PIGGING PRODUCTS & SERVICES ASSOCIATION

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Pigging Industry News

the newsletter of the Pigging Products & Services Association

NEW *Members*

Associate
Prior Power Solutions Ltd, UK

THE PRESIDENT'S LETTER

By Neil McKnight, T.D. Williamson, UK

As I write my first President's letter, 2025 is in full swing with spring sunshine slowly heating up the UK after a long winter.

A lot has already happened in the past few months, both in the PPSA calendar, and the general pace of global events and there are no signs of relenting anytime soon.

The year kicked off with the PPSA golf tournament in Houston and the PPIM conference. During our AGM, we agreed that it would be a good time to reach out for feedback on your experience and priorities. We are currently in the final stages of preparing a short survey that we'd love for you to take part in and let us know what is important to you.

It's a tremendous honour to write this letter as the newly appointed President of PPSA. I would like thank outgoing President Odd Reidar Boye for his leadership and contributions to the organization throughout the past few years. He has been an ever present and active member of the board throughout my involvement and has been a measured and knowledgeable voice in steering the ship. I look forward to seeing the ongoing evolution of his Ceilidh dancing skills in November!

I would also like to congratulate Neil MacKay on his appointment to Vice President. He has already demonstrated real energy and natural leadership as a Director and will no doubt continue to do great things.

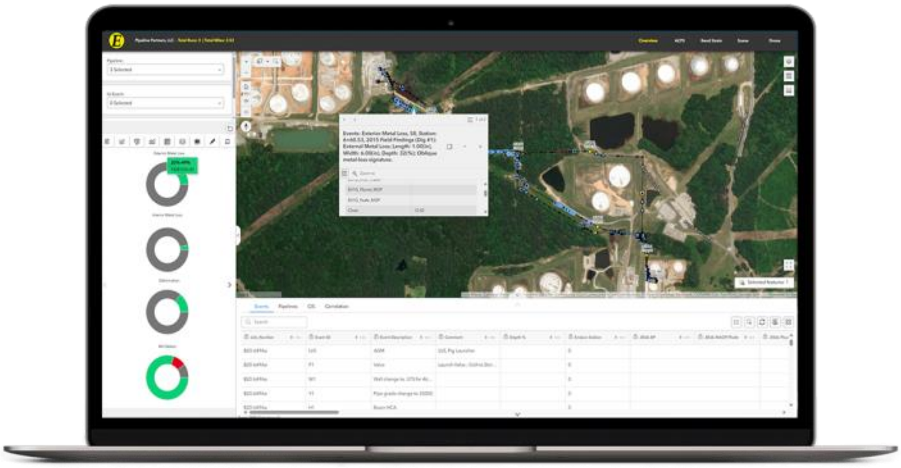
We welcomed two new board members at the AGM: Mark Elliott and James Lavender. We know their collective experience and passion for our industry will help propel us forward.

Most importantly, all of us would like to thank Diane Cordell for her ongoing dedication and drive at the heart of PPSA ensuring that the organization continues to thrive and grow.

Last year, I reached a personal milestone of 20 years in the pipeline and pigging industry. As I reflect, I go back to the early years and the people who went the extra mile to encourage and mentor an enthusiastic but naive new start. Without their patience and guidance, I wouldn't have had the chance to experience all industry has offered the past two decades.

So its truly humbling to have the opportunity to serve as President for an organisation which focuses so strongly on encouraging and supporting young people through its sponsorship of Young Pipeliners organisations and the inaugural PEP talks program at last year's Aberdeen conference. I will refrain from offering advice to new industry professionals but will encourage them to just give it a go, join a YPP group, try out a PEP talk or look for a mentor, you never know where it may take you.

Empowering Pipeline Management with Enduro's Geospatial Solutions



Enduro Pipeline Services leads the industry in pipeline integrity, utilizing its GIS Services team to deliver innovative geospatial solutions that enhance safety, ensure compliance, and boost efficiency. By leveraging Esri's ArcGIS Online web maps and Web Experience applications, Enduro transforms pipeline data visualization, analysis, and sharing, providing clients with actionable insights and intuitive tools.

Geographic Information Systems (GIS) are vital for managing pipeline assets, from mapping routes to ensuring regulatory compliance. Enduro's foundational GIS services provide the groundwork for robust geospatial operations:

- Data Collection and Mapping: Capturing spatial surveys and GPS.
- Data Storage and Management: Organizing geospatial datasets
- Spatial Analysis: Assessing relationships between pipeline data.
- Map Visualizations: Creating clear, layered maps for stakeholders.
  Data Conversions and Integrations: Unifying diverse data formats.
- Basic Reporting: Generating summaries of spatial insights.

These capabilities enable Enduro to tackle industry challenges like identifying High Consequence Areas (HCAs) and Moderate Consequence Areas (MCAs) for natural gas pipelines and adhering to PHMSA CFR 192 and 195 regulations.

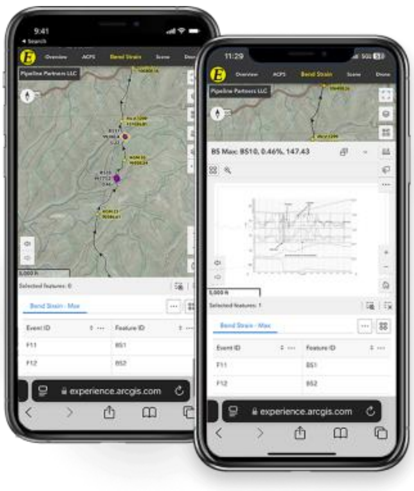
For inline inspection data, Enduro offers specialized GIS services to meet operational demands:

- Class & HCA Regulatory Analysis: Ensuring compliance.
- AGM Site Documentation: Logging Above Ground Marker data.
- Sub-meter XYZ Centerline Mapping: Precise pipeline alignments.
- Bend Strain Analysis: Assessing structural integrity.
- Pipeline Movement: Monitoring shifts over time.
- Correlation: Aligning inspection data with pipeline features.
- Operator Asset Management: Tracking and optimizing assets.

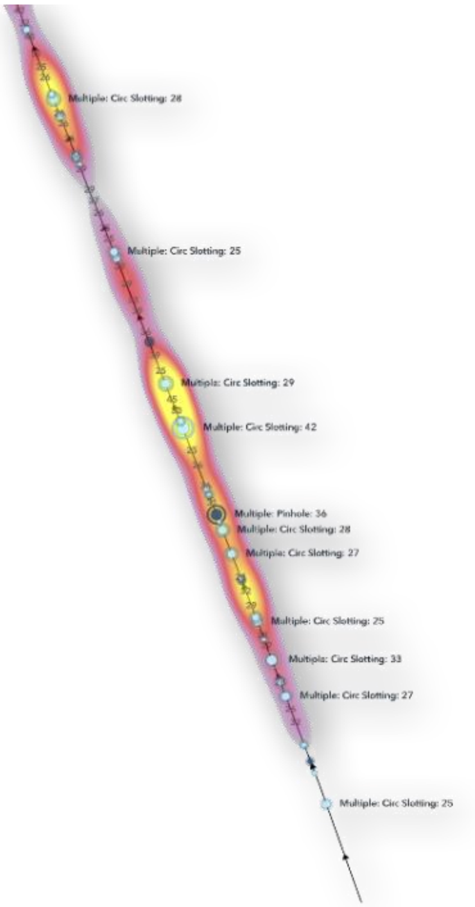
These services empower Enduro to develop dynamic, user-friendly applications via ArcGIS Online, showcasing pipeline routes, inspection statuses, and environmental overlays. What can you do with ArcGIS Online? ArcGIS Online empowers you to securely work with and manage data in the cloud, create dynamic maps and apps, perform advanced spatial analysis, foster collaboration, and share actionable insights both within and outside your organization.

Whether you're working with geospatial data for enduro pipelines or other industries, ArcGIS Online provides a versatile platform to streamline your workflows and enhance decision-making.

Accessible on any device, these web maps allow field crews to view alignments, managers to monitor compliance remotely, and operators to manage assets efficiently. The cloud-based platform integrates field data and reports into shared maps, streamlining collaboration and decision-making.



For instance, when a client faced extensive internal metal loss, Enduro processed ILI data to create an interactive ArcGIS Online web map, using cartographic design to display a heat map of metal loss, enabling field crews to identify severity and target repairs.



Enduro harnesses ArcGIS Online to redefine pipeline management, delivering unmatched safety, compliance, and efficiency. By transforming complex data into dynamic, accessible insights, Enduro empowers stakeholders to make informed decisions.

As the industry evolves, Enduro remains dedicated to advancing pipeline integrity through cutting-edge geospatial solutions.

Contact endurogis@enduropls.com to schedule a demo or discuss how these tools can elevate your operations.

Benchmarking Pipeline Integrity: The new pipeline insights tool for understanding peer comparisons

Author: Edmund Bennett, Principal Data Scientist, ROSEN Group

In the complex world of oil and gas pipeline operations, ensuring the safety, reliability, and performance of pipeline assets is critical. Over the years, operators have relied on In-Line Inspection (ILI) data to assess the integrity of their pipelines and make informed decisions for maintenance and upgrades. While these assessments are valuable, there has always been a missing piece: the ability to benchmark a pipeline's integrity against its peers. At ROSEN, we have developed a benchmarking tool that addresses this gap, offering operators a comprehensive view of their pipelines in the context of regional and global trends.

This article provides an overview of Pipeline Insights benchmarking, which leverages key technical indicators to compare the condition of inspected pipelines and identify actionable insights. Designed with a user-friendly dashboard, this solution aims to empower operators with the knowledge to prioritize resources effectively and navigate the complexities of pipeline integrity management. Enabling this powerful benchmarking capability is the ROSEN Integrity Data Warehouse, a comprehensive record of historical inspections conducted by ROSEN covering millions of pipeline joints and thousands of unique pipelines worldwide. We store billions of anomalies from millions of kilometers of inspected pipeline distance. An extensive set of geospatial data complements this data and is used to enrich inspection data and provide necessary contextual information.

The Need for Benchmarking in Pipeline Integrity
Pipelines operate under various environmental, operational, and material conditions that directly impact their performance and longevity. For operators, the challenge has always been to determine whether the state of their pipeline is acceptable in isolation and comparison to others in the industry.

The ability to benchmark pipeline integrity offers several key benefits:

1. Contextual Decision-Making: Understanding how a pipeline's integrity compares to its peers allows operators to set realistic performance targets and identify areas needing improvement.
2. Prioritized Maintenance: Benchmarking can help operators identify whether certain anomalies, such as internal corrosion or geometric deformations, are more prevalent in their pipelines compared to others.

3. Strategic Insights: By analyzing differences in pipeline conditions, operators can uncover the underlying causes, such as the performance of the integrity management system, rapidly aging infrastructure, untoward operational stresses, or environmental factors not accounted for in the design.

With these goals in mind, our Pipeline Insights benchmarking solution provides operators with unprecedented insight by aggregating and analyzing industry-wide data in a structured manner.

How the Benchmarking Tool Works
Our tool draws on ROSEN's extensive expertise in pipeline integrity, leveraging a wealth of ILI data and advanced analytics. The solution is centered around five key technical indicators:

- Internal Corrosion: Damage caused by corrosive substances within the pipeline, such as water, carbon dioxide, or hydrogen sulfide.
- External Corrosion: Degradation due to environmental exposure, coating failure, or cathodic protection inefficiencies.
- Geometric Anomalies: Structural deformations such as dents, wrinkles, or ovalities that may compromise the pipeline's integrity.
- Girth Weld Anomalies: Flaws or inconsistencies formed during girth weld construction.
- Milling Anomalies: Anomalies originating from the pipe manufacturing process, including laminations and seam weld issues.

Each indicator is analyzed to generate a detailed profile of a pipeline's condition. This profile is then compared to a carefully curated peer group, which is determined by two primary parameters:

- Region of Operation: Pipelines operating in similar geographical contexts are grouped to account for environmental and regulatory similarities.
- Product Type: Benchmarks are segmented by whether the pipeline transports oil or gas, ensuring meaningful comparisons based on the product's impact on pipeline conditions.

A Significant Step in Pipeline Integrity Management
While the benchmarking tool is already a valuable resource, our vision is to enhance its capabilities continuously. Future developments include:

- Enhanced Peer Grouping: Incorporating additional parameters such as pipeline material, age, and operational conditions for more granular comparisons.
- Predictive Analytics: Leveraging machine learning to predict how a pipeline's condition might evolve over time relative to its peers.
- Global Insights: Expanding the database to include a broader range of pipelines, enabling operators to benchmark against global trends.

These advancements will ensure that the tool remains at the forefront of pipeline integrity management, helping operators navigate an increasingly complex operational landscape. By enabling comparisons across key technical indicators and facilitating drill-down analyses, the tool helps operators understand where they stand relative to their peers and identify opportunities for improvement.

At ROSEN, we are committed to empowering the oil and gas industry with innovative solutions that drive efficiency, safety, and reliability. Our benchmarking tool represents a significant step forward in pipeline integrity management, providing operators with the context they need to make informed decisions and stay ahead of the curve.

Artificial Intelligence or Autonomous Isolation

The Safer Plug Company located at the Surrey Technology Centre in Guildford for the past 10 years have opened a second office at the Guinness Enterprise Centre in Dublin.

The new facility is configured to address the Graphic User Interfaces required for training up vessel personnel in the operation of new concepts and developments in AI coming onstream for Autonomous Isolation Plugs - which require uncompromising integrity.

Safer Plug Dublin is located in the shadow of the Guinness Storehouse which enables those undergoing training to enjoy a relaxing evening.

Introducing TEAM® WrapAssure – Raising Confidence in Composite Repairs

TEAM Inspection UK is proud to introduce WrapAssure, our inspection technique designed to reinforce the integrity of composite repairs. Combining advanced low-frequency ultrasonic technology with TEAM's industry-leading carbon fibre reinforced composite repair programme, WrapAssure provides a new level of assurance. By delivering critical data on the bondline and body of the repair laminate, the technique confirms repair quality and conformity, supporting safe operation of pressurised systems. With over 20 years at the forefront of engineered composite repair technology, TEAM's innovative WrapAssure service enhances the ability to validate repairs post-installation and over time, offering immediate, actionable results that promote continued system reliability.

The WrapAssure methodology was rigorously developed to address two essential questions: the size of defects tolerable within repairs without affecting performance, and the ability to reliably detect them. Using a simple hand-held probe, the system detects and sizes delaminations and debonds both during initial inspections and future monitoring. The results not only provide evidence of repair integrity but also create a baseline fingerprint for ongoing maintenance strategies. This easily deployable, rapid inspection method ensures minimal downtime, giving asset owners greater confidence in their repairs' long-term fitness for service. TEAM Inspection UK remains committed to delivering high-integrity NDT solutions across the oil, gas, energy, renewable, and manufacturing sectors, with WrapAssure exemplifying our focus on innovation and reliability.

STATS Group win significant Malaysian pipeline isolation contract

STATS Group and **EPOMS Sdn Bhd (EPOMS)** have secured a three-year pipeline isolation contract (including a 1 year option) with a major Malaysian oil and gas Operator covering onshore and offshore pipelines located in Peninsular Malaysia, Sarawak and Sabah.

In recognition of its growing market share in Malaysia, STATS has also committed to extending its in-country presence and has secured larger premises in Kuala Lumpur to support its growing energy sector client roster.

In addition, a significant investment is being made in strengthening the company's portfolio of Remote Tecno Plug®, hot tap (SureTap®) and line stop (BISEP®) tooling which will be based in Malaysia to service local and regional clients.

This aligns with STATS' regional and global growth strategy of investing in fleet and manufacturing facilities in the Middle East, North America and the UK. STATS is actively recruiting Malaysian nationals and plans to almost double its local workforce which will have access to its award-winning skills development and training programmes.

The general scope of work will see STATS provide the Operator with its Remote Tecno Plug technology in diameters ranging from 6" to 42" and specialist manpower, while EPOMS will supply all pumping, scaffolding, Non-Destructive Testing and other industrial services.

This significant award follows the signing of a strategic agreement between STATS and EPOMS in May 2023 to collaborate on Malaysian energy projects and to promote STATS' range of pipeline hot tapping, plugging and inline isolation services.
The DNV type approved Tecno Plug provides fail-safe double block and bleed / monitored pipeline isolation, meaning systems can remain pressurised, live and operational while they are repaired. The isolation plugs provide dual seals with a zero-energy zone to enable maintenance work on pressurised systems to be carried out safely and efficiently.

The pipeline technology specialist has also pioneered the industry's first leak-tight double block and bleed isolation technology for temporary line plugging with its unique BISEP tool improving operational safety and reducing time and costs during pipeline maintenance and repair.

Valeria Monobuoy Replacement—PVM SAS

The Challenge: Safe Underwater Isolation

PVM SAS, together with **CENIT** and the company **BUZCA**, faced the challenge of designing, building and installing a temporary sealing tool for the Pozos Colorados Terminal in Santa Marta (Magdalena). This activity was part of the Operational Continuity Module that would allow the start of one of the most important projects in the country: the replacement of the Valeria Monobuoy. This temporary tool was a critical solution, since it was to be installed in a submarine line in charge of transporting refined products for the national supply, ensuring a hermetic and stable seal during the period of inactivity of a section of the line.

The project required precise calculation of the line filling, dimensional analysis and hydraulic studies to guarantee the efficiency of the tool. Additionally, the team faced the challenge of securing the subsea installation at a precise point, considering depth limitations for diving personnel and adverse meteomarine conditions. To solve this, an underwater tracking device based on electromagnetic forces was implemented, which allowed the tool to be located with millimeter precision. The temporary installation lasted an estimated 120 days, coinciding with the monobuoy replacement period. One of the biggest technical challenges was to ensure that the tool provided a complete seal and remained in position in the face of pressure variations within the line.

Innovation Process and Solution

To address this technical challenge, the PVM SAS engineering team developed the RDS-8DS tool, an innovative subsea sealing system that combines a bi-directional mechanism with high precision sealing discs. This unique design ensures complete tightness in both flow directions, overcoming the limitations of conventional unidirectional systems.

The system incorporates a differential pressure-activated (18 psi ± 0.5 psi) unidirectional sealing module, which ensures mechanical locking of the tool after installation, eliminating the risk of axial displacement even under internal pressure variations of up to 150% of normal operating pressure. This feature proved critical to maintaining seal integrity during the required 120 days of temporary operation. The design of the RDS-8DS allows it to be deployed in extreme conditions, guaranteeing reliable sealing by means of discs made of high-strength materials. These components have demonstrated a minimum service life of 120 days in accelerated aging tests (ASTM D471), maintaining 95% of their initial mechanical properties.

Its bidirectional technology ensures total tightness (leakage < 0.1% according to API 6DSS) in reversible flows of up to 3 m/s, preventing cross-mixing between refined products. The system incorporates a self-locking mechanism that eliminates axial displacements (>2 mm) even under pressure variations of ±20%.

For accurate monitoring, an underwater tracking system was integrated with the following specifications:

- Frequency: 22 Hz (±0.5 Hz stability).
- Accuracy: ±0.3 m in dynamic conditions.
- Interfaces: Diver operable (up to 30 m)
- Transmitter: 316L stainless steel housing with IP68 protection

In field tests, the system achieved 99.7% reliability in continuous location for 4 months.

Project Results and Success

The RDS-8DS development process included a comprehensive validation protocol, structured in three phases:

1. Pressure testing:
Simulations performed on a 1:1 scale pilot built by BUZCA at its Cartagena facilities, which allowed replicating the real operating conditions of the line.
2. Corrosion resistance:
Accelerated tests in saline solution (3.5% NaCl, 40° C) for several hours.
3. Operational validation:
Real-time tracking and location of the tool with divers, who were trained in and out of the water.

Thanks to this effort and the commitment of the PVM SAS, CENIT and BUZCA teams, the operational continuity functioned optimally and allowed the monobuoy change to be successfully executed, without affecting the country's hydrocarbon supply, the operation or the integrity of the subsea line itself.

Nitrogen Pump Specialist, Prior Power Solutions, announces record growth in international markets

Prior Power Solutions, a British Original Equipment Manufacturer specialising in advanced nitrogen pump units, has reported increased international expansion over the past twelve months, with significant demand growing on multiple continents.

In 2024 the business saw a surge in orders from the United States, Australia, Africa, Italy, Caspian and Trinidad with its nitrogen pump being used in pipeline inspection, integrity and oil and gas exploration.

Continuing this growth, the company has confirmed it has orders already lined up for 2025 in markets including Sub-Saharan Africa, the Far East, Central Asia and Eastern Europe. The company credits the growth with its ability to continually meet the rigorous demands of international clients.

Speaking about the growth, James Rix, Managing Director at Prior Power Solutions said: "The success of Prior Power Solutions is testament to the fact that our nitrogen pumps set a benchmark for performance and reliability across the world.

“This growth not only demonstrates how our customers trust us with products but also shows how we can innovate and thrive in multiple markets. As we break new geographies in 2025, we’re proud to be showcasing British engineering on the global stage".

Contributing to the success was a £1 million investment made by Prior Power Solutions in 2024 and which included the creation of a direct-to-customer nitrogen pump hire business. As the first British OEM to provide nitrogen pumps for rent directly to end-users, the service has enabled the business to fulfil very short-term project requirements and deliver a competitive, flexible solution to customers, adding to the company’s market leading position.

James Rix added: "Our £1 million investment, demonstrates our ongoing drive to innovate and meet the changing demands of our customers. Our direct rental initiative set a new industry standard by giving companies across the globe a way to benefit from a high-quality nitrogen pump solution where capex is not available. This service has been transformative, and we look forward to what it can achieve in the years to come."

Based in Great Yarmouth, Prior Power Solutions designs and builds nitrogen pumps, fluid pumps, hydraulic power units, coiled tubing, compressors, and generator sets for hazardous locations. The company also offers a comprehensive repair, overhaul, parts and maintenance service for equipment in the offshore oil & gas, renewables, marine, agricultural and construction industries around the world.

Using pigs in mining: Overcoming challenges—4Pipe Hidropig

By - Eng. João Henrique M. Sousa

4Pipe Hidropig has established itself as one of the leading Brazilian companies specializing in pipeline cleaning and inspection services using pigging technology. Headquartered in Pindamonhangaba/SP and operating nationwide, the company has stood out for its technical approach, customized solutions and constant investment in innovation and training.

With a comprehensive portfolio that includes operations in oil pipelines, gas pipelines, mineral pipelines and industrial lines, 4Pipe combines technical knowledge, field experience and state-of-the-art equipment to ensure the integrity and operational efficiency of critical assets. The company employs everything from foam and mandrel pigs to advanced instrumented pig technologies, in compliance with the most rigorous national and international standards. 4Pipe's philosophy is centered on operational excellence, safety and sustainability, with a focus on delivering accurate and reliable results to its customers. Whether in industrial, urban or remote and difficult-to-access environments, the company operates with agility and strategic intelligence, joining forces with global partners to offer complete and high-performance solutions in the pipeline sector.

4Pipe Hidropig's Performance

In yet another important operation in the pipeline transport sector, 4Pipe Hidropig carried out the cleaning and internal inspection of two terrestrial pipelines that transport ore slurry, built in API5L Carbon Steel - Gr.B Sch40, both with a nominal diameter of 10" and an approximate length of 6 km each, assets located in the region of the state of Pará, close to the Amazon rainforest. The operation consisted of executing a sequence of cleaning pigs (foam and mandrel) and subsequent inspection using state-of-the-art ultrasonic technology, in line with current technical standards such as ASME B31.4, ASME B31.8, API 1163, and NACE and IBP guidelines.

Context and Logistics: Amazon Region Challenges

The assets were located in a difficult-to-access area, which imposed a series of logistical challenges, especially with regard to the mobilization of equipment, pigs, instrumentation, and the technical team.

The distance from our operational base, located in Pindamonhangaba/SP, required meticulous planning and the adoption of customized solutions to guarantee the integrity of the equipment during transportation, as well as the efficiency of execution in the field. Furthermore, typical climate conditions of the Amazon region, such as heavy rains and restricted access, required flexibility and adaptability from the team throughout the project.

Cleaning pigs: Preparing the Pipeline

The passage of cleaning pigs is a mandatory operational practice for preserving the internal condition of pipelines. When applied periodically, it prevents the accumulation of deposits and liquid phases, preventing the occurrence of localized corrosive processes. It is during the cleaning process that some specific problems of each pipeline become evident, such as deposition of organic material, inorganic incrustations, corrosion residues and even geometric anomalies.

In this success story, the cleaning sequence was conducted using foam pigs of different densities for initial sediment removal, followed by mandrel-type pigs with discs and brushes for more aggressive unclogging and removal of mineral incrustations and rust residues.

The mandrel pig was designed for different applications, allowing for the rapid replacement of its components, and can therefore be used in cleaning, removal, separation and calibration services.

The metal body has different configurations, and can receive seal discs, guide discs, cups, steel brushes, polypropylene brushes, calibrating plates, magnetic belts, transmitter housing, among other accessories. It was designed to prepare the line for the passage of the inspection pig and also for cleaning and draining the products, since its seal discs and cup allow the sealing of the entire pipeline, the brushes to scrape off the debris accumulated inside the lines, the magnetic belt to absorb ferrous residues and the calibrating plate to check the internal geometry of the pipeline.

For this project and to achieve greater effectiveness in the process, specific pigs were developed, with greater cleaning power and efficiency, without excessive aggression to the assets, preserving their integrity and safety. This was the key tool for us to achieve success in this operation.

This process was essential to ensure the ideal condition of the line for the passage of the instrumented pig, optimizing the quality of the data collected and reducing the risk of blockages or damage to the inspection equipment.

Benefits of Cleaning Operation: Increase Operational Efficiency and Flow Gain

The cleaning operation in mineral pipelines using pigs represents a consolidated and highly effective practice in maintaining the integrity and performance of the mineral slurry transportation system. In the specific case of a 10-inch mineral pipeline, the regular passage of cleaning pigs promotes the removal of incrustations, sediments and solid deposits that naturally accumulate over time on the internal walls of the pipeline.

This process results in a significant reduction in internal friction, restoring the effective diameter of the pipeline and, consequently, promoting a significant gain in flow rate. Field studies and operational analyses show that, after performing efficient cleaning with PIGs, it is possible to observe increases in flow rate of around 5% to 15%, depending on the initial degree of obstruction. This gain directly impacts the productivity of the system, reduces energy consumption associated with pumping and increases the useful life of the equipment, contributing to a more sustainable and economically advantageous operation.

In addition to the improvement in hydraulic performance, cleaning with PIGs also allows for better monitoring of the pipeline condition, facilitating inspections and preventing serious operational failures. Thus, preventive maintenance through pigging is consolidated as an essential strategy in the efficient management of pipelines.

In this case, for example, we obtained a gain of almost 2.5x the initial flow of the system, from 180 m^3/h to 400 m^3/h.

PULP TRANSFER DATA	
Volume of TQ-F1 (m3)	2.000
Flow rate before cleaning (m3/h)	180
Flow rate after cleaning (m3/h)	400
Transfer time of TQ-F1 100% with pulp before cleaning (hour)	11,1
Transfer time of TQ-F1 100% with pulp after cleaning (hour)	5

The benefits of cleaning with pigs in the pipeline directly impact the pumping system, in a positive way, such as:

- **Reduction of Mechanical Effort on Pumps**
  With less flow resistance, pumps operate with less effort to maintain the same flow rate, which reduces mechanical and thermal wear on components such as rotors, seals and bearings.
- **Decrease in Energy Consumption**
  Reducing pressure drop means less pressure is needed by the pumps, which results in lower power demand and, consequently, energy savings. This is especially relevant in continuous operations, where energy costs represent a significant portion of the operating cost.
- **Increased Equipment Lifespan**
  Operating under optimized conditions reduces the frequency of failures and the need for corrective maintenance. This extends the service life of pumping sets, reduces unscheduled downtime and improves system reliability.

These combined gains reinforce the importance of a well-planned cleaning routine with pigs, not only to maintain pipeline capacity, but also to ensure good performance and durability of the pumping system as a whole.

Inspection with Ultrasonic Pig

The asset inspection was carried out using ultrasound-instrumented (UT) pigs. This equipment is capable of detecting, with high resolution, thickness losses, localized corrosion and other internal and external anomalies along the pipeline. The following were evaluated:

- Loss of metal mass;
- Creep (lumps, swelling, ovalization);
- Localized and general corrosion;

Lessons learned and added value

This operation highlighted the importance of robust planning and synergy between national and international companies for executing projects in remote regions. Joint action allowed operational obstacles to be overcome, such as mobilization by river and air, and highly complex technical work to be carried out safely and within the established deadline.

Among the lessons learned, the following stand out: The importance of prior validation of the internal geometry of the pipeline for the appropriate selection of cleaning pigs;Innovation and engineering and project solutions, in addition to the use of cutting-edge tools and technologies; The need for a detailed plan for mobilizations and activities in remote areas; Efficient interaction between teams, especially in projects with multiple stakeholders.

The added value stands out not only for the good results obtained in this campaign, but also for the promotion of research and innovation in the sector, in order to make operations even more viable and efficient. The impact for the client was the conservation and management of assets, in addition to the contribution to increased productivity, reverberating in an increase in results, goals and profit.

The cleaning and inspection of these pipelines consolidates another technical milestone for 4Pipe Hidropig, reaffirming the company's commitment to operational excellence, safety and technical compliance. The partnerships throughout this project demonstrate the strength of collaboration in favor of asset integrity and innovation in the pipeline sector.

Validated ILI accuracy: IP PIPELINE TECHNOLOGY completes excavation verification in Central Asia

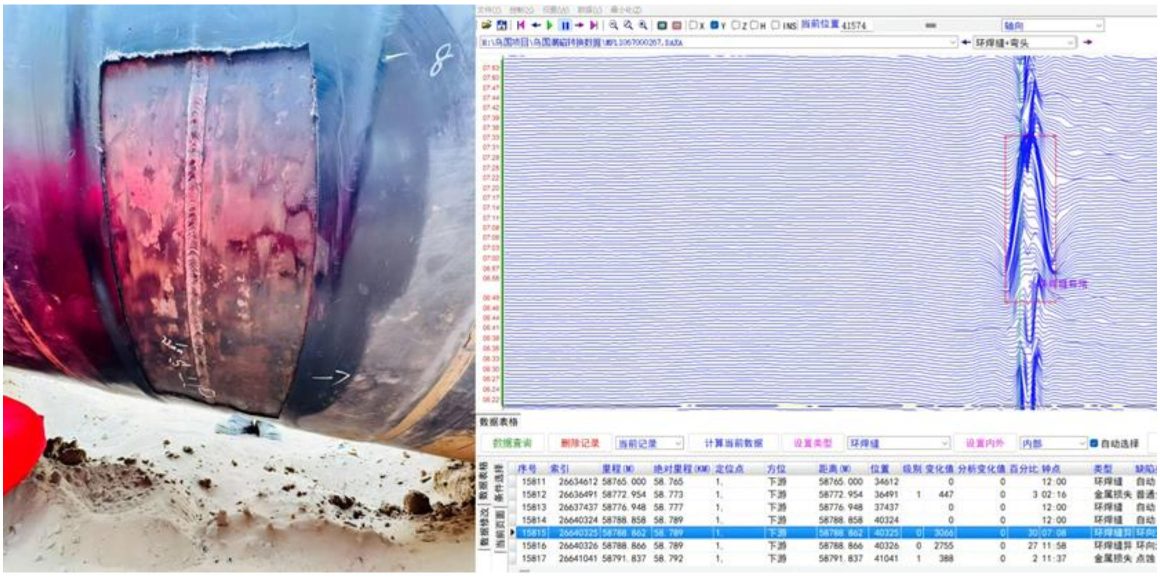
IP PIPELINE TECHNOLOGY has successfully completed an excavation verification campaign on a 65-kilometer pipeline in Central Asia, further affirming the accuracy and reliability of its inline inspection (ILI) technology.

The verification initiative was launched following a comprehensive ILI run, during which multiple potential integrity threats were identified. To validate the inspection data, four targeted excavation locations were selected, each representing a distinct anomaly type:

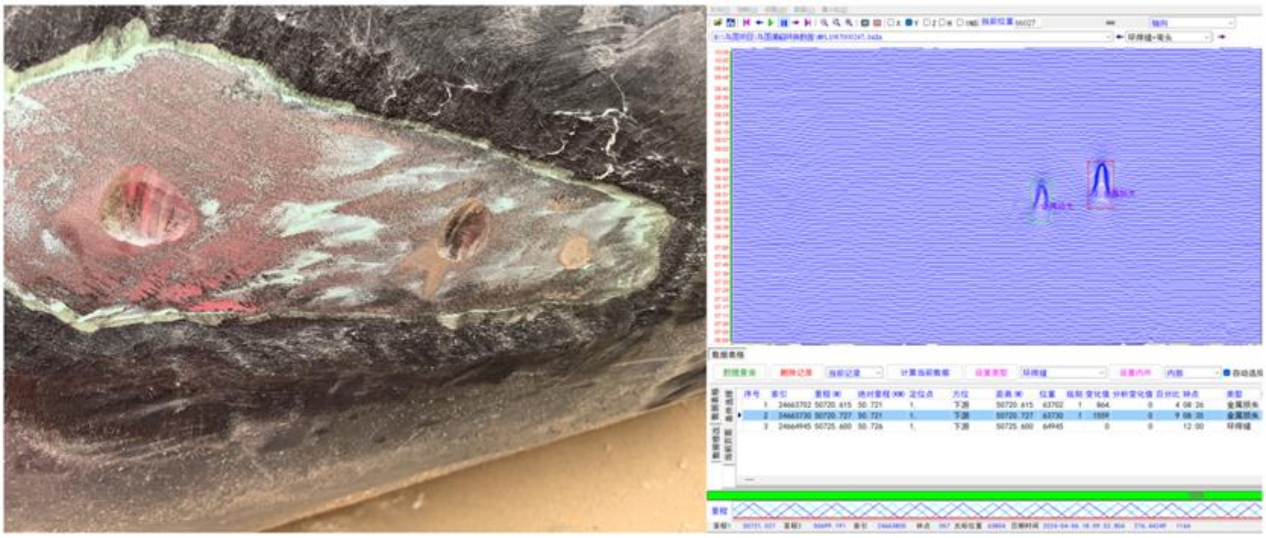
All excavations were performed by IP PIPELINE TECHNOLOGY's experienced field personnel in strict accordance with safety and operational standards. Upon exposure of the pipeline segments, all four anomaly types were confirmed and found to correspond precisely with the inline inspection results.

Notably, both the defect location and sizing errors were within the allowable tolerances defined by international standards and the client's requirements. For instance, the third excavation site involved an internal defect, specifically metal loss on the internal pipe wall. Our inspection report indicated that the defect measured 21 mm in length, 21 mm in width, and 11% in depth. However, field verification recorded dimensions of 20 mm in length, 25 mm in

1. Girth weld anomaly



2. External mechanical damage

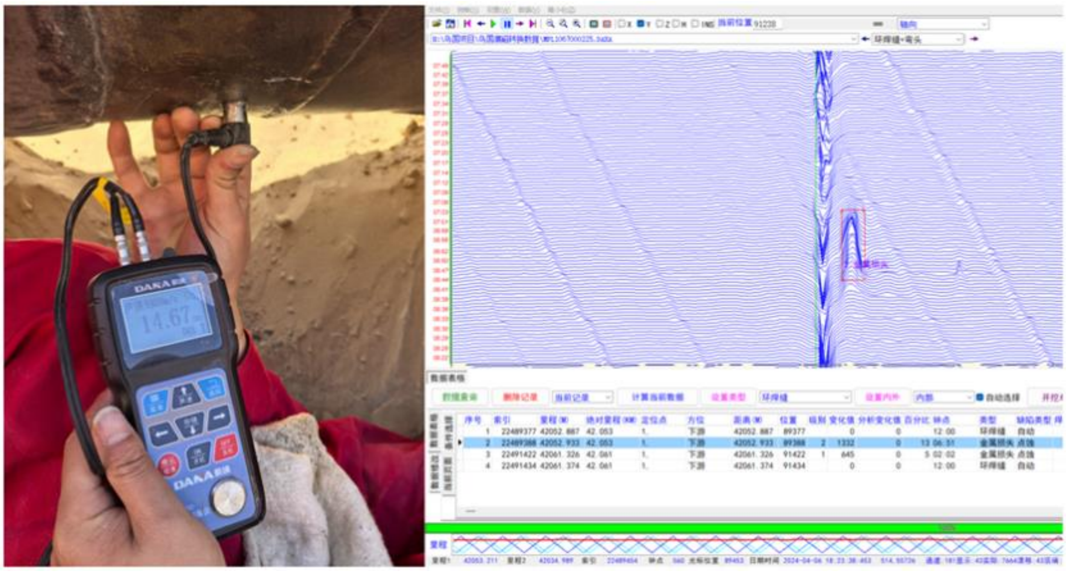


width, and 8% in depth. The discrepancy between the measured and recorded dimensions was minimal, further validating the accuracy and reliability of our data analysis. This high level of correlation further underscores the robustness of IP PIPELINE TECHNOLOGY's inspection tools and analytical methodologies.

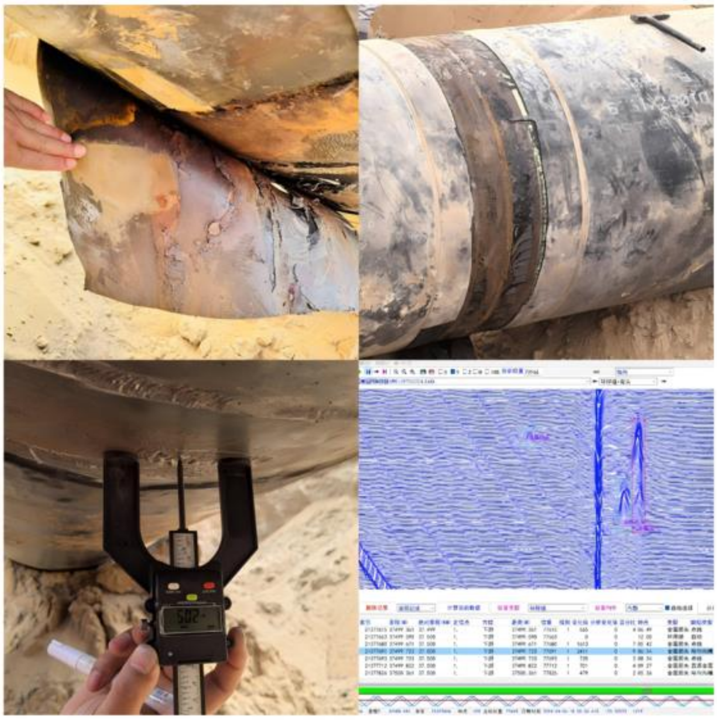
"This project in Central Asia demonstrates our continued ability to integrate advanced inspection technology with proven field practices to deliver validated, actionable results," said a company representative. "Accurate identification and quantification of pipeline defects are fundamental to ensuring asset integrity and operational safety, and we are proud to support our clients with dependable solutions."

The successful outcome of this verification effort highlights IP PIPELINE TECHNOLOGY's strong commitment to pipeline integrity and safety, particularly in regions experiencing rapid energy infrastructure development. Through high-fidelity diagnostics and reliable data, the company continues to contribute to safe, efficient pipeline operations across Central Asia and beyond.

3. Internal wall metal loss



4. Corrosion on and around a circumferential weld



Apache Pipeline Products Custom Pig trays – Supporting safer and more efficient pipeline operations

Apache Pipeline Products continues to raise the bar in pipeline equipment manufacturing with its robust line of Custom Pig Trays. Designed to withstand demanding field environments, these trays are a critical tool for pipeline operators focused on safety, efficiency, and extending the lifespan of their pigging assets. Manufactured at Apache's 55,000 sq ft facility in Edmonton, Alberta, these trays are tailored to meet a variety of operational requirements across the pipeline sector.

In-house engineering and versatile design for every operation
With Apache's fully integrated in-house capabilities, each pig tray benefits from precise engineering and rigorous quality control throughout the design, fabrication, and assembly process. Made from durable carbon steel and available with protective coatings, these trays are built to handle tough conditions encountered across North America's pipeline infrastructure.

Apache's trays are customizable in size, material composition, and finishes to accommodate various pigging programs. Whether operators need trays for lightweight pigs or heavy-duty pigs used in large-diameter pipelines, Apache delivers purpose-built solutions. Ergonomic features, such as optional removable handles, forklift pockets, and reinforced edges, reduce handling risks and simplify transportation both on-site and in the yard.

Field-tested performance backed by customer insights
Apache's Custom Pig Trays have been successfully deployed across numerous field projects, where feedback from pipeline crews has highlighted significant improvements in operational safety and workflow efficiency. In remote, high-traffic, and environmentally challenging worksites, these trays have proven critical in minimizing pig damage during transport and staging, while reducing manual handling strain on workers.

For example, operators managing large-scale maintenance projects have noted how the trays' modular options—such as stacking capabilities and weather-resistant finishes—help streamline logistics and protect pigs from environmental exposure, ensuring optimal pig performance when deployed.

Commitment to Pipeline integrity and operator safety
By offering fully customized solutions backed by decades of industry expertise, Apache reinforces its role as a trusted partner in pipeline maintenance and operations. The Custom Pig Trays exemplify Apache's dedication to providing products that enhance safety, extend equipment life, and optimize day-to-day workflows for pipeline crews.

As part of Apache's broader portfolio of pigging tools and accessories, these trays complement their end-to-end solutions designed to tackle even the most complex pipeline challenges. Apache Pipeline Products continues to innovate, providing reliable equipment that helps operators maintain pipeline integrity while meeting evolving industry standards.

Online leak sealing solution for emergency pipe repair 3X Engineering

Overview
The objective of the repair, performed in January 2025 by **3X ENGINEERING (3X)** distributor was to seal online a leak occuring on a 14" pipe transporting crude oil located on the upper deck of FPSO.
To perform this repair, it was decided to use 3X emergency leak sealing system STOPKiT® Offshore, which was available at 3X distributor's warehouse.

Scope of Work
The leak was caused by internal corrosion in the heat-affected zone at the 6 o'clock position of the straight 14" pipeline. The online repair was conducted following 3X installation procedure outlined below, using STOPKiT® Offshore, specifically designed for this diameter and environment. STOPKiT® concept operates by concentrating all the needed stress in the pipe at the defect location. The hoop stress needed to stop the leak is brought by the technical strap and the screws. The strong fibers of the strap are both temperature and stress resistant.

1/ STOPKiT® Offshore was initially placed next to the leak using a specialized positioning device.
2/ STOPKiT® Offshore was then slided to perfectly center the rubber patch over the leaking defect.
3/ Once positioned over the leak, STOPKiT® Offshore screws were tightened to a maximum of 40 Nm to seal the leak.
4/ STOPKiT® Offshore positioner device was finally removed.

The leak was fully contained and sealed without shutting down the line pressure.

Results
Our trained and certified distributor successfully managed the repair, stopping the leak very quickly using our patented emergency leak sealing system, STOPKiT®. This product is the most efficient solution for online pipe leak repair, capable of sealing leaks in just a few minutes without interrupting operations.

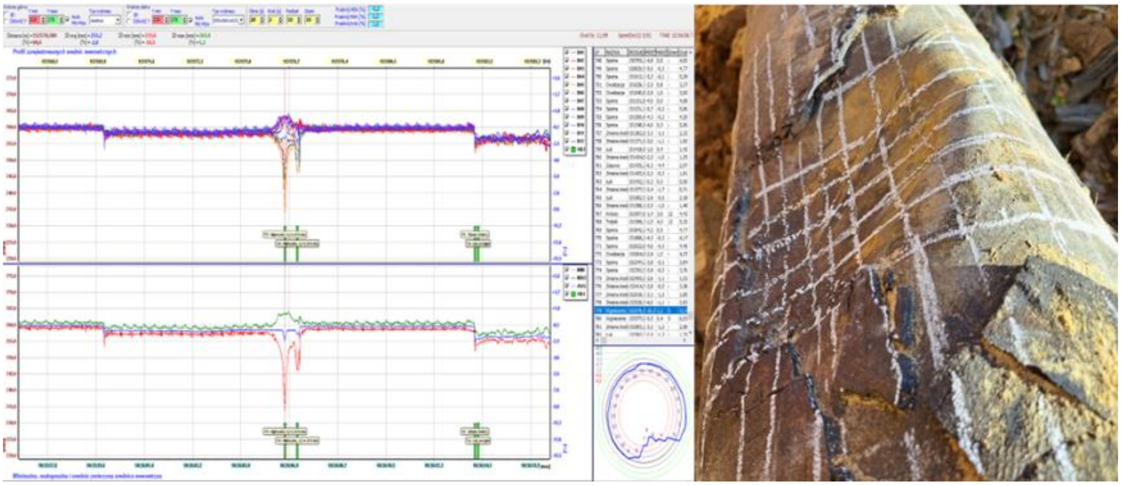
Precison Pipeline Inspection with Smart Ultrasonic Technology

Pipeline inspections utilizing smart ultrasonic tools are a key service offered by **Naftoserwis.** These technologically advanced inspection tools are developed and manufactured by our in-house team of engineers. Our continuously evolving technologies ensure the safe and efficient diagnostics of linear infrastructure while enabling uninterrupted transport of various energy utilities.

At the turn of the last inspection run, we once again demonstrated the critical importance of high-resolution geometric tools such as KALIBRAK. Naftoserwis successfully conducted a geometric inspection on a fuel pipeline using this tool, and subsequent data analysis revealed a critical dent that prevented the deployment of the intelligent diagnostic tool KORSONIC. Thanks to the high-resolution data provided by KALIBRAK, the pipeline operator was able to carry out a precise excavation. This confirmed the presence and severity of the anomaly detected by Naftoserwis. The root cause was identified as third-party interference. Following the successful repair of the anomaly by the operator, Naftoserwis performed a second inspection run using the KORSONIC tool. This phase involved advanced diagnostics and a comprehensive evaluation of the pipeline wall's technical condition.

This case highlights Naftoserwis's commitment to precision, operational reliability, and strong client collaboration. Our seamless communication and professional execution ensured an efficient and timely resolution—reinforcing Naftoserwis's reputation as a trusted partner in pipeline integrity management. Furthermore, for the past two years, Naftoserwis has consistently performed successful inspection runs using ultrasonic technology with the KORSONIC tool. These inspections focus on gas pipelines located in regions of natural gas and crude oil extraction, covering both the pipelines and the surrounding infrastructure.

The projects described are just a part of our activities. Naftoserwis, constantly seeking new areas for research and development and recognizing the growing demand for innovative services, has decided to leverage its extensive inspection experience. Our team is eager to take on new challenges, and we can assure you that pipeline systems continue to serve as the world's vital energy lifelines, operating safely, efficiently, and reliably. Naftoserwis continues to make enlarge the resources of diagnostic technical tools. This year set is to introduce the development of, a completely new high-resolution geometric tool, alongside two advanced ultrasonic diagnostic tools for pipeline inspections.



Comparison between the dent profile in the analysis software and the actual dent observed in reality

PETROSYSTEM SRL: the intrusive pig signallers' Italian manufacturer

PETROSYSTEM SRL, active in the pipeline cleaning and maintenance sector for over thirty years, recently opened its brand-new premises in Albano Laziale, Rome (Italy). Following intensive engineering development, can proudly present its range of intrusive pig signallers' models to cover any potential installation and service challenges.

Intrusive pig signallers
Designed to provide simple and effective pig passage detection, intrusive pig signallers have been widely used, not only in oil & gas but in the pipeline and process industries for many years. Supplied with traditional visual flag, they can be combined also with electrical indication to send signals to client's remote-control rooms.

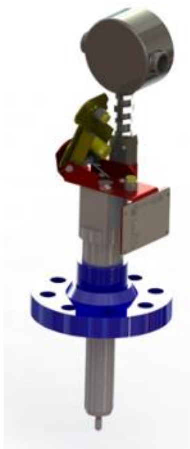
Intrusive pig signallers are still the only devices in the market capable of detecting any kind of pigging tool from simple foams to ILIs, under any service condition (liquid or gas) and without having to add any additional magnets, transmitter or other external element to the pigs the operator or service companies may have in place.

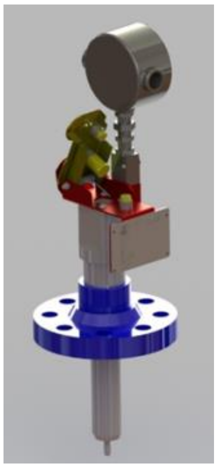
PETROSYSTEM intrusive signallers' portfolio. Covering all angles

UNIQA Model – specially designed for welding connection to the pipeline. Compatible with most commonly used welding bosses, nipples or threadless and suitable for installation or removal with hot tapping machines.

MEKA Model – With self-locking flag system, specially designed for installations in which the signaller is going to be installed at any angle in the pipeline, on vertical pipes or launchers or in any location subject to strong winds or other environmental challenges, makes sure flag will remain in the closed position and only positive pig passage will activate it.

SIGNA Model – Our most versatile model, in any class rating, with or without isolation valves, for installation above or underground at any depth, can be tailored to suit any client specification, materials, connecting flange face or pipeline service.





All our signallers incorporate omni-directional trigger, and the mechanical and electrical signals are independent. All our models can still send electrical pig passage confirmation to control room even if visual flag has not been reset.