Innovation & Field Application to Improve New Pipeline Construction

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Starting Integrity for New Pipeline Projects Critical – Cost of Failure Escalating

Most Common Pipeline Failures are caused by:

- Weld Repairs
- Tie-ins
- Hydrogen Cracks not detected
- Corrosion
- Third Party Damage

Elements that improve starting integrity

1 – Low repair rate – mainline and tie-ins
2 – High detection rate of weld defects
3 – High quality field joint coating
4 – Low Hydrogen tie-in techniques
5 – Lowering-in stress/strain management
Engineering Critical Assessment (ECA)—Detection Accuracy

- ECA requires special testing to measure pipe, weld and heat affected zone resistance to crack initiation

- Calculation of stress/strain during installation along with a lowering in procedure

- Detection accuracy of the AUT system using seeded defects

- Combined these elements are used to establish a defect acceptance criteria for each type of defect

- Generally more generous than workmanship criteria.
P-600 Dual Torch Welding System

- PGMAW welding technology generates high strength and tough weld metal
- Small HAZ compared to manual welding avoid HAZ softening
- Thru the arc tracking
  Vertical and horizontal tracking reduces operator error
- Position based parameters
  Welding faster 12 to 2, 2 to 4 and slower 4 to 6
- Built in QA/QC
  Inspector friendly
- Self Diagnostic
  Efficient problem solving to increase reliability
Project Planning and Start Up

- Dedicated time required to rig up the welding equipment to the customers shacks and tractors.

- Well organized welder training with a minimum number of training welds prior to testing

- Testing as a pair – one fail both fail

- Test using AUT designed for the project.
Recent Repair Rates 30-inch DAPL Project – 1,172 Miles

- Spread 1 1.6%
- Spread 2 1.5%
- Spread 3 3.0%
- Spread 4 1.5%
- Spread 5 1.9%
- Spread 6 2.0%
- Spread 7&8 1.8%

High production up to 300 welds per day with a main gang and mini Gang

Average 120 for main gang
60 for the mini gang
AUT Inspection

- Serves a QA/QC tool
- Communication with the welder foreman advising when indications are present but below threshold
- Sizing accuracy of 0.6mm to 1.6mm depending on the provider
- Better accuracy yields more generous ECA
Field Joint Coating with Multi Component Liquid (MCL)

- Low curing temperature – 80°C
- Facilitates high production
- One system can coat up to 150 joints per day.
- Low rejection rates
- Consistent coating thickness
Low Hydrogen Tie-in Welding

- Combination procedure Cellulosic for Root/Hot pass
- Mechanized Flux Core Welding (FCAW)— Low Hydrogen
- Increased Deposition rate and Operator Efficiency
- Technique is very similar to manual welding easy to train
- Low rejection rates

Major products using FCAW for tie-in and mainline welding

- Flanagan 36”
- WAHA 42”
- AIM 42”
- E to H 36”
- GTA 42”
LaValley Tie-in System Video
LaValley Tie-in System

- Phase one of the LaValley system was tested on Flanagan
- Demonstrated value to improve line up, safer working environment
- Phase Two in final development ready for field testing in 2017
- Apply sequenced load to form the “cut” end to the “factory” end
- Phase three add automated welding
Conclusions

1 – Target a low Repair Rate
   ECA for Defect Acceptance Criteria
   Effective use of NDT as QA/QC

2 – Train welding team before production

3 – Use high quality FJC

4 – Low Hydrogen tie-in techniques
THANK YOU FOR YOUR TIME.