intelitek

CNC Milling

ACTIVITY 7 HARDWARE TASKS

Name	Class/Period	Date

1. Overview

In this lab activity you will perform a dry run before running the Superman program on an actual workpiece.

2. Performance Objectives

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

- Perform a dry run.
- Machine a part given a completed NC program.

3. Required Materials

You need these materials to complete the hardware tasks:

- CNC milling center with installed mechanical vice
- Connected computer with CNCMotion
- 0.125 inch or 3 mm end mill (in a tool holder)
- Hex Allen wrench
- Machinable workpiece
- Safety goggles

4. Safety and Inventory Checks

Before beginning the hardware task, review this checklist.

- ☐ 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 and you need to construct a vice, remove the tool before constructing the vise.

5. Hardware Tasks

5.1. Preparing the Milling Station

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

Follow the steps below to prepare the hardware.

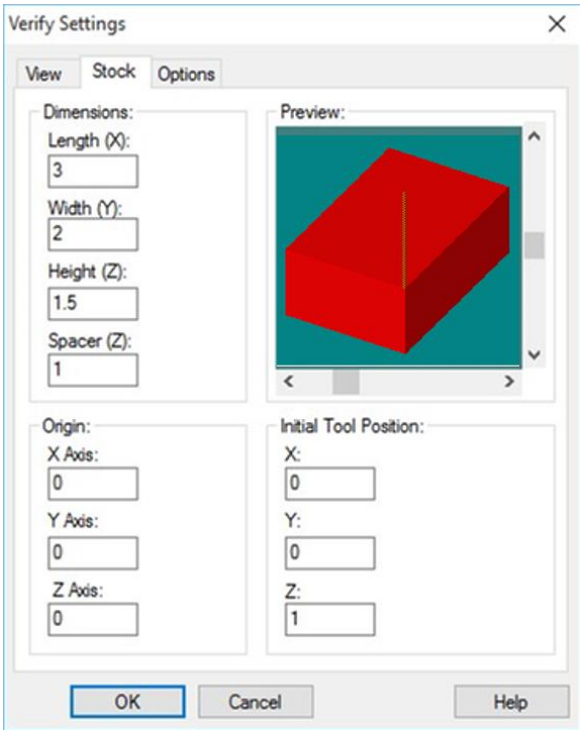
1. Ensure that the Emergency Stop button is released.
2. Turn on the power switch.
3. Run CNCMotion (If required, use the launch button in the activity), and ensure that it is connected to the mill (**Setup > On-Line**).
4. Close the safety shield.
5. Home the machine.
6. Open the safety shield.
7. Secure a workpiece to the vise.
8. Secure the end-mill in the tool holder and insert the tool holder into the spindle.
9. Open the Setup Tool Library **(Tools > Setup Library)** and confirm that Tool 01 is defined as the end mill that you installed.
10. Select Tool 01 **(Tools > Select Tool)** for use in the spindle.
11. Touch off the front, left, and top faces of the workpiece and define the workpiece origin.
12. Close the safety shield.
13. Verify the origin by sending the tool tip to a location directly above the origin. Keep your hand on the Emergency Stop button to prevent any potential accidents.

5.2. Preparing for the Dry Run

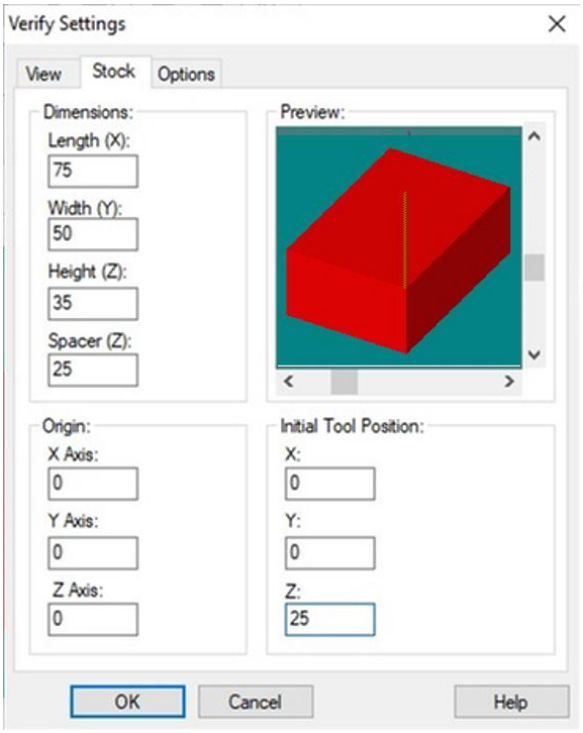
Follow the steps below to prepare the machine for the dry run.

1. Open (**File > Open**) the Superman NC program for your measuring system:
   - Imperial: **SUPERMAN_IMP.NC**
   - Metric: **SUPERMAN_MET.NC**
2. Double-click the Verify window to bring up the verify settings. Set the stock settings to those shown here:

Imperial



Metric

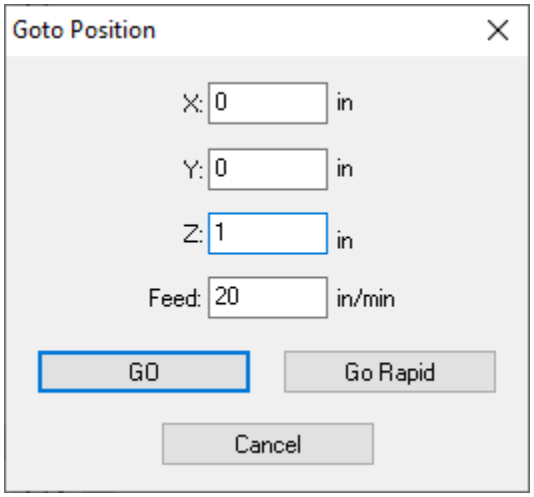


3. Verify the NC program. Confirm that the graphic verification looks like the Superman shield and adjust any settings if required.

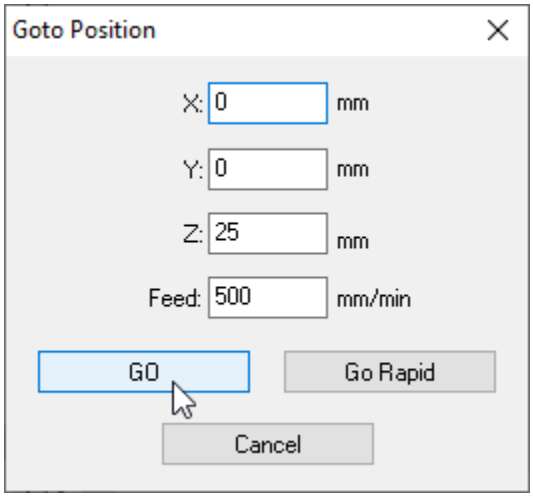
You will now set the workpiece origin as 1 inch / 25 mm above the top-front-left corner of the stock so that when the program is run for the dry run, the tool will operate above the workpiece.

4. Navigate to **Setup > Goto Position** and enter the following coordinates in the dialog box:

Imperial



Metric



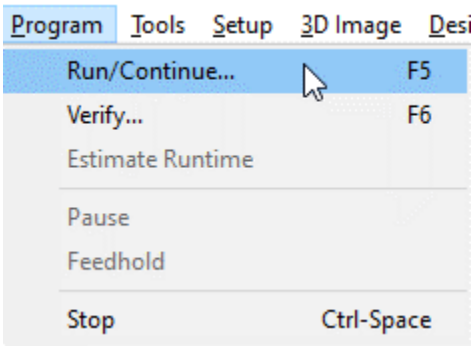
5. With one hand on the Emergency Stop button to prevent potential accidents, click **GO** to send the tool to the defined position above the point-of-origin.

6. Select **Setup > Set Position** to display the Set Position dialog box. Enter the coordinates **(0, 0, 0)** and then click **OK** to reset the point-of-origin to the current position.

5.3. Performing the Dry Run

Follow the steps to perform the dry run:

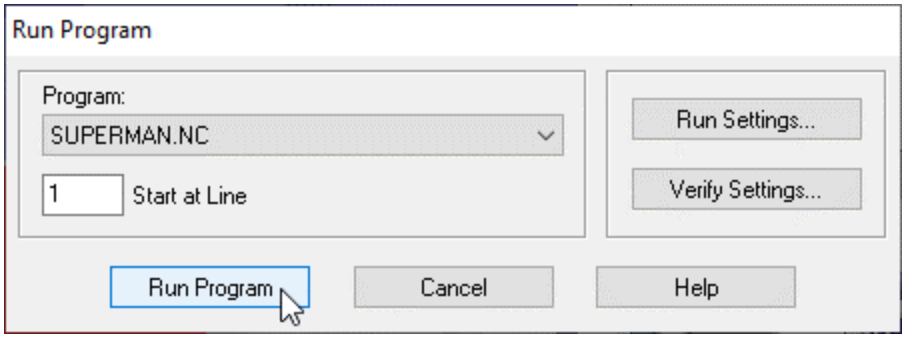
1. Select **Program > Run/Continue** or click the green Run icon on the toolbar.



The Run Program dialog box is displayed.

ⓘ ***Note:*** *In the next step you will run the program for the first time. Watch the tool motion in relation to the vise and the workpiece.*

2. With one hand on the Emergency Stop button, click **Run Program**. Look for signs of a possible tool crash with the hardware or stock and be prepared to prevent any crashes by pressing the Emergency Stop button.



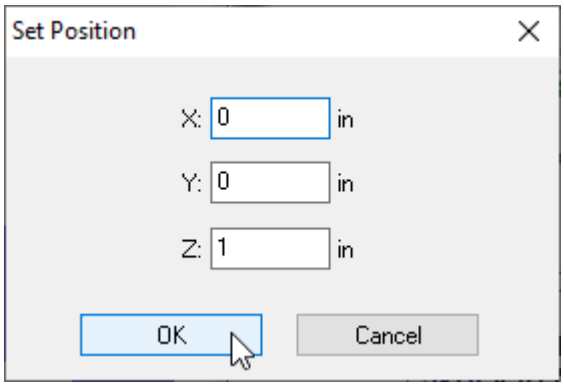
3. Confirm that the program executes correctly *above the workpiece* without striking the hardware.
   - If you are satisfied with the program execution, continue to the next step.
   - If there are any problems, make the necessary corrections and rerun the dry run until the program executes correctly.

5.4. Resetting the Origin

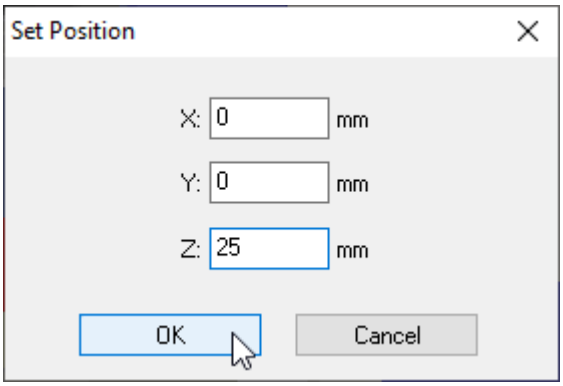
You will now reset the workpiece origin to the top-front-left corner of the stock in preparation for actual machining.

1. Navigate to **Setup > Go to Position** and enter the coordinates **(0, 0, 0)**.
2. With your hand on the Emergency Stop button to prevent potential accidents, click **GO** to send the tool to the position currently defined as the point-of-origin. As required for the dry run, this position is 1 inch / 25 mm above the origin.
3. Navigate to **Setup > Set Position**. Enter the coordinates shown below and then click **OK**.

Imperial



Metric



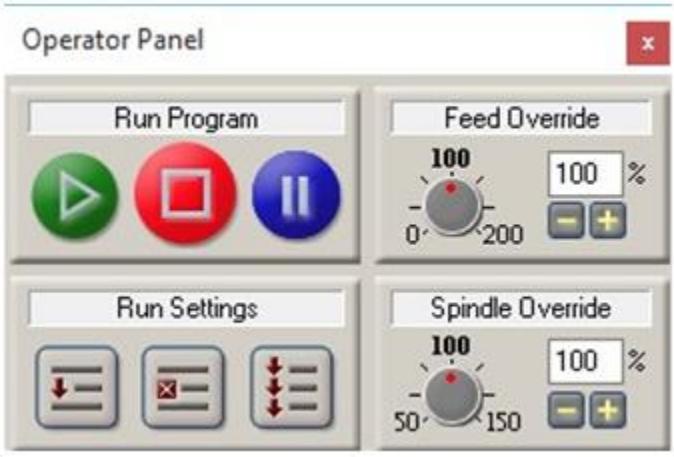
This resets the position to its true coordinates and restores the original workpiece origin.

5.5. Machining the Part

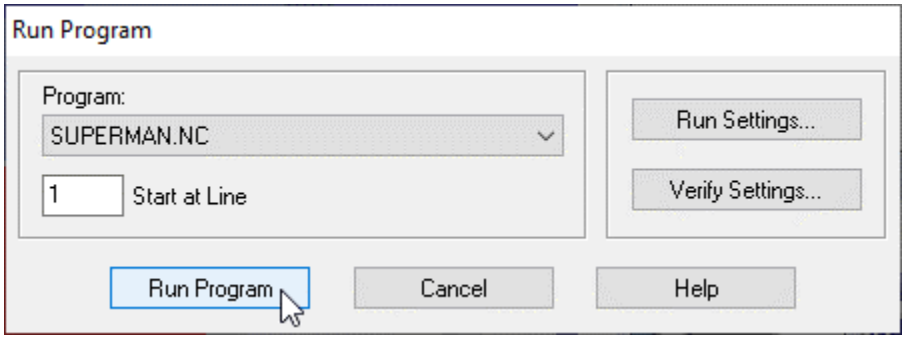
You will now observe the machining center cutting the part. Remember that when working with a machining center, safety is of highest importance. You are expected to be ready to instantly stop the machine should any problems arise.

Perform this procedure to machine the part:

1. Put on your safety goggles.
2. In the Operator Panel, set both the **Spindle Override** and **Feed Override** to **100%**. This ensures that the spindle speed and feed rate will be exactly as defined in the NC program.



3. Select **Program > Run/Continue** or click the Run icon on the toolbar. The Run Program dialog box is displayed.
4. Click **Run Program**.



5. Confirm that the program executes correctly:
   - If you are satisfied with the program execution, continue.
   - If there are any problems, make any necessary corrections and rerun the program until it executes correctly.

6. 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

7. Inventory and Shutdown

Unless instructed otherwise by your instructor, complete each of the steps below.

1. Home the mill.
2. Open the safety shield.
3. Remove the workpiece from the vise and store it away. You will reuse this workpiece in a future lab activity.
4. Remove the tool from the spindle and carefully store it away.
5. Store the step clamp and hex wrenches away.
6. Use a dry brush to clear any chips from the vise and cross-slide.
7. Switch off the milling center.
8. Exit CNCMotion.