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IDENTIFICATION OF DEFECTS ORIGINATED DURING THE FILLING OF CAST PIECES THROUGH PARTICLES MODELLING

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Abstract. In casting processes, strong recirculation zones may trap air, gases and strip particles of sand off the mold affecting seriously the quality of the cast pieces. Especially during the filling of molten pieces with large surfaces, several faults were detected which are responsible of considerable economic losses in such casting processes. The aim of this work is focused on the correct identification of these physical phenomena, through Computational Fluid Dynamics (CFD). A fully experimental work correlating a saline solution with similar properties than the liquid alloy was carried out in order to guess the flow behavior inside the mold. Different parameters such as filling time, temperature and velocity of the liquid alloy together with the geometrical design of the mold were taken into account. The simulated evolution profiles and propagation speeds were compared with the laboratory experiments showing good agreement, validating thus the numerical model. Through an advanced particles modeling feature from a commercial package, the potential to predict and later correct some casting defects was demonstrated. As a conclusion, the mold together with supply channels need to be carefully optimized in order to control the correct direction of solidification avoiding the appearance of oxides but also to prevent stripping the sand off the walls.

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