A Comprehensive Update in the Evaluation of Pipeline Weld Defects

Project Background

Yong-Yi Wang

Engineering Mechanics Corporation of Columbus

614-459-3200 ext. 230

ywang@emc-sq.com

Conference Call with DOT and PRCI

August 17, 2004

Overall Work Plan

- **Two focus areas**
  - **Stress-based Design - Revise/add weld defect acceptance criteria for longitudinal strains up to 0.5%**
  - **Strain-based Design - Develop weld defect acceptance criteria for longitudinal strains greater than 0.5%**
- **First focus area**
  - **Applicable to most onshore and some offshore (e.g., S-lay) application**
  - **Code implementation of existing technology**
  - **Significantly based on PRCI projects**
  - **Make use of recent code developments in Europe, U.S., Japan, and Canada**
- **Second focus area**
  - **Target new linepipe materials in arctic and deep water offshore applications**
  - **Technology development and implementation**
  - **Systematic initial development work has been done for PRCI by the PI**
  - **Same technology can be used for existing pipelines experiencing high longitudinal strains**

Feature of the Work

- **Target industry codes and standards**
  - **API 1104 Appendix A**
  - **CSA Z662**
  - **Possibly ASME B31.8**
- **Important Features**
  - **The outcome of this work will be a set of self-contained assessment procedures.**
  - **This work covers both stress and strain based design.**
  - **This work is the extension of the proven development work funded by PRCI.**
- **This project does not address:**
  - **Fatigue of offshore pipelines**
  - **Possible effects of bi-axial loading on the strain tolerance of pipelines**
  - **It is believed that heat-affected zone (HAZ) softening is a relatively minor issue in practice. Therefore this project does not address it.**
  - **The outcome of this will provide specifications of weld mechanical properties to achieve a strain design target. However, it does not specify how such mechanical properties may be achieved.**

$E = mc^2$

Timeline of the Project

- **Acceptance Criteria for Stress-Based Design**
  - **A draft version is expected by September/October, 2004.**
  - **The draft will be presented to PRCI, DOT, and in a public meeting scheduled in mid-October.**
  - **A revision to the draft may be presented in the January API 1104 Appendix A committee meeting, subjected to API agenda.**
- **Acceptance criteria for Strain-Based Design**
  - **The document will be produced at the conclusion of this project.**
  - **Experimental tests to validate the acceptance criteria is under preparation.**
  - **Code implementation will follow after the closure of the project**

$E=mc^2$