

Finding the Center of Rotation on a 5-Axis Table-Table Milling Machine with a Trunnion Unit

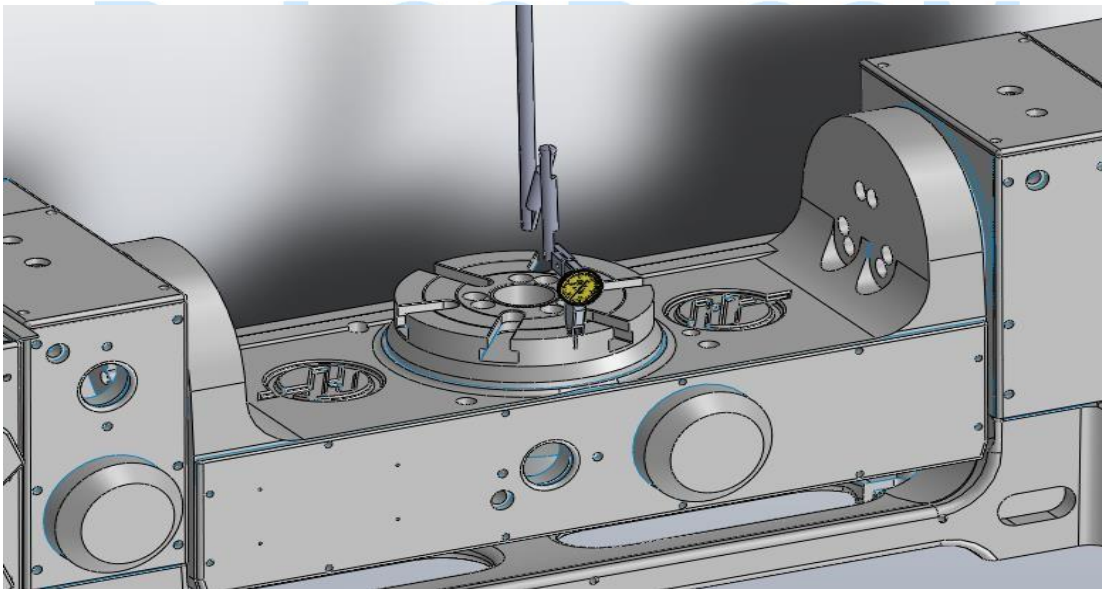


In the BobCAD-CAM system when using the multi-axis features your machine must be properly defined. The calculations that must be performed for proper G-Code creation depends on an accurate definition of your machine's kinematics. This document covers how to find the center of rotation for a 5-axis Table-Table machine with a trunnion unit so the machine parameters can be correctly defined.

There is a simple test you can use to find the necessary values and we will walk you through this process here in this document. This document is prepared for a machine with A and C axes, but the same logic applies to a machine with B and C axes. You just need to replace every X measurements with Y and vice versa. Please make sure to keep the sign of the reading at each step and carry those signs to next steps.

Step 1 - Locate the X Center of the Rotary Axis (X_p) and Y_1

Using an indicator locate the center of the X axis by sweeping an indicator around the OD of the rotary platter to center the machine spindle on the rotary axis.



Note the X and Y axis values for this location.

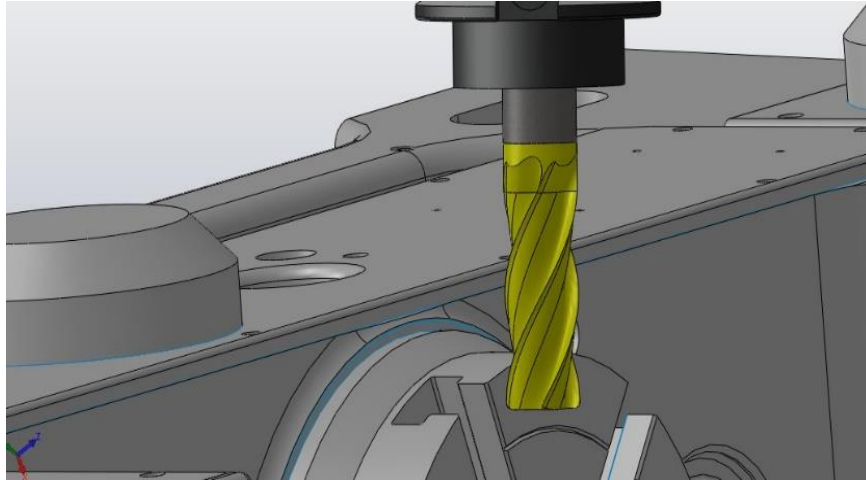
X_p = _____ (This is the X location of the center of rotation)

Y_1 = _____

Step 2 – Locate the Y axis Center of Rotation (Y_p)

To locate the center of rotation for the tilting axis we will be positioning the tilting axis to two different locations. By using an Endmill, Edge Finder, etc. We can locate the face of the rotary platter in the two positions and with simple division we will have the center of the Y axis for the tilting unit. Below are the steps and reference images to complete this task.

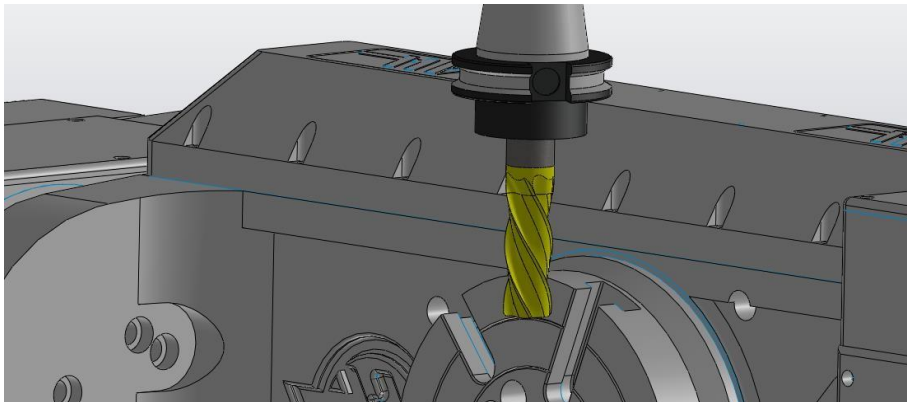
- a) Tilt the saddle assembly to the 90 Degree position
- b) Using a Tool or Edge Finder locate the face of the rotary platter as shown in the image below



Note the Y Axis position for this location.

$Y_2 =$ _____ (Y axis value at 90 Deg Tilt)

- c) Tilt the saddle assembly to the -90 Degree position
- d) Using a Tool or Edge Finder locate the face of the rotary platter as shown in the image below



Note the Y Axis position of this location.

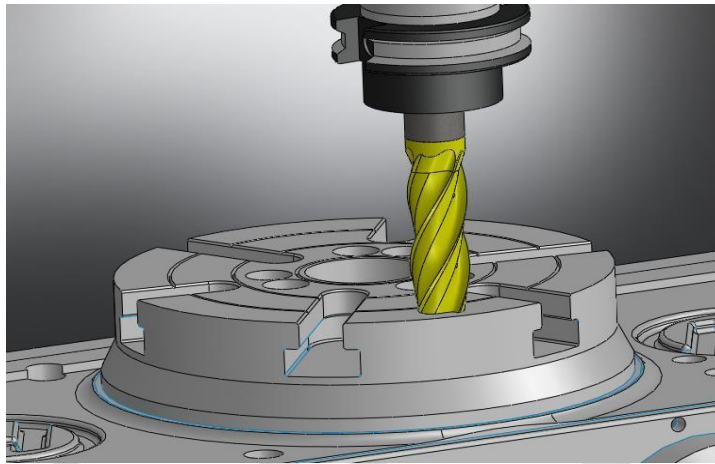
$Y_3 =$ _____ (Y axis value at -90 Deg Tilt)

Now calculate the Y axis center of rotation (Y_P) by adding Y_2 and Y_3 and dividing the result by 2.

$$Y_P = ((Y_2 + Y_3) / 2) - Y_1 = \underline{\hspace{2cm}}$$

Step 3 – Locate the Z Axis Face of the Rotary Platter (Z_1)

We need to locate the face of the rotary platter when the tilting axis is a Zero position. Make sure the machine has the tilting axis and using a tool or indicator mounted to the spindle locate the face of the rotary platter and note the Z axis position as shown below in the following image.

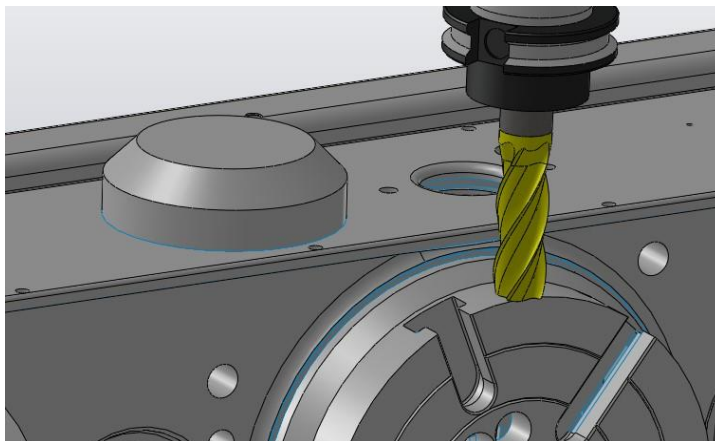


Note the Z axis position for this location.

$$Z_1 = \underline{\hspace{2cm}}$$

Step 4 – Locate the Z Axis Center of the Rotary Platter When Tilted 90 Deg (Z_3)

We now need to locate the center of the rotary platter when the tilting axis is rotated at 90 degrees. This will tell us the difference in the Z axis for the position of the rotary axis when at the two locations. To do this we need to take a tool or indicator and reference the highest point on the rotary platter with the tilting axis set to 90 (or -90) degree position.



Note the Z axis position for this location.

$$Z_2 = \underline{\hspace{2cm}}$$

Now we need to measure the diameter of the rotary platter.

PD = _____ (This is the Platter's Diameter)

Important Note: We will be using the radius instead of the diameter in the next step

We now need to subtract the radius of the rotary platter from Z_2 to get the Z axis center of the rotary platter (Z_3).

$Z_3 = Z_2 - (PD / 2) =$ _____

Step 4 – Locate the Z axis Center of Rotation (Z_P)

To calculate Z_P , we need to subtract Z_1 from Z_3 . This tells us the difference in Z axis for the two points. The Z_P value will be used in your machine setup to determine the center of rotation for your spindle axis.

$Z_P = Z_3 - Z_1 =$ _____

You we have the necessary information for the XYZ axes center point of rotation for this machine tool. If you have any questions, please contact our support department.

