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Contract Number: DTRS56-04-T-0010

Project Title: Evaluation of Hydrogen Cracking in Weld Metal Deposited using Cellulosic Electrodes

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Quarterly period ending: November 3, 2005 {effective date: October 4, 2004}

Objectives: The objectives of the proposed project can be summarized as follows: (1) To determine the effect of electrode drying and arc length on weld metal chemistry, mechanical properties and hydrogen cracking susceptibility. (2) To determine the effect of electrode re-hydration on weld metal chemistry, mechanical properties and hydrogen cracking susceptibility. (3) To develop practical guidelines on how to prevent hydrogen cracking in welds deposited using cellulosic covered electrodes.

- Technical Status

- Continued technical work on Tasks 2, 3, and 7. Note that Tasks 2 and 5 are funded by a separate project (EWI Project #46354CAP) and are tracked under this effort as a cost-share.
- Task 1: Selection/Procurement of Welding Electrodes
 - This task has been completed.
- Task 2 & 3: Preliminary Welding and Testing of Dried and Re-hydrated Electrodes
 - Various electrodes, mentioned in previous quarterly reports, were tested in the as-received, dried and rehydrated conditions for coating moisture and weld metal chemical analysis.
 - Electrodes were down-selected based on the results of the moisture testing, and groove welds were made with each electrode in each condition using short and medium arc lengths. The welds were inspected visually and radiographically for porosity and cracks, and then machined to remove mechanical test samples. Testing included bend and tensile testing. Results of the testing were presented in earlier quarterly reports.
 - Some of the results from the initial round of testing were inconsistent, especially in terms of variations with arc length. Additional work has focused on determining whether the variations in the results were related to manufacturing differences, or if they were a result of normal scatter.
 - The rehydration conditions initially selected were overly aggressive, and the rehydration method may not be practical for most users. Additional electrodes have been ordered and will be used to refine the rehydration conditions and explore alternative methods of rehydrating the electrodes.
- Task 7: Reporting
 - No significant activity in this quarter.