

INTRODUCTION

Foundry has been shaping the metals since the earliest days of civilization. A wide variety of sizes and shapes of simple and intricate nature can be produced in foundry shop. In general, we say another name of the foundry, as *casting*. But, in actual, foundry is a place where castings are produced. The foundry shop involves the various operations like pattern making, sand preparation, molding; melting of metals, pouring in moulds, cooling, shake-out, fettling, heat treatment, finishing and inspection.

Casting is the process of making metal/alloy component parts of desired shapes by pouring the molten metal into a prepared mould and then allowing them to cool and solidify. A *pattern* may be defined as a model of anything which is used to prepare moulds. A *mould* is a container which may be formed by placing the pattern in damp sand. It is a *cavity* made of sand or metal having similar shape and size to that of the actual casting. *Molding* is the process of making moulds.

Moulds are classified as temporary and permanent. Temporary moulds are made of refractory sand and other binding materials and may be produced either through hand molding or machine molding, whereas permanent moulds are made of ferrous metals and alloys, i.e., cast iron, steel, etc.

STEPS INVOLVED IN MAKING A CASTING

1. Make the pattern out of the wood, metal or plastic.
2. In case of sand casting, select, test and prepare the necessary sand mixture for mould and core making.
3. With the help of patterns, prepare the moulds and necessary cores. A *mould* is a container having a void or cavity of the shape to be cast. A *core* is a body which is employed to produce a cavity in the casting.
4. Melt the metal/alloy to be cast.
5. Pour the molten metal/alloy into the mould and remove the casting from the mould after the metal solidifies.
6. Clean and finish the casting.

EXPERIMENT NO. M1:

AIM: To make single piece pattern and moulding.

TOOLS REQUIRED: Carpenters vice, Hand saw, wood rasp file, Try square, Steel rule, Metal jack plane, Bevel Protractor, Molding flasks, Pattern, Trowel, Showel, Rammer, Slick, Riddle, Runners, Raisers, Sprue, Strike off bar, Molding boards, Draw spike, Gate cutter, Bellows etc.

MATERIALS REQUIRED: Wood, Molding sand, Bentonite powder, Chalk powder, Binder.

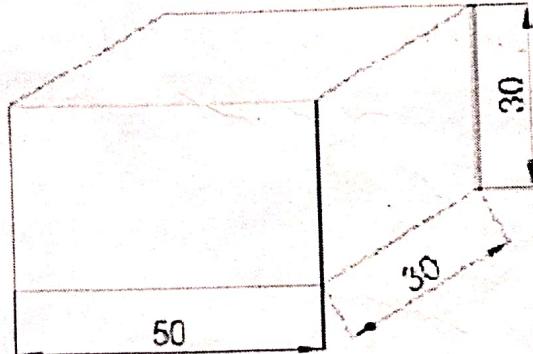
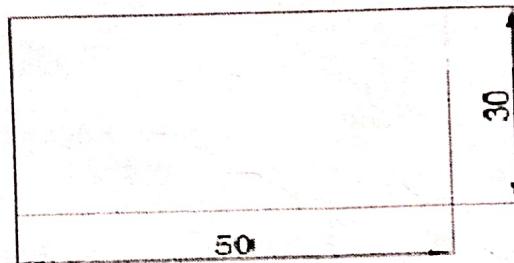
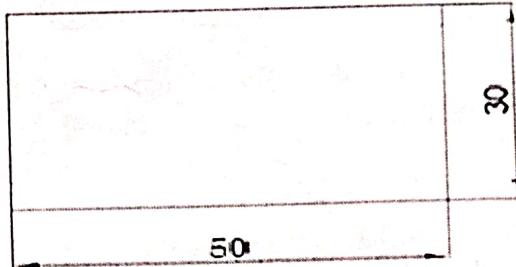
PROCEDURE: 1. Take the given wooden piece and make it the size of 50 x 50 x 30 mm using the metal jack plane, and hand saw.

2. By using try square and steel rule mark the dimensions using pencil.
3. With the help of the wood rasp file give draft angle using the wood rasp file.
4. With help of a bevel protractor measure the required drat angle if it is not 5^0 . Then file with the wood rasp file.
5. Check all the dimensions with the help of steel rule.

SEQUENCE OF OPERATIONS:-

1. The pattern is placed on the molding board, with its flat side on the board.
2. The drag box is placed over the board, after giving it a clay wash inside.
3. Parting sand is sprinkled over the pattern and molding board.
4. Foundry sand is placed over the pattern, until it is covered to a depth of 20 to 30mm
5. Using fingers, sand is packed around the pattern and into the corners of the box.
6. Some more sand is then placed in the box and packed with the rammer. Using first peen end and then the butt end.
7. The excess sand from the top surface of the drag is removed by striking-off with the strike-off bar.
8. The drag is turned upside down.
9. The loose sand particles are blown -off with the bellows and the surface smoothed.
10. The cope box is placed in position on top of the drag box, after giving it clay wash inside. The riser pin is then located on the surface of the pattern.
11. The sprue pin is placed at about 50 to 60 mm from the pattern, but on the opposite side of the riser pin.
12. Parting sand is sprinkled on the upper surface.

13. Steps 4 to 7 are repeated.
14. Using a vent rod, holes are made to about 10 mm from the pattern.
15. The sprue and riser pins are removed by carefully drawing them out. A tunnel shaped hole made at the top of the sprue hole, called pouring basin/cup.
16. The cope is lifted and placed aside on its edge.
17. A draw spike is inserted into the pattern and the edges around the pattern are wetted. Then the pattern is located by tapping and then drawn straight up.
18. The mold is repaired by adding bits of sand, wherever the mold is found defective.
19. Using a gate cutter, a gate is cut in the drag, from the sprue to the mold.
20. The loose sand particles that are present in the mold are blown-off.
21. The mold is finally closed by replacing the cope on the drag and placing weights on it



Note: Draft angle of 5 degrees is provided on the vertical edges.

PRECAUTIONS:-

1. Do not let sand too wet. Water is an enemy of molten metals.
2. Never stand or look over the mold during the pouring or immediately after pouring because the metal might spurt out of the hole.
3. While working with molten metal, wear protective clothing such as face shield or safety goggles, asbestos or leather gloves, which are tight at the wrist, protective aprons that will protect from heat as well as molten particles of metal.
4. Provide adequate ventilation to remove smoke and fumes.
5. Do not shake – out a casting too hastily, which may result in second and third degree burns.

RESULT:-

EXPERIMENT NO. M2:

AIM: To prepare a green sand mould for the dumbbell.

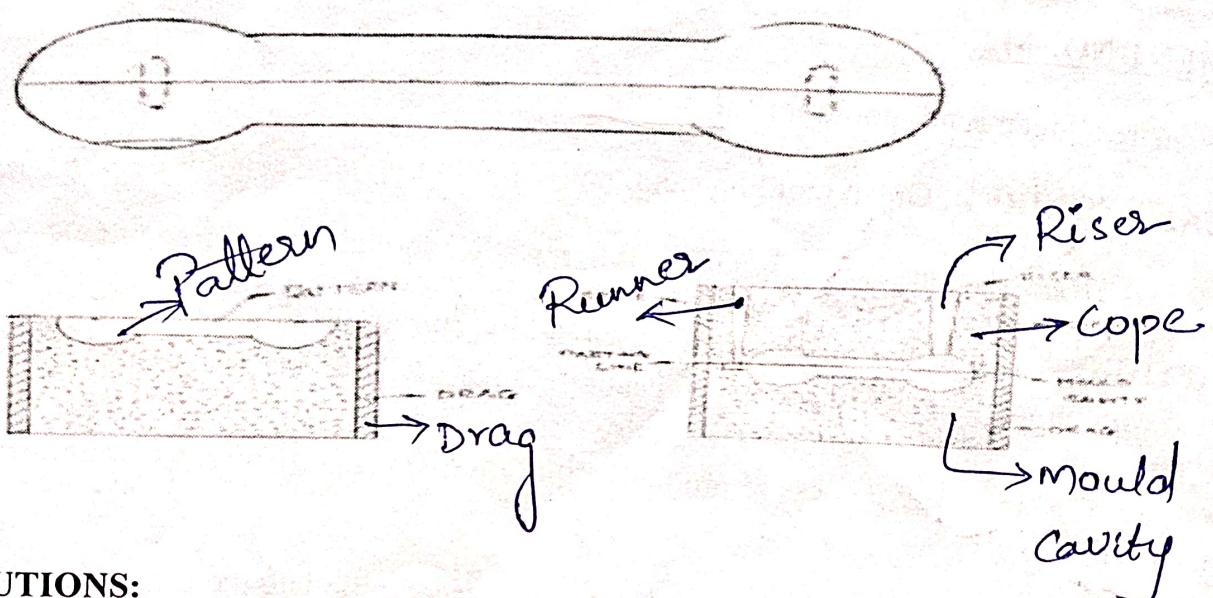
MATERIAL REQUIRED: Green molding sand, pattern, molding boxes, parting sand.

TOOLS REQUIRED: Rammers, slicks, strike off bar, riddle, shovel, riser, sprue pin etc.

DESCRIPTION: A mould can be described as a cavity created in compact sand mass which when filled with molten metal will produce a casting. Obviously it is the impression left behind by a pattern after withdrawing the pattern. The cavity obtained will exactly resemble with the external shape and size of pattern. The process of producing this cavity is called molding technique.

PROCEDURE:

1. First of all a suitable flask is selected. Large enough to accommodate the pattern and also allow some space around it for ramming.
2. Sprinkle the parting sand on the floor for easy removal after ramming. The drag part is placed upside down on the floor.
3. The pattern which comes into the drag part, is placed such that parting surface matching with floor.
4. Molding sand is filled all along the pattern surface and fill up to the level flask Rammed properly. Hold the pattern and ram the sand around it. Again fill the sand up to the level of flask and ram it.
5. The excess sand is removed by using strike off bar.
6. A small amount of dry loose sand is sprinkled over the top surface and the drag is turned upside down.
7. The cope portion pattern is assembled drag pattern with the help of dowel pins. Assemble the cope flask.
8. Runners, riser is put in positions and supported vertically by taking small amount of molding sand around them.
9. The sand is filled in the flask and rammed it. Excess sand is removed and vent hole are made, parting sand is sprinkled around the top surface.
10. Then remove the cope and drag flask gently and carefully without spoiling the mould.
11. Remove the pattern from the flask by slightly shaking pattern in horizontal position along x and y direction.
12. Repairs are then made in the cavity and gates are cut.
13. The cope and drag flasks are assembled together and mould is ready for pouring of molten metal.

**PRECAUTIONS:**

1. Ramming to be done uniformly.
2. Molding flask (cope and drag) is to be assembled with guide pins. ✓

RESULT: