

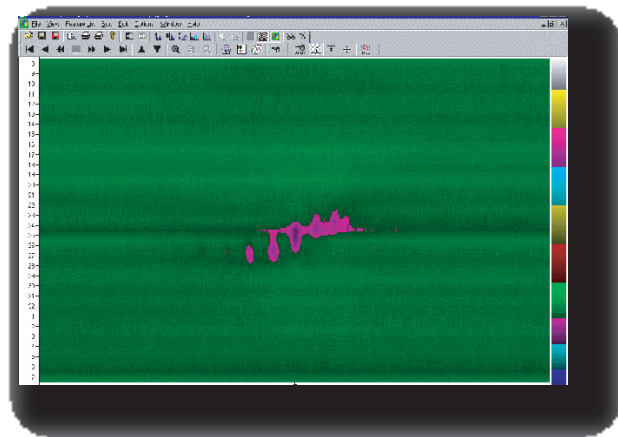
# Linalog DEF

## Advanced technology to assure the integrity of pipelines.

The leading cause of leaks and failures in pipelines is mechanical damage from third-party encroachment. Other sources of costly mechanical deformation include construction damage and movement of the pipeline resulting from heave, subsidence, floods or other natural events. Tuboscope developed Deformation/Slope survey systems to detect and characterize anomalies such as mechanical damage, dents, buckles, wrinkles, changes in ovality and hydrotest expansions. It also tracks slope changes that indicate vertical displacement of the pipeline. Deformation surveys provide the high-definition information needed to pinpoint mechanical anomalies and high-stress areas, assess the need for repairs, prioritize maintenance activities and reduce the risk of costly failures.

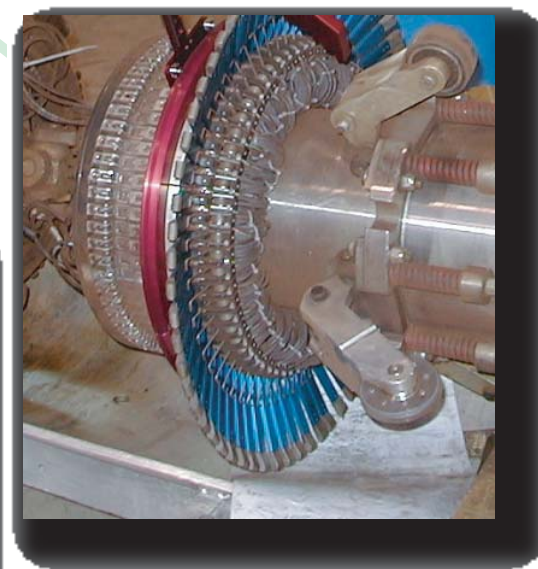
## Comprehensive mechanical profiles.

The Deformation system consists of a sophisticated deformation/slope tool for data acquisition and powerful LinaView software for interpretation and visualization. The tool captures complete circumferential and longitudinal data about deformation, slope, ovality, anomaly orientation, wall thickness changes, girth welds, distance measurement and product temperature and pressure. Valves, tees and other pipeline features are also accurately located. Advanced recording techniques allow 100% data storage in solid-state digital memory. Tools are equipped with odometer wheels to measure linear distance along the pipeline and an orientation device to establish the circumferential position of anomalies.



The Deformation tool performs reliably in new construction applications or in-service pipelines under extreme temperatures and pressures. It operates in crude oil, natural gas, fuel oil, finished products, water, nitrogen or air.

- Highly accurate deformation detection reduces risk of potential failures from mechanical damage and other stress risers
- Comprehensive profiles of deformation length, width and depth—including areas as small as one inch (2.54 cm) square - accurately assess the need for maintenance
- Continuous monitoring of slope changes provides early warning of high-stress areas caused by heave or subsidence
- Strain analysis calculations harness deformation information to provide an unprecedented ability to determine maintenance priorities; helps eliminate unnecessary excavations
- Precise location of points of interest reduces excavation costs
- Flexible, Windows based LinaView interpretation software provides powerful, easy-to-use querying capabilities and integrates with pipeline risk assessment software



## More sensors, more sampling means greater reliability.

Deformation tools are equipped with a dense array of sensors that monitor the entire circumference of the pipeline. Each sensor is mechanically and electrically independent, providing separate channels of data to more precisely define anomalies. Deformation tools can sample continuously at every tenth of an inch (2.5 mm) during the survey run. This generates a tremendous volume of data for superior resolution of areas of interest.

## Strain calculations highlight priorities.

With this large volume of precise information, Tuboscope can perform highly accurate strain analyses for selected anomalies. A Tuboscope strain analysis uses circumferential and longitudinal profiles from Deformation surveys to calculate strain estimates. The relevant strains are calculated and displayed to evaluate and prioritize mechanical anomalies. For a detailed report, contact your Tuboscope representative.

### Reliable detection of anomalies:

- Mechanical damage
- Dents
- Buckles
- Mashes
- Wrinkles
- Diameter changes
- Ovality
- Flat Spots
- Hydrotest expansions
- Third party or construction damage

### Accurate indication of pipeline features:

- Girth Welds
- Valves
- Tees
- Transition joints
- Insulating flanges
- Spiral welds
- Scraper detectors
- Stopple fittings
- Wall thickness changes

## LinaView software: power and accessibility.

Deformation surveys record 100% unfiltered data. Flexible, easy-to-use LinaView software makes it accessible in any format you choose.

- Identifies and prioritized defects based on severity
- Comprehensive query capabilities
- Flexibility to easily tailor information in meaningful formats
- Numerous display and reporting options
- Familiar, easy-to-use Windows based format
- Assists with compliance reporting requirements
- Compatible with most pipeline risk assessment software

## Full service, customized to your needs

Drawing on more than forty years of continuous innovation, Tuboscope offers a wealth of experience and global resources to assist you in maintaining the integrity of your pipelines. Your Tuboscope representative works closely with you to determine the level of service that is right for you. This may involve only a portion of your overall inspection program or complete turnkey service as your "single source" of responsibility. Depending upon your needs, Tuboscope can conduct a preliminary risk-based assessment of your pipeline, consult with you on evaluation of points of interest, or even coordinate additional third-party services. Deformation surveys are part of a complete package of inspection and pipeline maintenance services from Tuboscope:

- Assistance with engineering studies and strategic plan development
- LinaView Plus corrosion survey systems
- Line cleaning and pre-inspection procedures
- Survey tool launching and receiving consultation
- Data interpretation and analysis of points of interest
- Ongoing technical support