



SNS COLLEGE OF TECHNOLOGY

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Department of Mechanical Engineering Foundry

CASTINGS: Casting is a process for making components by pouring molten metal into a cavity and allow to solidify. The solidified metal is called Casting.

PATTERN: Pattern is the model of the required casting.

MOULD: Mould is a cavity or the required shape made in moulding sand.

CLASSIFICATION OF PATTERNS: Patterns are classified into Size and Shape, Number of parts to be produced and Method of castings.

TYPES OF PATTERNS:

Solid or Single piece Patterns: Exact shape is obtained.

Split pattern: Made into two halves i.e. Upper pattern and lower pattern. A line separating is called parting line.

Loose piece Patterns: After making mould fist solid piece is removed and loose piece is removed.

Match plate Patterns: Runner and gates are required. Used in machine moulding and for large volume.

Sweep Patterns: Surfaces like cylinder, cone and spheres these patterns are used.

Skeleton Patterns: Larger in size. Used for water pipes, turbines.

Segmental Patterns: Circular parts like rings, wheels, rims are produced by using segmental patterns.

Shell Patterns: Hollow pattern and used in pipes and short bends.

PATTERN MATERIALS: The materials used for making patterns are Wood (Teak, Mahogany, White pine), Metals (Cast iron, Steel, Brass, Aluminium), Plasters, Plastics and wax.

Wood: Advantages: Light weight, cheap, easily available, repairs are easily made.

Disadvantages: Absorbs water, High wear and tear, Not used for mass production & M/c moulds.

Metal: Used for mass production. It can be used in machine moulding. Advantages : Long life, Used for mass production, Not absorbing moisture, Resistance to wear and abrasion. Limitations: Costly, Not easily repaired.

Plasters: Plaster of paris or gypsum cement, Difficult shapes can be made easily, Not affected by moisture and used for small patterns.

Plastics: Made from master pattern, light weight, Not affected by moisture.

Wax: Paraffin wax, Shellac wax, and Micro crystalline wax are used. Good surface finish can be obtained. Not affected by moisture. Cost is less and used for small patterns.

PATTERN ALLOWANCES: Extra size given to the pattern is called Pattern Allowance. Various allowances are Shrinkage allowance, Machining allowance, Draft or Taper allowance, Distortion & Shake allowances

Shrinkage allowance: Metal shrinks during solidification and contracts on cooling. Compensation is required. For Cast iron 1mm per 100mm, Aluminium 1.7 mm per 100 mm, Brass 1.5 mm per 100 mm, Steel 2 mm per 100 mm are the recommended shrinkage allowances.

Machining Allowance: Extra size given for machining. For Cast iron 2.5 mm and for non ferrous metals 1.6mm and for cast steel 3 mm are the recommended machining allowances.

Draft or Taper allowance: For removal of pattern from the mould.

Distortion allowance: The metal get distortion during cooling and not shrinks uniformly. To avoid the bend the distortion allowance is provided in the pattern.

MOULDING SAND: The reason for using sand is to maintain the shape at very high temperatures, can be used again and again, Less expensive.

Constituents: The constituents are Sand, Binder and Additives.

Sand: Silica sand is used 80 to 90 %. It gives refractoriness to sand. Cheap and easy availability. Easily moulded, reusable and withstand high thermal stability. Clay content – Silica sand 2%, Lean sand 2-10%, Medium sand 10-20% and loam sand 50%.

Types of Sand: Three types of sands are normally used. They are Natural sand, Synthetic sand and Special sand.

Natural Sand: Obtained from river beds and used for light castings. Advantages are – cheap and easy availability and wide range of grain sizes are available. Limitations are—Less refractoriness, may be fused with metals.

Synthetic sand: Used in machine moulding. It has higher refractoriness. More uniform grain size.

Special sands: Zircon and Chromite sand. Good refractoriness and hence used for facing sand.

BINDERS: Used to bring the property of cohesiveness to the sand. To bind the sand grains together and to give strength of the sand. Two types are used. 1. Organic binders:- Used for core making. Cereal, resins, drying oils and molasses. 2. Inorganic binders:- Common clays are Kaolinite and Bentonite.

ADDITIVES: It is added to moulding sand to improve the properties of strength, refractoriness, permeability and to give surface finish. Common additives are Sea coal (smoother surface), Saw dust (to improve permeability), Cereals (to improve dry strength and green strength), Silica flour (to improve surface finish). at the sand bed. After melting enough quantity of molten metal the clay plug is removed and collected in ladles.

Then the molten metal is poured into the moulds. The floating slag on the top layer of the molten metal is tapped out through the slag hole. Again the furnace is charged to the full level for repeating.

PROPERTIES OF MOULDING SAND:

POROSITY OR PERMEABILITY: Permeability is a measure of moulding sand by which the sand allows the steam and gases to pass through it.

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PLASTICITY OR FLOWABILITY: It is the property of moulding sand by which the moulding sand flows around and over the pattern and fills the flask.

ADHESIVENESS: The moulding sand by which it stick or adheres to another body.

STRENGTH OR COHESIVENESS: It is the property by which it sticks together. It should have sufficient strength so that the mould does not collapse.

REFRACTORINESS : It is the property of moulding sand to resist high temperature of the molten metal.

MOULDING SAND PREPARATION:

Sand is prepared by the steps

1) Mixing of sand 2) Tempering of sand 3)Conditioning of sand.

Mix with sand, binders, moisture and other additives

Tempering of sand: The process of spraying and mixing adequate amount of water with the sand in muller is called tempering.

Conditioning of sand: Removing foreign materials, Distributing the binder uniformly,

Controlling the moisture, Aerating the sand, Delivering at proper temperature.

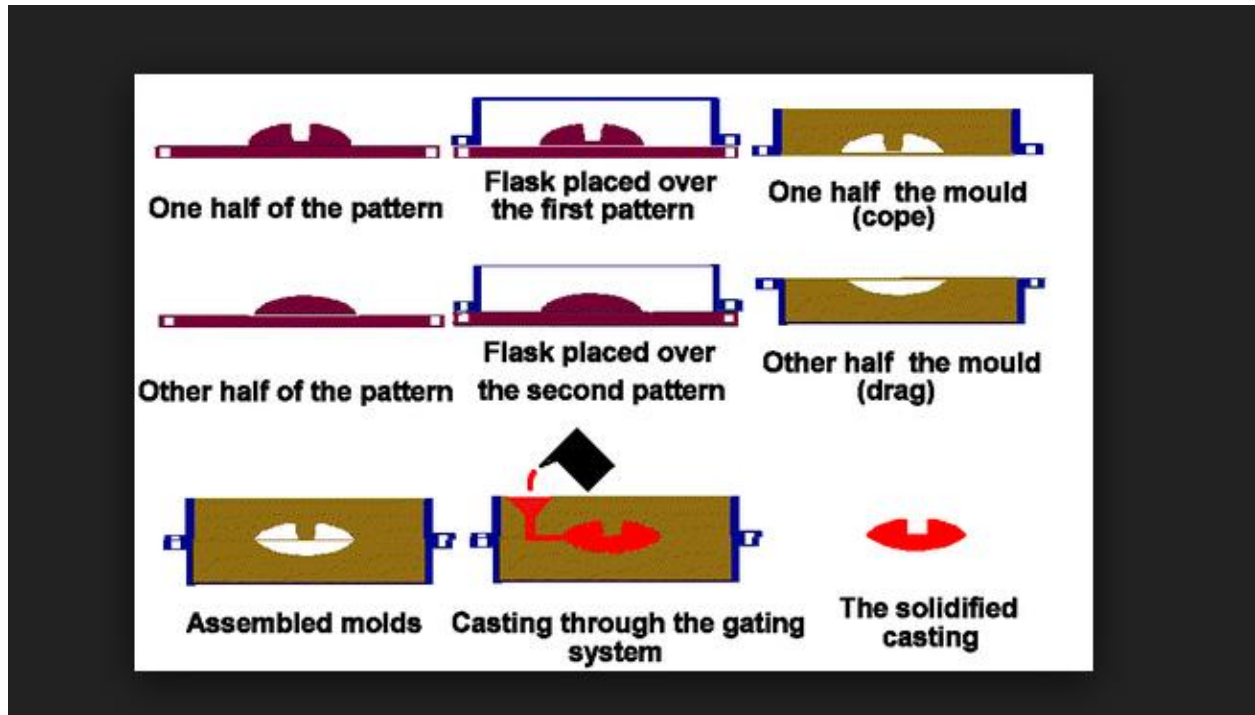
MOULDING TOOLS:1. Shovel, 2)Riddle 3) Rammer 4) Trowel 5) Slick 6) Strike off bar 7) Lifter

8) Vent wire 9) Sprue pin 10) Riser pin 11) Gate cutter 12) Draw spike 13) Swap 14) Bellows

15) Mallet 16) Moulding boxes.

PROCEDURE FOR MAKING GREEN SAND MOULD

- a. Two piece split pattern. The pattern is placed at the centre of the moulding board.
- b. The drag box is placed around the pattern, Dowel pins are connected to the box.
- c. 20 mm layer of facing sand is first placed around the pattern and then drag is filled with green sand.
- d. Sufficient ramming is done by the rammer and add sand if necessary.
- e. Excess sand is removed by strike of bar.



- f. Vent holes are made by vent wire to escape the gases during pouring of metal.
- g. The top surface is made smooth by trowel.
- h. Then the drag is tilted upside down as shown in figure.
- i. The parting sand is sprinkled over the drag box.
- j. Top half of the pattern is placed correctly in position.
- k. Cope box is placed correctly in position on the drag using dowel pins.
- l. Riser pin and sprue pins are correctly placed in position.