Microstructure and mechanical properties in simulated repair welding HAZ of 2.25Cr-1Mo steel (P22)

Seong-hyeong Lee¹, Na Hye-sung¹, Choi Sung-bu², Nam Tae-heum², Kang Chung-yun¹

¹Dept. of materials Science and Engineering, Pusan National University
²Korea Institute of Nuclear Safety

Abstract

A 2.25Cr-1.0Mo steel (P22) has been used for piping, and header in high temperature and pressure conditions of nuclear power plants.

The repair welding is permitted two or three times by customary practice rule, but there is no regulation to limit the number of repair welding base on the study heat affected zone. It is generally known that the heat affected zone weakens during repair welding.

Therefore, P22 was evaluated microstructure characteristics of repair welding heat affected zone and correlation between the mechanical properties and microstructure of repair welding heat affected zone was discussed.

Simulated heat affected zone of repair welding were fabricated in order to evaluate mechanical properties of heat affected zone by welding in P22.

Peak temperature curves of the heat affected zone was calculated by Sysweld simulation software. And various simulated heat affected zone of repair welding was fabricated by using the Greeble test machine.

Analysis of the mechanical properties of the tensile strength, impact value, hardness, reduction of area was obtained with the temperature of simulated heat affected zone of repair welding. And microstructure, prior austenite grain boundary size, carbides was analyzed.

Therefore, it was confirmed that correlation between mechanical properties and microstructure of repair welding heat affected zone.

Key Words: 2.25Cr-1.0Mo Steel, P22, Mechanical properties, Sysweld, Greeble