Introduction to Machining Processes Lab and Draw Layout of Lab

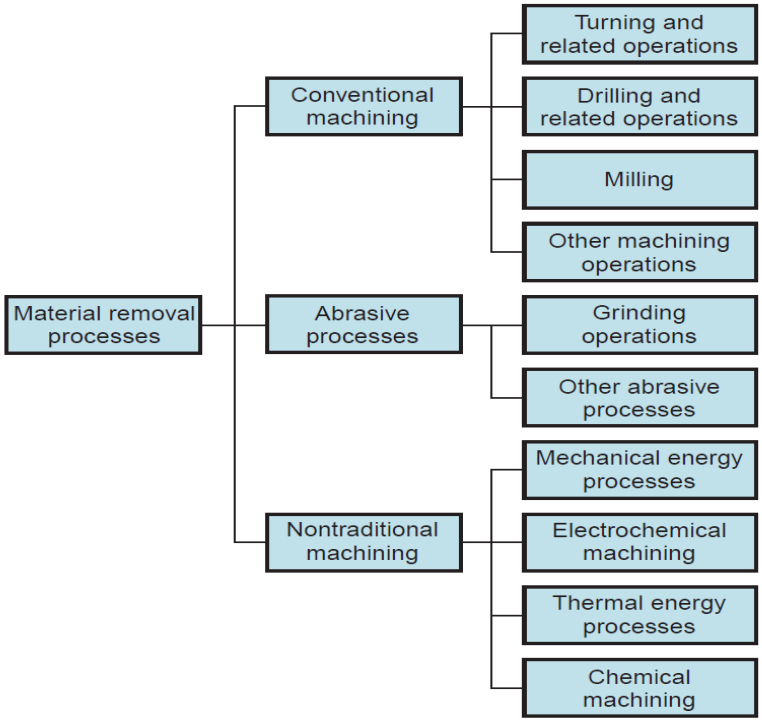
Introduction:

Machining is the process of using cutting tools to remove some amount of a piece of material (metal, wood, plastics, ceramic, etc.) to precisely shape it for an intended use. This use of the physical action of cutting tools is also known as subtractive manufacturing.

The primary machines used in machining are

- Lathe (metal lathe)
- Milling machine
- Drill press
- Abrasive grinders.
- Shaper machine

Other machines can be either manual or automated. Most automated machines have CNC (computer numerical control) and are capable of producing very intricate, precise, and complex parts with a high degree of repeatable accuracy for any number of applications.



The material removal processes are a family of shaping operations in which excess material is removed from a starting work part so that what remains is the desired final geometry. The ‘‘family tree’’ is shown in Figure.

The most important branch of the family is;

Conventional Machining

Conventional machining in which a sharp cutting tool is used to mechanically cut the material to achieve the desired geometry. The three principal machining processes are turning, drilling, and milling. The ‘‘other machining operations’’ in Figure include shaping, planning, broaching, and sawing.

Another group of material removal processes is the;

Abrasive processes

Abrasive processes which mechanically remove material by the action of hard, abrasive particles. This process group, which includes grinding. ‘‘Other includes honing, lapping, and super finishing. Finally, there are the nontraditional processes, which use various energy forms other than a sharp cutting tool or abrasive particles to remove material. The energy forms include mechanical, electrochemical, thermal, and chemical.

Machining is important commercially and technologically for several reasons.

Variety of work materials

Machining can be applied to a wide variety of work materials. Virtually all solid metals can be machined. Plastics and plastic composites can also be cut by machining. Ceramics pose difficulties because of their high hardness and brittleness; however, most ceramics can be successfully cut by the abrasive machining processes.

Variety of part shapes and geometric features

Machining can be used to create any regular geometry, such as flat planes, round holes, and cylinders. By introducing variations in tool shapes and tool paths, irregular geometries can be

created, such as screw threads and T-slots. By combining several machining operations in sequence, Shapes of almost unlimited complexity and variety can be produced.

Dimensional accuracy

Machining can produce dimensions to very close tolerances. Some machining processes can achieve tolerances of 0.025 mm (0.001 in), much more accurate than most other processes.

Good surface finishes

Machining is capable of creating very smooth surface finishes. Roughness values less than 0.4microns (16 m-in.) can be achieved in conventional machining operations. Some abrasive processes can achieve even better finishes.

Non-Conventional Machining

Lathe Machine

Shaper Machine

Drill Machine

Milling Machine

Shaper Machine

Layout of Machining Processes Lab