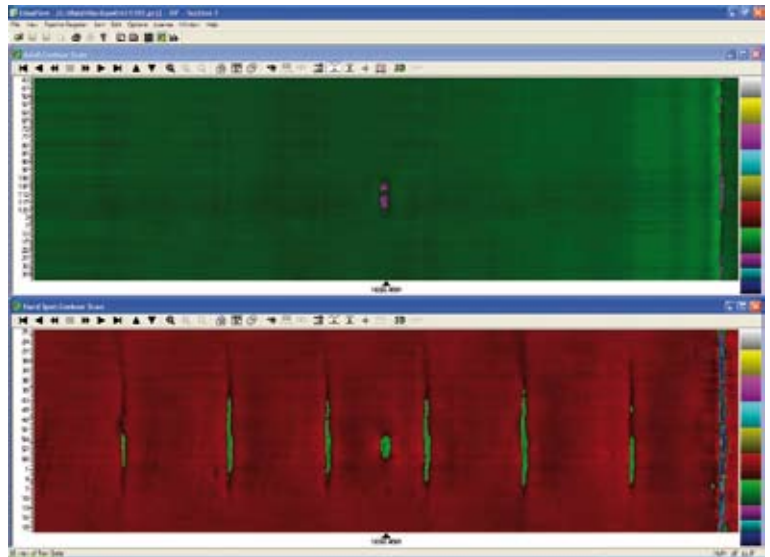
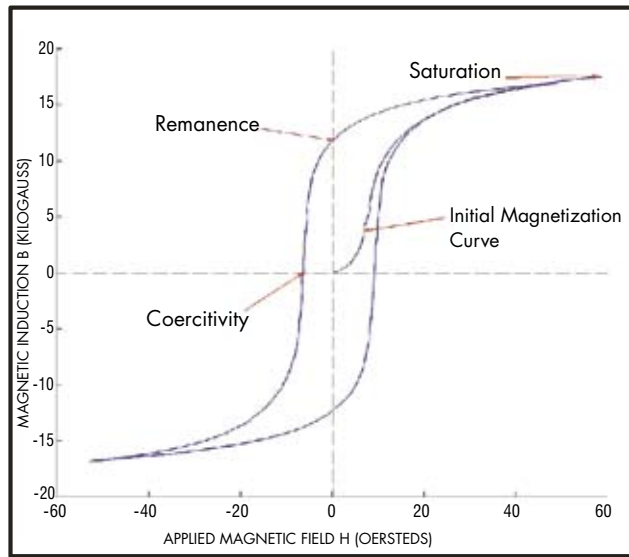


# Linalog® Hard Spot



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## General Description:

NDT's Linalog Hard Spot tools provide you with 100% unfiltered, high-resolution data for analysis of hard spots every 0.1" (2.5mm) down your pipeline. Hard spots are areas of elevated hardness in relation to the surrounding pipe surface. They have high coercivity and a high saturation point, which means they are harder to magnetize and demagnetize than normal pipe steel. It is this physical characteristic which the Hard Spot tool exploits to survey your pipeline by comparing data collected by corrosion hall sensors in the active magnetic field and data collected by the trailing residual field hall sensors.

There are three commonly accepted mechanisms that lead to the condition known as localized hard spots within a section of pipe.

- Local quenching — caused in the pipe mill where localized areas of heated steel in the austenitic state are quenched by uncontrolled cooling water at an accelerated rate versus the surrounding plate steel in the same state forming localized regions of martensite. Typically found in certain mills during the 1950's and 1960's.
- Cold working — steel is stressed beyond its elastic limit and the shape of the material is deformed permanently. This can be caused by Expander Marks created during the rounding process by pressure from the expanding machine mandrel, during the formation of Field Bends where work hardened areas are created by the mandrel during the bending process and by Mechanical Damage such as gouging.
- Welding — superheating of the pipe surface may be caused by arc burns.

Although the mechanisms involved in the creation of residual stresses in mill (quenched) hard spots, cold working (plastic deformation) and HAZ (localized superheating) are different, all exhibit a measurable coercivity that is greater than within the surrounding parent metal. As a consequence, all are readily detected by the hard spot inspection tool.

API specification 5L section 9.10.6 defines a repairable hard spot as an area greater than 2 inches (50mm) in any direction with a hardness greater than or equal to 327 Brinell, 35 Rockwell C, or 345 Vickers. NDT typically reports hardness over 250 Brinell in bands of 50 Brinell.

## LinaView® Analysis Software

Your survey report and data are delivered with NDT's industry leading LinaView ILI data analysis software, the same software our data analysts use.

- Easy to use and comes with full documentation.
- Simultaneously view the Pipeline Register database and also raw sensor data in A-scan and C-scan formats to give you a complete picture of your pipeline.
- Sort and order your view of the database using the built-in query tools.
- View and reprint dig sheets, statistical charts and tabular reports.
- Supports all industry standard metal loss pressure code calculations.
- Synchronized with LinaView® Pro to also view your pipeline data in a GIS framework.

## LinaView® Pro Integrity Management Software

An INS module can be run on most tools. The data can be incorporated into your own GIS platform or NDT's LinaView Pro Integrity Management system.

- The INS centerline module provides 3D (plan + profile) coordinates with linear reference "M" provided by the tool odometer.
- The cost benefit of INS far surpasses traditional over-the-line GPS and probing techniques.
- This data provides the most detailed and accurate "registration" of the pipeline, by providing coordinates every 0.01m along the pipelines, and tagging all identified features with coordinates.
- Further gains in efficiency are realized by establishing an accurate baseline survey and validating existing GIS data, significant reduction in data integration errors and labor costs.
- All industry standard data formats and structures are supported for import/export.
- The LinaView Pro system provides a platform for Integrity Management tasks such as integrity assessment programs, prioritization, risk analysis, regulatory compliance, and various optimization functions.

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