

Advanced Submerged Entry Nozzle Design for Beam Blank Casting in Industrial Mould

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Within a CSM – Danieli joint investigation focused on casting conditions and steel quality in an industrial beam blanks mould, different Submerged Entry Nozzles (SEN) geometries were tested with numerical modelling based on a suitable Design Of Experiments strategy. Indices were defined, based on literature and validated to evaluate the nozzle flow behaviour. They were related to suitable flow conditions at meniscus, to avoid slag entrapment occurrence, and at walls, to avoid hot-spotting harmful for the solid shell integrity and in turn for the as-cast surface quality.

From the modelling work, general indications were given on flow features related to possible defect occurrence. Then, guidelines were achieved to improve reference conditions. These guidelines for adequate SEN geometry involve number of holes angle, holes size and shape, and number of holes as well.

Solutions were found satisfying the indices, and expected to fulfill the quality requests.

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