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Tech labs

TECH 8

Tapping and threading

PROGRAMS:	EST, AST
LAB TYPE:	Technique
CONCEPT:	Manufacturing (characteristics of tapping and threading)
STUDENT BOOK:	Chapter 12, page 415
TOOLBOX:	Pages 88–89

GOAL

Apply the techniques of threading and tapping to produce a threaded rod and a nut.

MATERIALS

- cylindrical steel rod (6.4 mm (1/4 inch) diameter, at least 25 mm length)
- metal ruler
- scratch awl
- band saw
- push block
- bench vise
- flat file
- 6.4-mm (1/4-inch) die
- diestock
- applicator containing cutting oil
- paper towels
- hexagonal piece of steel (11 mm (7/16 inch) width across flats × 5.6 mm (7/32 inch) height)
- hammer
- centre punch
- drill press vise
- drill press
- 5.6-mm (7/32-inch) metal drill bit
- 6.4-mm (1/4-inch) tap
- tap wrench
- 6.4-mm (1/4-inch, nominal diameter) hex nut
- 6.4-mm (1/4-inch, nominal diameter) screw

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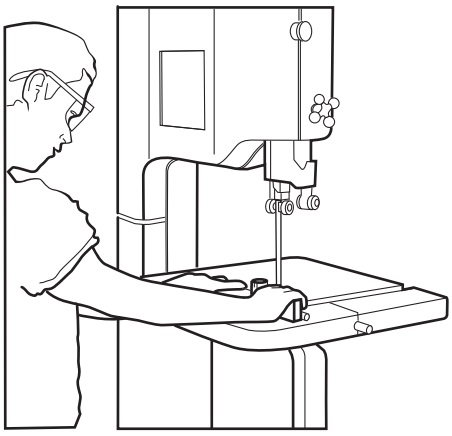
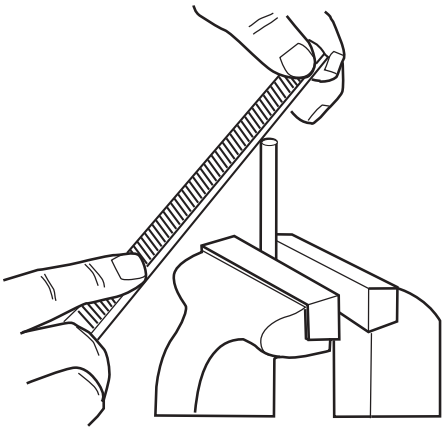
PROCEDURE

1. Threading

Make a threaded rod, following the manufacturing process sheet below.

Manufacturing process sheet
Part: threaded rod
Main material: 6.4-mm cylindrical steel rod

No.	Operation		
10	**Measuring and laying out**	**Illustration**	**Materials**
11	If necessary, measure and mark a 25-mm length of steel rod.		• Metal ruler • Scratch awl
20	**Machining**	**Illustration**	**Materials**
21	Cut the rod at the marking.		• Band saw • Push block
22	Secure the rod in the vise and file the cut end of the rod.		• Bench vise • Flat file

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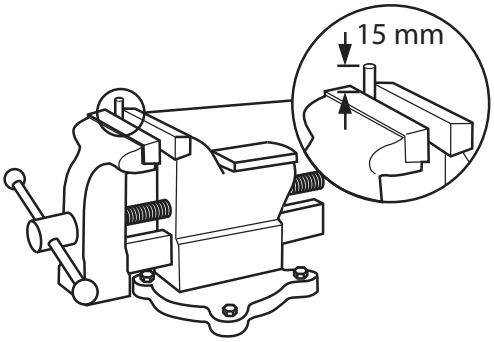
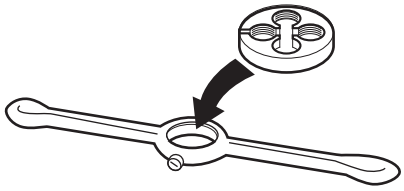
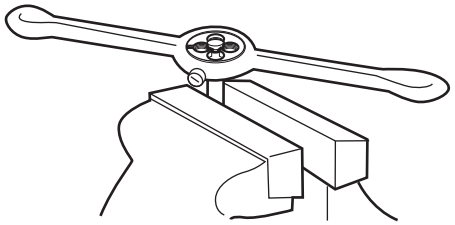
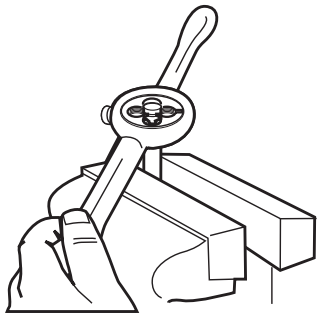
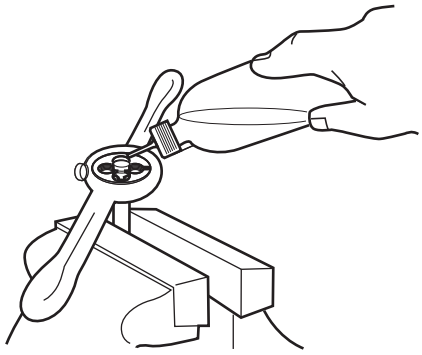
23	Adjust the position of the rod so that it is vertical, with a length of 15 mm extending beyond the vise jaws.		• Bench vise
24	Insert the die into the diestock.		• 6.4-mm die • Diestock
25	Place the die on the filed edge of the rod. Make sure the die is perfectly perpendicular to the rod.		• 6.4-mm die • Diestock • Bench vise
26	Fit the die onto the rod, giving the diestock a quarter turn clockwise.		• 6.4-mm die • Diestock • Bench vise
27	Lubricate the junction between the die and the steel rod with cutting oil.		• Applicator containing cutting oil • 6.4-mm die • Diestock • Bench vise

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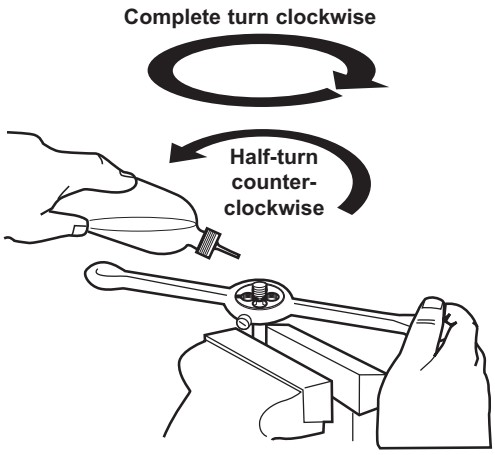
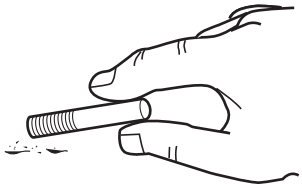
28	Gently turn the diestock clockwise. After each full turn, make a half-turn counterclockwise to remove any residue that may have formed during threading. Apply cutting oil as needed. Proceed with threading until the diestock reaches the jaws of the vise.		• Applicator containing cutting oil • 6.4-mm die • Diestock • Bench vise
30	**Finishing**	**Illustration**	**Materials**
31	Shake the threaded rod to remove any remaining residue in the threads.		
32	Sponge off excess cutting oil with a paper towel.		• Paper towel

2. Tapping

Make a hex nut, following the manufacturing process sheet below.

Manufacturing process sheet
Part: hex nut
Main material: hexagonal piece of steel (11 mm width across flats, 5.6 mm height)

No.	Operation		
10	**Measuring and laying out**	**Illustration**	**Materials**
11	Scratch a line between each pair of opposite vertexes on the piece of steel.		• Metal ruler • Scratch awl

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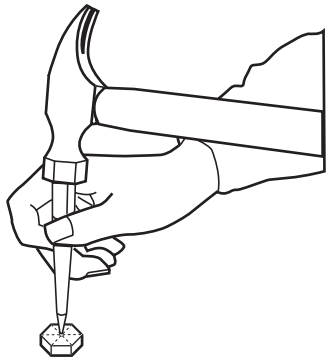
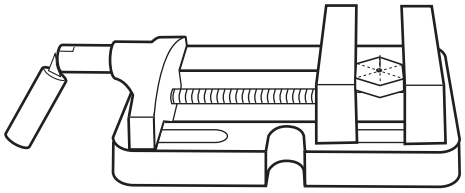
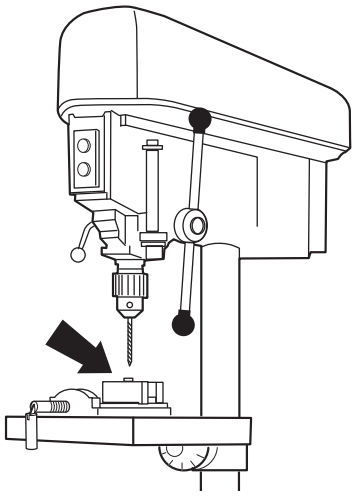
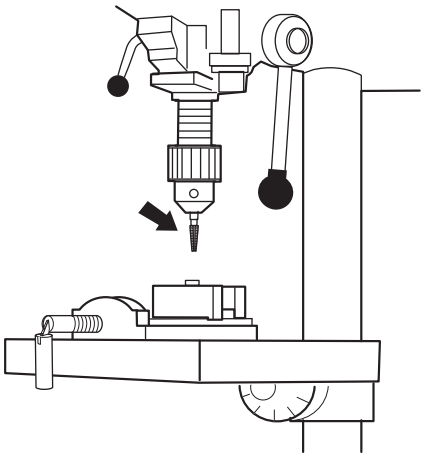
12	Punch a starter hole at the intersection of the three lines you drew in step 11.		• Hammer • Centre punch
20	**Machining**	**Illustration**	**Materials**
21	Secure the piece of steel in the drill press vise.		• Drill press vise
22	Place the vise on the drill press table. Drill a 5.6-mm hole in the piece of steel, centring it at the starter hole you made in step 12.		• Drill press • 5.6-mm metal drill bit • Drill press vise
23	Remove the bit from the drill press and install the tap in its place.		• Drill press • 6.4-mm tap

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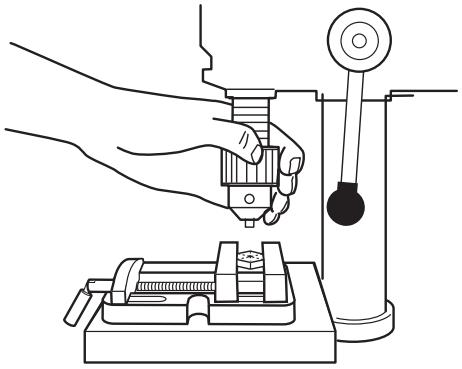
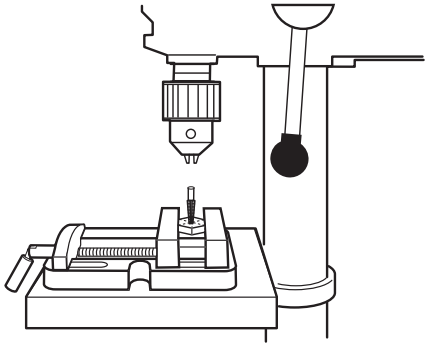
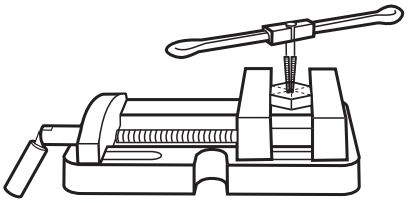
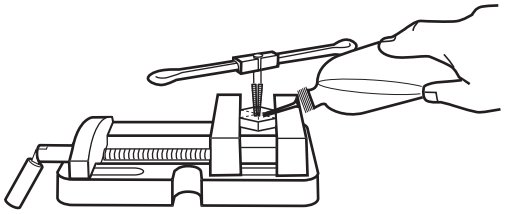
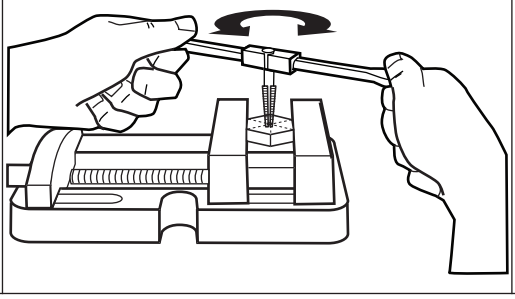
24	Place the tap just above the hole in the piece of steel. Fit the tap into the hole by lowering the drill chuck and, at the same time, turning the chuck clockwise by hand.		• Drill press • Drill press vise • 6.4-mm tap
25	Remove the tap from the drill press, leaving it fitted in the hole in the piece of steel.		• Drill press • Drill press vise • 6.4-mm tap
26	Place the drill press vise on the worktable and mount the tap wrench on the tap.		• Drill press vise • 6.4-mm tap • Tap wrench
27	Lubricate the junction between the tap and the edges of the hole with cutting oil.		• Applicator containing cutting oil • Drill press vise • 6.4-mm tap • Tap wrench
28	Turn the tap gently clockwise by turning the tap wrench. After each full turn, make a half-turn counterclockwise to remove any residue that may have formed during tapping. Apply cutting oil as needed.		• Applicator containing cutting oil • Drill press vise • 6.4-mm tap • Tap wrench

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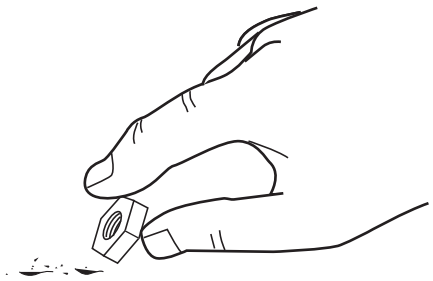
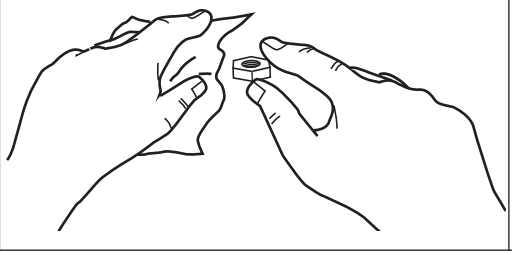
30	Finishing	Illustration	Materials
31	Shake the finished nut to remove any remaining residue in the threads.		
32	Sponge off excess cutting oil with a paper towel.		• Paper towel

REFLECTING ON THE LAB TECHNIQUE

1. During this lab you applied two techniques: threading and tapping.

a) What is the difference between these two techniques?

_____

_____

_____

b) Give some examples of parts that are manufactured by threading.

_____

c) Give some examples of parts that are manufactured by tapping.

_____

2. Try to thread an industrially manufactured hex nut onto your threaded rod.

a) Are the two parts compatible? Explain your answer.

_____

_____

b) What can you conclude about your technique for making a threaded rod?

_____

_____

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3. Try to thread your hex nut onto an industrially manufactured bolt.

a) Are the two parts compatible? Explain your answer.

_____

_____

b) What can you conclude about your technique for making a hex nut?

_____

_____

4. Try to thread your hex nut onto your threaded rod.

a) Name at least two necessary conditions for the two parts to be compatible.

_____

_____

b) Are the two parts compatible? Explain your answer.

_____

_____

5. What improvements can you suggest to the manufacturing processes in this lab?

_____

_____

_____