2012 Prevention First Symposium: Smart Pipe Project
October 24th, 2012

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Agenda

• Technology
• Project Overview
• Installation Challenges
• Operational Experience
• Take Aways
What is Smart Pipe?

SMART PIPE®

- High Strength Fiber Windings
- HDPE Outer Wrap
- High Strength Fiber Tapes
- Monitoring System
- Carbon Fiber Pulling Tape
- HDPE Core Pipe

A New Life for Aging Pipelines
Product Design

1. HDPE Core
   - Reduced erosion
   - Corrosion resistant to oilfield fluids
   - Temperature rating of 140°F

2. High strength fiber tape and windings
   - Higher pressure ratings (up to 1000psi)

3. Fiber Optics
   - Continuous health monitoring
     1. Temperature – leak detection
     2. Vibration – warning of potential mechanical damage
     3. Strain – indicator for material creep
Fiber Optic Measurement

Surface Acquisition Unit

Fluids or Gas leaks and sensing cable provides early detection

Temperature anomaly at leak event
Manufacturing Process

• In shop or In field
  • Smaller sizes can be spooled
  • Can fabricate continuous sections up to a few miles long
  • Fabricate and install up to 1 mile/day

• Can handle larger pipe sizes
  • 32” for shorter sections
  • 16” for longer runs
Manufacturing Process Video
Designed for Slip Line Applications
SmartPipe Project at Oxy Long Beach
Scope of Work

Replace a Clean Oil and Water Reject line (~300ft each)

- Install 20” SmartPipe inside existing 24” Clean Oil pipeline
- Install 14” SmartPipe inside existing 20” Reject pipeline
- Connect and integrate fiber optic monitoring system
Installation Challenges

1. 1st industrial application
2. Site logistics
3. State and Federal waivers
Site Logistics – Onsite Fabrication

PIER J2 – J6
SMART PIPE STORAGE, MANUFACTURING & INSTALLATION AREAS

RAILROAD TRACKS CORRIDOR
Site Logistics – Installation Path
Modeling the Bends
Modeling the Bends - FEA
The Bends In Practice
A Congested Entrance
The Waterfall
In Operation

- Alarms
- Tested successfully
- Data is logged into a closed system
- Have had no issues with pipe integrity in 2+ years
Take Aways

• A challenging installation

• Lines are performing as designed

• Worth considering for future applications