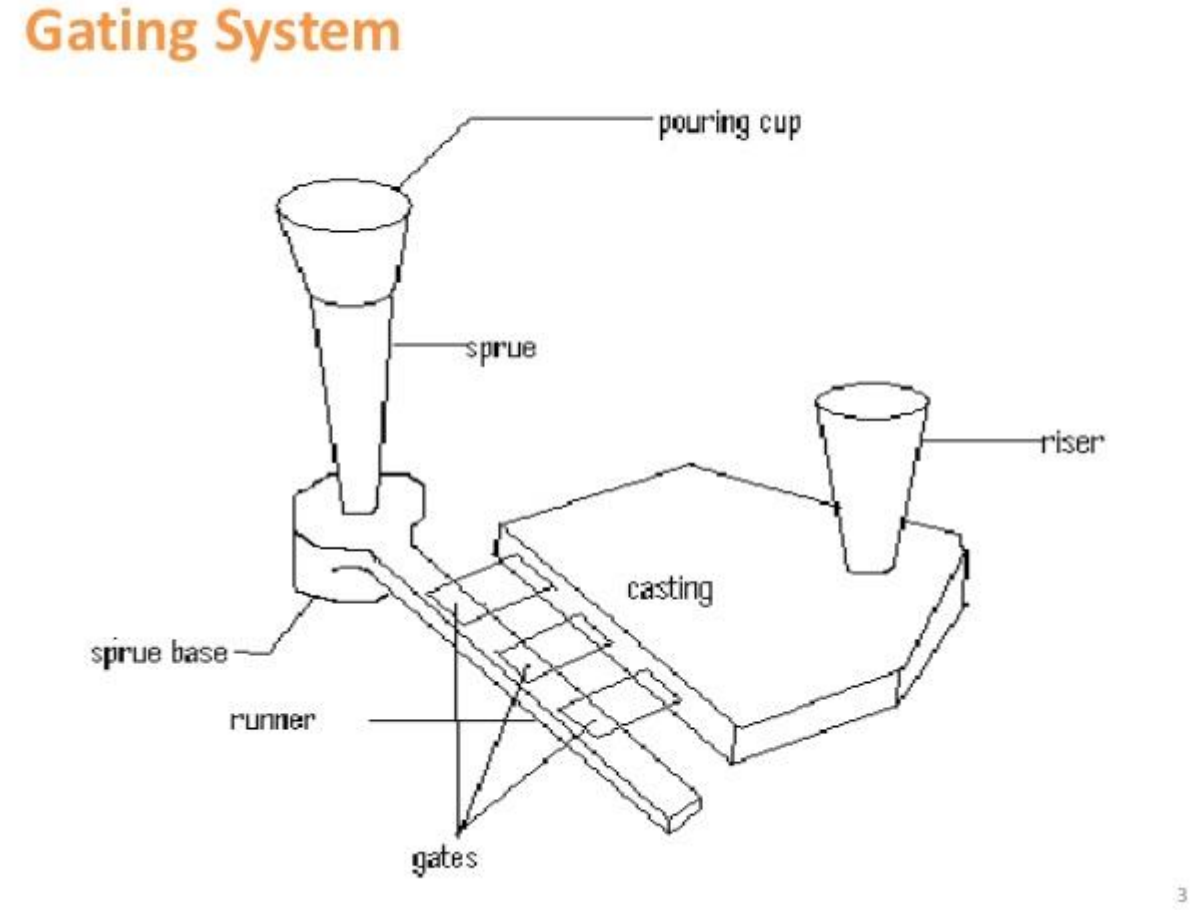
Riser and Gating Design



GATING SYSTEM:-

- The term gating system refers to all passageways through which the molten metal passes to enter the mould cavity.
- The gating system is composed of

Pouring basin

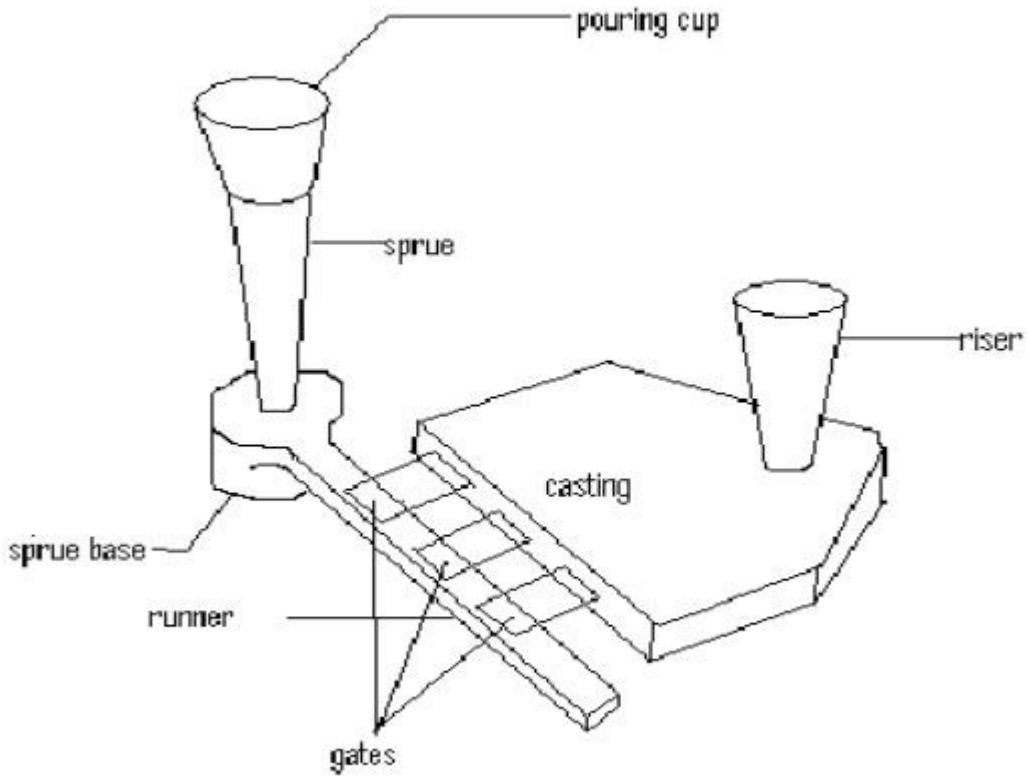
Sprue

Runner

Gates

Risers

Gating System



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Pouring basin-

It is the conical hollow element or tapered hollow vertical portion of the gating system which helps to feed the molten metal initially through the path of gating system to mold cavity. It may be made out of core sand or it may be cut in cope portion of the sand mold. It helps in maintaining the required rate of liquid metal flow. It reduces turbulence and vertexing at the sprue entrance. It also helps in separating dross, slag and foreign element etc. from molten metal before it enters the sprue.

Sprue-

It is a vertical passage made generally in the cope using tapered sprue pin. It is connected at bottom of pouring basin. It is tapered with its bigger end at to receive the molten metal the smaller end is connected to the runner. It helps to feed molten metal without turbulence to the runner which in turn reaches the mold cavity through gate. It some times possesses skim bob at its lower end. The main purpose of skim bob is to collect impurities from molten metal and it does not allow them to reach the mold cavity through runner and gate.

Gate-

It is a small passage or channel being cut by gate cutter which connect runner with the mould cavity and through which molten metal flows to fill the mould cavity. It feeds the liquid metal to the casting at the rate consistent with the rate of solidification.

Runner-

It is a channel which connects the sprue to the gate for avoiding turbulence and gas entrapment.

Riser-

It is a passage in molding sand made in the cope portion of the mold. Molten metal rises in it after filling the mould cavity completely. The molten metal in the riser compensates the shrinkage during solidification of the casting thus avoiding the shrinkage defect in the casting. It also permits the escape of air and mould gases. It promotes directional solidification too and helps in bringing the soundness in the casting.

Considerations for Designing Riser:-

While designing risers the following considerations must always be taken into account.

(A) Freezing time-

1 For producing sound casting, the molten metal must be fed to the mold till it solidifies completely. This can be achieved when molten metal in riser should freeze at slower rate than the casting.

2 Freezing time of molten metal should be more for risers than casting. The quantative risering analysis developed by Caine and others can be followed while designing risers.

(B) Feeding range-

1. When large castings are produced in complicated size, then more than one riser are employed to feed molten metal depending upon the effective freezing range of each riser.

2. Casting should be divided into divided into different zones so that each zone can be feed by a separate riser.

3. Risers should be attached to that heavy section which generally solidifies last in the casting.

4. Riser should maintain proper temperature gradients for continuous feeding throughout freezing or solidifying.

(C) Feed Volume Capacity-

1 Riser should have sufficient volume to feed the mold cavity till the solidification of the entire casting so as to compensate the volume shrinkage or contraction of the solidifying metal.

2 The metal is always kept in molten state at all the times in risers during freezing of casting. This can be achieved by using exothermic compounds and electric arc feeding arrangement. Thus it results for small riser size and high casting yield.

3 It is very important to note that volume feed capacity riser should be based upon freezing time and freezing demand.

Riser system is designed using full considerations on the shape, size and the position or location of the riser in the mold

Defects occurring due to improper design of gating system:-

- Oxidation of metal
- Cold shuts
- Mould erosion
- Shrinkages
- Porosity
- Misruns
- Penetration of liquid metal into mould walls.