

Casting or Foundry

● Casting:

Casting is the process of producing metal/ alloy components parts of desired shapes by pouring the molten metal/ alloy into prepared mould (of that shape) and then allowing metal/ alloy to cool and solidify. The solidified piece of metal/alloy is known as “Casting”. The place where casting is done is “Foundry”.

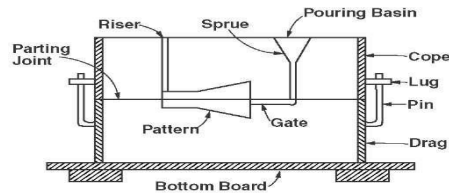


Fig. 1. Mould Making

● **Steps Involved in Making a Casting:**

1) Pattern Making:

A pattern may be defined as a model or replica of the casting with certain allowances provided on it. Around the pattern moulding sand is packed to create a cavity known as mould cavity in which molten metal is poured, and allowed to solidify the result is the “Cast Object”. Even for one piece, pattern is required. The core print on the pattern provides the location in mould cavity to other place core.

a) Material for Making Pattern:

- | | | |
|----------------------|-----------|-----------------|
| i) Wood | ii) Metal | iii) Plastic |
| iv) Plaster of Paris | v) Wax | vi) Polystyrene |

b) Types of Pattern:

- | | |
|----------------------|-------------------|
| i) One piece pattern | v) Sweep Pattern |
| ii) Split Pattern | vi) Gated Pattern |

- iii) Loose Piece Pattern
- iv) Match Plate Pattern
- vii) Skeleton Pattern

2) Mould Making and Core Making:

In case of sand casting, select, test and prepare the proportionate sand mixture for mould and core making. The main ingredients present in mixture are silica sand binder and moisture. A mould is container (of sand or metal etc.) having an impression of pattern known as mold cavity.

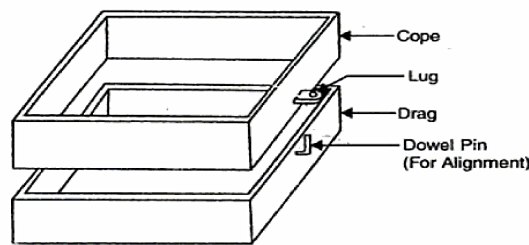


Fig. 2 Moulding Box

To make a mould, moulding flask is used, the entire moulding flask is called “cope” and the bottom one is called “drag” in two part moulding. Core is a body (of sand) which is employed to produce any cavity recess or any internal shape in the casting. Core is made in core box to get the required shape and in wet state is baked for certain degrees and with dry strength it is placed in the mould cavity.

3) Melting Metal:

Melt the metal/ alloy to be cast. Melting is done in pit furnace, electric furnace, induction furnace, or cupola depending on the quality required. Molten metal/ alloy is poured in the pouring basin or cup from that it flows into the sprue from sprue it flows through the runner and from gate it enters the mould cavity. It fills the mould cavity and slowly rises in the riser which ensures that the mould cavity is fully filled. After cooling, remove the casting by breaking the mould.

4) Clean and Finish the Casting:

Adhered sand or loose practices of sand can be removed by sand blasting, shot blasting, hydro sand blasting or tumbling action. With the help of sledge hammer casted sprue, runner and riser are knocked from the casting and remaining portion or unwanted fins is ground by portable grinding machine.

5) Test and Inspect the Casting:

Under working condition the casting is tested for any leakage or cracks. Inspection is done for finding the defects by using destructive or non- destructive methods. Remove the defects if any.

6) Casting is ready for shipping.

• Advantages of Metal Casting:

- 1) Casting is one of most versatile manufacturing processes.
- 2) Casting provides the greatest freedom of design in terms of shape, size and the product quantity.
- 3) Casting imparts uniform directional properties and better vibration damping capacity to the cast products.
- 4) Casting produces machinable parts.
- 5) Shapes difficult and uneconomic to obtain otherwise may achieved by casting process.
- 6) A product may be cast as one piece, thereby eliminating the need of joining.
- 7) Very heavy and bulky parts which are otherwise difficult to get fabricated may be cast.
- 8) Metals (cast iron) difficult to be shaped by other manufacturing processes may be cast.
- 9) Casting can be designed for equal distribution of load and for minimum stress concentration.
- 10) Casting processes can be mechanized and usefully employed for mass production of components.

• Applications of Metal Casting:

- 1) Transportation vehicles cast part account for more than 90% part of automobile engine and more than 50 % weight of a tractor.
- 2) Machine tool structure e.g. Planner beds, lathe bed.



Dr. Vishwanath Karad
MIT World Peace University, Pune

- 3) Turbine vanes
- 4) Power generators
- 5) Mill housing
- 6) Railway crossing (Mn. steel cast section), Rail Tracks, Rail Wheels.
- 7) Paper mill stock breaker parts (steel)
- 8) Air-craft jet engine blades.
- 9) Agricultural Equipment Parts.
- 10) Sanitary fitting (cast Iron), GI.