

# Continuous Steel Casting Technology

A photograph of a continuous steel casting process. A bright, glowing stream of molten steel is being cast into a mold, creating a long, continuous strand. The scene is illuminated by the intense heat of the steel, with a worker visible in the foreground, partially obscured by the machinery. The background shows the industrial structure of the casting plant.

**Khalid Al-Dolaimy**  
**University of Diyla**  
**Engineering College**





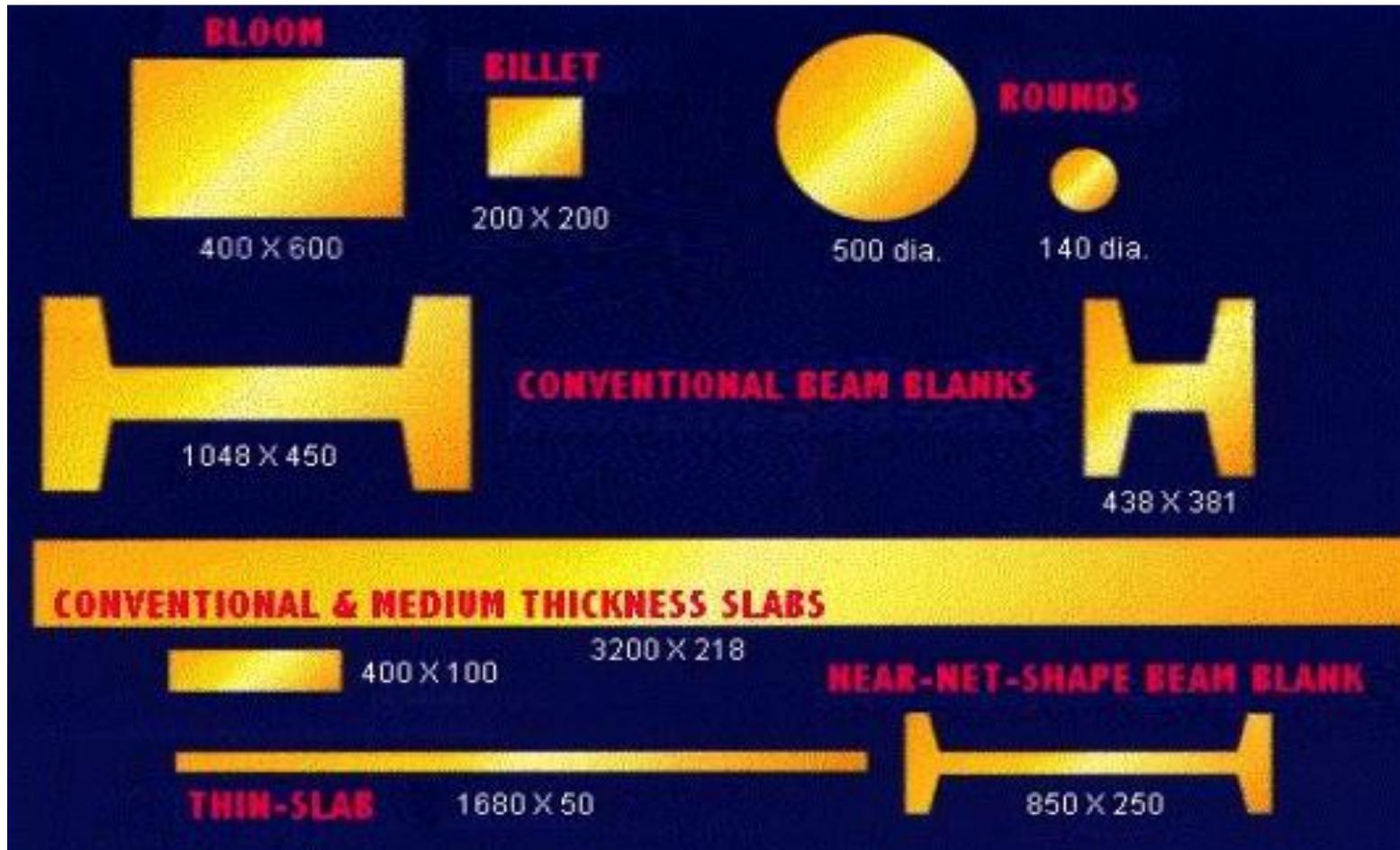


# The Processes of the Continuous Casting

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?

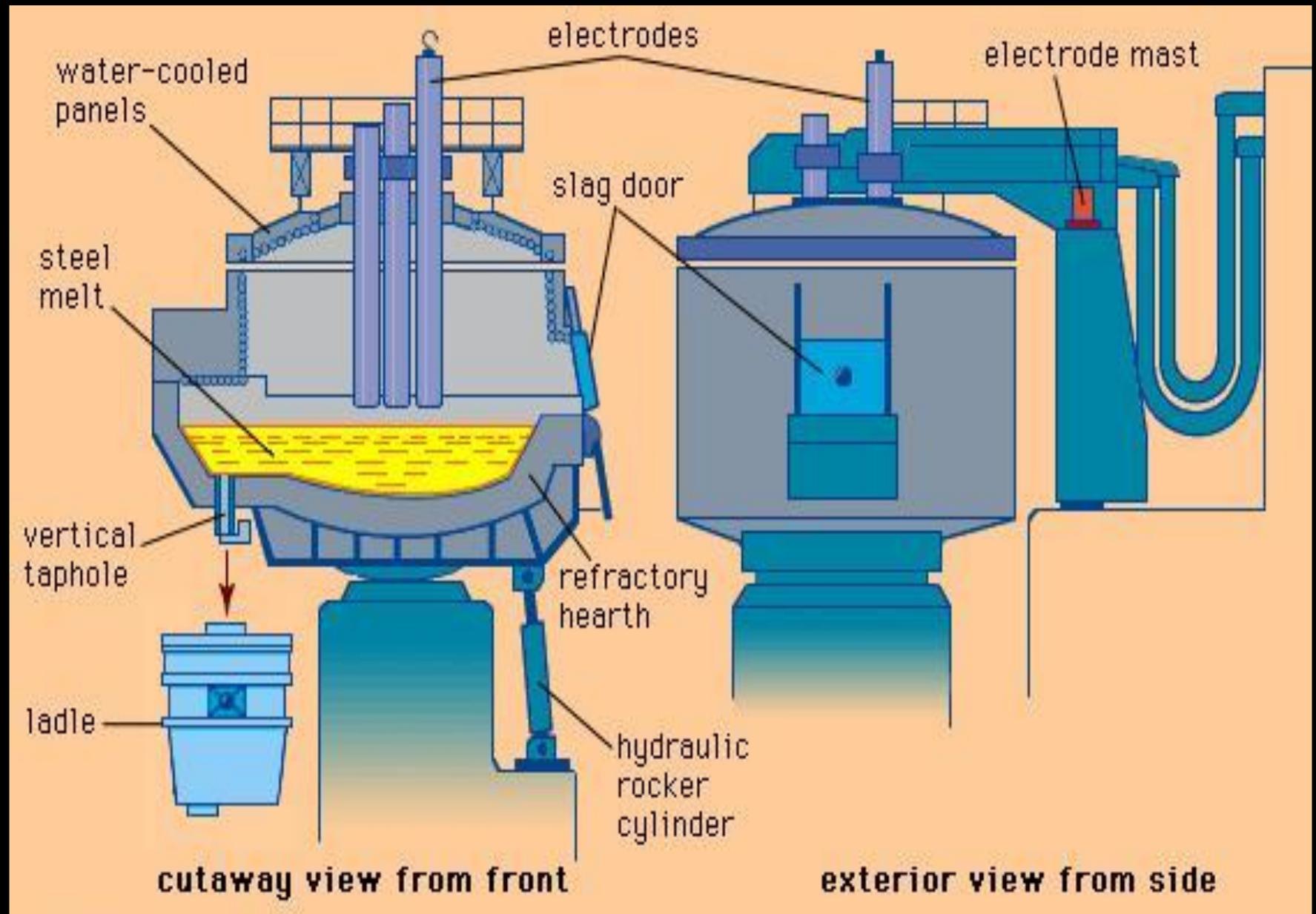
Steel is an alloy of iron and other elements, including carbon. When carbon is the primary alloying element, its content in the steel is between **0.002%** and **2.1%** by weight.

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

# Getting the molten steel from 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

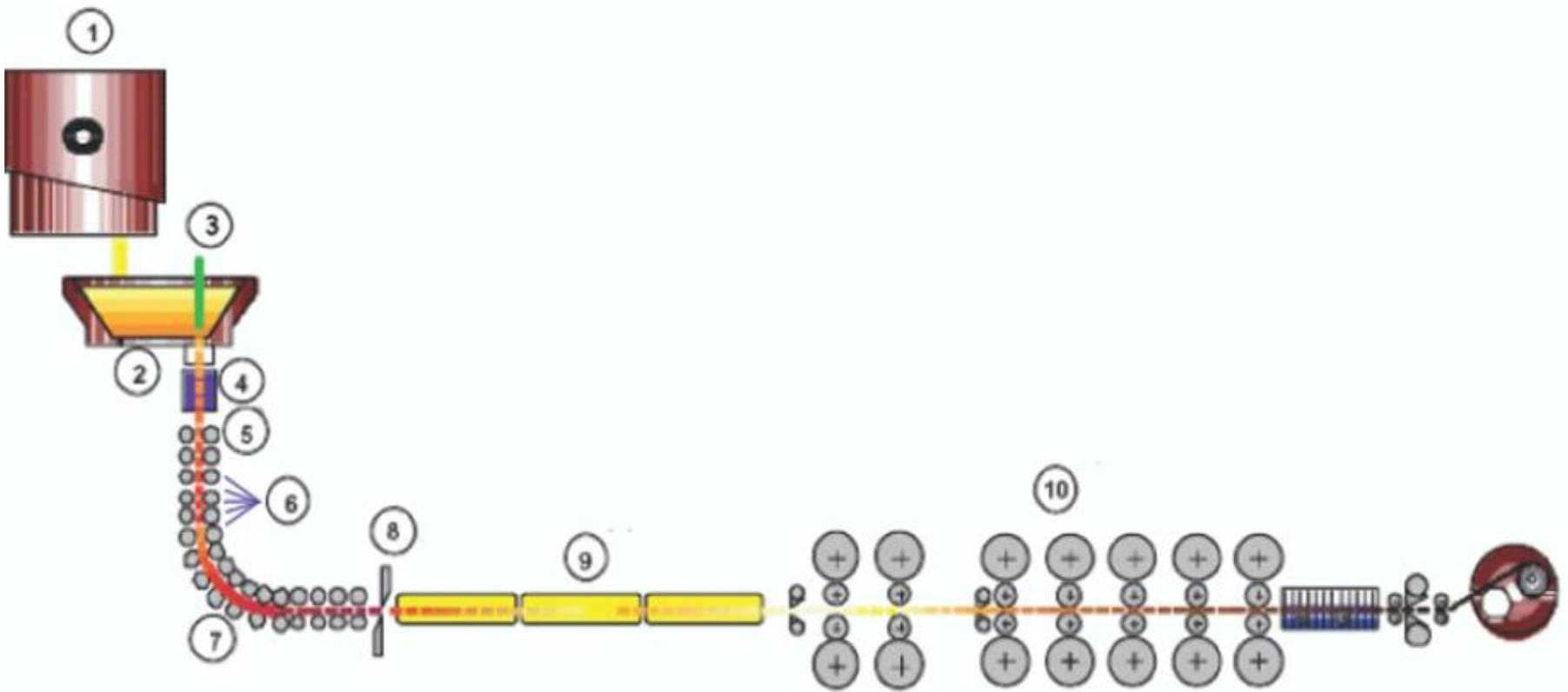




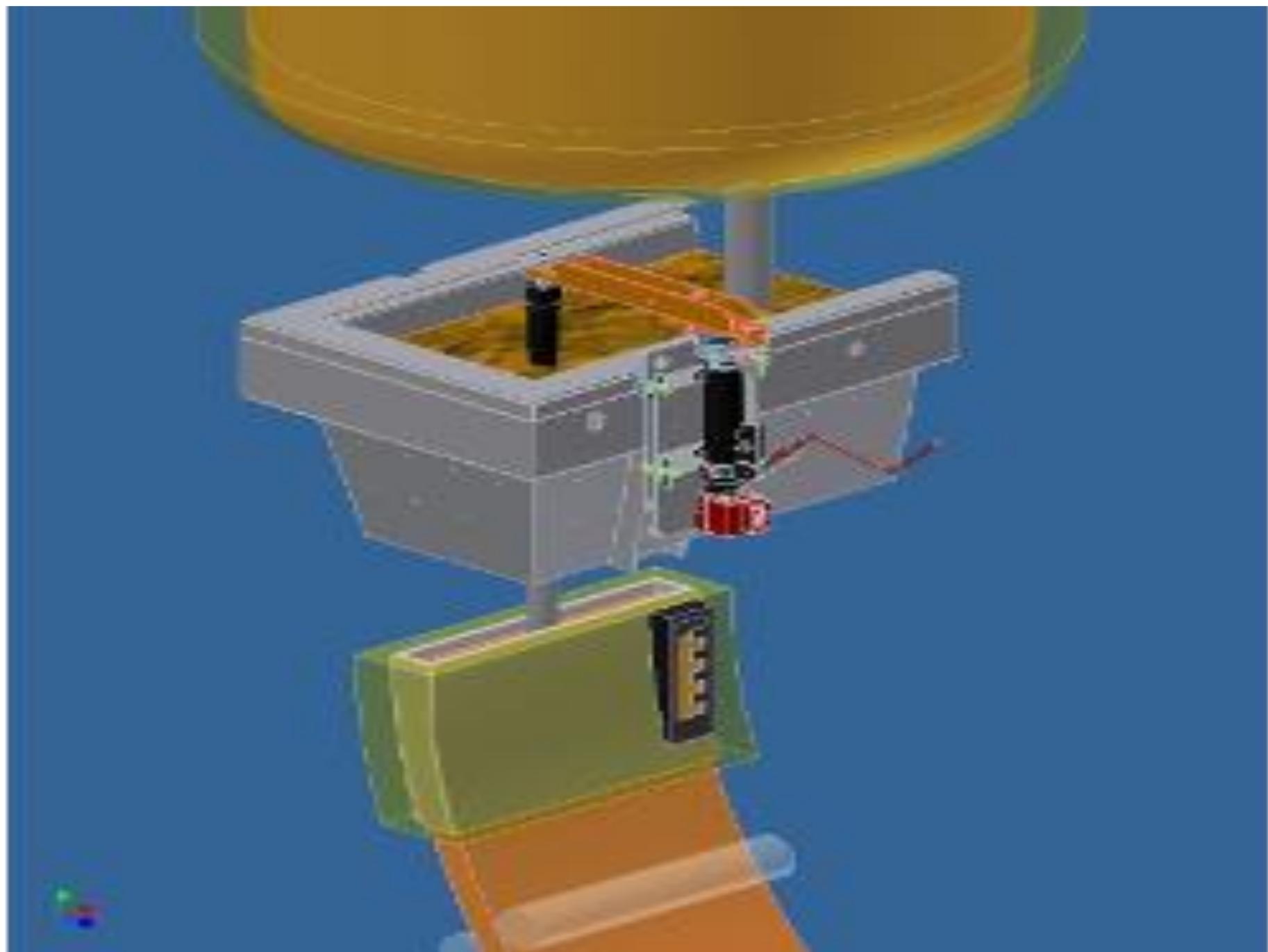
# ***THE MORTEN STEEL FROM FURNACE TO THE LADLE FURNACE***







- 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.**

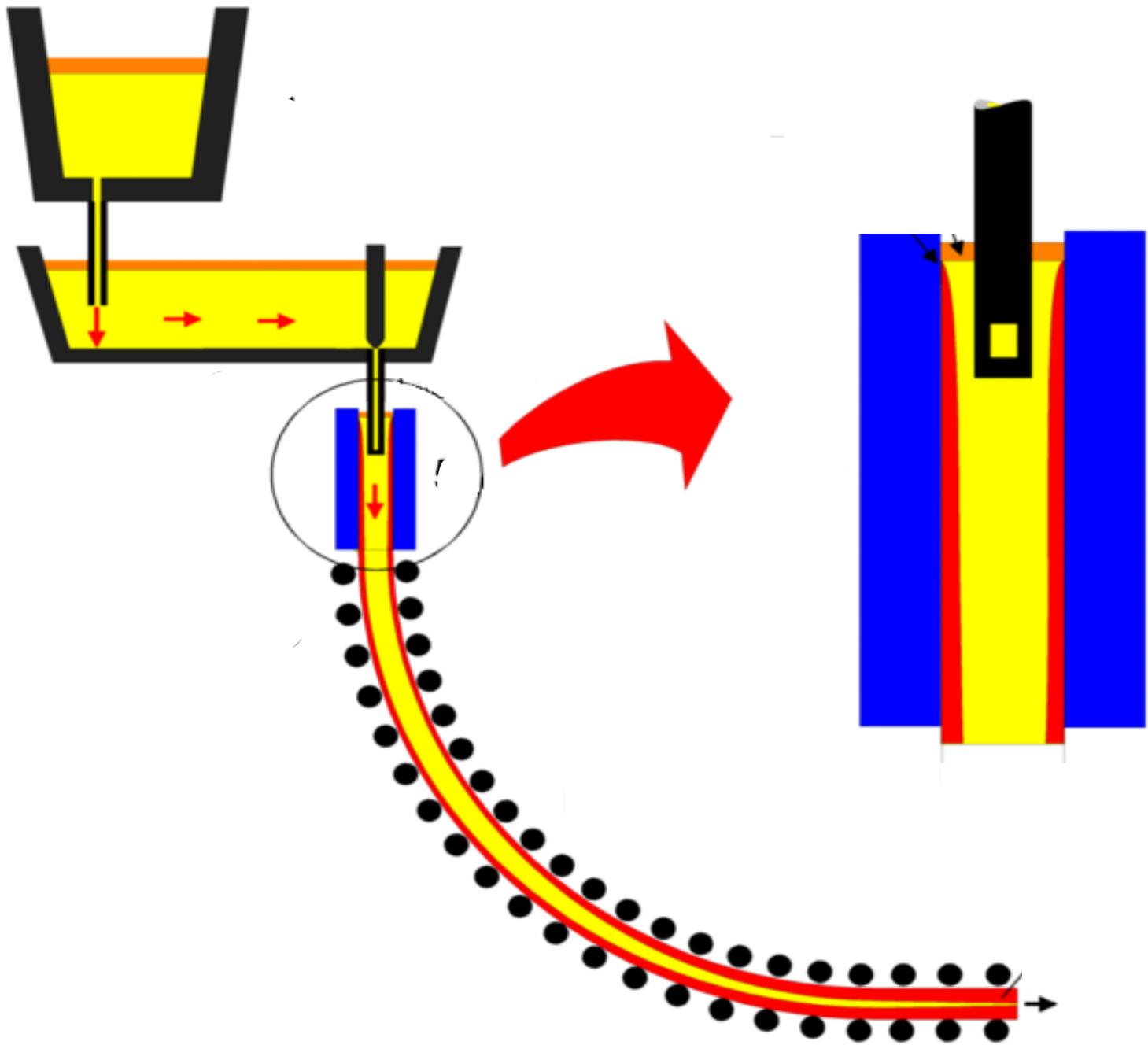
**6) The core of the strand, as it exits, is still liquid; because of that, the strand proceeds through a secondary cooling section**

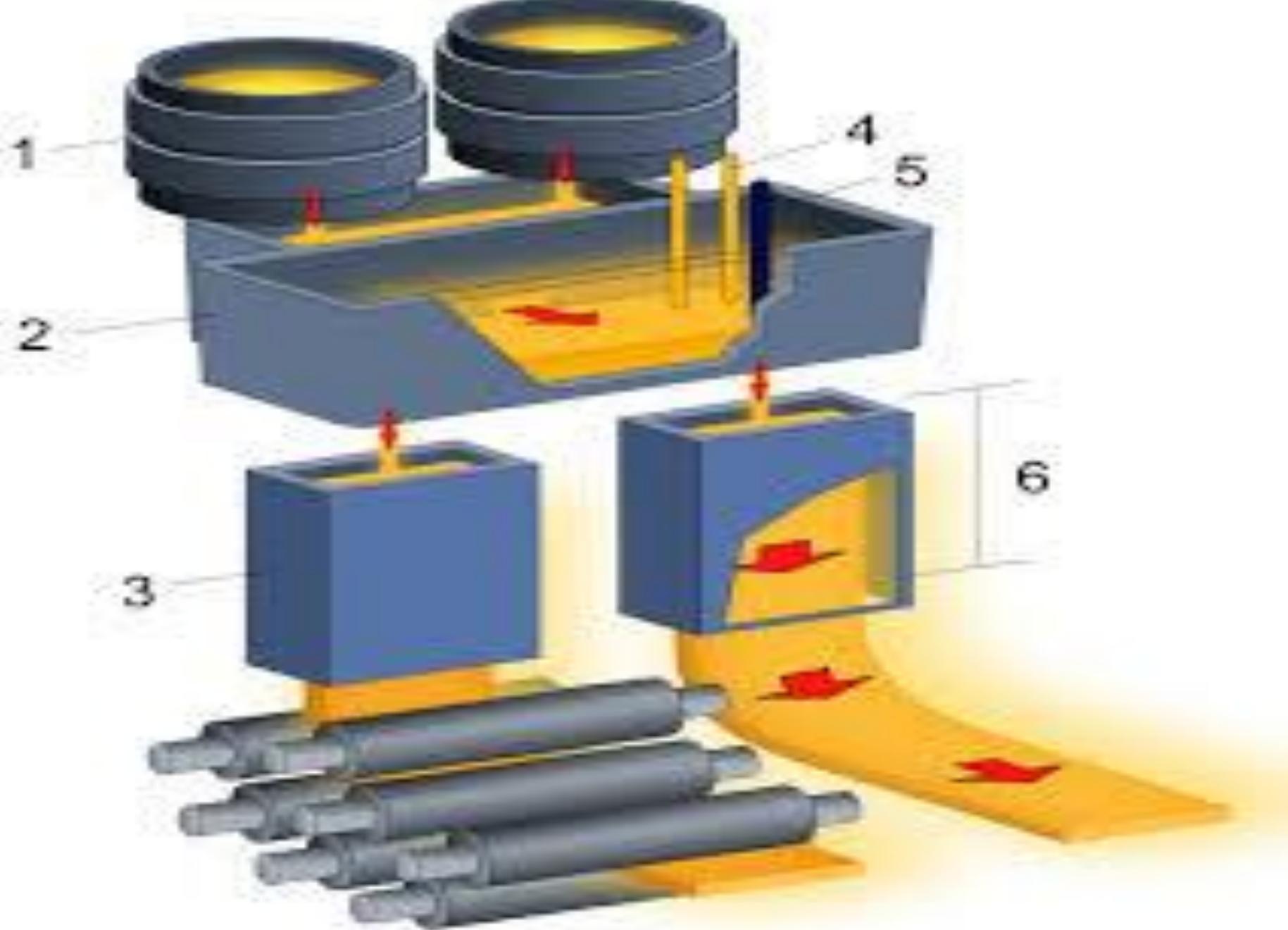
**7) The strand is bent from the vertical plane to horizontal plane using rolls**

**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**



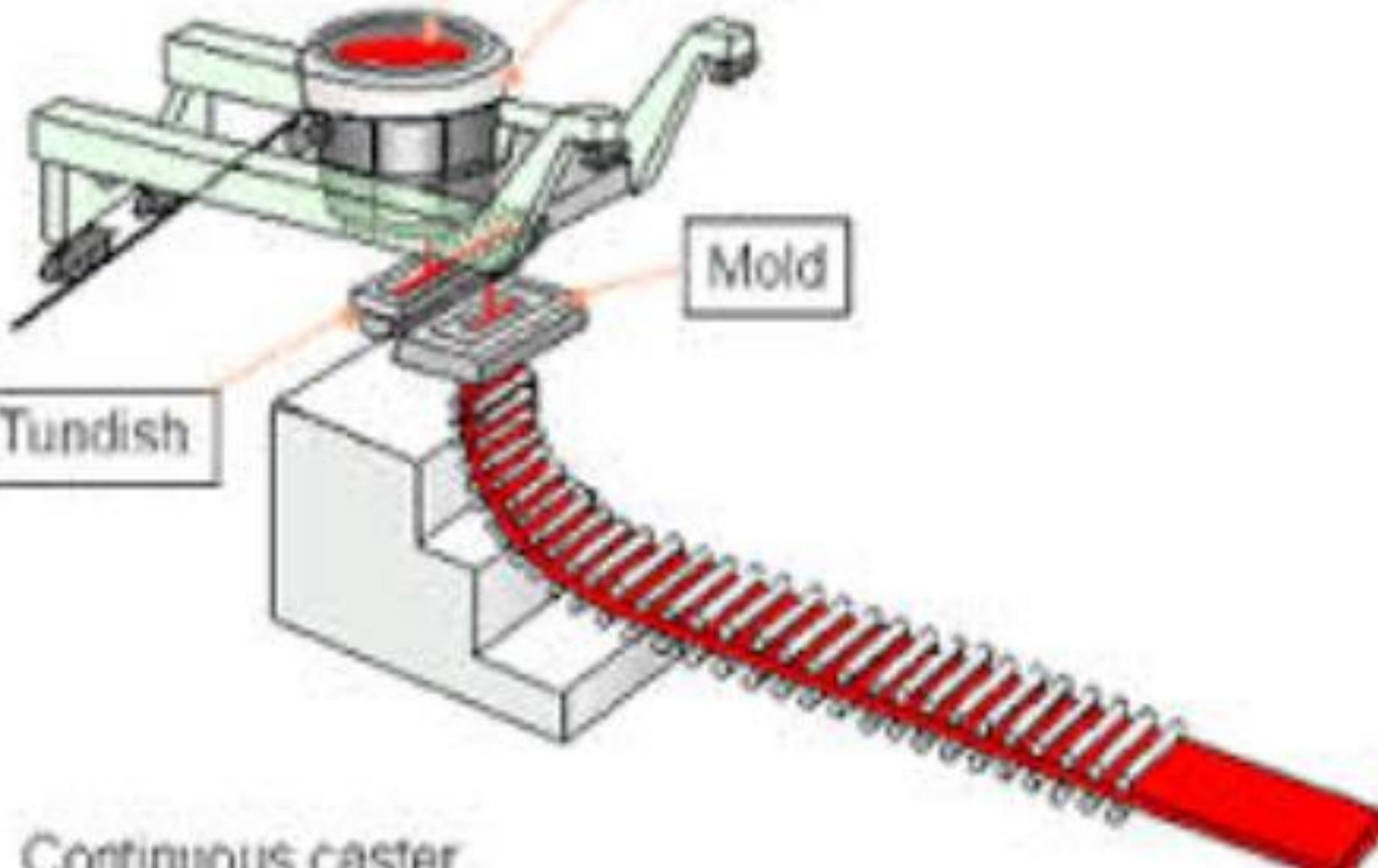


Molten steel

Ladle

Mold

Tundish



Continuous caster







**Molten Steel**  
98% Fe  
0.04 - 1.5% C  
1% Mn  
various alloys  
3000°F  
Fluidity ~ 6 cp



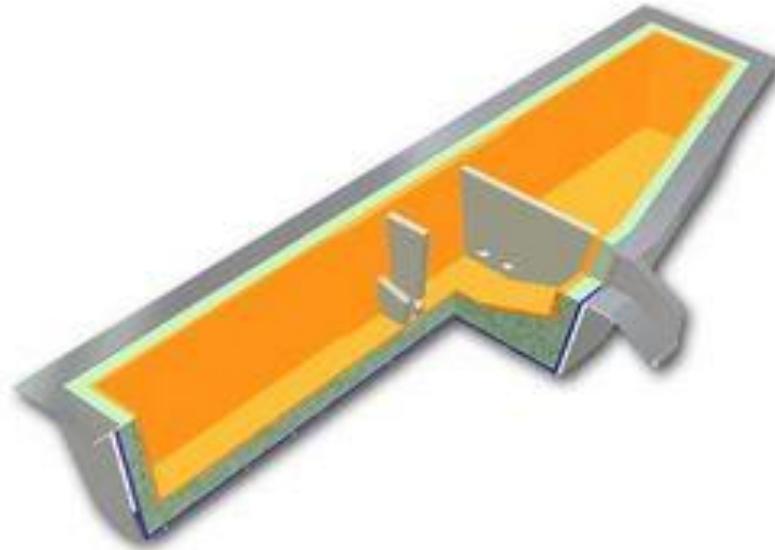




**So, We are ready to start to the continuous casting**



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

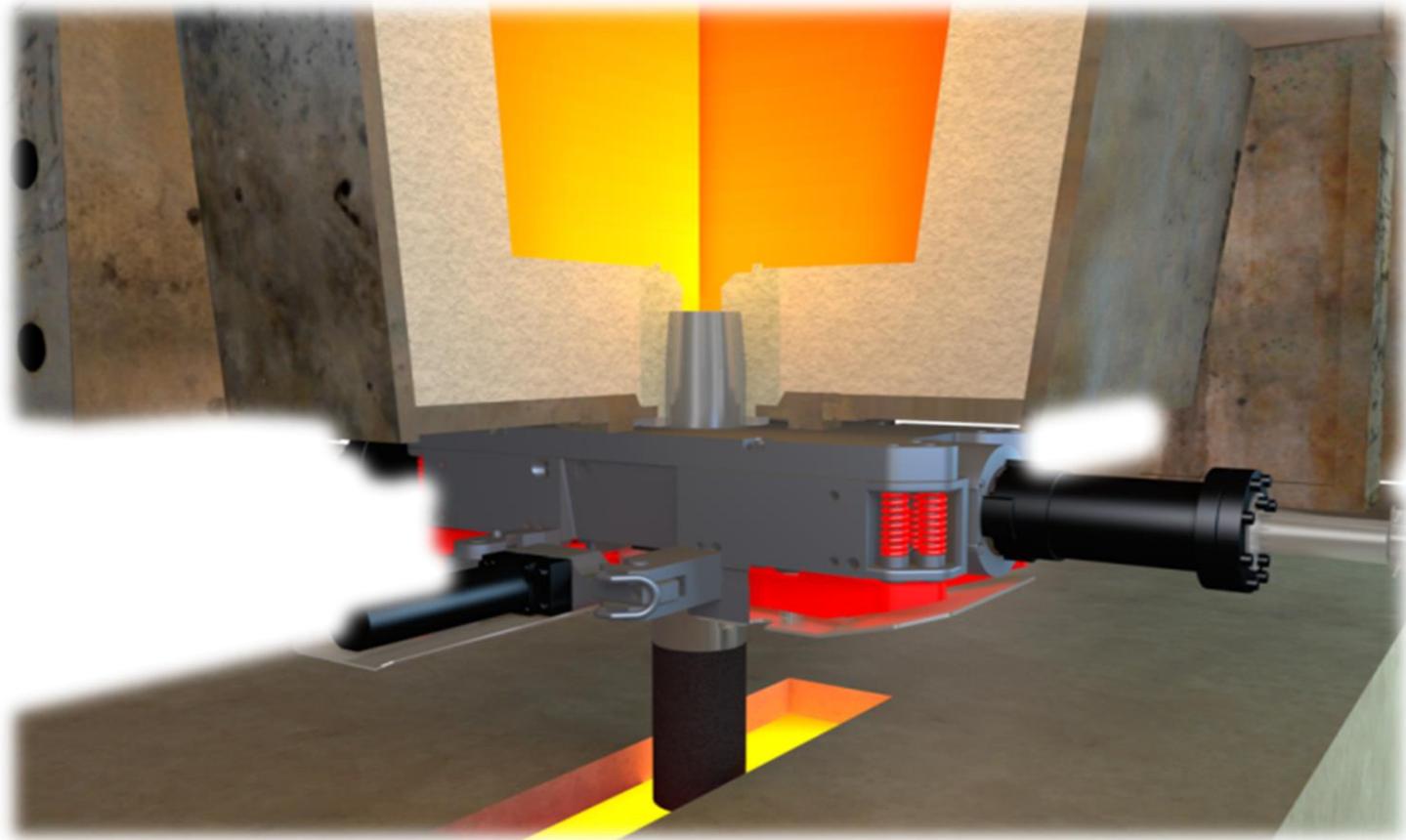


- ✓ Nozzles are located along its bottom to distribute liquid steel to the molds

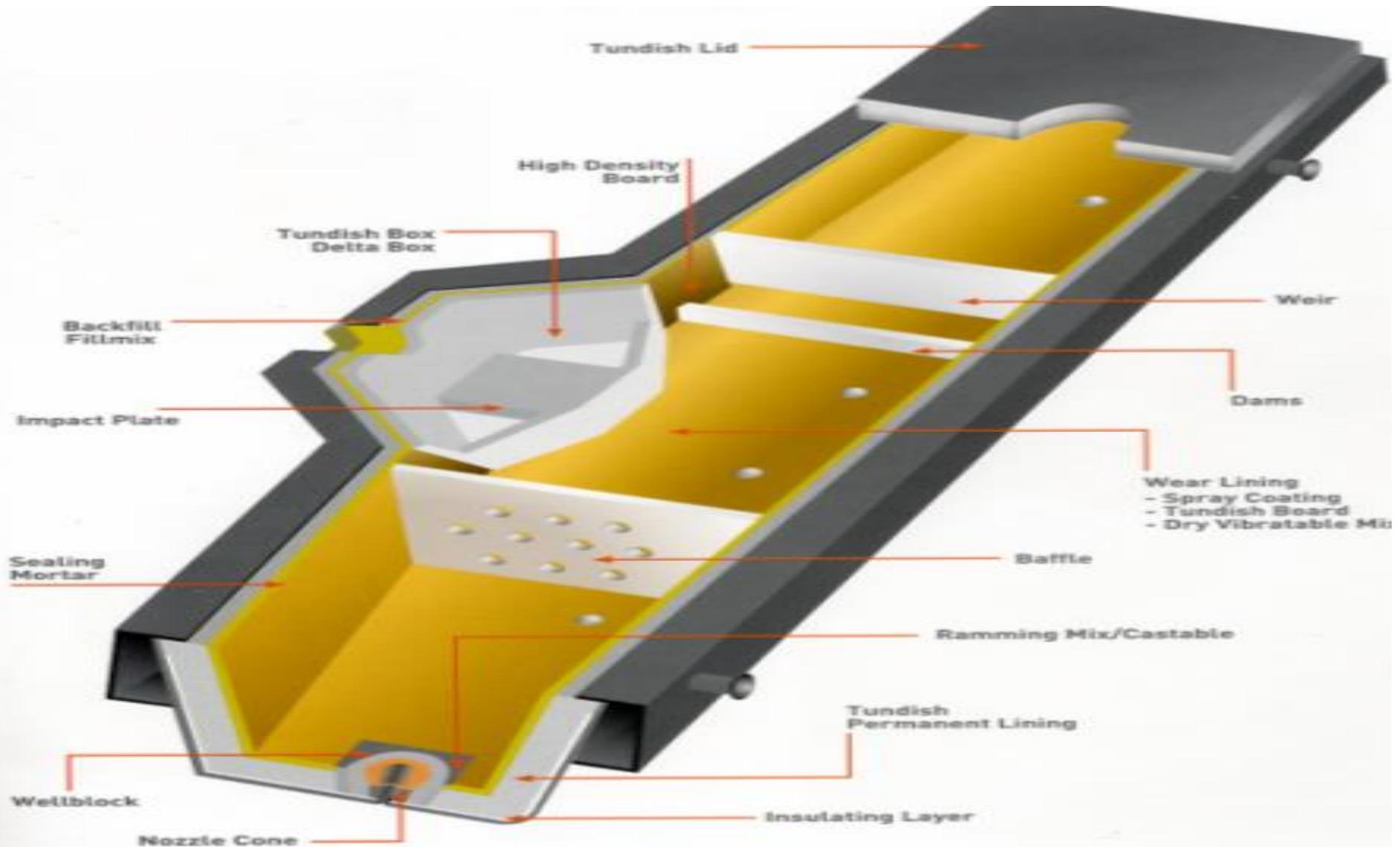
✓ **The tundish can be designed according to the following conditions:**

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

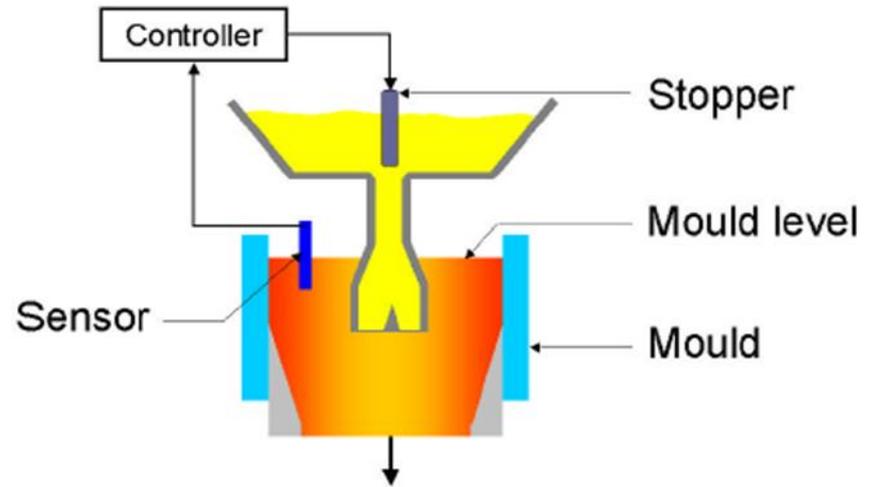
A tundish may have a **refractory-lined lid**, and has bottom ports that are assembled with **slide gates** or **stopper rods** through which the melt is teemed into the mold



# TUNDISH OVERVIEW

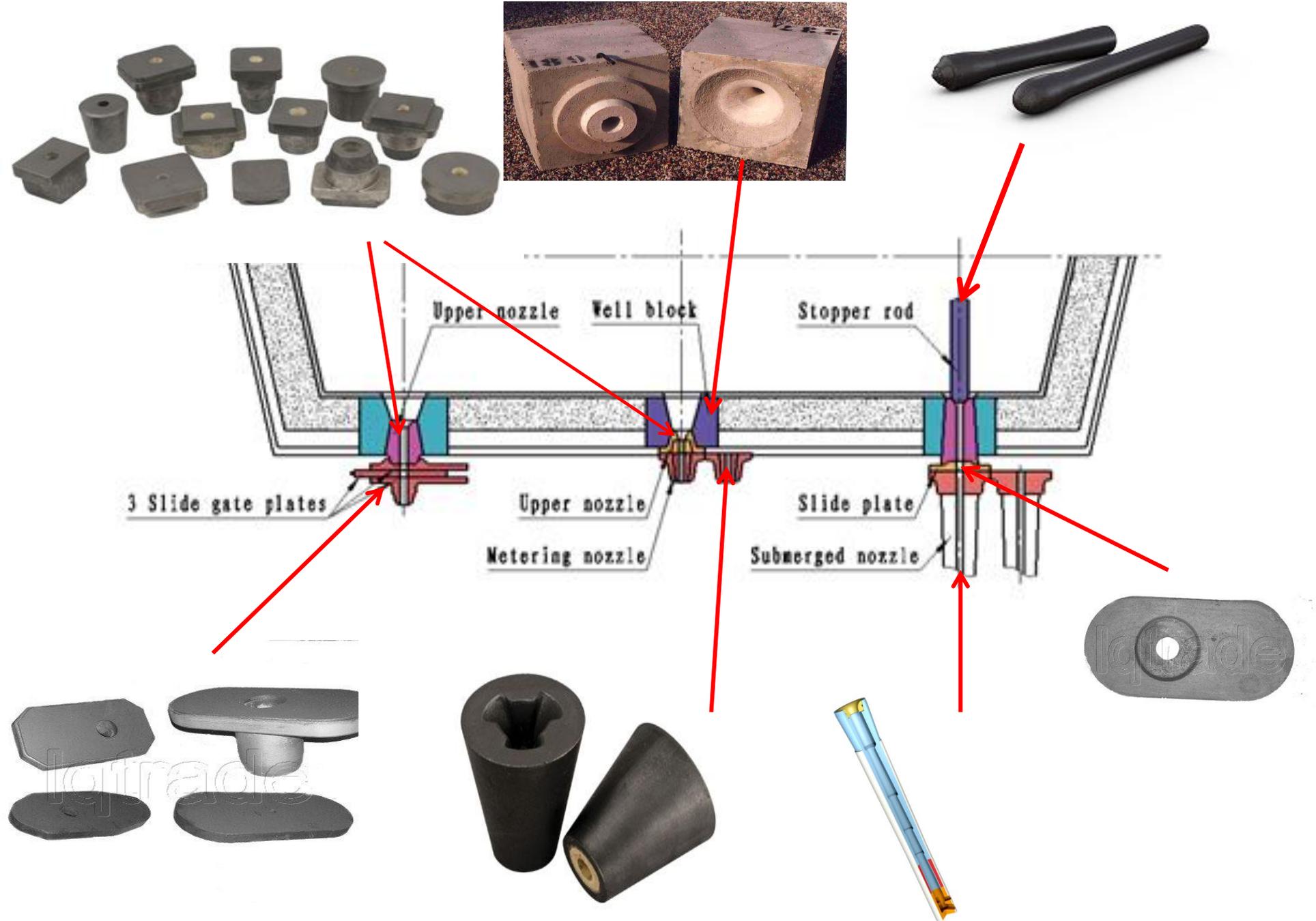


- ✓ **Stoppers:** This is used to control the molten steel flow from the tundish to the mold



The overview of  
tundish before all  
processes are  
begun



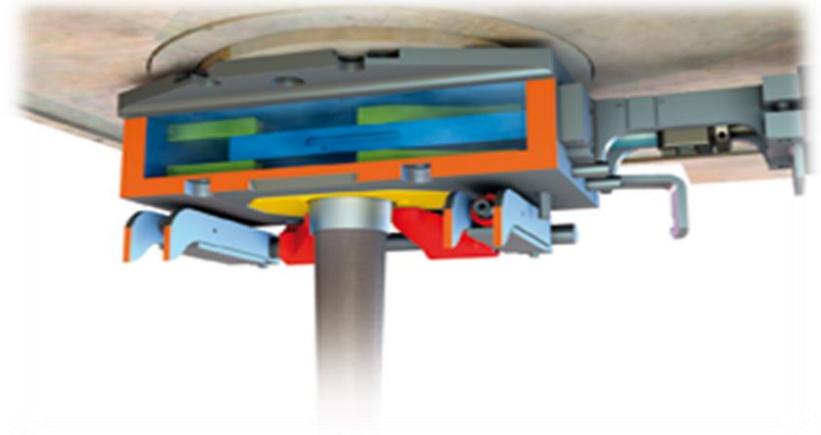
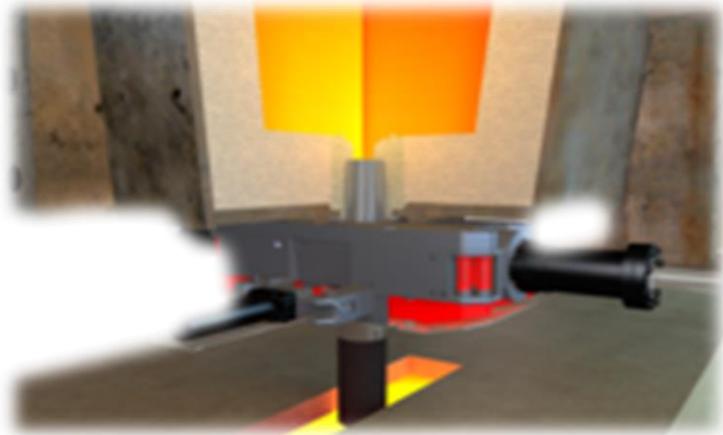








- ✓ **Slide Gates:** Tundish gates are provided with 3 plates in order to avoid the movement of the subentry shroud in the mould during the flow control by throttling.



























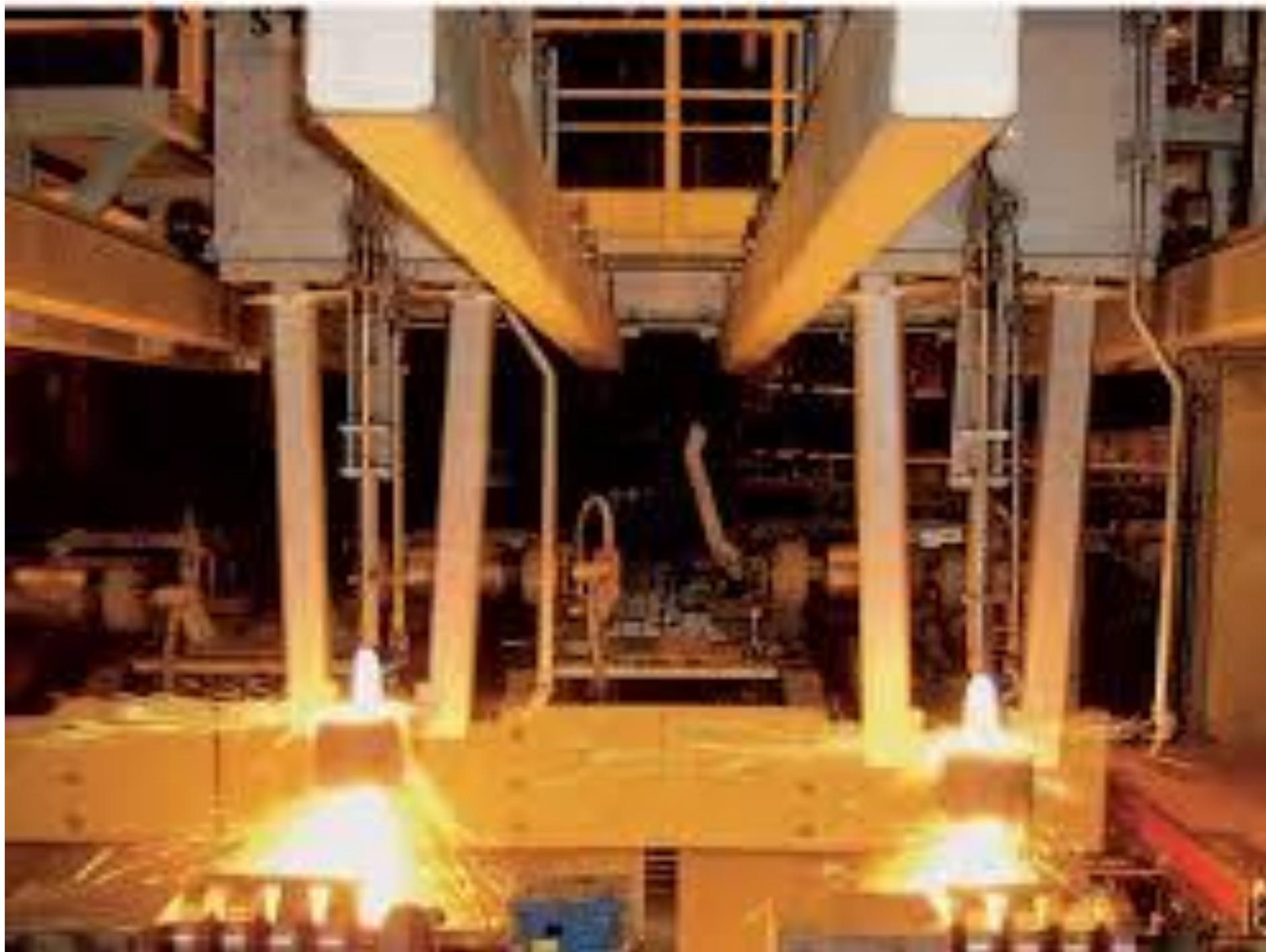






































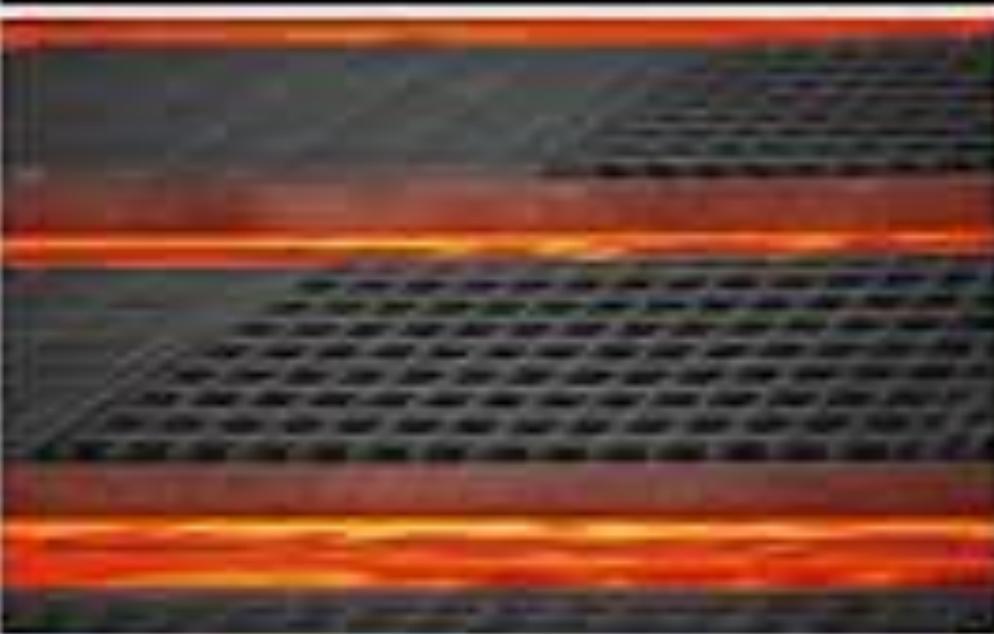
























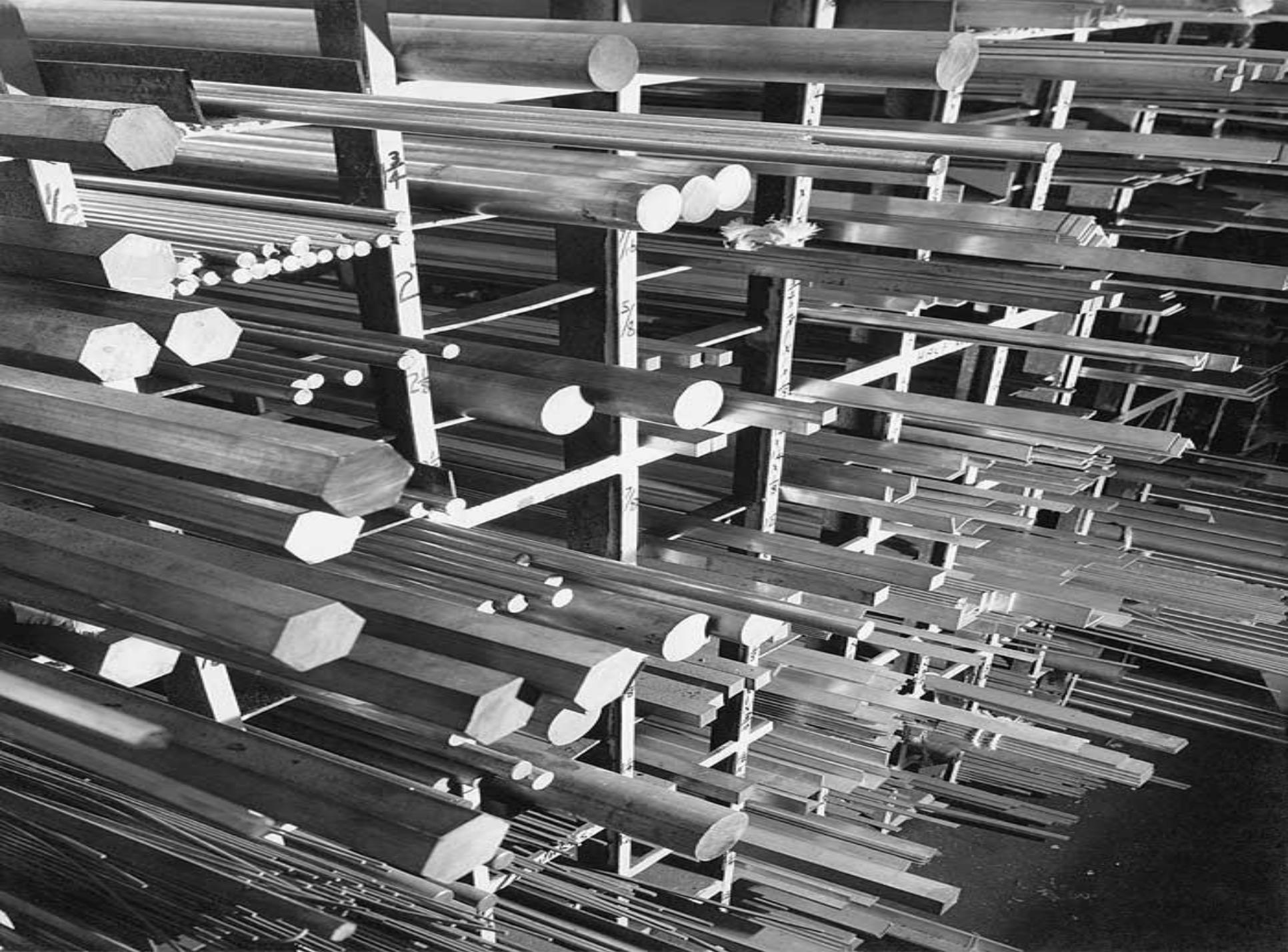


L250

8620

L250

8620



# ***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.

A dramatic industrial scene featuring a large, intense shower of bright orange and yellow sparks falling from a central point. The sparks are dense and create a wide, fan-like shape. The background is dark and metallic, with some structural elements visible. The overall atmosphere is one of high energy and industrial activity.

**THANK YOU  
FOR YOUR  
ATTENTION**