

01 Introduction to manufacturing processes

Manufacturing processes: as a technical process, the manufacturing is the application of physical and chemical processes to alter the geometry, properties, and/or appearance of a given starting material to make parts or products; manufacturing also includes assembly of multiple parts to make products.

The processes to accomplish manufacturing involve a combination of machinery, tools, power, and labor, as shown in Figure 1.1 (a)

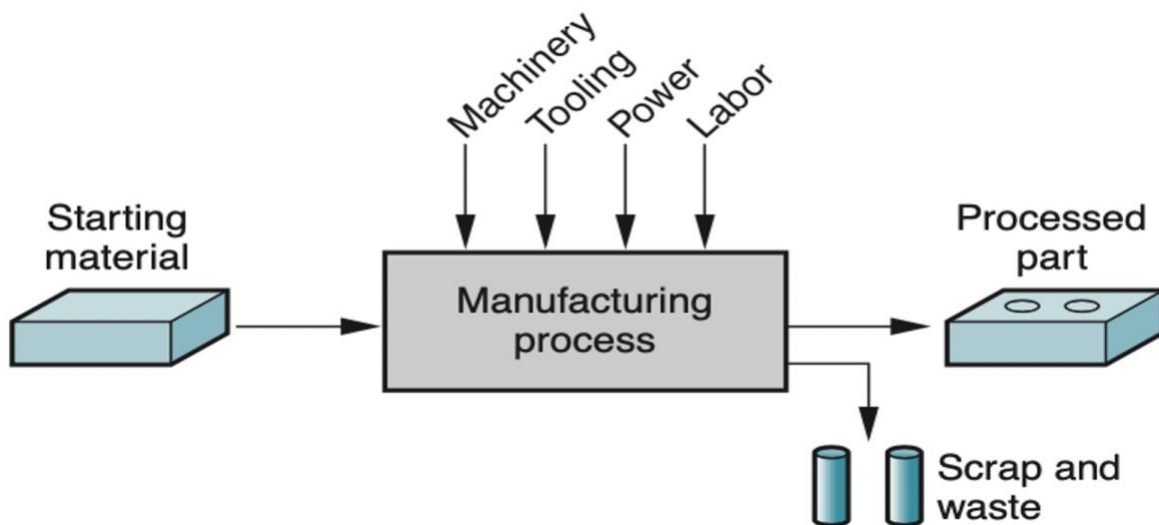


Figure 1.1 (a) Manufacturing processes as a technical process.

Manufacturing is almost always carried out as a sequence of operations. Each operation brings the material closer to the desired final state.

Manufacturing Processes: as an *economic* process, manufacturing is the transformation of materials into items of greater value by means of one or more processing and/or assembly operations, as shown in Figure 1.1(b).

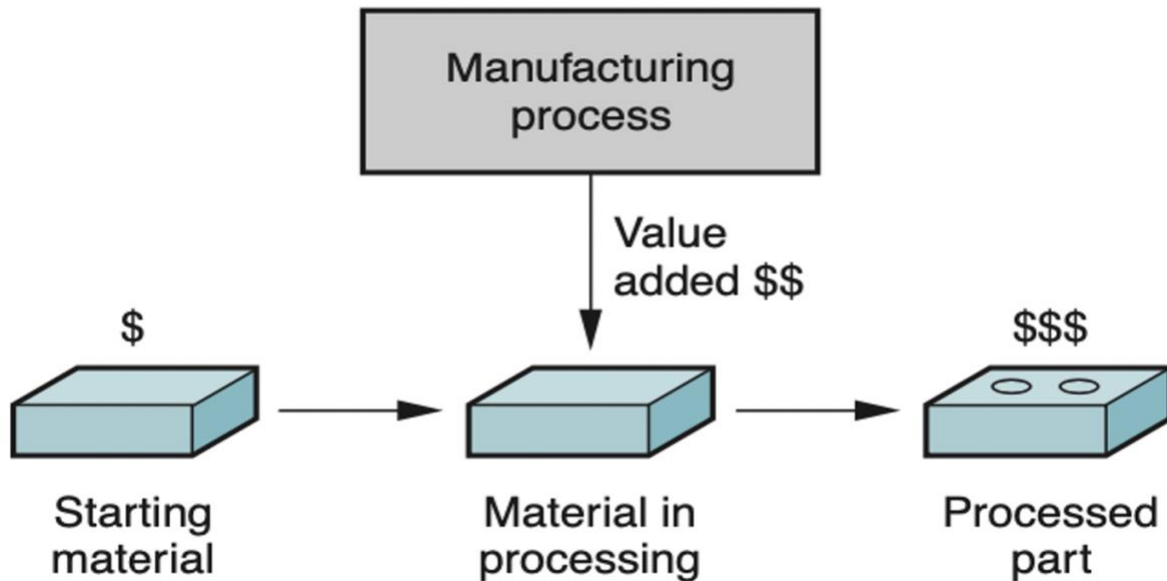


Figure 1.1 (b) Manufacturing processes as an economic process.

Materials in Manufacturing:

most engineering materials can be classified into one of three basic categories:

- (1) Metals,
- (2) Ceramics, and
- (3) Polymers.

Their chemistries are different, their mechanical and physical properties are different, and these differences affect the manufacturing processes that can be used to produce products from them. In addition to the three basic categories, there are:

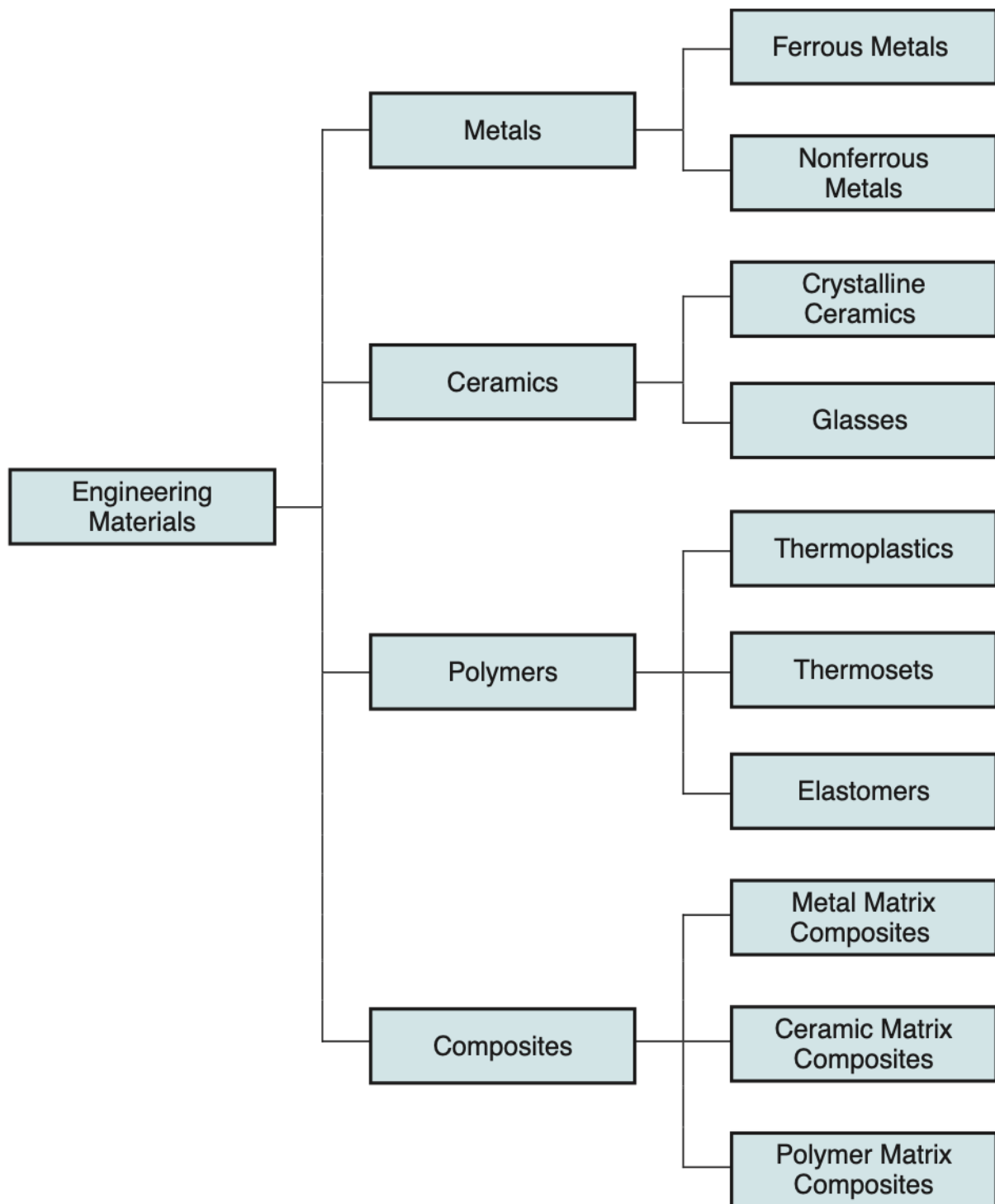


Figure 1.2 Classification of the four engineering materials.

Processing Operations:

A processing operation uses energy to alter a work part's shape, physical properties, or appearance to add value to the material. The forms of energy include:

1. Mechanical energy.
2. Thermal energy.
3. Electrical energy, and
4. Chemical energy.

The energy is applied in a controlled way by means of machinery and tooling. Human energy may also be required, but the human workers are generally employed to control the machines, oversee the operations, and load and unload parts before and after each cycle of operation.

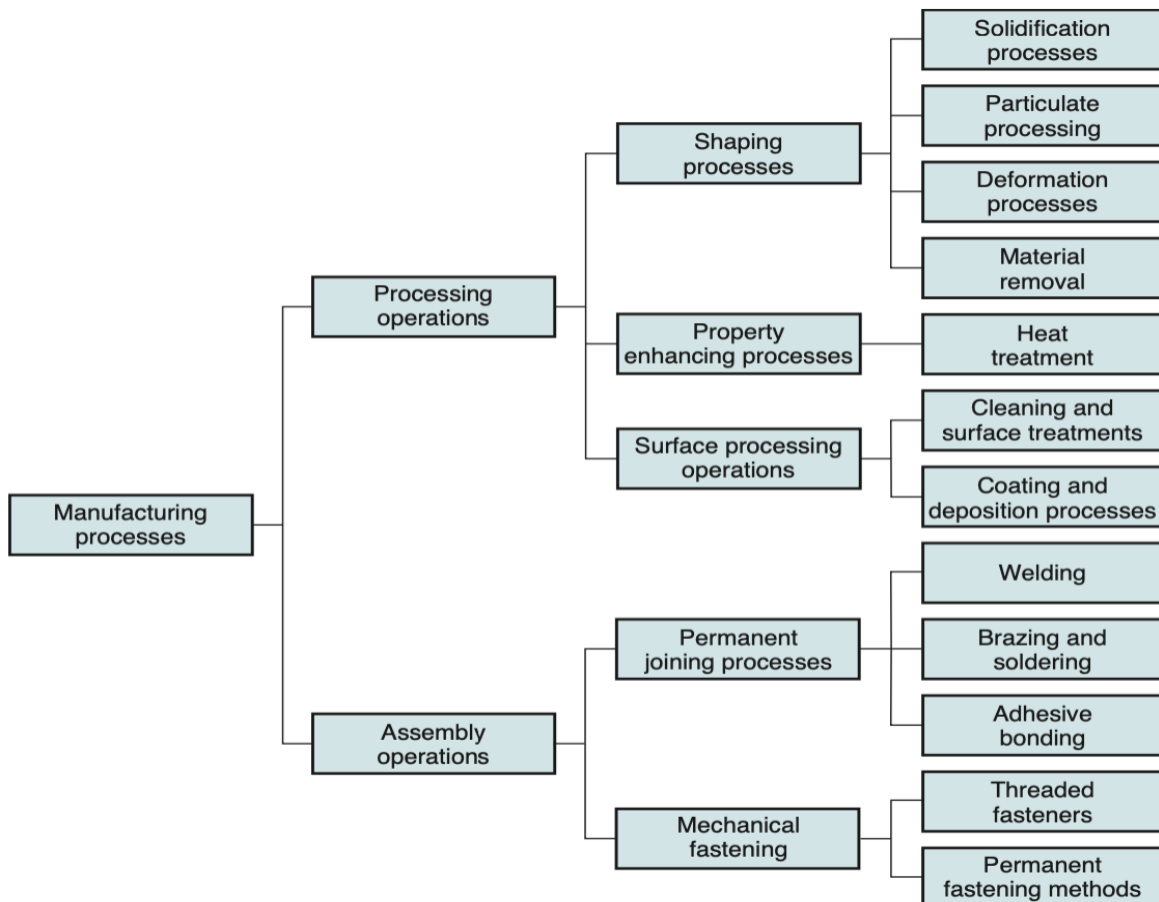


Figure 1.3 Classification of manufacturing processes.