Contribution ID: **151** Type: **Oral Presentation**

CFD and FEM study on redesigning the mould geometry of the thin slab caster of Tata Steel in IJmuiden for enhanced casting performance

Wednesday 8 October 2025 14:00 (20 minutes)

Thin slab casters around the world are increasingly turning to thicker moulds to achieve three main objectives: boosting throughput for higher production, eliminating the need for a funnel to accommodate the submerged entry nozzle (SEN) and thereby reducing the risk of longitudinal face cracks (LFC), and enhancing meniscus stability to reduce sliver defects.
In the current landscape, where most steelmakers are heavily investing in energy transition infrastructure, major revamps of operational equipment are limited. Therefore, this study conducted a feasibility assessment to explore potential changes to the caster that would require minimal modification while increasing the mould thickness, including the Liquid Core Reduction (LCR). Throughout the study, the EMBR, SEN, and funnel shape remained unchanged, although changing the mould geometry may enable or even require further changes.
The analysis utilized computational fluid dynamics (CFD) calculations to assess the impact of potential changes on the flow at the meniscus. Additionally, finite element method (FEM) calculations were employed to evaluate the ability of liquid core reduction to maintain consistent slab thickness without causing cracks.
The study concluded that an increase in mould thickness from 90 mm to 110 mm is feasible without requiring a major revamp of the caster. However, this adjustment alone would not completely eliminate the need for the funnel. CFD calculations indicated that while flow velocities at the meniscus would decrease, meniscus fluctuations would increase. FEM calculations revealed that the reduction would elevate the risk of cracking, but this risk could potentially be reduced through adjustments to the secondary cooling.
The findings suggest that an increase in mould thickness can be achieved without a major revamp, but it may not fully address all challenges. These results offer valuable insights and development efforts aimed at enhancing the stability and performance of the thin slab caster at Tata Steel in IJmuiden.

Primary author: Dr SENGE, Stefan

Co-authors: Dr LUCHINI, Bruno; AGEMA, Jelle

Presenter: Dr SENGE, Stefan

Session Classification: Caster Design & Process Optimization

Track Classification: Steelmaking - Continuous casting, near-net shape casting and ingot casting