

슈퍼 듀플렉스 다층용접부의 미세조직 및 공식(Pitting Corrosion)에 미치는 용접열사이클의 영향

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Effect of Welding Thermal Cycle on Microstructure and Pitting Corrosion Property of Multi-pass Weldment of Super-duplex Stainless Steel

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Abstracts

Due to their high corrosion resistance and improved mechanical properties super-duplex stainless steel (SDSS) are extensively used in petrochemical plants such as facilities in modern oil platform and off-shore process equipment. It is well known that the best mechanical and corrosion resistance properties of super-duplex stainless steel are obtained with a microstructure having approximately equal amounts of austenite and ferrite. And it is also known that sigma(σ), chi(χ), secondary austenite(γ_2), chromium carbides and nitride affected adversely their properties. Therefore these phases must be avoided.

However, effects of succeeding weld thermal cycle on the change of microstructure of weldment at multi-pass weld were not seldom experimentally researched. Therefore in the present work, the change of weldmetal microstructure and the effect of microstructure on pitting corrosion property at 40°C by succeeding each weld thermal cycle were researched. The thermal history of root side was measured experimentally and the change of microstructure of root weld according to thermal cycle of each weld layer was evaluated. And the relationship between microstructure of root weld and pitting corrosion property at 40°C was also investigated.

Results of the present work are show as below.

1. The ferrite contents of root weld are gradually reduced by succeeding weld thermal cycle.
2. The 2nd phases such as sigma(σ), chi(χ), secondary austenite(γ_2), chromium carbides and nitride are increased gradually by succeeding weld thermal cycle.
3. The pitting corrosion was detected in root weld part and weight loss by pitting corrosion is increased in proportional to the time exposed over 600°C of the root weld.
4. The succeeding weld thermal cycles affect the microstructure of the former weldments and promote the formation of 2nd phases. That is, the more succeeding welds are added, the more 2nd phases are gradually increased. Consequently, it is thought that this adversely affects pitting corrosion property.

Key Words : Super-duplex stainless steel, Pitting corrosion, Welding thermal cycle