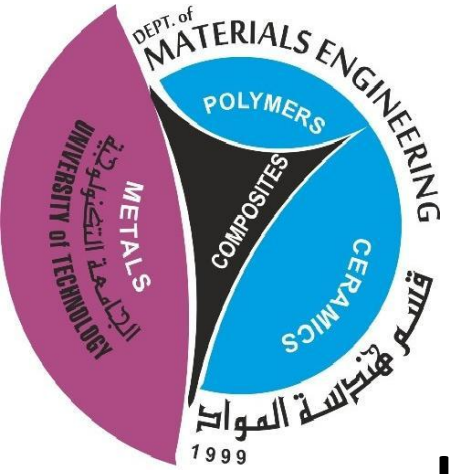


University of Technology
Materials Engineering Department

Casting Technology I

Fourth Class

General Materials Branch

Class Objectives

Benjamin Franklin said:

- *- Tell me, I will forget,*
- *- Teach me, I will remember,*
- *- Involve me, I understand*

References

1. S. Kalpakjian, "Manufacturing Engineering and Technology", Addison-Wesley Company, USA, 2012.
2. Black.T, Kosher " De Garmo Materials and Manufactures in Engineering,", John Wiley & Sons, Inc., 2010.
3. P. Mikell Groover, "Fundamentals of modern manufacturing: materials, processes and systems", John Wiley & Sons, Inc., 2011.
4. R. Singh, "Introduction to Basic Manufacturing Processes and Workshop Technology", New Age International (P) Ltd., 2006.

توزيع الدرجات

Terms	Grade
Mid Term	20%
Quiz	5%
Lab	10%
Assignment	5%
Final	60%

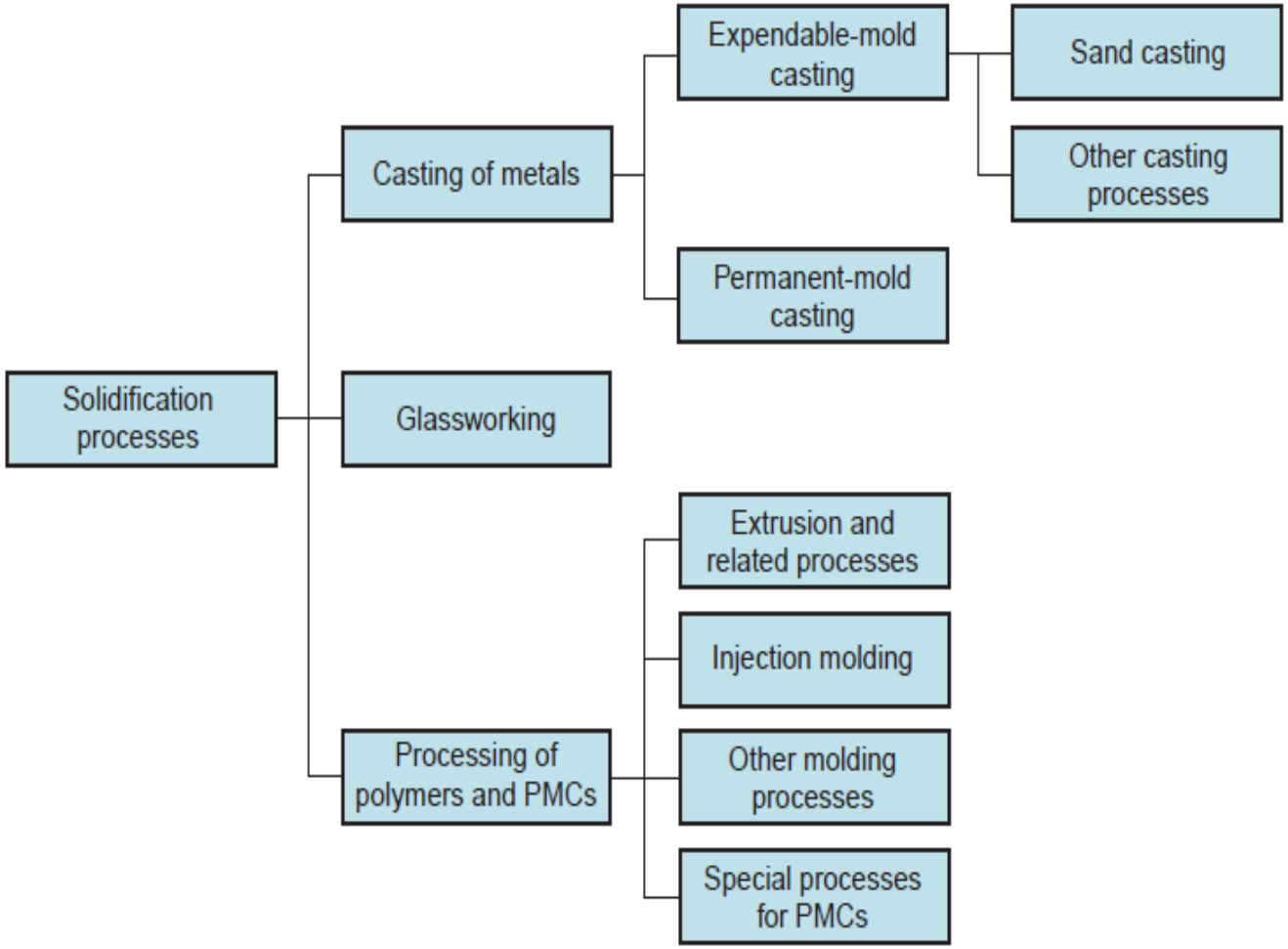
Course Subjects

- Fundamentals of metal casting.
- Overview of Casting Technology.
- Heating and Pouring.
- Solidification and Cooling.
- Patterns and Core
- Expendable-Mold Casting Processes (Single Use Mold Techniques).

Course Subjects

- Sand Casting
- Continuous Casting
- Shell Casting
- Vacuum Molding
- Plaster-Mold Casting
- Ceramic Mold Casting
- Rubber Mold Casting
- Graphite Mold Casting
- Casting Design
- Cleaning Casting and Finshing

Classification of solidification processes



Overview of Casting Technology

Lecture 1

- ***Casting*** is a process in which molten metal flows by gravity or other force into a mold where it solidifies in the shape of the mold cavity. The term ***casting*** is also applied to the part that is made by this process. It is one of the oldest shaping processes, dating back 6000 years .

Definition

- The term ***ingot*** is usually associated with the primary metals industries; it describes a large casting that is simple in shape and intended for subsequent reshaping by processes such as rolling or forging. involves the production of more complex geometries that are much closer to the final desired shape of the part or product.

Advantages

1. Casting can be used to create complex part geometries, including both external and internal shapes.
2. Some casting processes are capable of producing parts to net shape. No further manufacturing operations are required to achieve the required geometry and dimensions of the parts.
3. Other casting processes are near net shape, for which some additional shape processing is required (usually machining) in order to achieve accurate dimensions and details.

Advantages

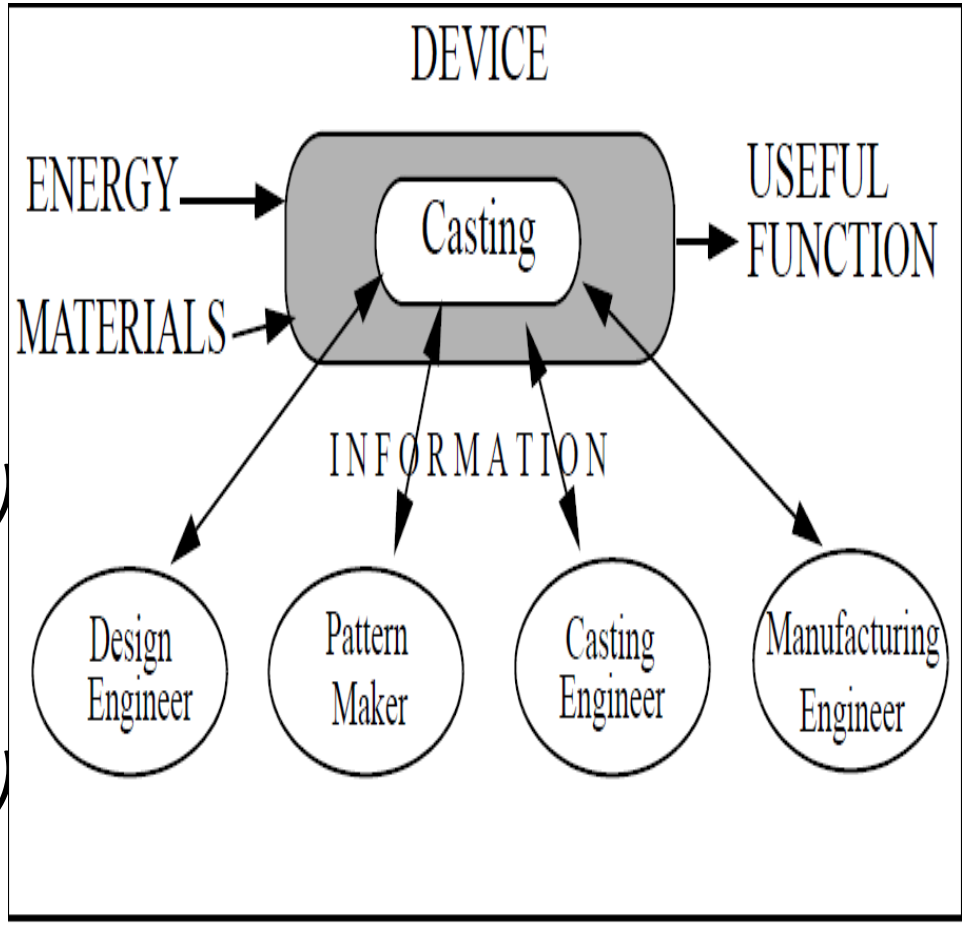
4. Casting can be used to produce very large parts. Castings weighing more than 100 tons have been made.
5. The casting process can be performed on any metal that can be heated to the liquid state.
6. Some casting methods are quite suited to mass production

Limitation

- These include limitations on
- mechanical properties,
- porosity,
- poor dimensional accuracy
- surface finish for some casting processes,
- safety hazards to humans when processing hot molten metal's,
- environmental problems

Metal Castings & Materials Engineering

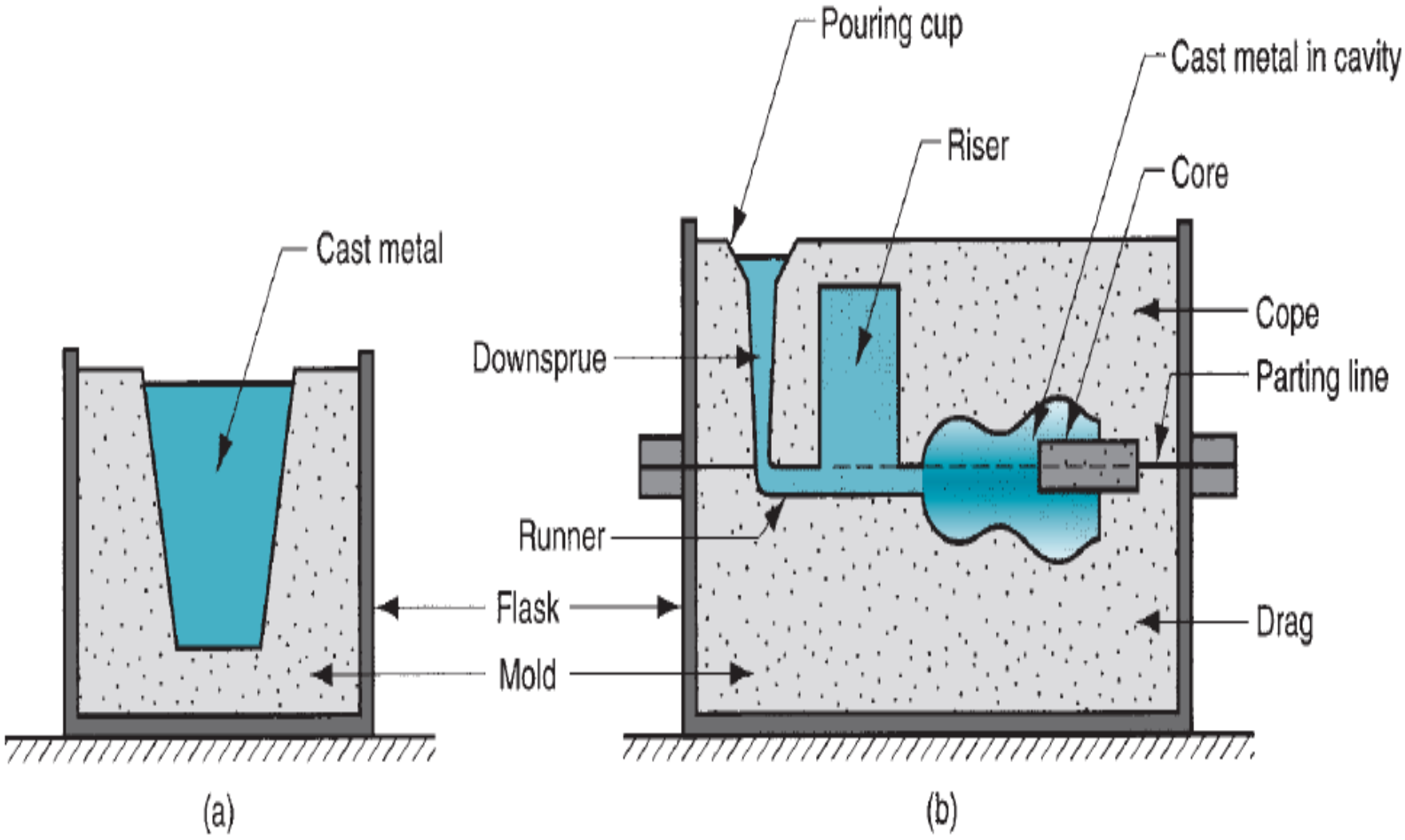
- *Design Engineers (Mechanical Engineers)*
- *Pattern Makers (Skilled craftsman, CAD)*
- *Casting Engineers (Metallurgical Engineers)*
- *Manufacturing Engineers (Mechanical, Metallurgical Engineers)*



Casting Terms

- As a production process, casting is usually carried out in a ***foundry***. A foundry is a factory equipped for making molds, melting and handling metal in molten form, performing the casting process, and cleaning the finished casting. The workers who perform the casting operations in these factories are called ***foundrymen***

The Mold


Cast metal
Pouring cup
Riser
Cast metal in cavity
Core
Cope
Parting line
Downsprue
Runner
Flask
Mold
Drag
(a)
(b)

Type of Mould

- Casting processes divide into two broad categories, according to type of mold used:
- *expendable-mold casting*
- *permanent-mold casting.*

An expendable mold