Taguchi Design of Manufacturing Condition for Semi-Solid Al-Si Alloy fabricated by Cooling Slope Plate method

In this paper, we used Taguchi design to find an optimum condition for semi-solid Al-Si aluminum alloy fabricated by cooling slope plate method. In CS method, molten alloy was poured over an inclined cooling plate in order to make the semisolid slurry. The semisolid slurry flowed and solidified into a mold placed at the bottom end of the slope. In Taguchi's design, it is well-known that high value of S/N ratio (Signal vs. Noise) is better. Consequently, manufacturing conditions were arranged as table of orthogonal array L9(34), and then pouring temperature and tilt angle of cooling plate factors were determined. From microstructural observations, grain size and shape factor were measured by image analyzer. The results of S/N ratios showed that the pouring temperature has the main effect on grain size and morphology of silicon phase of an Al-23%Si alloy cast by cooling slope plate method, since S/N ratio which is sensibility on surround environment was the highest. The optimum conditions were also identified.