電腦輔助分析A356鋁合金鑄件冒口之補充性研究

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摘 要

冒口補充探討多是研究鑄鋼或鑄鐵，工業界常用的A356鋁合金 並沒有較明確的冒口法則可以依循，本研究之主要目的乃利用電腦 模擬軟體AFSolid system探討和修正Caine冒口補充A356鋁合金階 梯狀鑄件與板狀鑄件法則及量測冒口補充距離。首先利用 FLOWCast流動模擬分析之速度場探討不同澆口比對鑄件澆流道的 影響，其次利用SOLIDCast凝固模擬分析探討A356鋁合金之Caine 冒口補充法則和量測冒口之補充距離，以建立A356鋁合金鑄件的冒 口補充經驗模式。此外，利用軟體內建立之缺陷指標如熱點、溫度 梯度、冷卻速率和凝固時間等預測鑄件之縮孔位置，最後以CO2砂 模法實際澆鑄鑄件以驗證電腦模擬之正確。 研究結果顯示，澆口比為1：4：4之澆流道可具有較平穩的鋁 液流動，可有效降低紊流。而由缺陷預測指標可知，若冒口之補充 可滿足鑄件，熱點則會發生於冒口內。較大的溫度梯度和冷卻速率 可促進鑄件獲得良好補充，避免縮孔之產生。而當冒口的凝固時間 大於鑄件時，可獲得補充健全之鋁合金鑄件。此外，因Caine冒口 補充法則之方程式曲線標繪的健全範圍與電腦模擬結果相差甚 大。而利用X光非破壞檢驗實際澆鑄之鑄件，發現鑄件之縮孔位置 與電腦模擬結果大致吻合，故以電腦輔助模擬分析確實可用以評估 鑄件之健全性。

關鍵詞 : A356鋁合金、電腦模擬、Caine冒口補充法則、冒口補充 距離、健全性

目錄

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