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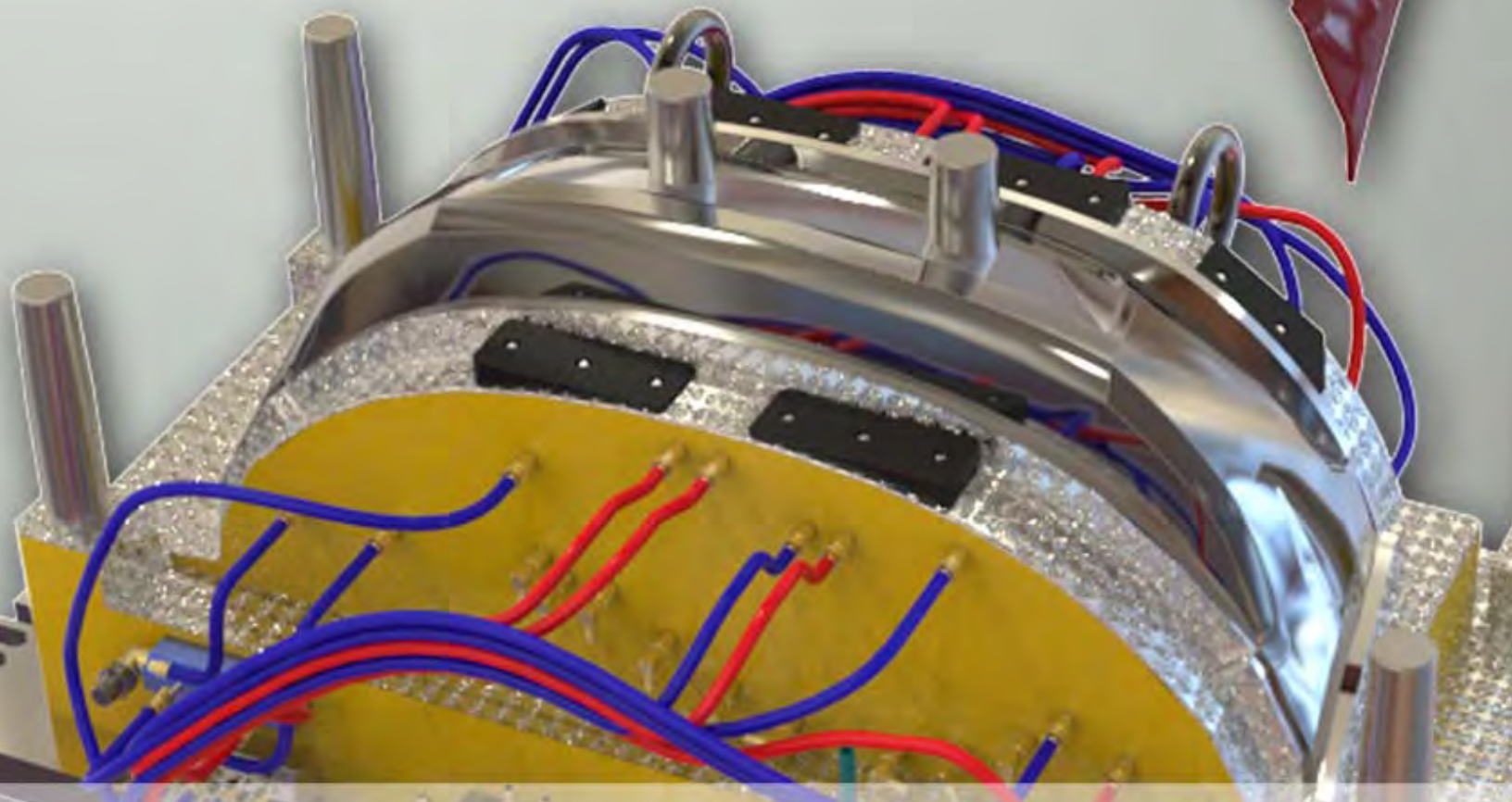
Tips & Tricks



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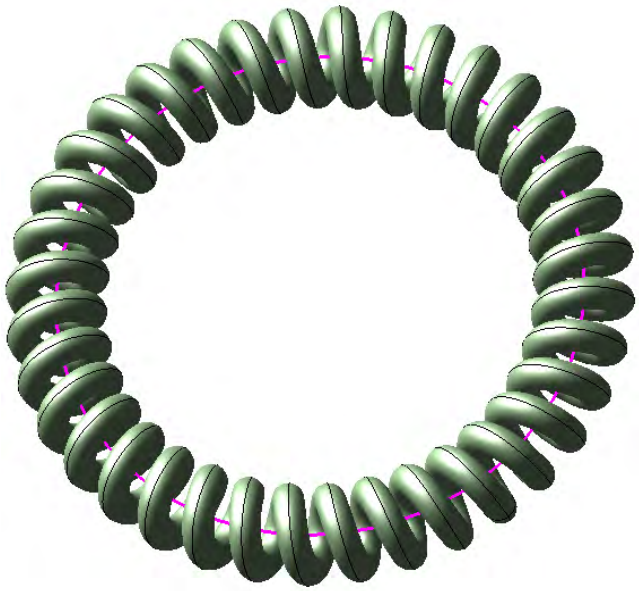
Tips & Tricks #69
Creating a Circular Spring

I recently had a customer ask how to make a “circular spring.” I’ve illustrated what a circular spring looks like to the right.

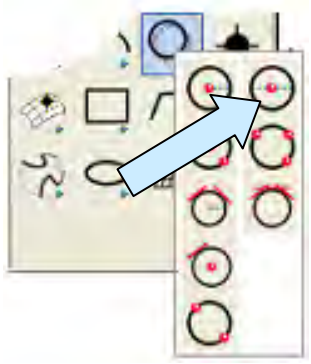


You can imagine wrapping a flexible coil spring around the groove of a pulley to get the shape shown.

Now if you look at the SOLID HELIX Function or HELIX SPLINE Function Dialog Boxes, you won’t see any options for making this creature.

We create this by using the SWEEP Function with a Twist.! (Literally and Figuratively!)

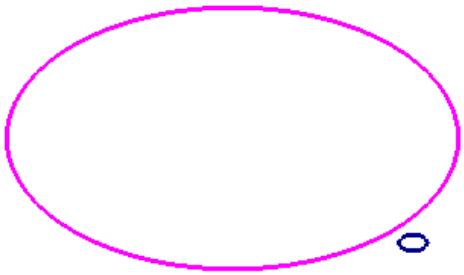
You can download the supplied “CircularSpring1” file to try this or create a filefrom scratch.



To generate the spring we need to create two circles on a a horizontal plane (CPlane=1.)

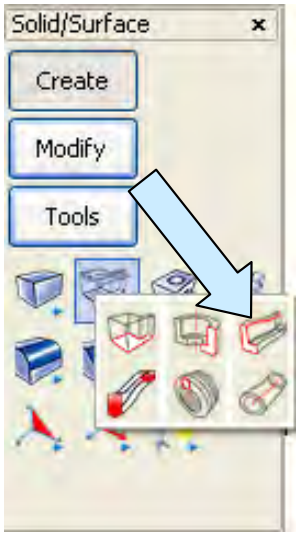
Click on the CREATE CIRCLE BY DIAMETER Icon. Type 2 for the diameter and using the KeyIn Option, hit the ENTER Key three times to place the circle at the origin.

Next create a 0.125 inch diameter circle and using the KeyIn Option type 1.13 for the X value and hit the ENTER Key three times.



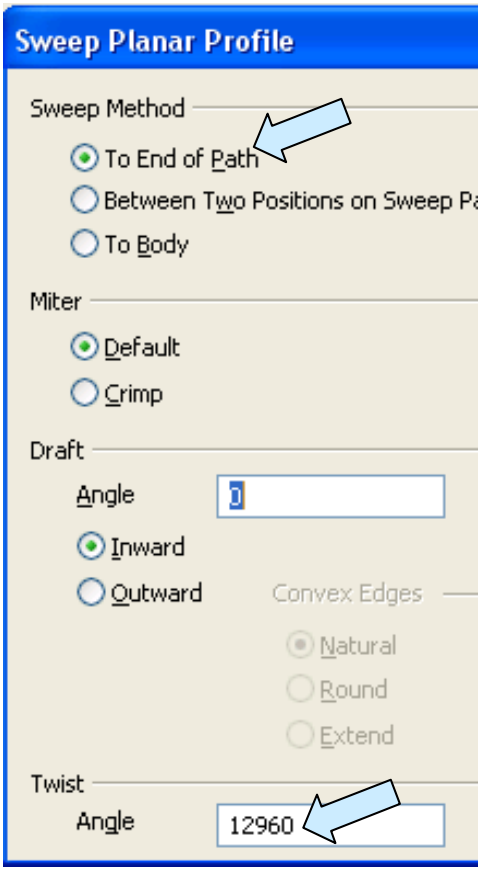
You will now have a screen that looks like this:

(These two circles are on Level 5 in the supplied file.)



Now, click on the SWEEP Icon.

A Dialog Box appears.

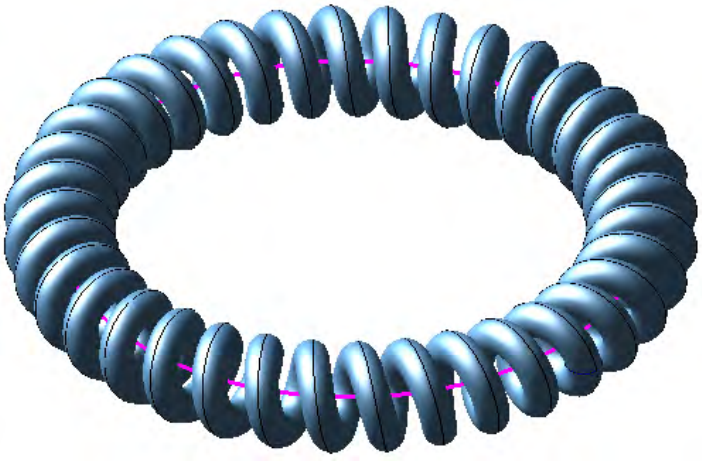


Select the To End Of Path Option.

Type “360*36” in the Twist Angle Field.
This calculates out to 12960.

Then, click on the OK Button.

Select the small circle and hit the ENTER Key.
Then, select the large circle and hit the ENTER Key.

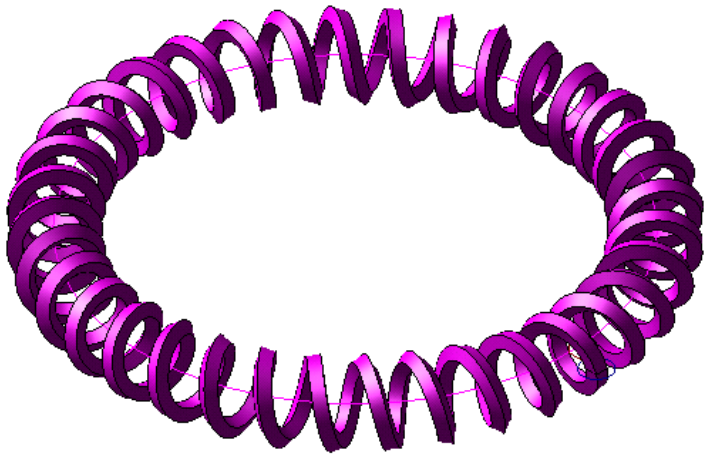


You will get a circular spring like the one pictured to the left.

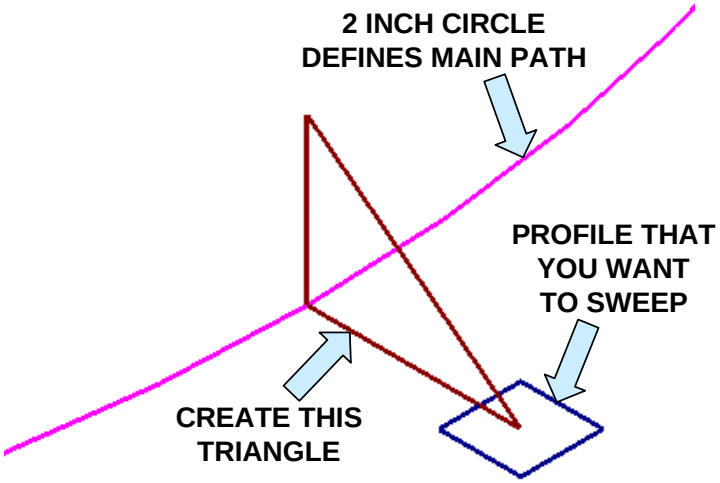
This is a simple way to quickly get a circular spring model where the spring wire cross-section is circular.

Now you might want to make a non-circular cross-section circular spring.

Here's an example of one with a square cross-section.



If you try this same approach, you may get an error message citing a self-intersection problem even if it looks like there should be room to sweep the part. (The twist function works well with circles but runs into problems with rectangles, rounded rectangles, etc.



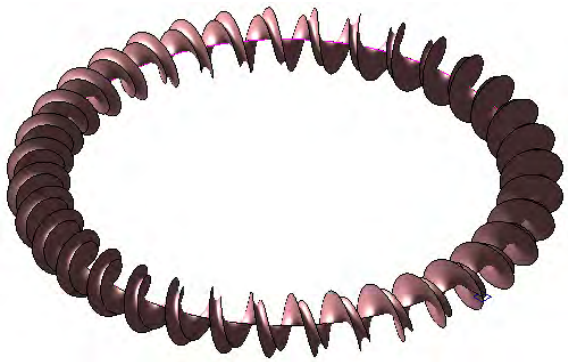
You can still generate the part. We'll simple create the helical centerline for the sweep first and then do a simple sweep of the profile along that curve.

Create a small triangle on a vertical plane (CPlane=2) like the one shown to the left.

The left side of the triangle is centered on the circular path and the right apex lies at the center of the profile that you want to sweep.

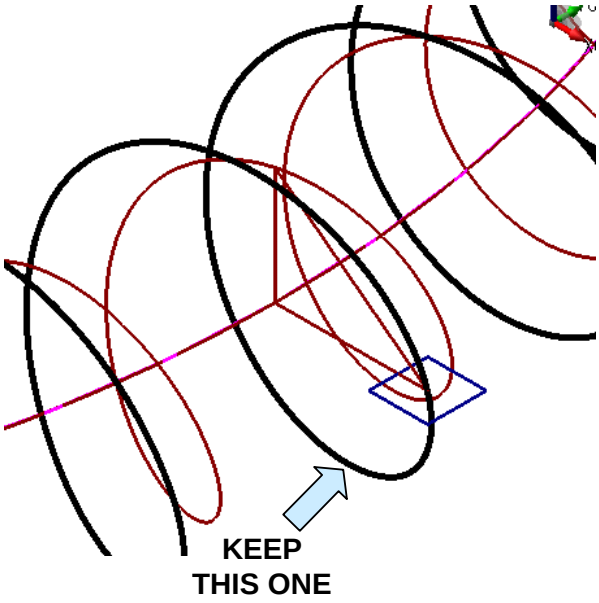
Use the SWEEP Function to sweep the triangle along the entire 2 inch diameter circle with a Twist Angle equal to 360*36 equals 12960.

This will give you a weird-looking helical solid that looks like this:



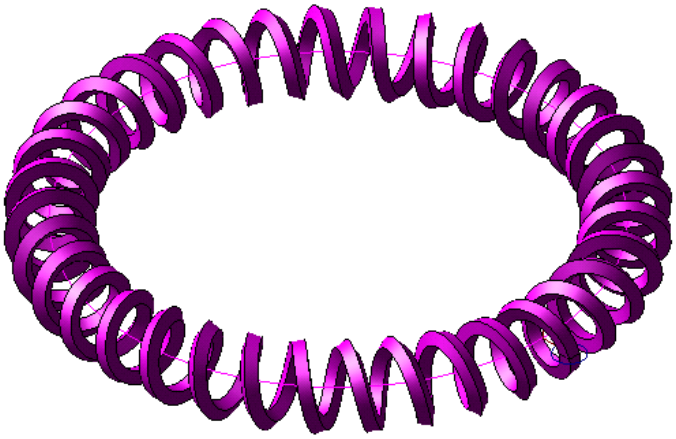
Now, Use the GENERIC BURST Icon to burst the weird solid into component curves.

Then delete all of the curves from the weird solid except for the one helical spline that passes through the center of your square profile.



We'll use this one spline as the sweep path for a simple sweep operation.

Click on SWEEP. This time we'll make Twist Angle = 0.



Sweep a small square (I used 0.05 x 0.05 size along the helical path to get a circular spring made from square cross-section wire.

Now that's a pretty wild model!