



Pigging Industry News

the newsletter of the Pigging Products & Services Association

THE PRESIDENT'S LETTER

By Dr. Mike Kirkwood, T.D. Williamson, UK

I would love not to talk about COVID but in the words of some of the worlds medical experts “we will just have to live with it, just like the flu”. However, COVID restrictions continue to relax so, on a positive note I do see some of our favorite conferences planned and my travel is booked! I am hoping I will meet, in person, some of our PPSA members that I have only seen digitally over the last two years.

In the industry, I have to talk about the weather again. We saw severe storms resulting the voluntary shutdown of the Transmountain system British Columbia, Canada late last year. The shutdown resulted in some fuel shortages but the pipeline was back up and running safely after only three weeks. This event, although not isolated, highlighted the fragility of our energy infrastructure but also the resilience of our industry to respond to get the pipeline operational over a challenging period with truly adverse conditions to overcome. As pipeliner's, we remain resolute in ensuring energy flow as safely as possible and as we move into a new era, we will see more demands on

pipeline systems to convey new products such as hydrogen and carbon dioxide. This brings me back to the PPSA and our annual seminar held in November 2022 with 7 presentations from PPSA members. Also, our webinar focus was on emerging fuels, one on the Future of Natural Gas from an Economic Point of View by Jan Frowijn of ROSEN USA and David Madero Suárez an Independent Energy Consultant and a second on Pipeline Integrity and the Transition to Hydrogen by Neil Gallon and Michael Tewes of ROSEN Group. The seminar papers are on the PPSA website at <https://ppsa-online.com/papers> and the webinar papers and videos where submitted are at <https://ppsa-online.com/webinar>.

On the social side, the next PPSA annual golf tournament is taking place at the Black Horse Golf Club in Houston, USA on 31st January. We are looking for teams and individual players to take part and companies to sponsor the tournament. Money raised will be donated to Young Pipeline Professional projects.

NEW Members

Full

PT. Farrel Internusa Pratama, Indonesia

4PIPE Hidropig Engenharia Industrial LTDA, Brazil

Elastomeros PVM SAS, Colombia

Details and how to book a place are at <https://ppsa-online.com/golf>

As I said previously, some of our favorite conferences are on. My first will be PPIM 2022 in Houston. As usual, we will hold the PPSA Annual General Meeting at 3pm, Tuesday 1st February 2022 in Houston at the PPIM Conference venue. The AGM is a great way to give your ideas about the future strategy of PPSA. Also we will be electing 2 new Directors from the Eastern Hemisphere to join the PPSA Board. We will be exhibiting at the PPIM exhibition and look forward to meeting up with our members and industry representatives there. Please come and see us in person! Other events this year that we will be exhibiting at include the ptc conference in Berlin in March and the IPC conference in Calgary in September.

As always, please keep up the great work you do and stay safe. ●

The PPSA golf tournament, 31st January 2022, Houston, USA

Thanks to our golf tournament sponsors:



Ice Pigging: Advanced pipe cleaning technology

By Paul Treloar

Ice pigging, a sustainable cleaning method for potable water distribution mains and wastewater force mains, was developed in the United Kingdom and introduced in the United States in 2012. The method involves pumping a slurry of ice into a main through a hydrant, or similar fitting, and using system pressure to push the ice pig downstream to exit through a hydrant or similar fitting. The ice slurry filling a pre-defined percent of a pipe's volume cleans with shear forces up to 1,000 times greater than with water alone, provides more effective cleaning, and uses significantly less water than traditional flushing methods.

An ice pig works like a glacier, rather than bulldozing sediment and biofilm, it incorporates them into the ice. Because the ice pig enters and exits through a hydrant, specialized launch and retrieval stations aren't required as with mechanical pigging or swabbing. Customer service isolation usually isn't necessary either.

Because the pig is an ice slurry, not a solid pig, it will not get stuck permanently. An ice pig can negotiate pipe bends, diameter changes, broken gate valves, and in-line butterfly valves without affecting the cleaning process. The technology was introduced to the US water industry in 2012 and since that time, over 400 full-scale potable-water distribution system cleaning projects, and sewer force main cleaning projects have been conducted across 43 States in the US.

Development history

Ice pigging technology was developed at the University of Bristol, United Kingdom, in 2000, and soon thereafter was granted a worldwide patent for its unique cleaning technology, which was primarily applied in cleaning food and beverage industry piping.

The University approached the local water company, to ask if there was a water industry application that could use ice pigging. At the time, the water company flushed its smaller-diameter mains and mechanically pigged the large ones. However, strategic mid-sized pipes (12–24 in.) were often left uncleaned because they were too difficult to take out of service for several days for conventional pigging.

In 2009, approval was granted from the UK's **Drinking Water Inspectorate**, the agency

responsible for water quality in England and Wales. The technology has since been used in the United Kingdom, Holland, Germany, France, Japan, Australia, Chile, Saudi Arabia, and the United States.

American Pipeline Solutions based out of Hackensack, New Jersey, are the sole service provider in the US, while in the UK, Europe and the rest of the World, Suez Advanced Solutions UK provide the service under the guidance of Phil Pettit.



24 inch Remote Tecno Plug® pipeline relocation

STATS Group was recently contracted by a multinational pipeline company in Canada to provide leak-tight double block isolation of a 24" crude oil line that required to be re-routed due to terrain stability issues. This complex and challenging project required the isolation plug to be pigged 64 miles, continually tracked and accurately positioned at the isolation location in order for the tie-in hot works to be completed within a 48 hour shutdown.

Data gathered from regular inline inspection (ILI) runs identified integrity issues and pipeline buckling due to ground movement where the buried pipeline travelled down a slope. In order to restore integrity to the line a new section of pipeline was laid avoiding the affected area and once the pipeline was isolated, purged and vented, the damaged section was cut out and the new section was safely welded and tied in. In order to fully assess the pipeline isolation project, an engineering and feasibility study was conducted to determine the safest and most efficient method of carrying out the isolation. Following the study, STATS proposed the use of a Remote Tecno Plug®, a piggable inline isolation tool which provides fail-safe double block isolation of pressurised pipelines while the system remains live and at operating pressure. The Remote Tecno Plug was chosen to provide the isolation over a traditional line stop method as it significantly reduced the number of fittings that would be left on the pipeline, therefore reducing potential future integrity issues and limiting the amount of equipment that would be required onsite. With the Remote Tecno Plug and technicians at the worksite, final pre-deployment checks were conducted on the isolation plug before it was loaded into the pipeline launcher. The Tecno Plug was installed into the launcher with two purge pigs at the front and two line fill plugs behind. The plugs were pigged through the pipeline to the isolation location with 90 metres of product between them. The plugs were constantly monitored and tracked through the pipeline to ensure accurate positioning of the plugs at the isolation location and a pre-installed nitrogen inject point to vent and purge the pipeline.

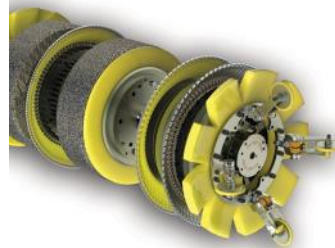
Once at location, the Remote Tecno Plug was hydraulically activated to engage the locks and dual seals. As part of the isolation barrier proving sequence, each seal was tested independently with full pipeline pressure in the direction of the expected pressure differential, proving both seals of the double block isolation were leak-tight. The annulus between the Remote Tecno Plug seals was then vented to ambient to create a zero-energy zone and an isolation certificate was issued the client. With the isolation in place, the remaining line was blown down by pumping nitrogen into the pipeline through an

injection point behind the isolation plug and pigging the purge pigs to the terminal receiver. Following the purging activities the affected section of pipeline was cut and the new pipeline was welded into place while the pipeline remained pressurized at 330psi. With the tie-in operations completed, the purge pigs were pigged with product from the terminal receiver towards the set Remote Tecno Plug displacing the nitrogen in the pipeline and equalizing the pressure in the pipeline. The Remote Tecno Plug was then unset, removing the isolation and all five pigs were pigged through the new section of pipeline to the terminal receiver.

Wes Gardner, Engineer for STATS Group said, "The workscope was completed safely in just 30 hours, providing the client with significant savings, and returning the pipeline to production ahead of schedule. The successful delivery of the project is testament to the teamwork and good communication between all parties."



24 inch Remote Tecno Plug®



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Enduro put years of engineering skill into the DFL™ Multi Tool. Using multiple data sets, our award-winning analysis team coordinates all of the data using our exclusive Pig Prog II Presenter™.



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14 years experience ILI of tank farm / depot pipelines

In the world of hydrocarbon transportation by pipeline, depot lines, jetty lines, lateral lines and others are often not constructed with in-line inspection in mind. They may be quite old and subject to different codes for design, construction and operation than transmission pipelines. Even the regulations governing operation of such lines may be different.

Such lines pose significant challenges for operators to achieve effective, high resolution internal inspections. SPSE operates a major depot at Fos-sur-Mer in France with more than 40 pipelines of 34" and 42" diameter connecting storage tanks to the manifolds. These lines required inspection. All lines had only a single point of entry possible, consequently all inspections had to be bi-directional.

Some years ago, SPSE conducted a review of available technologies and service providers in order to select the best solution since an inspection campaign stretching over several years was planned.

Several vendors and technologies were contracted during 2008 to inspect one of the 34" lines – each vendor a different line. Two vendors offered UT solutions and one, **3P Services**, an MFL solution. In order to make a real comparison among the competing technologies, a blind comparison test was arranged. Each candidate "pilot" pipeline was fitted with a test spool immediately downstream the launching position.

A range of artificial defects of varying dimensions was machined into the spool, mainly on the external surface. In addition, the spool had actually been in service in one of the lines and contained a population of natural defects, all of which could be considered typical examples of what could be anticipated in the coming inspections. The natural defects displayed a typical concentration at a 6 o'clock orientation. Exact dimensions of the natural defects, effectively the existing contours of the pipe's surface, were measured with a UT device. Effectively, a grid of 5cm squares

was superimposed onto the surfaces of the pipe to "map" the wall thickness and specific metal loss. Once 3P's inspection was completed and report delivered, the ILI data and report were aligned to the known map of features in the test spool and compared. Unity plots comparing actual defect dimensions with those reported by 3P. Plots for reported versus actual depth of artificial features, reported versus actual feature length and reported feature length (again artificial), and finally reported depth and UT measured depth of the natural corrosion features.

For all categories, 3P's reported results were largely well within the reporting specification. Some depth predictions were outside the tolerance lines, though these were found to be related to the location of deepest point of features crossing two 5cm grids. In addition, 3P's analysis reported virtually all of the features, artificial and natural, present in the line. Probability of detection and identification was therefore also demonstrated in the blind comparison test.

Based on these good test results, SPSE decided to go forward with 3P. During 2009, the first of a multi-year contract, 6 further 34" lines were inspected.

Aside from having only a single point of entry possible, the 34" lines contained another obstacle to pigging, especially to ILI tools: They were fitted with 30" gate valves. Just to make it easy, at least interesting, it was not possible to be certain that valves were fully open.

Removing the valve for each individual inspection was a very substantial extra cost and complication to SPSE. 3P evaluated whether it would be possible to traverse the reduced bore 30" valves, in both directions, without damage to the tool and without impact to inspection data.

New modules, especially the magnetic measurement module, were designed and constructed. Tests were also performed ensuring confidence that a tool could successfully be deployed into any of the depot lines.





06:00 view of 30" gate valve removed from the line



View of 30" gate valve in 34" pipe simulation



Simulation of partially closed valve

The tests were successful so that, from 2010 onwards, there was no further need to remove the 30" valves before making the inspections.

Other operational efficiencies and optimisations were also achieved. 3P assisted the design of a versatile launcher. The tests were successful so that, from 2010 onwards, there was no further need to remove the 30" valves before making the inspections.

Other operational efficiencies and optimisations were also achieved. 3P assisted the design of a versatile and robust temporary, mobile launcher, relatively easy to install and move from pipeline to pipeline.



During 2010, 5 x 34" and 1 x 42" lines were inspected. During 2011, 5 x 34" lines and 4 x 42" lines were inspected.

In the following years, more lines were inspected, finally more than 40 lines received their first inspection.

In 2020, following another competitive selection process, SPSE again contracted 3P to perform re-inspections of the depot lines.

Starting out as „non-inspectable“, procedure to inspect these lines is now considered fairly straightforward:

Tank lines

- Launch at tank, pump to manifold, reverse flow and pump back to launch
- 2 cleaning, often 1, cleaning run

Inspection

- Advantages
 - 2 data sets: tool records data travelling in both directions
 - Speed of confirmation of run success (usually within 12 hours)
 - Flexible tool capable of reducing from 34" to 30" diameter ●

ILI: The foundation for material verification

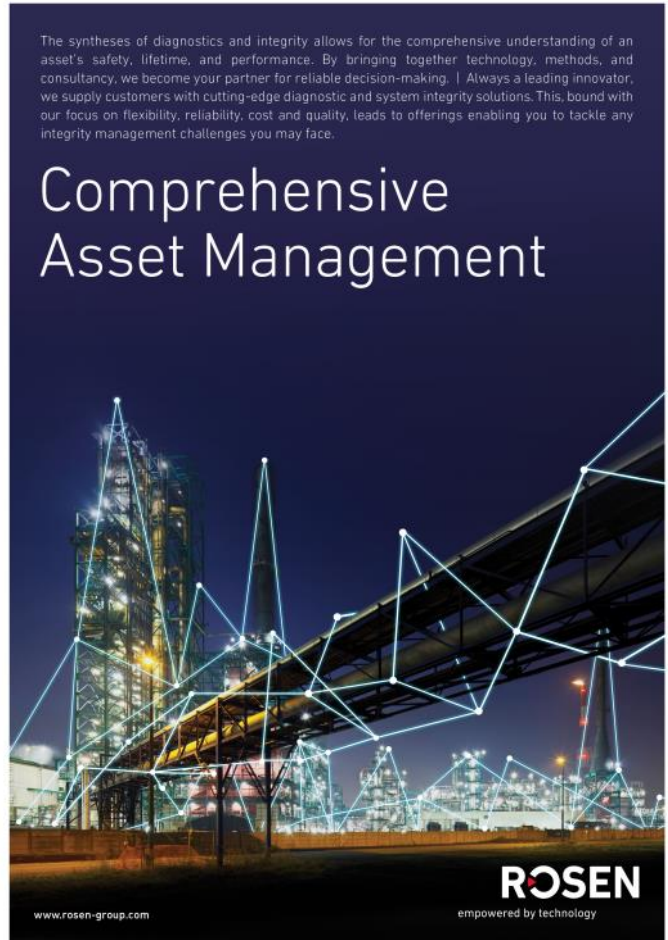
Author: Jason Edwards, Sean Knight

New regulations around the world are showing the importance of developing a comprehensive understanding of material properties. This is evident with the new **Pipeline and Hazardous Materials Safety Administration (PHMSA)** regulation in the US, which extended integrity management (IM) requirements in an effort to address issues related to pipeline data and documentation.

The new regulation, which came into effect on July 1, 2020, requires operators to possess traceable, verifiable and complete (TVC) records for onshore steel transmission pipelines, for the purpose of MAOP reconfirmation and input into integrity management. Operators may not have TVC records available for all pipes, but **ROSEN** has a proven solution.

ROSEN's material verification framework aims to support operators through the material verification process as prescribed in section 49 CFR §192.607. The core of ROSEN's material verification service is the Pipeline DNA process, which provides a comprehensive look into the pipeline's makeup or "DNA." ROSEN's Pipeline DNA process integrates multiple ILI datasets – MFL, geometry, mapping, material properties and other pertinent information – to establish "populations" of pipes within a pipeline. Each population has a unique combination of the following characteristics, as shown in Figure 1:

- Diameter
- Nominal wall thickness
- Strength (YS and UTS)
- Seam type



The key to the DNA process is ROSEN's Pipe Grade Sensor (PGS) technology, which provides strength data for each individual pipe. Figure 1 shows the distribution of yield strength, which allows ROSEN to provide an initial estimation of the material properties that make up a line with just one ILI inspection.

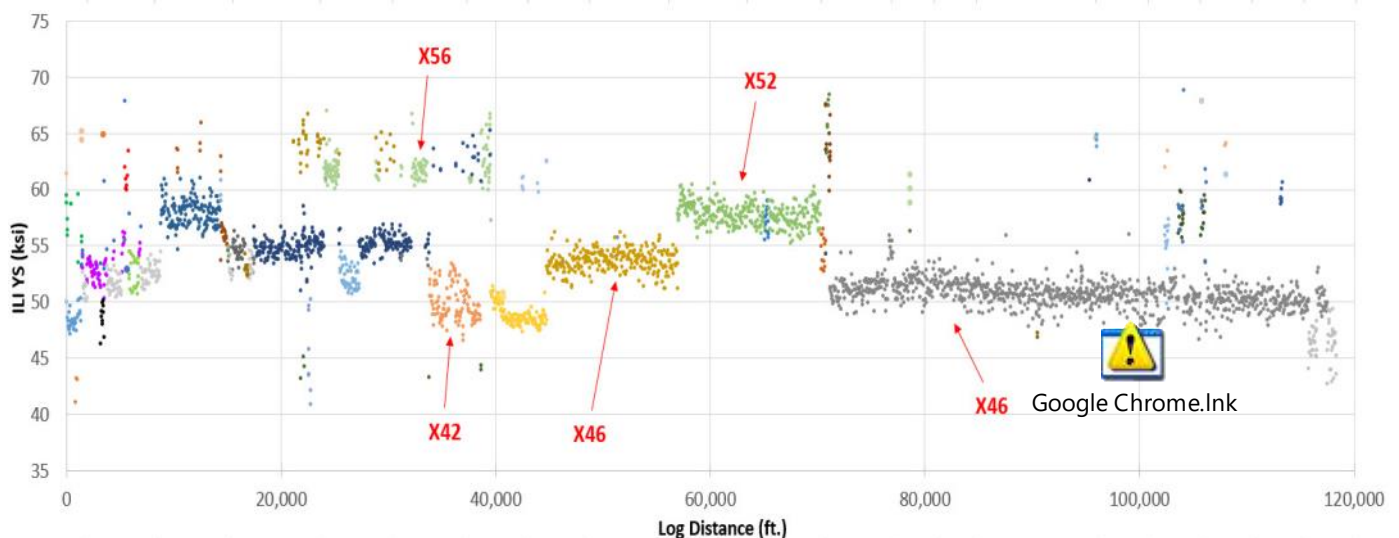


Figure 1: Populations identified along the full pipeline length with Romat Pgs grade assignment

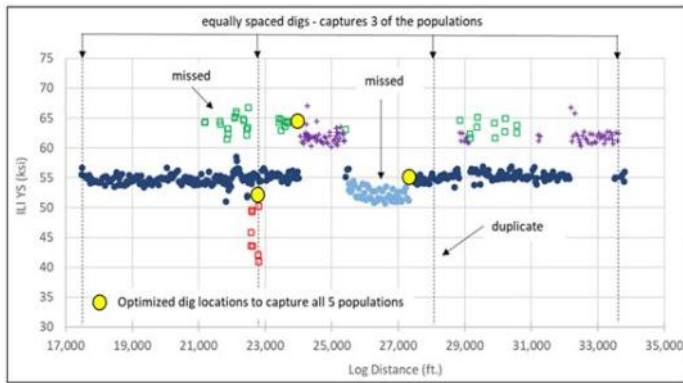


Figure 2: Example of the importance of selecting optimal material verification locations

ROSEN’s integrity engineers and technical specialists perform an integral part of the material verification process by analyzing existing pipeline records to validate and align the ILI data, ultimately producing a detailed and accurate picture of the pipeline. Non-destructive field verification can then be implemented to fill any gaps in the knowledge about the pipeline. This is essential in determining the TVC status of each population as stated in 49 CFR §192.607 and directly relates to the dig plan and the subsequent actions that are required to complete material verification action on the line.

ROSEN performs industry-accepted in-situ, non-destructive strength-determination testing as well as chemical analysis, in-situ metallography, and hardness and ultrasonic wall thickness measurements. A targeted verification program is then developed in collaboration with the operator until a robust understanding of the pipeline attributes is achieved. Dig sites can be targeted to efficiently capture populations that require further verification. This provides a significant advantage over the alternative of relying on an opportunistic or an evenly spaced dig strategy (1 dig per mile as outlined in 49 CFR §192.607), as illustrated in the hypothetical example in Figure 2. This figure shows that three digs could be used to capture all populations, whereas four equally spaced digs would miss two of the populations. Reliable knowledge of the pipeline’s populations can allow alignment of the material verification strategy with the locations of other planned dig (construction, integrity threats, other investigations, etc.) to save costs.

Using an integrated approach of enhanced ILI with destructive and non-destructive testing, in combination with a well-defined strategy for material verification, operators are now able to improve integrity management as well as satisfy regulatory requirements in a cost-effective and efficient manner. No standard approach will meet the objectives of every operator, making ROSEN’s ability to adapt and improve the material verification process to meet the needs of each operator while satisfying regulatory requirements a necessity. ●

KTN AS joins ROSEN Group

As of 1 January 2022, KTN AS becomes a full member of the ROSEN Group to provide its portfolio of services under the ROSEN brand.

For the past five years, KTN AS and the ROSEN Group have been working together, to provide in-line inspection services for challenging pipelines. This strategic alliance further extends ROSEN’s technology and capabilities portfolio and hereby increases the possibilities for customized solutions for challenging pipeline diagnostics. KTN AS offers an ideal opportunity for the ROSEN Group to broaden their offering; it allows the group to leverage their strength in the market and accelerate time to market goals by accomplishing its goal of adding an additional service pillar. KTN AS, much like the ROSEN Group, has always internalized the concept of ‘empowered by technology’ and is therefore a great match. KTN AS is a leading provider of proprietary, technology-enabled in-line inspection, particularly in the ‘unpiggable’ market segment. The decision to offer solutions under one brand was made to ensure operators are best supported in customizing solutions for their pipelines. No personnel changes will be made and services will continue to be provided by trusted experts.

The additions to the portfolio include mainly self-propelled tethered inspection units utilizing UT and TOFD technologies as well as additional resources for feasibility studies. The tethered in-line inspection method enables the collection of high-quality data on pipeline integrity status. ●

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Case study 24” & 36” high pressure plugs for pipeline decommissioning

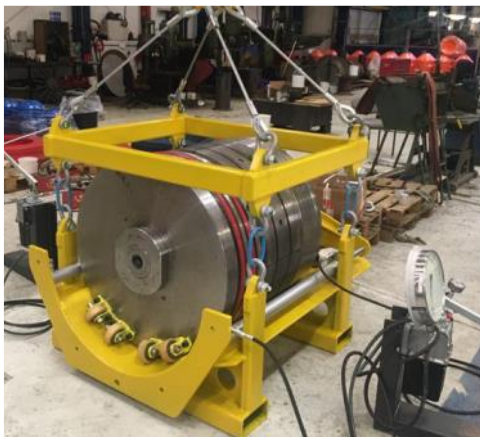
iNPIPE PRODUCTS™ was approached by a global chemical company who required high pressure plugs for the isolation of 24” and 36” pipelines at one of their facilities serving a major pipeline network in the North Sea.

Following a technical review of the project details and discussions with the Client, iNPIPE PRODUCTS™ provided a turnkey solution which included full project management, design, manufacture, supply and Factory Acceptance Testing of the high pressure plugs, with all work carried out at our extensive facilities in North Yorkshire, together with installation services on site. To facilitate easy installation lifting frames and loading trays were provided together with cradle and 36in pipe clamp, designed and manufactured specifically to suit the client project requirements. Initial requirements required remote pressure monitoring of pressures upstream of the plug together with plug seals and hydraulic energizing and deenergizing circuits, however this requirement was subsequently removed from the scope of supply by Client request.

The project required iNPIPE PRODUCTS™ to mobilize the requisite personnel for site management and installation of the tools. The project was completed successfully and with great feedback received from another happy client.




High pressure plugs



36in high pressure plug positioned in loading cradle



36in pipe clamp

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NDT Global's Proton Phased Array Service

Introduction

The history of inline inspection (ILI) dates to the early 1960's with magnetic flux leakage (MFL) inspection technology. In the 1970's and 1980's more sophisticated methods for accurately and reliably detecting pipeline defects were introduced such as, higher resolution MFL technologies and ultrasonic technology (UT) wall thickness measurements. The following decades saw the emergence and development of ultrasonic crack detection for axial and circumferential defects. By the end of the century and early 2000's UT inline inspections were capable of accurately detecting and sizing a more diverse range of pipeline anomalies. However, this can have limitations in detecting challenging defects such as long seam cracks. In these cases, pipeline operators resort to hydrostatic testing as part of their pipeline integrity program. Due to the possibility of asset damage and reduced throughput, hydrotests are not ideal.

Industry challenge

Challenging crack features continue to lead to pipeline failures costing operators hundreds of millions of dollars. Conventional ILI crack detection technologies are not always capable of accurately detecting, sizing, and classifying the most challenging crack like features and therefore, in some instances, cannot replace Hydrostatic Testing (HT) in pipelines. In 2014 a major pipeline operator required a solution for a specific type of long seam crack in their 26" pipeline. It is against this backdrop that NDT Global endeavored to design the next generation of ILI ultrasonic crack detection as a solution to the operator's problem.

NDT Global's solution

The culmination of over 2 years of research and development by the technology team at NDT Global led to a revolutionary ultrasonic inline inspection tool that met the customer needs and answered the industry challenge. The solution required a Phased Array inline inspection technology that provides absolute depth sizing by utilizing tip echo signals. This was the only way to accurately detect, size and discriminate, with high-confidence and accuracy, all crack like features in their pipeline. PROTON is the next generation ILI technology featuring a state-of-the-art Phased Array inspection system. In its standard configuration, five aligned datasets are combined in one inspection service.

How does the technology work?

The conventional ultrasonic setup requires known medium properties and is mechanically optimized for specific inspection conditions, for example mechanically fixed ultrasonic sensor angles are

required for various pipeline products. Different angles to overcome systematic limitations of conventional shear wave technology require a mechanical modification of the tool before launching. In contrast to that, the phased array solution allows for different shot scenarios, shot angles α , and circumferential resolutions without mechanical modifications. Sector scans, wall thickness paintbrush, wall thickness scanning, pitch and catch, diffraction measurements or even combinations are possible through the full electronic control over each phased array element. The flexibility of a phased array system allows designing an optimized measurement configuration for any inspection task.

Inspections Performed

As of October 2019, the inspection system has been utilized 7 times in customer's lines – all 7 inspections were successful and show that Proton is working as expected. The 1st inspection took place in April 2019 and was classified as a research and validation run. The gathered data of certain subsections was analyzed and used to correlate with NDE and destructive testing results from cut out coupons.

After positive validation, the remaining commercial inspections were performed in November and December 2019. Over the entire distance the tool ran within the pre-agreed thresholds. In total, for 7 Inspections the tool gathered 150.7 TB data over 468 km of the pipeline system. The performance achieved has allowed the customer to move forward with an effective and efficient crack management program rather than having to rely on hydrostatic testing.

Conclusions

NDT Global's PROTON Phased Array inline inspection service allows wide adjustments to achieve optimal performance in pipeline operators' assets. Its flexibility can be used to program special inspection modes for DSAW, ERW, FW or other conditions without mechanical modifications to the tool. Whereas historic tools needed to be physically adapted to medium and inspection tasks, this solution offers flexibility. Optimized measurement scenarios for all kinds of threats can be programmed including axial and circumferential resolution and the angle of incident of each single shot. Depending on the operational conditions, a suitable configuration can be selected to gather the most important information for an accurate assessment of the asset. Looking forward, the capability of this platform to record detailed information is the enabler for a 3D reconstruction inline inspection service. The operator and NDT Global expect a high benefit in this next step of enhanced (offline) data processing.

Advantages of Proton

Crack Sizing

- Absolute depth sizing by Tip echo analysis
- Sub millimeter depth sizing accuracy
- Hook cracks, axial cracks, lack of fusion, tilted cracks, skewed cracks, etc., regardless of seam type
- Crack identification & characterization, e.g., Hook –tilting towards the counterclockwise direction

Flexibility

- Phased array angles can be adjusted by electronics/firmware requiring no mechanical redesign
- Measurement configurations are adjustable to the specific inspection needs, e.g., ERW or DSAW
- Easy adjustments for different nominal wall thicknesses by simple electronics/firmware modifications.
- Compatible with most liquid products including water, crude oil, diesel, refined products, etc.

Local Seam Weld Wall Thickness Measurement

- Important input for severity assessment of cracks in a seam
- Accuracy: +/- 0.4mm wall thickness @ 90 % confidence
- Accurate seam weld wall thickness measurements significantly reduce the number of “severe” or “injurious” cracks in a line resulting in remediation cost savings
- 1st tool in the industry with this capability

Benefits

- Absolute depth sizing of cracks providing the most accurate sizing ever
- True defect classification
- Enhanced reliability and fitness-for-service assessments
- Reduces conservativeness of assessment calculations which in turn reduces unnecessary remediation expenditures
- Lowers risk of having an unexpected pipeline failure or rupture
- Most accurate and sophisticated ILI technology ever developed



Next generation ILI technology featuring a state-of-the-art Phased Array inspection system

Performance verification of IP Pipeline Technology's Crack Detector

Author: Thom Wang, IP Pipeline Technology

Pipeline crack has always been a difficulty in traditional MFL detection. In order to realize the detection of crack defects in different directions on the pipe surface. The team led by Professor Yang Lijian of **Shenyang University of Technology** proposes a detection method based on balanced electromagnetic technology. This technology uses AC excitation to detect the space electromagnetic field distortion caused by the crack on the pipeline surface. Unlike single AC magnetic flux leakage and AC electromagnetic technology, there is no special requirement for the crack angle and detection direction, and the full angle can be achieved. A clear distinction can be made between transverse and longitudinal cracks, and identify cracks within 10mm from the inner wall of the pipe effectively. It has a good detection effect for the cracks at the weld, and can identify the cracks on the weld through the signal characteristics.

IP Pipeline Technology is the brand of Shenyang University of Technology. The team of this brand helps Shenyang University of technology to implement projects worldwide and has rich project implementation experience. IP Pipeline Technology completed the crack detection project in 2021. The 18-inch crack detection tool, MFL tool and MFL+TFI tool are used to detect the crack of KeWu Line.

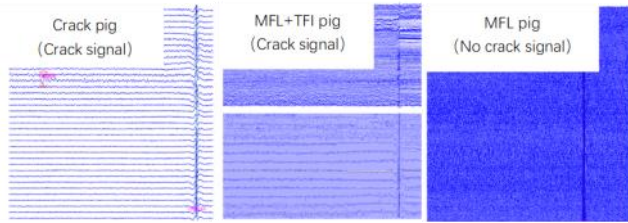
Pipeline name	Section	Size	Length	OD nom.	WT nom.	Product
KeWu Oil Pipeline	KeShou to Wangjiagou	18 "	298km	457mm	7.1mm	Oil



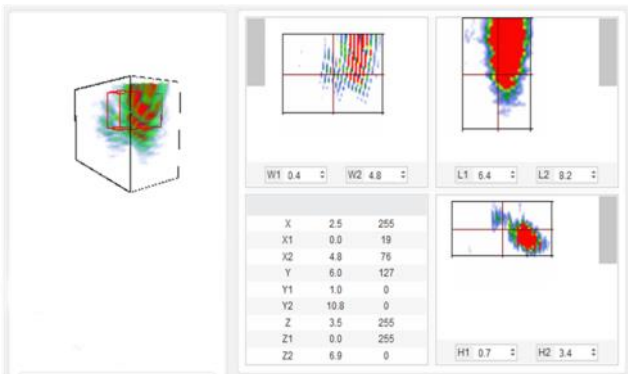
Crack detection tool

Crack verification result 1

Original data

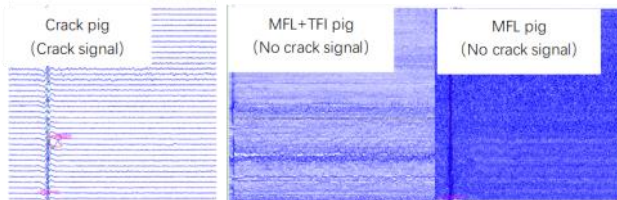


Maximum amplitude position	Defect starting position (S1)	Defect indication length (L)	Defect indication width (L)	Defect depth (D)	Defect height (H)	Evaluation of the results
188.5	185.4	4.4	1.8	1	2.7	Level II



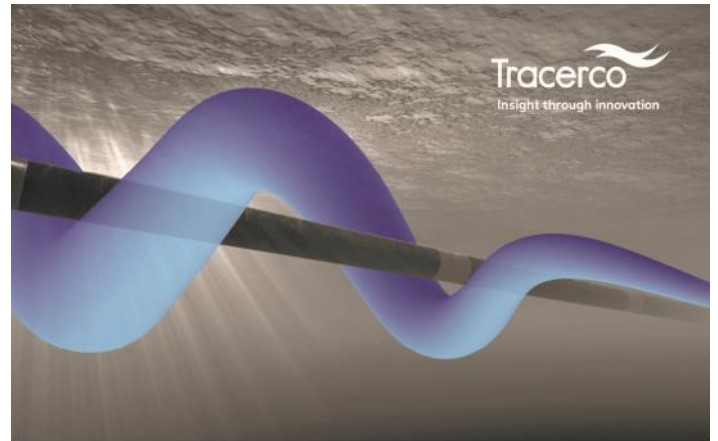
Crack verification result 2

Original data



It can be seen from the results:

- TFI tool and crack detector can effectively detect crack defects that cannot be detected by MFL detector.
- Crack detector can detect the crack defects that cannot be detected by MFL tool and MFL+TFI tool.



100% accurate, safe and reliable pipeline pig tracking

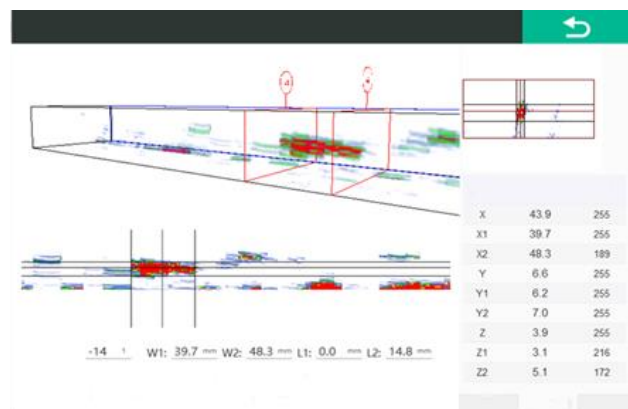
Tracerco Diagnostics™ Pig Tracking systems provide fast, effective and complete control of subsea pig tracking, positioning and location – preventing any significant financial losses by limiting the time taken to locate any lost or stuck pigs.

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Maximum amplitude position	Defect starting position (S1)	Defect indication length (L)	Defect indication width (L)	Defect depth (D)	Defect height (H)	Evaluation of the results
12:40	/	6.6	0.7	4.5	2	Level III
11:50	/	8.6	0.8	3.9	2	Level III



"For the detection method of excavation verification, we adopt ultrasonic phased array, which can effectively reduce the error. The on-site detection results of the seven weld defects we excavated this time have verified the accuracy of our detection. Crack detector is a good supplement to the MFL tool." IP Pipeline Technology CEO, Fred Lee said.

Pipeline engineering specialist STATS acquired by SRJ Technologies Group

STATS (UK) Limited (STATS) announced that its shareholders have executed a Share Purchase Agreement to sell 100% of the issued share capital of the company to **SRJ Technologies Group plc (SRJ)**. The acquisition combines Aberdeenshire-based STATS with SRJ's portfolio of disruptive technologies that are well positioned to capitalise on global energy market growth and the transition to green energy. SRJ is a publicly listed company on the Australian Securities Exchange (ASX: SRJ), and will undertake an offer of shares to raise A\$142m to fund the cash component of the purchase price for STATS and to provide working capital for the combined group post-completion.

The transaction is subject to customary conditions, including SRJ obtaining the required shareholder approvals and is expected to close in the first quarter of calendar year 2022. ●

17th Pipeline Technology Conference to be held for the first time as a hybrid event in Berlin and online

From March 7-10, 2022, the European flagship event for the pipeline industry, the 17th Pipeline **Technology Conference (ptc)**, will once again take place in Berlin.

Transmission and distribution system operators from around the world will again come to ptc to learn about the latest developments and offerings in the industry and to exchange ideas with other operators and market participants. Thanks to the integration of NO DIG Berlin into ptc 2022, more municipal network operators will also be attracted to Berlin. They will be able to find out about new developments in trenchless construction techniques at the exhibition and conference.

The conference program will again include four high-profile panel discussions in which current challenges for the industry will be discussed. In addition to cyber security and decarbonization, the issues of public perception and the shortage of skilled workers will also be discussed. The core of the event, however, is the technical conference program with 30 technical sessions in which more than 100 speakers report on new technologies and application examples. Two special case study sessions will give participants a deeper insight into the technical challenges of specific projects (GET H2, River Humber pipeline replacement).

For more information on the 17th Pipeline Technology Conference, visit <https://www.pipeline-conference.com/>. ●

3X Engineering reinforces 2 inch piping spools, Qatar

The objective of the repair, carried out at the beginning of March 2021 by **PEC team (Power Engineering Corp. / Alqodara Alhandaseya Co)**, **3X ENGINEERING (3X)** local distributor was to reinforce piping spools areas suffering from internal damages. This was at an Onshore Treatment Plant with sour water pipelines.

Calculations using 3X software and according to ISO 24.817:2017 were performed to define the design of the repair. PEC advised to apply 6 layers for straight line, 8 layers for bend, 8 layers for flange, 8 layers for reducer & 12 layers for tee sections with REINFORCEKIT® 4D (R4D).

Surface preparation was completed by PEC team, using Bristle Blaster machine, in order to get a good surface roughness (superior to 60µm Rz) and ensure the bonding between the substrate and the composite system. Hygrometric conditions were checked and the surface was cleaned and degreased with acetone (steps described below – the procedure was the same for the second piping spool to be reinforced).

1. F3XS1 ceramic anti-abrasion filler were applied over the defected weld joint. A minimum of 3mm thickness of ceramic filler F3XS1 was applied over each joint section. Climatic conditions were checked before moving on composite wrapping.
2. Wrapping process to reinforce the defected area (previously covered with epoxy resin to ensure good wetting and impregnation of the tape) was completed using Kevlar® tape (i.e.: specific size tape for small pipe diameter) impregnated with 3X specific epoxy resin.
3. Last layer of epoxy resin was applied all over each repair and reference plate was installed for traceability purpose.

For each repair, samples of filler and resin were taken during application for quality control.

⇒ 178 joint sections were successfully completed using R4D composite system in 4 weeks by 1 composite specialist and 4 applicators. This job represents over 35m repair length.

The 3 piping lines were successfully repaired using R4D composite solution (i.e.: 2-year repair lifetime). This project was quite complicated due to the total numbers of spools to be wrapped and the difficult accessibility to perform the repair but was completed on time as per the schedule required by the client. All the COVID-19 safety measures were correctly respected. ●