Since 1988, Enduro Pipeline Services, Inc., a Tulsa U.S. based company, has provided services and sales to assist its Energy Industry clients with their pipeline challenges around the globe.

At Enduro, we believe in a hands-on approach to tackling these challenges and providing optimum solutions.

Grant A. Coleman, P.Eng.
• Pipelines have been around for a long time!
PIPELINES
Evolving construction techniques

• stave pipe construction became steel
WHAT’s A PIG
Pipeline Internal Gauge [PIG]

**ILI PIGS**
- First PIG’s - Bales of Hay
- No consideration for pipeline
- Foam Pigs
- Mechanical PIGs
CLEANING PIGS
Effective and Compliant

ILI Cleaning

- Foam Pigs
- Mechanical PIGs
- Urethane
- Modern cleaning PIGs
- Cups
- Disks
- Brushes
- Magnets
- Application specific

www.enduropls.com/cleaning
CLEANING

Foundation for all that comes next

• Slotted cup design
• Slotted disc design
• For pigging dual diameter and multiple diameter pipelines.

CUSTOMIZED CLEANING

Nitrogen Purges
Cleaning & Scraping
Batching
Hydrostatic Fill

FLEXIBLE & VERSATILE
ANATOMY OF A SMART PIG

Did you know that since the 1960s, pipeline operators have been using an increasingly sophisticated technology called smart pigs to “see” inside their pipelines?

In fact, these ‘pigs’, which stands for pipeline inspection gauges, are one of the industry’s main diagnostic tools. They travel through a pipeline to monitor its health, diagnose issues such as metal defects, forecast potential challenges and report any issues to the pipeline operator.

Smart pigs come in a range of sizes with varying features, customized to fit the pipeline they are monitoring.

www.ingaa.org/Pipelines101.aspx
CALIPER PIGS
Geometric anomalies

• Direct Physical contact with pipeline
  • Usually!
  • Measures the internal diameter of the pipeline

✔ New Construction / onstream
✔ Rugged / Versatile
✔ Mechanical state of pipe
  ✔ Dent, Ovality, buckle, wrinkles
  ✔ Pipeline Expansion
✔ Bend Stress Analysis
✔ XYZ Mapping
CALIPER PIGS

Geometric anomalies

- Dent Strain
- Ovality
- Dent
- Bend Strain
- Wrinkle Bend
- Field vs. Factory

CLEANING  INLINE INSPECTION  TRACKING  ANALYSIS

WWW.ENDUROPLS.COM

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CALIPER PIGS

- Geometric anomalies
- Transmitter mounting available
- Brushes and paraffin scraper blade available

METAL BODY

- Versatile Pig
- Cups
- Discs
- Gauge plates
- Cleaning, batching, purging and paraffin removal.

Dynamic Speed Control Available

https://napipelines.com/
MAGNETIC FLUX LEAKAGE (MFL)
Using strong magnets to see anomalies in the pipe wall

- Axial (down the pipeline)
- Transverse / circumferential (around the pipe)
- Angled (mixture of both)
- Low / remnant / residual field (after magnets are gone)
MAGNETIC FLUX LEAKAGE {MFL}
Using strong magnets to see anomalies in the pipe wall

• MFL Concept
MAGNETIC FLUX LEAKAGE {MFL}
Using strong magnets to see anomalies in the pipe wall

• Different shapes
  • Different names

• Different specifications
ASSESSING SUCCESS
How are we doing

• Tighter tolerances
• Advanced algorithms & analysis
  • Line specific
  • Threat specific
  • Improved insight
ASSESSING SUCCESS
How are we doing

THEN

NOW
CLOSING THOUGHT
How are we doing / Where are we going

- We have moved from Thing Finders barely able to do 20 mile inspection to advanced ILI tools able to go over 750 miles in a single inspection

- Going Forward
  - More advanced information on the physical pipe properties
  - Tighter tolerances
  - Leverage Big Data, Machine Learning ... make more from the data we have
Thank you
Future

• We have moved from Thing Finders barely able to do 20 mile inspection to advanced ILI tools able to go over 750 miles in a single inspection

• Tomorrow
  • More advanced information on the physical pipe properties
  • Tighter tolerances
  • Leverage Big Data, Machine Learning ... make more from the data we have