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

PUBLIC PAGE

QUARTERLY REPORT

Project WP#278: Development of Optimized Welding Solutions for X100 Line Pipe Steel

For Period Ending: February 29, 2008

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Background

To meet the increasing demand for energy in North America, oil and gas reserves in more remote and challenging regions are being developed where large volumes of natural gas will be transported by new long distance, high pressure transmission pipelines. Advanced pipeline designs utilizing high strength line pipe is a key element in meeting these increasing energy demands. A significant amount of laboratory research has been conducted on the development of X100 line pipe and associated welding technology; including, a few recent demonstration projects of limited size and scope. Accordingly, there are few welding process options proven for X100 and the knowledge resides within a small number of companies. The objectives of the proposed work are to establish the range of viable welding options for X100 line pipe, define essential variables to provide for welding process control that ensures reliable and consistent mechanical performance, validate the new essential variables methodology for relevant field welding conditions, and verify weldment performance through a combination of small and large scale tests. Full implementation will be achieved through changes to applicable codes and standards.

Progress in the Quarter

Project activities undertaken through the second quarter focused on (1) State of the Art Review; (2) Identification of Essential Variables; and (3) Fundamental Understanding of Welding Processes and Essential Variables.

The work to develop the gap analysis for the welding of high strength steel pipelines is continuing and the estimated completion date is May 31, 2008.

The full characterization of the welding processes and the resulting welds is needed to identify the essential variables in the welding of X100 linepipes. Certain physical measurements during and after the welding, such as welding parameters, temperature and thermal strain histories, and post-welding microstructures, will need to be taken.

Three X100 line pipe steels have been selected for HAZ simulation studies; including generation of continuous cooling transformation (CCT) diagrams for the grain coarsen (GC) HAZ. Further detailed evaluation of HAZ structure and properties is also underway. A review of relevant literature related to simulation of weld metal is currently underway. On-going discussions have focused on how to design a range of suitable welds that can be used to extract small-scale specimens for weld metal simulation studies.