Contribution ID: **141**   Type: **Oral Presentation**

A comparative CFD study on tundish flow with particle tracking

Wednesday 8 October 2025 16:50 (20 minutes)

Continuous casting machine (CCO) is fundamental to produce steel at reasonable costs. The tundish represents the main source of steel for this kind of facility, acting as a buffer between the ladle and the nozzles feeding casting profiles. This component significantly influences the quality and yield of continuous casting operations. Our study focuses on leveraging Computational Fluid Dynamics (CFD) to track particle behaviour within the tundish. By simulating the flow patterns, we aim to optimize tundish design in terms of steel cleanliness. We defined two main scenarios that have different impact on molten steel flow and inclusion transport, with the intention to minimize defects and enhance overall efficiency.

Our approach involves tracking individual particles—both in terms of trajectory and residence time—allowing us to understand their impact on product quality. A huge postprocessing has been done in python on order to perform analysis in a structured framework, making comparison of the two cases much easier.

Finally, the head reason is to reveal by simulations how inclusions move and could accumulate within the steel flow. This kind of knowledge prompt strategies to reduce inclusions in the final product.

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Session Classification: Digitalization, AI & Modeling

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