

Consolidated Program for Research and Development for Welding of High Strength Steel Pipelines, #277 & 278

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QUARTERLY REPORT

Project WP#277: Update of Weld Design, Testing, and Assessment Procedures for High Strength Pipelines

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Background

High strength pipelines are expected to become a major player in long distance onshore hydrocarbon transportation. Understanding the differences between the modern high strength and older-generation linepipes is critical to the safe and economical application of those modern materials. The objectives of this project are to fill the critical gaps and provide guidelines on the effective use of high strength linepipes, from design and testing to weld integrity assessment procedures. The interdependence of linepipe materials, welding processes, design requirements, and weld integrity will be investigated to enable realistic and effective use of high strength linepipes.

Progress in the Quarter

The activities in the fourth quarter of this project covered (1) coordinating with Project #278 to complete the first round of girth welds, (2) reviewing linepipe specifications, (3) developing weld metal tensile and toughness testing protocols, (4) developing weld strength mismatch requirements for stress- and strain-based designs, and (5) preparing for medium scale testing.

Joint web-conferences with Project 278 have been held once every two weeks. After extensive preparation work the first round of girth welding was completed in early June 2008. Literature review of linepipe property specifications is continuing. Specific focus areas for the linepipe specifications have been identified. Work is under way to address girth weld tensile strength test methods using a range of specimen geometries, including standard round bars, full-strip and split-strip tensile specimens. The development of fracture toughness testing protocol is continuing with both experimental testing and numerical simulation. A draft SE(T) testing protocol has been issued. SE(B) and SE(T) specimens have been machined and tested. A large matrix of analysis has been completed to develop weld strength mismatch requirements for stress-based design. The preparation for medium scale testing is largely complete. Trial specimens have been fabricated and shipped to NIST.