

Study on Metal-Die Interface Heat Transfer in Squeeze Casting Process

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Abstract: The heat transfer at the metal-die interface is believed to have great impact on the solidification process and microstructure of squeeze casting. The present paper focuses on the effect of pressure at the metal-die interface and process parameters on the metal-die interfacial heat transfer coefficient (IHTC) in squeeze casting process. Experiments were carried out and a “plate shape” casting was used to cast aluminum alloy A356 against a H13 steel die. In order to overcome the uncertainty in the installation of the thermocouples, a special temperature sensor unit was developed. Through the temperature sensor unit, the temperature at the appropriate distance (1 mm, 3 mm and 6 mm) from the interface of the metal-die can be obtained. Based on the temperature measurements inside the die, the IHTC was calculated by using an inverse approach. The pressure at the metal-die interface was measured using Kistler pressure transducers 6175A2 with operating temperature 850°C and pressures up to 200 MPa. The results show that the pressure at the metal-die interface has a great influence on the IHTC. At the moment when the pressure was applied, the IHTC was increased significantly. The peak value of the IHTC increased as the peak value of the pressure increased. However, the IHTC and the pressure at the metal-die interface are not synchronized. The appearance of the peak value of the IHTC was later than the appearance of the peak value of the pressure at the metal-die interface.

Keywords: squeeze casting, metal-die interface heat transfer.

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More details about the speaker can be found:

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