

CNC Milling

ACTIVITY 4 HARDWARE TASKS

Name	Class/Period	Date

1. Overview

In this hardware task, you will mount a tool in your milling center’s spindle, define the tool in the control program, and select the tool for use.

2. Performance Objectives

After completing these hardware tasks, you will be able to:

- Mount a tool in the tool holder and in the spindle
- Define and select the tool in CNCMotion

3. Required Materials

You need these materials to complete the hardware tasks:

- CNC milling center including computer with CNCMotion
- A 1/8th inch or 3 mm end mill
- A tool holder assembly
- A crescent wrench set
- A tool holder nut wrench

4. Safety and Inventory Checks

Before beginning the hardware task, review this checklist and mark off each item as you complete it.

- Ensure that your lab station passes the safety guidelines.
- Complete the inventory and safety checklists for your lab station.
- If there is a tool in the spindle, ask your instructor to remove the tool before constructing the vise.

⚠ Warning: Milling tools are extremely sharp. To avoid cutting yourself, it is best to handle them from the shank, with gloves or a shop rag. Never touch the teeth with your hands.

📌 Note: If required, review the previous activities and hardware tasks for any procedures that are not described in full.

5. Mounting a Tool in the Tool Holder

Follow the steps below to mount a tool in the tool holder. Before beginning, review the videos of the procedures in the online activity.

1. Snap the collet into the nut.



2. Screw the tool holder nut and collet into the ISO20 tool holder by hand.



3. Slide the tool (the end mill) into the collet and tighten it with the tool holder nut wrench.



4. Further tighten the assembly using the appropriate crescent wrench in tandem with the tool holder nut wrench.



6. Mounting a Tool in the Spindle

Perform the following to mount a tool in the spindle. You can review videos of the procedures in the online activity.

1. Ensure that **Emergency Stop** button is released.
2. Turn the milling center ON.
3. Run CNCMotion (If required, use the launch button in the activity), and ensure that it is connected to the mill (Setup > On-Line).
4. Open the safety shield.
5. While holding the tool by the bottom of the tool holder, **press the green drawbar button on the spindle** and **insert the tool holder** into the spindle, then release the green drawbar button.



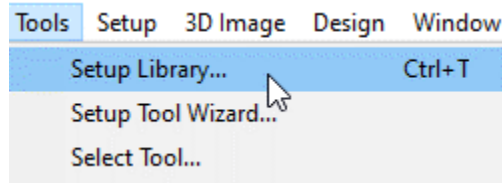
The tool should now be sucked into the spindle.

6. Ensure the tool is installed correctly by holding the tool by the flange of the tool holder and turning the tool and spindle. Check to ensure the tool and spindle spin concentrically (together).

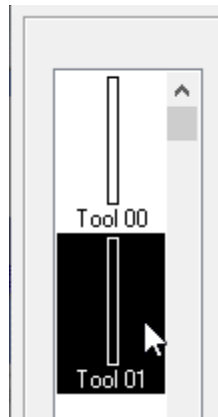
7. Defining Tools

Follow the steps below to define the tool in CNCMotion.

1. From the **Tools** menu, click **Setup Library**. The Setup Tool Library window is displayed.

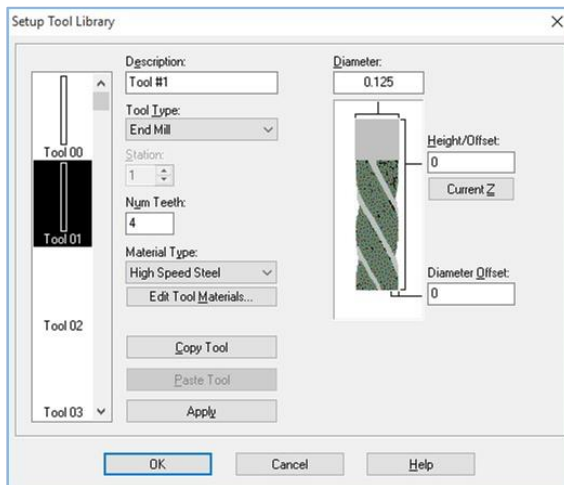


2. In the list on the left, select **Tool 01**.

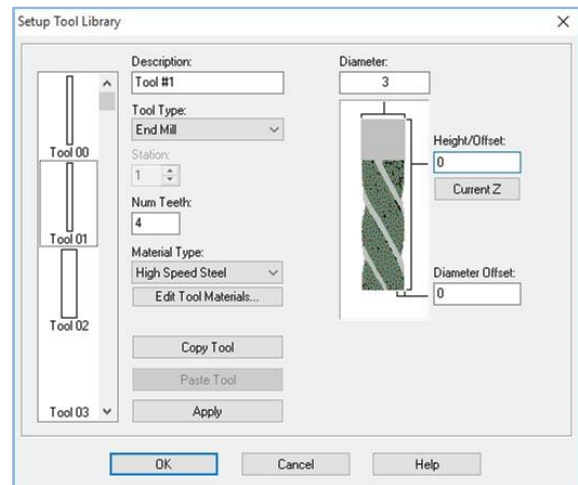


3. Define the tool by completing all the fields as shown.

Imperial (1/8th inch end mill)



Metric (3 mm end mill)

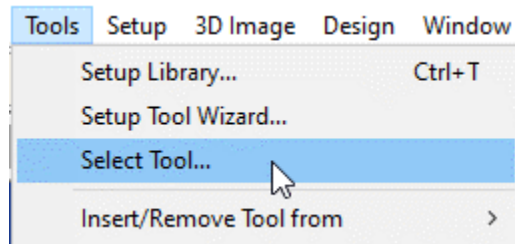


4. Click **OK**.

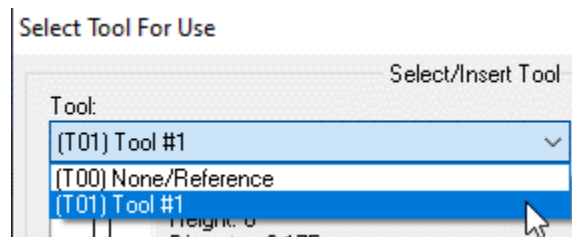
8. Selecting a Tool for Use

CNCMotion needs to know which tool is placed in the machine in order to execute any NC program correctly. You inform the application by *selecting the tool*. (At this point in the course, you are not going to be running an NC program. However, this step is required when running one.)

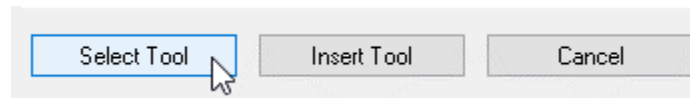
1. From the **Tools** menu, click **Select Tool**.



2. From the Tool dropdown list, select the tool you installed in the spindle, **Tool 01**. A description of the tool is displayed on the right side of the dialog box.



3. Click **Select Tool**. The tool you selected is registered and the Select Tool for Use dialog box is closed.



4. In the **Machine Info** window, check that the Tool field reports that Tool 01 is installed.

Machine Info	
Tool	01
Pass	000

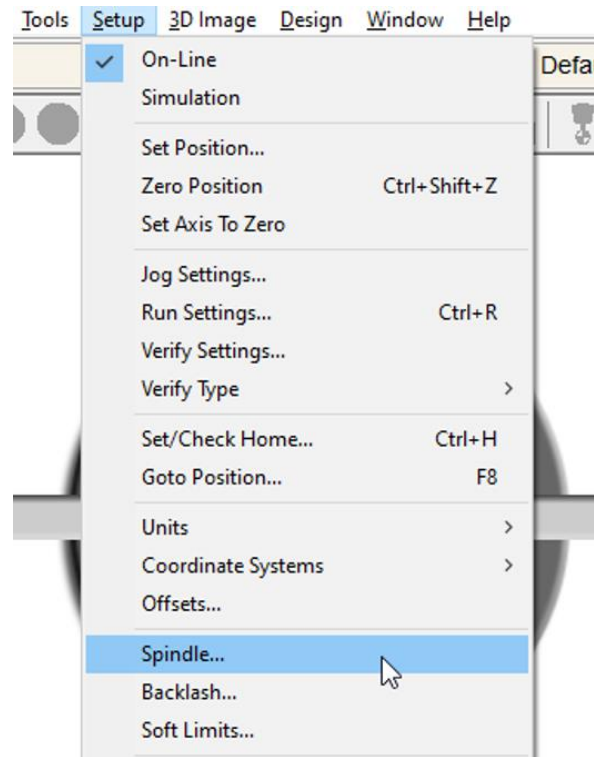
Note: Before you machine a part, always check that the correct tool is listed in the Tool field.

9. Activating the Spindle

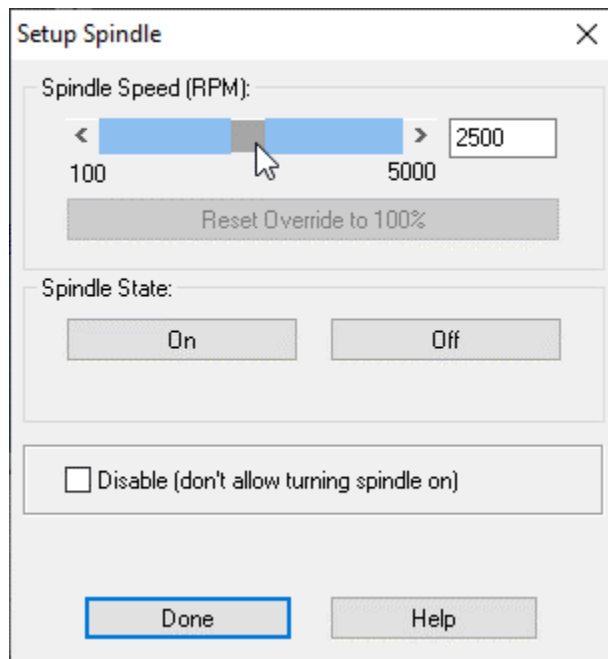
Follow this procedure to rotate the tool.

1. In the **Jog Control** window, define the **Speed** as maximum and the **Step Size** as continuous.
2. Carefully move the spindle up and down (Z axis), taking care not to bring the tool into contact with the vise or cross-slide.
3. Move the tool a safe distance from the hardware.

4. Navigate to **Setup > Spindle**.



5. Drag the **Spindle Speed** slider to 2500 RPM.



6. Place one hand on the Emergency Stop button and be prepared to press the button if there is any danger of the spindle impacting the hardware.

7. Click **On**. The spindle will begin to rotate.

- 8. Drag the **Spindle Speed** slider and watch the effect on the speed at which the spindle is rotating.
- 9. Click **Off**. The spindle will stop rotating.

10. Removing the Tool

Perform the following to remove the tool holder from the spindle:

- 1. Tools may heat up during use. Wait several minutes for the tool to cool down.
- 2. Open the safety shield.
- 3. Carefully grasp the tool holder with one hand.
- 4. While holding the bottom of the tool holder, press and release the green drawbar button on the spindle and remove the tool holder from the spindle.
- 5. Store the tool and tool holder in the appropriate place in your lab station.
- 6. Exit CNCMotion.

11. Authentic Skills Assessment

Have your instructor verify that your work meets the requirements in the Performance Objectives and sign below. Keep this hardware task sheet for future reference.

Instructor Signature	Date

12. Inventory and Shutdown

Unless instructed otherwise by your teacher, review and complete each of the items on the checklist below.

- Tidy your workstation and store away any loose mill components.
- Switch off the milling machine.