

真空輔助壓鑄AG40A鋅合金技術之探討

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摘要

鋅合金壓鑄因內部孔洞導致壓鑄件的機械性能無法再提升，而限制其應用。為開拓鋅合金應用範圍並提高其機械性能，需不斷地提升及開發鋅合金壓鑄之技術。本研究利用真空輔助系統置於熱室壓鑄鋅合金之製程中，配合模具的改良，對不同鑄造壓力、模具溫度和澆注溫度等三種製程參數交互組合壓鑄條件，在一般大氣及抽真空輔助條件下，進行AG40A鋅合金衛浴把手之壓鑄實驗分析，進而尋求真空輔助壓鑄AG40A鋅合金之最佳製程參數條件。研究結果顯示，施以各種壓鑄實驗後，發現真空輔助AG40A鋅合金壓鑄件較未真空輔助壓鑄件具有更少的孔洞率、更佳的抗壓強度度和更高的抗洩漏試驗壓力值。此外，在其他條件相同下，對於可造成AG40A鋅合金壓鑄件孔洞率為最少及抗壓強度為最高的模具溫度之比較，發現施以真空輔助時的模具溫度為150，較未施以真空輔助時的100 模具溫度高。而且在其他條件相同下，對於造成AG40A鋅合金壓鑄件孔洞率為最少的澆注溫度之比較，亦發現施以真空輔助的澆注溫度為420，較未施以真空輔助的400 澆注溫度高。然而，無論論有無施以真空輔助壓鑄，鑄造壓力對於AG40A鋅合金壓鑄件之孔洞率及抗壓強度的影響趨勢並未有改變。對於抗洩漏試驗，有施以真空輔助及未施以真空輔助的鋅合金把手壓鑄件皆發現未有洩漏情形，係因AG40A鋅合金的晶粒近似於圓晶而造成晶界未有應力集中所致。利用OM觀察AG40A鋅合金把手壓鑄件之手柄破斷面處附近的區域，發現施以真空輔助可使鑄件的孔洞率減少且尺寸變小，鑄件的晶粒亦會變小，而促使其抗壓強度增加，同時也發現使用真空輔助壓鑄在150 模具溫度時可使AG40A鋅合金壓鑄件的晶粒變得更小。而對於SEM觀察把手壓鑄件的手柄破斷面處，發現施以真空輔助的確可使AG40A鋅合金晶粒微細化，進而造成其抗壓強度增加，同時也發現施以真空輔助壓鑄在420 澆注溫度時可使AG40A鋅合金把手鑄件的孔洞變得更少且小。

關鍵詞：AG40A鋅合金，真空輔助壓鑄，孔洞率洞率，抗壓強度度，抗洩漏試驗

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