Bike Crank (Part 2) - Geometry

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Geometry

⚠ For users of ANSYS 15.0, please check this link for procedures for turning on the Auto Constraint feature before creating sketches in DesignModeler.

Cornell MAE 3272 students: The dimensions of your gauges are different from the ones here. Please update the dimensions when comparing your ANSYS results to your measurements.

In this section, we will go into DesignModeler, the geometry engine, to sketch each gauge of the rosette on the front face of the crank. We will then create surfaces for each gauge from the sketch. We first need to define a new coordinate system, as shown in the video below.

Summary of steps in the above video:

1. In Crank Part 2, double click Geometry
2. Orient your view to XY plane
3. Click on Edge Selection and select the front edge of the left hole
4. Of the GUI buttons on the top left, click New Plane, which looks similar to the plane icons under the tree

We then draw our first gauge and give it the proper dimensions.

Summary of steps in the above video:

1. Orient yourself in the XY Plane view
2. Select Plane 4 > New Sketch in the toolbar
3. Zoom in on the middle portion of the bike crank lengthwise
4. Under the Draw drop-down menu, click Rectangle by 3 points
5. Click 3 points so that the rectangle is slanted (do not allow for edges to snap to horizontal/vertical configuration)
6. Click on the Tab called Dimensions and ensure General is selected
7. Select the long slanted edge and shorter slanted edge
8. Input 0.083 in for the longer edge and 0.063 in for the shorter edge

This video will show you how to insert a midpoint which will be helpful to place the gauges at their correct locations. We will also show you how to copy your gauge to make the other two.

Summary of steps in the above video:

1. Zoom in on the rosette/rectangle you just created
2. Go to the Draw menu and select Construction point at the very bottom of the options
3. Click on the edge of the longer side of the rectangle, but preferably so it does not snap to the middle of the edge
4. Click on Constraint menu > Midpoint > click the edge and the Construction point
5. Also put a midpoint on the opposite long side of the rectangle with the same method
6. Click on Draw > Line > click on two Construction points on long edge
7. Apply another midpoint to the newly created line (that midpoint is the middle of the gauge)
8. Go to Modify Menu > Copy > highlight all edges and middle point > Paste
9. Paste two figures > right click > End

With the midpoints correctly defined and being static relative to the gauges, we specify their distances in the coordinate system centered at the front face of the support hole.

Summary of steps in the above video:

1. Go to Dimensions in the drop menu
2. Select Vertical > Neutral axis (x axis) > Midpoint of gauge > place the constraint line
3. Edit the constraint so the midpoint is 0.219 in above the x-axis
4. Repeat for all gauges
5. Zoom to fit the left hole and all three gauges
6. Select Horizontal > Y axis crossing the hole > Midpoint of gauge > place the constraint line
7. Edit the constraint so the midpoint for the gauges match the problem statement

Finally, we orient the gauges and create surfaces from the sketch.

Summary of steps in the above video:

1. Zoom to fit three gauges to view
2. Under the drop menu > Angle > select the longer slanted edge of one of the gauges > x axis
3. Input 135 deg into this new constraint
4. Constrain the other gauges in the same way from left to right, 135 deg (completed), 90 deg, 45 deg
5. Under Concept at the very top menu, select Surface from Sketches
6. Click on Sketch 1 > Apply > Generate

Go to Step 3: Mesh

Go to all ANSYS Learning Modules