illumination so that ample illumination falls on the point of operation (See "Levels of Illumination" table in Chapter 47) There should be no reflected glare or shadows Any moving shadows or possible stroboscopic action should be avoided

The working surfaces of all machines should be of a height that will contribute a minimum of fatigue for the operator Manufacturers of machines design the height of the work surface for persons of average stature If an operator is of less than average stature and the machine cannot be lowered, a substantial platform securely fastened to the floor and of compensating height should be provided The height of all auxiliary tables and supports for the work in operation should be the same as the machine Average heights from floor to points of operation are considered 36 in for hand-fed circular saws, 32 in for power-fed circular saws, 42 in for band saws, 36 in for shapers and jointers

All belts, shafts, gears or other moving parts should be fully enclosed The metal frames of machines should have all noncurrent carrying parts grounded The frames of all portable electrical power tools held in the hand shall have a separate ground wire in the power cord and polarized plug Provision should be made for the removal of sawdust and scrap, so that they do not accumulate Finely divided dust, such as could be generated from finishing or sanding machines, should be caught and confined before a dusty atmosphere can be made Finely divided dust atmospheres can cause explosion and fire hazards

Cutting tools should be kept sharp at all times Not only do dull tools produce poorer work and require more power, but they also have a tendency to "grab" and therefore create an unnecessary hazard

The working surface should be kept entirely free from scrap and waste If scrap or waste comes in contact with a revolving saw or cutter, another unnecessary hazard is created

Floors should be well maintained to prevent splintering conditions and protruding nails Floors should be kept even and free from holes Floors in the area of machines should be maintained so that the floors will not become polished and slippery Nonslip treads or nonslip paint will reduce this hazard

Aisleways should be established by painted lines or other markings One-way aisleways should be equal to width of the widest vehicle plus 3 ft A two-way aisleway should be twice the width of the widest vehicle plus 3 ft

All machines should be constructed and maintained so that they are free of all sensible vibration while running at full speed, with the largest cutting tool mounted The machines should be designed so that a larger size tool than the machine was designed for cannot be mounted Alterations by operators or maintenance men should not be made to eliminate this safety feature All arbors and mandrels should be constructed so that they have a firm and secure bearing and are free from play All belts, pulleys, gears, shafts and moving parts should be enclosed and guarded so no one can contact them This also includes power drives in the back of the machine, or moving parts in other remote locations

All operators and helpers should have proper apparel—no loose sleeves or parts of clothing which may become entangled in rotating shafts or cutter heads, adequate hair net or cap to contain loose hair, no rings or bracelets, and adequate glove protection on the hands

If operation is noisy, see suggestions in Chapter 45, "Industrial Noise" Generally, if it is necessary to shout in normal conversations, the noise level is too high and ear plugs or ear muffs are needed Noise levels are higher when hardwoods are used

Everyone in the machine area should be required to protect his eyes with safety spectacles or goggles

Specific Safety Principles

Circular saws

There are two principal types of accidents involving circular power saws (*a*) contact by the operator, helper, or take-away man with the blade during operation or while the blade is at rest and (*b*) kickbacks These two types of accidents can be prevented by proper guarding in some cases and by correct work procedures in others

Power saw operators are most frequently injured when their hands slip off the stock