Development of a Continuous Composite Casting Process for the Production of Bilayer Aluminium Strips

Abstract:
A thermal process window to form a stable metallurgical compound of AlSn6Cu and Al99.5 was obtained by initial experiments. A special mould system for a horizontal continuous composite casting process was developed, supported by finite element simulations. Preliminary 2D models were used to identify the main process variables influencing the temperature in the region where the compound is formed between the two layers. The thickness ratio of the layers and the initial temperature of the AlSn6Cu substrate strip were found to be the most important parameters. The special bilayer mould system was manufactured and implemented into an existing continuous casting device upgraded by a second furnace to hold the additional pure aluminium. A stable casting process was achieved. The quality of the manufactured compound was assessed by metallographic specimens cut from the obtained bilayers. Based on temperature measurements, a full 3D finite element model was developed to gain a more realistic description of the temperature and fluid flow conditions in the composite casting, especially in the margin regions.

Stichworte:
Aluminium alloys; Composite casting; Compound casting; Continuous casting; Clad strip