Finding the Center of Rotation on a Mill-Turn Machine with a Z-Axis Oriented Milling Head

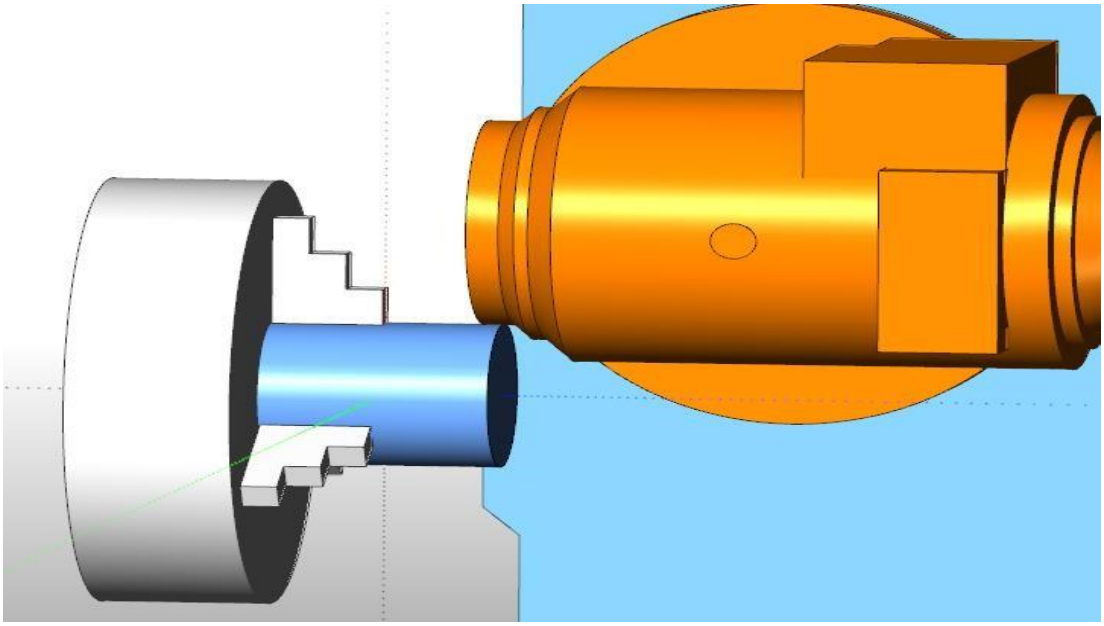
BobCAD-CAM
World Leader in Powerful & Affordable CAD/CAM Software
www.bobcad.com
877.262.2231 | 727.442.3554

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 mill-turn machine with a Z-axis-oriented milling (spindle) head 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. Please make sure to keep the sign of the reading at each step and carry those signs to next steps.

Step 1- Locate the Z-Axis Position with the Spindle at Zero Degrees (Z_1)

Setup an indicator on the main spindle's chuck while the milling (spindle) head is at 0-degree orientation (it is oriented horizontally). Touch the end of the indicator with the face of the spindle, and then Zero the reading on the indicator.



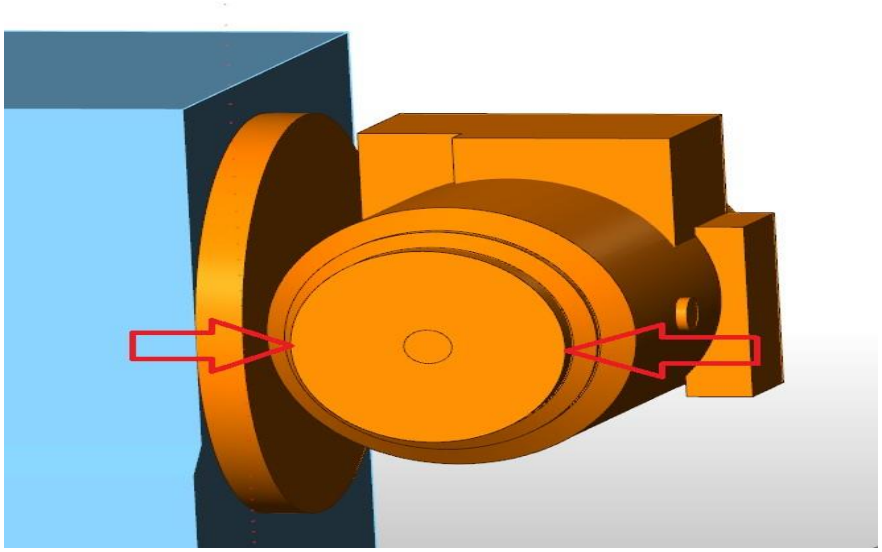
Note the Z-axis position for this location.

Z_1 = _____

IMPORTANT NOTE: Do not move the indicator setup as we need this exact position for later measurements.

Step 2- Measure the Diameter of the Spindle Ring (SDM)

The spindle ring is the ground outer portion of the spindle that protrudes out of the spindle assembly. We need to know the accurate diameter of this as this value is used in the next step. The following image shows the spindle ring for this example machine.

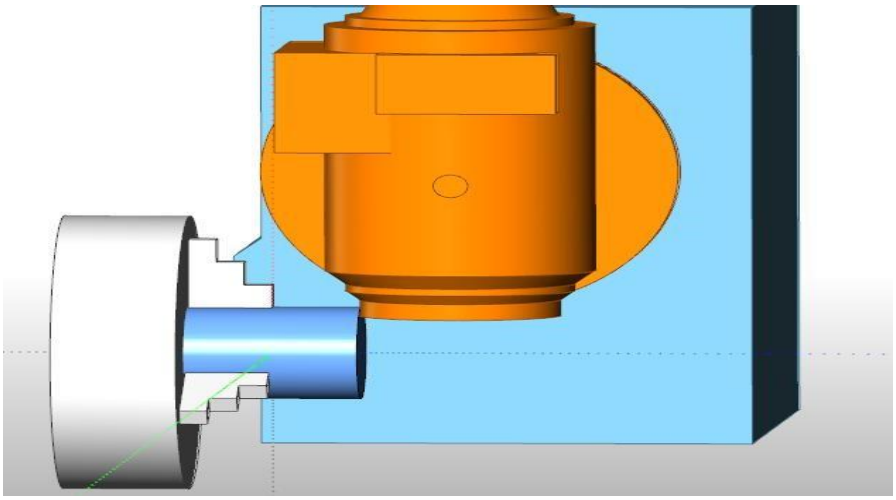


SDM = _____

NOTE: We will be using the Radius of the spindle in the next step

Step 3 - Read the Z-Axis Position with Spindle Rotated Up 90 Degrees (Z_2)

For the next reading you need to rotate the spindle axis 90 degrees so that it is oriented vertically as shown in the image below. Take a reading from the lowest portion of the outside diameter of the ground spindle ring while the indicator is taken back to zero.



Note the Z-axis position for this location.

Z_2 = _____

Step 4 – Calculate the Adjusted Z-Axis Position (Z_3)

The Z_3 value is the adjusted Z value to let us know where the center of the spindle axis is in this position. To get the Z_3 value simply subtract the spindle radius found in the step 2 from the Z_2 value found in the step 3.

$Z_3 = Z_2 – (SDM / 2) =$ _____

Step 5 - Find the Z-Axis Position of the Center of Rotation (Z_P)

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

$Z_P = Z_1 – Z_3 =$ _____