

## 23 METALWORKING MACHINERY

### ANSWERS—QUIZ 1

1. b
2. a
3. b
4. a, d
5. c
6. a, b, or c
7. Metalworking machinery is used to shape or form metal by cutting, impact, pressure, electrical techniques, chemical techniques, or a combination of these processes.
8. Spinning lathes reach speeds of 500 to 2,000 rpm.
9. Operations performed with drilling machines include countersinking, reaming, tapping, facing, spot facing, and routing.
10. Grinding machines shape material by bringing it into contact with a rotating abrasive wheel or disk. Grinding includes surface, internal, external cylindrical, and centerless operations, as well as polishing, buffing, honing, and wire brushing.
11. Insecurely clamped workpieces and unenergized magnetic chucks are the common sources of injury to operators of surface grinders.
12. Planers machine metal surfaces by holding the cutting tool stationary while the workpiece is moved back and forth underneath it, whereas for shapers the workpiece is held stationary while the cutting tool is moved back and forth.
13. When unpacking abrasive disks and wheels, inspect them for damage from shipment and have a qualified person give them the “ring” test. This test can be used for both light and heavy disks or wheels that are dry and free of foreign material. To conduct the test, suspend a light disk or wheel from its hole on a small pin or a finger, and place a heavy one vertically on a hard floor. Then gently tap the wheel or disk with a light tool, such as a wooden screwdriver’s handle. A mallet may be used for heavy wheels or disks. Make the tap at a point 45 degrees from the vertical centerline and about one or two inches from the periphery. A wheel or disk in good condition will give a clear, metallic ring when tapped.

### ANSWERS—QUIZ 2

1. a
2. b
3. a
4. b, c
5. a
6. A major cause of accidents from machine tools is the careless use of high-pressure compressed air to blow chips, cuttings, or shavings from machines or workers’ clothing.
7. In slotter operations, the most serious accident is for the worker’s fingers to get caught between the tool and the workpiece.
8. Wire brush wheels, or scratch wheels, are used to remove burrs, scale, sand, and other materials.
9. Personal protective equipment is especially necessary when operating scratch wheels because the wires tend to break off. Operators must wear aprons made of leather, heavy canvas, or other heavy material; leather gloves; face shields; and goggles.
10. A circular saw for cutting cold metal stock should have a hood guard at least as deep as the roots of the teeth. The guard should automatically adjust itself to the thickness of the stock being cut. Use a sliding stock guard when tube or bar stock is cut. Guard the portion of the saw under the table with a complete enclosure that provides for disposal of scrap metal. A plastic or metal guard placed in front of and over the saw provides protection against flying pieces of metal.

### ANSWERS—CASE STUDY

1. The machine tool operator’s safety depends largely upon following established safe working procedures and wearing proper protective clothing and equipment.
2. The following rules apply to safely operating any machine tool. Operators should know and comply with these rules:
  - Never leave machine tools running unattended, unless the machine has been designed to do so.
  - Use proper personal protective equipment.
  - Do not throw refuse into or spit into the machine tools’ coolant. Such actions foul the coolant and might spread disease.
  - Do not manually adjust and gauge (caliper) work while the machine is running.

- Use brushes, vacuum equipment, or special tools for removing chips. Do not use hands.
  - Understand the differences in machining ferrous and nonferrous metals, and know the health or fire hazards of working with these metals.
  - Use the proper hand tools for each job.
3. All machine tool operators should wear eye protection with side shields. Wearing close-fitting clothing is also vitally important to the operator's safety. Many serious injuries and fatalities have resulted when neckties, loose shirt sleeves, gloves, or other clothing have been caught in a belt and sheave, between gears, or in a revolving shaft. Operators should not wear rings, necklaces, or other jewelry that can get caught in machinery. Long hair that could be caught by moving parts should be covered. Because most machine operations involve handling heavy stock or machine parts, every operator should wear protective footwear.