



SAND CASTING

19ME301 Manufacturing Technology
Unit -1 Casting and Joining Processes
II Year /III Semester
Mechanical Engineering

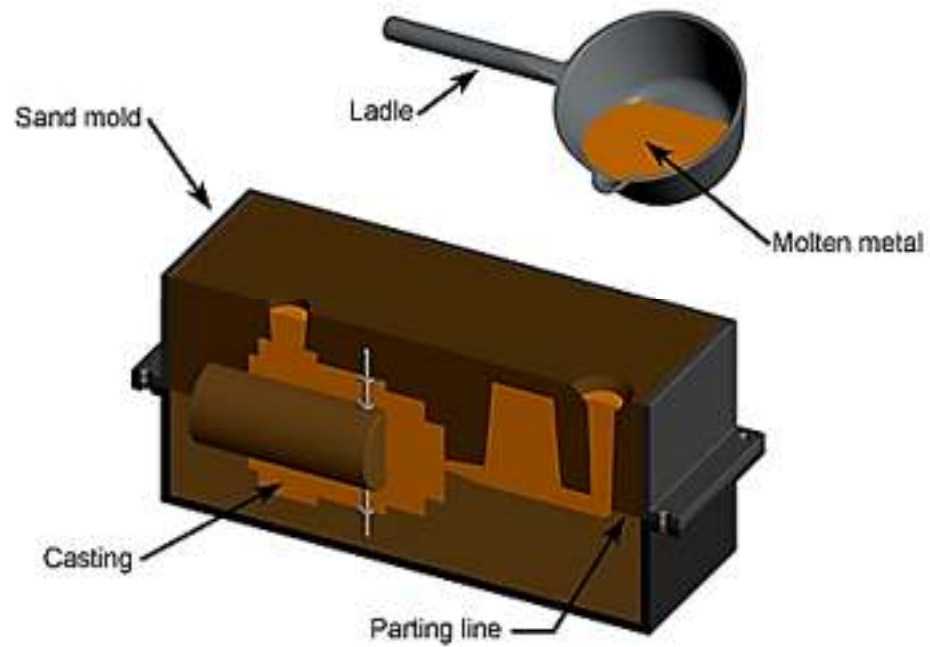


WHAT IS SAND CASTING?

- Sand casting, the most widely used casting process, utilizes expendable sand molds to form complex metal parts that can be made of nearly any alloy.
- The sand casting process involves the use of a furnace, metal, pattern, and sand mold.
- The metal is melted in the furnace and then ladled and poured into the cavity of the sand mold, which is formed by the pattern.
- The sand mold separates along a parting line and the solidified casting can be removed.



SAND CASTING





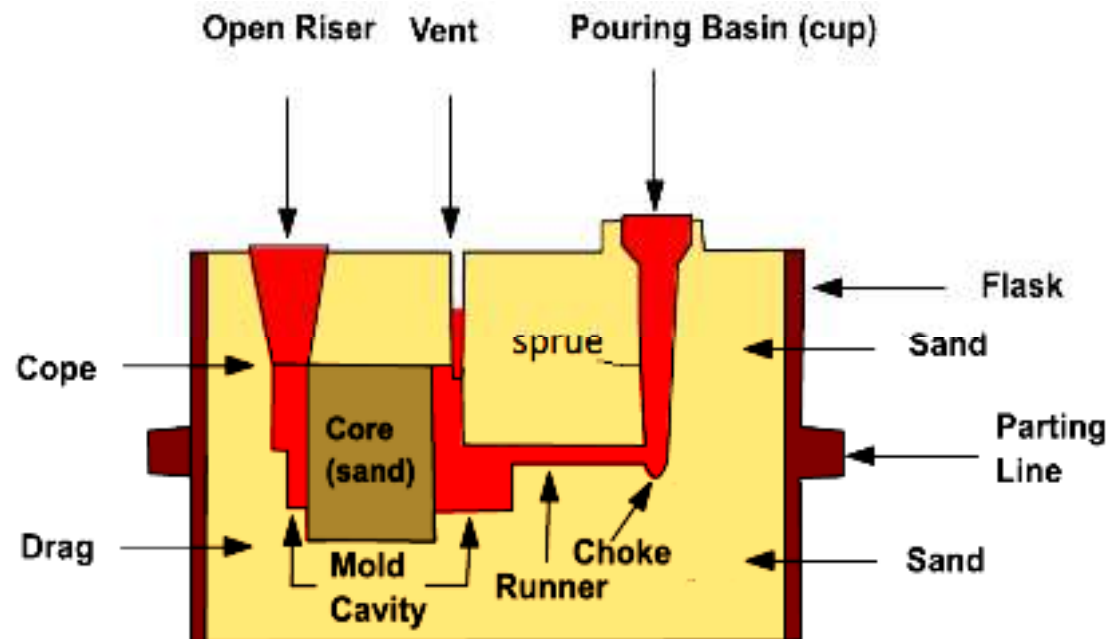
WHAT IS A MOULD?

- The physical model of the casting used to make the mould.
- When the pattern is withdrawn, its imprint provides the mould cavity.
- This cavity is filled with metal to become the casting.



IMPORTANT CASTING TERMS

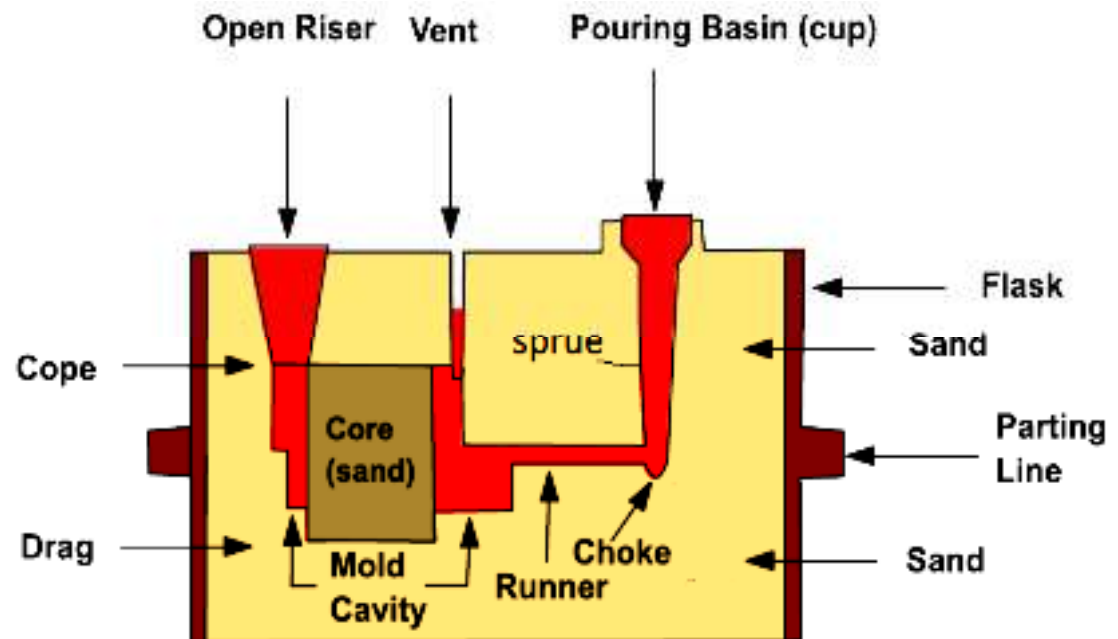
- Pattern
- Parting line
- Moulding sand
- Facing sand
- Core
- Pouring basin





IMPORTANT CASTING TERMS

- Sprue
- Runner
- Gate
- Riser





STEPS IN MAKING SAND CASTINGS

- (i) Pattern making,
- (ii) Core making,
- (iii) Moulding,
- (iv) Melting and pouring,
- (v) Cleaning



Sand Casting- Video

<https://www.youtube.com/watch?v=fCyaJ8Q76U8>



PROPERTIES OF MOULDING SAND

1. Refractoriness:

- The ability of moulding sand to withstand high temperatures without breaking down or fusing.
- The degree of refractoriness depends on SiO_2 content and shape & grain size of the particle.
- To enhance the property, sand should have lower percentage of lime, magnesia, alkali, oxides of metals.
- Refractoriness is measured by Sinter point rather than its melting point.



PROPERTIES OF MOULDING SAND

2. Permeability:

- Also referred as porosity, is the property of sand allow the escape of any air, gases or moisture present or generated in the mould when the molten metal is poured into it.
- Liquid metals cause evolution of gases due to their reaction with moulding sand ingredients.



PROPERTIES OF MOULDING SAND

3. Cohesiveness:

- Also referred to as the strength of sand.
- It is property of moulding sand by virtue which the sand grain particles interact and attract each other within the moulding sand.
- Moulding sand should be capable of withstanding the compressive and erosive force exerted by liquid metal while filling the cavity.
- Low strength mouldings result in defective castings.
- It depends upon the grain size, sand particle shape and size, moisture content and density, strength inversely affect the porosity



PROPERTIES OF MOULDING SAND

4. Flowability:

- It is the ability of the sand to get compacted and behave like a fluid.
- It will flow uniformly to all portions of pattern when rammed and distribute the ramming pressure evenly all around in all directions.
- In general, flow ability increases with decrease in green strength, and, decrease in grain size.
- flow ability also varies with moisture and clay content.
- It is also called as plasticity fluidity.



PROPERTIES OF MOULDING SAND

5. Adhesiveness:

- It is property of moulding sand to get stick or adhere with foreign material such sticking of moulding sand with inner wall of moulding box.
- It helps the sand to retain the mould cavity and stay in the box.



PROPERTIES OF MOULDING SAND

6. Collapsibility:

- After solidification of the molten metal, the casting is required to be removed from the mould.
- If the moulding sand is easily collapsible, free contraction of the metal as well as easy removal of the casting is possible.
- If the sand is not collapsible, it will strongly adhere to the casting, becoming very hard to separate after metal solidification.



CORE AND CORE PRINT

- Core is metal or sand body, which is set into the prepared mould before closing or pouring it.
- These are used to produce holes, projections, cavities in casting.
- Core is kept on seat in the mould box prepared by pattern.
- Projection is made in mould box during moulding process.
- these projections made on mould box are known as core print.



TYPES OF CORES

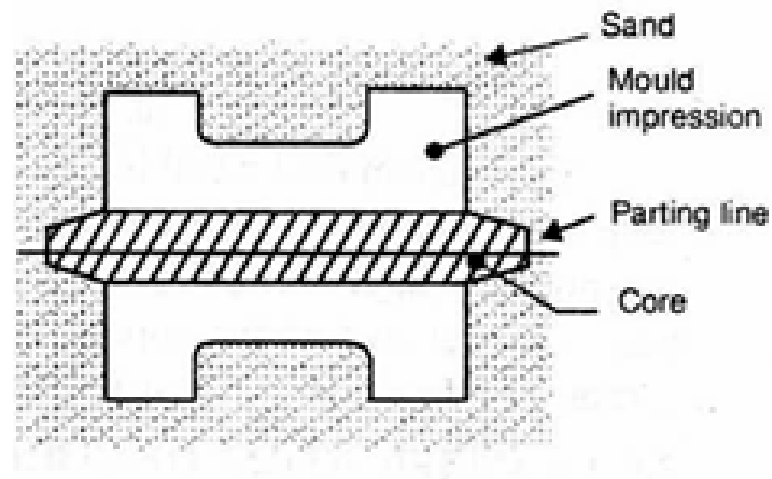
1. Horizontal core.
2. vertical core.
3. Balanced core.
4. Drop core.



TYPES OF CORES

1. Horizontal core.

- As per the name it kept horizontally in the mould box.
- Its position is along parting line.
- It is commonly used in foundry.

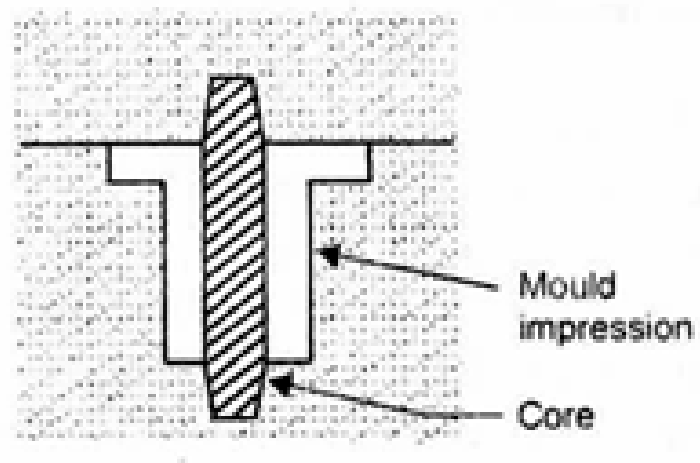




TYPES OF CORES

2. Vertical core.

- Its is placed vertical in mould box.
- It occupies cope and drag.

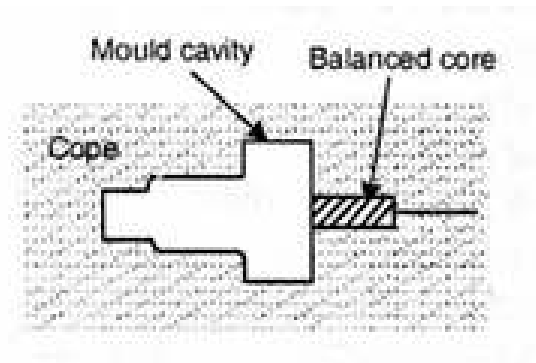




TYPES OF CORES

3. Balanced core.

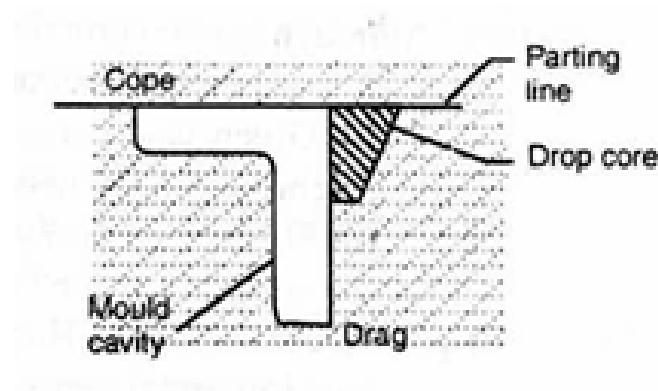
- Only blind holes or holes which are open at one side are produced by balanced casting.
- Balanced core has only one core print to maintain alignment of core, core print and portion of core outside the mould cavity is kept slightly larger and heavier.





DROP CORE

It is used to produce holes in casting above or below the parting line.





REFERENCES

1. Rao, P.N. "Manufacturing Technology Foundry, Forming and Welding", 4th Edition, TMH-2013.
2. Sharma, P.C., "A Text book of production Technology", S.Chand and Co. Ltd., 2014

