

MEE2006: Introduction to Mechanical DesignInstructor: Prof. Keun Ryu (kryu@hanyang.ac.kr; <http://turbolab.hanyang.ac.kr>)

Note 5: Basic machine tools

Lathe

Almost all machine tools have evolved from the lathe. A lathe /leɪð/ is a tool that rotates the workpiece about an axis of rotation to perform various operations with tools that are applied to the workpiece to create an object with symmetry about that axis.

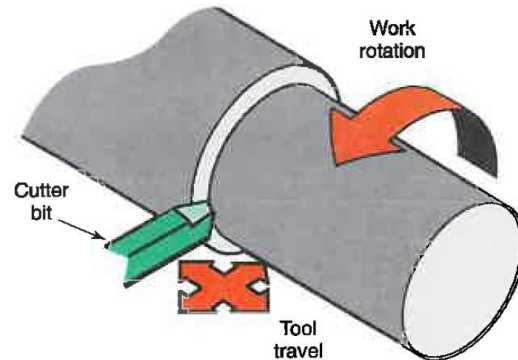


Figure 1-7. The lathe operates on the principle of the work being rotated against the edge of a cutting tool.

The most advanced version of the lathe is the CNC turning center. Computer numerical control (CNC) is the automation of machine tools by means of computers executing pre-programmed sequences of machine control commands. This is in contrast to machines that are manually controlled by hand wheels or levers, or mechanically automated by cams alone.



Drill press

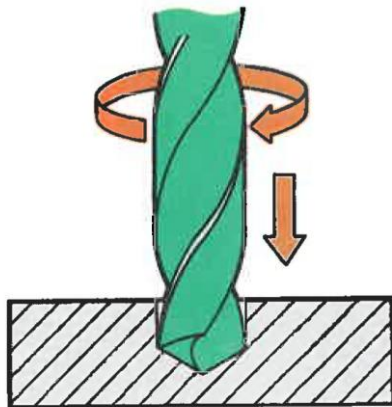


Figure 1-10. A drill press operates by rotating a cutting tool (drill) against the material with sufficient pressure to cause the tool to penetrate the material.



Grinding machines

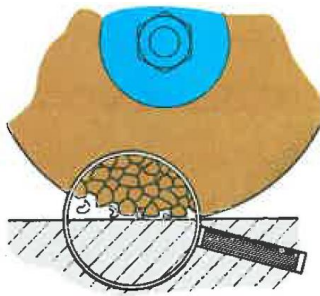


Figure 1-11. Grinding is a cutting operation, like turning, drilling, milling, or sawing. However, instead of the one, two, or multiple-edge cutting tools used in other applications, grinding employs an abrasive tool composed of thousands of cutting edges.



Band machines

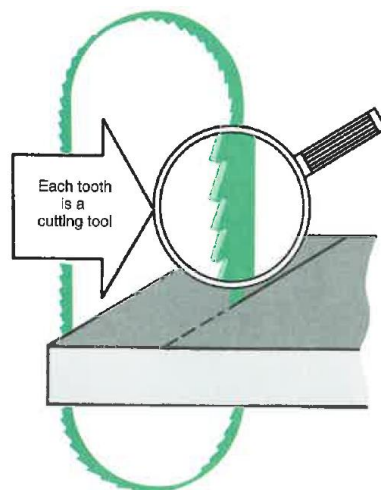


Figure 1-12. Band machining makes use of a continuous saw blade, with each tooth functioning as a precision cutting tool.



Milling machine

Milling is the machining process of using rotary cutters to remove material from a workpiece by advancing (or feeding) the cutter into the workpiece at a certain direction.

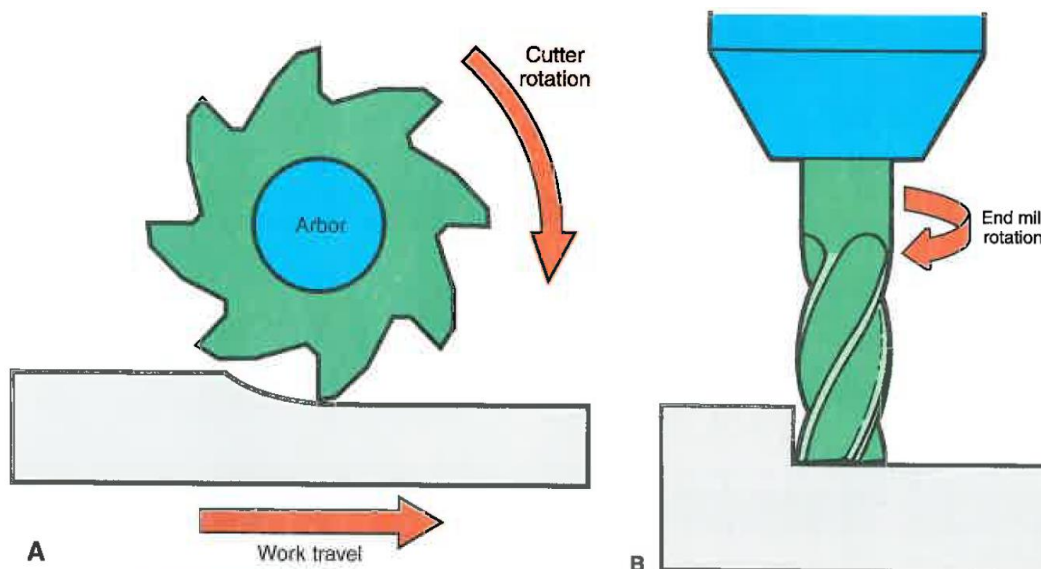


Figure 1-13. Milling removes material by rotating a multitoothed cutter into the work. A—With peripheral milling, the surface being machined is parallel to periphery of the cutter. B—End mills have cutting edges on the circumference and the end.