

## Chapter 2

# Shop Safety

### LEARNING OBJECTIVES

After studying this chapter, students will be able to:

- Give reasons why shop safety is important.
- Explain why it is important to develop safe work habits.
- Recognize and correct unsafe work practices.
- Apply safe work practices when employed in a machine shop.
- Select the appropriate fire extinguisher for a particular type of fire.

### INSTRUCTIONAL MATERIALS

**Text:** pages 23–28

Test Your Knowledge Questions, page 28

**Workbook:** pages 11–14

**Instructor's Resource:** pages 49–56

Guide for Lesson Planning

Research and Development Ideas

Reproducible Masters:

2-1 Fire Extinguishers and Fire Classifications

2-2 Test Your Knowledge Questions

Color Transparency (Binder/CD only)

### GUIDE FOR LESSON PLANNING

Introduce the chapter with a display of safety equipment and safety posters. Discuss the duties of a safety officer in industry. Safety *cannot* be overemphasized!

Have students read and study the chapter. Review the assignment and discuss the following:

- State and shop/lab safety requirements.
- Students must assume responsibility for their safety and others in the shop/lab.
- Approved eye protection must be worn while working in the shop/lab.

- No machines to be operated until instructions have been given in its operation.
- No machines are to be operated unless all guards and safety devices are in place and functioning properly.
- Permission must be received before operating a machine tool.
- Dress must be appropriate.
- Students must avoid operating machine tools and other equipment while their senses are impaired by medication or other substances.
- Safe technique for handling metal chips and cuttings produced while operating machine tools.
- Importance of washing hands thoroughly after working in the machine shop/lab.
- Safe disposal of cloths used to clean machines.
- Procedure to be followed for reporting and taking care of any cut, burn, bruise, scratch, or puncture, no matter how minor it may appear.

### Technical Terms

Review the terms introduced in the chapter. New terms can be assigned as a quiz, homework, or extra credit. These terms are also listed at the beginning of the chapter.

*adequate ventilation*  
*approved-type respirator*  
*back injuries*  
*combustible materials*  
*electrocution*  
*OSHA*  
*protective clothing*  
*safety equipment*  
*unsafe practice*  
*warning signs*

### Review Questions

Assign *Test Your Knowledge* questions. Copy and distribute Reproducible Master 2-2 or have students use the questions on page 28 in the text and write their answers on a separate sheet of paper.

### Workbook Assignments

Assign Chapter 2 of the *Machining Fundamentals Workbook*.

### Research and Development

Discuss the following topics in class or allow students to choose topics for individual or group projects.

1. Invite a local industry safety officer to discuss typical safety programs, and why industry places so much emphasis on a safe working environment.
2. Ask a representative from your local fire department to demonstrate the proper use of fire extinguishers and what to do in case of a fire in the shop. Copy and distribute Reproducible Master 2-1.
3. Invite a safety expert from a local shop or a safety equipment supplier to evaluate your safety program and make recommendations for any necessary improvements.
4. Work with school officials to see what protective eye wear is available for each student. Prepare a table of estimated needs, cost per year, and cost in succeeding years.
5. Develop and produce a series of colorful safety posters for the shop.
6. Prepare visual aids on safe work habits to be observed when using hand and machine tools.

7. Secure samples of safety posters and other safety program features used by local industry.
8. Design and construct a bulletin board on eye safety.
9. Contact the National Society for the Prevention of Blindness, 1790 Broadway, New York, New York 10019, for information on its Wise Owl Club of America.
10. Show a video or film on eye safety.
11. Produce a slide show or video on safe work habits when using the lathe, drill press, grinder, or vertical milling machine.

### TEST YOUR KNOWLEDGE ANSWERS, Page 28

1. Evaluate individually.
2. carelessness
3. c. the entire time you are in the shop.
4. spontaneous combustion
5. Flying chips can cause serious eye injuries and vaporized oil can cause a fire and result in painful burns and property damage.
6. you have received instructions on its safe operation; all guards are in place; it has been determined that it is in safe operating condition
7. adjustments, measurements
8. brush, hands
9. adequate ventilation  
approved dust/fume mask
10. attention
11. heavy machine accessories or large pieces of metal stock
12. Check with your doctor, pharmacist, or school clinic to determine whether it will be safe for you to operate a machine.
13. Evaluate individually.

































### WORKBOOK ANSWERS, Pages 11–14

1. a. at all times when in the shop
2. habit
3. c. Both a and b.
4. brush, pliers
5. c. spontaneous combustion may result

6. d. Both b and c.
7. ventilation, dust mask
8. Evaluate individually.
9. d. All of the above.
10. e. Both a and c.
11. Any two of the following: when your senses are affected by medication, all guards and safety features are not in place, you have not been instructed in the safe operation of the machine.
12.
  - a. When working in a noisy area.
  - b. When handling solvents, cutting fluids, and oils.
  - c. When machining produces airborne dust particles.
13. d. All of the above.
14. c. Class C Fires
15. b. Class B Fires
16. a. Class A Fires
17. d. Class D Fires
18. Evaluate individually.
19. Evaluate individually.
20. Evaluate individually.



# Fire Extinguishers and Fire Classifications

Fires	Type	Use	Operation										
<p><b>Class A Fires</b> Ordinary Combustibles (Materials such as wood, paper, textiles.) <i>Requires. . . cooling-<u>quenching</u></i></p> 	<p><b>Soda-acid</b> Bicarbonate of soda solution and sulfuric acid</p> 	<p>Okay for use on</p>  <p>Not for use on</p> 	<p>Direct stream at base of flame.</p>										
<p><b>Class B Fires</b> Flammable Liquids (Liquids such as grease, gasoline, oils, and paints.) <i>Requires. . . blanketing or smothering</i></p> 	<p><b>Pressurized Water</b> Water under pressure</p> 	<p>Okay for use on</p>  <p>Not for use on</p> 	<p>Direct stream at base of flame.</p>										
<p><b>Class C Fires</b> Electrical Equipment (Motors, switches, and so forth.) <i>Requires. . . a nonconducting agent.</i></p> 	<p><b>Carbon Dioxide (CO<sub>2</sub>)</b> Carbon dioxide (CO<sub>2</sub>) gas under pressure</p> 	<p>Okay for use on</p>  <p>Not for use on</p> 	<p>Direct discharge as close to fire as possible, first at edge of flames and gradually forward and upward.</p>										
<p><b>Class D Fires</b> Combustible Metals (Flammable metals such as magnesium and lithium.) <i>Requires. . . blanketing or smothering.</i></p> 	<p><b>Foam</b> Solution of aluminum sulfate and bicarbonate of soda</p> 	<p>Okay for use on</p>  <p>Not for use on</p> 	<p>Direct stream into the burning material or liquid. Allow foam to fall lightly on tire.</p>										
<p><b>Dry Chemical</b></p> 	<p><b>Dry Chemical</b></p> 	<table border="1"> <tr> <td>Multi purpose type</td> <td>Ordinary BC type</td> </tr> <tr> <td>Okay for</td> <td>Okay for</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>Not okay for</td> <td>Not okay for</td> </tr> <tr> <td></td> <td></td> </tr> </table>	Multi purpose type	Ordinary BC type	Okay for	Okay for			Not okay for	Not okay for			<p>Direct stream at base of flames. Use rapid left-to-right motion toward flames.</p>
Multi purpose type	Ordinary BC type												
Okay for	Okay for												
													
Not okay for	Not okay for												
													
<p><b>Dry Chemical</b> <i>Granular type material</i></p>	<p><b>Dry Chemical</b> <i>Granular type material</i></p>	<p>Okay for use on</p>  <p>Not for use on</p> 	<p>Smother flames by scooping granular material from bucket onto burning metal.</p>										

# Shop Safety

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_

1. Why is shop safety so important? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
2. Most shop accidents are caused by \_\_\_\_\_. 2. \_\_\_\_\_
3. Safety glasses should be worn \_\_\_\_\_. 3. \_\_\_\_\_
  - a. most of the time
  - b. only when working on machines
  - c. the entire time you are in the shop
  - d. None of the above.
4. Oily rags should be placed in a safety container to prevent \_\_\_\_\_. 4. \_\_\_\_\_
5. Why should compressed air not be used to clean chips from machine tools?  
 \_\_\_\_\_  
 \_\_\_\_\_
6. Never attempt to operate a machine until \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
7. Always stop machine tools before making \_\_\_\_\_ and \_\_\_\_\_. 7. \_\_\_\_\_  
 \_\_\_\_\_
8. Use a(n) \_\_\_\_\_ to remove chips and shavings, *not* your \_\_\_\_\_. 8. \_\_\_\_\_  
 \_\_\_\_\_
9. When working in an area contaminated with dust or solvent fumes, be sure there is \_\_\_\_\_. A(n) \_\_\_\_\_ should also be worn when working in a dusty area. 9. \_\_\_\_\_  
 \_\_\_\_\_
10. Secure prompt \_\_\_\_\_ for any cut, bruise, scratch, or burn. 10. \_\_\_\_\_
11. Get help when moving \_\_\_\_\_  
 \_\_\_\_\_

Name: \_\_\_\_\_

12. What should you do before operating a machine tool if you are taking medication of any sort?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

13. Why is it necessary to take special precautions when handling long sections of metal stock?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

