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Pigging Industry News

the newsletter of the Pigging Products & Services Association

THE PRESIDENT'S LETTER

By Neil McKnight, T.D. Williamson, UK

Greetings to all! Lets get underway with a celebration as this year **PPSA** is 35 years old having been founded by Jim Cordell back in 1990. He envisioned that it would be greatly beneficial for Pipeline Operators and Pigging Vendors alike to have an organisation that would foster collaboration and facilitate knowledge sharing. The longevity and growth of PPSA over the past three decades stands as validation of this vision, a real achievement considering the numerous cycles our industry has gone through. The first PPSA Directory of Members/ Buyers Guide published had 25 members; this year that number sits at 112 (please request your free of charge copy now!) Even in the first year, the association had global reach– with members from North America, Europe, Middle East and Asia.

Getting back to the current day, its September 1st here in the UK as I write my second Presidents Letter of the year. It's a date that feels significant as focus switches on the approaching finishing line of 2025, and what else still needs to be achieved. For PPSA this part of the year is always busy and we have two great events coming up. Before the Rio Pipeline Conference opens, an Introduction to Pigging event is being jointly hosted by PPSA and **CTDUT Pipeline Technology Centre** for the second time. Presentations will be given by PPSA members introducing them to the concept of pigging and attendees will see a pig launched and received. Last time 20% of the audience were university students so it's a great way to encourage people to join the industry.

Registration has opened for the PPSA Pigging Seminar in Aberdeen on 18th/19th November. A programme of interesting papers will be presented alongside an exhibition where PPSA member companies will showcase the latest products and services. This is followed by the ever-popular Dinner & Ceilidh.

For the second year running we will be sponsoring some young pipeliners to develop their presentation skills with help from a professional Presentation Skills coach. The programme gives the delegates the opportunity to present to a friendly audience on the day before the main Seminar. We hope to see you there!

NEW Members

Full

National Gas Service, UK

Shenglong Oil and Gas Pipeline Inspection technology, China

SUN Pipeline Solutions, USA

PT Teknologi Inspeksi Maju Bersama, Indonesia

Associate

EV, UK

All the PPSA Board were present at PTC .....

Managing pipeline geohazards in a changing climate: Insights from South America—ROSEN Group

Climate change is intensifying geohazard risks to pipeline infrastructure, especially in mountainous regions like the Andes in South America. Increasingly frequent and severe weather events – such as floods, landslides, and erosion – can trigger sudden ground movements that threaten pipeline integrity. Operators must act quickly to assess and confirm the safety of their networks following such events. In the U.S., regulations like PHMSA's 49 CFR §192.613 and §195.414 require inspections within 72 hours of a disaster, setting a global benchmark for proactive geohazard management. While similar timeframes are not yet mandated in other regions, operators worldwide should adopt comparable practices to avoid catastrophic failures.

Geohazard Monitoring Approaches
To manage these risks, pipeline operators rely on a combination of field verification, remote sensing, and in-line inspection. Reports from landowners, aerial patrols, and geohazard audits help identify threats, but remote sensing technologies – such as satellite imagery and LiDAR – are increasingly used for wide-area monitoring. These methods offer valuable terrain data and change detection, but cannot directly assess pipeline integrity or confirm whether loading has occurred.

Inertial Measurement Unit Inspection Technology
Inertial measurement unit (IMU) tools provide direct insight into pipeline strain and displacement, making them essential for confirming structural safety. Recent advancements allow IMUs to be mounted on cleaning pigs, enabling rapid, cost-effective deployment without surface access or odometer wheels. These tools collect time-stamped inertial data and operate at higher velocities, minimizing operational disruption. A baseline run using a conventional high-resolution IMU is required to correlate subsequent inspections, especially when pipeline modifications have occurred.

Key Benefits of IMU-Based Inspection
The benefits of IMU inspection include, among others:

- Direct detection of bending strain and displacement
- Identification of unknown or emerging threats
- Support for structural integrity calculations
- Early warning for intervention planning
- Reduced inspection costs and faster response times
- No need for surface access in remote or rugged areas

IMU data can be interpreted to understand the nature of loading, especially when combined with other inspection technologies like magnetic flux leakage and caliper tools. These combinations help identify metal loss, deformation, and geometric anomalies that may impair structural capacity and thus allow for a comprehensive understanding of pipeline conditions. Accurate 3D geometry and strain data also support predictive modeling and intervention planning, including slope stabilization or section replacement.

Case Study: Andean Region of South America
A case study from the Andes illustrates the value of this approach, where a pipeline descends into a valley between steep mountain spurs and crosses a 130-meter-wide mudslide zone. IMU data collected in February 2023 and again in January 2024 revealed horizontal movement of 0.55 m and vertical displacement of 0.27 m. A strain change of 0.18% was recorded at the downstream boundary, indicating significant bending due to axial compression. These insights enabled targeted stress relief and stabilization efforts, effectively helping the operator manage the threat.

The progression of strain at the landslide boundaries was clear, while consistent strain through the slide body indicated movement of a largely coherent mass. Frequent IMU inspections provided critical data for scheduling interventions and managing girth weld locations. The operator's long-term strategy included monitoring, stress relief, stabilization, and section replacements – supported by high-resolution inertial data.

Proactive Management in Remote Regions
In regions like South America, where terrain and access challenges are common, the flexibility of IMU tools is invaluable. Their ability to operate without surface access makes them ideal for post-event inspections in rugged or remote areas. Rapid deployment enables early detection of loading problems, helping operators prioritize resources and demonstrate responsible management to regulators and stakeholders.

Conclusion
Climate change is reshaping pipeline integrity management. Adopting advanced IMU technologies, especially those deployable via cleaning pigs, equips operators with the tools needed to respond quickly and confidently to geohazard threats. Evaluation of IMU data alongside data from other in-line inspection technologies, such as high-resolution caliper tools and the latest axial stress measurement tools, can further enhance the understanding of the prevailing threat. By integrating frequent monitoring, rapid response, and robust data analysis, pipeline operators in South America and beyond can safeguard their networks against the growing risks posed by geohazards.

From unknown to understood: Phoenix pipeline inspection and mapping

One platform. Two capabilities. Phoenix sets a new standard in pipeline inspection and mapping. Its modular design and advanced technology make it suitable for a wide range of sectors — including oil and gas, water and energy infrastructure — wherever reliable internal pipeline understanding is required.

The Phoenix Smart Pigging System, developed by **iNPIPE PRODUCTS™,** combines high accuracy dimensional mapping with high definition visual inspection in a single platform. This dual capability, enhanced by AI-driven predictive analysis, provides operators with actionable insights that go beyond traditional inspection approaches.

A recent project in the water sector illustrates its adaptability. Faced with a 4.2 km ductile iron main with no existing documentation, a civil engineering firm required a complete internal survey. Phoenix delivered a turnkey solution: bespoke launch and recovery methods, accurate dimensional mapping, and high resolution internal imagery — transforming an undocumented pipeline into a fully understood asset. Designed and deployed by iNPIPE PRODUCTS™, the system provided the client with comprehensive insights in a single pass.

At the heart of Phoenix is its debris mapping tool, which integrates 360° sensor technology with HD video capture. The system delivers dimensional measurements accurate to 0.1mm at 5mm intervals, while simultaneously tracking pig position throughout the pipeline. The combined data set produces a comprehensive condition profile, invaluable for identifying features such as joints, valve seats and seals.

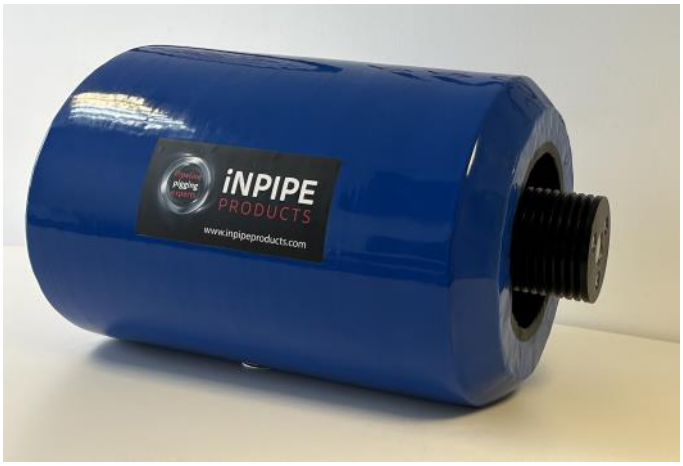
Phoenix software also identifies and quantifies debris, pinpointing its exact location and calculating volume. This enables targeted cleaning programmes and predictive maintenance planning. This capability is particularly valuable in oil and gas pipelines, where deposits such as wax, scale, sand and black powder can reduce efficiency, accelerate corrosion and damage downstream equipment. By accurately locating and quantifying debris, Phoenix enables targeted cleaning campaigns that improve flow assurance and support long term integrity management. With integrated AI, Phoenix can validate cleaning frequencies and forecast debris accumulation — empowering operators to optimise tool selection and pigging regimes.

The system is modular and fully configurable for each application. Options include a rigid metal-bodied cup pig or a flexible foam pig for negotiating tighter bends and more complex geometries. Scalable for use in pipelines from 600mm to 3200mm in diameter, Phoenix ensures accuracy and reliability across a wide range of operating environments.

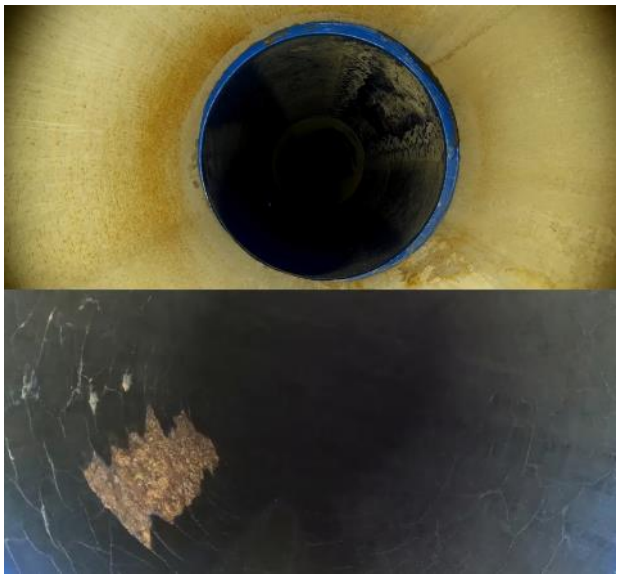
Every Phoenix system is designed, manufactured, and tested in the UK by iNPIPE PRODUCTS™, backed by over four decades of pigging expertise. The company provides comprehensive support from initial design through to successful deployment — anywhere in the world. The result is a robust inspection platform that delivers faster turnaround of actionable data, greater measurement accuracy and broader adaptability than conventional single function tools.

By combining precision, versatility and predictive intelligence, Phoenix enables operators across multiple sectors to move confidently from the unknown to the understood.

Pre-loaded cassette



Phoenix vision camera



Internal high definition video inspection

Phoenix flexible modular options

iNPIPE PRODUCTS™ achieves RoSPA Gold Medal for sixth consecutive year

iNPIPE PRODUCTS™ is delighted to announce that it has been awarded the RoSPA Gold Medal (six consecutive Golds) Award for health and safety achievement. This recognition highlights the company's continued commitment to protecting its people, clients and the wider community, and reflects the dedication of the iNPIPE PRODUCTS™ team to achieving the highest standards in health, safety and wellbeing.

Simon Bell, Managing Director at iNPIPE PRODUCTS™, said:
"We are extremely proud to receive this award once again. It underlines the ongoing commitment of our people to maintaining the highest standards of health and safety across our operations and demonstrates our determination to continuously improve."

The RoSPA Awards are the world's largest health and safety awards programme, attracting nearly 2,000 entries annually from over 50 countries. They recognise organisations who set the benchmark for accident prevention and safe working practices worldwide.

4Pipe Hidropig: Customer Service Capacity

By – Andrieli Marinho and Mateus Nobeschi

In the competitive industrial market, the ability to effectively serve customers is one of the key factors that determine a company's success. **4Pipe Hidropig** is a clear example of this, demonstrating that agility and commitment go hand in hand with quality and efficiency.

Delivering Projects with Agility and Accuracy
Recently, 4Pipe Hidropig was chosen to supply 63 cleaning and batching pigs for a 48" pipeline in a South American project led by a major engineering company operating under the EPC/IPC model, serving the Latin American mining sector.

The company's advantage lies not only in the quality of its products but also in its ability to respond quickly to tight deadlines. The request was received with an extremely short timeframe: to manufacture and deliver pigs with different densities, suitable for multiple stages of the operation, with deliveries starting in less than 10 days.

Development and Delivery in Record Time
To meet this demand, 4Pipe Hidropig developed and manufactured the 48" mold in record time. In just seven days, the first pigs were ready for shipment. The initial units were delivered in less than 15 days, and the complete delivery of all 63 pigs was finalized in less than 30 days — all while maintaining the quality and efficiency required by the project.

Commitment That Makes the Difference
This case exemplifies how customer service capacity goes far beyond simply delivering a product. It involves understanding urgency, adapting processes, innovating, and working with a focus on the client's operational success.

Successful high backpressure pigging in ultra-deep-water using Coiled Tubing downline—Halliburton

By Rodrigo Gianni Ferrira, Halliburton

As part of the pre-commissioning activities in a deep-water offshore field in Brazil, eight FCG (flooding, cleaning and gauging) operations were required on production, gas injection and gas lift pipelines of various diameters and lengths (up to 10" diameter and 23 Km long) to fill, clean and confirm pipeline geometry in preparation for the next pre-commissioning steps. The pipelines are constructed using CRA (corrosion resistant alloy) and hence, had to be flooded with clean freshwater to avoid corrosion due to ingress of salt and ferrous metal particles. The operations were performed by pumping fresh water from a CSV (Construction Support Vessel) using a specially designed CRA coiled tubing string to reach 2100 meters water depth and powerful diesel driven pumps to ensure the high flowrates and pressures required.

Challenges

- Deliver clean freshwater into pipelines at 2100 meters water depth
- High flowrates needed to keep minimum pigging speed
- High friction head loss on the long downline
- Large quantity of freshwater required: more than CSV capacity
- SIMOPS with a second vessel to store and supply freshwater

Solutions

- CT (Coiled Tubing) as a downline.
- CRA CT eliminated corrosion, avoided cleaning / pickling of CT and reduced friction.
- 550 Bar working pressure CT: to achieve required flow.
- High pressure HT-400 pumps on small footprint.
- Integration of water supply vessel and clear communication process

Results

- All eight FCGs successfully performed
- 130 hours of continuous safe operation
- 20 hours of pumping at 200 Bar and average 900 liters per minute
- Over 77 hours saved due to CRA CT reduced friction pressure / higher flow

Through collaboration with the customer, a safe, efficient and environmentally responsible solution was engineered and delivered to meet the project requirements

Figure 1: CRA CT string

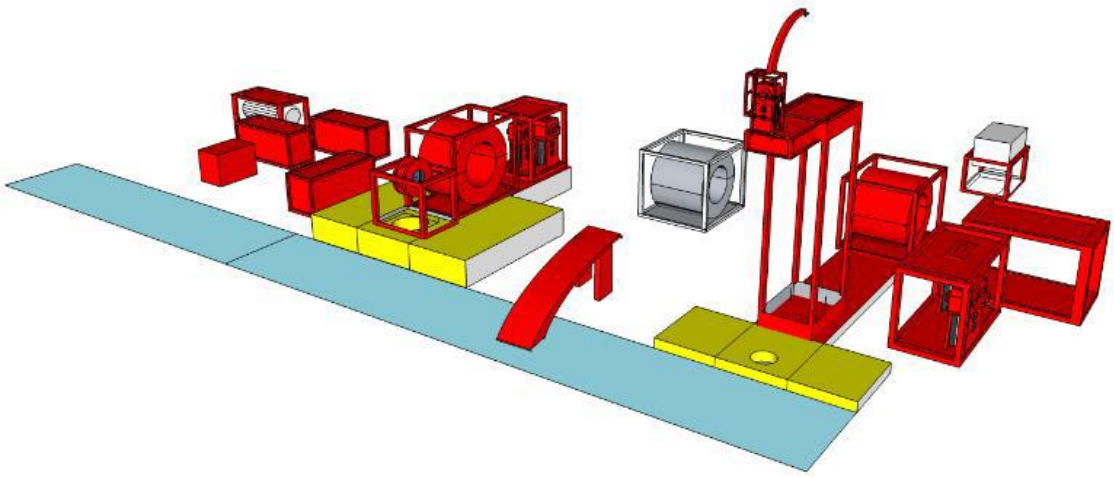


Figure 2: Operational layout

From data to decisions: Leveraging destructive testing to unlock the truth about complex cracking in LF-ERW pipelines - Phase II

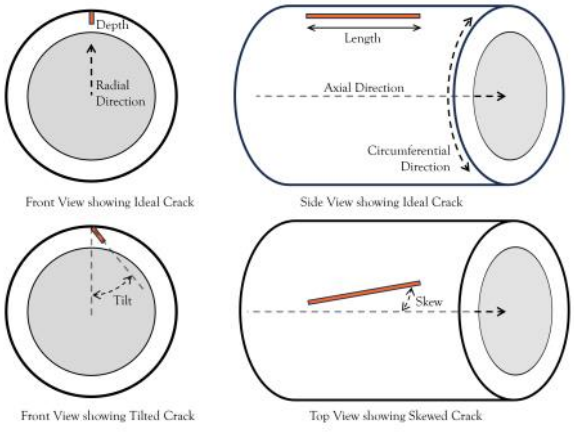
Pipeline integrity is built on trust, trust in inspection data, trust in verification techniques, and trust in the conclusions operators draw to keep their networks safe. Yet, when complex crack geometries distort that data, trust can falter.

For operators managing vintage low-frequency electric resistance welded (LF-ERW) pipelines, anomalies such as “hook cracks” and other off-axis flaws can challenge the limits of inline inspection (ILI) and non-destructive examination (NDE). A recurring question arises:

When NDE results don’t align with ILI, which do you trust and can either be refined to give the full picture?

This article presents Phase II of a joint investigation by **NDT Global and Phillips 66**, building on the Phase I study published last year: *Novel approach for detecting and identifying complex cracking in LF-ERW pipe, a real case study*. Phase I established a systematic method for recognizing ILI signal patterns associated with complex crack geometries particularly hook cracks validated through in-field NDE.

Phase II advances the work by incorporating destructive laboratory testing to provide metallurgical ground truth. This not only tests the accuracy of the Phase I methodology but also reveals where NDE classifications diverge from reality, allowing for more precise defect characterization and better-informed remediation strategies.



How tilt and skew in crack orientation complicate ultrasonic inspection

Phase I Recap: Establishing Pattern Recognition Methodology

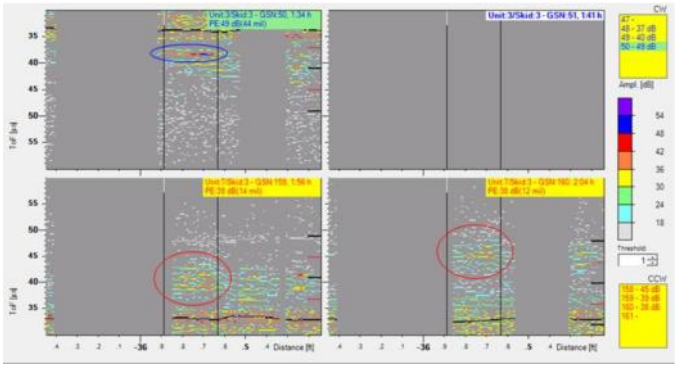
The Phase I project began with a high-resolution axial crack ILI of a 6 in, 1951 LF-ERW pipeline. Analysis revealed numerous weld-line anomalies with complex signal patterns. Field NDE using phased array ultrasonic testing (PAUT) confirmed several as hook cracks, alongside other defects.

From these verified digs, NDT Global developed a **signal pattern recognition methodology** to flag potential hook cracks in the remaining ILI data. Two signature patterns emerged:

1. **Amplitude/Pattern Asymmetry**: Clockwise (CW) and counterclockwise (CCW) sensors showed markedly different amplitudes or patterns, typical of tilted or skewed flaws.

2. **Alternating Reflections**: Similar CW/CCW signals, but with alternating internal/external reflections, suggesting multiple reflectors or complex geometry.

By applying these patterns, the team was able to classify unverified anomalies as likely, possible, or unlikely hook cracks. Phillips 66 used this information to prioritize digs, aiming for maximum risk reduction.



B-scan data showing different clockwise and counterclockwise sensor responses, a key signature of complex hook cracks

Phase II: Metallurgical Validation of the Phase I Findings

While Phase I created a robust pattern recognition process, the team knew it was based on NDE field classifications, which, while valuable, are not infallible. The question remained: *Were those classifications correct?*

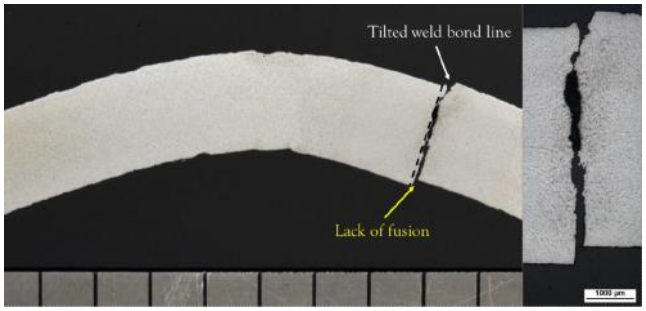
To find out, Phillips 66 expanded the verification program in Phase II. This time, they brought in a new NDE vendor using Total Focusing Method (TFM) ultrasonics. Unlike PAUT, TFM synthesizes data from multiple sound paths into a high-resolution image of the inspection zone, potentially revealing more detail about defect geometry.

Nine anomalies from seven pipe sections classified in the field as eight hook cracks and one lack-of-fusion (LOF) defect were selected for destructive metallurgical testing.

Ground Truth: The Lab Tells a Different Story
The destructive testing results were illuminating:

- **6 of 9** anomalies were confirmed as **weld bond-line LOF defects**, caused by insufficient edge preparation or heating during manufacturing
- **3 of 9** were **surface laps** sharp unfused folds in the pipe surface near, but not at, the bond line, likely formed during weld upset
- None showed evidence of in-service crack growth

Several anomalies that appeared to be hook cracks in ILI and NDE were, in fact, different defect types. This finding underscored a key limitation of non-destructive methods: even with advanced ultrasonic techniques, geometry and orientation can disguise a defect's true nature.



Metallurgical cutouts reveal that suspected hook cracks were actually lack-of-fusion and surface lap anomalies.

Refining the Patterns: Distinguishing Hooks from Laps
A detailed review of ILI data showed that surface laps near the bond line can **mimic hook cracks** in signal behavior different CW/CCW responses, high-amplitude corner echoes on one side, and "cloudy" multiple reflections on the other.

The differentiator was in **a reflection path blocking**: the lap's position partially obstructed certain bond line-surface echoes, subtly altering the amplitude distribution. By incorporating this nuance, NDT Global refined the Phase I rules removing one of the original two patterns, which destructive testing showed was unreliable for hook crack identification.

Applying the updated rules to more than 3,000 below-reporting-threshold anomalies reduced the candidate list for complex weld defects to fewer than 20 giving Phillips 66 a leaner, higher-confidence target list for future digs.

Sizing Accuracy: Clearing the ILI's Name
One of the original concerns in Phase I was that the ILI tool was under-sizing defect depths compared to NDE. Vendor 1's results suggested a consistent bias. However, when the metallurgical testing established the true depths, the story changed: the ILI measurements were **within their performance specification**. The apparent under-call came from NDE sizing inaccuracies not the ILI. Regarding the NDE data against the lab results, it brought both vendors' measurements into close alignment with ILI sizing curves. Statistical validation per **API Standard 1163** confirmed an actual tool tolerance of ±35 mils at 80 % certainty better than the contractual specification.

Lessons from Phase II for the Industry
The progression from Phase I to Phase II delivers several lessons for operators and service providers:

1. **Avoid Adjusting ILI Sizing Curves Solely Based on NDE** Without destructive testing, there's a real risk of introducing bias rather than correcting it
2. **The Value of Metallurgical Destructive Testing** Metallurgical destructive testing remains the gold standard for defect characterization and a vital benchmark for validating both ILI and NDE
3. **Adherence to a Systematic Methodology** A structured, protocol-driven approach—controlling for NDE limitations and asset-specific conditions—avoids premature conclusions
4. **From Hypothesis to Conclusion, Evaluating Accuracy** Probe choice, pipe curvature, and defect geometry can all compromise NDE accuracy
5. **Limitations of Field Verification Tools and Techniques** When proven against destructive testing, ILI signal patterns can focus resources where they matter most

For Phillips 66, Phase II delivered tangible benefits:

- Increased confidence in identifying true hook cracks
- Confirmation that ILI met or exceeded specification
- A smaller, better-targeted remediation list for future digs

For NDT Global, the project reinforced the importance of combining high-resolution ILI data with rigorous verification and validation to ensure inspection technology delivers not just data, but actionable insight.

Conclusion
Phase I hypothesized that certain ILI signal patterns could be used to identify hook cracks more accurately, even in complex geometries. Phase II put that hypothesis to the test with the highest standard of proof - destructive metallurgical analysis and found that the ILI was more accurate than initial NDE suggested.
The result is a refined methodology that combines advanced data analytics, targeted field verification, and ground truth validation to produce higher confidence, lower risk, and better-informed integrity decisions.

Revealing the hidden threats: How low field MFL is transforming pipeline integrity

Matt Romney
Product Line Director, T.D. Williamson, USA

Mike Kirkwood
Director, Integrity Engineering Solutions,
T.D. Williamson, UK

Understanding the Challenge: CSCC and Girth Weld Complexity

Circumferential Stress Corrosion Cracking (CSCC) is a form of environmentally assisted cracking that occurs when tensile stress, corrosive environments, and susceptible materials converge. Unlike axial SCC, which forms perpendicular to hoop stress and is more readily detected by conventional axial crack tools, CSCC manifests in off-axis orientations—often triggered by unintended bending, geohazards, or residual construction stresses.

Girth welds are, generally, not a threat to pipeline integrity unless they contain defects. When girth weld defects are present, they might include burn-throughs, misalignments, porosity, and start-stop anomalies and metal loss. These features are difficult to assess with standard MFL tools, which often miss or mischaracterize the anomalies due to their orientation and metallurgical complexity.

The LFM Advantage: Seeing What Others Miss

Figure 1: Example MDS™ Pro tool featuring (technology order left-to-right) SpirALL® MFL (SMFL), axial MFL (MFL), low-field MFL (LFM), deformation (DEF), internal/external discrimination (IDOD), and inertial mapping (XYZ)

MDS™ Pro (Figure 1) is a multi-technology inline inspection platform designed to deliver the most comprehensive assessment of pipeline integrity threats. By simultaneously collecting data from six independent technologies—including axial MFL, SpirALL® MFL (SMFL), deformation (DEF), internal/external discrimination (IDOD), inertial mapping (XYZ), and low-field MFL (LFM)—MDS™ Pro enables operators to detect, classify, and prioritize complex anomalies with unmatched precision. This integrated approach allows for reliable identification of interacting threats such as corrosion coincident with dents, hard spots, and stress corrosion cracking (SCC), which are often underreported or missed by single-technology tools, making MDS™ Pro a cornerstone in modern pipeline integrity management.

Among these technologies, Low-field MFL (LFM) stands out for its unique sensitivity to changes in steel microstructure, permeability, and stress—especially around sharp features. Unlike traditional axial MFL, LFM operates at a lower magnetic energy state, making it particularly effective at identifying circumferential stress corrosion cracking (CSCC), hard spots, and strain-induced anomalies. As industry specifications evolve, LFM is increasingly recognized not just as a detection tool, but as a critical asset for anomaly prioritization and material verification in high-risk pipeline environments.

Case Study: Girth Weld Analysis with MDS™ Pro

During the analysis of a pipeline inspected by MDS™ Pro, the Data Analyst noticed several locations where the LFM channel showed unusually strong indications with minimal corresponding metal loss signal on the standard MFL. These locations also coincided with unintended bends in the route (picked up by the IMU mapping unit), suggesting the possibility of elevated bending stress. Suspecting something lurking, the operator excavated those sites. Sure enough, they discovered colonies of CSCC right where the LFM had indicated. In contrast, a conventional axial MFL-only inspection earlier had not raised an alarm in those locations. Thanks to LFM, the cracks were identified and repaired under controlled conditions – averting a potential in-service failure.

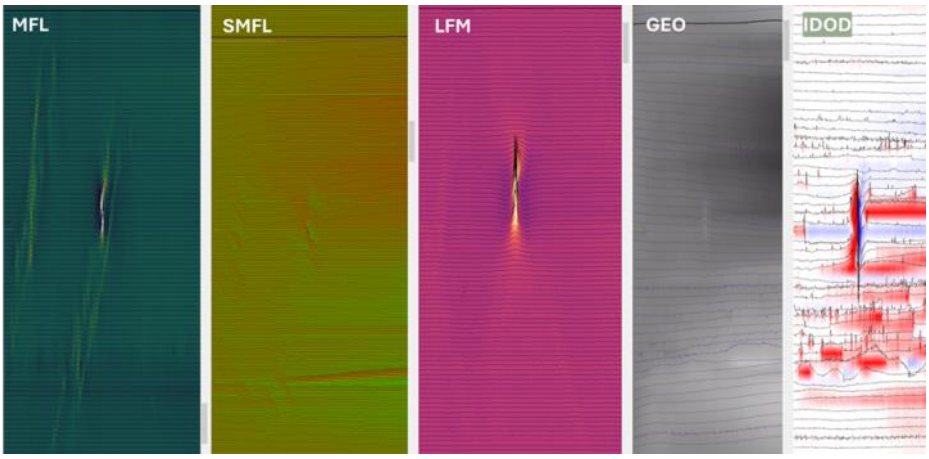


Figure 2: MDS™ Pro data with exaggerated LFM response indicating CSCC

In another case, MDS™ Pro was leveraged to assess an aging girth-weld that had corrosion nearby. The axial MFL data suggested metal loss stopped at the weld boundary, perhaps implying the weld was unaffected. However, the combined SpirALL MFL and LFM data told a different story – LFM indicated a permeability anomaly extending into the weld area. Upon investigation, it became clear that the metal loss continued into the weld zone, potentially impacting the weld integrity. This critical insight, only evident by comparing all available datasets including LFM, prompted the operator to perform a targeted weld repair. By catching the full extent of the defect, LFM helped avoid leaving a weakened weld in service, thereby mitigating a significant integrity threat that might have been overlooked.

Industry Momentum and Future Outlook

The growing body of evidence supporting LFM has led to its inclusion in specification development and industry uptake. Today, LFM is being leveraged for material verification, to enhance mechanical damage, hard spot, CSCC, and girth weld anomaly detection, identification and prioritization.

As the industry continues to refine crack detection and sizing—especially for gas pipelines—LFM stands out as a cornerstone technology. Its ability to detect subtle metallurgical shifts and correlate them with mechanical stress makes it indispensable for modern pipeline integrity management.

Central Polymer and Engineering Supply's decoking pigs

From 1998, **Central Polymer and Engineering Supply** started to develop decoking pigs. Decoking pigs are used to remove hard and rigid coke in the furnace heater pipe or exchanger pipe. Their appendages are composed of carbide, which can break rigid coke deposits. There are two types: Pin type and stud type. Both types can clean the coke successfully. With our special formula, these decoking pigs will not be stuck in the pipe and remove the coke totally. They are pushed by high pressure water during pigging. They have been used successfully in many refineries in Singapore, Malaysia, Indonesia and other countries.

Central Polymer and Engineering decoking pig

High-performance composite repair solution for pipe reinforcement

Overview

The aim of the job, performed in Europe in April 2025 by **3X ENGINEERING (3X)** specialists was to repair a 6" buried onshore gas pipeline with a dent and scratches. An impact caused the defects. The pipeline had a 64 bar pressure and 50°C temperature.

To restore pipe integrity, 3X high-performance composite solution **REINFORCEKiT® 4D (R4D)** was used.

Scope of work

Defect characteristics as below:
Dent's dimensions: 600 mm x 140 mm x 10.1 mm
Depth of dent (% of OD): 6% / Metal loss: 22% (1 mm)

According to ISO 24.817 standard and FEA simulation, it was determined to apply 22 layers of **R4D** (Kevlar® tape impregnated with bi-component epoxy resin) to repair the pipeline.

Surface preparation was completed using Bristle Blaster® machine to achieve a valid cleanliness degree (St3 equivalent to SA2.5) and a good surface roughness (leading to 80µm Rz), then confirmed using the surface roughness tester.

After checking hygrometric conditions, the surface was cleaned with acetone before composite wrapping.

The composite repair was completed following below stages:

1/ F3X8 filler was firstly applied over the defect to remodel the surface.
2/ A first layer of 3X resin was then applied to provide good adhesion with the composite material.
3/ Twenty-two layers of **R4D** were wrapped around the pipe for a total repair length of 90cm.
4/ Final layer of resin was applied over the repair and id plate was installed for traceability.

Results

Resin samples were collected during each stage for quality control. Hardness measurements, performed after job completion, confirmed the successful repair.

The composite repair is designed for a 20 year lifetime.

Small-diameter baseline inspector from IP Pipeline Technology

Authors: Rita Gu, Kiki Jiang
Affiliation: IP Pipeline Technology, China

The commonly used traditional method for baseline inspection of newly built pipelines before production is to use an air compressor to drive the detector to run in the pipeline. Under this method, when the detector encounters bends or changes in wall thickness, it is easy to experience "gas surge" phenomenon. The phenomenon of "gas surge" refers to the sudden release caused by the accumulation of pressure in front of the resistance zone, which causes the speed of the detector to soar to over 10 meters per second. In these high-speed areas, the detection data is invalid. For baseline inspection of pipelines over 12inch, our company uses a self-propelled detector. If you are interested, please check our company's previous news. For pipelines under 12inch, self-propelled detectors are not applicable. For this situation, IP Pipeline Technology has successfully developed a small-diameter backpressure pneumatic geometric detector through long-term research and testing.

1. **Design Principle**

The purely pneumatic design utilizes a cup-shaped component with a diameter smaller than the pipeline's inner diameter. In normal operation, it adopts a non-contact annular leakage mode, where the annular gap allows airflow to create a driving pressure differential between the front and rear of the inspector. This provides propulsion force while effectively mitigating speed fluctuations caused by gas bursts. Additionally, flexible steel brushes are integrated to ensure stable support. During operation, the compressible deformation characteristics of these brushes maintain smooth movement.

2. Pull Through Test Results

Pull through tests conducted on a 8inch Aero caliper showed an operational resistance of approximately 20kg in straight pipe sections.

3. Working Mechanism

The diameter-adaptive mechanism operates as follows:

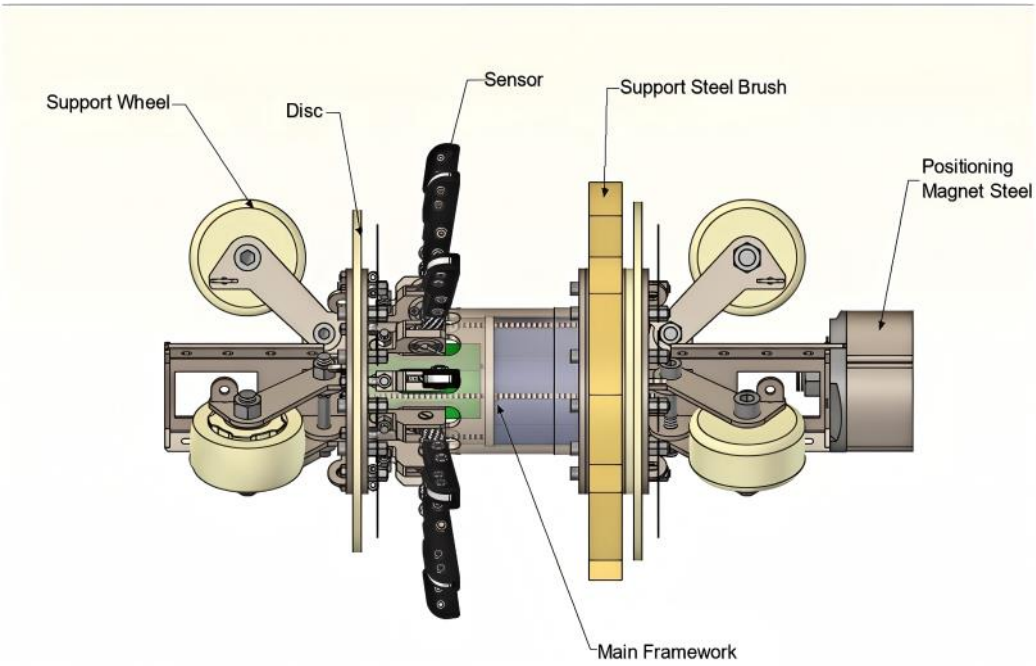
- In standard pipe sections, Aero caliper is driven by gas pressure differentials.
- At a target speed of 5m/s, the gas-induced pressure differential balances the 20kg operational resistance, maintaining steady motion (per dynamic equilibrium equations).

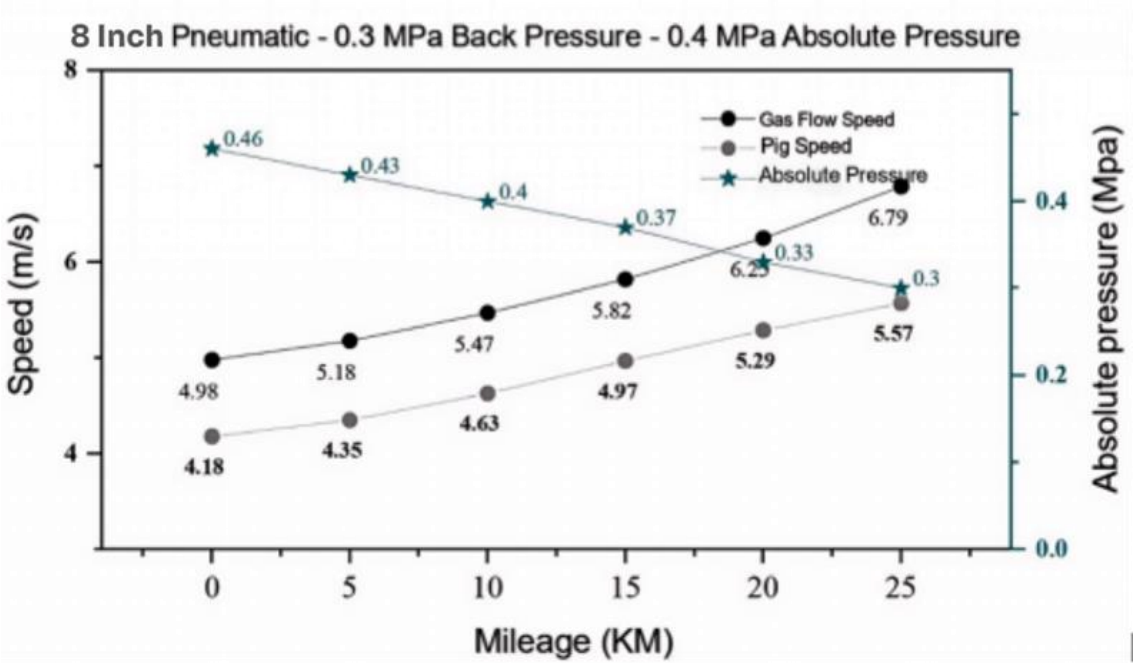
4. Key Calculations

- Pipe Cross-Sectional Area: $A=\pi d^2/4=0.33m^2$ (pipe inner diameter d=205mm).
- Effective Leakage Ratio: $\phi=10\%$ (accounts for annular gap and brush clearance).
- Pressure Differential Requirement: Computational fluid dynamics (CFD) simulations determined a total leakage pressure drop coefficient of 10. To achieve the required 20kg thrust, a pressure differential ΔP=20kPa must be established.

5. Operational Parameters

- Backpressure: 0.3MPa (operating pressure).
- Gas Flow Rate: $Q=50m^3$/min (provided by the compressor at the launching end).
- Pipeline Length: 25km.





6. Pressure and Velocity Analysis
As the inspector travels along the pipeline:

- Gas pressure decreases with distance.
- Flow velocity increases toward the downstream end.

The backpressure mode minimizes pressure/velocity differences between the pipeline's start and end, stabilizing the driving differential and preventing erratic motion. This mode also allows higher pressure differentials at lower actual flow velocities, reducing speed disparities between the gas and inspector.

The simulation confirms stable operation at 5m/s, with speed variations below 1.39m/s, ensuring high-quality geometric inspection in small-diameter pipelines.

This detector has been used multiple times in the newly built pipelines, and has demonstrated a highly stable operating speed in pipeline inspection, ensuring the quality of inspection data. Provide a stable and high-quality inspection solution for small-diameter newly built pipelines!

PPIM 2026 set for 19-22 January in Houston

The 2026 **Pipeline Pigging & Integrity Management Conference** comes early next year, opening on 19 January with the educational programme and 20 January for the exhibition. The technical presentations will follow on 21-22 January.

The organisers tell PPSA that spaces are still available in the Exhibition Hall. They expect to be completely sold out by 30 September.

Coming off another record turnout of 4000+ in 2025, the organisers at **CLARION** foresee continued growth in the market for pigging and inspection as well as other integrity-related services, which means greater interest than ever in PPIM. The event is the world's largest meeting focused exclusively on operational safety and reliability of pipeline systems. More information can be found at ppimconference.com.

Prior Power Solutions expands nitrogen pump rental fleet with an additional £1 million Investment

Following the launch of its nitrogen pump rental service in 2024, **Prior Power Solutions** has announced it is investing a further £1 million to grow its rental fleet to meet rising international demand.

Only one year from launch, the business is experiencing rising demand for its rental offering which has led to orders from principal markets including the Gulf of Mexico, Australia and Africa.

The company's latest investment includes the introduction of an acoustic nitrogen pump engineered to comply with strict noise control standards without compromising performance across tough operational settings. Beyond individual pump rentals, Prior Power Solutions is also experiencing increased rental demand for entire nitrogen service packages including over-pressurization skids and critical spares.

The business is also seeing demand grow from owner-operators many of whom are opting for a combined rental and purchase model to support their operations. The need for nitrogen pumps continues to rise, driven by applications such as purging, well bore cleanouts, well fracturing, and nitrogen perforation.

James Rix, Managing Director of Prior Power Solutions said about the investment:

"Our nitrogen pump rental service has achieved extraordinary results in the past year which has led to the decision to expand our fleet to meet customer needs. This includes adding more pumps and comprehensive service packages. Operators around the globe seek our solutions, training and technical support because they recognise our commitment to quality service and superior equipment."

In addition to growing its rental service offering, Prior Power Solutions has seen an increase in demand for its specialist training programmes with rental customers securing the training to enable efficient and safe field operations.

Prior Power Solutions announced its latest £1 million investment following an identical investment last year which launched the rental service.

Prior Power Solutions is a UK-based Original Equipment Manufacturer (OEM) specialising in nitrogen pumps, fluid pumps, hydraulic power units, coiled tubing equipment, compressors, and generator sets. With over 30 years of expertise, the company provides high-quality equipment and technical support to the offshore oil & gas, renewables, marine, agriculture, and construction sectors worldwide.

Prior Power acoustic nitrogen pump

ptc 2026 Returns to Berlin as the Global Pipeline Event

The 21st **Pipeline Technology Conference (ptc)** returns to the Estrel Congress Center as The Global Pipeline Event, welcoming participants from more than 60 countries to Europe's leading pipeline conference and exhibition. The four-day program begins with intensive training courses on Monday and continues with three days of keynotes, panel discussions, seven parallel technical tracks, and a closing Plenary "World Pipeline Outlook." Exhibition hours run alongside the sessions, with networking highlights including the ptc Meetup, the Get-together, and the Networking Dinner.

ptc 2026 features more than 150 technical presentations and global case studies that address the questions most relevant to operators and engineers today. Focus areas include lessons learned from failures and their translation into better practice; the security and resilience of critical infrastructure; emissions measurement and reduction; hydrogen transport alongside CO_2 pipelines; and the impact of rising AI data-center power demand on energy networks.

The technical program spans the full pipeline lifecycle: planning and design, construction, integrity management and inline inspection, corrosion and cathodic protection, leak detection, digitalization and cybersecurity, fiber-optic sensing, geohazards, rehabilitation and trenchless technologies, decommissioning, standards and regulations, valves and fittings, welding, and more. In addition to the technical program, ptc offers Operator Roundtables, hands-on Workshops, the "Global Women in Pipeline - Empowering Women, Engaging Men" forum, and the several awards for young professionals. The event typically welcomes 1,000+ participants, 100+ exhibitors, and delegations from more than 100 pipeline operators.

Executing critical valve replacement on a 56” scraper trap receiver without halting production

STATS Group has successfully completed a 56” inline isolation of a crude oil pipeline in Saudi Arabia to enable a scraper trap valve replacement without halting production.

A major client in Saudi Arabia required the replacement of a 56” scraper trap valve, with the critical condition that the work be completed without shutting down, purging, or flushing the entire pipeline. STATS were approached to engineer a solution whereby an isolation tool could be deployed to allow the safe replacement of the scraper trap valve. Following a comprehensive engineering study and detailed site survey, STATS proposed a custom-designed 56" Tethered Tecno Plug®, tailored specifically for this application and to overcome challenges with some non-standard scraper trap features.

Jijo George, Middle East - Manager of Projects at STATS Group, said, “This is the largest Tecno Plug in the history of STATS, highlighting a remarkable milestone in our capability to deliver safe, innovative and large-scale isolation solutions for critical pipeline infrastructure.

This successful project provided a safe and cost-effective double block isolation, resulting in no interruption to production and preventing a costly shutdown. The safe and efficient workscope was a result of advanced planning, dedication and teamwork between STATS and client personnel.”

STATS Tethered Tecno Plug isolation system featured two integrated isolation modules, engineered to deliver a safe and controlled pipeline isolation. The first module, known as the Door Plug, replaces the scraper trap door and provides the primary isolation. Once primary isolation is confirmed, the second module - The Tecno Plug is advanced to its designated set location immediately downstream of the 56" scraper trap receiver valve.

Both modules are designed to deliver a fail-safe double block and monitored isolation. Each isolation plug features dual elastomer seals and taper locks, the annulus void between the seals can be pressure tested to confirm seal integrity before breaking containment. The inline isolation tool is DNV Type Approved and fully certified ensuring compliance with the highest industry standards.

Prior to mobilisation, a comprehensive Factory Acceptance Test (FAT) was carried out on all 56" equipment at STATS' Abu Dhabi facility. The test replicated site conditions and validated equipment performance under maximum isolation pressure. To further ensure integrity, an additional leak test was conducted at STATS' Dammam facility before final deployment at site. Both test phases were witnessed by client representatives, ensuring full alignment to stringent operational and safety standards.

Following thorough pre-deployment inspections, the deployment tray holding the isolation plugs was positioned in front of the pipeline scraper trap door. The client then depressurised the scraper trap and opened the door, enabling safe loading of the 56" Tethered Tecno Plug and Door Plug.

Using stem bars, both the isolation plugs were pushed on wheels into the scraper trap and advanced into the pipeline until the front isolation plug was in the minor barrel. Once in position, the rear Door Plug was hydraulically activated, causing the taper locks and dual seals to radially expand against the pipe wall. Seal testing was performed to verify the integrity of the primary and secondary seals, with both seals independently tested and monitored. The Door Plug replaces the scraper trap door and allows access for the tether (Hydraulic control and monitoring lines) to pass through, enabling the pipeline to remain pressurised and operational, without replacing or modifying the original scraper trap door.

After confirming the double block isolation, a leak-test of the scraper trap was performed and the 56" scraper trap valve was opened, allowing the Tethered Tecno Plug to be pushed downstream of the valve location. The compact design of the Tethered

Tecno Plug & Door Plug Deployment

Tecno Plug allowed the isolation plug to be set in the short section of pipework upstream of the production tee maintaining uninterrupted production.

With primary and secondary seal tests completed and double block isolation verified, the isolation certificate was issued and the client unbolted the existing scraper trap valve. The stem bar was hydraulically disconnected, allowing removal of the old valve.

During valve replacement operations, a remote monitoring module maintained continuous surveillance of the dual seals, relaying pressure readings in real time back to the STATS isolation technician. The Tecno Plug and Door Plug remained leak-tight and stable under monitored conditions throughout the remedial works, effectively isolating downstream pressure (55 bar) without halting production.

Following installation of the new 56" scraper trap valve, the stem bar was reconnected hydraulically and the valve fully torqued. Communication systems were verified, and a flange joint leak test was conducted. Upon successful testing, the Tecno Plug isolation certificate was withdrawn, and pipeline product was reintroduced into the section between the Tecno Plug and the Door Plug to equalise pressure and prepare for the isolation plug removal sequence. The Tecno Plug was then unset and retracted to its initial deployment position. After closing the new scraper trap valve, a pressure build-up test was performed to confirm valve integrity.

Finally, the Door Plug was unset and both the Tecno Plug and Door Plug were retracted to the original deployment tray, marking the successful completion of the operation.

Tecno Plug Valve Replacement

IK Trax signs exclusive global distribution agreement with PigRun Solutions

IK Trax, a specialist in pig tracking and pig signalling technologies, has announced a new exclusive global distribution agreement with Canadian-based **PigRun Solutions**. Under the partnership, IK Trax will distribute the Patriot Above Ground Marker (AGM), an advanced and versatile tracking solution.

The Patriot AGM is a complete solution for pig tracking, capable of detecting magnetic sources, electromagnetic transmitters and acoustic signals – all in a single, integrated unit. It supports multiple power options: alkaline batteries for standard use, lithium batteries for extended performance, and external power sources for prolonged deployments.

To further enhance the functionality, the Patriot AGM can be paired with PAT Track Dashboard, a real-time tracking platform that enables remote monitoring, interaction with tools and access to data from anywhere in the world. Features include interactive mapping, real-time data graphs and instant notifications, making it a powerful tool for operators seeking full visibility and control.

"This partnership is a strong strategic step for us" said Charlotte Hope, VP at IK Trax, " As an emerging company, PigRun have developed products with a clear understanding of industry needs – something that aligns strongly with our own ethos. Their commitment to delivering innovative tracking solutions makes this a natural fit for IK Trax and our clients around the world."

Ihab Skafi, General Manager at Pig Run added: "We're thrilled to announce our partnership with IK Trax. This collaboration opens up significant opportunities for mutual growth and success. By combining IK Trax's global sales expertise with our joint commitment to technological innovation, we're accelerating our roadmap and bringing powerful new solutions to market – creating meaningful impact across the industry."

With this partnership, customers around the world will benefit from a complete tracking system backed by trusted industry expertise.

To find out more or discuss how the Patriot AGM could support your operations, get in touch with the IK Trax team at sales@iktrax.com or visit https://www.iktrax.com