LEARNING OBJECTIVES
After studying this chapter, students will be able to:
- Understand why cutting fluids are necessary.
- List the types of cutting fluids.
- Describe each type of cutting fluid.
- Discuss how cutting fluids should be applied.

INSTRUCTIONAL MATERIALS
Text: pages 149–152
  Test Your Knowledge Questions, page 152
Workbook: pages 53–54
Instructor's Resource: pages 135–138
  Guide for Lesson Planning
  Research and Development Ideas
  Reproducible Master:
    9-1 Test Your Knowledge Questions
  Color Transparency (Binder/CD only)

TECHNICAL TERMS
- chemical cutting fluids
- contaminants
- cutting fluids
- emulsifiable oils
- gaseous fluid
- lubricating
- mineral oils
- misting
- noncorrosive
- semichemical cutting fluids

GUIDE FOR LESSON PLANNING
Have students read and study the chapter. Review the assignment with them and discuss the following:
- The function of cutting fluids.
- Types of cutting fluids.
- When each type of cutting fluid is used.
- How cutting fluids are applied.
- When certain types of cutting fluids should not be used.
- The need to wash hands thoroughly after using cutting fluids.

Review Questions
Assign Test Your Knowledge questions. Copy and distribute Reproducible Master 9-1 or have students use the questions on page 152 and write their answers on a separate sheet of paper.

Workbook Assignment
Assign Chapter 9 of the Machining Fundamentals Workbook.
Research And Development

Discuss the following topics in class or have students complete projects on their own.
1. Contact cutting fluid manufacturers for literature on their products.
2. Prepare charts on the cutting fluids recommended for use when machining various materials.
3. Inspect the coolant equipment on the machine tools in the shop/lab. Prepare a report on their condition and, if necessary, make recommendations on how they can be improved.

TEST YOUR KNOWLEDGE ANSWERS, Page 152

1. Answers will vary but may include the following: cool the work and cutting tool; improve surface finish quality; lubricating to reduce friction and cutting forces, thereby extending tool life; minimize material buildup on cutting tool edges; protect machines surfaces against corrosion; and flush away chips.
2. Any order: mineral oils, emulsifiable oils, chemical and semichemical fluids, gaseous fluids.
4. Answers will vary but may include the following: high cost, operator health problems, stain some metals, have a tendency to become rancid.
5. Emulsifiable oil
6. Answers will vary but may include the following: increased cooling capacity, cleaner to work with, less danger to health, and present no fire hazard.
7. Chemical
8. semichemical
9. Evaluate individually. Refer to Section 9.1.3.
10. Blows away chips at high velocity.

WORKBOOK ANSWERS, Pages 53–54

1. mineral
2. light-duty (low speed, light feed) operations where high levels of cooling and lubrication are not required
3. d. All of the above.
4. An approved respirator must be worn.
5. d. All of the above.
6. wetting
7. d. All of the above.
8. Some formulas have minimal lubricating qualities; they may cause skin irritation in some workers; and when they become contaminated with other oils, disposal can be problematic.
9. water-based
10. cooling, chips
11. cooling rates
1. Cutting fluids must do many things simultaneously. What does this include? 
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2. List the four basic types of cutting fluids. 
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

3. What type cutting oil is recommended for machining aluminum, magnesium, brass, and free-
machining steels? 
____________________________________________________________________________________

4. Why does the above type of cutting fluid have limited use? 
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

5. _____ cutting fluids are also known as soluble oils.

6. What advantages do the emulsifiable oil cutting fluids have over the cutting fluids indicated in
Question 3? 
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

7. _____ cutting fluids contain no oils.

8. When small amounts of mineral oil are added to the cutting fluid described in Question 7, it is known as
_____ cutting fluid.

9. What are the advantages of the cutting fluids indicated in Questions 7 and 8? 
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

10. What is dangerous about using compressed air to cool the area being machined? 
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________