PIGGING PRODUCTS & SERVICES ASSOCIATION

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in

Pigging Industry News

the newsletter of the Pigging Products & Services Association

THE PRESIDENT'S LETTER *By Chuck Harris, T.D.Williamson, USA*

We are excited to announce that the new PPSA website has launched! Our site has been updated with a more modern look and feel, is more intuitive, and information is more readily accessible. You can access the new site at the usual address: www.ppsa-online.com. Please take the opportunity to peruse and let us know what you think. Feedback can be sent directly to Diane at diane@ppsaonline.com. The PPSA is also working on other online tools that will create value for its members and the industry alike. We look forward to future communications about these exciting web-based educational activities.

Our Member Directory & Buyers' Guide has also been updated and sent out in our worldwide mailing. Contact Diane if you would like a complimentary copy sent to you.

PPSA continues to be actively involved and engaged in the indust ry. This past June we exhibited at the Unpiggable Pipelines Solutions Forum organized by Clarion and Tiratsoo Technical. Sessions included innovations in utility pigging, challenging inspection projects, new and emerging technologies, and others. Thank you to our technical adviser Mark Elliott for manning the exhibition and to John Tiratsoo and BJ Lowe for putting on another great event.

As I mentioned in our June newsletter the PPSA is exploring options to better engage young pipeline professionals. In late September we had the opportunity to do exactly that when the Young Pipeline Professionals (YPP) USA held its first symposium in The Woodlands, TX., USA This was an opportunity for young professionals to learn from industry leaders, network with peers, gain broader understanding of the pipeline industry, connect with other energy sector organizations, and prepare to accept the duty and care of the pipeline industry. The agenda was filled with excellent topics and speakers such as Alan Mayberry, Associate Administrator for Policy and Programs, Office of Pipeline Safety; Andy Drake, Vice President -Operations and EHS, Enbridge; Mark L. Hereth, Principal, P-PIC, and many others. This first event sold out completely with over 100 young professionals in attendance, and PPSA was honored to invest in the future of the next generation of leaders.

I do also want to remind everyone that PPSA will be holding its annual pigging seminar in Aberdeen, UK on



for Operators, Contractors and Engineers



Individual

Siavash M. Pirsiavash, Sultanate of Oman

November 8th. Ten technical papers will be presented, along with an exhibition and pre-seminar evening reception. Please see www.ppsaonline.com/seminar for more details.



Molly Laughlin - YPP, USA Chair

www.ppsa-online.com

Industry news

ROSEN extends **ROCD** UT-C fleet for small diameter liquid lines in 6-inch pipelines

Pressure cycling is leading to cracking of liquid pipelines all over the world. Regulators as well as proactive operators are pushing the technological development to generate inspection solutions for every pipeline. Driven by the demand for small diameter crack detection services, **ROSEN** extended the RoCD UT-C service for high resolution axial crack detection with an outstanding solution for 6" pipelines. This gap closure is now serving pipeline operators worldwide with state-of-the-art inspection solutions for their pipeline systems.

ROSEN made no compromises in overall runtime, inspection speed, and sensor resolution to develop this tool. Key functions of the RoCD UT-C fleet like 1.5D bend capability, precise sensor guidance with a central tensioning system, as well as the well-known full data gathering for the whole pipe surface have been implemented. With measurement data for every point in the pipeline, ROSEN delivers run-to-run comparison capabilities as well as analysis below the reporting threshold. Best-in-class passage capabilities of 122 mm inner pipeline diameter and an overall tool length below 4.5 meters will allow operators to use this solution in the majority of the existing 6" pipeline systems, without having to deal with the limitations of the past.

The miniaturization of electrical and mechanical components as well as a new compensation of the pipe curvature played the key role during development. Efficient energy management with decreased power consumption and the utilization of established storage solutions like SD cards are allowing long inspection runs and fast turnaround times. With 144 crack detection sensors optimized to the small diameter, ROSEN can ensure high quality crack detection data supported by a full resolution ultrasonic wall measurement unit. This complementary approach using two measurement technologies in one inspection tool allows high quality data analysis and proper threat identification.

One of the first inspection projects for the newly developed tool was a nearly 200-km-long crude oil pipeline in North America. Operational success in this environment is only possible through close collaboration with the customer. After successful pipeline cleaning and gauging, the tool successfully inspected the asset. First run success as well as high quality inspection datasets from trap to trap confirmed ROSEN's capability to deliver. ROSEN has now one of the largest ultrasonic crack detection fleets in the industry and is delivering best-in-class services. ROSEN works closely with asset owners and operators worldwide to assess liquid pipelines for cracking and deliver outstanding solutions for every pipeline.



Key functions implemented into the RoCD UT-C fleet include 1.5D bend capability, precise sensor guidance with a central tensioning system, and well-known full data gathering for the whole pipe surface.



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iNPIPE PRODUCTS[™] bespoke multiple diameter pig design

iNPIPE PRODUCTSTM was selected to carry out unique pig design services for a client for a newly developed oil field. The long-term export solution for the asset requires the asset to be connected to the existing subsea pipeline infrastructure leading back to the mainland. Due to the waxy nature of the crude from this field, regular operational pigging is required to maintain effective through flow. The alternative would be to lay a new export pipeline to shore or export oil by tanker via a SAL system long term, which would be cost prohibitive.

The new 10" export line connected to an existing 14" line via a gate valve and a 10"-14" reducer. This 14" line then drops into a 24" line via a forged Tee. The 24" line has an equal wye, which must be negotiated before a 24"-34" reducer and a second equal Wye in the 34" pipeline section. The new bespoke design had to negotiate all the above nominal pipe sizes.

The Client's requirements needed to ensure that the selected pig design was capable of:

- Removing wax deposits from 10" and 14" lines
- Self-transit through a section of 24" and 34" pipe work
- Ability to be pushed in front of an existing 24" or a 34" pig without 'hang up' issues
- Capable of successfully traversing a forged 14"- 24" Tee

iNPIPE PRODUCTS[™] produced conceptual designs, which were reviewed by the client prior to testing program. In total the new pig design had to cope with a change in nominal pipe size of 70%. The manufacturing methodology selected was a flexi-cast, fully

iNPIPE PRODUCTSTM bespoke multiple diameter pig design



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polyurethane design, to ensure safe negotiation of transitions. In addition, the pig had to incorporate risk reduction features, should a pig be travelling in the larger pipe sections simultaneously. The fully cast design also provided buoyancy in the larger pipeline diameters.

The design included a combination of disc and flexi cups to provide effective wax removal in the new production lines. The flexi cups ensured travel through the larger ID pipeline sections, while also collapsing to the smallest size.

In addition, to control speed, reduce weight and provide jetting action in the smaller pipe sizes, the design had to incorporate a mechanical pluggable bypass system.

All design, tooling and pig production including full scale testing to replicate the line configuration was carried out at **iNPIPE PRODUCTSTM** Brompton on Swale facilities. The final tools were delivered on time and on budget.



Successful small diameter pipeline inspection using T. D. Williamson 4-inch MFL+DEF+IDOD

Small diameter pipelines present many challenges for successful inline inspection (ILI). This is especially true for 4-inch diameter pipelines. These pipelines often have difficult fittings to traverse, such as 1.5D centerline 90 degree radii bends and sections of heavy wall pipe greater than 0.300 inch.

Designing ILI tools capable of navigating these pipelines and producing a desirable speed profile under these operational conditions presents unique design challenges. Typical ILI tools designed for small diameter pipelines use brushes to transmit the magnetic flux to the pipe wall. Brushes on the magnetic flux leakage (MFL) body must be compressed to pass wall thickness changes, bends, and fittings, which increases the force required to drive the ILI tool through the pipeline. Polyurethane cups are traditionally used to provide drive for the tool through the pipeline and to also support the tool bodies. The polyurethane cups must also be compressed to pass pipeline features; polyurethane does not slide across steel easily, which contributes to the overall drag on the tool. Excessive drag can have a negative effect on the ILI tool's ability to navigate a pipeline by causing stopping and starting in bends and over-speed as a result of the stop/start process. T. D. Williamson (TDW) designed a unique approach to center and support the tool bodies and generate the necessary flux for the 4-inch MFL+DEF+IDOD tool to inspect pipe wall thickness greater than 0.300 inch.

Recently, the TDW 4-inch MFL+DEF+IDOD tool completed its first successful inspection for a liquids pipeline operator in Texas. The inspection was 42 miles (67.5 km) in natural gas liquid (NGL) product. The inspection pressure was 550 psi (37.9 bar), with an average tool speed of less than 2 feet (0.61m) per second. The operating conditions of this pipeline provided an aggressive opportunity for the first tool run. However, TDW engineering and project management teams assessed the risk and determined there to be a high probability of a successful inspection. In-house testing prior to the inspection yielded excellent results that were used to improve the tool design, eliminate possible failure modes, and better assess operational risks. After 36 hours of collecting high definition data, the high resolution, 4-inch MFL+DEF+IDOD tool was received fully operational, cleaned, and returned to the TDW Global Pipeline Integrity Center for triage by the experts in new tool development engineering. The triage did not detect any mechanical damage and noted very little wear. When the triage process was complete, the tool was recertified and sent out on another inspection.



A seasoned traveller... RunComTM comes of age!

Baker Hughes, a GE company's RunCom service turns 18 this year. RunCom, the tool used to determine the location and extent of corrosion growth between two or more in-line inspection (ILI) surveys, has been used to evaluate corrosion growth in over 160,000km of pipeline - equivalent to having travelled around the world 4 times! Corrosion is still one of the major threats to the integrity of onshore and offshore pipelines. Realistic corrosion growth rates are essential inputs to safe and effective pipeline integrity management decisions. The identification of where corrosion is active on a pipeline and how fast it is growing is a complex process which is understood in the general sense but is highly variable. Corrosion is therefore difficult to predict due to the very localised nature of its behaviour and the many parameters that influence the corrosion reaction.

Many pipelines have been inspected using intelligent in-line inspection tools several times. The use of repeat ILI runs to match and compare defects to estimate corrosion growth rates is now a well-used and established practice in the pipeline industry. The major advantage over other methods is that ILI can provide size and growth rate information on the detectable corrosion population, giving visibility of what is happening along the full length of the pipeline.



Back in the late 1990's, the advent of more powerful computers and advances in signal analysis software made it possible to develop intelligent and efficient signal matching. Comparison algorithms could rapidly run through the many thousands of metal loss signals returned from an ILI survey to identify changes in the detected corrosion. In 1999, BHGE pioneered the first specialist software tool to perform corrosion growth rate assessment on two or more sets of MFL ILI data and BHGE's ILI run comparison service, aka "RunCom" was born.

The precise signal matching and data synchronisation that RunCom enables is vital in the determination of relevant and accurate corrosion growth rates. The signal normalisation process used minimises systematic errors associated with two independent ILI data sets. This is a flexible and sensitive process and is only accurate because RunCom allows local scaling according to the variation in run condition and pipe wall thickness which can change the scaling required along the pipeline. Micro-alignment and direct subtraction of the scaled signals allows a confident discrimination of unchanged defects vs active defects.



Specialised sizing tools are used on side-by-side signal profiles and measurements allow discrimination of noise variation against true corrosion growth using the most accurate and appropriate sizing model. The assessment of the synchronised signal profiles uses interpolation of the signal to enable accurate comparison across different inspection vehicles and even different sampling resolutions.

Today, pipeline operators order BHGE's RunCom service on over 90% of their repeat ILI runs. Over the course of a year, BHGE conduct RunCom on upwards of 14,000 km of ILI data, matching, comparing and calculating corrosion rates for several millions of metal loss sites per year. Since the start of RunCom in 1999, BHGE have gained invaluable and unrivalled knowledge and experience from the 160,000+ km of pipeline ILI data assessed. These learnings have improved the algorithms and reporting deliverables, enhancing the value and benefit of RunCom to customers.



Modern equipment for ILI inspection manufactured by Transneft Diascan

Currently, **Transneft Diascan**, a subsidiary of **Transneft**, carries out the following activities:

- develops and manufactures in-line inspection (ILI) tools and cleaning equipment;
- performs in-line inspection of the linear part of pipelines, issuing technical reports, including information on technical condition evaluation, repair terms and methods;
- monitors the technical condition of pipelines on the basis of periodic inspections and maintenance of databases;
- performs a full as well as partial technical inspection of tanks without shutdown;
- carries out general contractor functions for technical inspection and certification of pipeline facilities: process and auxiliary pipelines of oil pumping stations, mechanical and technological and power equipment, automation, telemechanics and anticorrosion protection equipment.

The core activity of Transneft Diascan is related to inline inspection of the linear part of oil, gas and product pipelines from 6" to 48" through the use of inhouse produced ILI tools. Their operating principle is based on various physical methods of non-destructive testing. It includes geometry tools with navigation system, ultrasonic, magnetic, combined magnetic and combined magnetic and ultrasonic tools. All the ILI tools produced by Transneft Diascan are high resolu-



tion equipment capable not only of detecting defects, but also measuring their parameters and classifying them by type. This is a prerequisite for calculation of strength and durability of pipes with defects, as well as for the calculation of maximum pressures and operating life limits based on inspection results.

Transneft Diascan is operating in compliance with the international quality standard ISO 9001-2008. About 50,000 km of trunk oil pipelines and 5,000 km of oil product pipelines and process pipelines of oil pumping stations are inspected annually by the company. Transneft Diascan constantly modifies the existing ILI tools, develops the equipment using new inspection principles, and improves the quality of software products for processing ILI data.

The modified "Ultrasonic inspection tool 48-DKP" is intended to detect randomly oriented defects on 40", 42" and 48" pipelines. The ultrasonic inspection tool is equipped with 3402 sensors of CD type and 1134 sensors of WM type. Nine groups of CD type sensors allow the detection of randomly oriented defects. This ILI tool detects and sizes such defects as corrosion, lamination, gouges and cracks both in pipe body and in welds.

The modern ILI tools of Transneft Diascan use the magnetic inspection principle, including MFL and TFI tools, as well as their combination. The magnetic ILI tools manufactured by Transneft Diascan are notable for a high level of the pipeline wall magnetization, as well as for using multi-component high-resolution magnetic field sensors comprising additional eddy current measuring channels. The magnetic ILI tools detect and size such defects as general corrosion, pitting corrosion, metal loss, welded attachment, gouges, and cracks, both in pipe body and in welds and excessive penetration. Combined magnetic-ultrasonic ILI tools allow identification of most defects in the linear part of pipelines within one run. Currently, the ILI tools are equipped to regulate the speed of movement within the pipeline systems, which improves the quality of these ILI tools while moving in difficult speed conditions, for example, within a gas pipeline. An ILI tool with the use of electromagnetic and acoustic (EMAT) technology of sending and receiving of ultrasonic signals and an ultrasonic ILI tool with phased arrays are now in development. The EMAT ILI tool will allow the identification of all types of defects detected by ultrasonic ILI tools and to measure pipeline wall thickness. By this, the EMAT

ILI tools are able to be successfully used in gas pipelines without liquid medium. All the manufactured ILI tools are checked and tested at the Transneft Diascan test site.



Transneft Diascan tools from 6'' to 48'

i2i Pipelines introduce Dent and Deposit Mapping Disc

How clean is my pipeline? The eternal question that all pipeline operators ask themselves every time it comes to scheduling any kind of pig run. Knowing or anticipating the amount of deposit in the pipeline is a very important matter for so many reasons. As well as the obvious fear of plugging the line with wax, probably the most important time would be ahead of a scheduled in-line inspection run. Unless the operator has recent experience in pigging the line and has trust in the efficiency of the pigs being run, those nagging questions raise their head...How much deposit is in the line? How many runs will it take to remove? What type of pigs do I need? Will it delay the planned ILI? Then, when the pre-inspection cleaning gets underway it's always good to be able to check how the cleaning is progressing.

For those reasons, **i2i Pipelines** have developed a simple and innovative product that can attach to an i2i SmartFoamTM to locate and quantify the amount of debris in the line – introducing the DDMD or Dent and Deposit Mapping Disc.

I2i Pipelines is a fast growing, innovative company that are challenging the traditional methods and frequency of pipeline inspection by pioneering the integration of smart sensor technology on to operational cleaning tools, allowing valuable pipeline data to be gathered as easily as running a cleaner. This allows data trending and monitoring and improves predictive maintenance strategies. Following the success of the recently introduced PioneerTM and SmartFoamTM tools that are able to gather flow assurance data such as pressure, velocity and temperature as standard whilst scanning the internal pipe-wall for integrity threats such as corrosion and cracking. The addition of the DDMD brings another level of intelligence to the tools whilst still maintaining the underlying aim of simplicity and inspection without disruption. Furthermore, whilst having the initial aim of debris monitoring, the DDMD also facilitates accurate dent detection and measurement in a far more sophisticated manner than the traditional slotted gauge plate and in a far less complicated and cost-effective manner than a calliper tool.

I2i recently completed an operation in the Far East for a client with a strategically important offshore 16" pipeline. Frequent pigging led the client to realise that the pipeline was badly affected by wax to the extent that only under-sized foam pigs could be run. In need of an inspection solution for the pipeline as well as a desire to gather any flow assurance information on the line drove the client to contract i2i for a SmartfoamTM inspection solution, with the added benefit of the DDMD attached to the rear of the pig. Not only did the SmartFoamTM tool successfully inspect the pipeline, the addition of the DDMD enabled the wax deposits to be mapped and quantified through the pipeline and a total volume of wax calculated.

The DDMD is available in sizes from 8"-48" and is available as a stand-alone service or as an integrated product with any PioneerTM or SmartFoamTM tool run.



SmartFoamTM pig with rear-mounted DDMD at receive.



False colour image and sensor output showing wax distribution in waves along the length of the pipeline.

DDMD Dent & Deposit Mapping Disk

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 Data sampling every 1mm
- Ducu sumpling every min
- Quantifying deposits as well as inspecting through them
 Inspection & flow assurance data in one run

• Integrated with SmartFoam™ or Pioneer™ tools

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NDT Global identifying and characterising circumferential cracking

NDT Global responded to feedback in the industry to continually improve its ability to detect circumferential cracks and crack-like anomalies in pipelines.

Given the unique problems it poses, circumferential cracking severely threatens pipeline integrity management programs as it traditionally has gone undetected. The increased discovery of such anomalies during dig programs has spurred further development of inline inspection (ILI) tools for the liquid and gas pipelines targeting this type of threat. Features such as this potentially arise due to imperfections in the circumferential welds. Local stress/strain accumulation, caused by soil movement, is another common factor behind the development circumferential cracking. Availing of its team's experience and knowledge, NDT Global's identification of cracks and crack-like indications that orient circumferentially uses highly detailed and in-depth data. NDT Global deploys ILI tools that use ultrasonic shear wave technology to address circumferential cracking found in pipelines. Using the captured data, the company's experienced data analysts read and translate this information into flaw properties such as length, width, type and depth.



Several positively validated circumferential crack fields

Displayed above is an image that shows several positively validated circumferential cracks in a section of a pipeline. Clearly visible in the image, the third-party dig verified the presence of the features reported by NDT Global. Although circumferentially-orientated cracks are unique and not as frequent a threat as axial, for instance, the knowledge and experience that NDT Global's team possesses puts them in a position to deliver comprehensive inspection reports. The experienced data analysis team correlates information from previous runs, further enhancing the service offering. NDT Global's ability to rely on an industry-leading range of ILI tools, and how they capture data relating to defects, enables the team to take into consideration all types of cracking. The existing integrity assessment methodologies used for axial cracking can be used for circumferential cracks or flaws. Resultantly, the team ensures that it delivers the best possible data, used as

input to generate meaningful insight for subsequent assessments of all crack and/or crack-like features.

For these identifications to work in unison with ongoing integrity management programs, the operator makes an informed selection and prioritization of the findings to complete the field validation. By working with NDT Global, operators are in a better position to prioritize the actions they need to take to maintain the integrity of their pipelines. The basis of this prioritization is typically risk-based assessment that includes information from the findings, severity of identified features, consequence considerations, and the utilization of available geotechnical data. Information included in this geotechnical data originates from a field slope survey, because of the influence soil movement has on circumferential cracking.

Through the close collaborative relationships it enjoys with pipeline operators, NDT Global has worked extensively to incorporate feedback from field digs into the operation, reporting and analysis of circumferential crack defects. With the overall intention to eliminate pipeline failures due to integrity defects, NDT Global makes continued and concerted efforts to improve accuracy and success to ensure operators can accurately and confidently manage the integrity of their pipeline systems.

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STATS Group flexes their Bisep® in Australia

STATS Group were recently retained by a major operator in Australia to provide isolation of a pressurised 10" LPG pipeline at a natural gas plant in Victoria. The isolation was required to allow a launcher valve to be safely replaced while the system remained live and at an operating pressure of 41 bar.

It was the first time the pipeline technology specialist has deployed their hot tap installed ANSI Class 600 BISEP® on an Australian project. The BISEP® provides a fail-safe, fully proven double block and bleed (DBB) isolation and was deployed through a welded split tee fitting, without the need for additional hot taps to bleed or vent.

The BISEP® isolation is provided by a spherical dual seal plug, deployed from a pressure competent launcher through a slab valve and rotated towards the pressure threat. The spherical head houses twin compression seals and provides a facility to bleed the seal annulus (void) providing a zero-energy zone between the fully proven seals. The annulus bleed port is initially used to test each seal at 110% of the isolated pressure, it is then used to constantly monitor the isolation during the intervention work.

The elastomeric seals are activated by a hydraulic cylinder inside the plug, which compresses the seals. The resultant radial expansion pushes the seals out against the pipe bore. Venting the pressure downstream of the plug causes a piston effect on the plugging head, which acts to further energise the seals providing leak -tight isolation, even in corroded or pitted pipework. A differential pressure across the plug enhances the hydraulic actuation and maintain both seals, even with no hydraulic pressure present. This self-energisation feature makes the isolation fail-safe with dual redundancy in activation, providing the specified minimum differential pressure is maintained.

After performing validation tests on the BISEP®, STATS technicians confirmed successful double block isolation and an isolation certificate was issued to the client. Nitrogen was then flushed through the BISEP® launcher to purge the system and create safe worksite conditions to allow removal of the launcher valve. Once the new valve had been fitted nitrogen was again used to perform a joint re-instatement leak test of the newly installed valve against the back of the set BISEP®. A unique feature of the tool is the ability to withstand pressure in the reverse direction, which can make reinstatement of the isolated system easier when compared to traditional line stop systems.

After a successful leak test of the reinstated valve the pipeline pressure was equalised, the BISEP® was unset and recovered into its launcher. The slab valve was then closed, allowing the BISEP® launcher to be depressurised and removed. The hot tap machine was reinstalled to allow a completion plug to be deployed and set into the flange of the welded fitting. With the completion plug set and tested, the hot tap machine and slab valve were removed from the pipeline and a blind flange was installed onto the welded fitting.

STATS supplied personnel and equipment which included split tee fittings, hot tapping machine, DBB slab valve, BISEP® and completion plugs. All hot tapping and line isolation work was carried out by STATS technicians. Upon client request a System Integration Test was conducted at the Victoria facility prior to BISEP® deployment.

Gareth Campbell, STATS' Regional Sales Manager for South East Asia, said: "This project marks a significant milestone for STATS. This is the first time that our BISEP® has been deployed in Australia and we are encouraged by the level of interest shown in the region to adopt this game-changing technology. The BISEP® offers significant safety advantages over traditional line stop technology. The hydraulically activated dual seals provide leak-tight isolation of live, pressurised pipelines."



BISEP® isolation allows 10" launcher valve removal

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A.HAK Industrial Services signs its largest contract to date

A.Hak Industrial Services Middle East has secured the largest contract in the history of the company. Joining forces with **Al Tamimi**, the five year contract includes the inspection of the majority of the unscrapable pipelines of **Saudi Aramco** in the Kingdom of Saudi Arabia. This award is one of the largest of its kind globally and confirms A.Hak's position as a leader in delivering pipeline integrity services.

Roland Hendriks, General Manager of A. Hak Industrial Services Middle East, said: "A. Hak Industrial Services has a strong local presence in the Middle East and an impressive track record in cleaning and inspection of unscrapable pipelines, which was key to our success in securing this contract. Our personnel and equipment resources are at the leading edge of inspection services, and our turnkey approach ensures the efficient and safe completion of every project."

Inspection of unscrapable pipelines is one of the most important services of A.Hak Industrial Services worldwide. With innovative technology, a large range of pipelines can be inspected, scanning the full surface of the pipe wall in high resolution. This allows a full overview of any wall-thickness reductions that may impact the pipeline's integrity.

Commenting on the award, Rienk de Vries, Managing Director of A. Hak Industrial Services said: "This contract is another step in our growth strategy to become the reference for unscrapable pipeline inspections in the Middle East. We are very excited and honoured to work with such a reputable company as Al Tamimi. Combining our strengths, we will have positioned ourselves to serve Saudi Aramco in the best possible way and deliver the highest quality".

Saudi Aramco is the state-owned oil company of the Kingdom of Saudi Arabia and a fully integrated, global petroleum and chemicals enterprise. Over the past 80 years they have become a world leader in hydrocarbons exploration, production, refining, distribution and marketing. Saudi Aramco's oil and gas production infrastructure leads the industry in scale of production, operational reliability, and technical advances.

Clock Spring announces two-year OSHA recordable free safety milestone

Clock Spring Company, LP (Clock Spring), the world's leading manufacturer of permanent and temporary composite pipeline and pipe work repair solutions, has announced that it has achieved a major safety milestone, reaching two years of OSHA recordable -free hours.

"We are transforming this business with a focus on safety, innovation, and stewardship," said Matt Boucher, Clock Spring President and Chief Executive Officer. "The safety of our team and our colleagues, partners, and customers is our foremost concern. We work daily in product development and manufacturing operations to remove and mitigate hazards in the field and in the plant. We celebrate this important milestone today, but also recognize that our work is never done."

Clock Spring products are safer to use than traditional repair methods because their installation requires no lifting equipment, cutting, or welding. A typical install takes about 30 minutes, with full cure after two hours, allowing overwrapping and backfilling in the same day. This dramatically reduces open-ditch time, providing added safety benefits for personnel and assets. These innate benefits of the products are enhanced by Clock Spring's commitment to creating a safe work environment among employees, from the manufacturing to the shipping to the installation of the product.

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3X Engineering repairs 70m depth line

In August 2017 **3X ENGINEERING** (3X) and its local distributor **TAVANA** sealed 2 cracks and reinforced the pipe integrity at a 70m depth for their client. The pipeline is a 32" diameter gas line in the Middle East . There were two defects in the pipeline – a leaking crack and a non-leaking crack. The pipeline has a maximum operating temperature of 20°C and operating pressure of 1160 psi (80 bar).

According to ASME PCC-2 and 3X repair calculations, it was decided to make 2 different repairs. Eighty-eight composite layers of REINFORCEKiT 4D SUBSEA (R4D-S) product were determined to repair the external crack with through wall section and 20 layers for the non-opened crack. Underwater, several preliminary operations were performed prior to surface preparation to get a good surface roughness. 3X wrapping reinforcements were performed following several stages. It is important to note that working at 70-meter depth requires saturation dive.

- 1. For both defects, F3XUW9 filler was applicated to fill the cracks and reshape the pipe geometry.
- 2. P3X32 primer was applied under the composite plates and over the damaged areas (previously delimited on the pipe) to ensure good bonding.
- 3. Composite plates application on both defects recovered with F3XSS filler and strongly maintained with ratchet belts for curing.
- 4. P3X32 primer was applied on the whole surface of the repair before wrapping.
- 5. Kevlar® tape pre-impregnated with R3X1050-S resin (using special devices developed by 3X) was wrapped around the pipe as calculate above.

The pipeline was repressurized a few days after repair without any problems. This job was a challenge because of the 70m depth. 3X is experienced in subsea repairs but this was the first performed at this depth.



BOBIPREG - 3X specific machine for Kevlar[®] tape impregnation

The importance of river-bottom profiles for pipeline integrity management

When conducting ongoing pipeline integrity management programs, it is vital for operators to have access to as much information regarding potential corrosive activity on their pipeline as possible. The data provided from river-bottom profiles (RBP) offers a more in-depth look at anomalies in a pipeline that occurred because of corrosion.

An ultrasonic inline inspection (ILI) reliably detects and sizes corrosion anomalies in pipelines. The recorded ultrasonic technology (UT) inspection data provides a solid basis for a RBP, as this data directly extracts into a RBP. RBPs, i.e. the plot of remaining wall thickness versus distance, provides a detailed description of the actual shape of a corrosion anomaly (see image), at an axial resolution down to 0.75 mm. In contrast, magnetic flux leakage (MFL) data does not typically offer such detailed data, nor the same data accuracy.

Following an inspection run, **NDT Global's** experienced data analysis team analyzes the recorded inspection data to detect, classify and size anomalies. For metal loss anomalies, this sizing procedure determines:

- The peak depth of the anomaly present
- Minimum remaining wall thickness
- Total length of the anomaly

Corrosion that goes unchecked leads to potentially calamitous impacts on an operator's integrity management program, which underlines the integral role that accurate data – such as the data provided by high-resolution ultrasonic ILI tools – plays in a proactive pipeline management program. The proliferation of RBP comparisons increases the accessibility of accurate data regarding the presence and location of corrosion. Knowing the presence of corrosion in their pipelines, as well as the growth rate of such defects, enables pipeline operators to proactively and intelligently plan their maintenance, operate their pipelines and manage costs, all of which greatly aid long-term planning and safety.



ROSEN Group's crack-detection now certified by TÜV

With the TÜV certification of its inspection tools, the **ROSEN Group** has further solidified its position as a technology leader. While the company's UT inspection fleet has now been certified for a while, the certification of the so-called EMAT inspection technology was completed only recently. Like UT, EMAT is used for crack detection in gas lines. Early detection of potential cracks in gas pipelines is an important factor in ensuring the safe operation of such pipelines. Already in 2010, ROSEN had developed the EMAT technology to an operational stage. Since that time, it has earned an extraordinary reputation in the oil and gas industry.

Two representatives from the **TÜV Nord Group** travelled to the ROSEN location in Lingen (Ems) to present the certificate. "We are now the first and only company in all of Europe that can offer its clients TÜV-certified inspection tools," Thomas Beuker, Director Advanced Pipeline Diagnostics for ROSEN, exclaimed happily. The independent certification by the TÜV Nord Group confirms the high quality of these inspection tools that completely fulfill the

requirements set forth in TÜV memorandum 1069. This in turn gives operators of industrial systems the certainty that their pipelines are being inspected reliably, while allowing ROSEN to add yet another unique selling point to its already impressive list.

The tools were qualified by way of a variety of different pull tests, from which the gathered data were compared to reference measurement data, as well as the pertinent documentation. To this end, so-called "EMAT pigs" in various diameters, from 16" to 48", were subjected to rigorous testing at the company's largest location in Lingen (Ems). "I am extremely proud of this accomplishment. The result documents the success of our international team of experts," Beuker said, adding, "This makes us even more attractive for the type of national and international professionals that we are looking to add to our team in Emsland."

The demand for certification is continuously on the rise throughout Europe among operators who are eager to satisfy the increasing demands on the safe and efficient operation of pipelines set forth by the pertinent regulatory agencies. The ROSEN Group takes its responsibility as a global technology leader seriously and, in so doing, offers its clients considerable added value. So far there are no regulatory guidelines for this type of certification in Europe.

About EMAT Inspection Technology

EMAT (Electro-Magnetic Acoustic Transducer) is an inspection technology that can be used to inspect pipelines for cracks or coating defects. To this end, a rapidly fluctuating magnetic field creates ultrasound waves in the pipe wall. Material defects reflect these sound waves, which are then captured by the EMAT sensors. Contrary to conventional piezo-electric ultrasound, familiar to many from visits to the doctor or hospital, no liquid coupling agent such as water or oil is necessary. This makes the EMAT technology especially ideal for gas lines.



ROSEN Group receives TÜV



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