



## 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 steel3 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.

## PROCEDURE FOR MAKING GREEN SAND MOULD

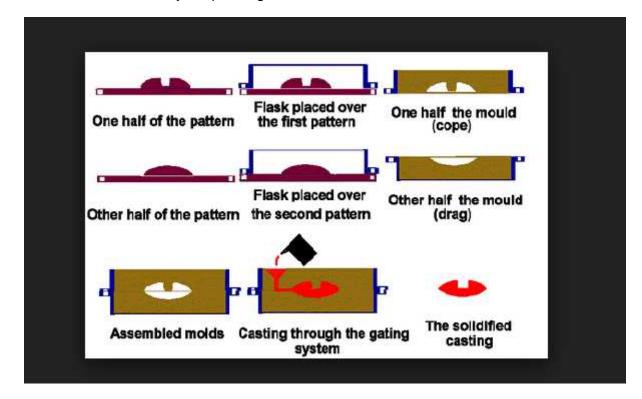
- a. Two piece split pattern. The pattern is placed at the centre of the moulding board.
- b. The drag box is placed around the pattern, Dowel pins are connected to the box.
- c. 20 mm layer of facing sand is first placed around the pattern and then drag is filled with green sand.
- d. Sufficient ramming 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.



## UNIT III OVERVIEW OF MECHANICAL ENGINEERING



- k. Cope box is placed correctly in position on the drag using dowel pins.
- I. Riser pin and sprue pins are correctly placed in position.
- m. Filling and ramming and venting of the sand are done similar to that of drag.
- n. Sprue and riser pins are removed.
- o. The pattern is removed from the box slowly.
- p. A gate is cut on the top surface of the drag. It should be exactly below the sprue.
- q. The mould surfaces are coated with coating material like graphite to get smooth surface to the casting.
- r. The core is set in position if necessary.
- s. Finally, the cope and drag box are assembled. Weight is placed on the cope to prevent the cope from floating or lifting up when the molten metal is poured.



t. The mould is ready for pouring the metal.