



# Studies on various methods of tundish steelmaking and its application for casting process

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**Abstract:** The paper deals with study of tundish steelmaking and its application for casting process. Tundish is a buffer vessels set between the steelmaking ladles of the casting molds in a Continuous casting process. It can be used to supply and distribute molten steel to the different strands and their molds. In addition to its main function to distribute and maintain uniform flow of liquid steel during continuous casting. A tundish can perform the task of a metallurgical reactor to improve the cleanliness of the liquid steel. This paper is mainly focus on methods of Tundish steel making and its application for casting process.

**Keywords:** Tundish, steelmaking, and casting process.etc.

**Introduction:** In the continuous casting tundish is an intermediate vessel between the mold and ladle, the word vessel is not completely significant for tundish, because it cannot store the liquid steel but it also provides metallurgical operations such as inclusion flotation, inclusion separation, thermal and chemical homogenization.<sup>(1)</sup> This paper is a mainly focus on casting process and its methods the intermediate reactors viz. tundish is the last opportunity for liquid steel to free from inclusion which affects the quality of steel.<sup>(2)</sup> The trapping of inclusion particle at the top surface seems to be a magical one, but at the top surface inclusion trap are maximum as compare to any other surface, because of the upward drifting force on practice.<sup>(2)</sup> Many times its happens that the inclusion removal rate at the outlet is very less as compare to expected value. So different aspect of third flow pattern are considered for floatation of the inclusion particles on top surface. For to check the efficiency certain experimental research in tundish was carried out by various affordable computers which made it possible to use of computational fluid dynamics (CFD) in metallurgical processes as in tundish.<sup>(3)</sup> The

CFD model is used for simulation of various boundary condition for same geometry and different velocity, density and diameter. <sup>(4)</sup>

## Methods:-

**1) Modeling:** Physical modeling generally used as a low temperature aqueous solutions, generally water to represent molten metal in the tundish. <sup>(4)</sup> There are several benefits using large scale model over small scale. There is a need of kinetic and dynamic similarity between prototype tundish and model tundish. <sup>(4)</sup> The tundish fluxes are particularly useful during the transfer of steel from the tundish to the caster mold in a continuous casting process, however the composition can be used in any steel making process requiring in tundish.

**2) Tundish metallurgy:** As we know that the tundish is a distributing vessel can transfer liquid steel from ladle to the appropriate number of strand during continuous casting. It also preserves the melt during ladle changes so that casting can be continued without being interrupted. Besides there conventional function, tundish can be used to promote cleanliness of the melt by floatation of inclusions. <sup>(5)</sup> The ladle side gate system is employed to control the flow of liquid steel from the ladle to the tundish. The level of liquid steel in the tundish is watched and automatically controlled by continuous adjustment to the ladle-side gate system. A modern tundish is designed to provide maximum opportunity for carrying out various metallurgical operations such as inclusion separation, floatation, alloying inclusion, modification by calcium treatment, superheat control, thermal and homogenization, leading to the development of a separate area of secondary refining of steel referred to as tundish metallurgy.

**3) Importance of tundish in continuous casting:** The role of tundish in the continuous casting process evolved from that of a buffer between the ladle and mold to being a grade separator and also a device for removing unwanted inclusions through the metallurgical processes and chemical reactions. Tundish is intended to deliver the molten metal to the moulds evenly and designed through rate and temperature without causing contamination by inclusions. In the sequence of continuous casting moulds, tundish directly control the molten steel in the last stage of liquid steel processing and refractions used are therefore, it require to have high stability and special properties. Tundish is one of the most important areas of refractory applications and so it also one of the biggest cost control center in the continuous casting process.

**4) Tundish technology for clean steel production:** Continuous casting of steel has become a widely used process and an important step in steel production. The cast steel has increased significantly in last twenty five years. As a result, steel cleanliness and strict composition control are now the primary concern of steelmakers. In modern steelmaking and casting plants steel is produced either in a basic oxygen furnace (BOF) or in an electric arc furnace (EAF). In (BOF) hot metal and scrap are blown by oxygen gas with flux addition such as lime, to remove carbon, phosphorous, sulfur and silicon. A modern EAF produces steel by remelting and refining steel scrap and other raw materials. <sup>(6)</sup>

**Conclusion:** The following conclusions are made on continuous casting process and production of clean steel casting.

- 1) Tundish is a refractory -lined channel consisting of an inlet and outlet sections. Sometimes has flow control devices such as dams and wires or baffle with holes along its length.
- 2) Tundish may have a refractory-lined lid and has bottom parts that are assembled with slide gates or stopper rods through which the melt is teemed into mold.
- 3) Tundish link ladle with the mold of a continuous casting machine. It accepts steel melt from a ladle and delivers it to continuous casting molds with minimum contamination.

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