to help prevent fire

Powder washing, a method in which a stream of powdered iron oxide is introduced into the gas flame to intensify the heat produced, should be done according to the same safe practices as other welding and cutting of carbon steel or cast iron However, when this method is used to clean or cut sprues, gates, and risers from alloyed castings, exhaust ventilation is recommended

Power presses

Power presses have wide application in finishing departments of foundries Sufficient aisle space, good housekeeping, and effective lighting should be provided for safety in power press operation Machines should be fully guarded and maintained in good working order Operators should be carefully selected and should be trained in efficient and safe operation of the machine Mechanical feed and ejection equipment should be used where practical

These topics are fully discussed in Chapter 32, "Cold Forming of Metals"

Nondestructive Testing

Visual observation, even with magnification, cannot locate all small, below-the-surface defects in cast and forged metals Proper nondestructive testing will, however, reveal all such defects positively without damage to the parts being tested Nondestructive testing methods will locate defects inherent in the metal (nonmetallic inclusions, shrinkage, porosity), defects that result from processing (high residual stresses, cracks and checks caused by handling, sprung, or grinding of castings and forgings), and in-service defects (sharp changes in section, corrosion, erosion)

The types of testing most commonly used for forged and cast metals are

1. Magnetic particle
2. Penetrant
3. Ultrasonic
4. Triboelectric
5. Electromagnetic
6. Radiographic

These methods, as well as others applicable to nonmetallic substances, are fully discussed in NSC Data Sheet 488, *Nondestructive Testing of Materials*

Recommendations for installation, inspection, and maintenance of the electrical equipment used in many of these testing procedures are given in Chapter 41, "Electrical Hazards"

Magnetic particle methods

Magnetic particle inspection is the most widely used test method It utilizes magnetism to attract and hold very fine magnetic particles right on the part itself If a defect is present, it interrupts the magnetic field and is clearly shown by the pattern made by the particles The part is magnetized in suitable directions by dc line voltages transformed to low-voltage (4 to 18 volts), high-amperage ac, half-wave current, or three-phase full-wave current

Inspection materials are finely divided ferromagnetic particles selected, ground, and controlled to provide mobility and sensitivity Materials are available in several forms and colors The type of defect to be located and the condition of the surface to be inspected determine which form of material and which method—dry, wet, or fluorescent—should be used Color is selected to provide maximum contrast with the surface of the part

All electric circuits should be installed and grounded according to standard procedures

Local exhaust is required to control the dust particles used for testing If local exhaust is not feasible, operators should wear respiratory protective equipment Eye protection should also be worn to guard against the irritating effects of the dust particles

Since the magnetic particle magnetizing equipment may produce arcing, it should not be used in an area where combustible gases or vapors may be present

Penetrant Inspection

Penetrant inspection methods are useful for revealing cracks, pores, leaks, and similar defects which are open to the surface in a metal or other solid material First, the part to be inspected is cleaned A penetrant is then applied to the surface and within a few minutes is drawn into defects by capillary action The penetrant is removed from the surface but remains in the defects.

A developer which acts like a blotter and brings the penetrant in the defects back to the surface is then applied, and the surface is inspected

Depending upon the sensitivity of the ma-