

25 HOT WORKING OF METALS

ANSWERS—QUIZ 1

1. a
2. a
3. a
4. b
5. a
6. a
7. c
8. c
9. a
10. d
11. b
12. There are several ways to determine the need for ventilation controls, including consulting applicable federal, state, or local regulations or standards, codes or recommendations; comparing air quality with similar operations in similar environments; and analyzing representative air samples taken in the breathing zone of workers.
13. Objects may fall from the platform and carbon monoxide could escape from the flues.
14. The main hazards are excess smoke, gases, and fumes; unprotected fire pits; unguarded, vertical sliding doors or their counterweights; and flashbacks from fire boxes.
15. They should be long enough that they can be held at the side of the body rather than in front.
16. The type and size of a die and the type of hammer determine the method to be used.
17. They should first lock out the power source so the equipment cannot run while repairs are being done.
18. The six types of testing most commonly used for forged and cast metals are (1) magnetic particle inspection, (2) penetrant inspection, (3) ultrasonic methods, (4) triboelectric method, (5) electromagnetic tests, and (6) radiography.
19. It should include several different examinations, starting with a baseline physical examination that includes a chest x-ray, an audiometric test, and a pulmonary-function test. It should set up periodic physical examinations using the same tests to monitor employee health, detect the initial stages of disease, and help reclassify workers as needed. The program should provide adequate first aid facilities

that have been approved by a physician, as well as employee training in first aid. If respirators must be worn, regulatory requirements must be met and industrial hygiene should be monitored. Employees should know the hazards associated with their working conditions and the proper emergency responses. Material Safety and Data Sheets should be available for all employees.

20. Since steam hammers represent a sizeable portion of forging equipment, a definite maintenance schedule should be set up for them. In reality, many steam hammers are not maintained as well as they could be. As a result they become inefficient. Usually the cost of operation is not known, but maintenance costs are higher for units that are in poor condition. Steam can be lost from worn piston rings or sleeves, loose heads, blown head gaskets, and leaky glands. Replacing worn rings reduces costs. Worn piston sleeves and sloppy linkage make a steam hammer hard to control and create a hazard. Loose cylinder heads are also hazardous.

ANSWERS—QUIZ 2

1. b
2. b
3. a
4. b
5. b
6. c
7. d
8. b
9. d
10. d
11. b
12. On the one hand is the problem of cleaning and removing deposits; on the other is the problem of controlling dust at the point of origin to prevent further dispersion and accumulation.
13. Floors should be pitched away to provide drainage and to prevent incidents, especially those caused by spills and “run-outs” of molten metal.
14. An operator who is “botting-up” should not thrust a bott directly into a stream of molten metal because that would cause a spattering hazard.
15. A scale guard can be hinged on one side to an upright post so that it can be swung closed or open; sup-

ported on a floor standard; or suspended from the ceiling or anchored to a rail.

16. A hard, brittle, or thin-skinned weld can become a flying hazard under impact. Therefore, the rod as well as the pre- and postheating methods used for the repair should be selected cautiously
17. The single most important factor when it comes to preventing injuries from forging presses is the operator's control of the tools and methods used.
18. The materials used are finely divided ferromagnetic particles that are selected, ground, and controlled to provide mobility and sensitivity.
19. To guard against these dangers, workers should be prohibited from shoveling sand out of mills while they are operating. Management can provide screen enclosures for charging and discharging the openings of mills. In some instances, self-discharging mills could be installed or existing mills could be equipped with discharge gates or scoops. Management could provide sampling cones so workers could take samples of the sand during the mixing operation. Another solution would be to install an interlocking device so the mill cannot be operated until the doors are closed.
20. The most frequent injuries include being struck by flying drift and key fragments, or by flash and slugs. Workers who use feeler gauges to check the guides, wear, or the matching of dies are also frequently injured, as are workers who use material-handling equipment improperly. Workers can crush their fingers, hands, or arms between dies or between tong reins. Some injuries are caused by kickbacks from tongs, by being burned by hot scale, and by getting foreign objects in the eye. In some cases, workers injure themselves by using swabs or scale-blowing pipes with short handles or by dropping stock on their feet. Noise-induced hearing loss is also a frequent problem.

economic. In such cases, management can develop a program that provides approved hearing protection for each worker and minimizes exposure to noise hazards.

2. Good housekeeping is essential for the safe handling of magnesium. Workers should prevent magnesium dust from accumulating on benches, floors, window ledges, overhead beams and pipes, and other equipment. They should not use vacuum cleaners to collect the dust; instead, they should sweep it up and place it in covered, plainly labeled iron containers. If it is not reused for other operations, it should be disposed of in accordance with federal, state, and local, regulations. Magnesium dust should not be mixed with regular floor sweepings.
3. In addition to these housekeeping precautions, grinding operations should use dust-proof motors to prevent the accumulation of static charges. The dust-collection system should be equipped with explosion doors and have an automatic interlocking control to assure its operation whenever grinding starts. Workers should know it is dangerous for them to use equipment that grinds magnesium to grind other metals because sparks can be produced. Equipment for magnesium grinding should be marked: FOR MAGNESIUM ONLY. Workers should use benches made of wood grating for rough finishing operations. Warning signs should be prominently displayed inside and outside the grinding area warning against smoking and against the use of water on magnesium fires. The signs should instruct workers how to use powdered graphite, limestone, or dolomite as extinguishing agents. Workers should keep an ample supply of powdered graphite close to each grinding unit in case of sparks.

ANSWERS—CASE STUDY

1. Controlling excessive levels of noise (over 85 dBA) can be difficult in foundries. It is not always possible to control noise using engineering solutions because of a lack of technology. Sometimes it is impractical because the exposure is infrequent and only occurs for short periods of time; sometimes the reasons are