ENTEGRA® UHR ILI Systems

PIPE GRADE CLASSIFICATION: LOOKING BEYOND POD AND POI TO ROI.

Understanding the impact of pipe grade along the entire length of a pipeline is an absolute necessity for pipeline operators. Especially given new Mega Rule requirements. ENTEGRA offers an operator access to accurate and cost-efficient confirmations of their historical pipeline data, as well as the ability to classify unknown pipe joints to maximize throughput, better mitigate risk, and increase ROI.

Job one for us is helping our customers to better know their pipelines and apply that knowledge to not only protecting, but optimizing their operations. Our Ultra-High-Resolution MFL/CAL combo technology backed by a team of experienced Level III analysts, affords our partners a more complete inventory of their pipeline.

Knowing Your Pipeline

If a pipeline's materials classification is compliant with the Mega Rule, it allows an operator to maximize their throughput and their ROI. Pipe grade can be considered one of the most consequential attributes to a pipe's make-up as it refers primarily to its strength. As the industry created higher grade pipe over the past 50 years, the makeup of the steel has changed. The inherent differences in the pipe's chemistry are apparent in data provided by ENTEGRA's UHR MFL/CAL tools.

Our standard MFL/CAL/IMU tool can provide both an integrity assessment as well as the pipe-grade classification in a single run. We then work with our operators to deliver a top-line analysis as well as a comprehensive report that includes detailed presentation and documentation of findings, as well as a comparison of the data with existing historical records.

Benefits

An accurate Materials Classification Report is one of, if not the most, significant benefits of ENTEGRA's comprehensive ILI system. In a single run, we can determine a pipeline's diameter, thickness, pipe type, and pipe grade, while accurately detecting and identifying the most complex corrosion and metal loss anomalies.

Effectively correlating historical data with UHR Data helps us tell a more complete pipeline integrity story.

MAKING THE GRADE OVER 59 MILES OF NATURAL GAS PIPELINE IN SOUTH TEXAS.
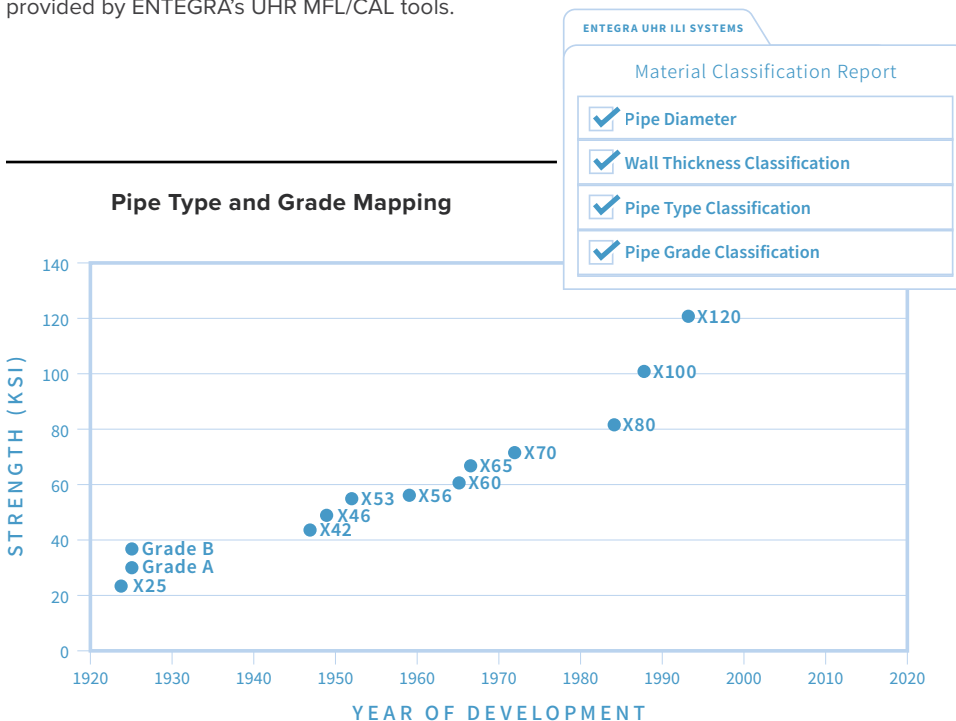
Overview

- 59 mile, 30" gas pipeline
- Multiple pipe types, grades, wall thicknesses, and vintages
- 30" UHR MFL/CAL tool with IMU

Challenge

ENTEGRA was employed to perform a materials classification report to confirm the operator's historical data, but more importantly, to fill in the gaps on a run of pipe with a vintage that spanned over 60 years (1952 to 2016).

This pipeline contained eight different wall thickness, six grade differences, and five pipe types (Spiral, DSAW, ERW, Flash Welded and SSAW). In addition, this 59-mile run included pipe from nine different manufacturers with various pipe material combinations.
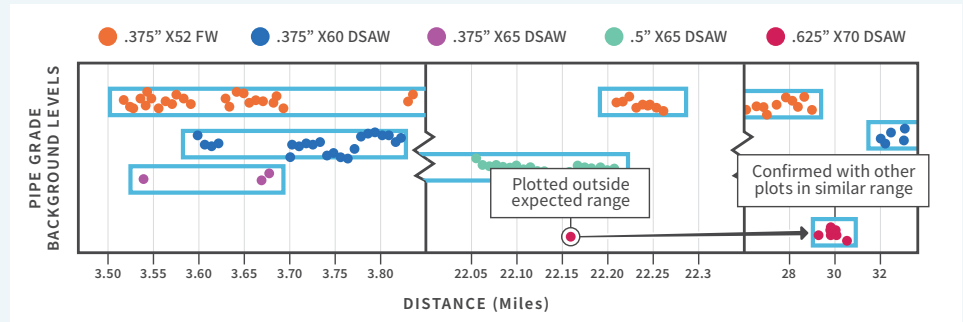
With all this variety found in the pipeline, we found that complete records had been lost in some of the historical pipeline documentation. These lost reports included numerous digs that each required single joint replacements. These records contained scattered and disjointed data on wall thickness and pipe type, and nothing concerning pipe grade.

ENTEGRA UHR ILI SYSTEMS

Material Classification Report

- ☑ Pipe Diameter
- ☑ Wall Thickness Classification
- ☑ Pipe Type Classification
- ☑ Pipe Grade Classification

Pipe Type and Grade Mapping

Scatter plot titled "Pipe Type and Grade Mapping" with X-axis "YEAR OF DEVELOPMENT" (1920 to 2020) and Y-axis "STRENGTH (KSI)" (0 to 140). Data points: X25, Grade A, Grade B, X42, X46, X53, X56, X60, X65, X70, X80, X100, X120.

Technical Details

Data needs context to unlock its value. Validating these single joints for a material classification report includes knowing each joint of pipe's diameter, wall thickness, pipe type, and pipe grade. Even though the operator's data was incomplete, it doesn't mean it wasn't useful. For example, the correlation of historical data with our UHR data gave ENTEGRA's Data Analyst team a starting point to begin compiling the material classification report.

Considering the identified variables, a systematic approach was developed to create a baseline of verified data. By sorting features into like bins, we could begin to identify if any abnormalities existed within the results. Through this approach we were able to identify sections of outlier X70 pipe. The X70 grade was determined as there were other recorded documentation of X70 pipe in the pipeline and the ILI tool readings suggested there was a correlation to these values.

Chart legend: ● .375" X52 FW   ● .375" X60 DSAW   ● .375" X65 DSAW   ● .5" X65 DSAW   ● .625" X70 DSAW

PIPE GRADE BACKGROUND LEVELS vs DISTANCE (Miles)

Plotted outside expected range

Confirmed with other plots in similar range

DISTANCE (Miles): 3.50 3.55 3.60 3.65 3.70 3.75 3.80 ... 22.05 22.10 22.15 22.20 22.25 22.3 ... 28 30 32

Outcome

Utilizing multiple datasets that the 30" UHR MFL combo tool's various sensors gathered in a single run, our Data Analyst team was able to classify pipe grades for seamless and seam type pipes, all without any calibration digs.

In addition to the materials classification report, we also detected, identified, characterized, and sized a range of pipeline threats including pinholes, pits-in-pits, long-seam corrosion, manufacturing flaws, physical damage, and previous repair structures.

The ILI tool's data correlated well with the pipe records, but in addition, it located joints that were not accurately documented. This alleviated any doubts or concerns the operator had, who consequentially was not required to classify any unknown pipe joints to the regulatory standard SMYS value of 24,000psi.

TIMELINE

One run, with immediates reported in 10 days and a full report delivered in 50 days.

VALUE

DA process avoids costly calibration digs. Maximized throughout by confirming all pipe grades.

EFFICIENCIES

Accomplished a materials classification report and metal loss survey in one run without requiring any calibration digs.

2X SENSOR DENSITY   **2X SAMPLING RATE**   **DUAL DIAMETER**   **1.5 DIAMETER/ BACK-TO-BACK BENDS**

The ENTEGRA UHR ILI System: A fusion of technology and people.

It starts with the technology – a fleet of innovative UHR tools boasting double the number of MFL sensors, double the number of caliper (CAL) sensors, and double the sampling rate delivering four times the resolution of other top-level, high-res tools.

A range of UHR MFL/CAL/IMU in-line inspection tools, from 3" to 36" in diameter, are the workhorses of a technology platform that far exceeds the demands of pipeline operators and traditional MFL deliverables. They're lighter. Compact. More collapsible. And more capable. Our latest technology release is an array of Cathodic Protection Current Mapping (CPCM) ILI tools which collect both AC and DC voltage data in a single run and can be correlated into our UHR MFL/CAL/IMU data, telling a more complete corrosion story.

What's behind that technology? Industry-leading experience laser focused on customer service. At ENTEGRA, project managers, engineers, subject matter experts, data scientists, Level III Analysts, and former pipeline operators work together to form the heart of our UHR ILI System.

Bottom Line

When compared to the impact and cost of a pipeline failure, the cost of an ILI run is insignificant. ENTEGRA's UHR ILI System - paradigm shifting ILI technology backed by the insight of our experienced team - helps operators to see more, know more, and do more when it comes to managing metal loss. We're setting the bar, worldwide, for first run success, increased throughput, reduced run costs, risk mitigation and ROI. That's the ENTEGRA difference.

For More Information

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For our latest API 1163 spec, talk to your ENTEGRA rep.

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