Continuous Steel Casting Technology

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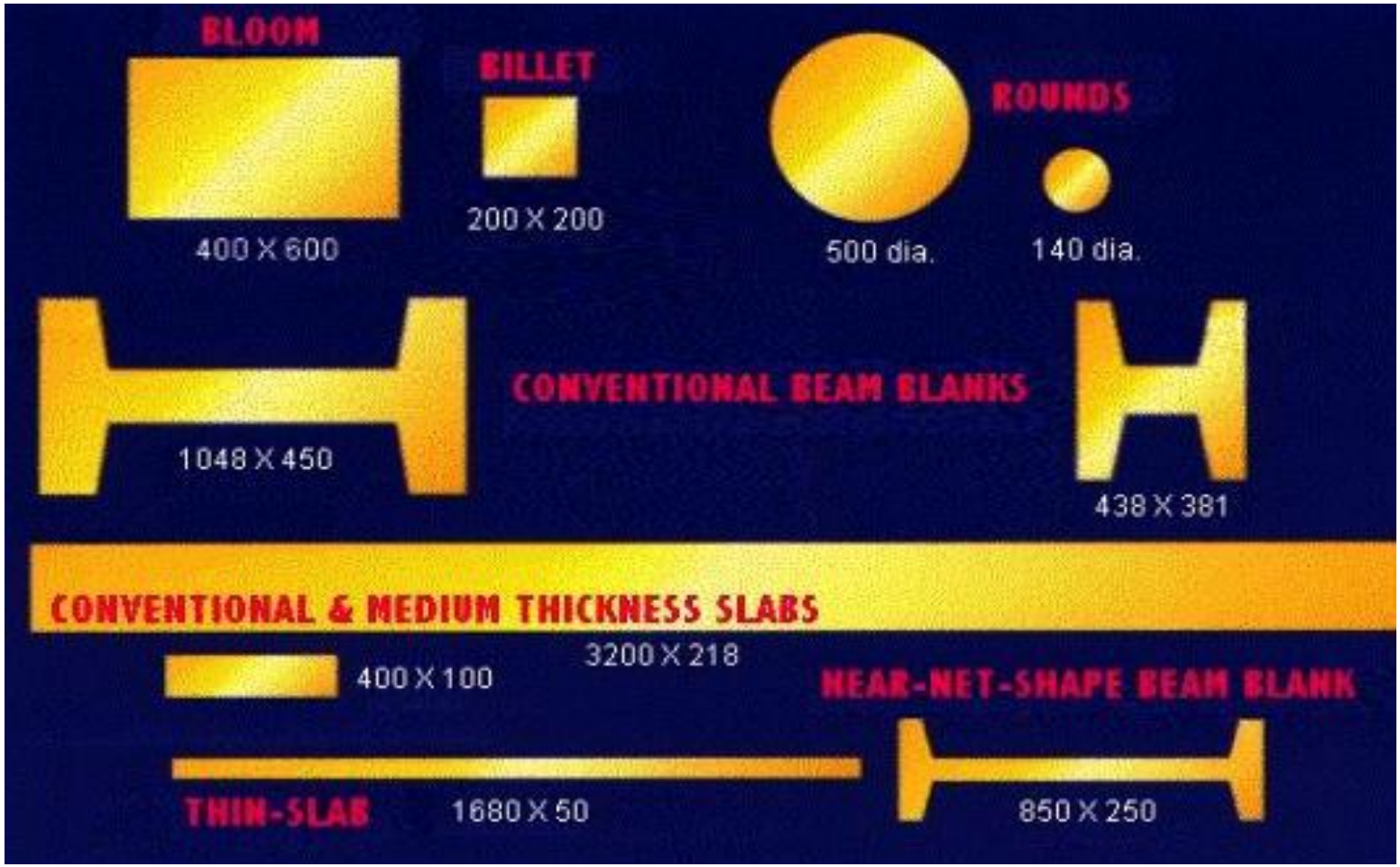
The Proses of the Continuous Casting

Continuous casting transforms molten metal into solid on a continuous basis and includes a variety of important commercial processes.

These processes are the most efficient way to solidify large volumes of metal into simple shapes for subsequent processing.

Continuous casting, also called strand casting, is the process whereby molten metal is solidified into a semifinished billet, or slab for subsequent rolling in the finishing mills.



Most basic metals are mass-produced using a continuous casting process, including over 500 million tons of steel, 20 million tons of aluminum, and 1 million tons of copper, nickel, and other metals in the world each year

- **Curved machines are used for the majority of steel casting and require bending and / or unbending of the solidifying strand.**

What is steel?

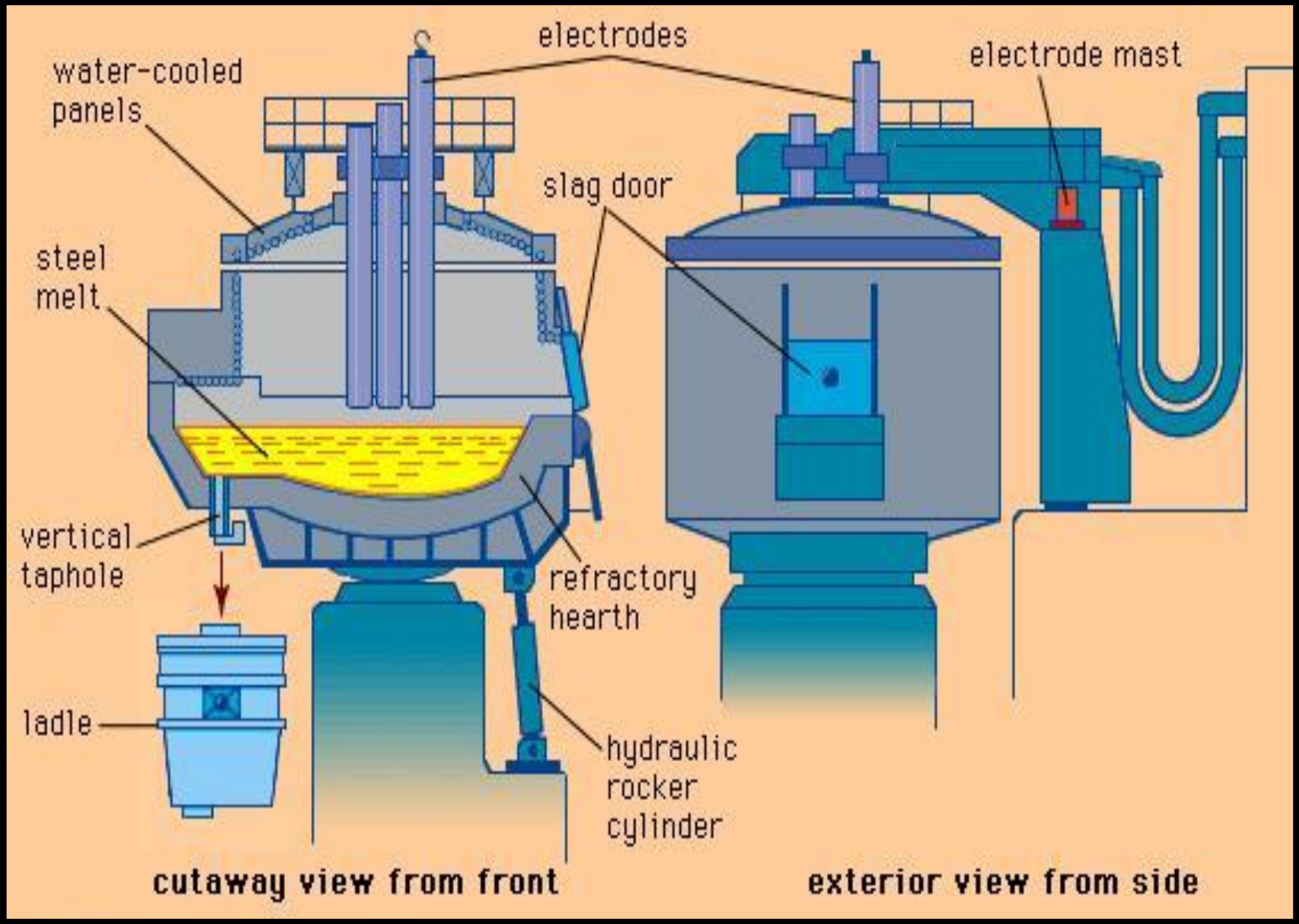
Steel is an alloy of iron and other elements, including carbon. When carbon is the primary alloying element, its content in the steel is between 0.002% and 2.1% by weight.

The following elements are always present in steel: carbon, manganese, phosphorus, sulfur, silicon, and traces of oxygen, nitrogen and aluminum

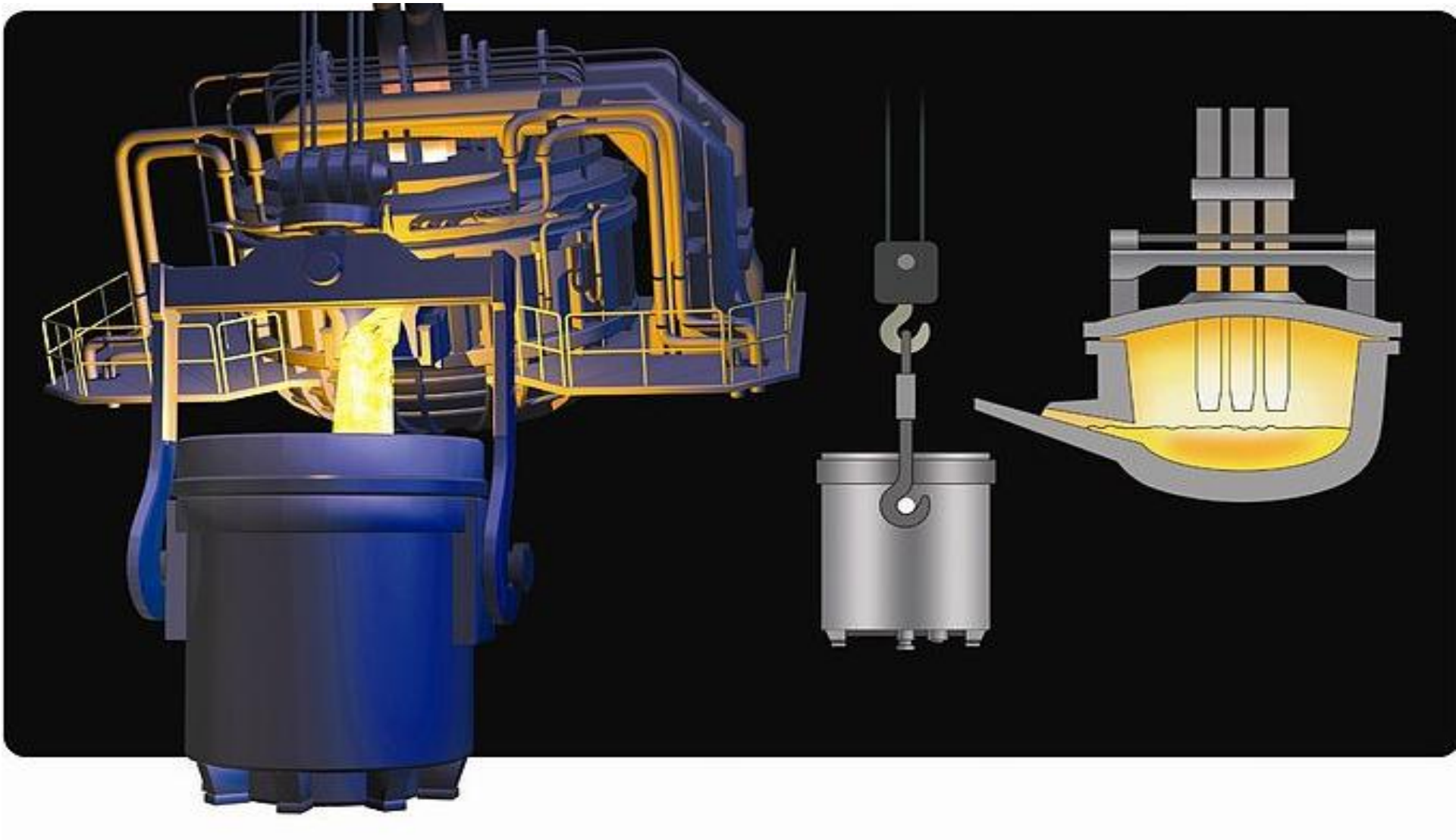
Getting the melten steelfrom the furnace

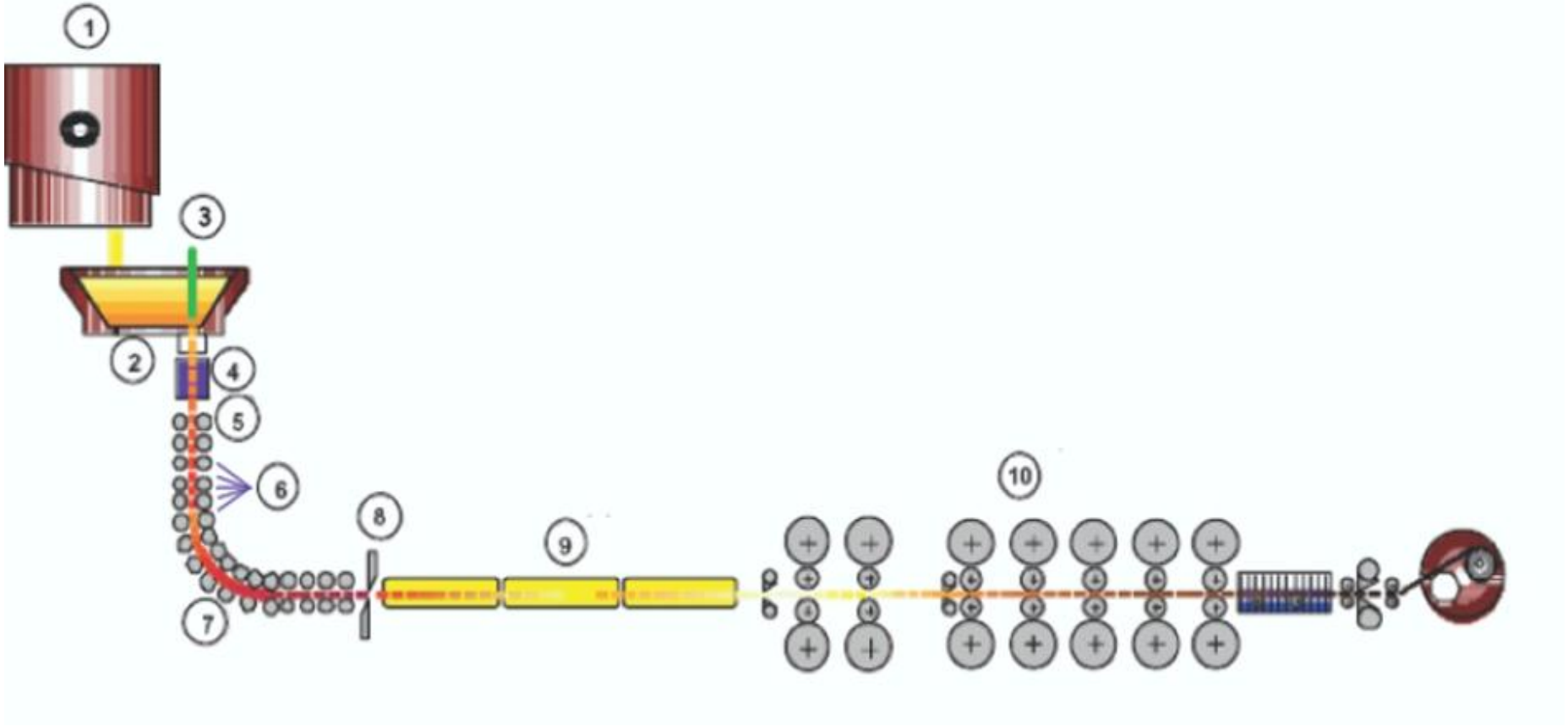
1.Molten iron from a blast furnace is poured into a large refractory-lined container called a ladle

2.The metal in the ladle is sent directly for steelmaking


electrodes
water-cooled panels
electrode mast
slag door
steel melt
vertical taphole
refractory hearth
ladle
hydraulic rocker cylinder
cutaway view from front
exterior view from side

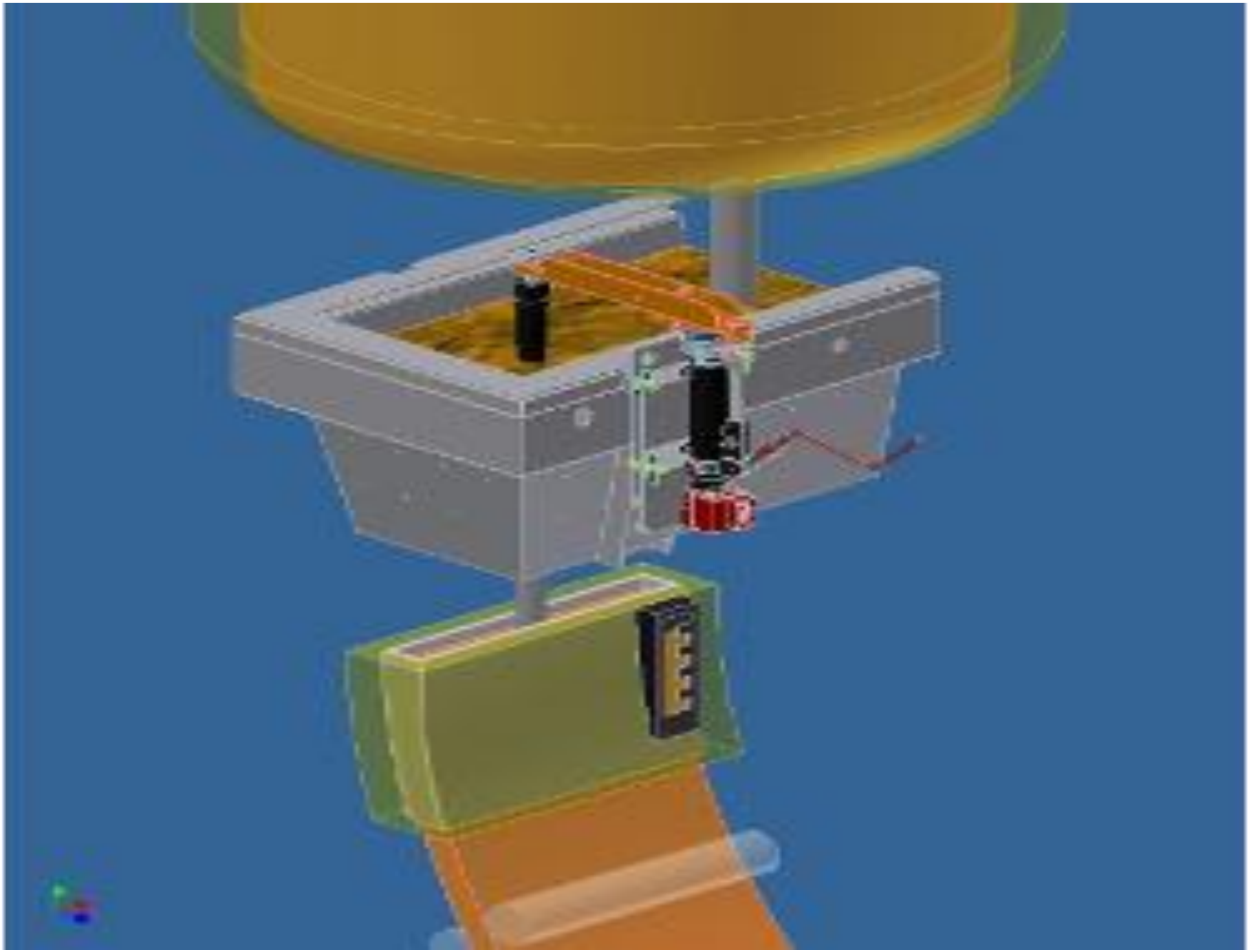
THE MORTEN STEEL FROM FURNACE TO THE LADLE FURNACE





1) The liquid steel comes from the steel plant in a ladle

2) From ladle it is tapped in a tundish



3) Liquid Steel is flowed through the nozzle to mould from tundish. The flow rate through the nozzle into the mould can be controlled by a stopper in the tundish

4) The mould is a rectangular copper box (orof shape similler to the final or semifinal product) without a top and a bottom

5) The outer shell is being ’grabbed’ by a driven roll just beneath the mould, pulling a strand of steel out of the mould.

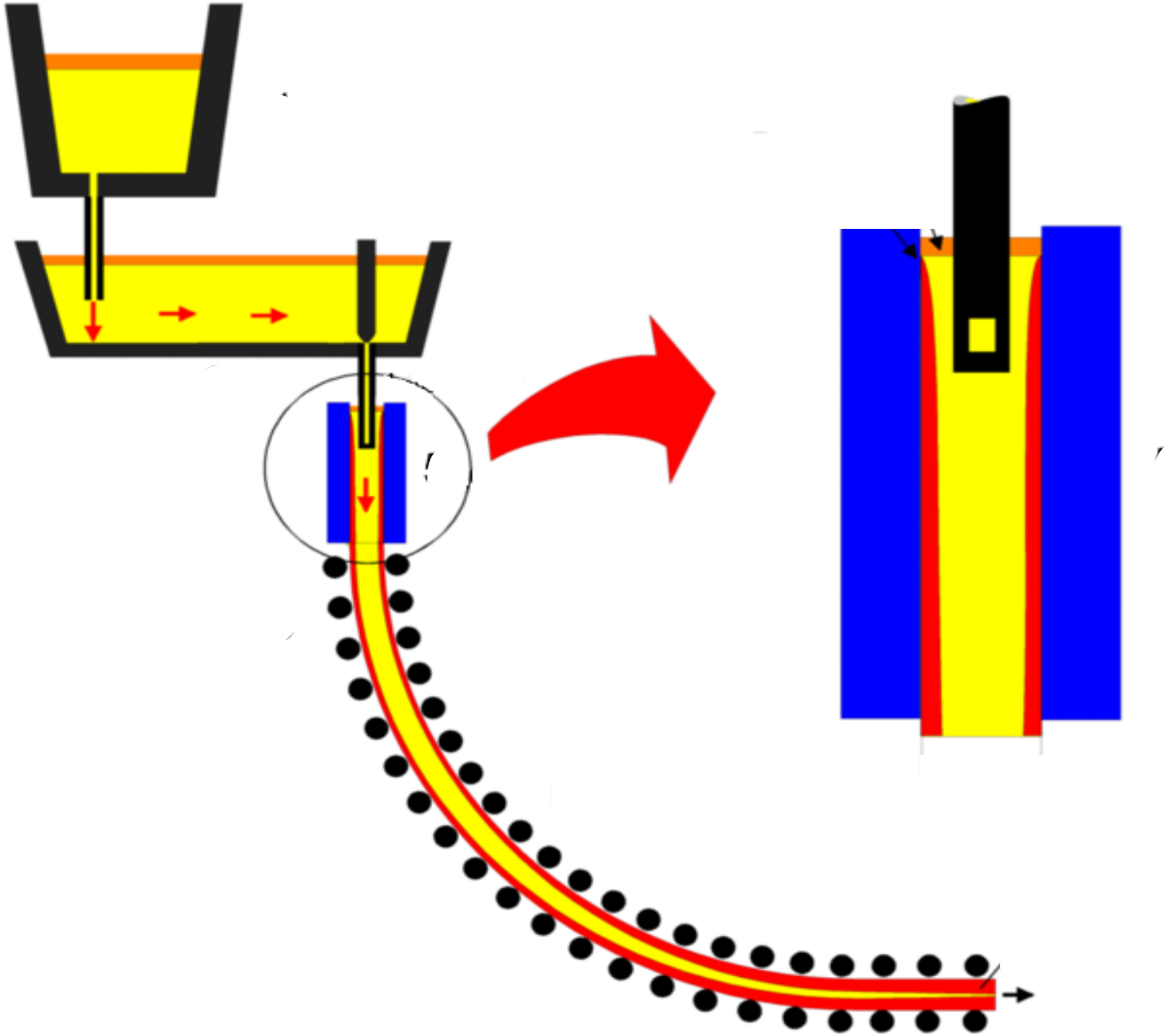
6) The core of the strand, as it exits, is still liquid; because of that, the strand proceeds through a secondary cooling section

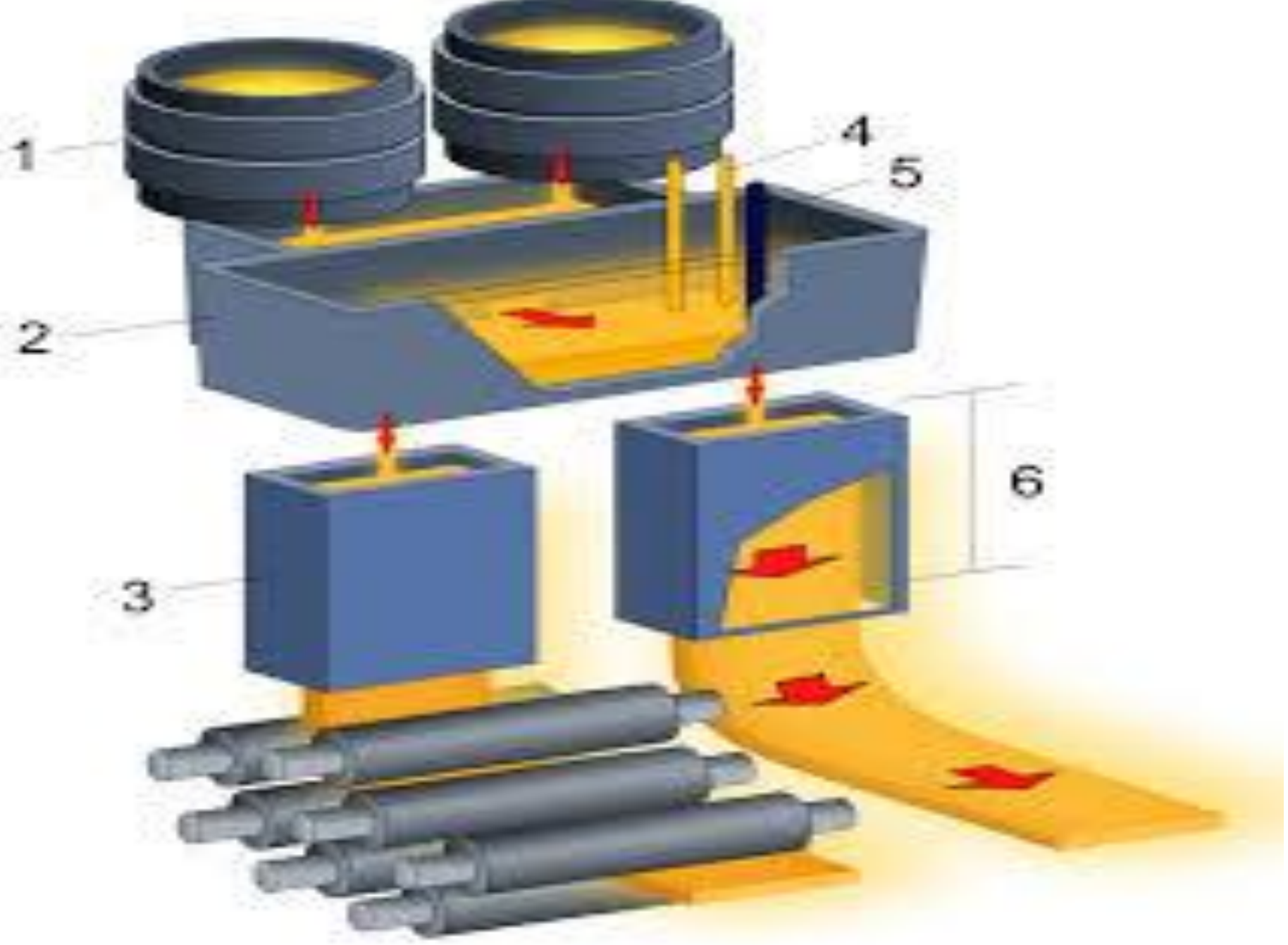
7) The strand is bent from the vertical plane to horizontal plane using rolls

8) At the end of the cooling section the cross-section of the strand is completely solidified, slabs are then created by cutting the strand

9) These slabs are put in a tunnel furnace to let them homogenize

10) After a while the slabs come out of the furnace; subsequently they are rolled out, further cooled and finally coiled

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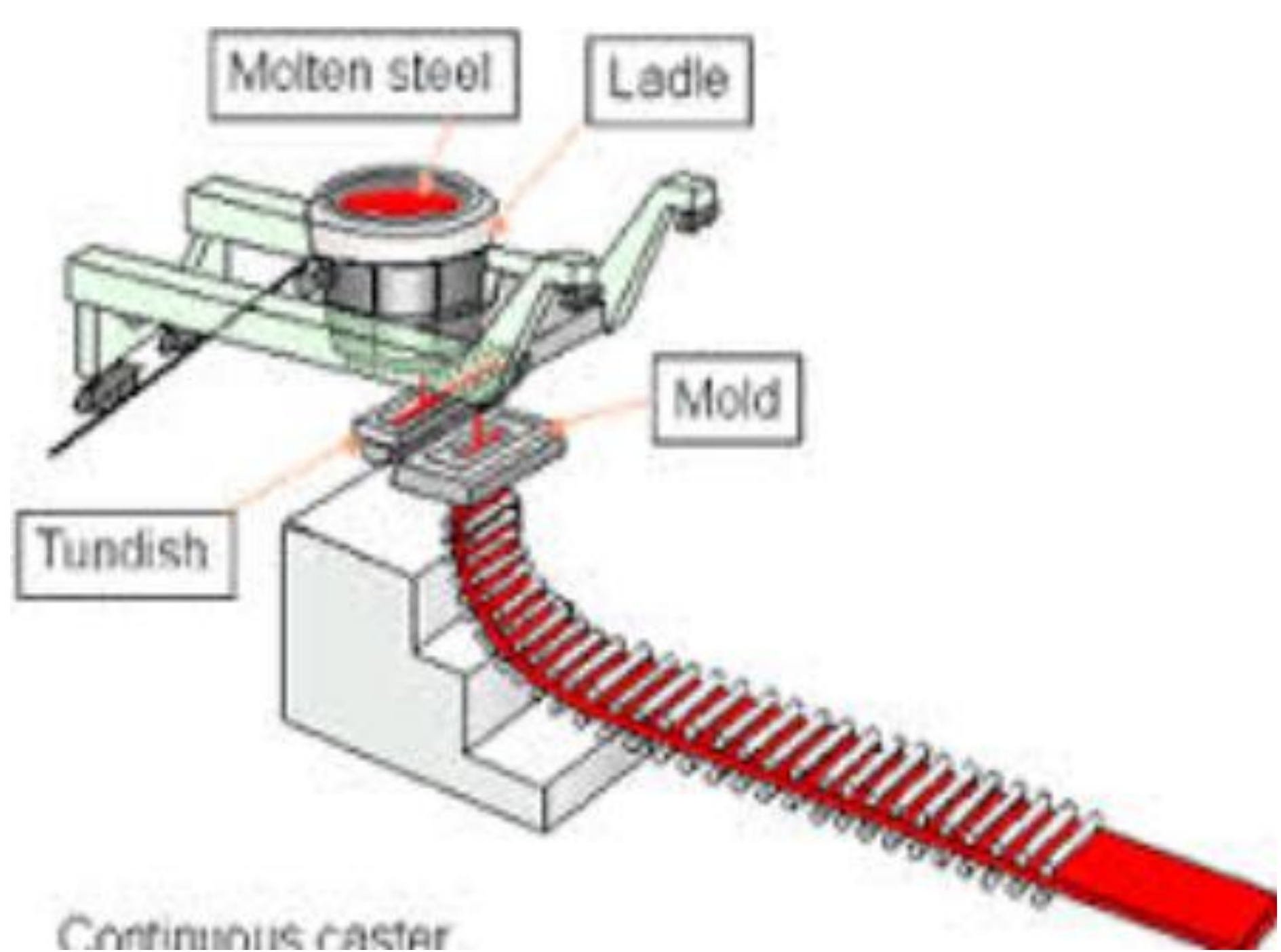
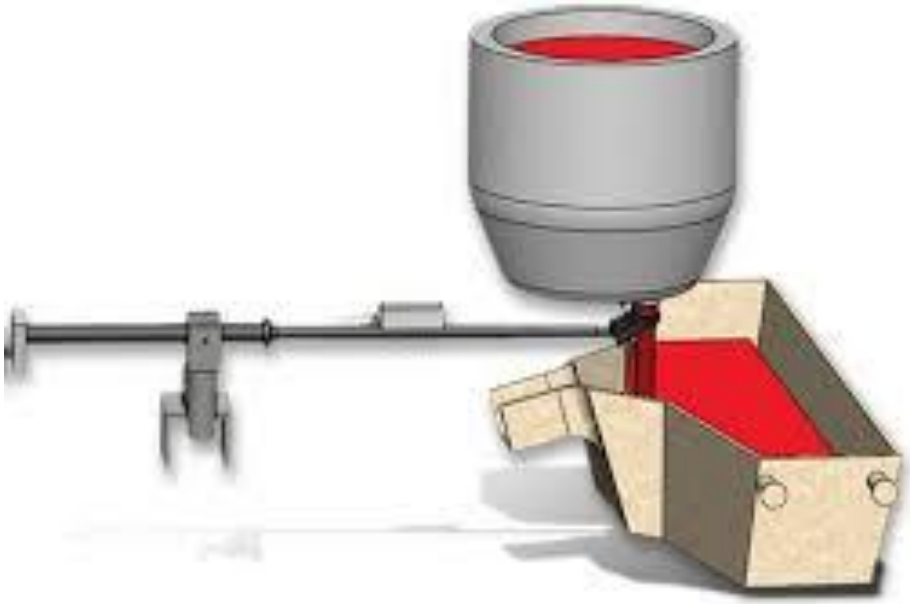


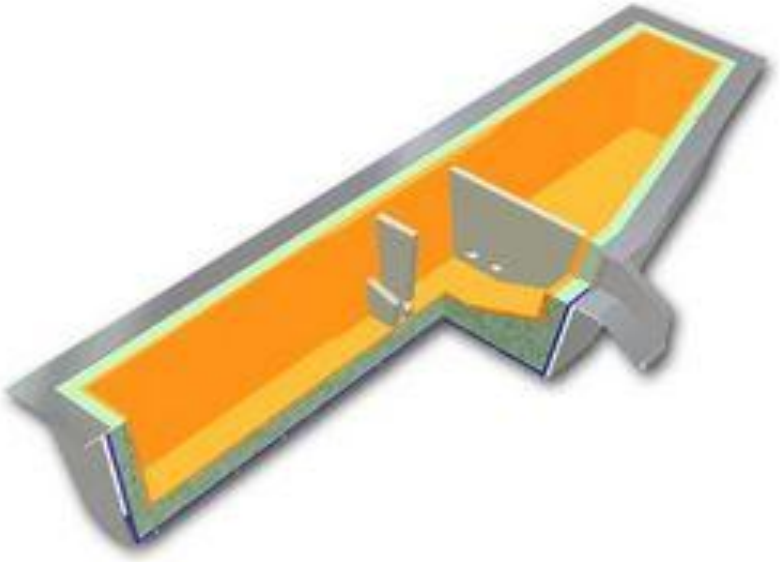
Continuous caster


Molten Steel
95% Fe
0.04 - 1.5% C
1% Mn
various alloys
3000°F
Fluidity ~ 6 cp



So,We are ready to start to the contlnuous castlng

- ✓ The shape of the tundish is typically rectangular, but delta and "T" shapes are also common.

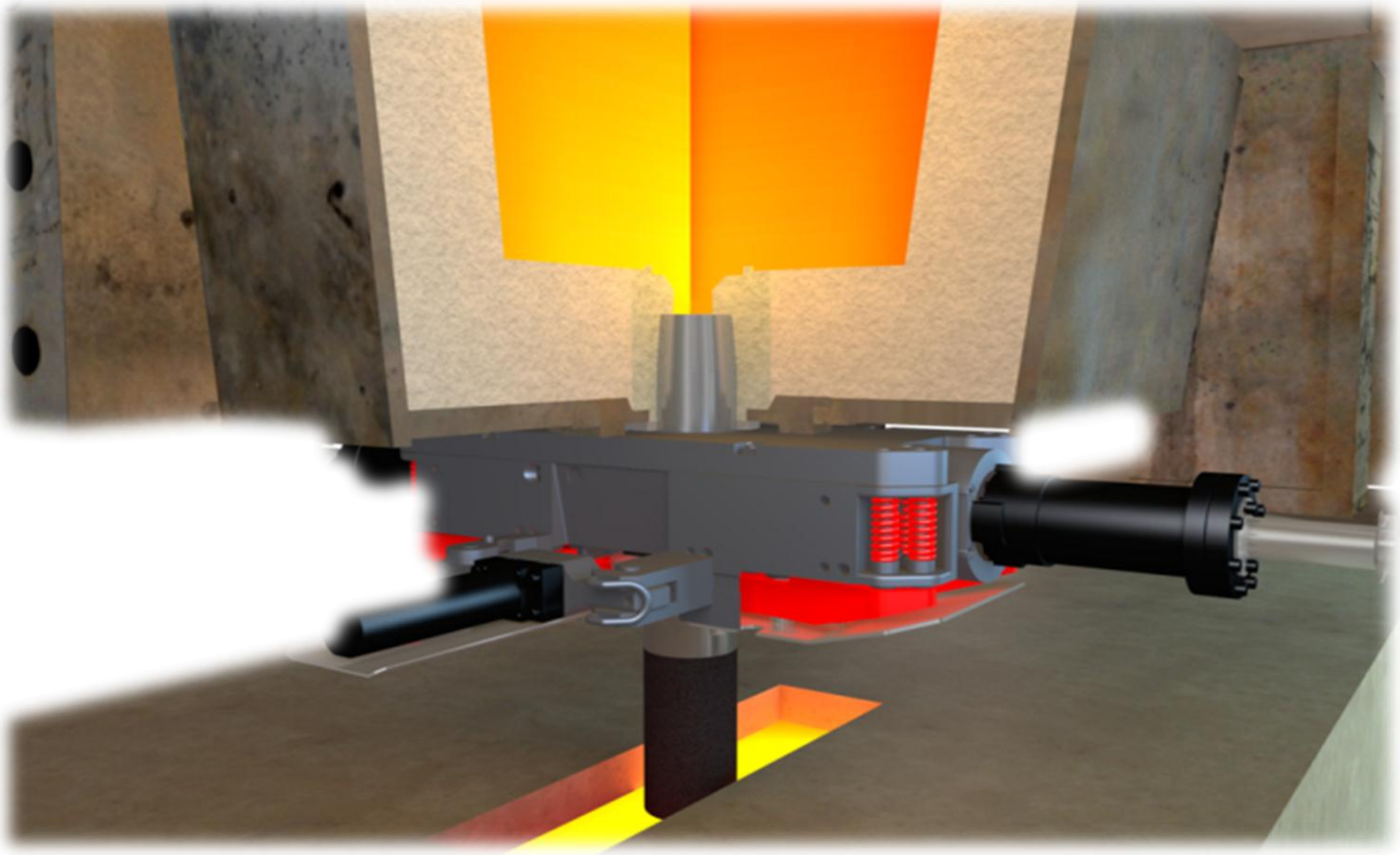


- ✓ Nozzles are located along its bottom to distribute liquid steel to the molds

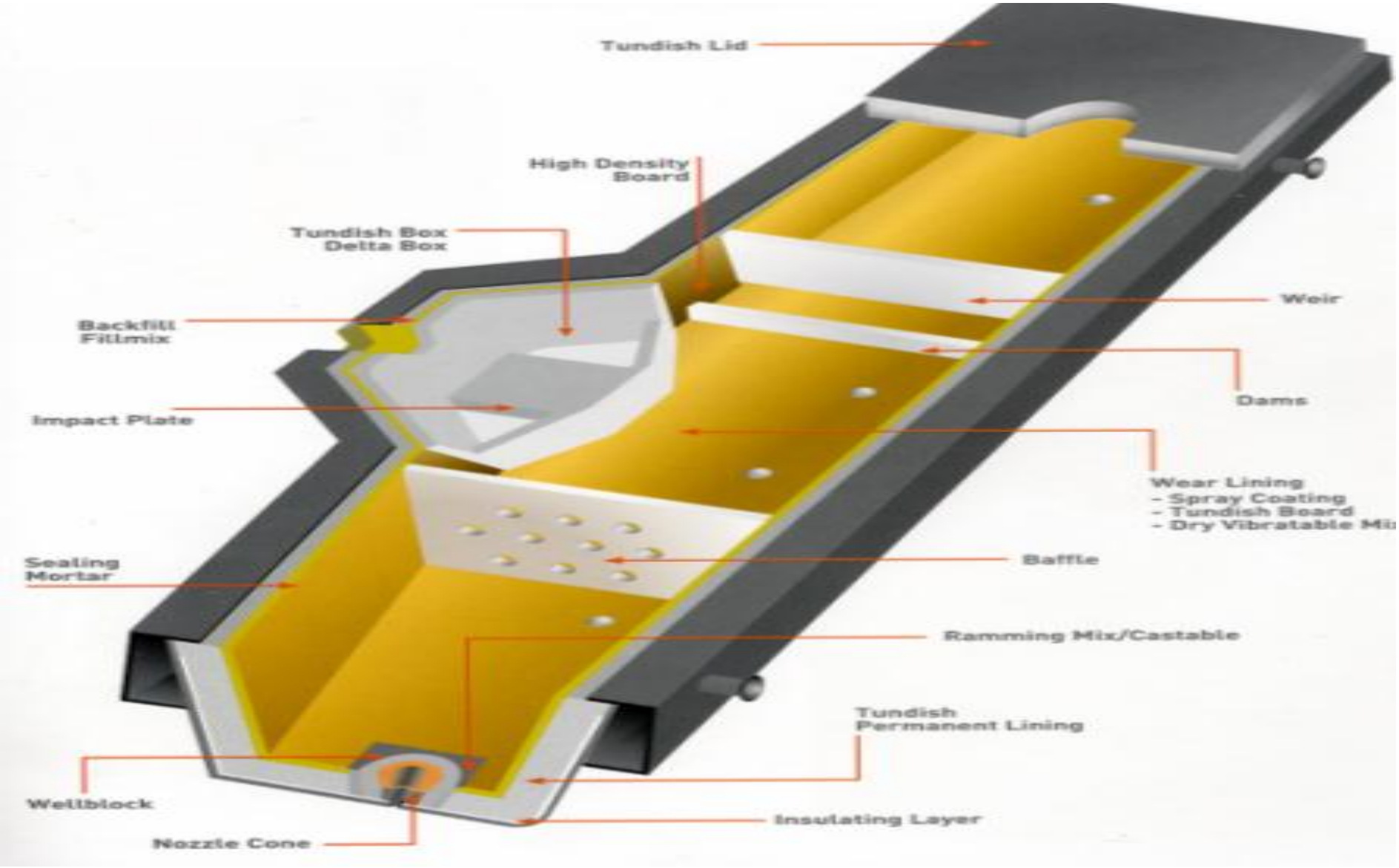
✓ **The tundish can be designed according to the following conditions:**

- The amount of the production:
- The volumes of ladle,
- The number of the strands

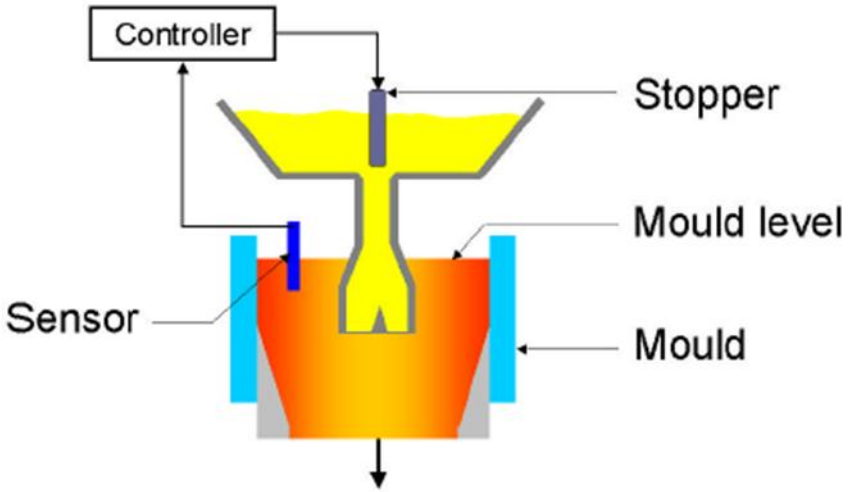
- A tundish may have a refractory-lined lid, and has bottom ports that are assembled with slide gates or stopper rods through which the melt is teemed into the mold



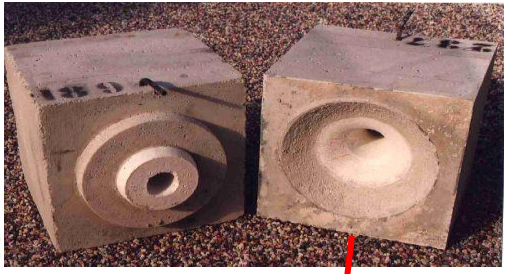
TUNDISH OVERVIEW

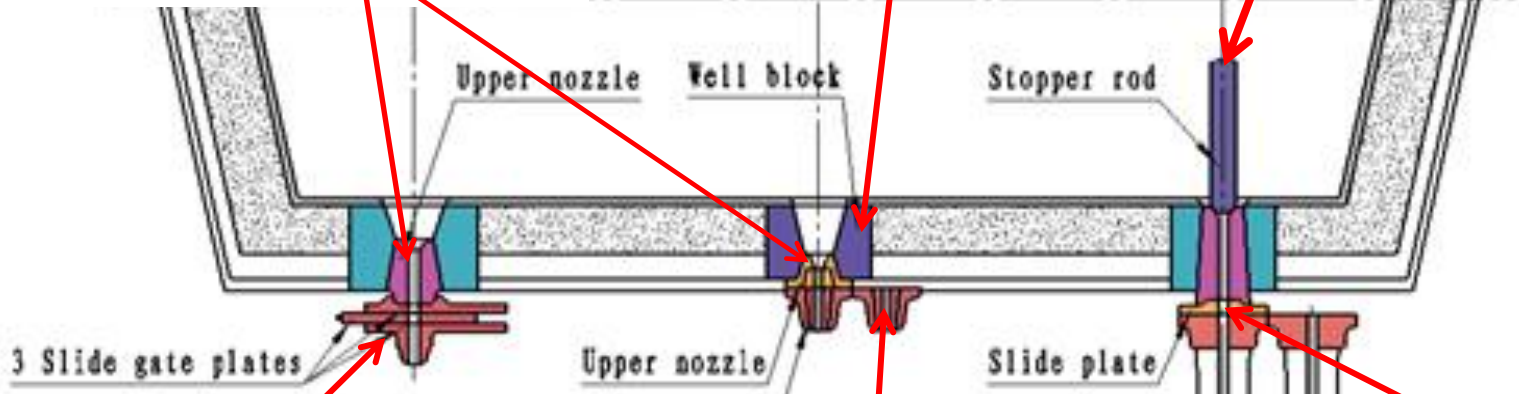


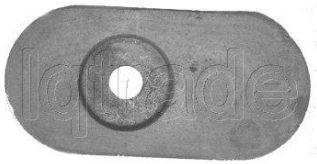
- ✓ **Stoppers:** This is used to control the molten steel flow from the tundish to the mold

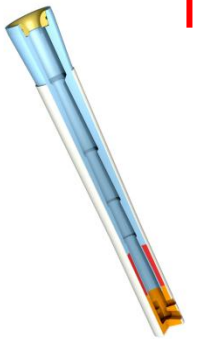


The overview of tundish before all processes are begun

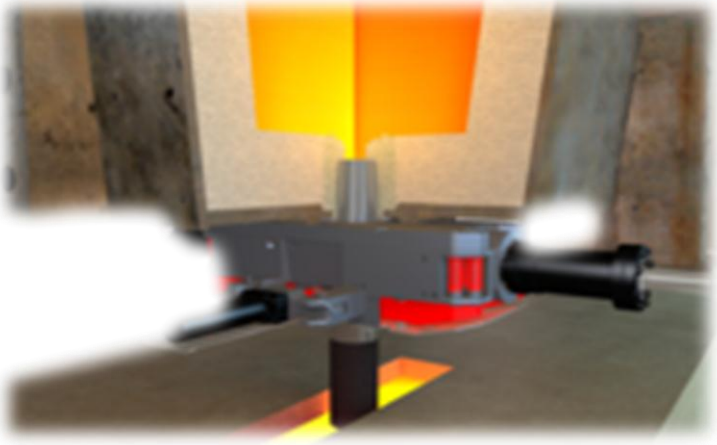


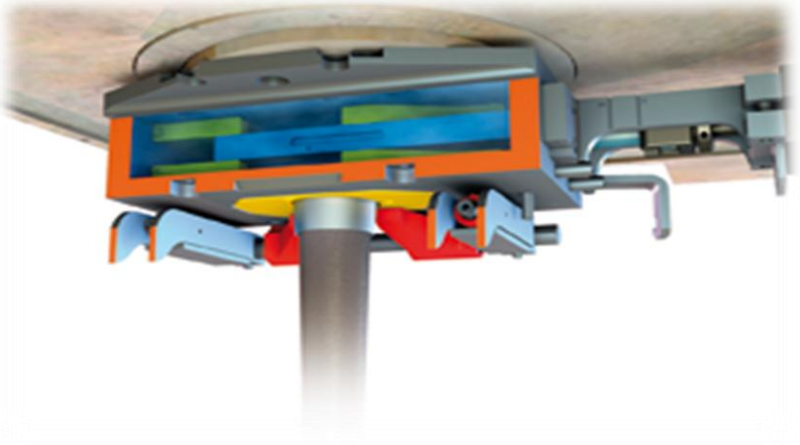

Upper nozzle
Well block
Stopper rod
3 Slide gate plates
Upper nozzle
Slide plate
Metering nozzle
Submerged nozzle





- ✓ **Slide Gates:** Tundish gates are provided with 3 plates in order to avoid the movement of the subentry shroud in the mould during the flow control by throttling.



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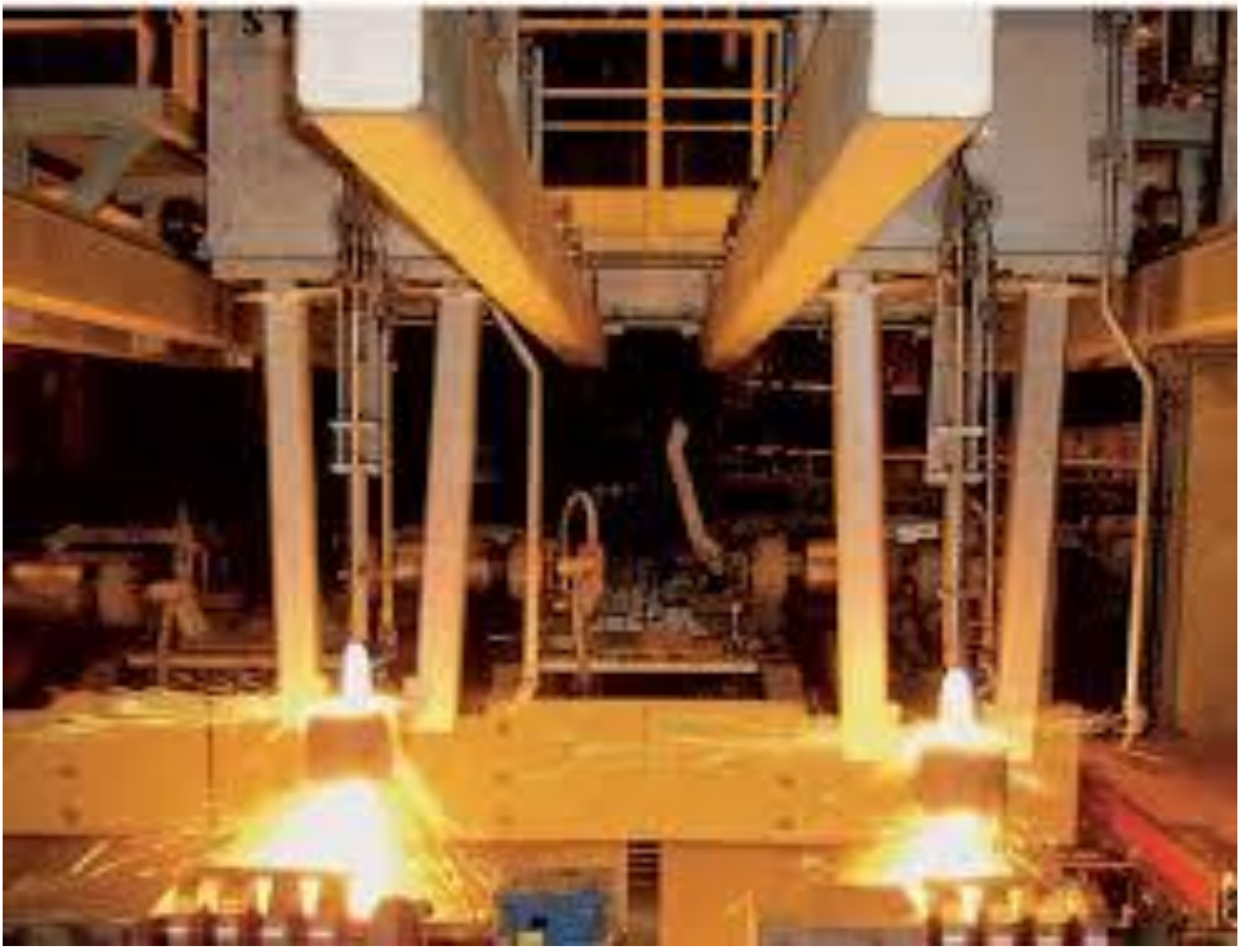


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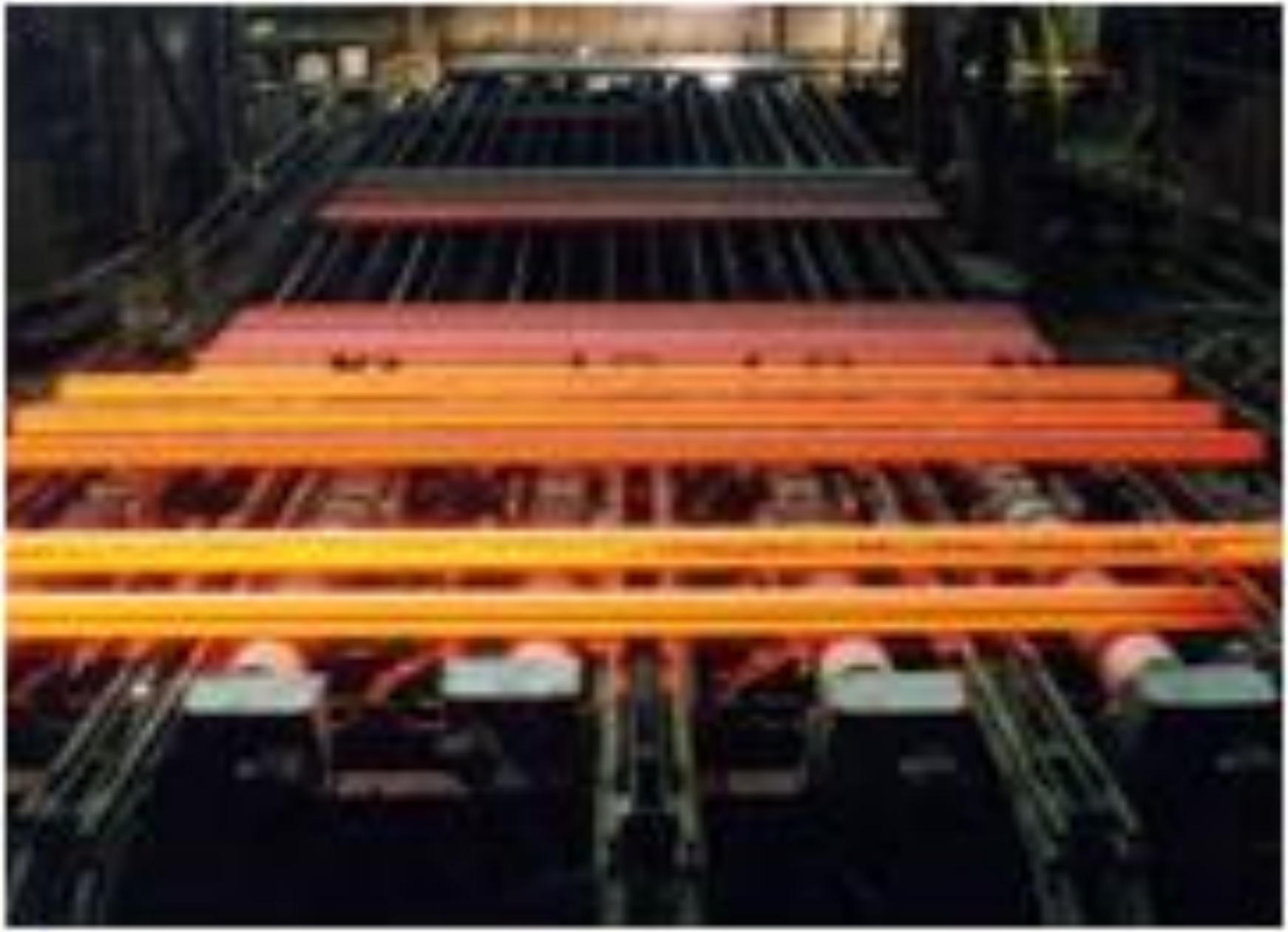
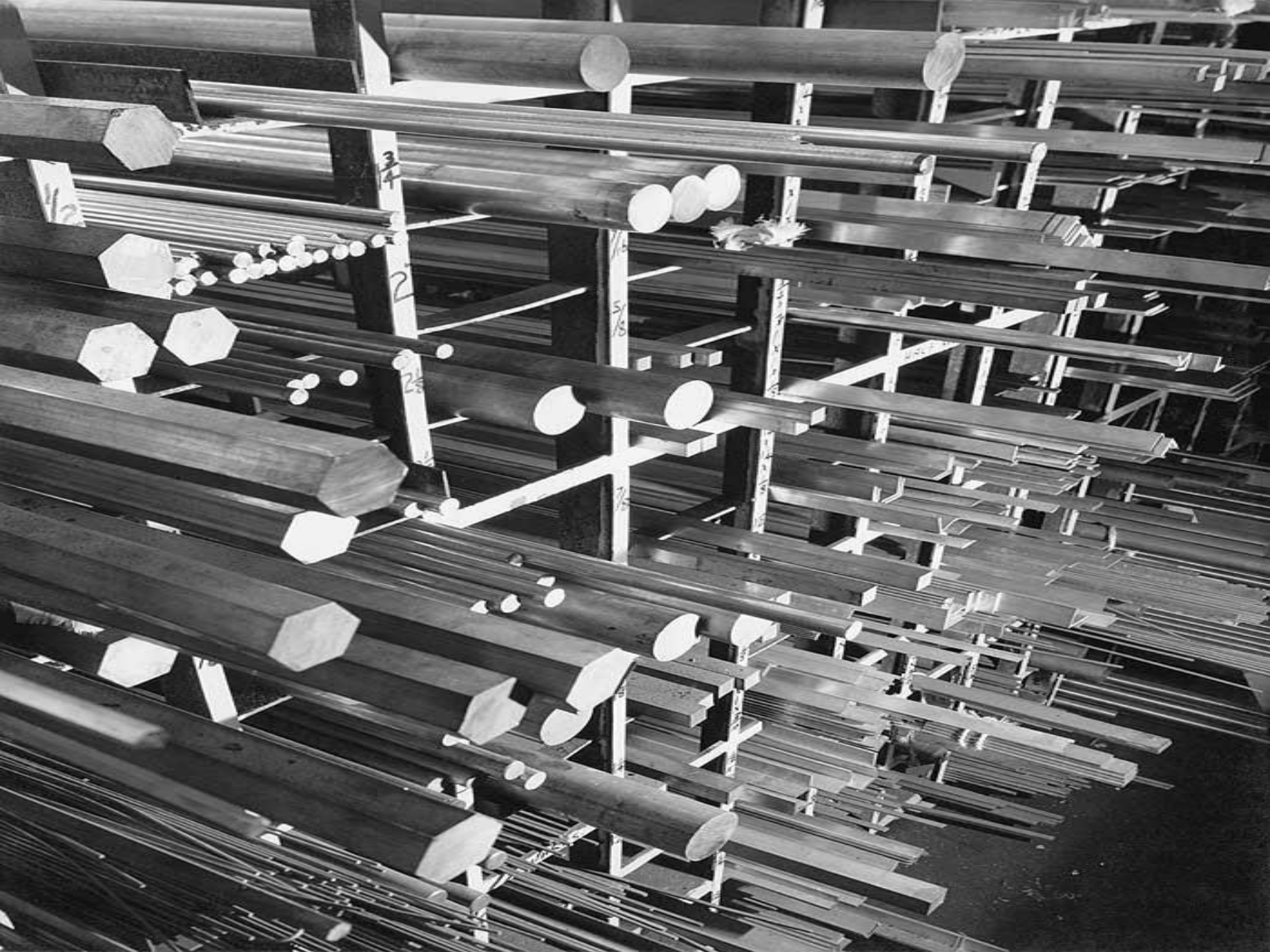



L250"
3520
L250"
3520



Advantages of continuous casting

- Sprue, runner, riser, etc. are not used. Hence, no waste metal this leads to 100% casting yield.
- Process is automatic.
- Product has good consistent soundness.
- Mechanical Properties are high and very reproducible.

DISADVANTAGE

- Not suitable for small quantity production.
- Continuous and efficient cooling of moulds is required, else, center-line shrinkage develops.
- Requires large floor space.


THANK YOU
FOR YOUR
ATTENTION