

NAME : PRINCE MAURYA

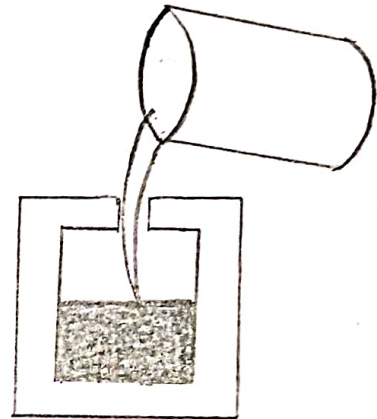
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FOUNDRY WORKSHOP

Foundry is a manufacturing process in which molten metal is poured into a mould cavity & on solidification of it we get our casting or cast job.

It involves a series of operations :

- Pattern making
- Core making
- Mould making
- Melting
- Pouring
- Cleaning



Types of Foundries :

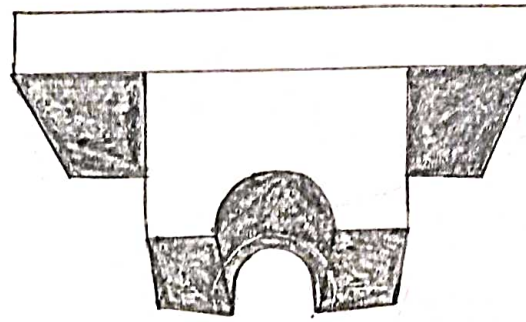
- Based on material
 - Ferrous, Non Ferrous, gray Iron, Steel, Brass, Light metal
- Based on nature and Organisational Framework
 - Jobbing foundry (A foundry that creates a wide variety of castings, in small quantities for a range of customers)
 - Production foundry
 - Semi Production foundry
 - Captive foundry (A foundry operation that is wholly incorporated into a larger manufacturing operation).

PATTERN:

A pattern is a replica of a casting along with some allowances.

Pattern Allowances :

- i> Shrinkage allowances
- ii> Machining allowances
- iii> Draft allowances
- iv> Distortion allowances

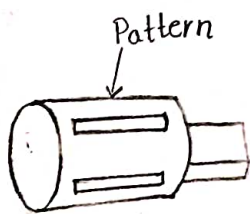


Pattern Materials :

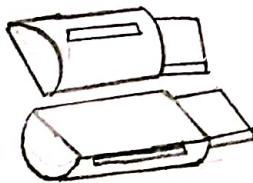
- Wood - common material because it is easy to work, but it warps.
- Metal - more expensive to make, but lasts much longer.
- Plastic - compromise between wood and metal
- Plaster of Paris
- Wax - precision casting.

Types of Patterns :

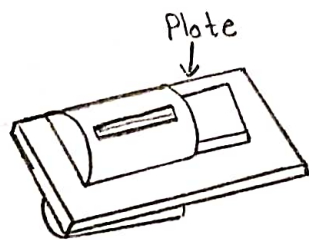
- i> Solid Pattern
- ii> Split Pattern
- iii> match Plate Pattern
- iv> cope and drag Pattern



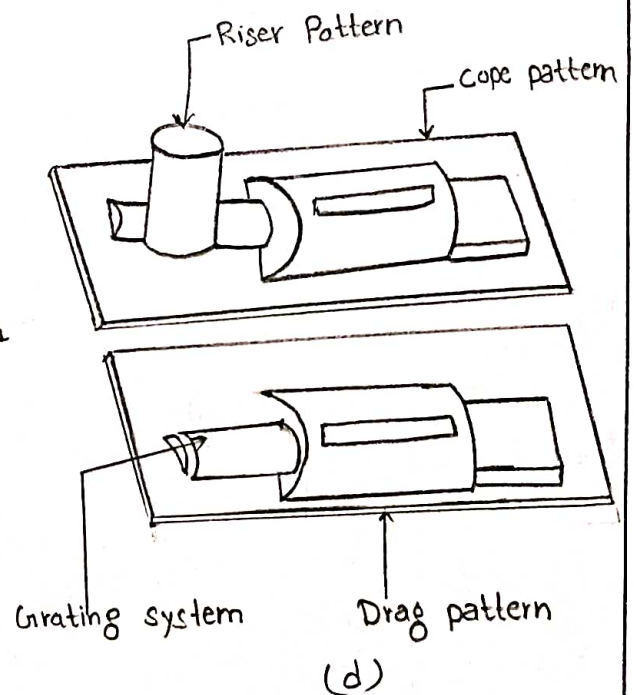
(a)

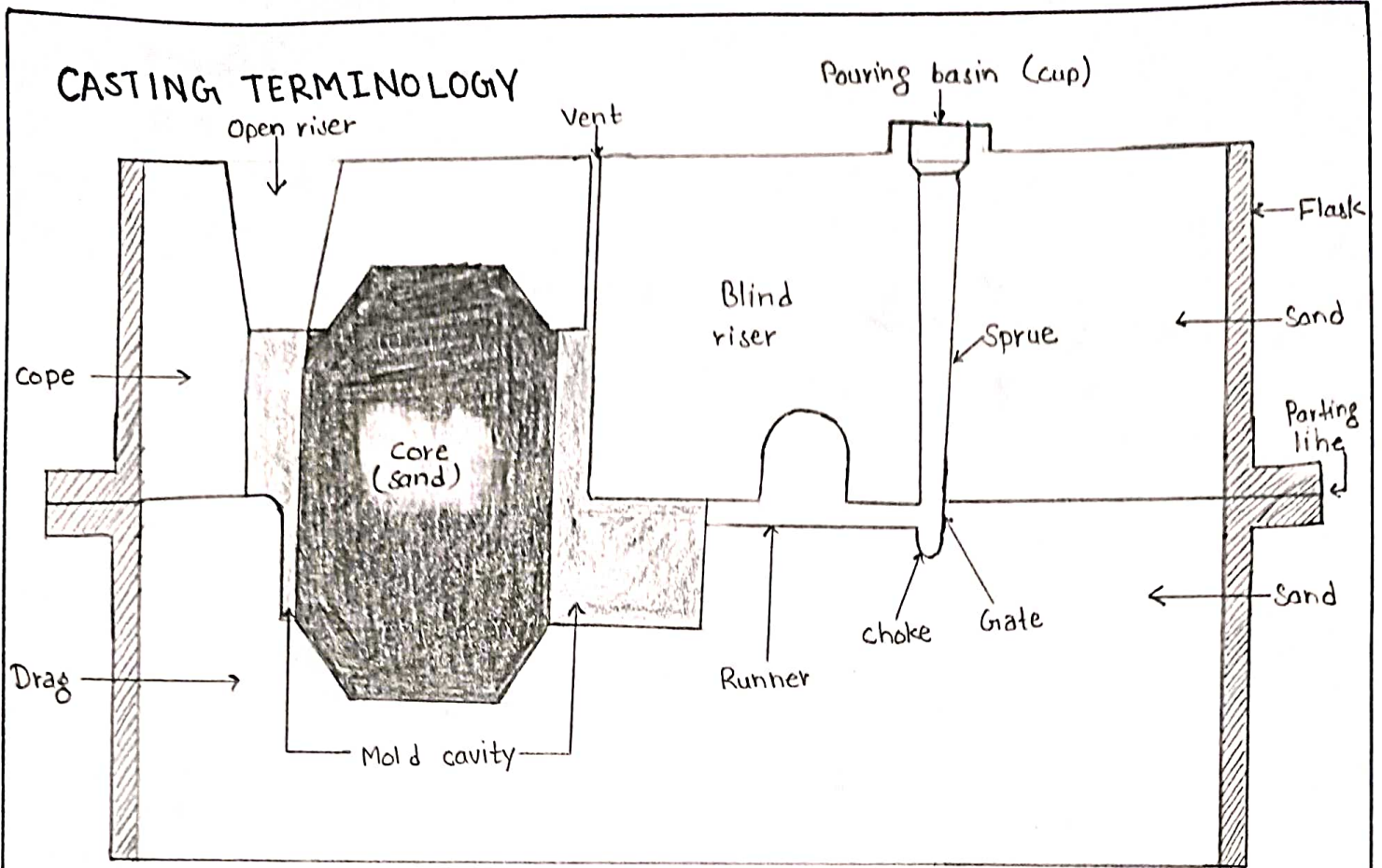


(b)



(c)





MOLDING SAND

The constituents of molding sand are :

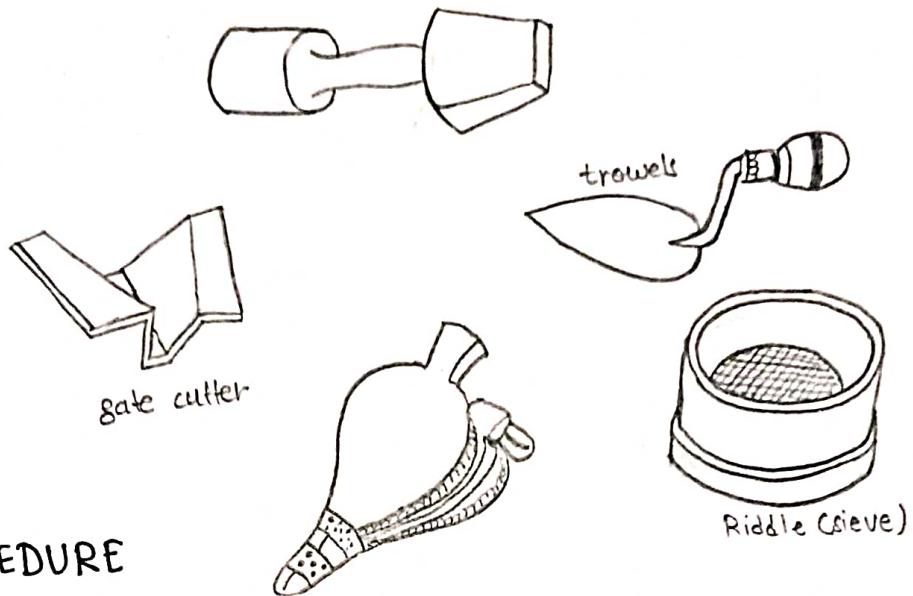
- Silica Sand
- Bentonite Powder
- Water
- Additives

Properties of Molding Sand :-

- Permeability
- Cohesive and adhesive strength
- Moldability
- Refractoriness
- Reusability

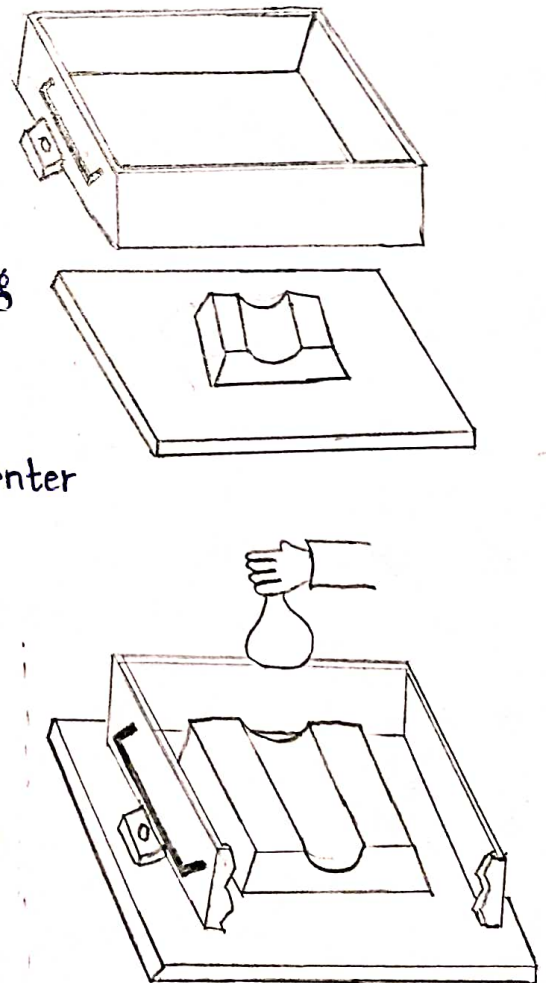
HAND TOOLS USED IN MOLDING

- Moulding Boxes : Cope & Drag Box
- Rammer
- Trowels
- Strike OFF Bar
- Vent wire
- Draw spike
- Gate Cutters
- Bellows
- Riddle

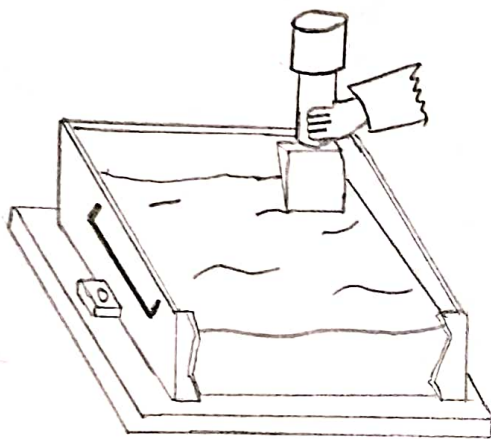
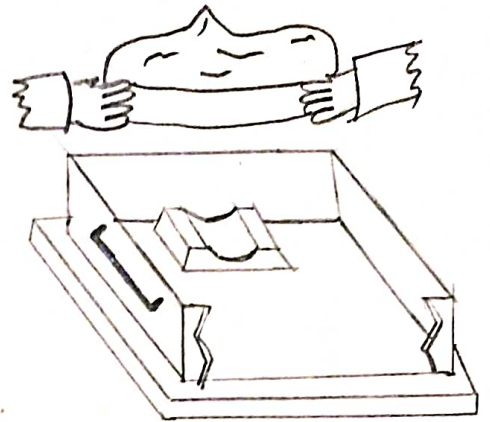


MOULDING PROCEDURE

- Before any casting can take place a wooden pattern is made precisely.
- This called pattern making and in industry this is a very skillful job.
- Any inaccuracy at this stage will result in the final cast being wrong or even failing.
- Drag is placed inverted on the mould floor and pattern is placed at the center of the box.
- Special casting sand will soon be packed around the pattern for easy removal of pattern from parting powder is sprinkled over and around it.
- It stops the casting sand sticking to the pattern and pulling away with it when the pattern is finally removed from the sand.



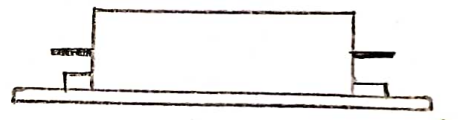
- Casting sand is then shaken through a sieve (called riddled sand) so that only fine particles fall around the pattern.
- This is called facing sand and it must be fine so that detail on the pattern shows up on the final casting.



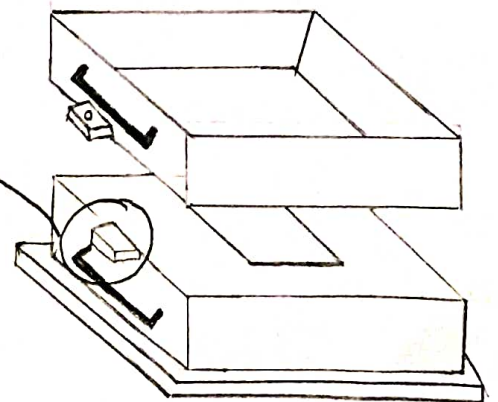
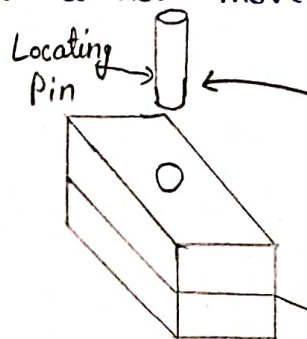
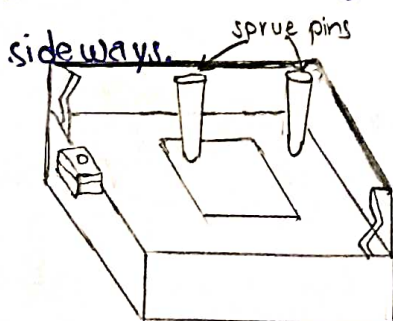
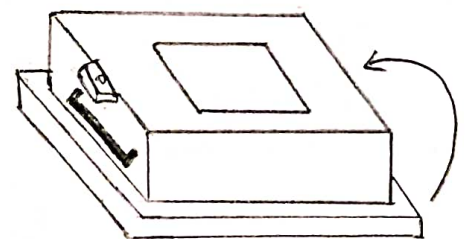
- The drag is then packed with more casting sand and then ram it down firmly using a ramming tool.
- The tool has two ends, one is cylindrical and is used for general packing down at of the sand.
- The other end is quite pointed and this can be used for packing sand close up to the pattern.

- When the drag is packed fully it is levelled off (called 'strickeled off') using a straight steel bar.

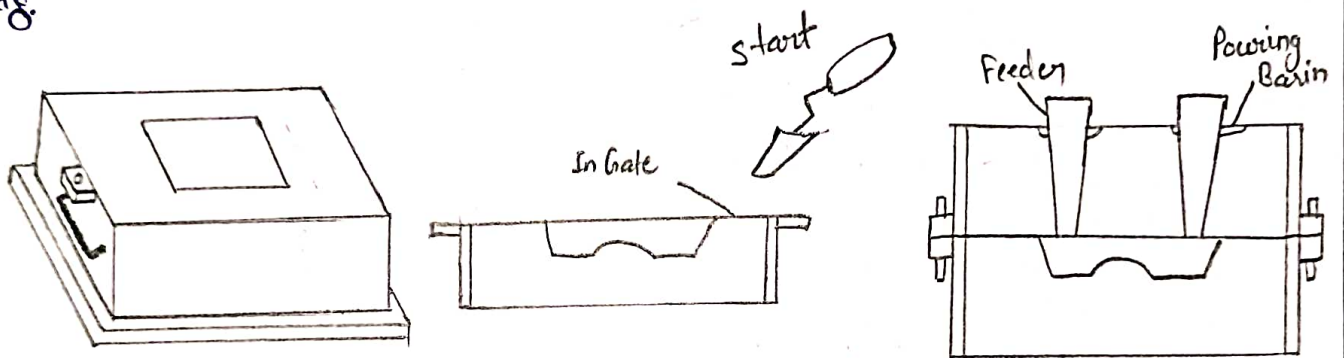
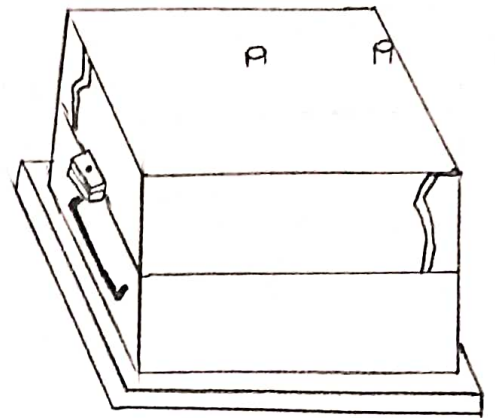
- The entire drag and its contents are then turned over so that the base of the pattern can be seen.



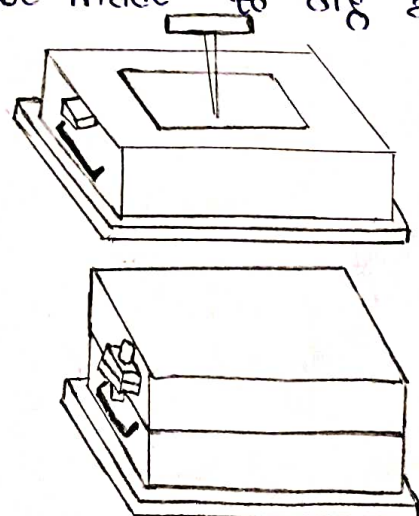
- A top box called a 'cope' is then placed on the top of the drag and locating pins are put in position so that the casting boxes cannot move sideways.



- Sprue pins are positioned.
- One usually on the back of the pattern and the other to the side.
- These will eventually provide an exit for the molten aluminium when it is poured into the sand.
- The sand is packed / rammed into the cope in the same way as the drag.

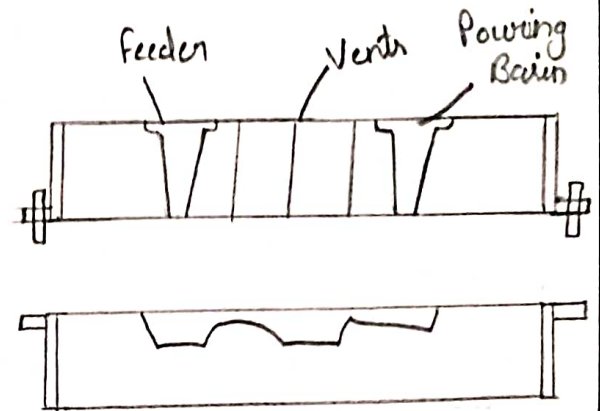


- The top box (the cope) is then removed and all is well the cope with the sand inside should lift off the drag (bottom box) without the sand falling out.
- A small 'gate' is cut below the position of one of the Sprue pins.
- This will help the molten metal to flow into cavity left by the mould.
- Small tools are available or can easily be made to dig a variety of shapes in the casting sand.
- They are similar to small trowels.
- The pattern is removed using a 'spike'.
- Before removing the pattern it is good idea to gently tap the spike so that it loosens the pattern from the sand.

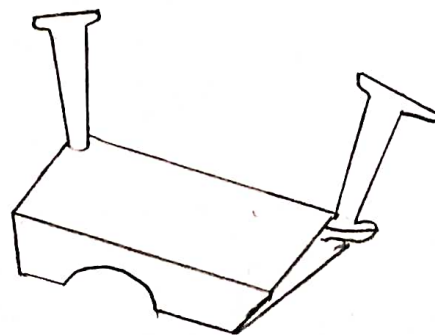
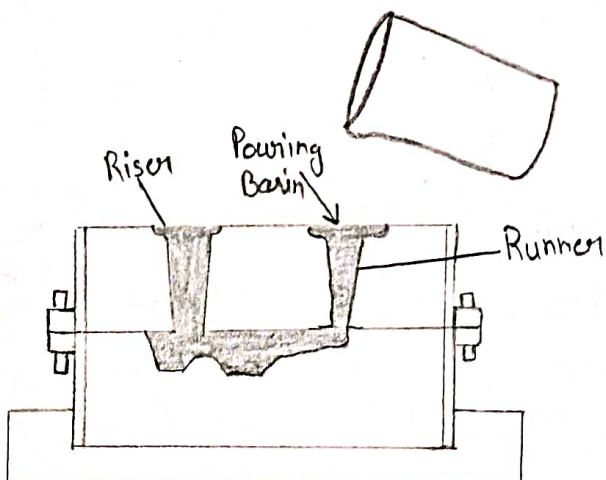


- It can be then lifted away from the casting box (drag).
- The cope is placed back on the top of the drag and the locating pins put in the position.

- Vents can be created using a thin piece of welding rod, pushing it through the sand.
- This allows gases to escape once the molten metal is poured.



- The molten metal is poured with great care.
- The molten metal is poured down the hole left by the first Sprue pin (now called the runner).
- As it runs down the runner it flows through the 'gate' cut by the trowel, into the cavity left by pattern and up the riser (the hole left by the second Sprue pin).
- The casting should be left for at least an hour before removal from the sand.
- When removed from the sand, the runner and riser are cut away and the casting is ready for machining.



CASTING DEFECTS:

- Several defects can develop in castings
- Most can be avoided with proper design and Processing techniques.
- Metallic Projections - fins, flash, rough surface
 - Too high pressure
 - Improper mating mold pieces.
- Cavities - pockets caused by shrinkage or gases
 - Can be controlled by adding flux.
- Discontinuities - includes cracks, cold/hot tearing, and cold shuts
 - Constrained cooling
 - Molten metal too low temperature.