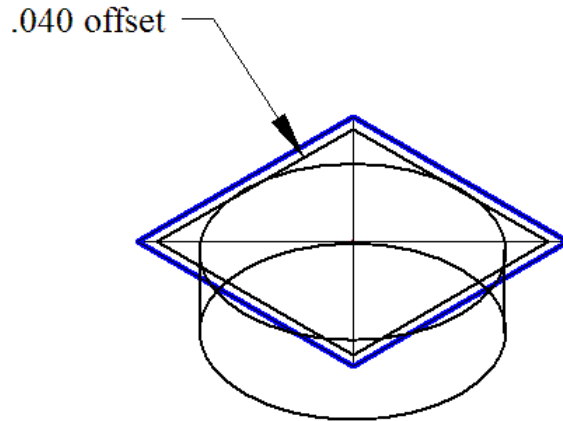


To create a .040 chamfer the top ellipse must be moved in the "Y" axis  $-.040$ . Select the top ellipse then choose "move selected objects", type  $0, -.040$  at the prompt, then use "slide an end-point" within the EDIT tab to trim the outside lines to the top ellipse. The bottom ellipse should also be moved up  $.040$  as well if there is to be a chamfer on both sides of the knob.

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## Step 4

Offset the parallelogram for the creation of a smaller (ellipse) diameter at the very top (the effect of a chamfered edge)

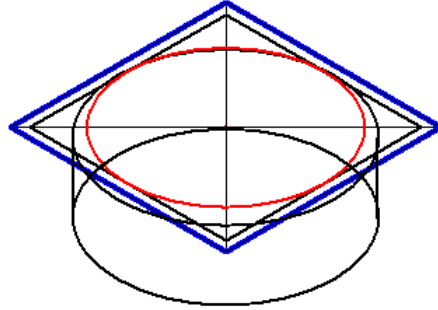


Use "draw a polygon" within the SHAPES tap and draw a polygon around the parallelogram, then offset the polygon inward .040".

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## Step 5

Create a smaller ellipse

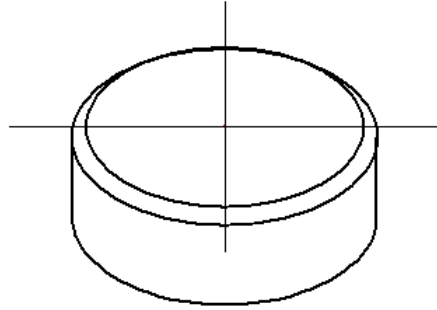


Now create an ellipse using the new polygon (shown in RED)

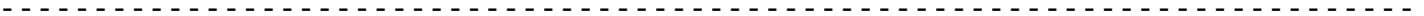


## Step 6

Delete the polygon and trim outside features

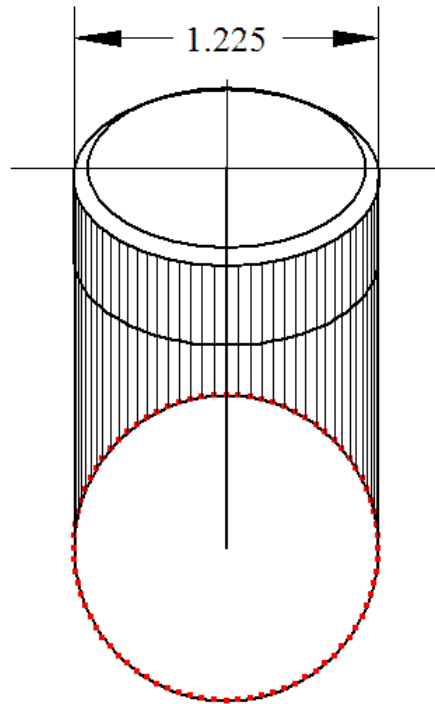


Delete the polygons and trim the bottom ellipse so that it has the appearance of a 3D solid



## Step 7

Draw a circle with 80 points, then extend lines from each point upward

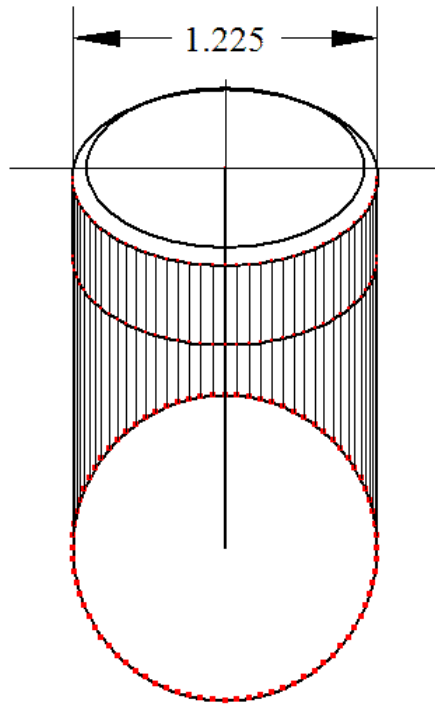


Draw a circle 1.225 in diameter directly below the knob, then place 80 points around the circumference, drawing lines from those points to the top outside edge of the knob (as shown).

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## Step 8

Place points at the intersection of all vertical lines and the knob (as shown)



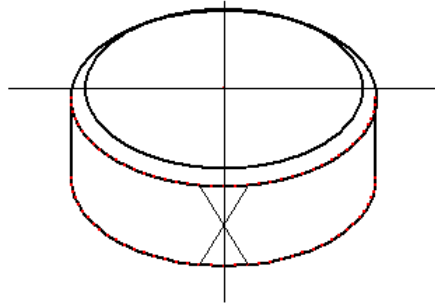
Place points at the intersection of the  
two ellipses and the vertical lines

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## Step 9

Draw the first two diagonal lines

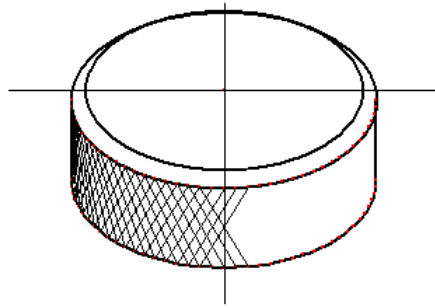


Draw a diagonal line from the second top point left side from the centerline to the second point bottom point right side from the centerline, then copy/mirror that line to form an "X"

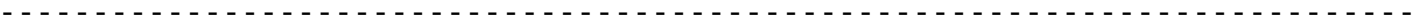


## Step 10

Continue drawing the diagonal lines along one side

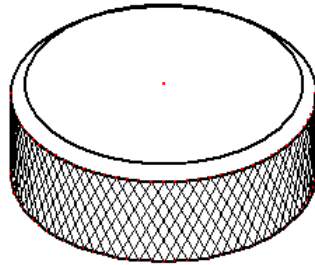


Join each subsequent points on one side  
only until all points have been exhausted



## Step 11

Copy and mirror diagonal lines to the opposite side

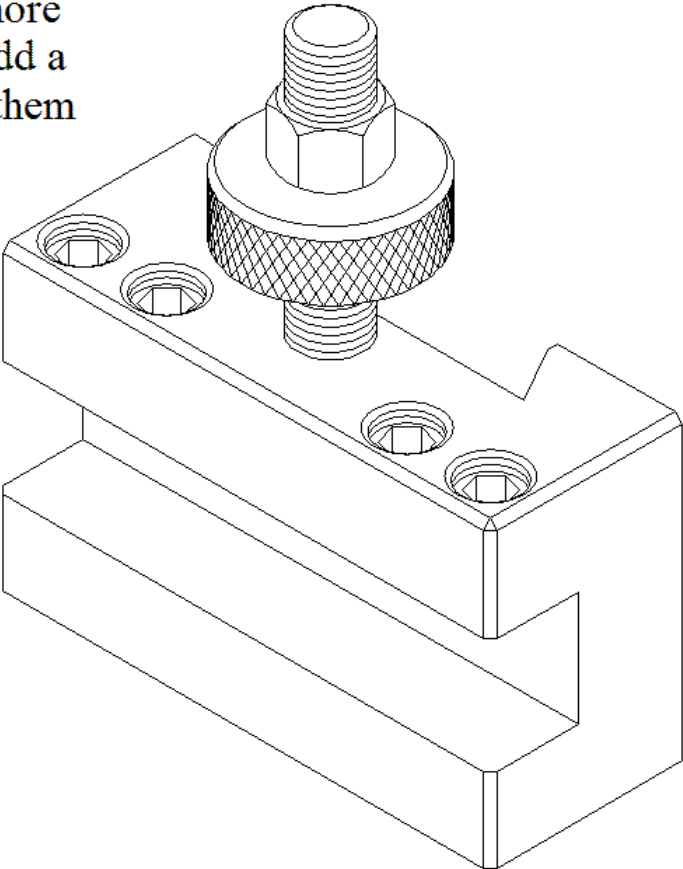


Select all diagonal lines and copy/mirror  
to the opposite side as well.



# Step 12

Drawings become more realistic when you add a little visual depth to them



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-Finished!