熱處理製程對鉻鉬合金鋼TIG銲件的高溫機械性質之研究

簡奕丞、李義剛

E-mail: 360560@mail.dyu.edu.tw

摘 要

SAE 4130製作大型精密有縫高壓容器時，須經由兩種製程，分別為直縫銲接製程(AWST ; Annealing + Welding + Solution + Tem -pering)與圓周銲接製程(ASTWR ; Annealing + Solution + Tem -pering + Welding + Stress Relief)。然而，此高壓容器大多使用於高溫環境，服役時易受高溫及高壓影響。因此，本研究為模擬SAE 4130兩種銲接製程於高溫環境的顯微組織與機械性質影響，期望藉由所得到之結果做為結構設計的參考。 研究結果顯示：常溫衝擊時，衝擊韌性依序為：ASTWR >AWST >AST，其與試片預置缺口處的顯微組織有關；高溫衝擊時，易受Si 與 MnS 析出相，以及其析出尺寸大小影響。當析出相越多且越大時，會造成機械性質下降。室溫至600℃範圍，抗拉強度皆為： AST >AWST > ASTWR，此與試驗前銲接製程有關。然而，高溫拉伸性質易受Fe2O3：Fe3O4比例影響，比例高時會有較佳的機械性質；反之，機械性質下降。有關Si析出相的影響發現：高溫衝擊時，衝擊值會隨Si之析出相尺寸變小而下降；高溫抗拉強度，則因Si析出相尺寸變大而上升。比較AWST與ASTWR兩銲接製程於實驗溫度範圍內，ASTWR的衝擊值均為最高，顯示可承受較大的瞬間應力作用；拉伸試驗結果顯示，AWST銲後調質處理製程可承受較高的穩定應力作用。

關鍵詞 : 高溫機械性質、調質處理、應力消除

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