Pipeline mapping from GE

For years, pipeline operators worldwide have taken advantage of the industry's largest fleet of in-line inspection tools from GE's PII Pipeline Solutions business. In the past decade, many of these tools have provided highly accurate mapping data in addition to their primary inspection functions.

This mapping capability has now been extended to a wider range of tool sizes using low-drift Inertial Measurement Unit (IMU) technology.

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imagination at work

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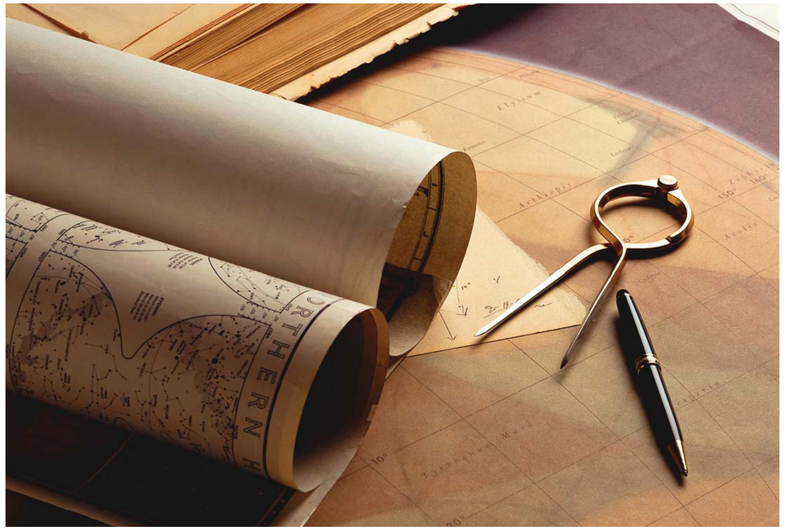


Mapping & Strain Capabilities

Add long-term value to any in-line inspection with simultaneous centreline mapping

Why map a pipeline?

Increasingly, regulations demand that pipeline operators document the precise location of pipeline assets. In some cases, however, records are old and of unknown accuracy, or may not include details of centreline location.

Our Pipeline mapping service can benefit operators by determining the precise location of each girthweld and pipe feature.

The mapping function can be added to corrosion or caliper inspection tools giving maximum benefit from a single inspection run.

Minimising repair costs

When repairs are required for defects reported by an inspection, our IMU coordinates enable you to quickly and reliably locate them before excavation – by going directly to a precise GPS location – significantly reducing digging costs and in-field time.

By giving you the GPS co-ordinates of the defects to an accuracy of +/- 1.5 m, our IMU mapping technology takes your repair crew directly to the job.

Planning mobilisation

Accurate IMU data helps operators avoid unpleasant in-field surprises by taking into account local geography and third-party constraints that may impede site access.

- Clear indication of land ownership
- Minimise access needs
- Plan logistics for roads, rivers, forestry
- Arrange all necessary resources in advance

Improve return on investment

Knowing the precise location of all asset features is a key part of any integrity management system. GE's mapping service improves the quality of information available, thereby enhancing the performance of all GIS, GPS and associated decision-making tools.

Increase security, decrease costs

GE uses some of the highest performance IMUs available for inspection of both liquid and gas lines.

MagneScan inspection tool.

Caliper inspection tool.

Mapping for every project and budget

Various capability levels are available for IMU mapping, ranging from basic, budget-priced units through to high-performance, low-drift navigation units. GE uses the best available, low-drift IMUs to map the position of your pipeline.

By including the IMU mapping option with your next in-line inspection, you will reap the combined benefits of pipewall-integrity data and mapping data from a single run.

IMU mapping capabilities can be added to the following inspection tools:

MagneScan™ – versatile, high-resolution metal-loss inspection, including MagneScan Triax for advanced length and width sizing of pitting and Narrow Axial External Corrosion (NAEC).

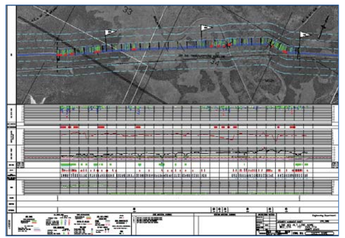
Caliper – location and measurement of dents and other geometric deviations .

In addition, most of our future inspection tools will be designed to incorporate IMU technology.

IMU's impact on the inspection operation

Inclusion of the mapping function makes little change to the logistics of an inspection run. The main additional activity is the provision of surveyed reference points prior to inspection, approximately every 3 km (2 mi) along the pipeline.

These points can be features such as block valves or temporary above-ground markers. GE's procedure WO77 is available for more information on accurate survey techniques used to obtain these control references.



Create accurate maps and alignment sheets for review and analysis.

Strain measurement

Environmental loading can cause significant bending strain which threatens pipeline integrity. This can be caused by many factors, including:

- Unsupported pipe across a span terrain
- Landslips and earthquakes
- Sea-bed movement
- Anchor damage
- Frost heave
- Sand-dune movement
- Poor construction

To identify areas of bending strain, specialised algorithms are applied to the IMU data in order to calculate pipeline curvature. Comparison with a previous inspection greatly improves confidence in the identification of low-level deformations; therefore, we recommend that new lines be mapped to provide an accurate baseline.

If bending strain is found, remedial action can include exposing the pipe and replacing backfill or rock dumping. In extreme cases, extended environmental loading can lead to buckles, which need to be cut out and repaired.

Our performance has been confirmed by blind testing in a client's pipeline. The client exposed a 60-m length of pipe and displaced the centre by 200 mm. By running an IMU tool before and after the deformation, we successfully located and sized the deformation feature in 29 km of 30" pipeline. Other run-to-run comparisons have confirmed the repeatability of our bending strain data, both onshore and offshore. A complete strain report can be offered as an addition to mapping runs.

Increasingly, strain-based designs are being considered for new pipelines. These designs can use modern pipe material such as x80. x100 or x120. With strain-based designs it is even more important to confirm that the strain capacity of the pipeline has not been fully utilised during pipe laying. An IMU Strain inspection can give this confirmation.

IMU provides GPS co-ordinates for location of idenditified defects to an accuracy of +/- 1.5 m.

Why choose GE?

Best solutions

Every technological innovation we offer is firmly grounded in the reality of your business. We don't sell static tools. We are continually evolving the science of pipeline integrity, and the benefit to you is the most comprehensive suite of solutions available.

Total service

A successful inspection is just the beginning. The real objective is to enhance the long-term integrity of your pipeline. The breadth of our expertise is always at your disposal – from Fitness for Purpose assessments and mapping surveys to remediation services and long-term integrity planning. Different tools with different specifications can be used depending on different situations.

Unmatched experience

Our teams have inspected more pipelines than any other company, and we maintain the industry's most extensive and detailed database of pipeline defects. We've inspected over 600,000 km of pipeline and documented every known type of pipewall anomaly. This experience, combined with a steadfast commitment to technological advancement, enables us to identify and predict changes in pipewall condition with the utmost accuracy.

Global support

GE's PII Pipeline Solutions business has the global infrastructure and local presence to deliver advisory, technical and support services 24 hours a day. Whenever and wherever you need us, we'll be there – equipped with the highest level of experience and technology every time.

Continuous improvement

A triumph in one area can lead to remarkable enhancements in the next, so we leave no stone unturned. As we transform in-field discoveries into new software utilities, we use other programming innovations to increasing our data resolution and inspection efficiency (eg., enhanced inspection capabilities of SmartScan and UltraScan Duo). Because so many environmental and operational factors are beyond your control – our job is to maximize control everywhere it is possible. And we've been doing just that for more than 25 years.

Integrity services

Our pipeline services go far beyond data gathering. We have the experience and resources required to offer complete pipeline integrity solutions from a single source. All our inspection services are grounded in the most advanced technology and statistically significant procedures available. The information provides a solid, highly detailed foundation upon which future pipeline integrity can be monitored, maintained and improved.

Safety focused

In our latest safety initiative, we are leading the industry in ATEX certification of pipeline inspection tools. ATEX is European Union safety legislation governing electronics and procedures in potentially explosive atmospheres – in our case, launch and receive zones. Our three major technology centres (Cramlington, Calgary and Stutensee) are fully certified to ATEX Quality standards (extensions of ISO 9001), as well as our inspection tools, personnel and procedures for in-field service in the EU and other applicable regions. ATEX compliance is mandatory for pipeline operators and their service suppliers in the EU. So we have invested significant time and resources – and will continue to do so – in order to uphold this heightened level of safety for our staff and customers alike.

IMU tool features

- Suitable for liquid and gas pipelines
- Accuracy is +/- 1.5 m (59") with reference points up to 3 km (2 mi) apart – more precise measurement can be provided upon request
- Datum standard WGS84
- Format: latitude, longitude and elevation
- Report can be converted to any National Geographic Standard
- IMU modules are fully suspended for better centreline route mapping