

PMHSA R&D Forum Dent Assessment Methods & Challenges

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Acceptability Criteria



- The acceptability of dents is currently based on the depth of the dent in comparison to the pipe OD
- For a plain dent the allowable dent depth is 6% OD
- For a dent on a seam weld or girth weld, the allowable dent depth is 2% OD



Assessment Methods



- For those dents that are not accepted based on depth criteria, ASME B31.8 recommends strain based acceptability criteria
- However, for dents on welds, the weld quality and ductility must be assured prior to implementing strain based acceptability criteria
- For vintage pipelines, original weld inspection records are not readily available, thus strain analysis is not always possible

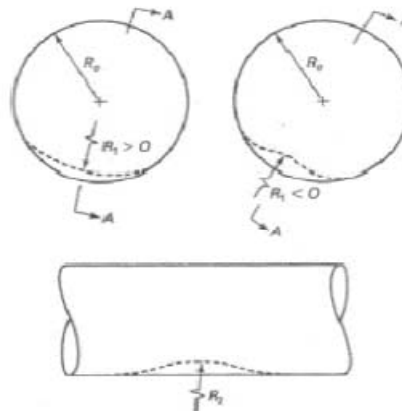


Fig. R1 Method for Estimating Strain in Dents

Caliper Results

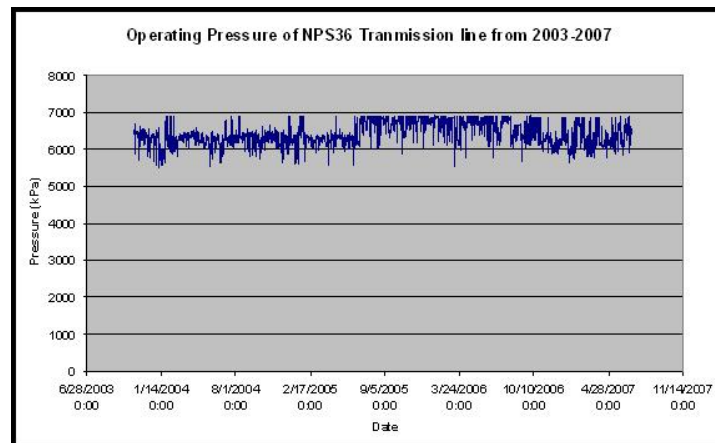


- On a recent 100 mile long caliper run on the ANR system, 12 dents on welds were found were larger than 2% depth
- The cost of repair for these dents is > \$1M
- Over the past 10 years, the 36,000 mile TransCanada system has not had any in-service leaks or ruptures due to plain dents on welds

Topics for Discussion



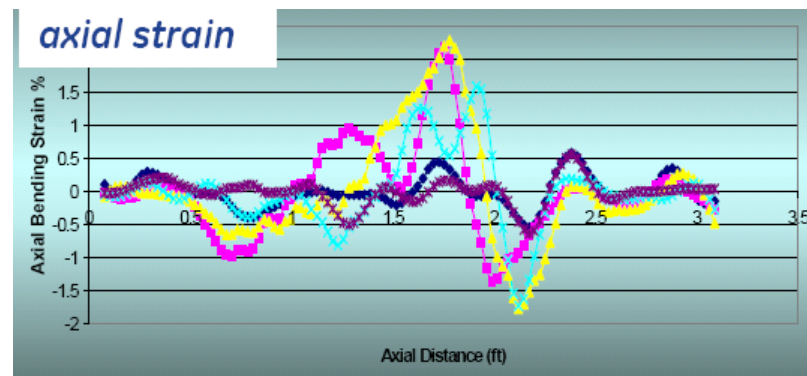
- The origins of the current depth based criteria for dents on welds is conservative
- Much of the previous research assesses the fatigue life of dents on welds with large pressure fluctuations
- The pressure in a gas transmission line is relatively stable
- Research evaluating the fatigue life of dents $> 2\%$ depth, under gas transmission operating conditions, may be worthwhile

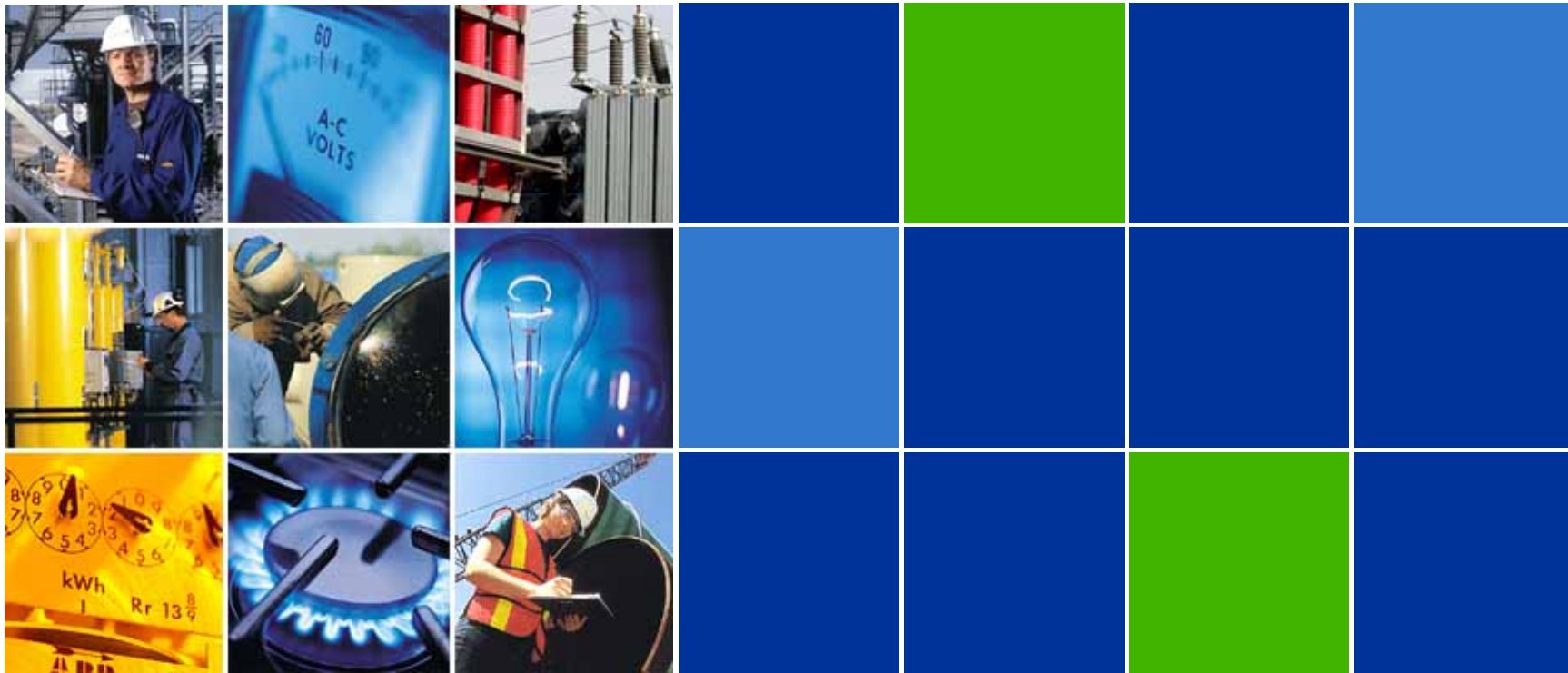


Additional Topics for Discussion



- When using strain based acceptance criteria, the limiting strain is 6% for plain dents, and 4% strain for dents on welds
- The origins of these strain limits are based on extremely conservative judgments from tests of dents under cyclic loading
- It may be worthwhile to study the allowable strain limits for dents, under gas transmission line loading conditions, and to evaluate these limits based on a deterministic approach





Thank You