

**Wang, Y.-Y.,** Stephens, M., Horsley, D., Preliminary Analysis of Tensile Strain Capacity of Full-Scale Pipe Tests with Internal Pressure, Proceedings of the 18th International Offshore and Polar Engineering Conference (ISOPE 2008), Vancouver, BC, Canada

### **Abstract**

Wide plate tests have been recognized as the “benchmark” for measuring the tensile strain capacity of pipeline girth welds. Numerical analysis in recent years, however, showed that the tensile strain capacity of a pipe could be reduced by the application of internal pressure. A series of full-scale experimental tests of 12.75- inch OD X65 ERW pipes were conducted with and without internal pressure to examine the effects of internal pressure on tensile strain capacity. The test setup was carefully designed to provide high quality data for the validation of prior numerical predictions and for the development of future predictive models. The background information leading to the current work is first reviewed in this paper. The design of the full-scale tests, including the instrumentation plan and test setup is described. The initial test results are shown in conjunction with numerical simulation of the results. Overall the test results conclusively demonstrated that the tensile strain capacity of pipelines having circumferential planar defects could be reduced by 50% or more when internal pressures equivalent to Classes 1 and 2 designs are applied. The reduction in tensile strain capacity is consistent with predictions from numerical models.

### **Keywords**

Strain-based design, Tensile strain capacity, Fracture mechanics, Ductile fracture, Pipeline