

FOUNDRY & CASTING SHOP

Introduction

Foundry is the oldest and most basic industry for production castings. The process of casting is defined as metal, alloy objects obtained by allowing molten metal to solidify in a mould.

The basic steps involved in this process are:

1. Pattern making
2. Core making
3. Moulding
4. Melting
5. Melting and pouring
6. Cleaning

Pattern

It is the approximate replica of the exterior of the castings. It is also referred as main tool in foundry shop for obtaining mould cavity.

Ingredients of Moulding Sand

1. Silica sand grain
2. Binder
3. Moisture
4. Additives

Green Sand

It is the mixture of silica sand with 18 to 30 percent clay, having a total water of from 6 to 8 percent. The clay and water furnish the bond for green sand. It is fine, soft, light and porous. Being damp, when squeezed in the hand. It retains the shape, the impression given to it under Mould prepared in this sand is known as green sand moulds.

Foundry Tools and Equipment's

Foundry tools and equipment's may be classified into three groups namely hand tools, flasks and mechanical tools

Hand Tools

1 Shovel - A shovel is used for mixing and tempering moulding sand and for moving the sand from the pile to the flask. A shovel must always be kept clean.

2. Rammer – A hand rammer tool is used for packing or ramming the sand into mould. One end called the peen is wedge shaped and the opposite end called the butt. As a flat surface floor rammer are similar in construction but have long handles pneumatic rammers are used in large moulds saving considerable labor and time.

3. Trowel – Trowel consist of a metal blade fitted with a wooden handle. Trowel are employed in order to smooth or sleek over the surface of moulds. A worker also uses them in repairing the damaged portions in a mould. The usual trowel is rectangular in shape and has either a round or square end.

4. Slick - It is a small double ended tool having a flat on one end and a spoon on the other end this tool is also made in a variety of shapes. The one most commonly used is the oval spoon. Slicks are used for repairing and finishing small surfaces of the mould.

5. Lifter - Lifters are made of thin sections of steel of various widths and lengths with one end bent at right angles as shown. They are used to clean and finish the bottom and sided of deep narrow opening in moulds.

6.Strike off Bar - The strike-off bar is a piece of metal or wood with a straight edge it is used to strike-off excess sand from the mould after ramming to provide a level surface.

7. Sprue Pin - A sprue pin is a tapered peg pushed through the cope to the joint of the mould. As the peg is withdrawn it removes the sand leaving an opening for the metal. This opening is called the sprue through which the metal is poured the sprue pin forms the riser pin.

8. Gate Cutter - It is a small piece of tin plate shaped as shown this serves as a tool for cutting gates and runners in the mould.

9. Vent Rod - A vent rod or wire, as shown is used to make a series of small holes to permit gasses to escape while the molten metal is being poured.

Moulding Boxes

Sand moulds are prepared in specially constructed boxes called flasks the purpose of the flask is to impart the necessary rigidity and strength to the sand in moulding. They are usually made in two parts. Held in alignment by dowel pins the top part is called the cope and the lower part. The drag if the flask is made in three sections. The center is called the cheek these flasks can be made of either wood or metals depending upon the size required and the purpose they must serve. Metal flasks are used when production is large, but when only a few of castings are needed and a special flask must be obtained. The wooden flasks are the most economical.

FOUNDRY TOOLS

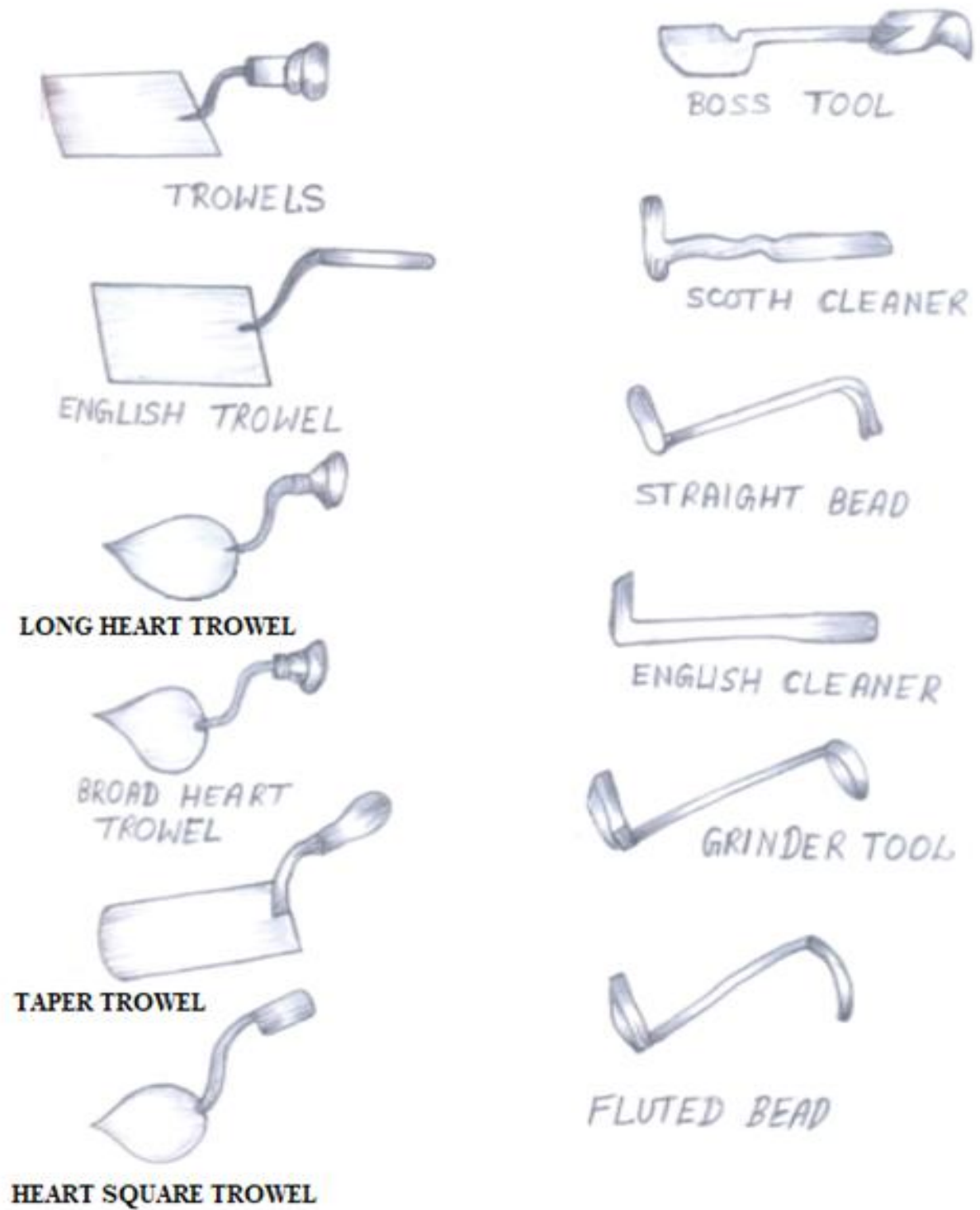


Fig. 1: Tools



SMOOTHER

Fig. 2: Smoothness Tools

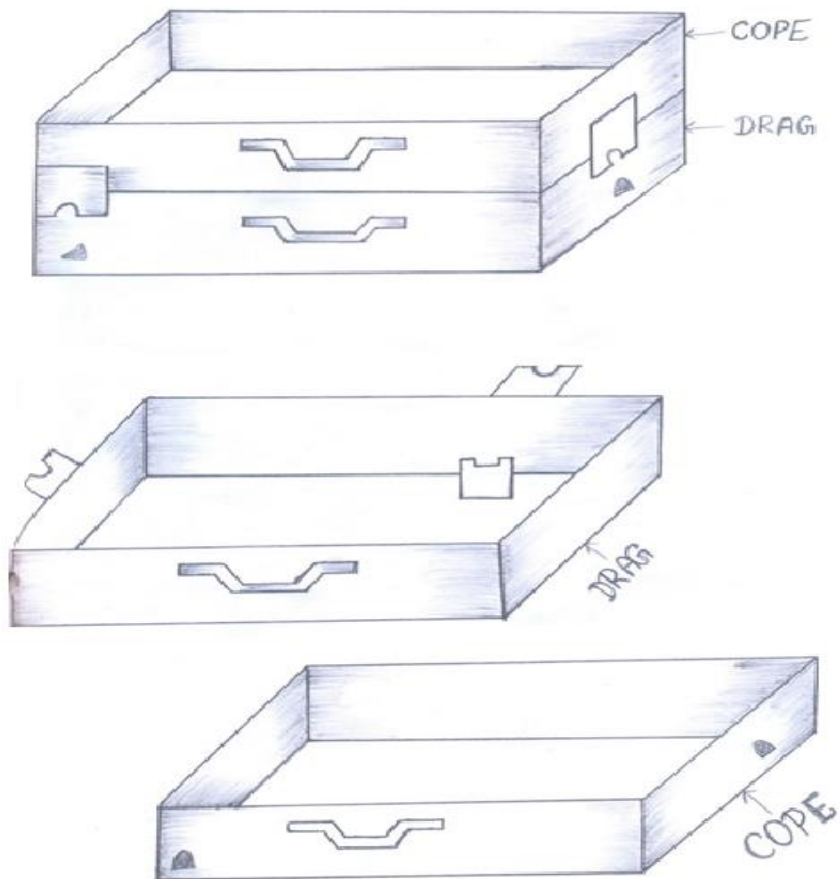


Fig. 3: Moulding Box

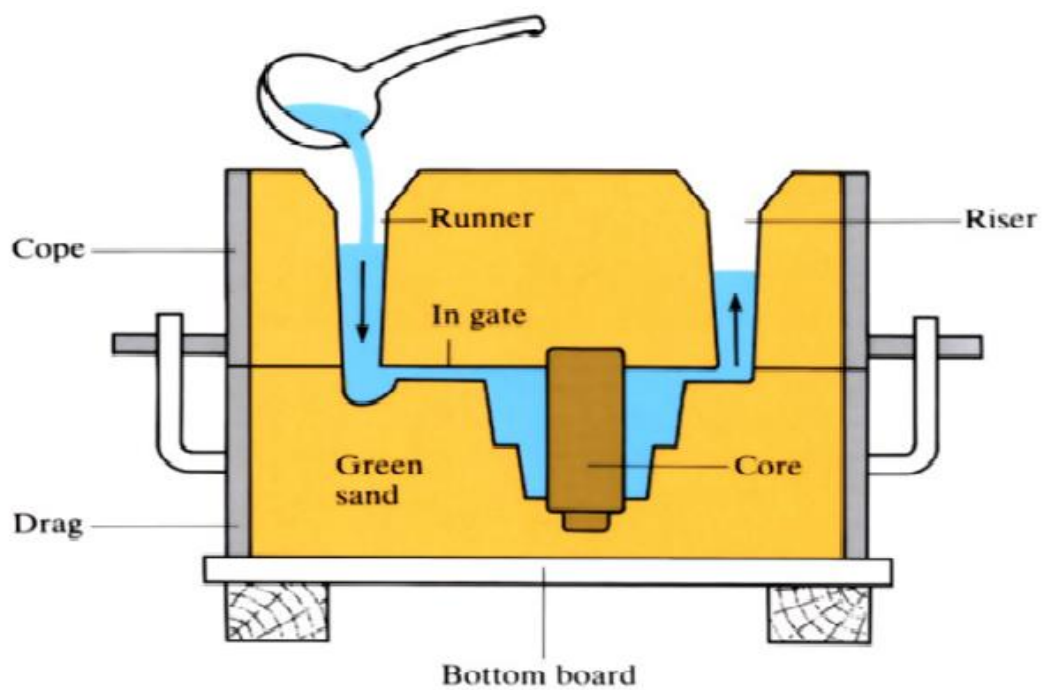


Fig. 4: Sand Casting

PRACTICAL NO.1

MOULD MAKING USING SINGLE PIECE PATTERN

OBJECTIVE

To prepare a mould for casting using a single piece pattern.

TOOLS REQUIRED

Moulding box, pattern, foundry tools such as trowels, cleaners, smoothers, beads etc.

PROCEDURE

1. The drag is placed inverted on the ground and the pattern is placed at center.
2. The moulding sand is put over it and remaining is done care is to be taken to see that the position of the pattern is not changed during ramming initially.
3. After this the excess sand if any, is removed by strike off bar.
4. Now the cope is placed over drag. The riser and sprue pins are placed and sand is charged into its vicinity.
5. Ramming is again done and the excess sand to be removed the surface is finished.
6. Now the cope is removed and kept a side. The riser and sprue pin are removed.
7. The pattern from the drag is also removed using appropriate tools.
8. The surface of cope and drag finished by smoother and cleaners.
9. Gate is made in the drag where the sprue hole meets the drag.
10. The cleaners of the cope and drag should coincide which is confirmed by marking made on the riser and runner.

RESULT

The mould cavity for the Plumber block is prepared and made ready for pouring.

RESULT ANALYSIS

Changes in dimensions (length, width, dia., weight etc.).

LEARNING OUTCOMES

What did you learn in this practical?

APPLICATION

Where we can apply the knowledge gained in this practical.

SUGGESTIONS

If you have any suggestion related to this practical, please advise.

PRECAUTION

1. Do not wear loose clothes.
2. Remove wrist watches, ring bracelets etc.
3. Wearing goggles or a face shield during pouring operation.
4. Handle hot pieces with tong.
5. Switch off the electric grinder after use and don't place it on floor while in operation.
6. If you see any accident happening immediately inform to the instructor.



Fig. 5: Plumber block Pattern

PRACTICAL NO.2

MOULD MAKING USING A SPLIT PATTERN

OBJECTIVE

To prepare a mould for casting using a split pattern.

TOOLS REQUIRED

Moulding box, pattern, foundry tools such as trowels, cleaners, smoothers, beads etc.

PROCEDURE

1. The drag is placed inverted on the ground and the pattern is placed at center.
2. The moulding sand is put over it and remaining is done care is to be taken to see that the position of the pattern is not changed during ramming initially.
3. Place the upper and lower parts of pattern in cope and drag respectively with a gentle push.
4. After this the excess sand if any, is removed by strike off bar.
5. Now the cope is placed over drag. The riser and sprue pins are placed and sand is charged into its vicinity.
6. Ramming is again done and the excess sand to be removed the surface is finished.
7. Now the cope is removed and kept a side. The riser and sprue pin are removed.
8. The pattern from the drag is also removed using appropriate tools.
9. The surface of cope and drag finished by smoother and cleaners.
10. Gate is made in the drag where the sprue hole meets the drag.
11. The cleaners of the cope and drag should coincide which is confirmed by marking made on the riser and runner.

RESULT

The mould cavity for the dumbbell shaped part is prepared and made ready for pouring.

RESULT ANALYSIS

Changes in dimensions (length, width, dia., weight etc.)

LEARNING OUTCOMES

What did you learn in this practical?

APPLICATION

Where we can apply the knowledge gained in this practical.

SUGGESTIONS

If you have any suggestion related to this practical, please advise.

PRECAUTION

1. Do not wear loose clothes.
2. Remove wrist watches, ring bracelets etc.
3. Wearing goggles or a face shield during pouring operation.
4. Handel hot pieces with tong.
5. Switch off the electric grinder after use and don't place it on floor while in operation.
6. If you see any accident happening immediately inform to the instructor.

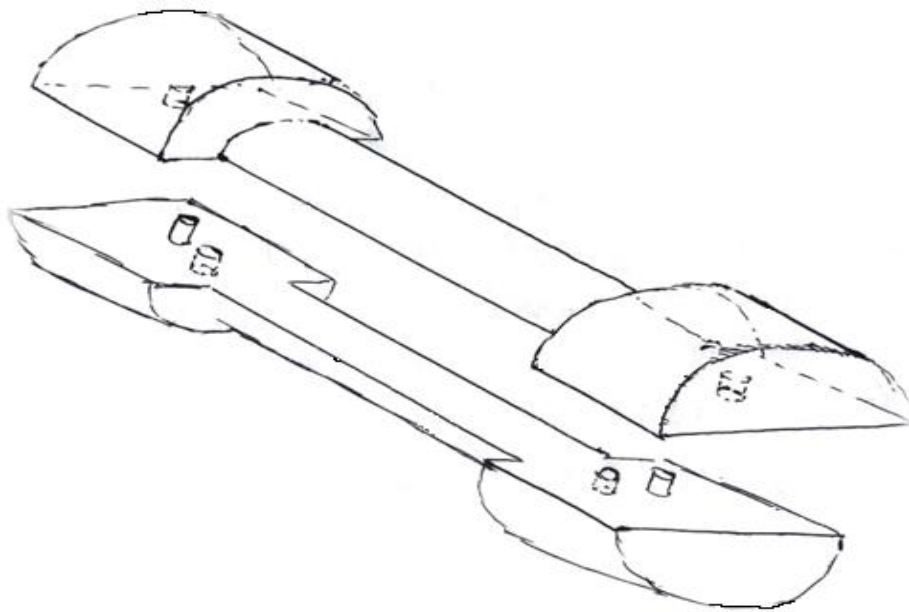


Fig. 6: Split Pattern of a Dumble