SOUTHWEST RESEARCH INSTITUTE®
QUARTERLY STATUS AND PROGRESS REPORT
FOR PERIOD ENDING SEPTEMBER 30, 2004

OTHER TRANSACTION AGREEMENT DTRS56-02-T-0001
SwRI® PROJECT 14.06162

"APPLICATION OF REMOTE-FIELD EDDY CURRENT (RFEC) TESTING TO INSPECTION OF UNPIGGABLE PIPELINES"

Many pipelines contain internal restrictions that do not allow the passage of inspection pigs that use conventional inspection technology. The purpose of this project is to investigate the feasibility of a remote-field eddy current (RFEC) inspection method that utilizes either a unique collapsible excitation coil or a small rigid excitation coil that can pass through internal pipeline restrictions.

The primary accomplishments during this reporting period were in Task 6 that was added to the project as described below.

Task 6—Demonstration at PSF

This task involved hardening the laboratory breadboard system and performing a demonstration of the system at the Pipeline Simulation Facility (PSF) in Columbus, Ohio, September 13–16, 2004. The test facility and arrangements were made available under sponsorship by the DOE.

Two 12-inch-diameter pipes, both having a nominal wall thickness of 0.375 inch, were tested: (1) a new 32-foot-long grade B seam-welded pipe containing machined defects and (2) a 48-foot-long seamless pipe containing three machined defects and natural corrosion that was removed from service (used). The RFEC system performed well with few problems during the benchmark testing. Signals were obtained from known calibration flaws in both new and used pipe, and numerous signals were obtained from flaws in blind areas of the pipes.

The DOE requested analysis of the data in specified regions along the length of each pipe; this included start, end, total length, width, and maximum depth of metal loss. The intent of the original SwRI project was to show feasibility of flaw detection with the RFEC system; therefore, procedures for flaw characterization (primarily depth determination) were not included. Nevertheless, to support this benchmarking demonstration, cursory flaw characterization procedures were developed and used in the data analysis.

Results from the pipe with manufactured defects showed that all of the flaws were detected, and there were no false calls. In the seamless natural corrosion pipe, one defect was missed, and there was one false call. Comparisons of the measured flaw characteristics (length, width, and depth) based on those determined from the RFEC signals with the actual values provided in the answer key showed good correlation, although the depths and lengths were generally underpredicted and the widths were overpredicted.

SwRI believes that the results are very promising, given the level of development that went into the RFEC system, particularly the data analysis computations. These results show strong potential for development of a pipe inspection system that can collapse to pass through restrictions and then expand to full diameter to provide a reliable high-sensitivity inspection.

Point of Contact

Gary L. Burkhardt, Staff Scientist
Applied Physics Division
Southwest Research Institute
6220 Culebra Road
San Antonio, Texas 78238
(210) 522-2075
(210) 684-4822 fax
gburkhardt@SwRI.org