POSTER EXPOSITION

Poster 9

Avoidance of hydrogen assisted cold cracking in multi-pass weld metal

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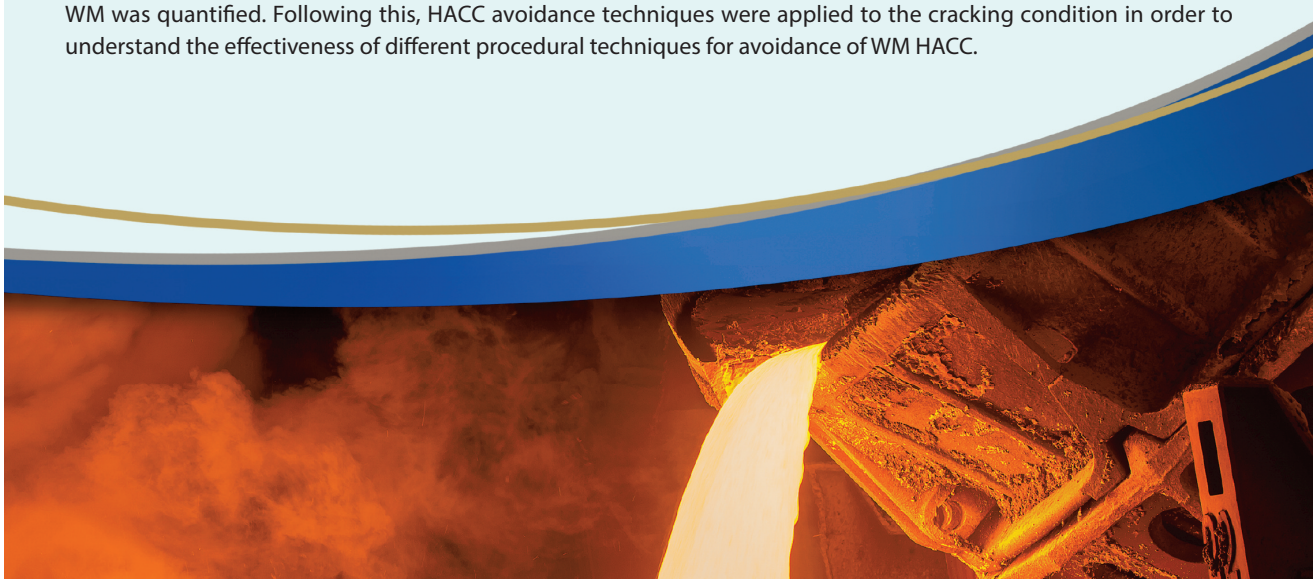
ABSTRACT:
Many challenges still remain regarding the mechanism of hydrogen assisted cold cracking (HACC). Historically, heat affected zone (HAZ) HACC has been the predominant failure mode, its causes and mitigation have been studied extensively and are generally well understood. However, with the development of lean composition steels, along with the use of high strength, highly alloyed welding consumables, a shift from HAZ cracking to weld metal (WM) cracking may also commonly occur. So far, industrial techniques for avoidance of HACC are still focused on HAZ cracking and do not consider the difference between the mechanism resulting in HAZ or WM HACC. Thus, a need has arisen to define the cracking mechanism and techniques for the avoidance of WM HACC.

In this study a condition that results in both WM and HAZ HACC has been developed on U-groove S690QL grade steel samples, welded with a multi-pass technique and flux-cored welding wire. In-depth microstructural investigation was undertaken to characterise HACC morphology in both WM and HAZ, and the bulk diffusible hydrogen of the deposited WM was quantified. Following this, HACC avoidance techniques were applied to the cracking condition in order to understand the effectiveness of different procedural techniques for avoidance of WM HACC.



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