intelitek

CNC Milling

ACTIVITY 3 HARDWARE TASKS

Name	Class/Period	Date

1. Overview

In this hardware task, you will construct your machining center's vise, secure a workpiece, and jog the cross-slide.

2. Performance Objectives

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

- Construct a vise for a milling workpiece.
- Secure the workpiece in the vise.
- Move the cross-slide using the control software.

3. Required Materials

You need these materials to complete the hardware tasks:

- CNC milling center
- Computer with CNCMotion
- A piece of wax stock
- A vise with hold down set
- Allen wrenches of various sizes
- One milling vise
- Two studs
- Two clamp nuts
- Two step blocks
- Three step clamps
- Two T-nuts
- Try square

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.

Note: *Review previous activities and hardware tasks for any procedures that are not described in full.*

5. Constructing the Vise

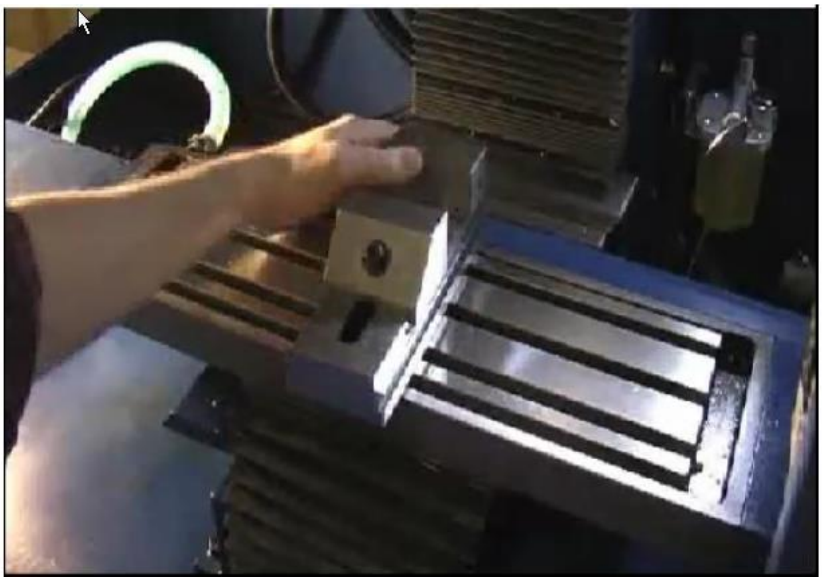
5.1. Vise Components and Construction

Two mounting block assemblies hold the mechanical vise in position on the cross-slide. Each assembly is comprised of a T-nut, stud, clamp, and nut.

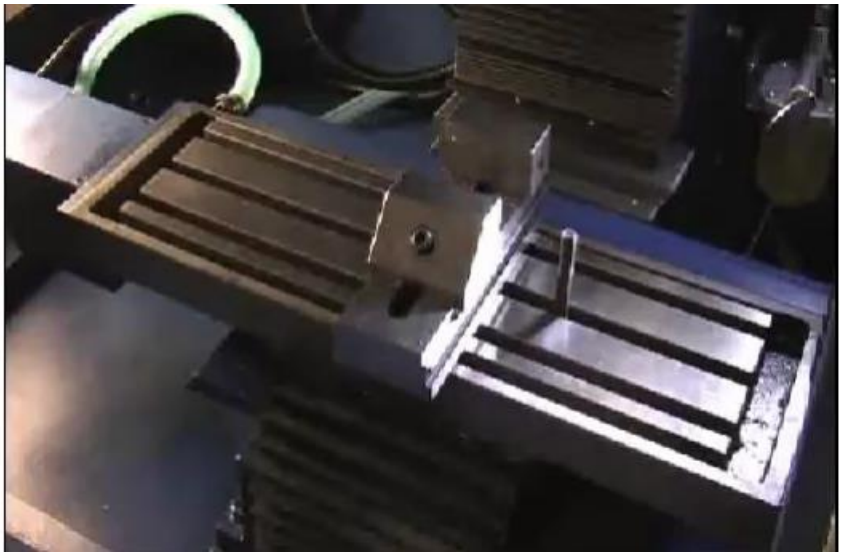
5.2. Procedure for Constructing the Vise

Perform the following to construct the vise. You can review videos of the procedures in the activity.

1. Turn the milling center ON.
2. Run CNCMotion (If required, use the launch button in the activity), and ensure that it is connected to the mill (**Setup > On-Line**).
3. Open the safety shield.
4. Place the vise centered along the length of the cross-slide.

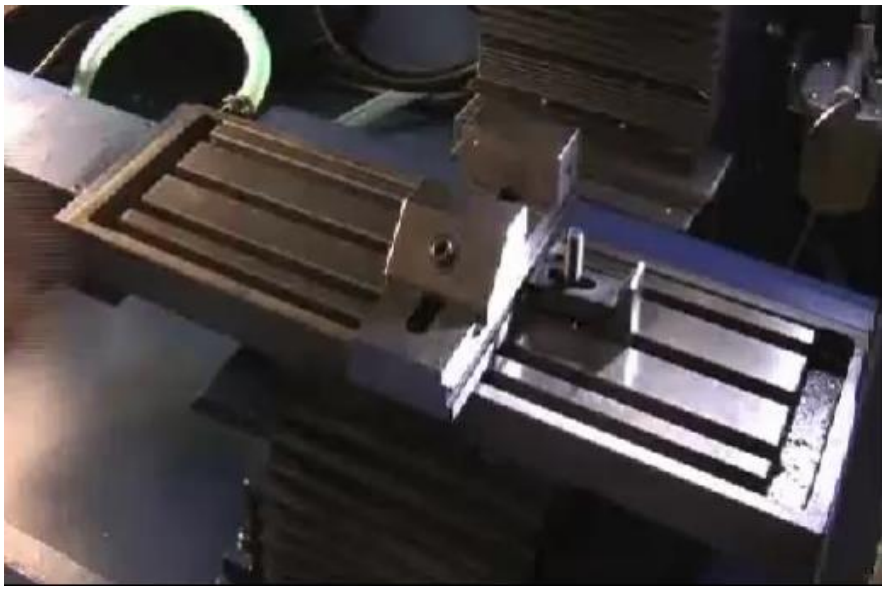


5. Insert the stud and T-nut into the cross-slide.



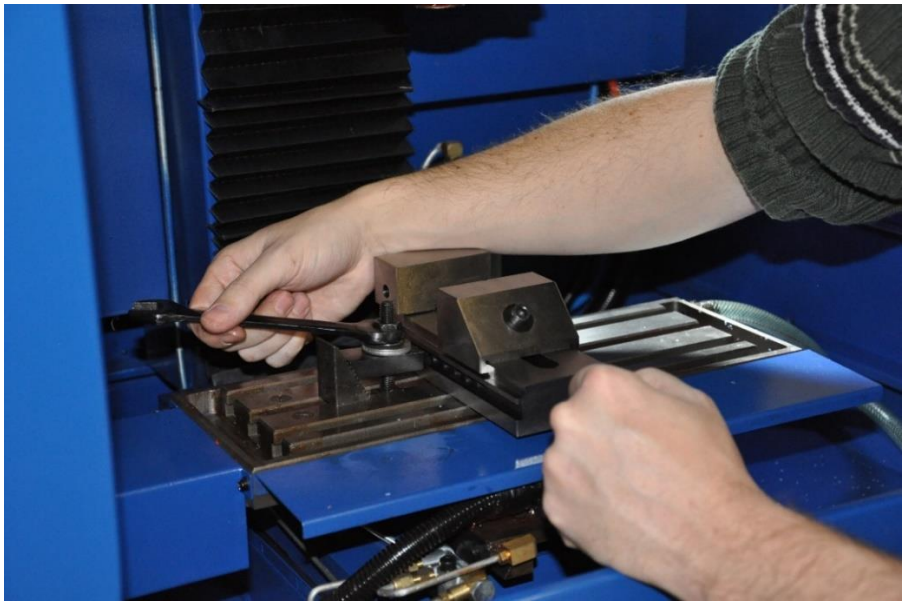
6. Place the step block beside the stud.

7. Slide the clamp over the stud with the angled ends of the clamp inserted into the slots on either side of the vise.



8. Before tightening, use a try square to ensure that the vise is aligned.

9. Thread a nut to secure the assembly and tighten the nut with a wrench.

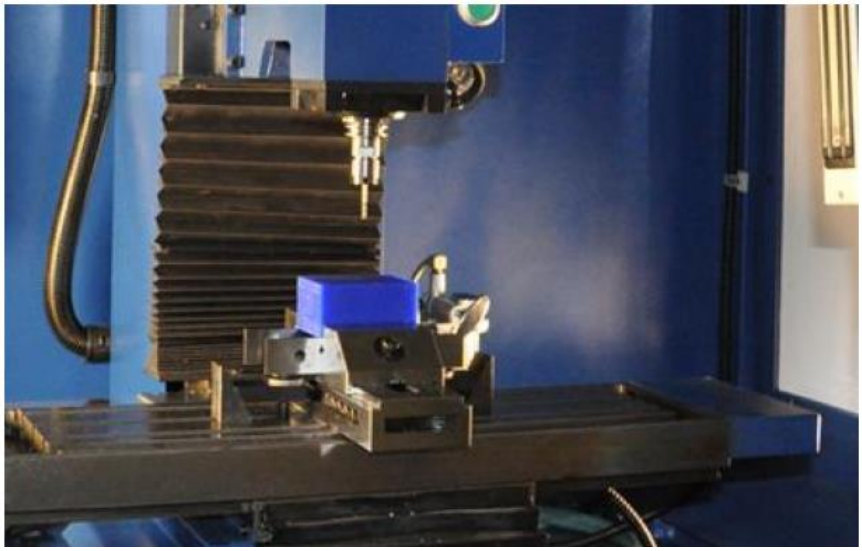


10. Show your assembled vise to your instructor.

6. Securing the Workpiece

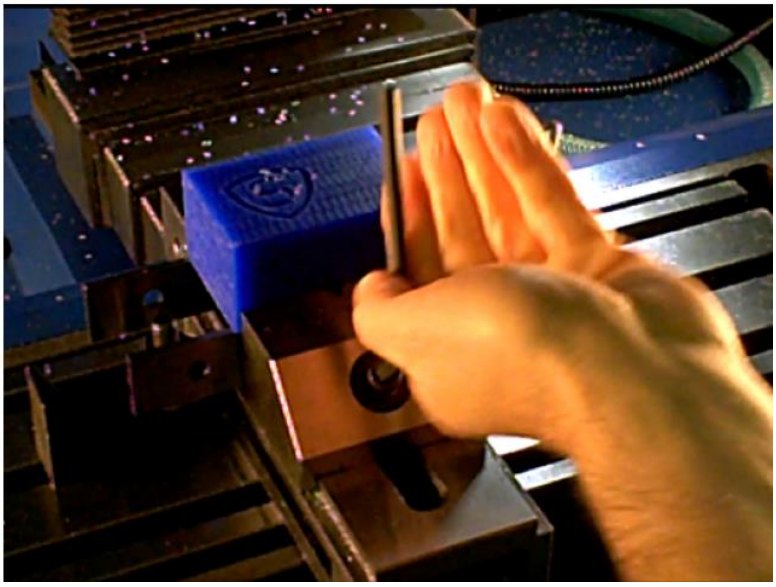
Perform the following:

1. Place the remaining step clamp flat on the bottom of the vise, against the fixed vise jaw.
2. Place a wax workpiece against the fixed jaw of the vise, on top of the spacer. At least an 1/8th inch (3 mm) of the stock should be above the vise jaws.



3. Align the edge of the stock with the edge of the vise.
4. Manually push the movable vise jaw up against the workpiece.

5. Insert a Hex Allen wrench into the hole on the movable jaw of the vise and turn clockwise to tighten the jaws of the vise so that the workpiece is secure in the vise.



6. Ensure that the workpiece is absolutely secure and cannot move at all.
7. Show the secured workpiece to your instructor.
8. Close the safety shield.

7. Moving the Cross-slide

Now that the vise is assembled and the workpiece is secured, you can move the workpiece by jogging the cross-slide.

Perform the following:

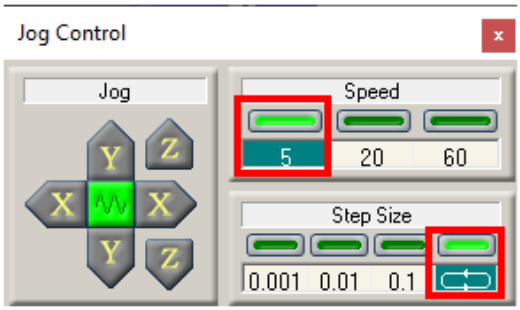
1. In CNCMotion, select **Window > Run and Edit Screen** to display the 3D image.
2. Home the machine (send the spindle and cross-slide to its preset position). To do so, click the Home icon, and then select **Home**.

3. In the Jog Control window:

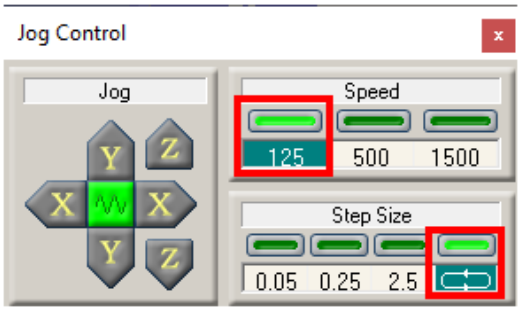
   a. Set the Speed to the slowest setting.

   b. Set the Step Size to continuous movement.

Imperial



Metric



4. Click each of the X and Y options and note the direction in which the cross-slide moves. Remember that positive and negative directions are determined by the direction in which the *spindle* moves relative to the workpiece.

5. Once you get comfortable with the movement of the X and Y axes, increase the speed to the maximum and move the axes again.

6. In the Jog Control window, select the highest step size.

7. Move the axes again. Note the change in motion.

8. Show the two types of axis movement (continuous and step) to your instructor.

8. 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

9. Shutdown

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

- ☐ Insert a Hex Allen wrench into the hole on the movable jaw of the vise and turn it counterclockwise to release the jaw until you can remove the workpiece.
- ☐ Store away the workpiece. You will use this workpiece in the coming activities.
- ☐ Tidy your workstation and store away any loose mill components.
- ☐ Switch off the milling center.