

EFFECT OF CASTING PARAMETERS ON MICROSTRUCTURE, RECRYSTALLIZATION BEHAVIOUR AND FINAL MATERIAL PROPERTIES OF TWIN-ROLL CAST 1050 ALLOY

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ABSTRACT

Aluminium alloys produced by twin-roll casting exhibit inherently existing features due to distinctive solidification behaviour encountered during casting. Contrary to fine intermetallic particles observed at the outermost surface, centerline segregations enriched in solute elements reside at the mid-plane of cross-section. These morphological and compositional discrepancies are affected by casting parameters and resultant heat extraction due to separating force exerted by solidifying metal. In that respect, materials produced with different set of casting parameters were exposed to different thermo-mechanical processes to elucidate recrystallization and grain-growth behaviour inherited by initial as-cast microstructure. Microstructures were investigated by employing metallographic techniques throughout downstream processes. Complementary studies were performed by electrical conductivity measurements, tensile tests, micro-hardness tests and corrosion tests. Results show that microstructural properties of as-cast sheet can be tailored with defined combination of casting parameters. This also results in different material properties to evolve as they are exposed further annealing and rolling operations.

Keywords: Twin-roll casting, separating force, centerline segregation, recrystallization.