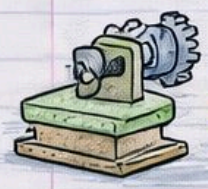

Manufacturing Practices
Module-2 Notes

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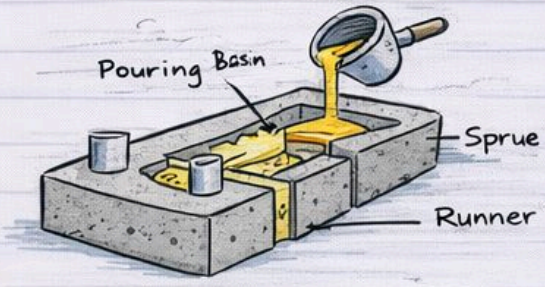
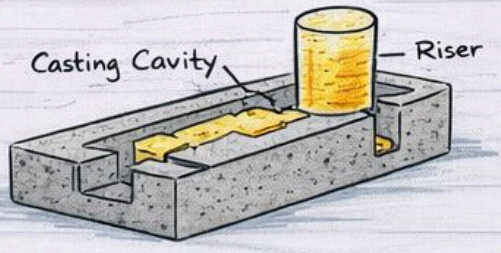
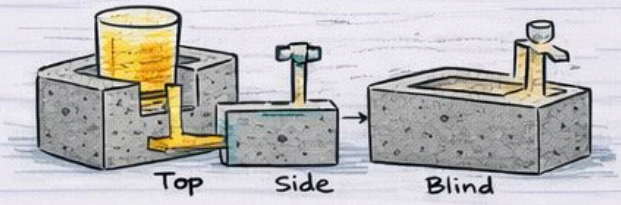
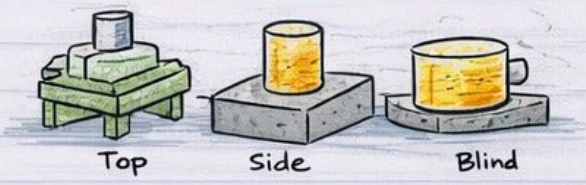
Contents Covered:

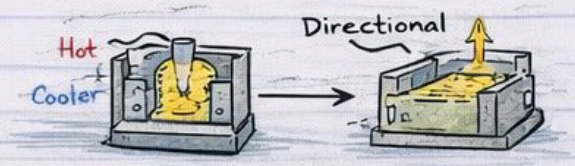
- Gating System
- Risering System
- Risers: Types and Location
- Directional Solidification

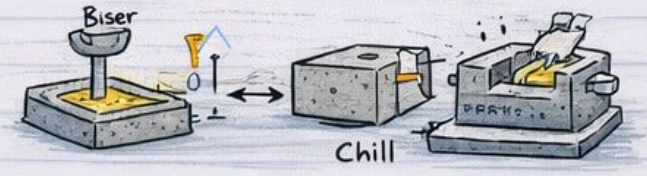






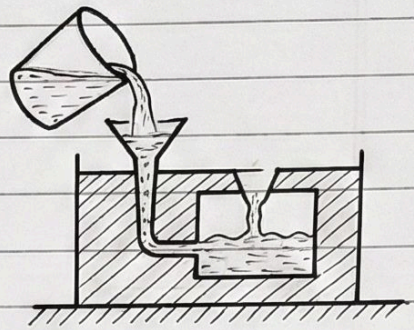






GATING SYSTEM

Gating system or feeding system of a mould is used to introduce the molten metal into the casting cavity. It is also called the runner system.



Elements of Gating System (Fig. 1.5):

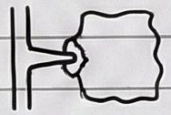
1. Pouring basin
2. Sprue (Down sprue)
3. Runner (Runner bars)
4. Gates

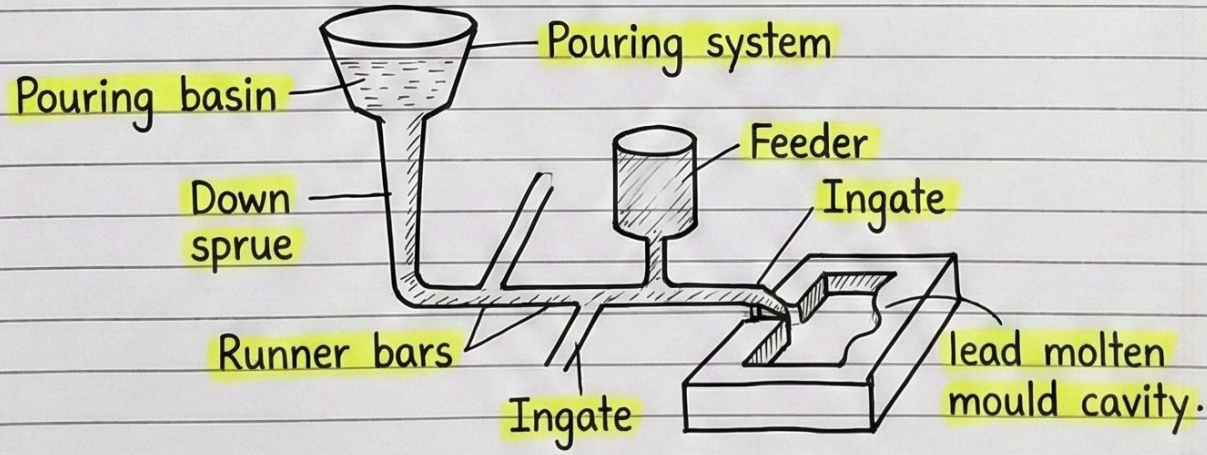
1. **Pouring basin**: Formed at the top to receive molten metal. Generally funnel shaped, placed near the edge. Should be deep to avoid vortex formation and kept full to compensate for metal shrinkage.

2. **Down sprue**: Vertical passage connecting pouring basin to runner bars. Tapered downward to avoid aspiration of air and metal damage. Circular cross-section offers minimum resistance.

3. **Runner bars**: Horizontal channels (below joint level) carrying metal from sprue to gates.

4. **Gate**: Leads molten metal from runner bars to the mould cavity. Size and location must be arranged for consistent filling rate.

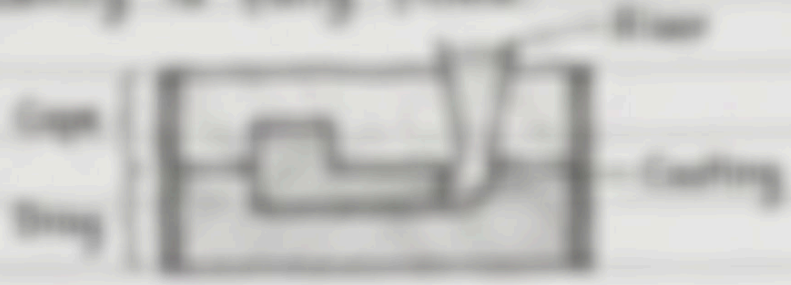




Gating system as in Fig. 1.5

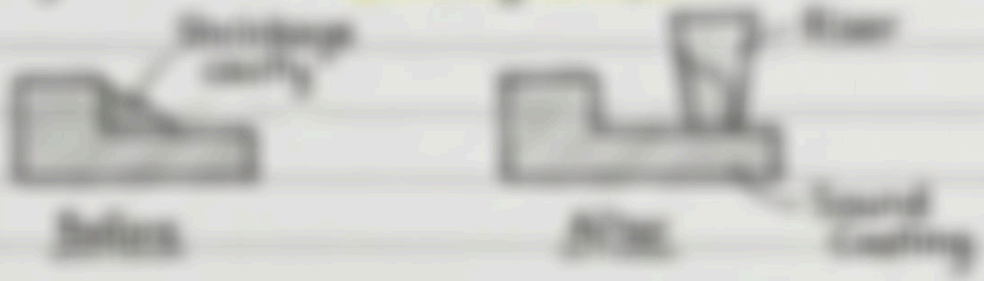
RISERING SYSTEM

Risers are passages made in the sand of the mould in the cope where molten metal rises above the highest point of the casting after mould cavity is fully filled.

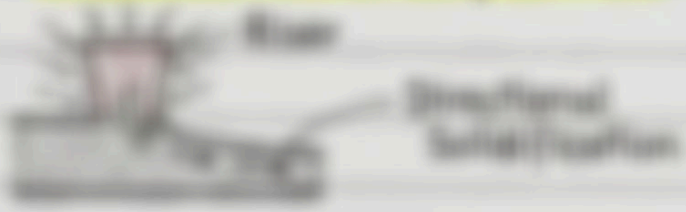


Risers serve dual functions:

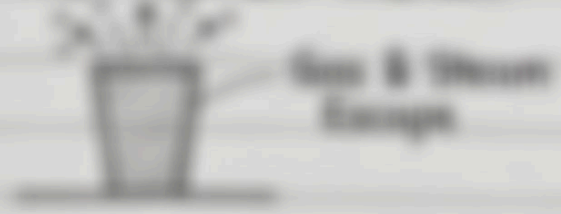
1. These compensate for solidification shrinkage, a very common casting defect.



2. These are heat source and freeze last to promote directional solidification.



3. Risers also permit the escape of steam, gas and air as the mould cavity is being filled up with the molten metal.



RISERS : TYPES AND LOCATION

1. Types of Risers:

- There are two types of risers:

(a) **Open or Top Risers**: Placed above the surface, **open to the atmosphere**.

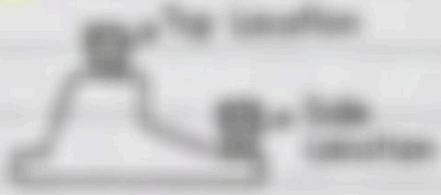
- Liquid metal acts as a **reserve**, feeding under **gravity** and **atmospheric pressure**.

(b) **Blind or Side Risers**: **Do not open** to the atmosphere.

- Used to **feed liquid metal** to the main casting, usually located on the gating system.

2. Location of Risers:

- Location is decided on the basis of **casting design**, **metal type**, and **directional solidification**.
- Should ensure feeding of liquid metal to all parts under sufficient **hydrostatic pressure**.
- Two types of riser locations:



1. **At the top** of the casting.
2. **At the side** of the casting.

- **More than one riser** may be required for **large castings**.

- **Spacing** should be decided to **minimize shrinkage**.
- **Top location** preferred for **light metals** for sufficient hydrostatic pressure.

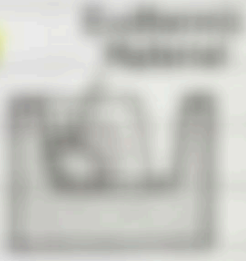
DIRECTIONAL SOLIDIFICATION

Directional solidification of casting can be achieved by establishing a proper **temperature gradient** towards the **riser**.

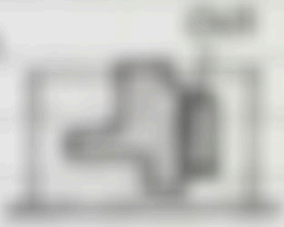
Methods used to achieve directional solidification:

1. Use of **padding**: It is a **wedge shaped extra metal** added to the casting so that its thickness is **maximum near the feed point** and **decreases with the distance** from the feeder. Extra material can be removed during **machining**.

2. Use of **exothermic materials**: Mixture of **metal oxide and aluminium** in powder form can be added which **produce heat** due to **exothermic reactions**. This method helps in directional solidification.



3. Use of **chills**: **Chills** are **metal pieces** which can be **embedded** in the **thick section** of the casting and help in **quick solidification**.



The chill serves the following functions:

- **Directional solidification** of castings of **uneven thickness**.
- Avoids **uneven contraction and distortions**.
- Ensures **denser casting**.
- Avoids **internal defects**.
- The chills may be placed in the **mould walls** or in the **mould cavity** and become part of the casting.

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