

Studies on Microstructure and Mechanical Properties of Simulated Heat Affected Zone in a Micro Alloyed Steel

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Abstract : Proper selection of welding parameters for getting excellent weld is a challenge. HAZ simulation helps in identifying suitable welding parameters like heating rate, cooling rate, peak temperature, and energy input. In this study, the influence of weld thermal cycle of heat affected zone (HAZ) is simulated for Submerged Arc Welding (SAW) using Gleeble ® 3800 thermomechanical simulator. A (Micro-alloyed) MA steel plate of thickness 18 mm having yield strength 450MPa is used for making test specimens. Determination of the mechanical properties of weld simulated specimens including Charpy V-notch toughness and hardness is performed. Peak temperatures of 1300°C, 1150°C, 1000°C, 900°C, 800°C, heat energy input of 22KJ/cm and preheat temperatures of 30°C have been used with Rykalin-3D simulation model. It is found that the impact toughness (75J) is the best for the simulated HAZ specimen at the peak temperature 900ºC. For parent steel, impact toughness value is 26.8J at -50°C in transverse direction.

Keywords : HAZ simulation, mechanical properties, peak temperature, ship hull steel, weldability

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