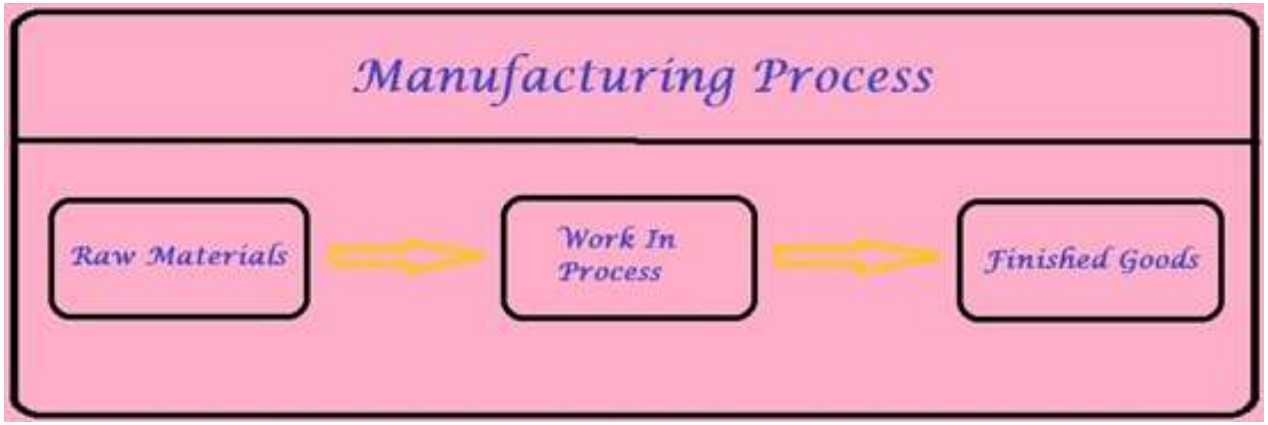
MACHINE TOOLS

Basic definitions

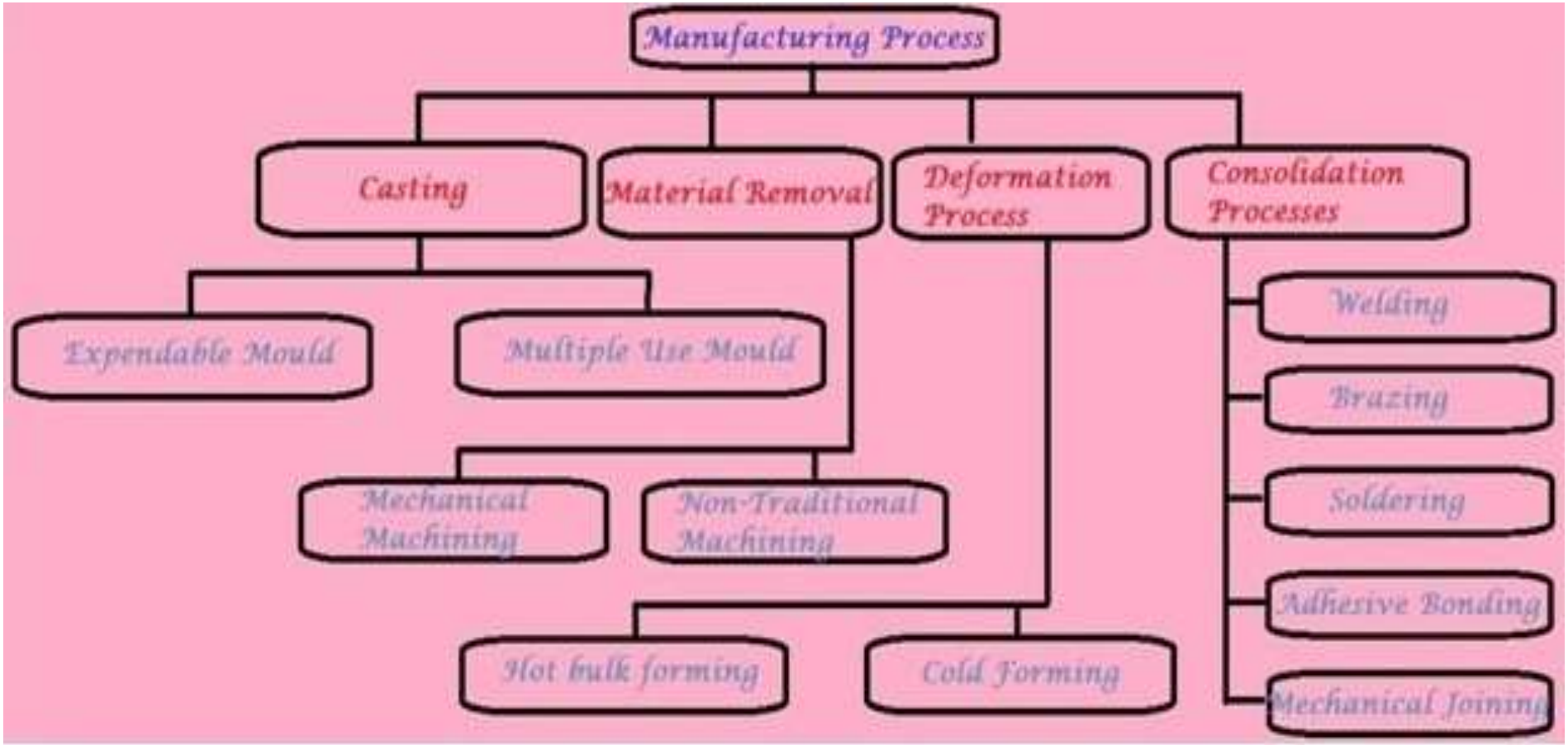
- **The machine** is a system of mechanisms that make it easy and replace the physical labor of man.

Basic definitions

- **Manufacturing machine** is an artificial dynamic system which serves to implement the tasks of the technological process-leading to permanent transformation of the starting material.



Technological process



Sorting of production machines

- Processed material
  - Machines for metal
  - Machines for wood
  - Machines for glass and ceramic material
- Mechanism for the transmission of energy use
  - Electrical
  - Mechanical
  - Hydraulic
  - Pneumatic

Machines tools

- Division of machine tools
  - According to the realization of the cutting process
  - According to technological possibilities
  - According to the level of flexibility

Flexibility

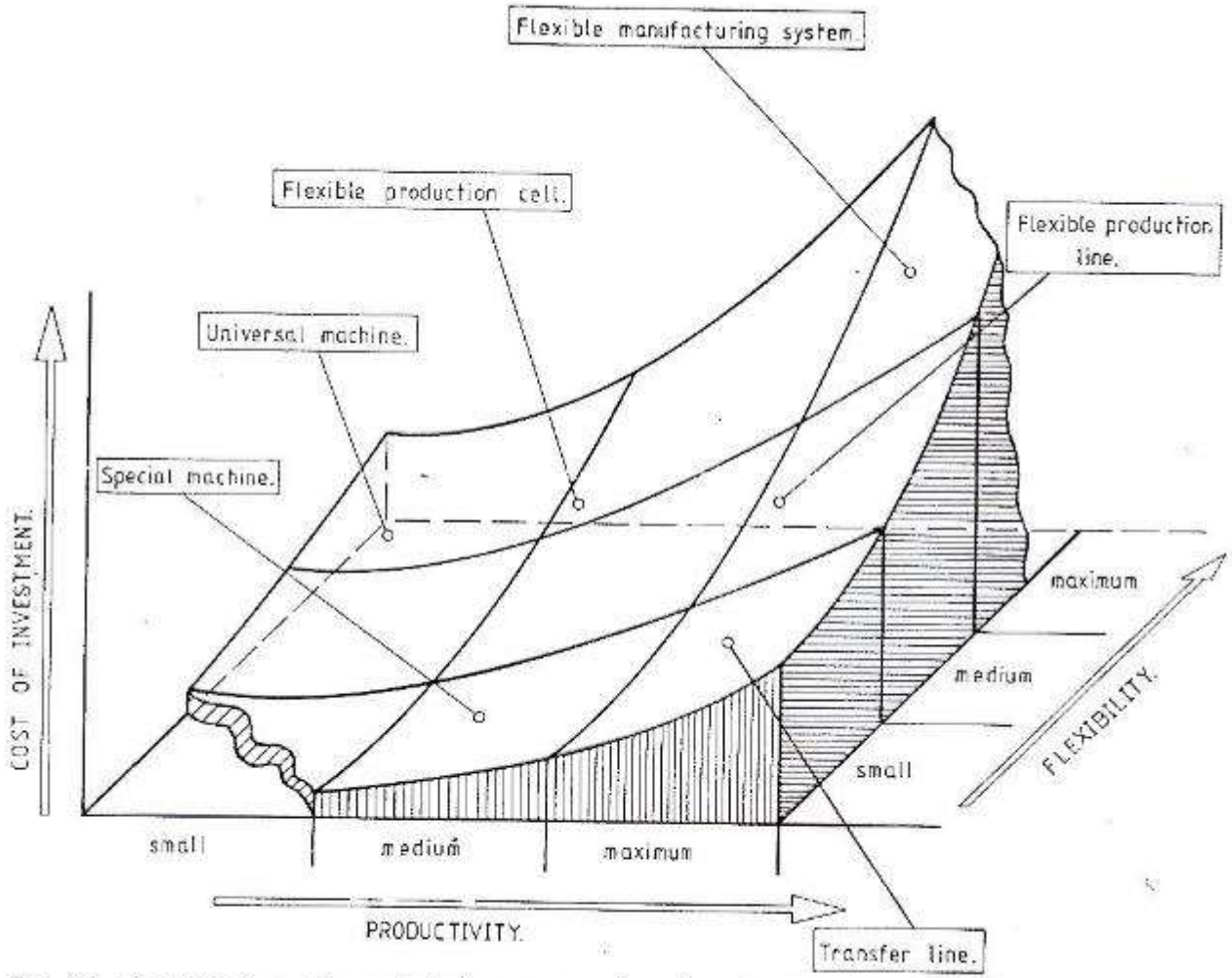
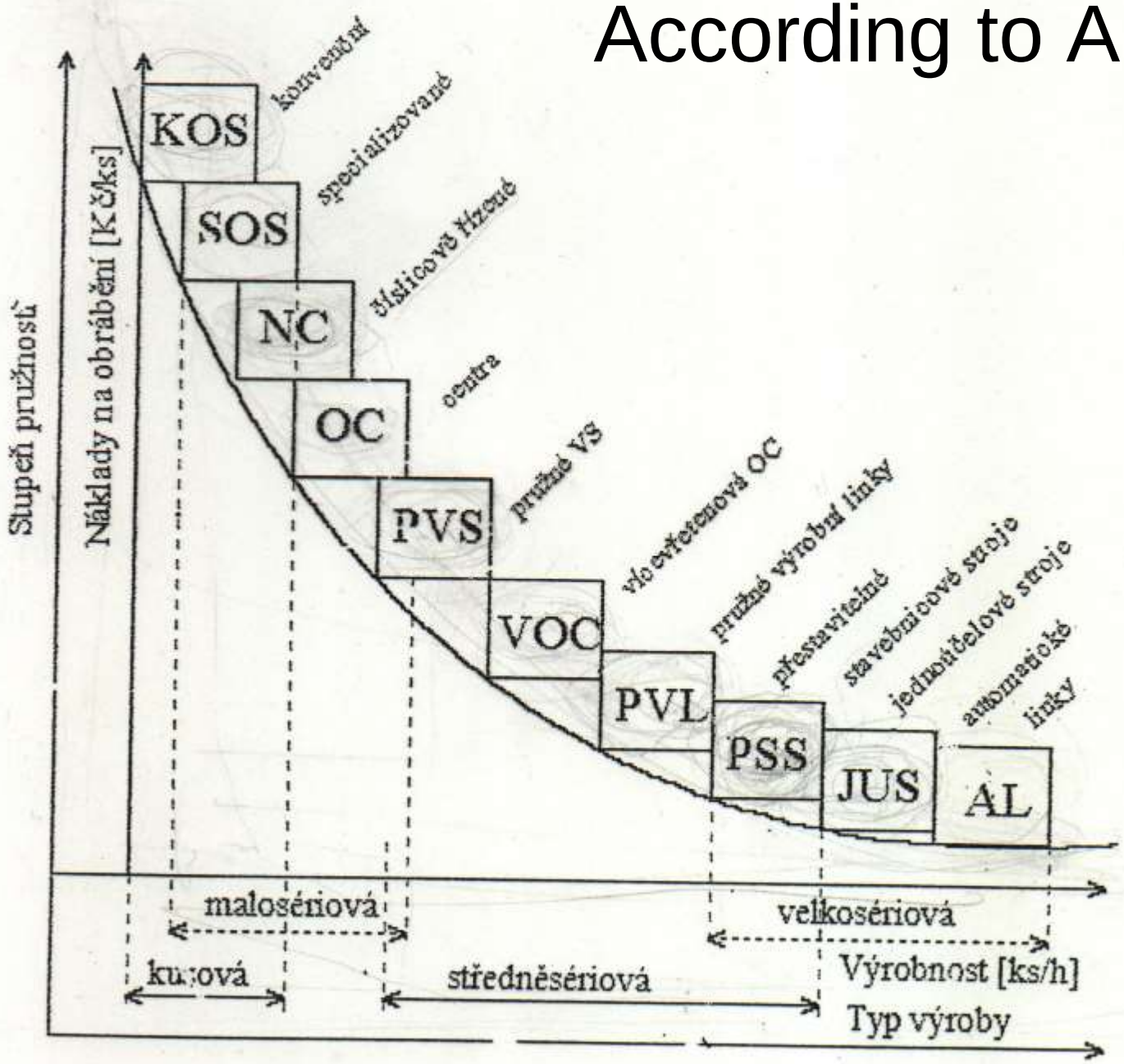


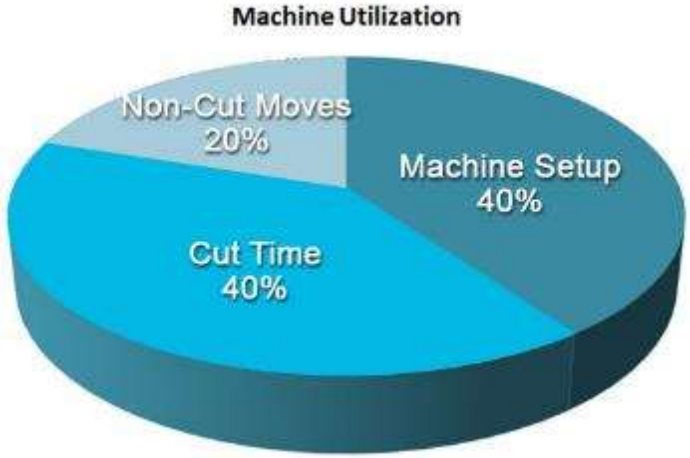
Fig. 2.1. A comparison of manufacturing systems based on the following criteria: automation level, productivity and investment costs. [Courtesy of Scharmann Machine Ltd.]

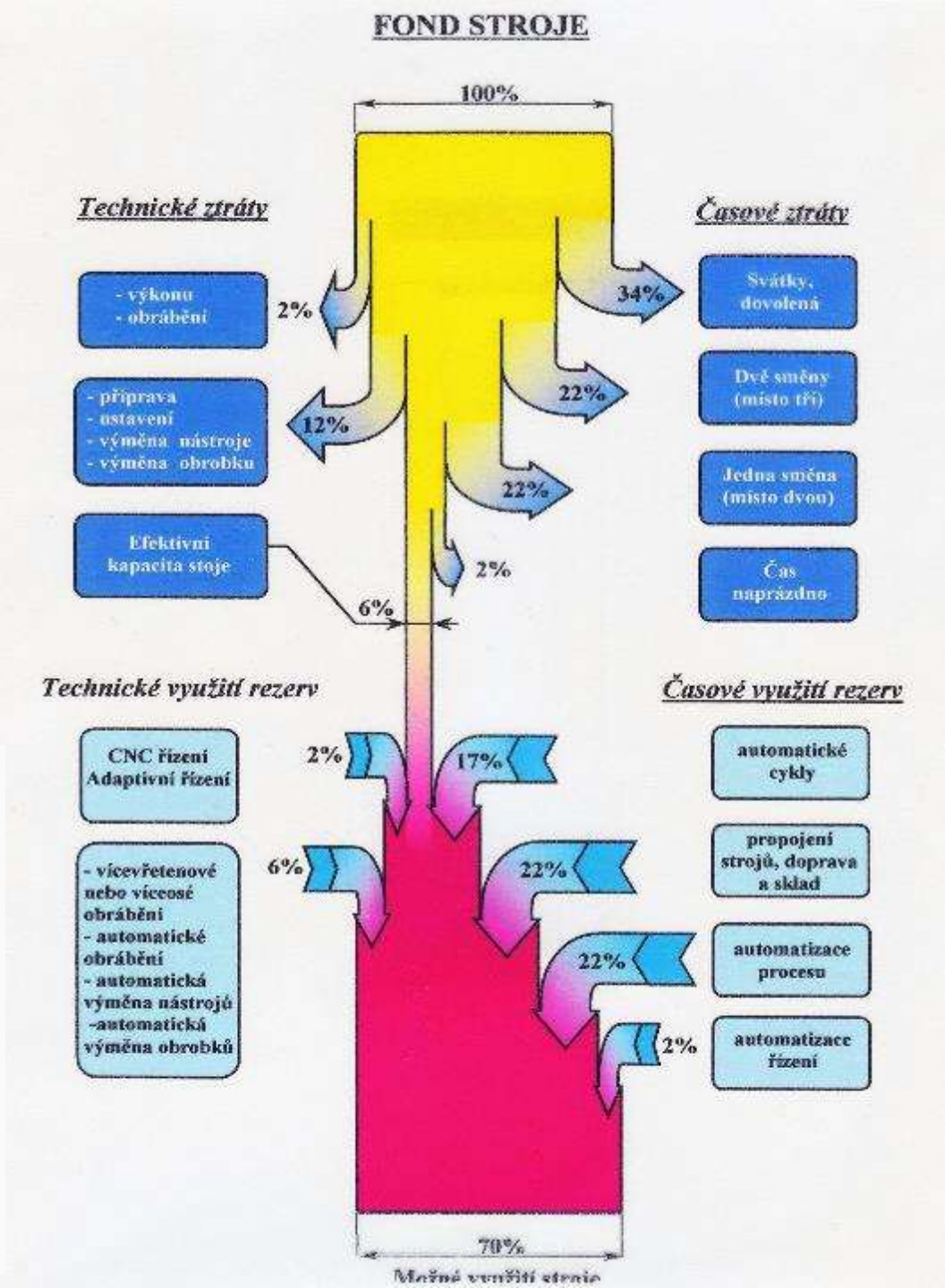
According to Automation



Trends – Industry 4.0

Utilization of a machine tool





Lathe

Definition

Lathe is a machine, which removes the metal from a piece of work to the required shape and size.

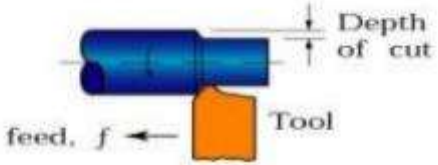
- Lathe is one of the most important machine tools in the metal working industry. A lathe operates on the principle of a rotating workpiece and a fixed cutting tool.

- The cutting tool is feed into the workpiece, which rotates about its own axis, causing the workpiece to be formed to the desired shape.

- Lathe machine is also known as "the mother/father of the entire tool family".

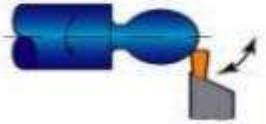
LATHE OPERATIONS

(a) Straight turning

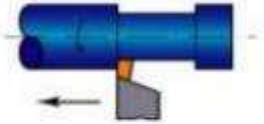


(b) Taper turning

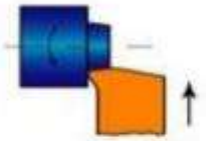
(c) Profiling



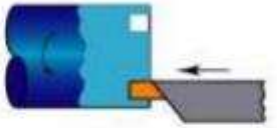
(d) Turning and external grooving



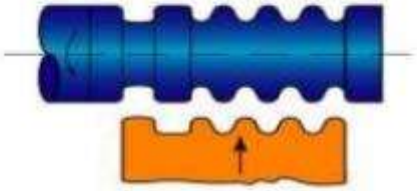
(e) Facing



(f) Face grooving



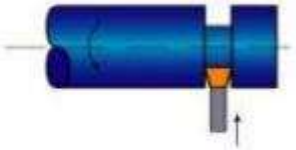
(g) Cutting with a form tool



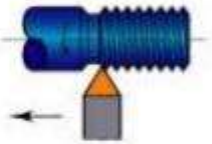
(h) Boring and internal grooving

(i) Drilling

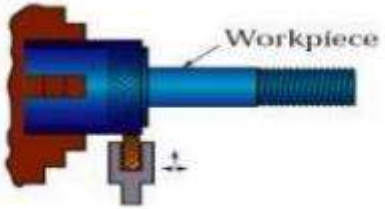
(j) Cutting off



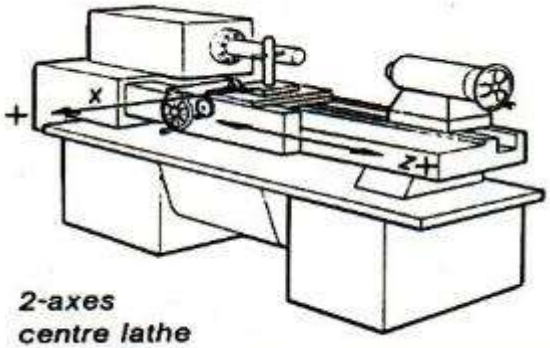
(k) Threading



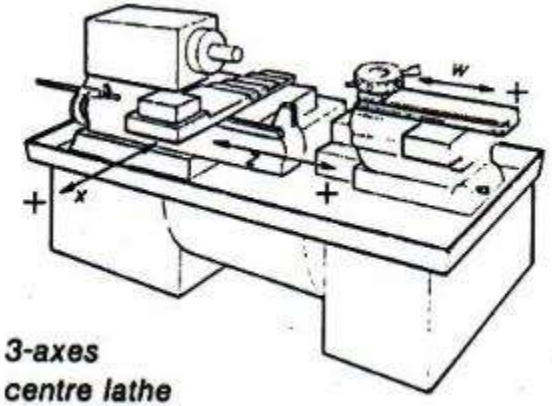
(l) Knurling



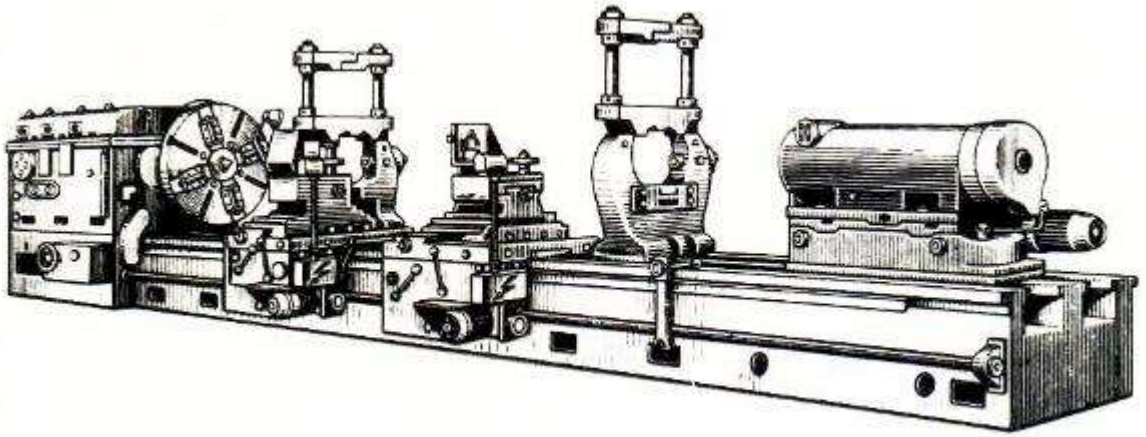
Lathes



2-axes centre lathe

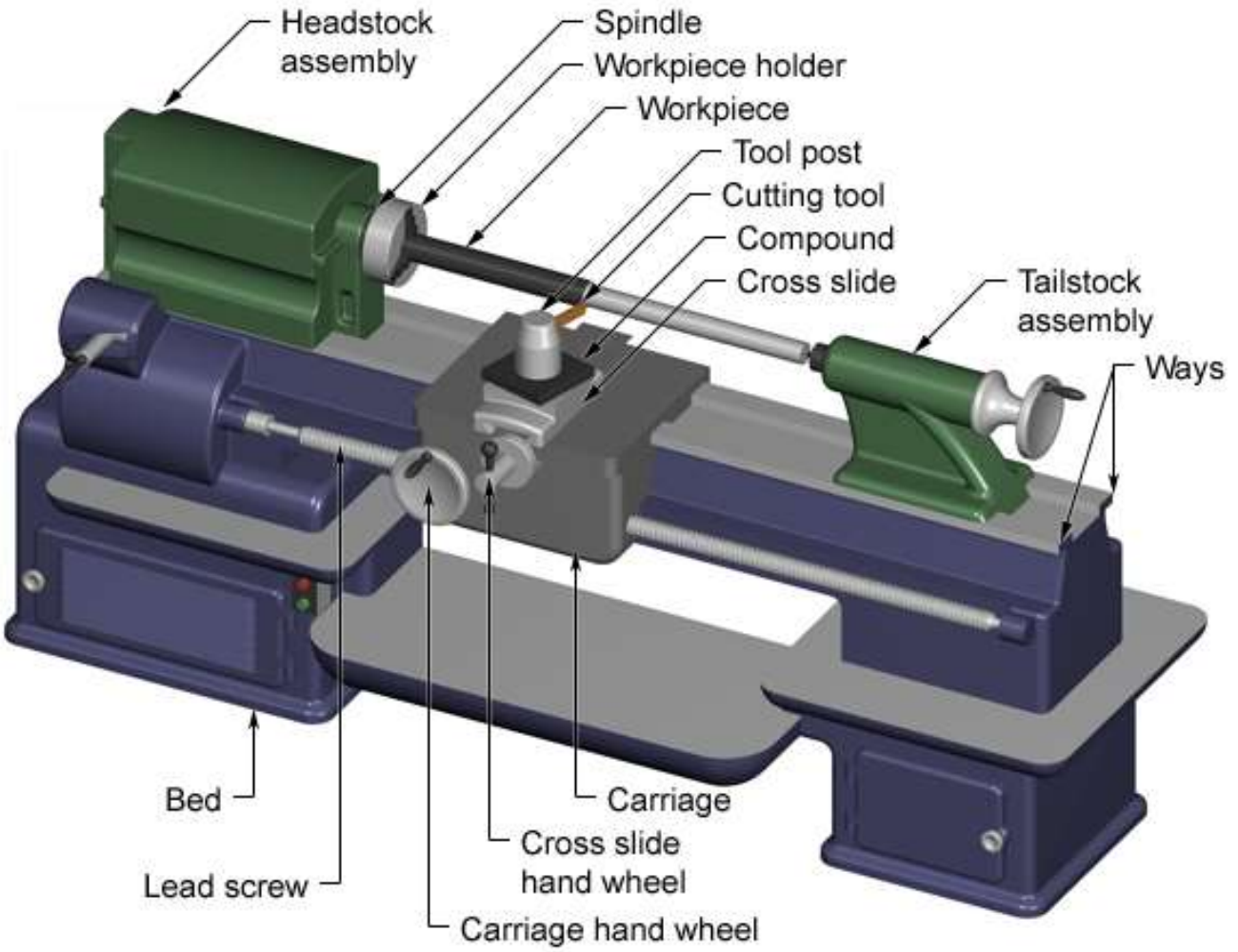


3-axes centre lathe

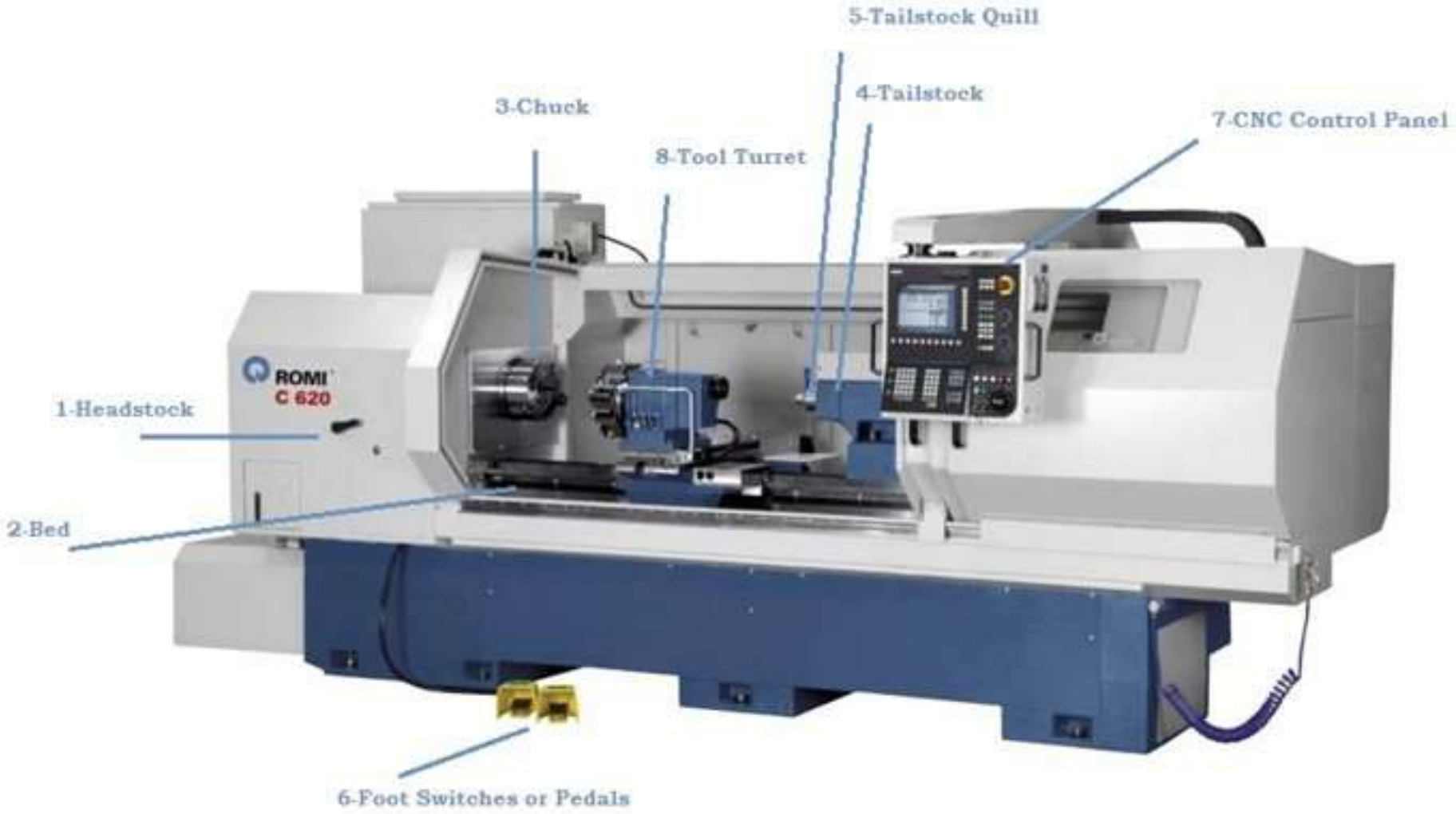


III Fig. 54. Roll-turning lathe, model 1825

Lathes



Lathes


5-Tailstock Quill
4-Tailstock
3-Chuck
7-CNC Control Panel
8-Tool Turret
ROMI
C 620
1-Headstock
2-Bed
6-Foot Switches or Pedals

Milling machines

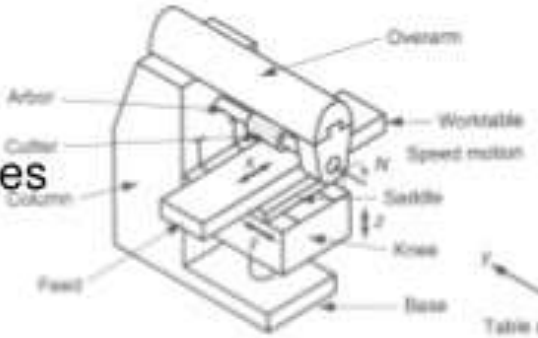
Milling is the process of machining flat, curved, or irregular surfaces by feeding the workpiece against a rotating cutter containing a number of cutting edges. The usual Mill consists basically of a motor driven spindle, which mounts and revolves the milling cutter, and a reciprocating adjustable worktable, which mounts and feeds the workpiece.

Milling machines

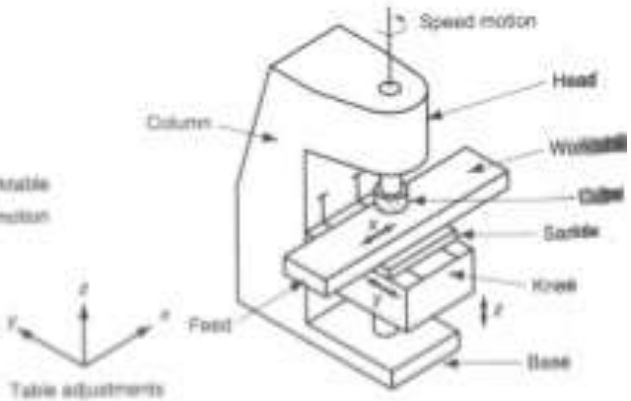
Milling machines are basically classified as vertical or horizontal. These machines are also classified as knee-type, ram-type, manufacturing or bed type, and planer-type. Most milling machines have self-contained electric drive motors, coolant systems, variable spindle speeds, and power-operated table feeds.

Milling Machines

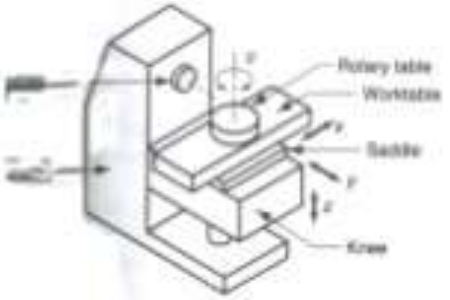
- Knee-and-column Milling Machine
  - Horizontal and Vertical types
  - Universal and Ram types
- Bed-type Mill
- Planer-type Mills – the largest category
- Tracer (profile) Mill – reproduce an irregular part geometry
- CNC Milling machine



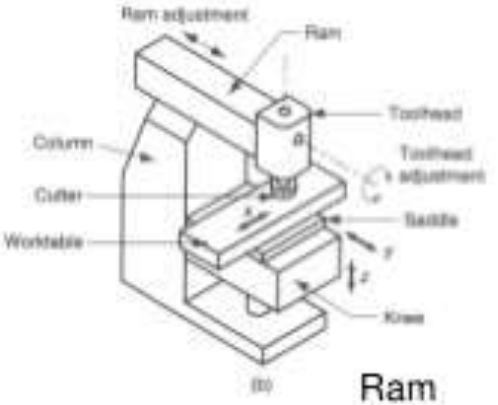
Horizontal



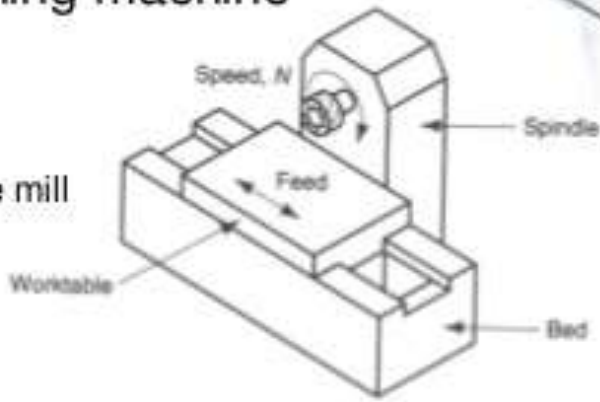
Vertical



Universal



Ram



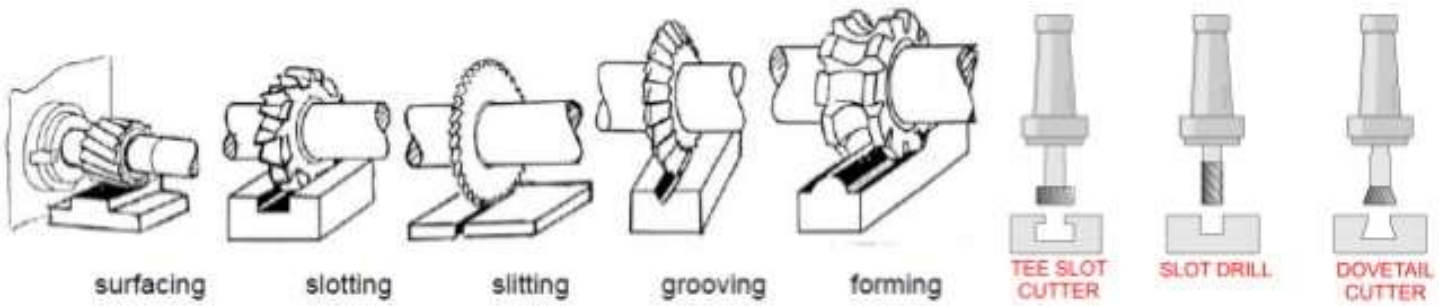
Bed-type mill

Milling machines

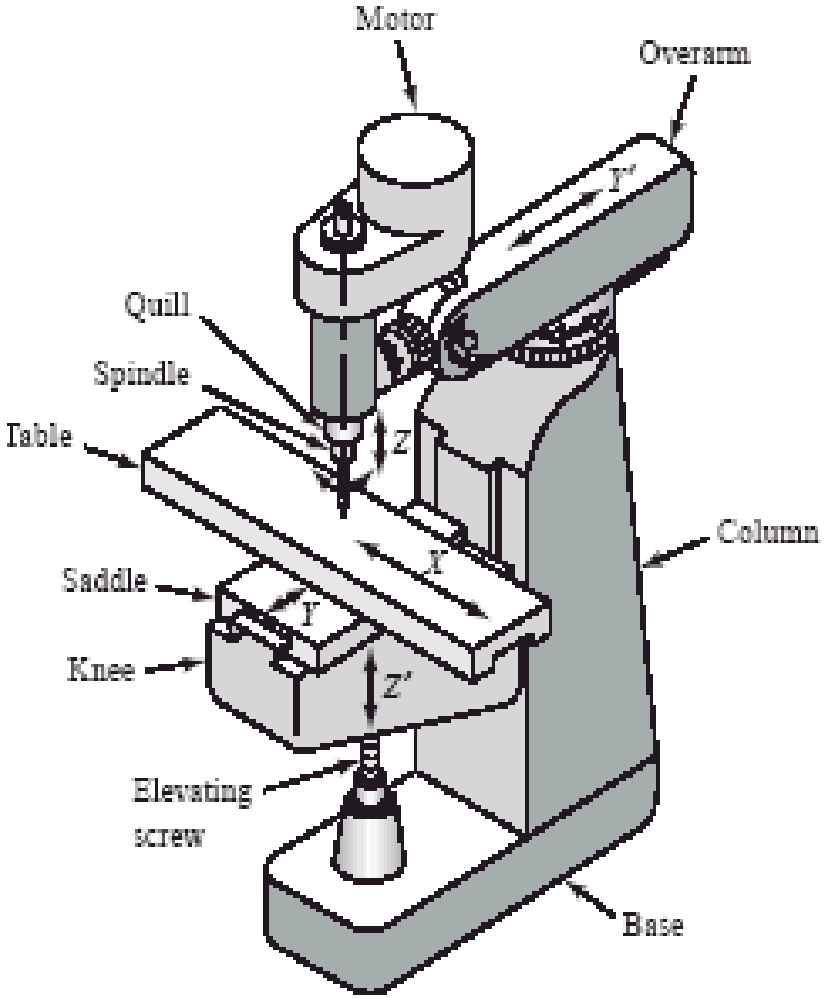
Basic Machine Tools

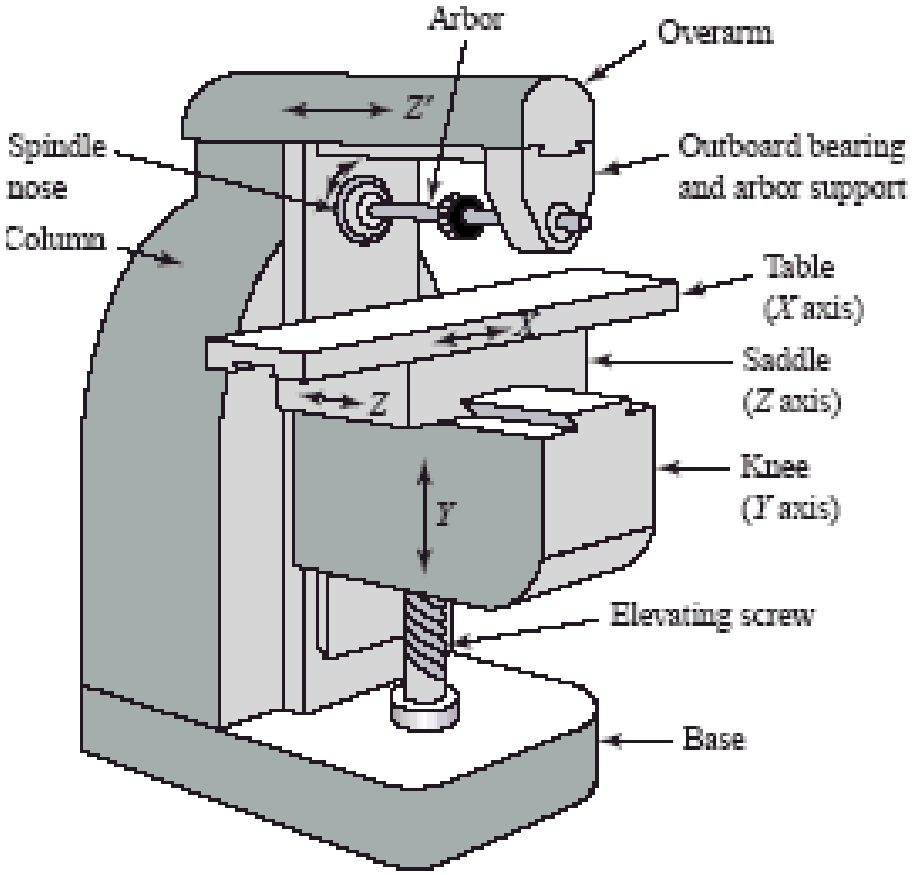
Milling machine

- Flat surfaces
- Slotting
- Slitting
- Grooving
- Parting
- Forming

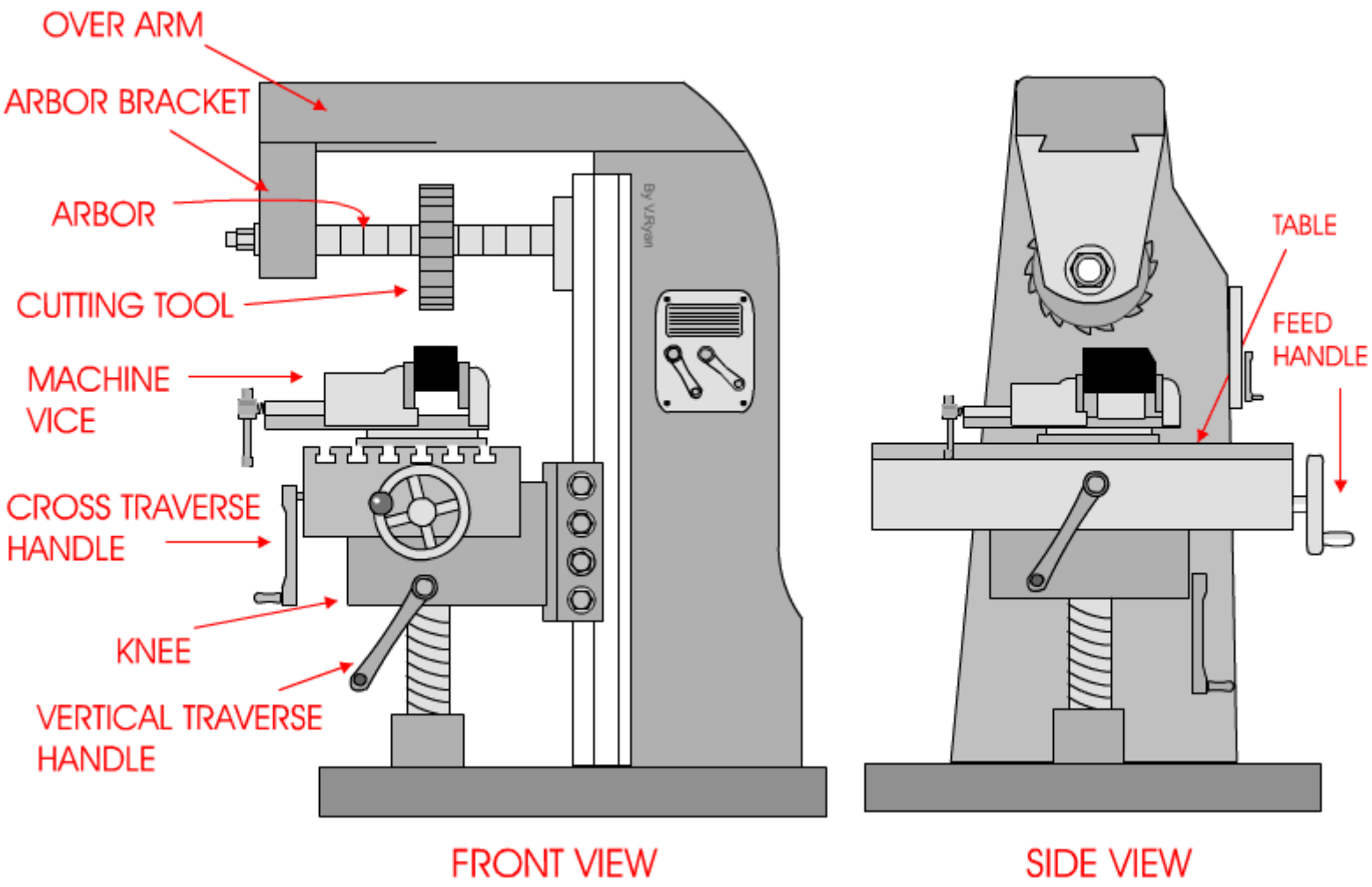


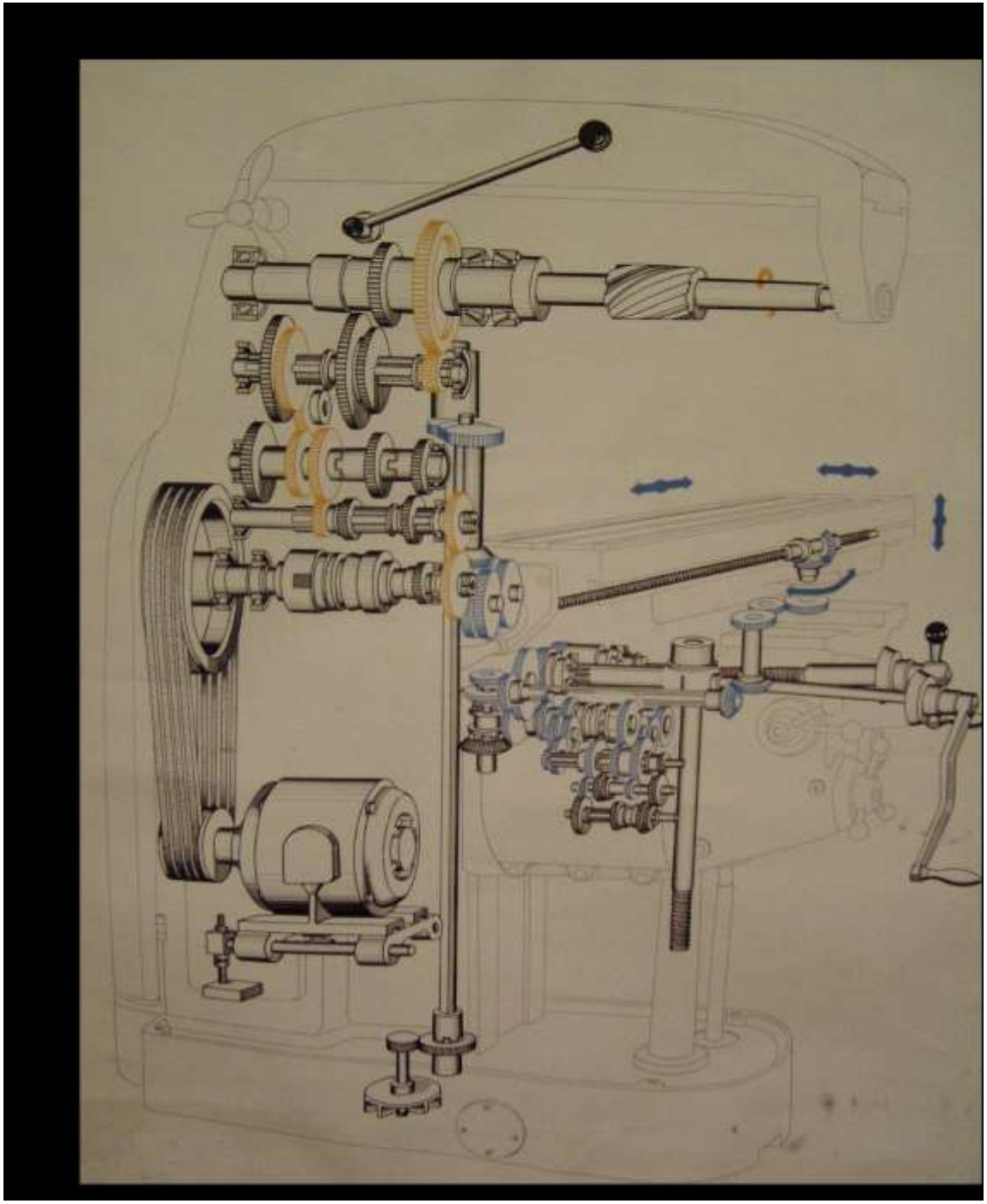
Milling machines



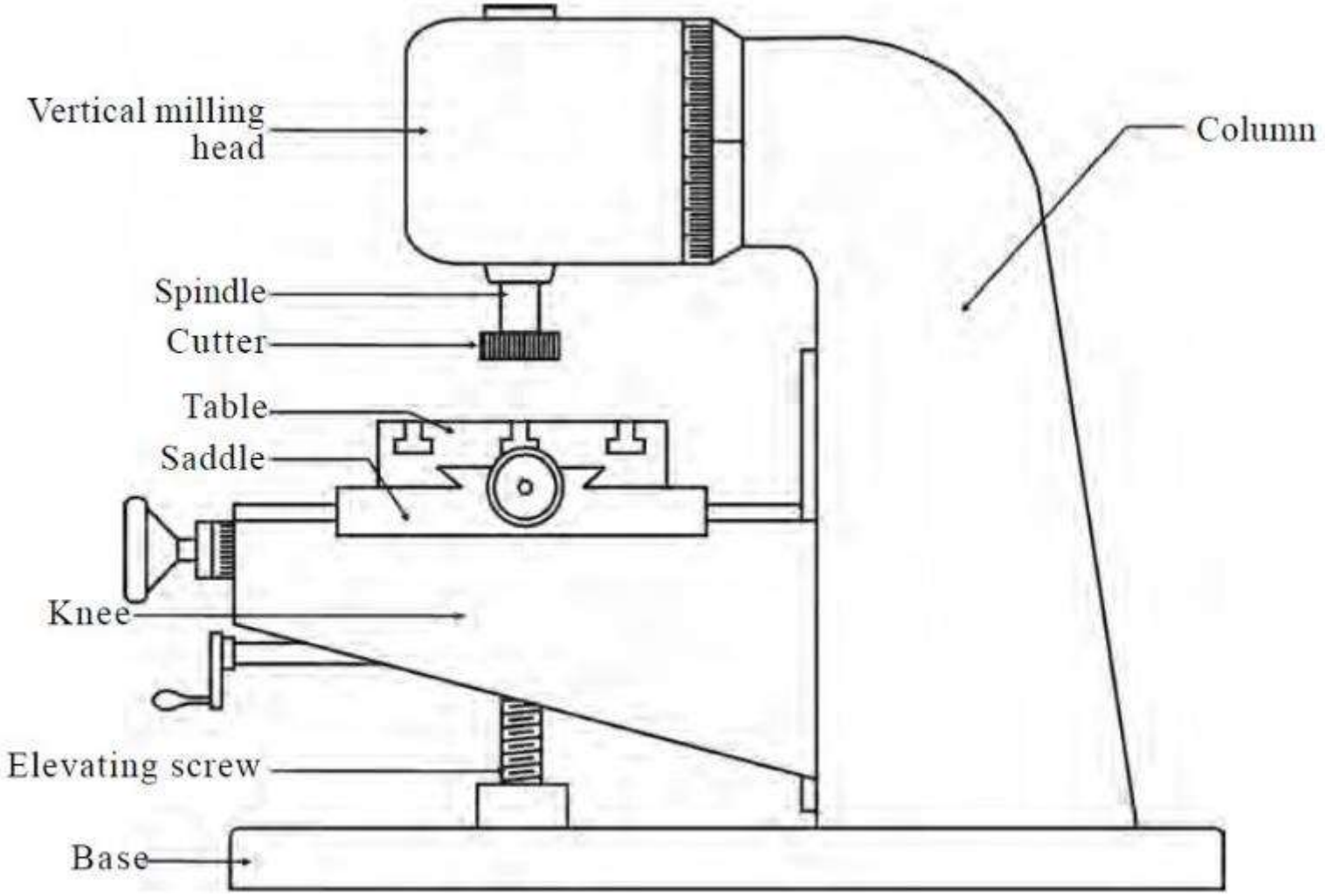


Milling machines

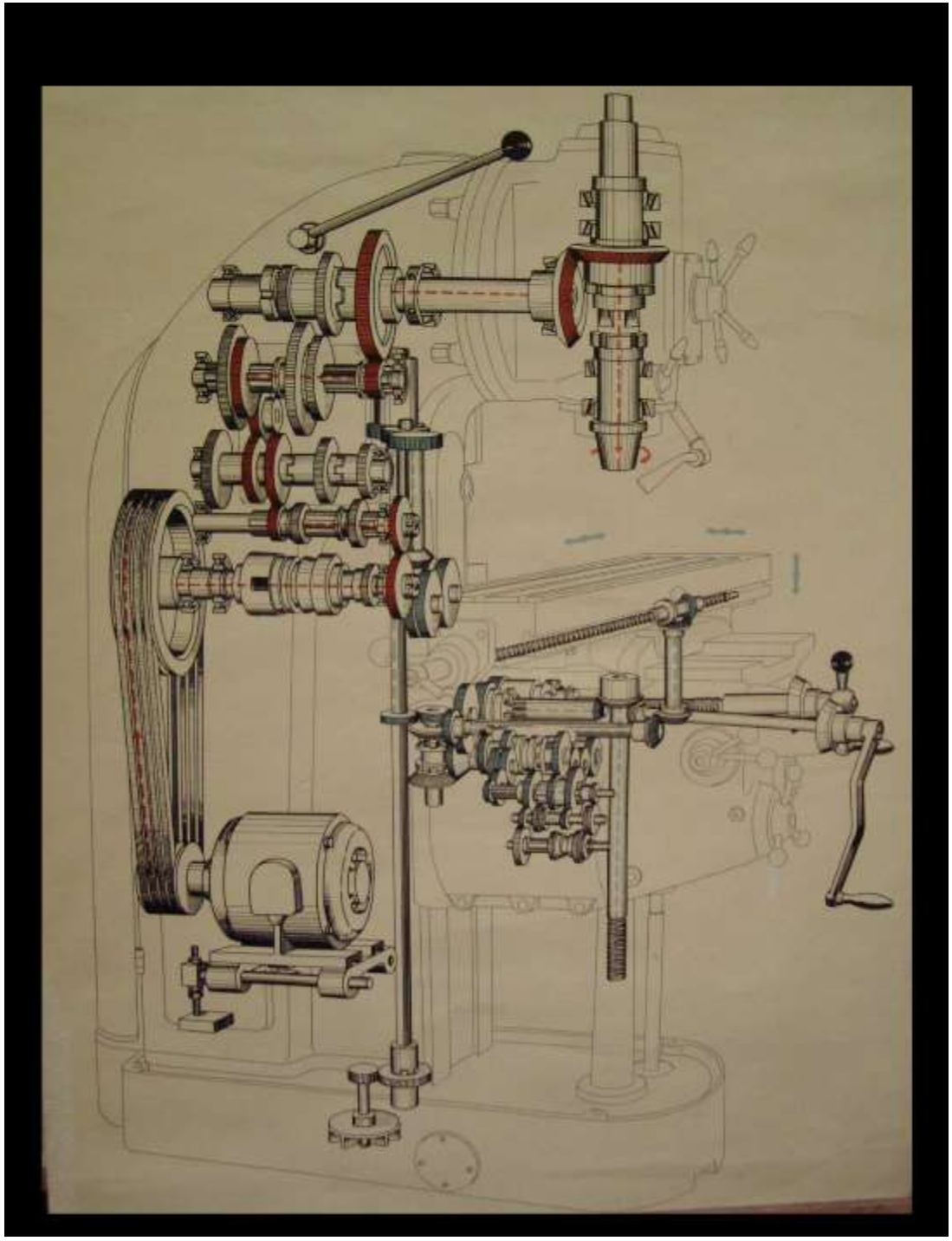




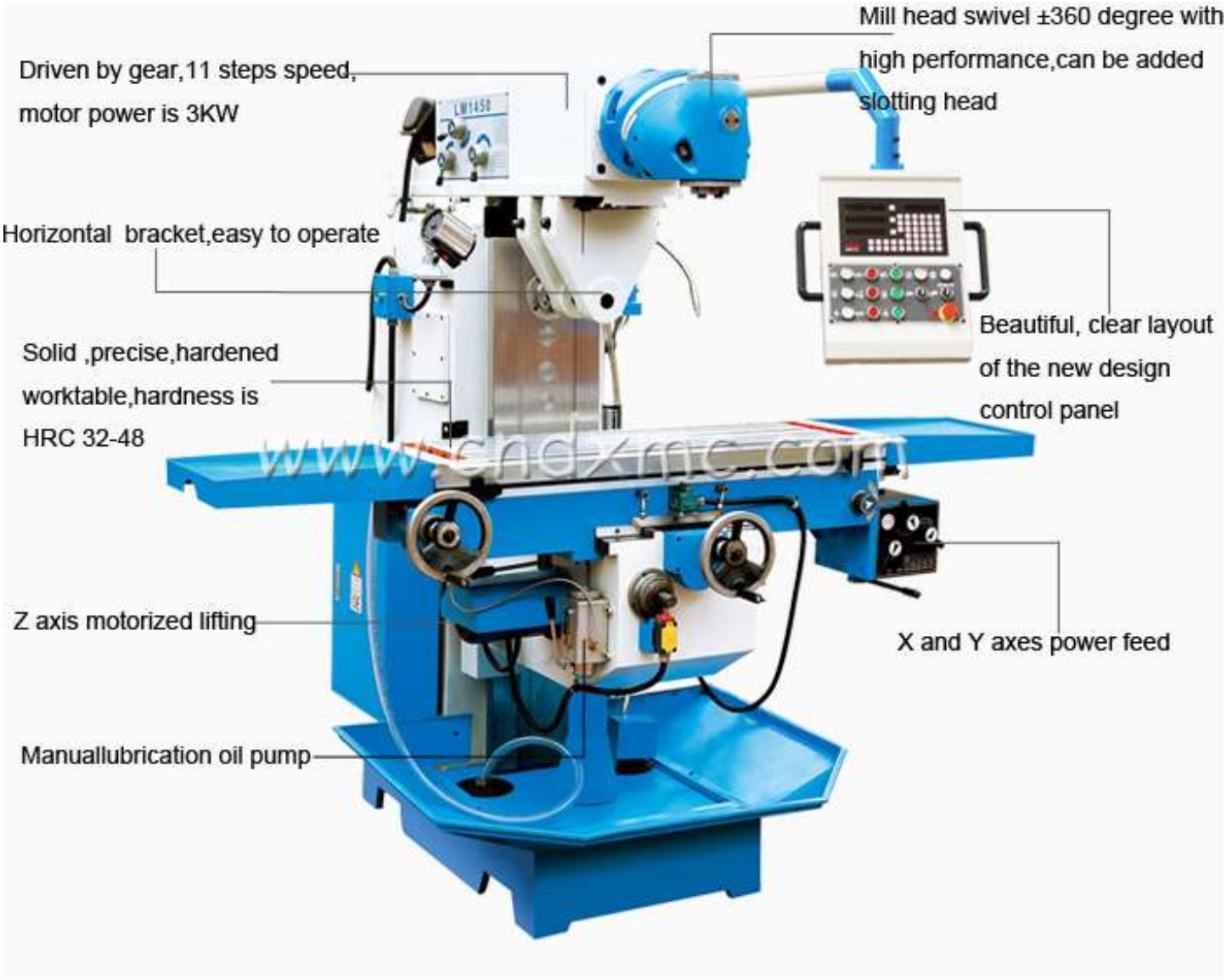
Milling machines



Vertical Milling Machine

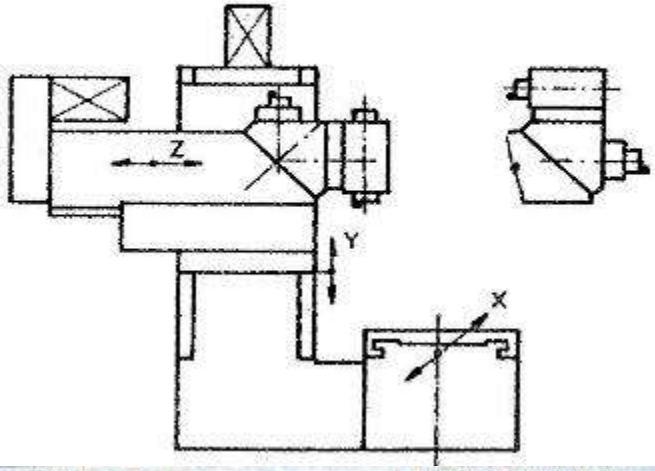


Milling machines

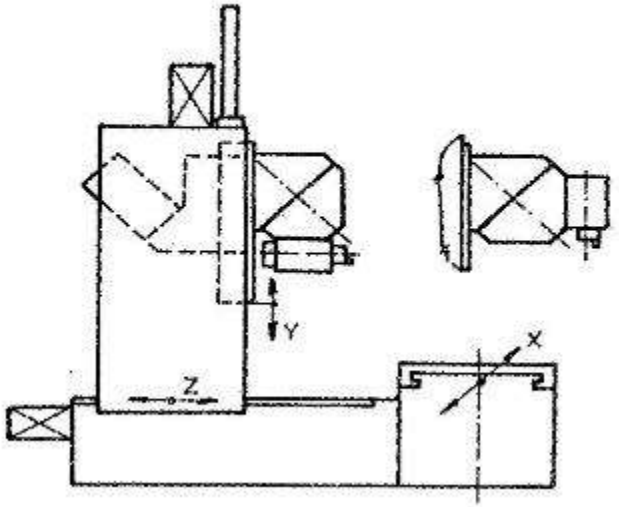


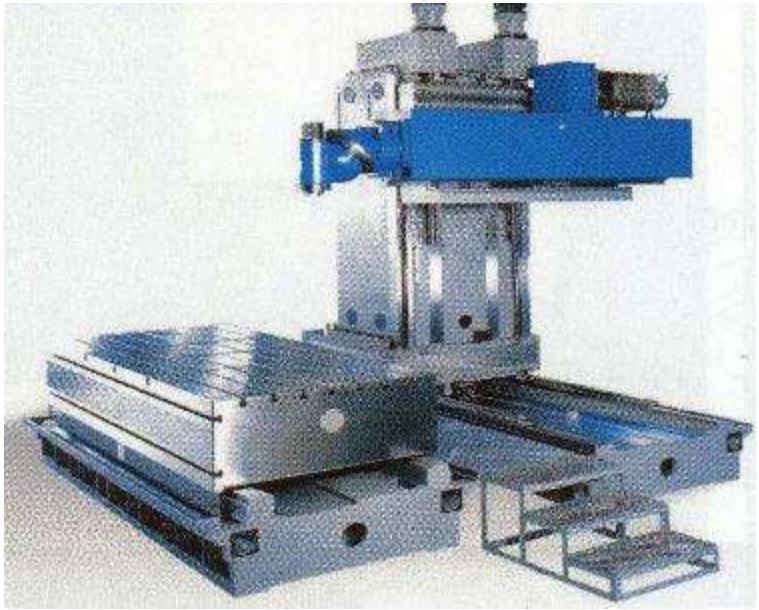
Milling machines

s výsuvným vřetenikem

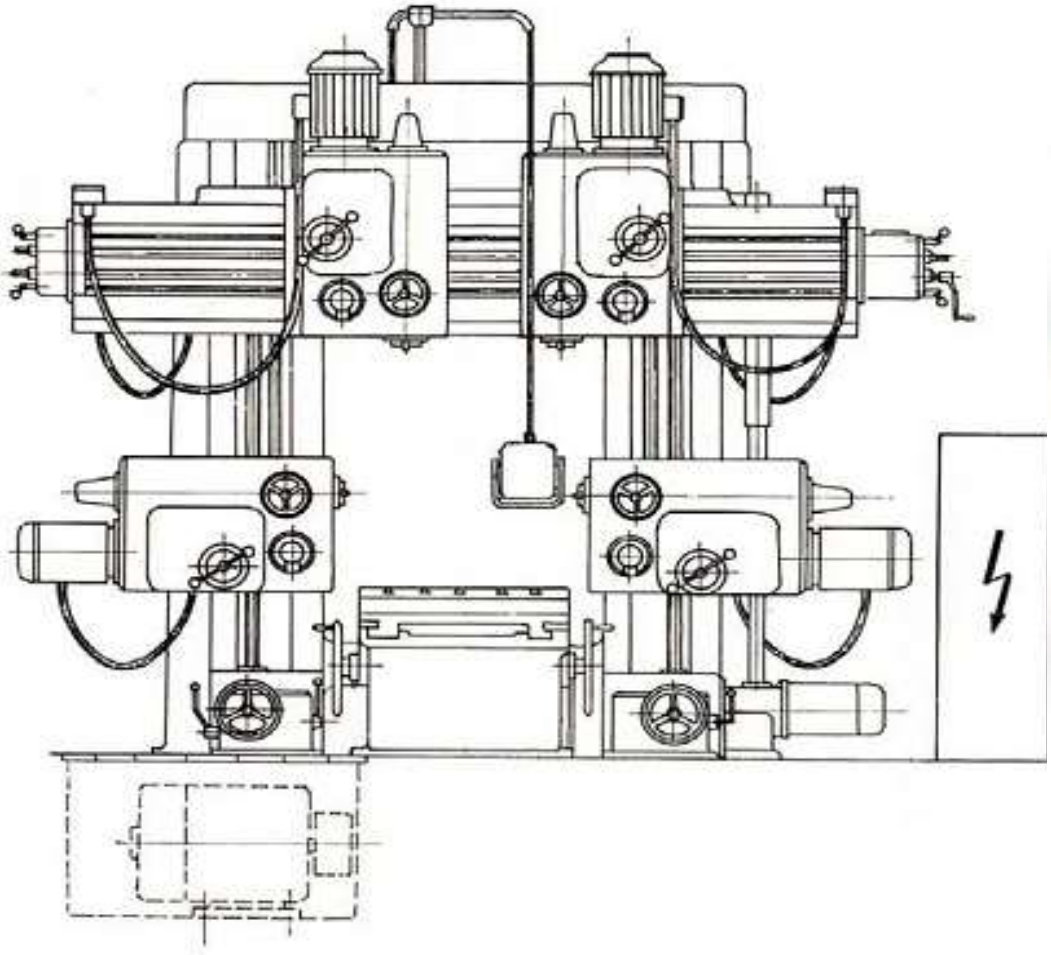


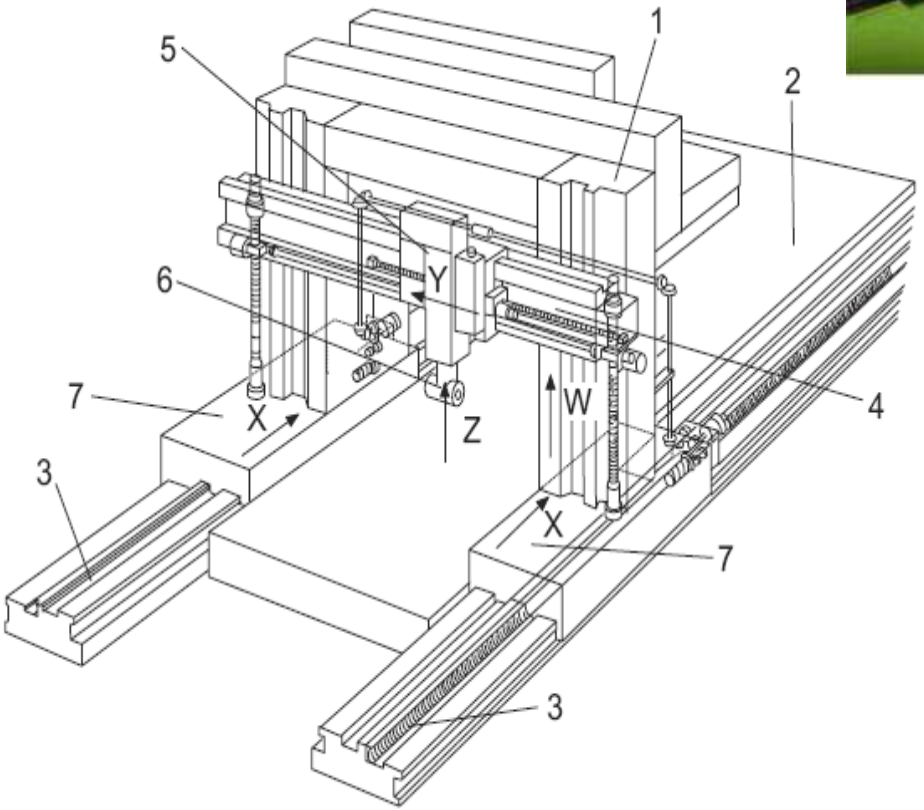
s posuvným stojanem





Milling machines





1 Portál

2 Upínací stůl

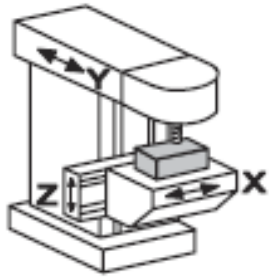
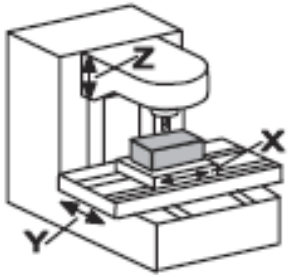
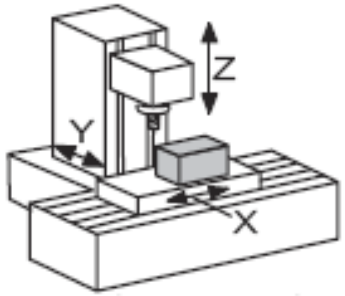
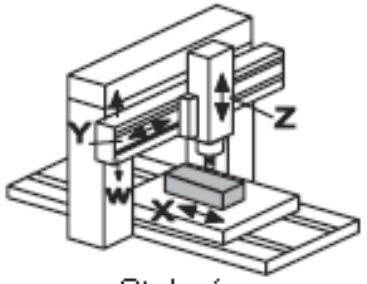
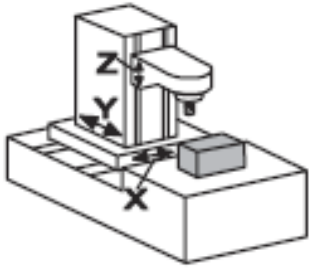
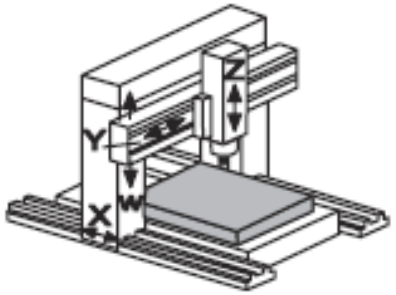
3 Lože

4 Příčný nosník

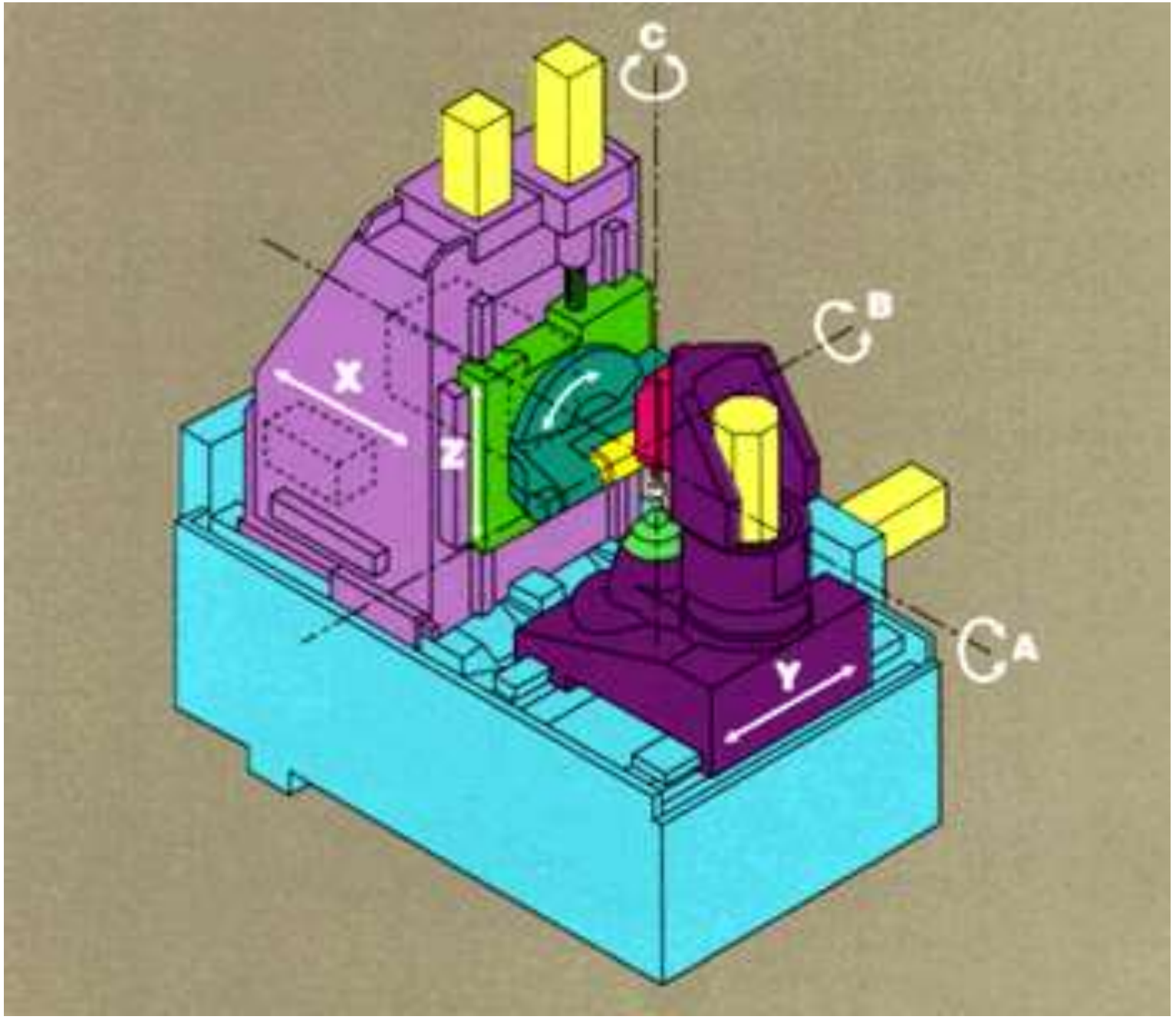
5 Frézovací saně

6 Úhlová frézovací hlava

7 Portálové saně

		Stavební forma		
		Konzolové	**Stolové**	**Portálové**
Počet poháněných os	1	 Stojanové	 Křížový stůl	
	2		 Křížové lože	 Stolové
	3		 Pojízdný stojan	 Sloupcové

Gear cutting

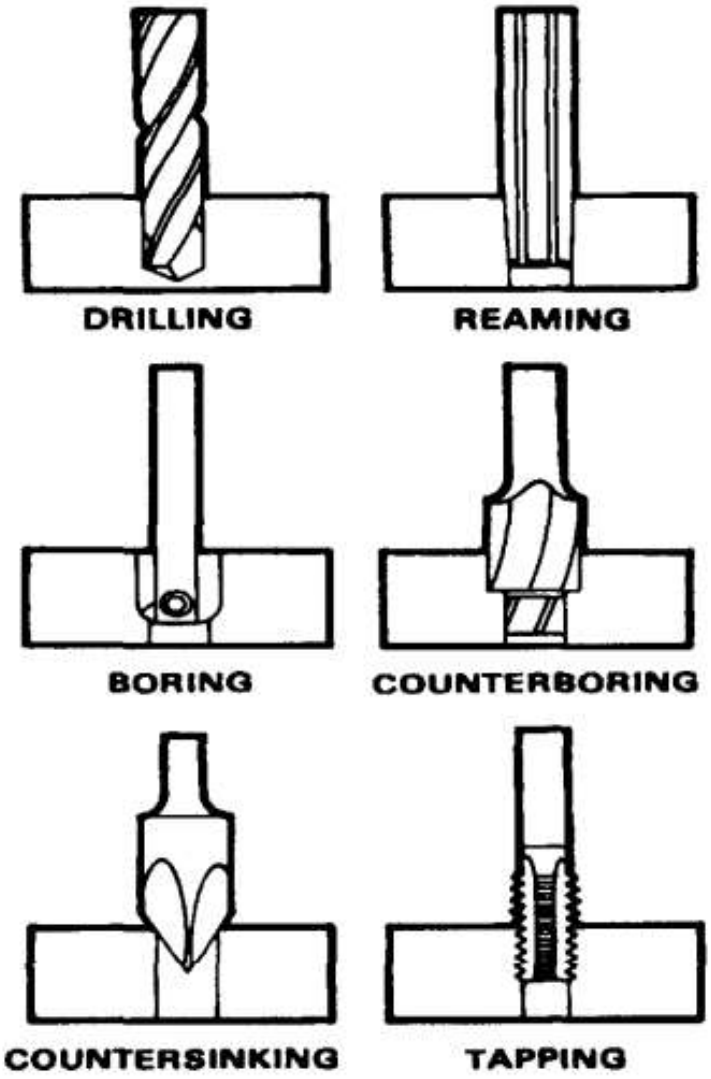



DMU 80 monoBLOCK

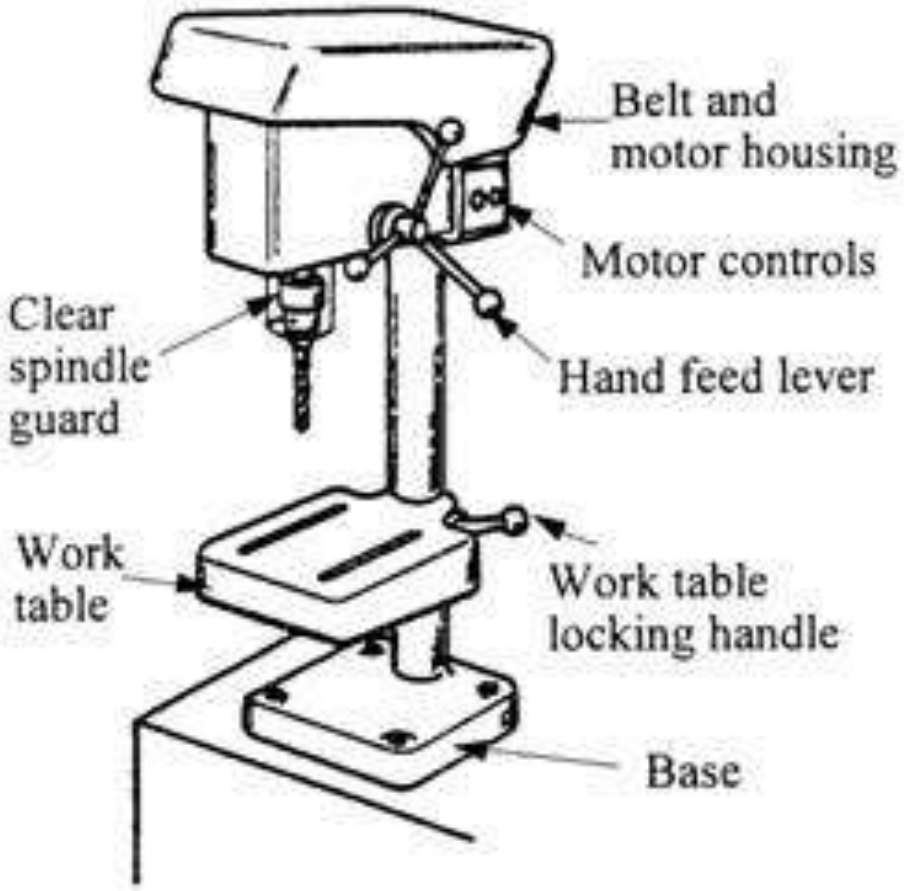
Drilling machines

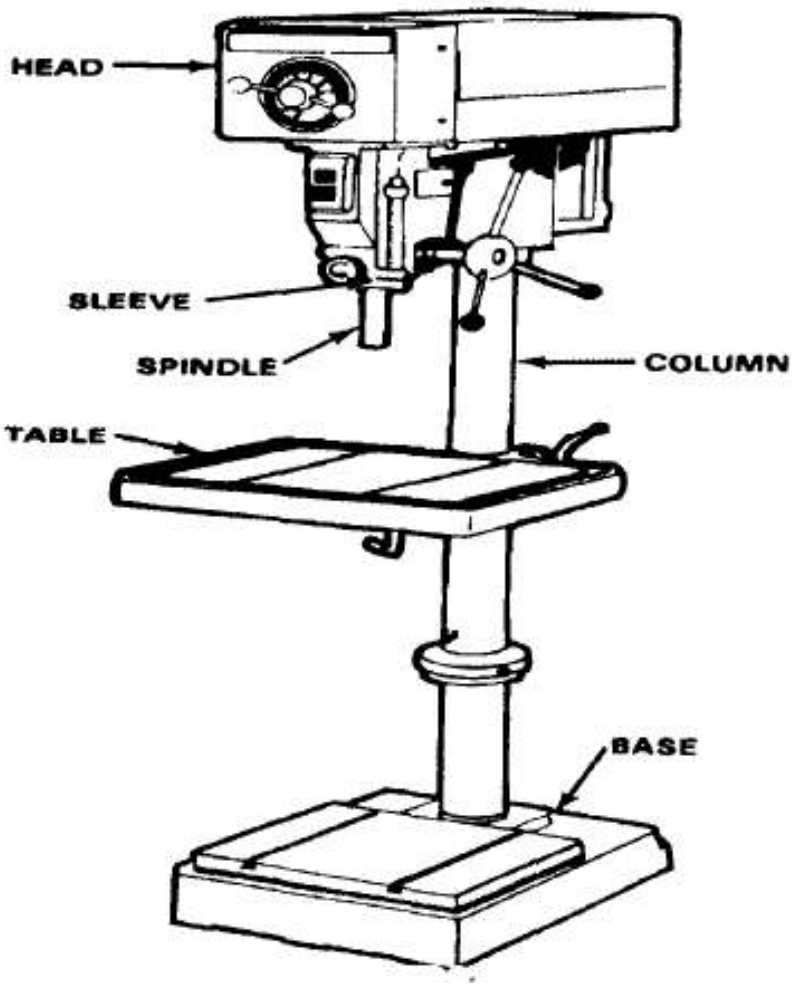
A drilling machine is used to cut holes into or through metal, wood, or other materials. Drilling machines use a drilling tool that has cutting edges at its point. This cutting tool is held in the drill press by a chuck or Morse taper and is rotated and fed into the work at variable speeds.

Drilling machines

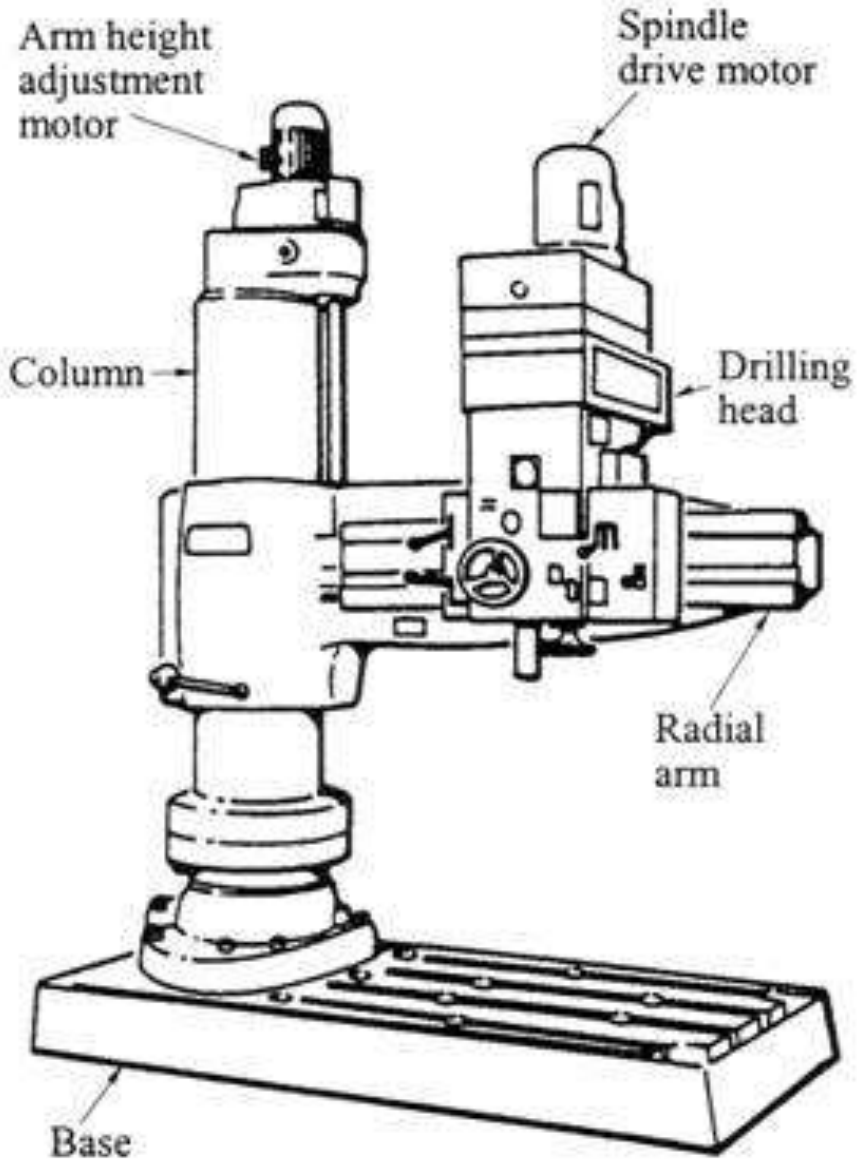


Drilling machines





Drilling machines




HELTOS


HELTOS
HELTOS
CASTOR

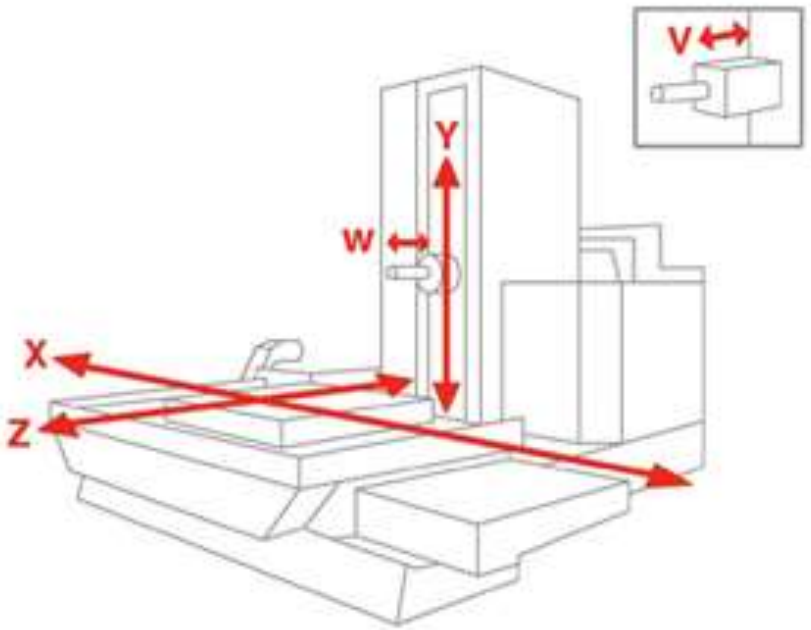
Drilling machines

Drilling machines

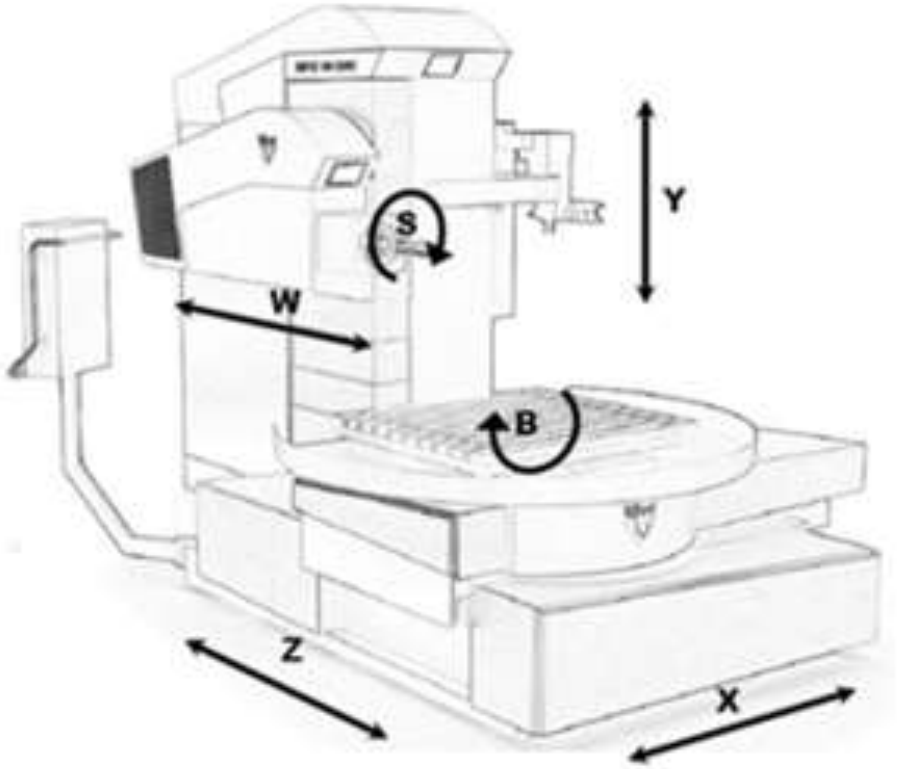
Milling and boring machines

Boring machine is used for machining long through-hole, large diameter stepped holes, holes and other different locations on a large box parts. Due to the high degree of linear cutter boring and boring bar rigidity, so machined hole, and position of the cylinder so high.

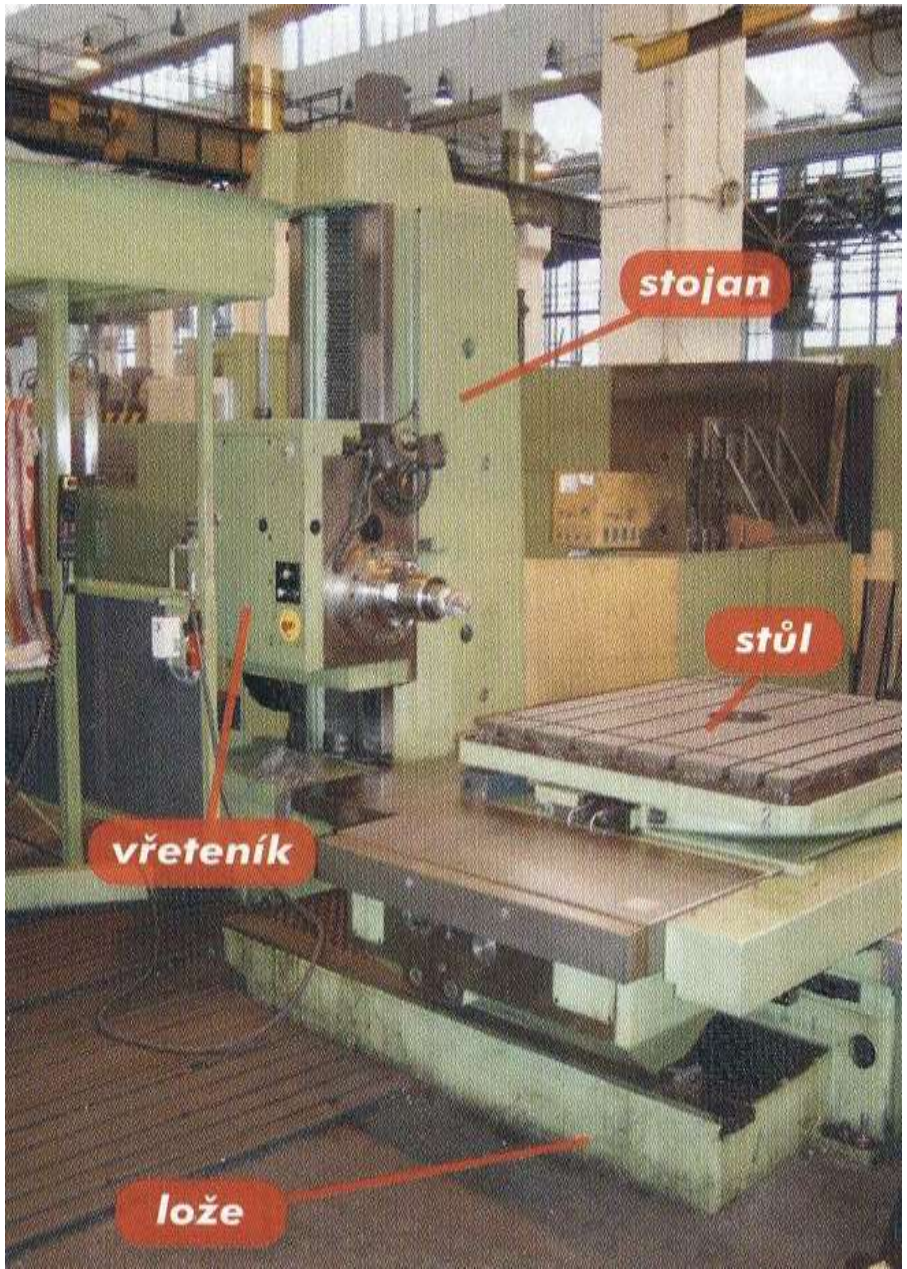
Milling and boring machines

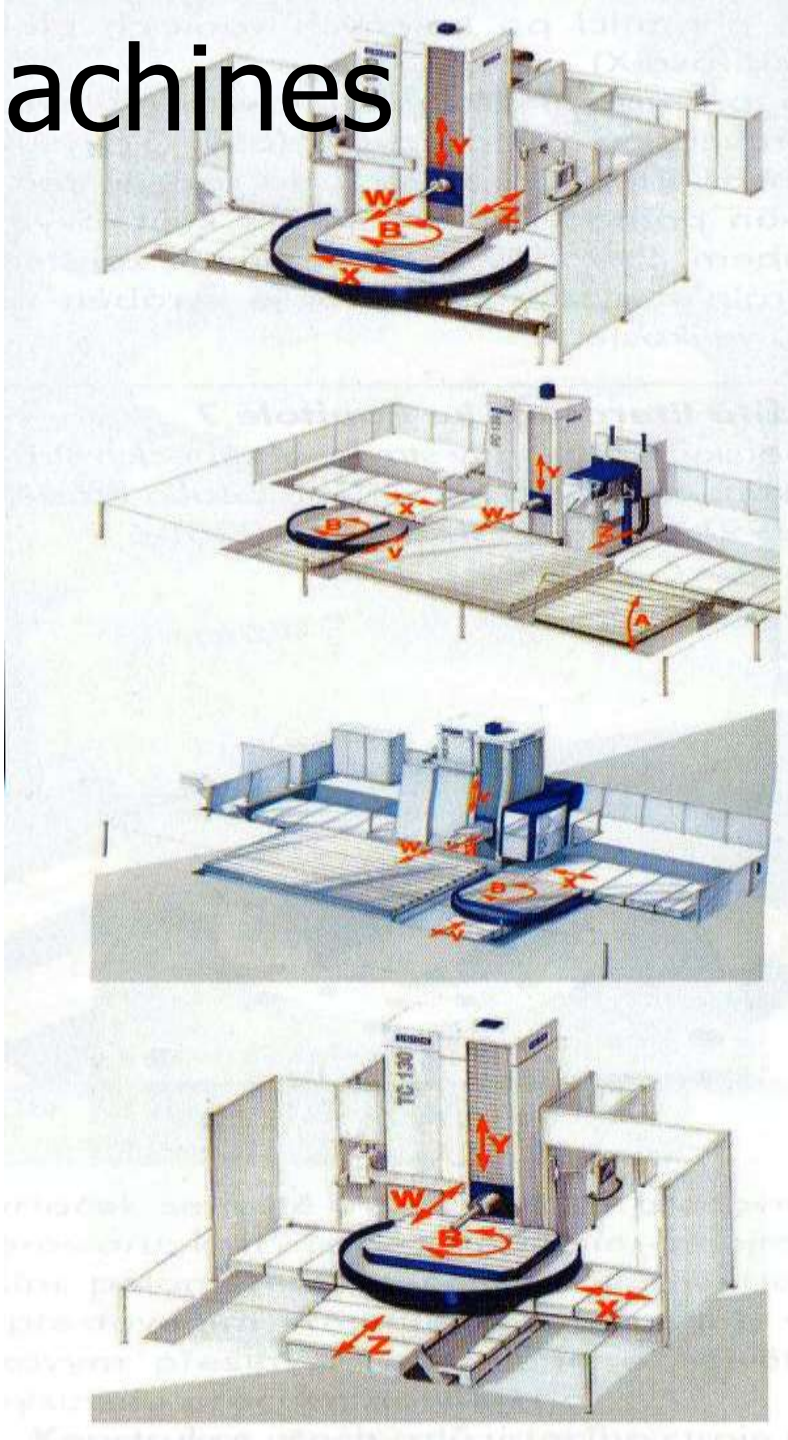


Milling and boring machines



Milling and boring machines





Grinding machines

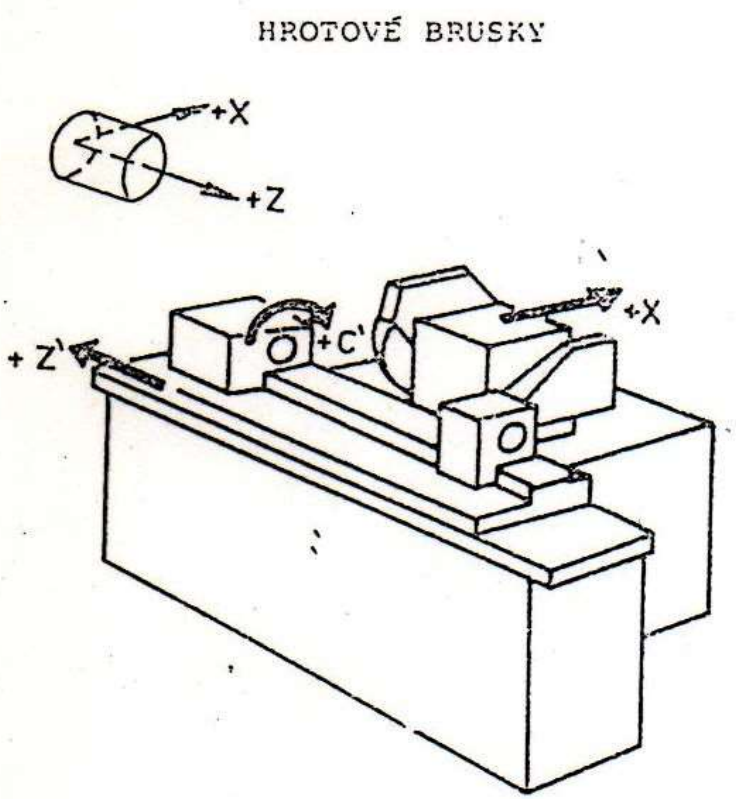
Grinding is a machining process that takes a very light “cut” using abrasive media—typically an abrasive grinding wheel.

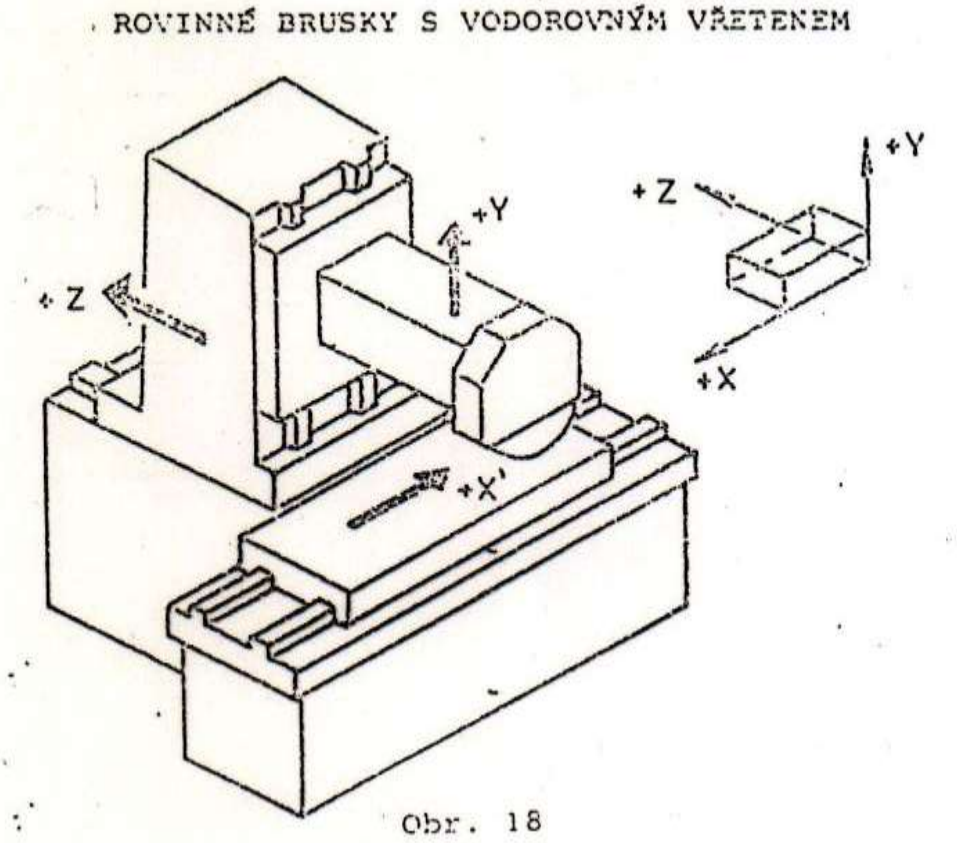
Grinding is also an effective process for machining workpiece materials that are too hard for milling or turning.

Grinding machines

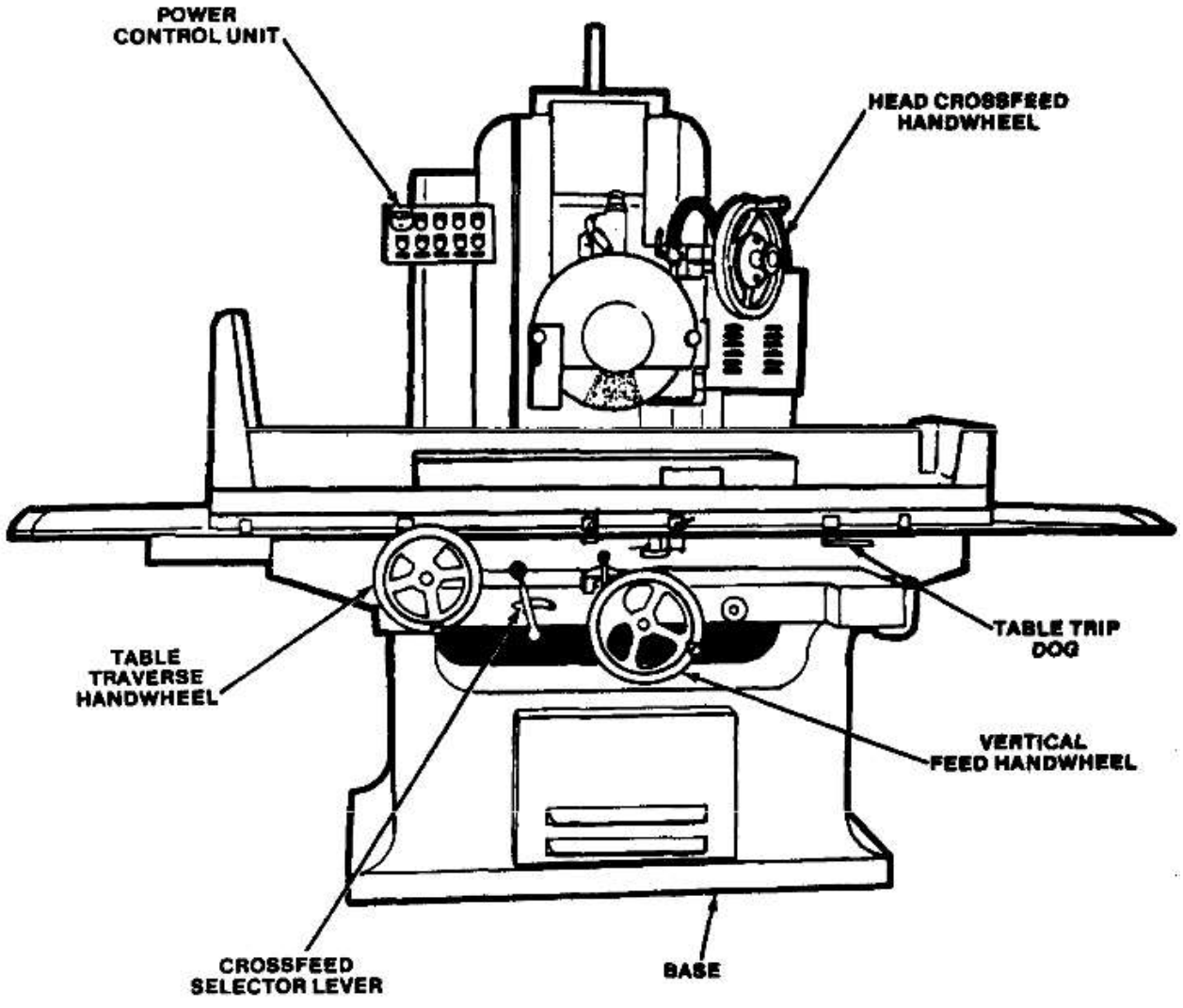
Some grinders machine round parts. These machines include cylindrical grinders and centerless grinders.

Grinding machines

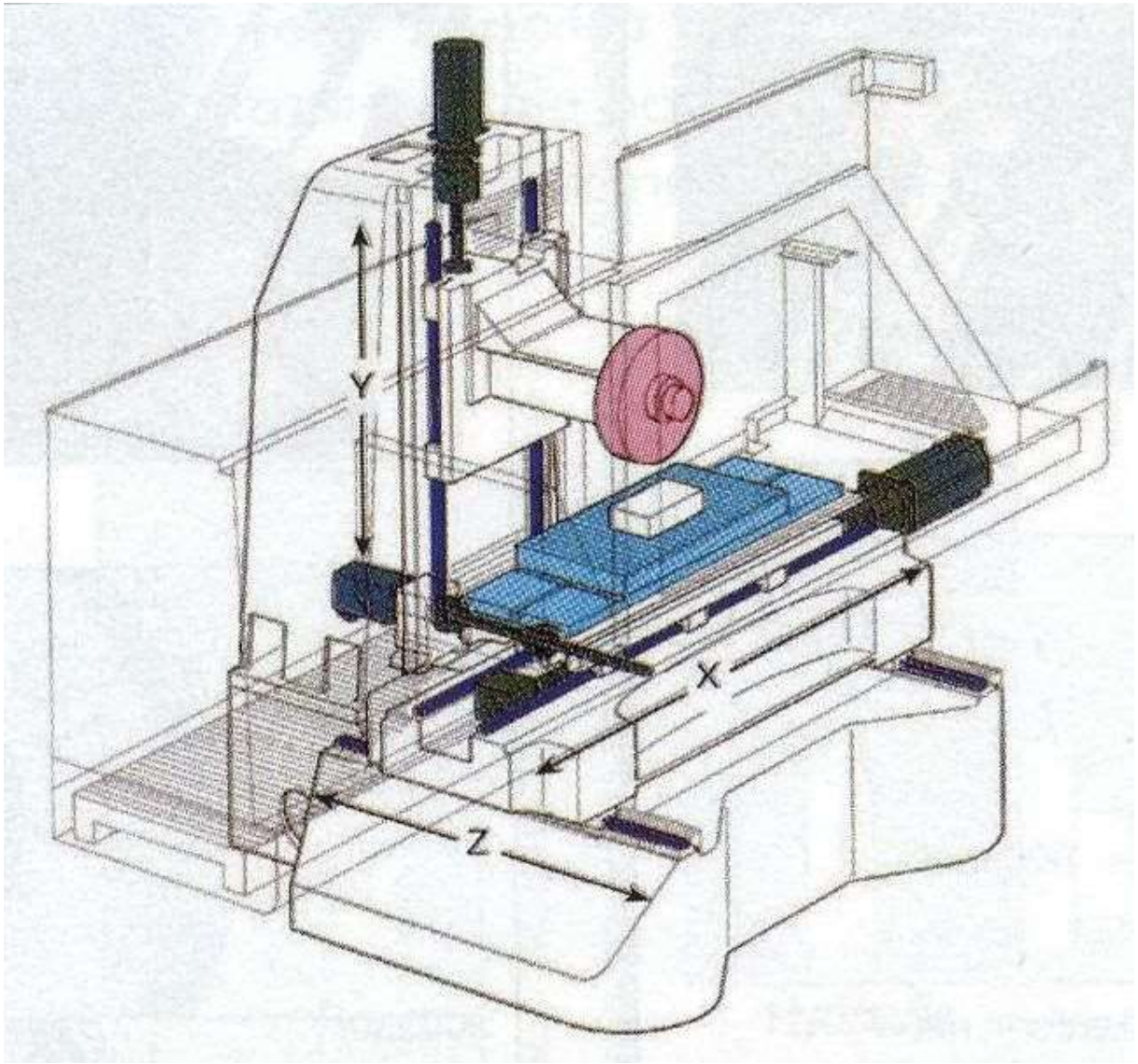




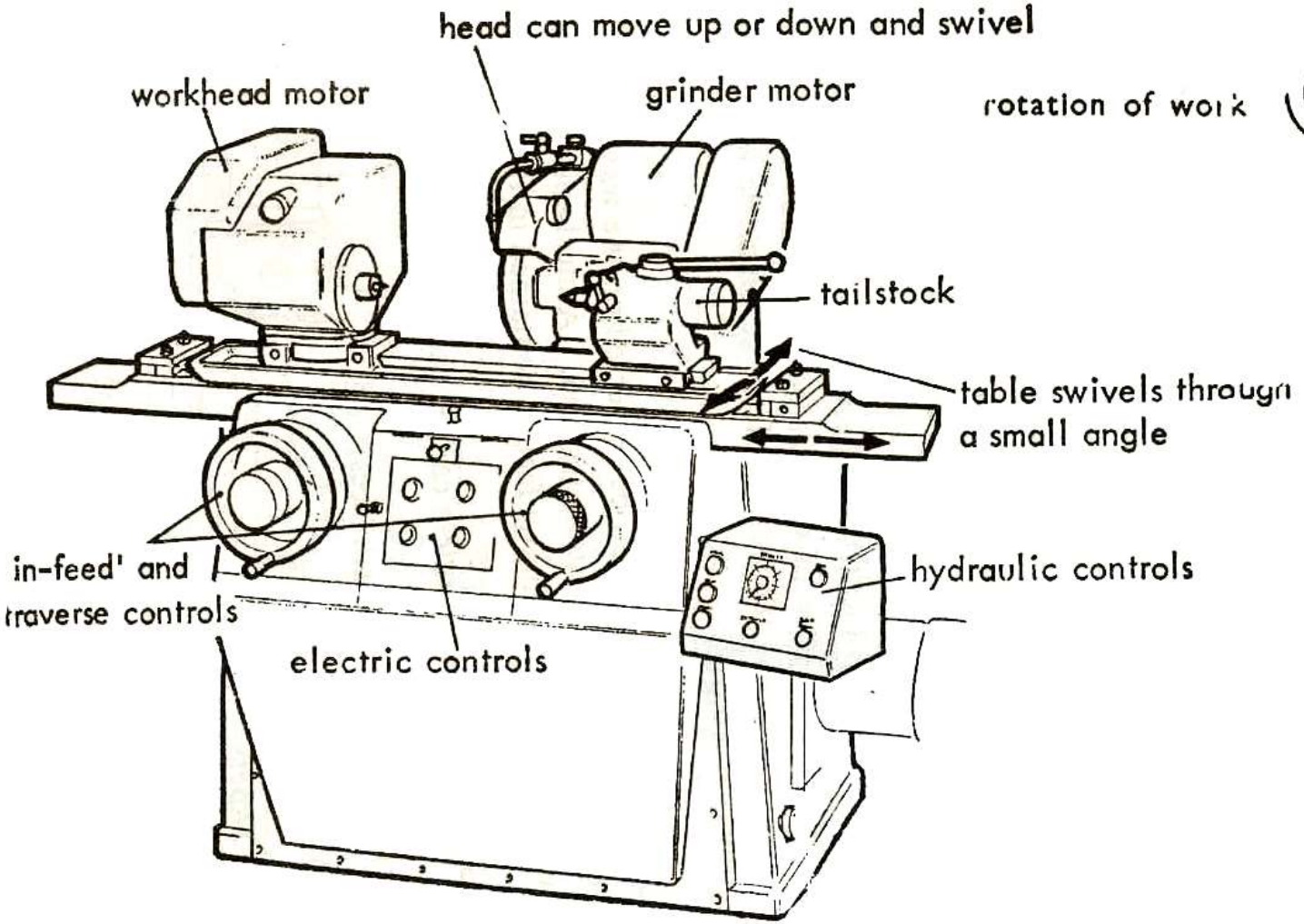
Grinding machines

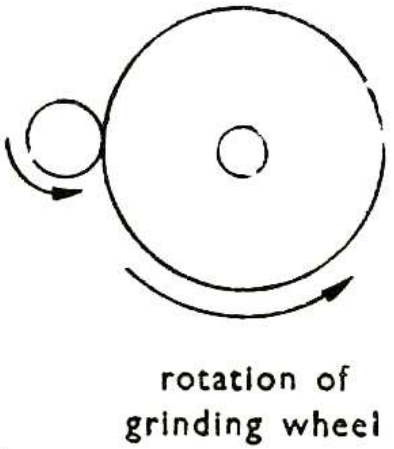


Grinding machines

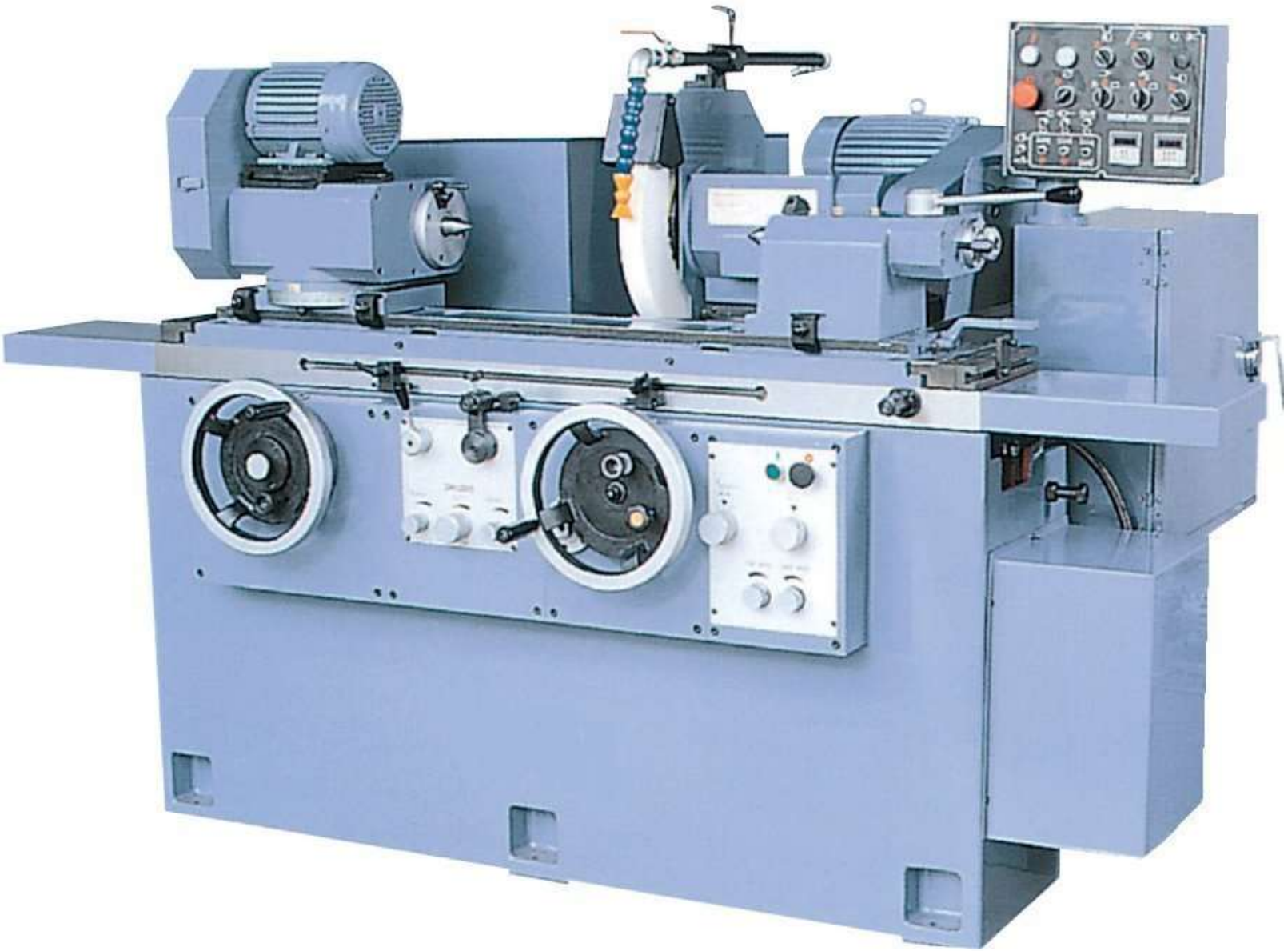


Grinding machines

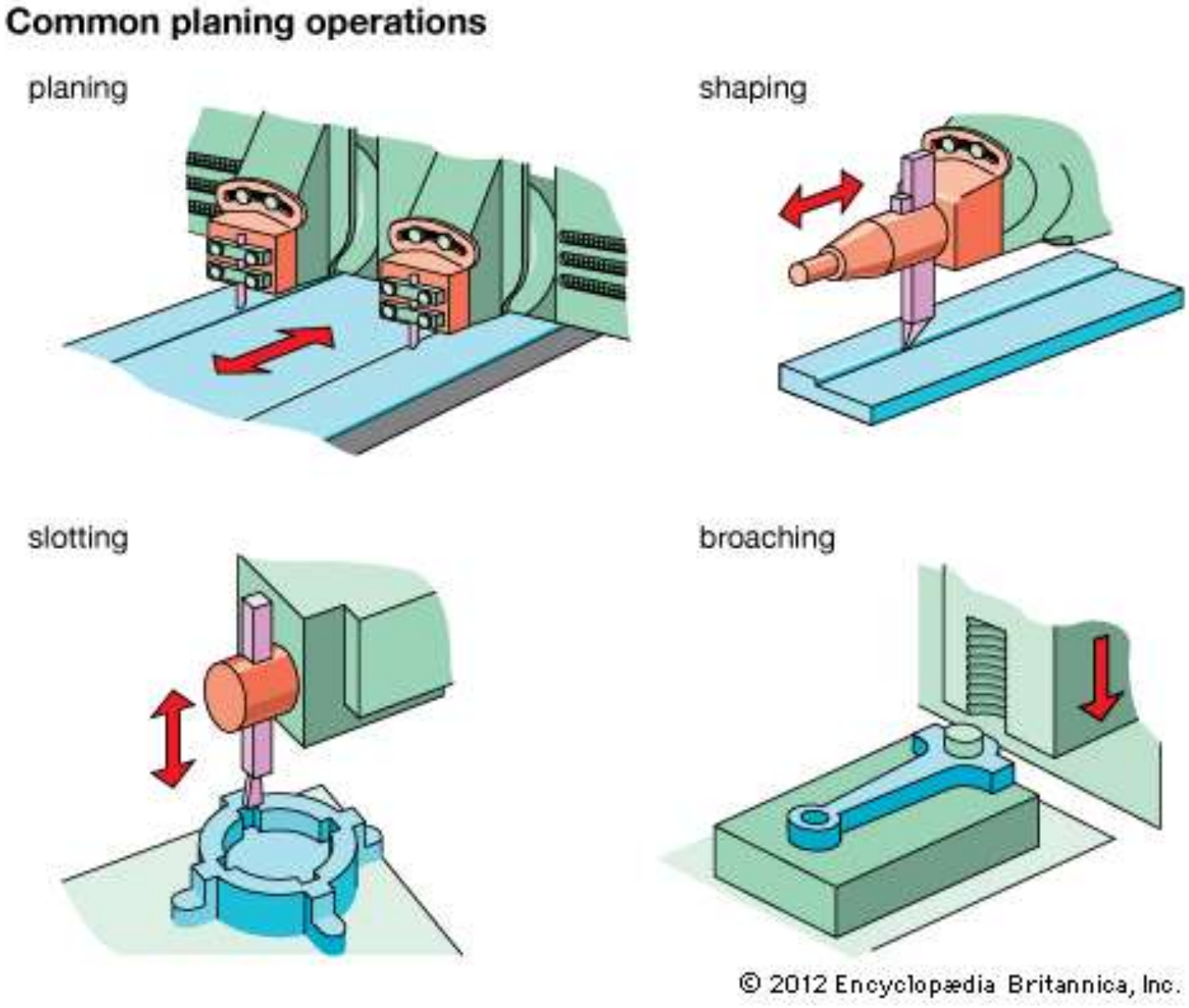




Grinding machines



Shaping Machine



Shaping Machine

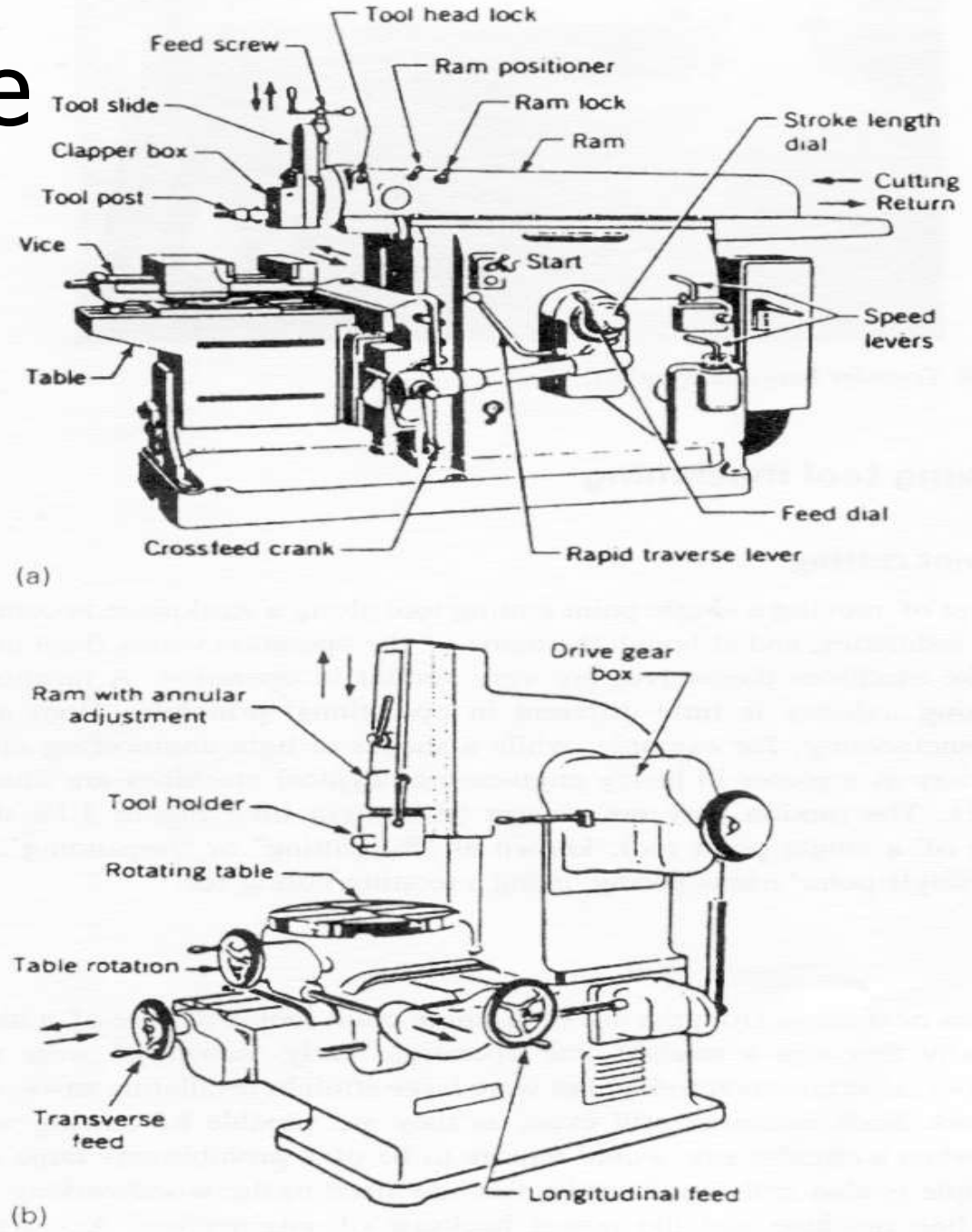


Figure 4.11 (a) Shaper; (b) slotter or vertical shaper; (c) planer.

Planing machine

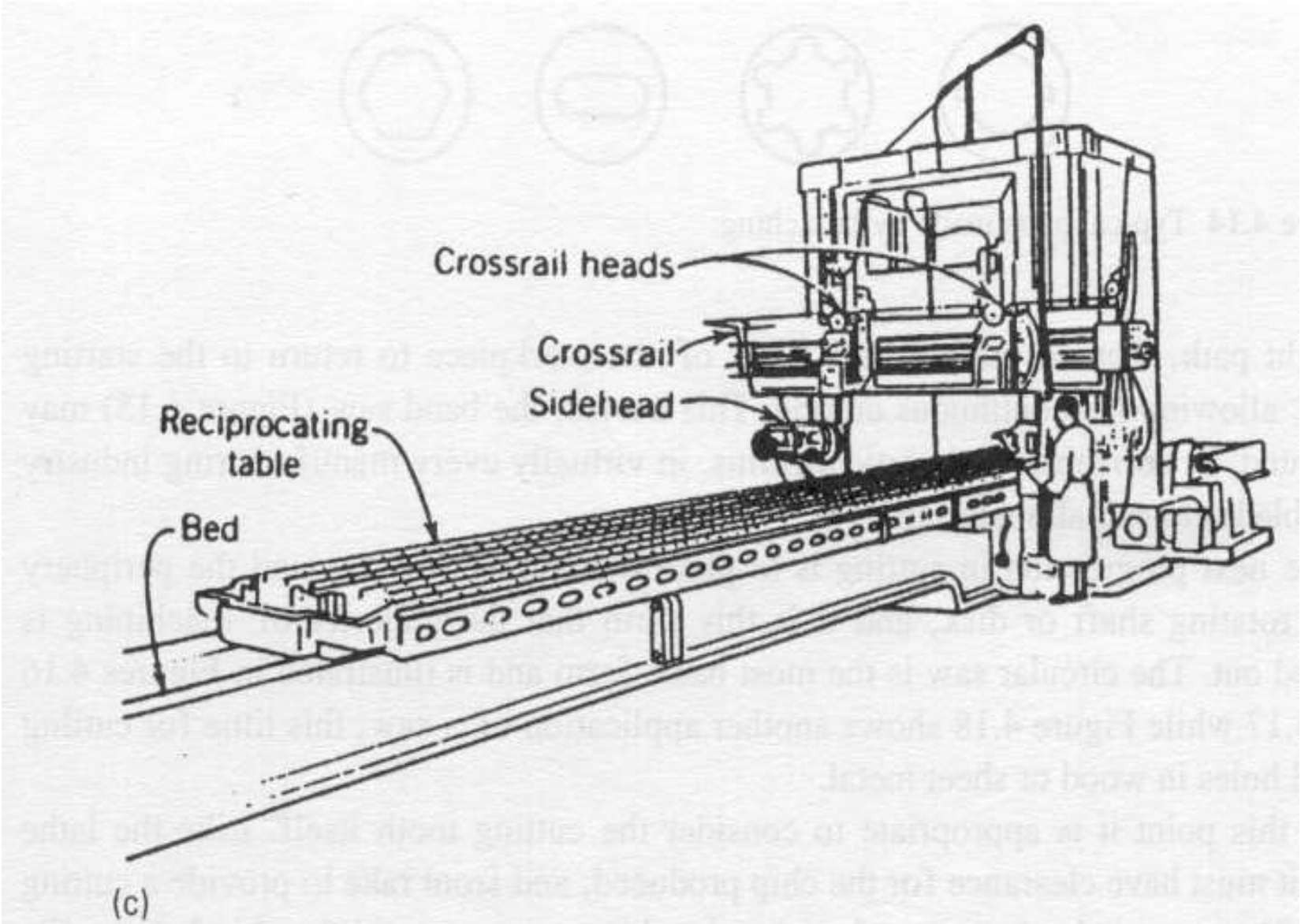
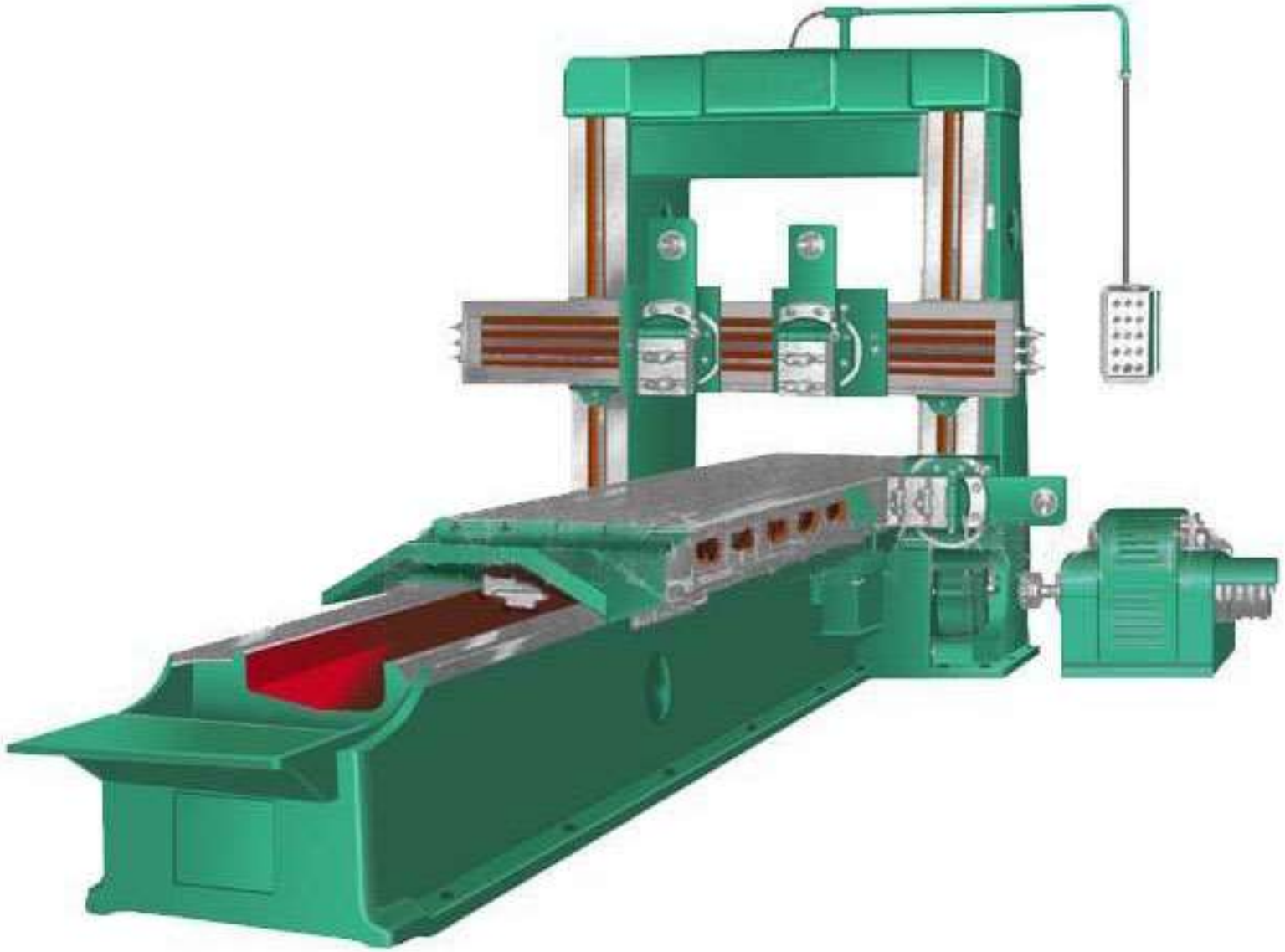


Figure 4.11 Continued.

Shaping Machine

Slotting Machine

Planing machine



Planing machine