



Pipeline Integrity Solutions

- + PIPELINE INTEGRITY MANAGEMENT SERVICES (PIMS)
- + INVISTA™ ULTRASONIC IN-LINE INSPECTION TECHNOLOGY
- + ENGINEERING ASSESSMENT AND CONSULTING

Pipeline Integrity Management Service

Quest Integrity Group understands the complexities and challenges involved in pipeline inspection projects. These challenges can affect data quality and line coverage, as well as project time and cost efficiency. Whether providing turn-key support to manage all operational elements around a successful inspection or select services to complement an operator's existing project resources, Quest Integrity's Pipeline Integrity Management Services (PIMS) are designed to help companies meet these challenges.

- We specialize in unpiggable or challenging pipeline assets and project complexity, providing dedicated expertise and technology
- The breadth and depth of our integrity management solutions allow us to anticipate and respond to unexpected challenges, providing the highest quality inspections and assessment data
- We provide single source accountability in turn-key applications to get the inspection done right, safely and efficiently, simplifying the inspection process and delivery.

Project Management

- In-line inspection projects
- Turn-key integrity projects
- Comprehensive ILI and pipeline pressure testing programs
- New line commissioning
- Dig prove-up programs

In-Line Inspection Support

- Mechanical and chemical line cleaning
- Batching projects
- Nitrogen purge projects
- Pig tracking
- AGM (above-ground marker) site selection and documentation
- Anomaly survey and dig staking
- Global positioning surveys (GPS)
- Line location
- Pumping
- Line drying
- Temporary flow management

Integrity Engineering and Integrity Management Program Development

- Inspection feasibility assessments
- Program and scope development Procedure and budget development
- Reporting and recommendations

Equipment and Materials Selection and Procurement:

- Identification and supply of cleaning, batching and other related pipeline pigging equipment
- Supply or rental of pig launcher/receiver barrels, valves and metering equipment
- Identification and supply of consumable materials



“I want to extend my deepest appreciation for the professionalism of the Quest Integrity team. The long line pigging success was directly attributed to your effort to go above and beyond...”

**Project Manager,
Bristol Industries**

Invista™ Inspection Technology

Effective pipeline integrity management has been problematic for the large number of pipelines that were not designed for in-line inspection (traditionally unpiggable pipelines). The Invista™ ultrasonic (UT) in-line inspection technology is a bi-directional tool that provides 100% overlapping coverage of geometry and metal loss features. Designed to overcome the most difficult inspection environments, its operational simplicity and navigation capabilities are unmatched in the pipeline industry.

Benefits

Improved Safety and Flexibility

- Lightweight, self-contained, compact tools are handled easily; no lifting machinery required
- Superb minimum passage and bend capabilities; negotiates damaged or restricted pipe
- Lower pressure differential requirements and bidirectional capability minimize line disruptions

Reduced Operational Risk

- Unique design reduces wear, impact and debris collection associated with conventional in-line inspection technology
- Direct high-density UT measurement delivers accurate, repeatable results
- Solutions oriented – analysis of all line data vs. individual flaw locations

Cost-Effectiveness

- Single pass, combined geometry and metal-loss data provides 100% overlapping coverage
- Linear UT sizing minimizes verification digs and improves excavation and repair confidence
- Permanent line modifications not required

Time Efficiency

- Efficient inspections minimize offline status
- Onsite turnaround and rapid data analysis allows real-time operating decisions
- UT inspections do not permanently magnetize pipe, thereby eliminating demagnetization repairs

Inspection Applications

- Terminal storage lines
- Wharf, station and jetty connections
- Offshore pipelines
- Upstream gathering and flow lines
- Road crossings and casings
- Exploration and production injection lines
- Compressor and pump stations
- Airport fuel transfer systems
- Petrochemical fuel stock lines
- Product and fuel loading lines
- Delivery and tank farms
- High Consequence Area (HCA) pipe sections



Features

- + Accommodates 2" – 30" diameters and dual diameters
- + Back-to-back bends with >90° short radius turns
- + Bore restrictions, step changes, reduced port valves
- + Limited or missing launcher/receiver facilities
- + Low/no flow or limited flow conditions
- + Non-standard and bulging pipe material
- + Significant wall-thickness changes
- + Single entry/exit, line stoppage, plugged valves
- + Tight bend radius to 1.0 diameter, mitre bends
- + Unbarred tees and wyes

Engineering Assessment and Consulting

LifeQuest™ Pipeline Visualization and Assessment Software

Platform for delivery of InVista™ inspection and fitness-for-service assessment results

Powerful Client Data Viewer

- Displays 100% of inspection data
- High resolution 2D and 3D views of wall thickness and inner profile
- Accurate 3D visualization for complete display of inspection data
- Intuitive, easy-to-install and easy-to-use Windows®-based software
- Fully synchronized data display windows for rapid examination of inspection results

Complete Analysis and Assessment Capabilities

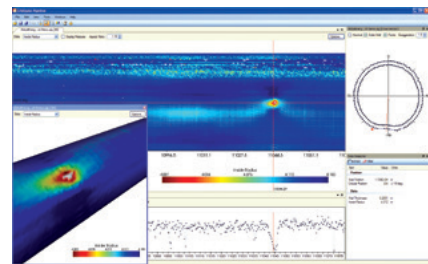
- Mechanical Includes standard calculation methods B31G, B31G Modified, and API 579-1/ASME FFS-1 local thinning assessments
- Allows addition and annotation of features for marking areas of interest and planning prove-up digs
- Easily exports data to Microsoft Excel®
- Client-configurable feature table for compatibility with GIS data management systems

Fitness-for-Service Engineering Assessment

- Maximizes utility of high fidelity direct measurement InVista data
- Provides remaining strength and Maximum Allowable Operating Pressure (MAOPr) for entire length of pipe
- Follows API 579-1/ASME FFS-1 local thinning assessment methodology (accepted Level 2 methodology in ASME B31G-2009)

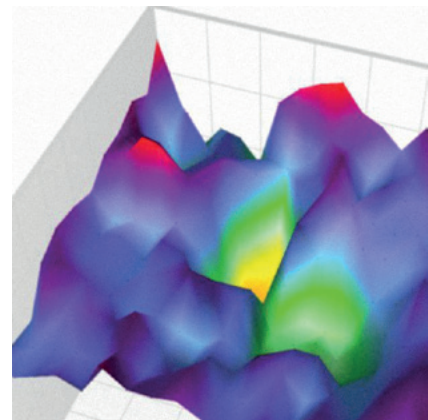
Engineering Assessment

- Crack-like flaws
 - 3D elastic-plastic finite element analysis provides accurate estimates of burst pressure and critical flaw size
 - Advanced crack assessment combined with shear wave ultrasonic in-line inspection is a proven alternative to hydrostatic testing
 - Remaining life assessment used to determine reinspection or retest intervals
- Dents and gouges
 - 3D elastic-plastic finite element analysis captures complexities of dent creation and re-rounding
 - Remaining life is computed with proprietary damage model
- Corrosion growth rate modeling



Damage Mechanisms Identified

- + Terminal Corrosion
- + Corrosion under insulation (CUI)
- + Erosion
- + Soil environment corrosion due to coating failure
- + Pitting
- + Deformation (e.g., dents, ovality, bulging, swelling) (HCA) pipe sections



Pipeline Analysis Services

ILI Independent Review:

- Develop and/or implement ILI process verification as part of ILI report receipt
- Develop and/or implement ILI validation process

Run Comparison:

- Unique Baseline Run Comparison – weld to weld matching between two or more inspections
- Baseline Plus Run Comparison – baseline report plus a raw data review
- Ad Hoc Analysis support

Raw Data Review:

- ILI data review for a specified threat
- Review individual and/or multiple data sets
- Review reportable features from ILI inspections to assess repeatability
- Compare ILI data and provide actionable information, such as changes in depth and length

ILI/Excavation Comparative Analysis:

- Highlight advantages
- Identify limitations
- Growth Assessment



The Quest Integrity Difference

Quest Integrity combines innovative technologies, software, engineering assessment and the deep expertise of our people to consistently deliver unparalleled solutions for the integrity management of critical assets.

Solutions for difficult-to-inspect pipelines:

- + InVista™ ultrasonic in-line inspection technology
- + Fitness-for-service engineering assessment
- + LifeQuest Pipeline data visualization, analysis and assessment software
- + Advanced engineering assessment of dents, gouges and crack-like flaws
- + Failure assessment and root cause analysis
- + Materials engineering and lab support
- + Engineering, manufacturing and technical support



Quest Integrity, a TEAM company, is a global leader in the development and delivery of asset integrity and reliability management services. The company's integrated solutions consist of technology-enabled, advanced inspection and engineering assessment services and products that help organizations improve operational planning, increase profitability, and reduce operational and safety risks. Quest Integrity is built on a foundation of leading edge science and technology that has innovated and influenced industry best practices since 1971.