

Case Study

Cost-Effective and Innovative Ultrasonic Phased Array Inspection of a Large Diameter Pipeline

Intero inspected a large diameter pipeline using the highly innovative ultrasonic phased array technology. This product was specifically developed for inspecting large diameter pipelines, in product, at a tank terminal in the Netherlands. This client's key focus was to obtain a high-resolution inspection with the most accurate data possible.

Intero's turnkey approach produces impactful benefits to the client while maintaining a cost-effective and time-efficient project from beginning to end.

Intero Provided:

- Project management
- Cleaning, gauging, and inspection
- Certified equipment
- Mechanical work and subcontracting
 - Scaffolding and lifting assistance
 - Bolt torquing
- Advanced quality reporting
 - Detailed anomaly information

With safety as a top priority at Intero Integrity, we remain diligent in exercising all necessary precautions for the safety of individuals, the environment, and assets for each and every client we service. While executing this project in a short timeframe, Intero Integrity was able to accomplish a successful and, more importantly, safe job with almost no operational disturbance.

Pipeline Characteristics

- Diameter: 28" (711.2 mm), Length: 110 m (360.9 ft)
- Nominal wall thickness: 7.9 mm (0.31"); 9.5 mm (0.37"), and 12.7 mm (0.50")
- Operational product: crude oil
- Inspection medium: crude oil

The Challenge

- Unpiggable and tiny space
- Inspection in product

This client had several challenges regarding the integrity of the pipelines. As the terminal was built in ~1960, there are not only corrosion issues on the pipeline but also some construction damage was detected by Intero which urgently needed appropriate measures.

The main challenge for the client is the complexity of the pipelines. Most of them are a short distance (under 100m in length) and have a large diameter. The main pipelines come in from Rotterdam harbor area into the manifold pit on site. From this manifold, the lines need to be inspected towards the tanks, via pump pits until the exit manifold where the product is distributed to refineries in Germany Ruhr-area.

There is very little room to open flanges and separate the pipes in order to install pig launchers and receivers. Sometime the pipes need to be cleaned and inspected bi-directionally.



The main challenge from an inspection technology perspective is the inspection in product, in this case crude oil. Due to the large diameter and changing product properties, it is extremely challenging to focus the ultrasonic beam spot to ensure a high-resolution inspection.



Unpiggable, Not Anymore

Intero UT inspection tools make use of a small but high resolution sensor head. This provides flexibility to inspect the most complex geometries like <1.5D or mitered bends. The tool can run bi-directionally and

requires only a short pig launcher. This accommodates the installation of pig launchers and receivers in tiny spaces like manifolds in tank farms. The entire operation is executed by the same Intero crew including the installation of launcher and spool pieces, cleaning, and inspections. This turnkey approach avoids inefficiencies and eliminates subcontractor interfaces.

Development Phased Array Inspection Tool

Specifically for the inspection of large diameter pipelines in product, Intero developed an innovative phased array solution. This technology makes it possible to optimize the ultrasonic beam focus for every possible diameter and various product properties to ensure the most accurate and high resolution data possible.

For this inspection, Intero used the real-time data monitoring feature. With a “hair thin” fiber optic cable connected to the tool, incoming data is evaluated during the run. This provides swift insight of line conditions and increases the success of the inspection run.

Advantages

- Turnkey approach - multiple services from one supplier.

Safety, Flexibility, and Operational Risk

- Single body, BiDi tool for 12-64"
- Small sensor head → flexible, high resolution
- Tees, offtakes, short radius bends, reductions, etc.
- Small pig-launcher
- Flexible for various products
- Light and heavy crud, naphtha, gasoline, diesel, etc.
- Optional: real-time data monitoring during inspection run
- Safety, flexibility, and operational risk

Quality

- Tool performance can be guaranteed, despite changing product properties
- High-resolution inspection and reporting
- A-scan data

Time Efficiency

- Inspection in product, reduce out-of-service duration
- Swift insight in the success of the inspection run due to real-time data monitoring

Cost-Effectiveness

- Even short pipeline lengths are economically feasible to pig (from ~100m onwards)

Environmental

- Inspection in product reduces environmental burden