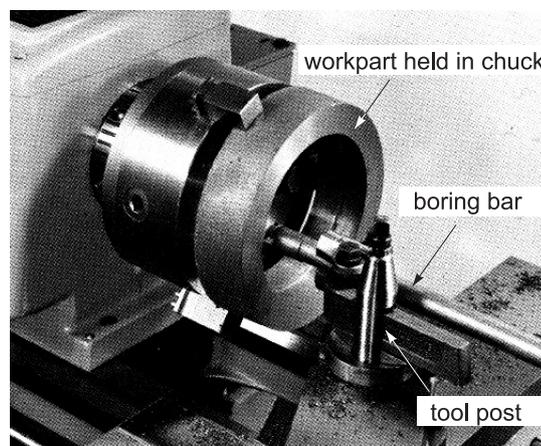


## 6.5 BORING

### *Introduction*

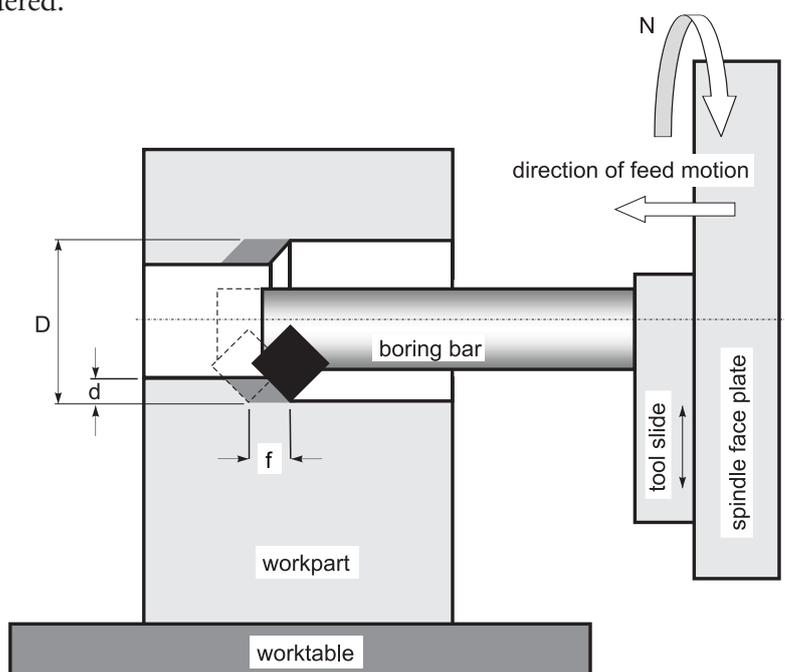
Boring is a process of producing circular internal profiles on a hole made by drilling or another process. It uses single point cutting tool called a *boring bar*. In boring, the boring bar can be rotated, or the workpart can be rotated. Machine tools which rotate the boring bar against a stationary workpiece are called *boring machines* (also *boring mills*). Boring can be accomplished on a turning machine with a stationary boring bar positioned in the tool post and rotating workpiece held in the lathe chuck as illustrated in the figure. In this section, we will consider only boring on boring machines.



Boring operation on a lathe.

### *Cutting conditions in boring*

Since boring is an operation quite similar to turning, the same type of cutting conditions could be considered.

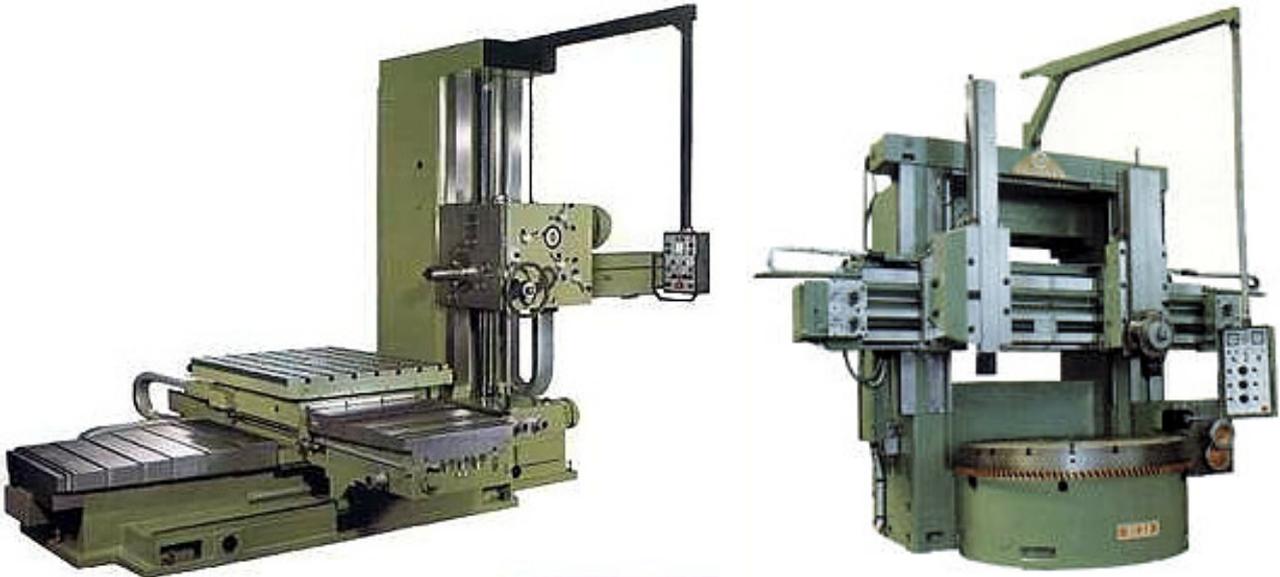


Set-up of the boring operation on a boring machine.

## *Boring machines*

Boring machines can be *horizontal* or *vertical* according to the orientation of the axis of rotation of the machine spindle.

In *horizontal boring* operation, boring bar is mounted in a tool slide, which position is adjusted relative to the spindle face plate to machine different diameters. The boring bar must be supported on the other end when boring long and small-diameter holes.

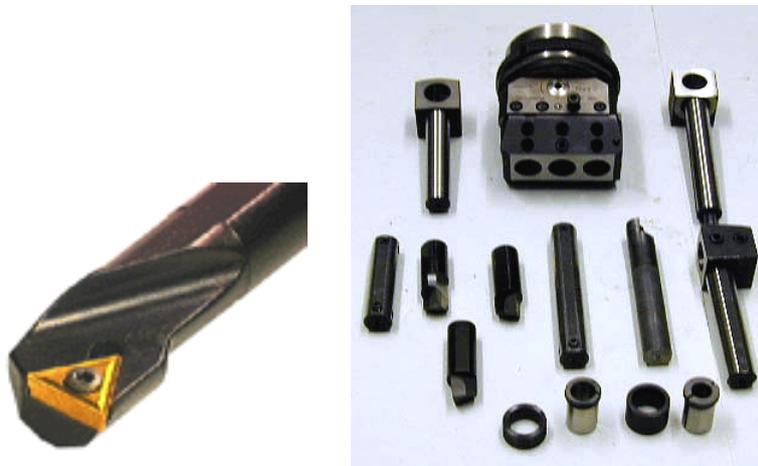


Horizontal boring machine (*Left*) and vertical boring mill (*Right*).

A *vertical boring mill* is used for large, heavy workparts with diameters up to 12 m. The typical boring mill can position and feed several cutting tools simultaneously. The workpart is mounted on a rotating worktable.

## *Cutting tool for boring*

The typical boring bar is shown in the figure. When boring with a rotating tool, size is controlled by changing the radial position of the tool slide, which hold the boring bar, with respect to the spindle axis of rotation. For finishing machining, the boring bar is additionally mounted in an adjustable boring head for more precise control of the bar radial position.



Boring bar with indexable carbide insert (*Left*), and adjustable boring head with accessories (*Right*).