

Controlled Charging of Hot Metal (HM) from HM Ladle to Converter and controlled dumping of Steel into Emergency Container for avoiding Splashing / Spillage.

1. **Introduction:** In Visakhapatnam Steel Plant, Steel is produced in 150 Tons LD Converters by pouring Hot Metal, Scrap, lime and blowing with Oxygen. The carbon content in the Hot Metal is reduced by reacting with Oxygen and steel is made. The Hot Metal in the ladle is poured into the Converter using Cranes by aligning Hot Metal ladle with the sprout of the LD converter. The alignment is done by the crane operator and LD Converter Operator in sync. Sometimes due to misalignment, the Hot Metal spills on to the platform and spoils the platform. This leads to loss of hot metal and damage of the shop floor which results in production stoppage. In each Converter around 24 times hot metal is poured per day and blown to Steel and there are 6 converters in two shops of SMS at RINL.

2.0 Controlled Charging of Hot Metal (HM) from HM Ladle to Converter

2.1 Present Scenario:

The Liquid Hot Metal at 1500 Deg. C, received from Blast Furnace or from Mixer in 150 Ton ladle is poured into converter with the help of EOT Carnes. The operator of the LD Converter tilt the converter towards Hot Metal Ladle with sprout facing the ladle. Accordingly, the crane operator sitting in the control room of EOT Crane brings the hot metal ladle nearer to the sprout of the LD Converter and aligns it to pour into the LD Converter. With the expertise of the both the operators, most of the times without much hiccups the Hot Metal is poured in to the LD converter. However, at times due misalignment metal may spill on the floor which will damage the floor and result in production stoppage and damage to the property. Some times this problem may also happen due to snapping of the steel Ropes which are carrying the Hot Metal Ladle.

2.2 Required Solution:

An IIOT based sensor with AI to align the HM Ladle and the LD Converter so that the spillage of HM on to the shop floor can be avoided. Tilting interlock to be provided in the EOT Crane unless and until the alignment between LD converters sprout and HM Ladle is proper the metal pouring shall not be allowed. There shall also be one e IIOT sensor based alarm to be provided to the crane operator when the steel rope carrying the HM ladle is weak.

3.0 Controlled dumping of Steel in Emergency Container in Continuous Casting Area:

3.1 Introduction: The Steel Produced in the LD Converter is brought to the Continuous Casting Machines with the help of 150 Ton steel Ladles and placed on the Turret Stand. The Ladle Slide Gate is opened at the bottom and the liquid steel flows into the tundish arranged at the bottom of the ladle. From the Tundish the steel flows into bottomless molds and cooled to get solid blooms of size 320mmX250mm or 250mmX250mm and length 6meter. The sizes vary depending on the mills where these intermediate products

rolled to finished products. At times, due to some interruptions in the continuous casting process the casting cannot proceed further and the ladle slide gate needs to be closed to stop further flow of steel into Tundish. The liquid steel remaining in the Ladle may be dumped into an emergency container with the help of EOT Crane or recycled by pouring into the LD Converter. This is all depends on the availability of LD converter for blowing.

3.2 Current Scenario: The excess liquid in the Steel Ladle is poured into Emergency Container kept in the DF/GH bay area with the help of EOT Crane. To avoid the spillage/splashing of Steel, it is to be carefully positioned the ladle over and nearer to the emergency container. At times, due to some mistakes, the steel may spill/splash on to the ground.

3.3 Required Solution: To avoid the spillage/splashing an IIOT/AI based solution may be thought of to align the Steel Ladle with Emergency Container. An interlock may be provided in the Crane PLC to avoid the same.

STEEL MELT SHOP

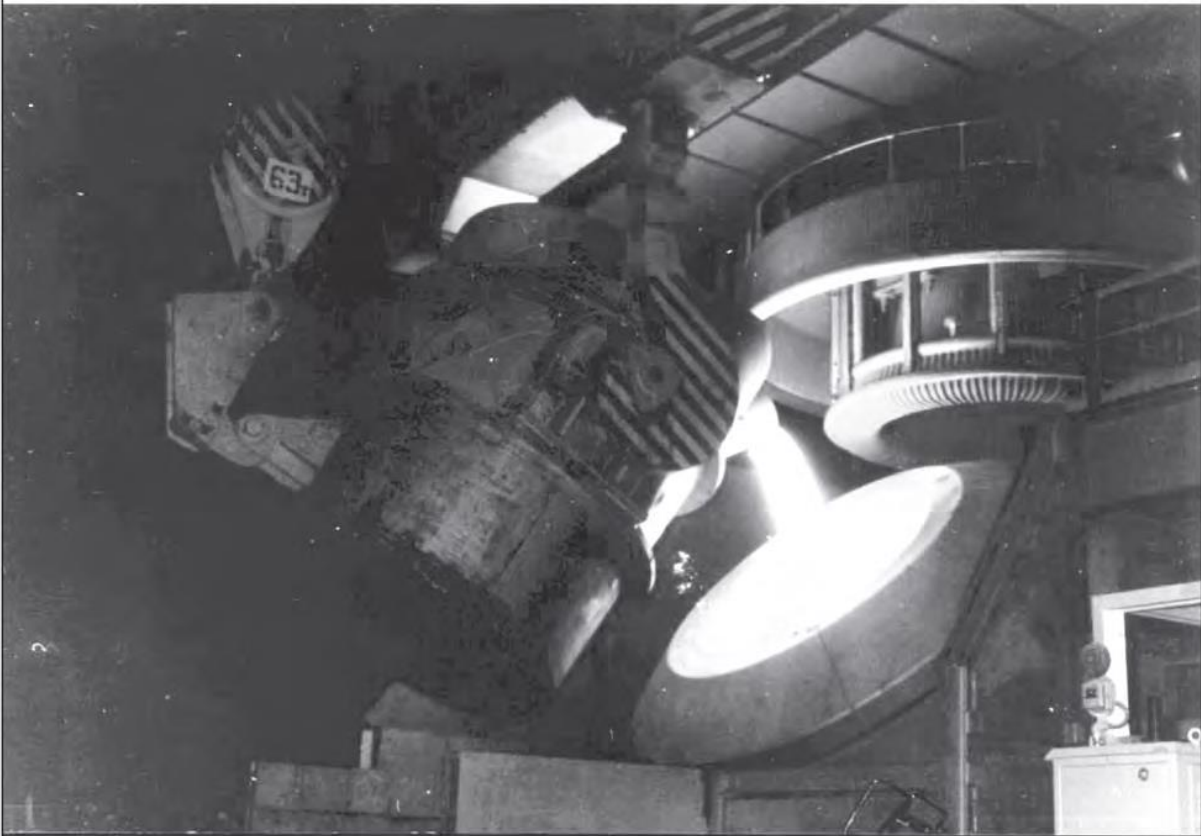


Fig:1 Hot Metal being poured into LD Converter from HM Ladle with the help of Crane.

