Machine Tools (Part II)

Milling Machine

In a milling machine the cutter is a circular device with a series of cutting edges on its

circumference. The workpiece is held on a table that controls the feed against the cutter. The

table has three possible movements: longitudinal, horizontal, and vertical; in some cases it can

also rotate. Milling machines are the most versatile of all machine tools. Flat or contoured

surfaces may be machined with excellent finish and accuracy. Angles, slots, gear teeth and cuts

can be made by using various shapes of cutters.

Drilling and Boring Machines

To drill a hole usually hole-making machine tools are used. They can drill a hole according to

some specification, they can enlarge it, or they can cut threads for a screw or to create an

accurate size or a smooth finish of a hole.

Drilling machines are different in size and function, from portable drills to radial drilling

machines, multispindle units, automatic production machines, and deep-hole-drilling machines.

Boring is a process that enlarges holes previously drilled, usually with a rotating single-point

cutter held on a boring bar and fed against a stationary workpiece.

Shapers and Planers

The shaper is used mainly to produce different flat surfaces. The tool slides against the stationary

workpiece and cuts on one stroke, returns to its starting position, and then cuts on the next stroke

after a slight lateral displacement. In general, the shaper can make any surface having straight-

line elements. It uses only one cutting-tool and is relatively slow, because the return stroke is

idle. That is why the shaper is seldom found on a mass production line. It is, however, valuable

for tool production and for workshop where flexibility is important and relative slowness is

unimportant.

The planer is the largest of the reciprocating machine tools. It differs from the shaper, which

moves a tool past a fixed workpiece because the planer moves the workpiece to expose a new

section to the tool. Like the shaper, the planer is intended to produce vertical, horizontal, or

diagonal cuts. It is also possible to mount several tools at one time in any or all tool holders of a

planer to execute multiple simultaneous cuts.

Grinders

Grinders remove metal by a rotating abrasive wheel. The wheel is composed of many small

grains of abrasive, bonded together, with each grain acting as a miniature cutting tool. The

process gives very smooth and accurate finishes. Only a small amount of material is removed at

each pass of the wheel, so grinding machines require fine wheel regulation. The pressure of the

wheel against the workpiece is usually very light, so that grinding can be carried out on fragile

materials that cannot be machined by other conventional devices.