

Wang, Y.-Y., Wang, B., Liu, B., Jia, D., Rapp, S., and Huising, O., Strain Capacity of Vintage Girth Welds and Integrity Management Process, Paper No. 2, 22nd Joint Technical Meeting of APGA-EPRG-PRCI, Brisbane, Australia, April 29 – May 3, 2019.

Abstract

Vintage pipelines constitute a large proportion of pipelines in North America. These pipelines occasionally experience high longitudinal loads due to landslides, settlements, washout, seismic activities, etc. The vast majority of these pipelines have performed well under those conditions. Occasional failures have occurred.

This paper starts with the concept of strain-based assessment (SBA), which forms the basis for the integrity assessment of vintage girth welds. The overall process of performing SBA is then introduced. The major focus of this paper is the development of a tensile strain capacity (TSC) estimation tool. The development process involves: (1) the adoption of an overall framework of the tensile strain models, (2) the development of crack-driving force relationships specific to features of vintage girth welds, (3) the development of a TSC estimation tool, and (4) evaluation of the tool through curved wide plate (CWP) testing and associated material characterization tests. The tool is shown to provide reasonably conservative estimates of TSC. Gaps and future work to further refine the assessment of vintage girth welds are highlighted at the end of the paper.

Keywords

Vintage pipelines, Girth weld strain capacity, Integrity management