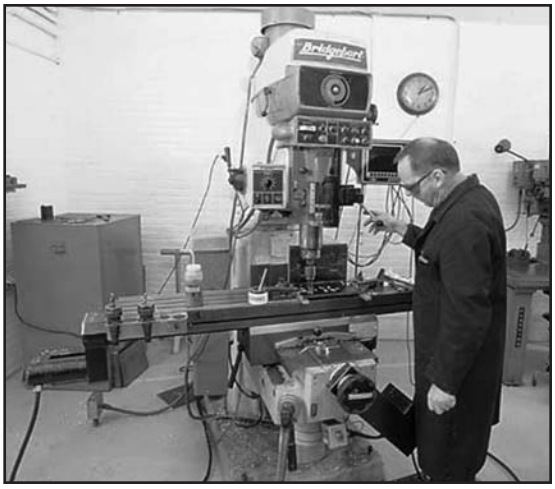
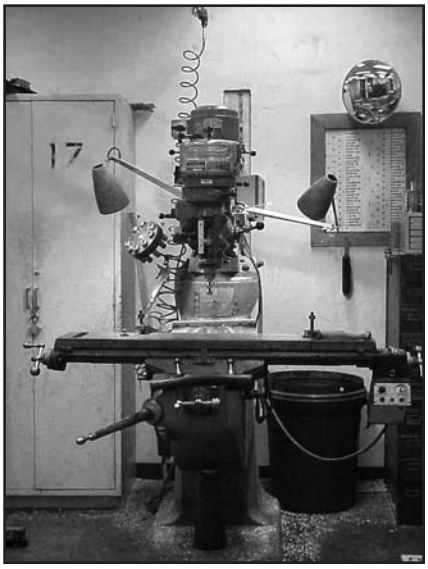
Milling machine

A milling machine removes material from a work piece by rotating a cutting tool (cutter) and moving it into the work piece. Milling machines, either vertical or horizontal, are usually used to machine flat and irregularly shaped surfaces and can be used to drill, bore, and cut gears, threads, and slots.

The vertical mill, or "column and knee" mill, is the most common milling machine found in machine shops today. The general construction of this mill includes the quill, which moves vertically in the head and contains the spindle and cutting tools. The knee moves up and down by sliding parallel to the column. The column holds the turret, which allows the milling head to be positioned anywhere above the table. Hand wheels move the work table to the left and right (X axis), in and out (Y axis), in addition to moving the knee, saddle, and worktable up and down (Z axis).



Georgia Tech Research Institute



Illinois Institute of Technology

Vertical "column and knee" mill.

Hazard

Serious injuries and entanglement can occur if the operator contacts the rotating cutter. Metal shavings and lubricating/cooling fluids might also present a risk from the point of operation area.

Material might spin and strike an operator if the material is not secured to the table.

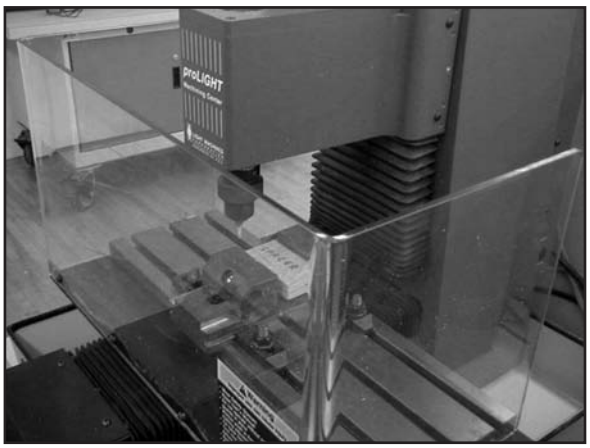
Injuries can also occur from a projected wrench if it is left in the spindle.

Solution

Secure the work piece either by clamping it onto the work table or by clamping it securely in a vise that is clamped tightly to the table.

NOTE: *Computer numerical controlled (CNC) mills are rapidly replacing manually fed machines, mainly for versatility and production reasons. The increased automation does not normally require the operator to move the hand wheels (like the traditional machines) so operators must always keep their hands away from the point of operation. A guard or shield that encloses the cutter head or milling bed may be considered to protect the operator from the cutting area, flying metal shavings, and lubricating or cooling fluids.*

Make sure the tightening wrench is removed from the mill.



Ball State University

In some cases, a shield can provide an operator protection from the cutter as well as from metal shavings and metal working fluids.

References

- **General Industry**
  Oregon OSHA Division 2/Subdivision O 29 CFR 1910.212 — General Requirements for All Machines
- ANSI B11.8 *Drilling, Milling, and Boring Machines*