

Machine Tools

fence, usually of iron pipe sections, should be installed. Such fencing should conform to the state code or the specifications of the ASI Standard A12.1, *Safety Requirements for Floor and Wall Openings, Railings and Toe Boards*.

The operator should never attempt to tighten the work or the tool, caliper or measure the work, feel the edges of the cutting tool, or oil the mill while it is in operation, nor should he ride the table while it is in motion, except that on some large mills, like those used for boring turbine castings, the operator may have to ride the table in order to observe the progress of the work. In such cases, he should always be certain that no portion of his body will come in contact with a stationary part of the mill.

Steps or stairs which provide access to the machine or to the work should have a pitch of not more than 50 degrees and should have nonslip treads. Stairs with four or more risers should be provided with a standard handrail 34 in. above tread center.

Milling Machines

Milling—machining a piece of metal by bringing it into contact with a rotating multi-edged cutter—is done by horizontal and vertical milling machines, by gear hobbers, profiling machines, circular and band saws, and a number of other types of related machines.

About two of every three milling machine accidents occur when operators unload or make adjustments. Other causes of injuries include

- 1 Failure to draw the job back to a safe distance when loading or unloading
- 2 Using a jig or vise which prevents close adjustment of the guard
- 3 Placing the jig or vise-locking arrangement in such a position that force must be exerted toward the cutter
- 4 Leaving the cutter exposed after the job has been withdrawn
- 5 Leaving hand tools on the worktable
- 6 Failure to clamp the work securely
- 7 Reaching around the cutter or hob to

remove chips while the machine is in motion

- 8 Removing swarf by hand instead of with a brush
- 9 Adjusting the coolant flow while the cutter is turning
- 10 Calipering or measuring the work while the machine is operating
- 11 Using a rag to clean excess oil off the table while the cutter is turning
- 12 Wearing gloves, ties, or loose clothing
- 13 Using cutters incorrectly dressed
- 14 Storing cutters incorrectly
- 15 Attempting to remove a nut from machine arbor by applying power to the machine
- 16 Striking cutter with hand or arm while setting up or adjusting stopped machine

Basic milling machines

Regardless of the classification, direction of movement, or special attachments which make varied operations possible on a milling machine, the safeguarding requirements are basically the same. To guard the cutter, one of several methods should be employed (Fig. 26-7).

The hand-adjusting wheels for quick or automatic traverse on some models should be mounted on the shaft by either clutches or ratchet devices so that the wheels do not revolve when the automatic feed is used, or else the wheels should be provided with removable handles with compression springs so that the handles cannot remain in the wheels unless held in place by the operator.

The horizontal milling machine should have a splash guard and pans for catching thrown cutting lubricant or lubricant running from the tools. The lubricant should be directed on the work in such a way that the distribution setup will not be drawn into the cut by means of the cutter rotation. When possible, all cuts should be made into the travel of the table, rather than away from the direction of travel.

Metal saws

A circular saw for cutting cold metal stock should have a hood guard at least as deep as the roots of the teeth, and the guard should