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Butt Fusion Integrity & NDE Evaluation

3rd Quarterly Report

Hitesh Patadia
Principal
Tej Group, Inc.
For Gas Technology Institute

NYSEARCH/Northeast Gas Association
1515 Broadway, 43rd Flr.
New York, NY 10036
(212) 354 4790 x214
Angelo Fabiano – Primary Investigator
Technology Manager
afabiano@northeastgas.org

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This project started on July 15, 2007.

The primary objective of the program is to develop a tightly controlled butt heat fusion process through comprehensive testing and evaluation. This can be done by using novel test methods which will help to validate the safe and long term performance of PE joints under actual field conditions and serve as the basis for an effective reference point for the continued development of advanced Non-Destructive Evaluation (NDE) technologies. Specifically, this program aims to: (1) develop comprehensive analytical models to characterize the impact of various types of in-service stress states and fusion process variables, (2) develop comprehensive test data to characterize the long-term performance of joints made under parametrically controlled set of fusion variables, (3) develop a set of criterion to identify "suspect joints" that are visually acceptable but fail prior to their intended design life. These criteria can be used as the basis for process improvements, continued technology developments and to integrate new test methods and fusion parameters within applicable industry standards and specifications (ASTM, PPI, 49CFR Part 192).

Project Tasks and Status:

Task #1: Steering Committee Interactions (Ongoing)

NYSEARCH is leading a joint industry steering committee consisting of members from gas utility companies, regulatory agencies, pipe/fitting and equipment manufacturers. This is to ensure that the review of data/information is objective and to obtain support from the gas industry in the event that improvements or changes to Butt Fusion procedures are recommended as a result of the project.

On January 31, 2008 a Steering Committee meeting was held in order to develop a consensus position on the overall test matrix, review the current technical/analytical modeling results and recommendations related to the overall technical approach and short term testing requirements.

Task #2: Development of an Analytical Model- Status: 80% complete

TEJ Group, with the assistance of PPI member companies including Central Plastics, has been working to quantify the impact of both the fusion process variables and in-service stress states for PE joints through various analytical modeling efforts. This is a necessary first step in order to effectively bound the various butt heat fusion parameters. Given the numerous variables, a purely empirical approach would be cost prohibitive and time consuming. To date, various analytical models have been developed to characterize the influence of key heat fusion process variables as a function of different pipe sizes and SDR values.

- **Analytical Model Development** – Based on the preliminary findings from the analytical modeling the Industry Steering Committee recommended additional short term testing to validate the model results and make any necessary adjustments.

Task #3: Comprehensive Long Term Testing

TEJ has initiated a comprehensive review of several techniques to characterize the long term performance of butt heat fusion joints. It is anticipated that a consensus based approach with respect to the long term testing will be developed at the next scheduled Steering Committee meeting. The selection of the appropriate litmus test is required to develop a suitable protocol to verify/validate the long-term performance of PE joints under anticipated service conditions.

Task #4: Integration within Industry Standards

- Status: Not Initiated

Task #5: NDE Evaluation

- Status: Not Initiated

Task #6: Reporting

- Status: On-going