

Pigging Industry News

the newsletter of the Pigging Products & Services Association



Aberdeen seminar

Gordon Short, past-president of PPSA, gives a personal view of the 14 November, 2007, seminar

LAST NOVEMBER'S annual LPPSA Pipeline Pigging Seminar, held in Aberdeen, was actually the first time I had attended the event since I stood down from being president of PPSA in 2004/5, so it was good to catch up with some old friends and colleagues. The event itself was extremely well attended with 97 delegates from all sectors of the pipeline industry. This was great to see, especially when I think back to the early years when we struggled to get 30 delegates including the presenters and exhibitors! For those of us involved at that time we had to think long and hard about whether we were right to continue to persevere with the seminar: I think the attendance at the 2007 event probably vindicates the decisions we took.

The formal part of the seminar was both interesting and varied, and I think it would be fair to state that the quality of papers has improved markedly since the early days! In total, ten papers were presented during the day. The subject matters were quite broad although the majority did relate – unsurprisingly, to some extent – to inspection. Papers from Rosen, GE PII, Penspen, and NDT discussed aspects of data analysis and interpretation, including some of the limitations. Other papers from Applus RTD and Spetsneftegaz focused more on the hardware of in-line inspection tools.

It was particularly encouraging for me to see so many papers presenting technologies which were either new to the North Sea, or which were currently under developed. The paper by Kevin Scott of Baker Hughes

PMG introduced the subject of using ILI tools to monitor cathodic protection, and the novelty of using a pig to capture CP data was apparent to many of the delegates present. In addition to this, David Russell of Weatherford introduced the MAPS pig – an inspection tool capable of direct stress measurement of ferrous pipeline materials; Robin Brinham of Pipeline Engineering presented on the AMPL (automatic multiple pig launcher) – a novel launching system that uses changes in pipeline pressure to arm and launch pigs remotely; and Bjorn Stoltze of HAPP Technology introduced new cleaning technology – hydraulically-activated power pigging.

It is a good sign for the future health of our industry to see this level of innovation.

After lunch Gary Batty of Tracerco gave a live demonstration of isotope pig tracking, and this was followed by the Ideas Forum, chaired by Tom Sowerby, which as usual stimulated some interesting debates. There were quite a number of points raised, and several themes appeared: the needs of the end users (to solve problems) and the ability of the supply chain to deliver the new technologies required (the solutions); and the support for innovation (or lack of it) from both the end users (oil companies) or others (governmental sources). These two points alone could occupy many hours of discussion within our industry, which is arguably something that PPSA should be looking to help facilitate in future.

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This then brings me on to the final theme of the forum which surrounded the role of PPSA itself. It was suggested that PPSA should become more than just a trade organization to one where being a member of PPSA means that certain minimum standards of say, quality or technical competence, have been achieved. In effect if you are a member of the PPSA and have the right to use the PPSA 'badge', then this would mean something of value to the end customer. This is an interesting comment, and one that certainly is worth considering further. We just have to think back some 18 years to when PPSA was formed and the challenges of our industry at that time, and compare this with the needs of today and level of membership and support that PPSA now has.

It is clear that things have changed and I would certainly agree that a discussion on the future direction and role of the PPSA is needed in order for it to remain relevant and to provide best value for its membership.

Anyway, it was great to see such a well-attended seminar and the level of discussion and debate both formally and informally associated with it. I am sure that as the organization grows and evolves with the input of its members, then it will do so in a positive way.

Thanks – as always – must go Gill, our secretary, for all her efforts in organizing the seminar, as well as to all of the chairmen who kindly "volunteered" their time and with out whom the event wouldn't have happened. ●

New Members

Full

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International GmbH,
Germany
Socotherm S.P.A., Italy

Associate

PSE International Ltd,
Denmark
SNTGN Transgaz, Romania

Individual

Bartley Duggan, Opus
Engineering Ltd, Ireland
Dale Millward, STATS Group,
UK
Björn Stoltze, HAPP
Technology Ltd, Germany

Industry news

Cottam Brush: the world's newest pipeline brush factory

UK-BASED Cottam Brush has started 2008 with a new name (it was Cottam Bros), a new website (www.cottambrush.com), new company colours and logo, and a brand new factory. Managing director Ben Cottam is proud of the company's success over the last 12 months: "It will be tough for us this year to better our achievements of 2007. We are, however, being just as ambitious this year. We will be looking to expand our pipeline brush business into the USA by increasing our presence, along with innovative product development". With two trips to Houston planned over the next few months, the company is also

serious about increasing its activities in the US. "We have the confidence to look further afield now that we're in our new factory. We will be able to react quicker to enquiries and bring our lead times down, which is critical in the pipeline maintenance industry," explained Kathy Bevan, sales manager. "We also want to speed-up our product development process which we are confident we can achieve." Expanding manufacturing capabilities are also on the agenda in 2008 for manufacturing director Alan Crook: "We are now settled in our new factory and we're already seeing efficiency benefits. Our customers want new products so we will need new machinery to make them. We had to concentrate on building the new factory last year but now we're focused on making sure that our machinery is world class."

Cottam Brush is hosting an open day to launch its new facility on 29



Ben (left) and David Cottam.

February, and all PPSA members are most welcome to attend. For details of how to register, email ben.cottam@cottambrush.com. For members unable to attend on this date, private tours can be arranged. ●

'Free-swimming' inspection system

A HAK Industrial Services has developed the *Piglet*

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inspection system which combines the advantages of a free-swimming inspection system with those of cable-operated inspection systems. The company says that the disadvantages of both have been eliminated, and the bi-directional system is suitable for passing small-radius bends, mitre bends, multiple diameters, etc. According to Hak, the *Piglet* system can inspect pipeline lengths of up to 12km in one run (depending on pipe diameter), negotiate an unlimited number of bends, and travel in two directions. In addition, it has the ability to inspect multiple diameters in one run, provide all ultrasonic measurements on-line, and save the raw ultrasonic data for detailed post processing analysis.

The new inspection system is equipped with a special umbilical storage facility that holds a glass-fibre optic cable on a reel stored in the inspection system itself. The *Piglet* operates using ultrasound waves for measuring the wall thickness and inner radius of the pipe: a sound pulse is sent from the transducer in the middle of the pipe in the direction of the pipe wall; the pulses generated by the transducer are reflected towards the pipe wall via a rotating mirror, which enables measurements to be taken of the complete circumference of the pipe. Depending on the diameter of the pipeline (and therefore the surface to be inspected), the travelling speed of the *Piglet*

through the pipe is adjusted to provide 100% scan coverage, ranging from 200m/hr to 1 km/hr.

As the *Piglet* progresses through the pipeline, the raw data is gathered and transmitted to an on-line computerized data-acquisition system which shows the actual wall thickness and an initial discrimination between internal and external corrosion. This allows both the inspection engineers as well as the pipeline owner to obtain a first impression on the condition of the pipeline. In addition, an advanced data-acquisition system simultaneously stores all the data, which allows for detailed post-processing, resulting in one of the most accurate and detailed ultrasonic analyses of the inspected pipeline available in the industry. This post-processing can start immediately the inspection has finished.

Up to now, for small-diameter tools, the fibre length, and thus the inspection length, is limited (1 to 2 km). However, in a new development of its technology, and in order to overcome this limit in length, Hak has developed a system whereby the data is stored on board, thus creating a free-swimming version of the *Piglet*. Specifications regarding detection and sizing are not compromised, however, and have the same high resolution and quality as the tethered tool. This implies that part of the raw ultrasonic signal (the A-scan) must be stored on

board, rather than only storing calculated wall-thickness values. Although this makes the design more complex, especially in terms of the storage demands, the free-swimming *Piglet* still features the capability to have the raw data (A-scan) of each measurement available for further defect analysis.

As this approach has proved to be very successful, the on-board storage will now also be available for the larger diameters of tool. This will make it possible to gather as the bi-di *Piglet* is pumped back into the launcher, resulting in two data-sets of the complete line which needed to be inspected. ●

An automated batch pigging system using large-diameter pigs

by Christian J Cloyde
TD Williamson, Tulsa, OK, USA

IN LATE 2006, Enbridge – a mass transporter of crude oil – contracted TD Williamson to develop, design, and fabricate an automated batch pigging system for use on its Southern Access Expansion project in the US. This is a 42-in liquid crude oil pipeline running 514km from Superior, Wis., to Delavan, Wis. The batch pigging system had to be designed to accommodate a maximum flow rate of 600,000bbl/d and to meet the following requirements: a minimum batch of 63,000bbl/d, a maximum of nine batch pigs to be

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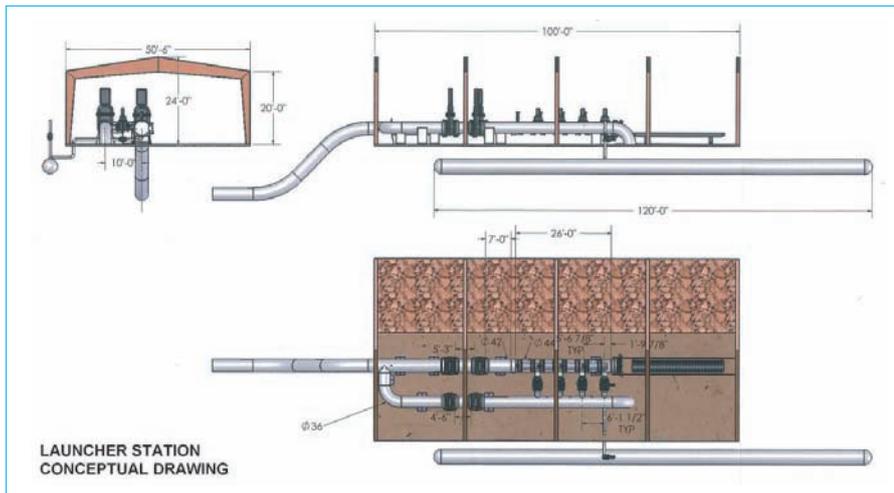
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TDW's launcher station concept.

launched/received per day, four to five batch pigs to be launched/received in a 12-hour period, and a minimum of 2.4 hours between pig launches.

The automated batch pig launcher and receiver will be in service for between two and five years, or until the flow is sufficient to sustain turbulent flow. Therefore, as many facets of the system as possible needed to be modular or skid-mounted for future use at other facilities. Automation of this system had to provide remote operation and real-time programmable logic controller



Modified pigs used for the batch launcher.

(PLC) status communication between the launching/receiving stations and the control centre in Edmonton, Alberta. In addition, the system had to accommodate cleaning pigs and inline inspection tools.

Design

In the past, this type of batch system would typically incorporate the use of spherical pigs launched from an angled-barrel launcher with one or more mechanically-actuated pins. TD Williamson proposed a system centred on a specially-designed mandrel pig, pre-loaded four at a time and launched from a horizontal barrel. Pigs have been used in automated systems before, but not on this size of pipe diameter, or with this many pre-loaded pigs. In an effort to provide the highest level of batch quality and integrity possible, the decision was made to use TD Williamson's patented multi-lip *RealSeal* cups in a disc-cup or DC-DC construction.

In addition, the pig body was extended beyond the second disc-cup set and a bumper was added to the front of the pig in order to

accommodate stacking of the pigs within the pipeline and the pig traps. From the design dimensions of the batch pig, a launching and receiving system incorporating pig-handling equipment, trap and sump pumping, and state-of-the-art pig signalling was developed.

Operation

Operation of this system will follow a repeatable series of events. Four pigs will be loaded into the launcher from a load tray, will be held in place with electrically-actuated pins, and the pre-launch positions will be verified with pig signals. Each of the four pigs will have a kicker line positioned behind it and, at the appropriate time, the pin in front of the pig to be launched will be retracted and the valves cycled to launch the pig into the pipeline. A proper launch will be verified by the positional pig signal on the barrel and pig signals immediately downstream of the mainline tee. Progress of the batch pig will be monitored in Edmonton, with electronic pig signals at various locations along the pipeline and, ultimately, on the pig receiver barrel.

Pipeline flow will be routed through the oversized receiver barrel and the multiple by-pass lines until five pigs have entered the receiver barrel and gone onto an internal tray. At that time, the pipeline flow will by-pass the receiver and the pig trap will be isolated. After depressurizing and draining the trap, the closure will be opened and the five batch pigs pulled out onto an external cart designed to support all five pigs and the tray that carries them. The pigs will be unloaded from the cart and the internal tray inserted into the receiver barrel. Finally, the receiver closure will be shut, the trap pressurized, and the

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pipeline flow rerouted through the pig trap. The unloaded pigs will be cleaned, inspected, maintained, and stockpiled at the receiver station in Delavan until they are transported back to the launcher.

Safeguards

Health, safety and environment (HSE) is a major concern for every aspect of the pipeline industry, and this automated batch pigging system is no exception. Several redundancies and back-up mechanisms have been built-into the automation and piping design in an effort to reduce or eliminate exposure of personnel and equipment to the hazards associated with pigging a crude oil pipeline. From conceptual design to the fabricated product, emphasis has been placed on reducing the amount of time that the insides of the launcher and receiver barrels will be exposed to the atmosphere. The pig-handling equipment designed specifically for this application was conceived with this aim in mind. The on-site sump skids incorporate safeguards that will help prevent overflow and consequent damage to the environment.

Construction of the launcher and receiver stations began in mid-2007, and commissioning is expected to take place shortly. ●

Weatherford acquires NGKS' Russian assets

PSA MEMBER **Weatherford International Ltd** completed its acquisition of **NGKS'** Russian assets in 2007, and the Russian company has now become part of Weatherford's existing Pipeline & Specialty Services (P&SS) group. Headquartered in Russia, NGKS is a provider of in-line pipeline inspection services using high-

resolution tools. NGKS and P&SS are committed to maintaining a leadership position in the development and manufacture of inspection tools, techniques, and technology to meet the needs of the industry. The acquisition has enabled the company to provide a global service of MFL and UT tools, designed to provide the best possible detection and characterization capabilities of any NDT for all forms of metal loss, environmental cracking, and production-related anomalies. ●

Pre-commissioning in India....

ABERDEEN-based **BJ Process and Pipeline Services** has completed a contract to provide specialized pipeline services to **Global Offshore International Ltd**, the main contractor to **BG Exploration and Production India Ltd** which has a 30% interest in the joint venture that operates the offshore Tapti gasfield. The field is located 160km NW of Mumbai, and consists of approximately 363,500 acres, comprising the South and Mid-Tapti gas fields. BJ supplied pre-commissioning services for the field's NRPOD pipeline system, which is a network that gathers gas from Tapti field and the surrounding area. Infield lines carry gas from the new MTA wellhead platform to the central TCPP platform, where it is processed. It is then exported via the existing 36-in and 42-in **ONGC** pipelines to the Hazira gas plant.

BJ PPS provided a full range of services, including flooding, hydrotesting, caliper survey, gauging, dewatering, vacuum drying, and nitrogen purging of the 22-km, 20-in, infield line and the 78-km, 20-in export line. In

addition, a piggy-back 4.5-in instrument air line was also pre-commissioned. ●

... services in Kuwait...

BJ PPS has been awarded a multi-million dollar contract by **Hyundai Heavy Industries Co Ltd** to provide pipeline pre-commissioning services in Kuwait. These services will be carried out on **Kuwait Oil Co's** (KOC) crude oil export facilities project in the Fahaheel-Ahmadi region, 30km from Kuwait City.

The project is intended to achieve crude oil production capability of 3m brl/d when completed. BJ PPS will be working on three 56-in diameter subsea pipelines extending 25, 19.3, and 14.2km to the onshore terminal at the North Pier pumping station and metering station, and another 24-in diameter, 23.5-km long, subsea pipeline which arrives onshore at the Port Mina Al-Ahmadi, or South Pier, station. The new pipeline project is an expansion of these facilities. BJ PPS is providing flooding, cleaning, gauging, leak testing, dewatering, hydrotesting, and nitrogen purging and packing, for these new lines. It is also performing de-oiling services on the existing pipelines to facilitate tie-ins and replacement.

BJ PPS has well advanced with the first two phases of the four-phase programme, and the target for completing the 18-month pre-commissioning contract is the summer this year. ●

...and BJPPS completes contract for Atlantis field

IN A THIRD recent announcement, BJ PPS confirm it has successfully completed a pipeline pre-commissioning



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- MFL scanner equipment for pipe and tank inspection



operation for **Subtec Middle East Ltd**, a subsidiary of **Global Industries Ltd**, and the installation contractor for the offshore section of the Atlantis gasfield development in the UAE. Atlantis comprises a wellhead platform that feeds a 14-in diameter, 75-km long pipeline to the shore. The gas from this development will provide a new and much-needed energy supply for the UAE.

Prior to start-up and commissioning, BJ PPS provided pre-commissioning services, including flooding, dewatering, hydrotesting, air-drying and nitrogen purging to -20°C on the pipeline, which terminates at the first onshore flange on the beach before the RAK gas terminal. ●

EMAT launched in the US

STANS, Switzerland, based **Rosen** says that its *RoCD2* in-line inspection tool has now completed three surveys in the US, with more runs scheduled for early 2008. The company's multi-diameter EMAT fleet consists of 14/16-in and 24/26-in tools, with 28/30-in and 34-36-in tools now in production.

The technology uses electromagnetic acoustic transducers (EMAT) that are designed to detect cracks and coating disbondment in pipelines. Traditional ultrasonic technology uses transducers that require a liquid couplant, making it

potentially very costly for use in gas pipelines. Rosen has designed an EMAT technology that eliminates the need for a liquid couplant, thus allowing it to be used efficiently in gas pipelines.

An acoustic wave is generated by creating an interaction between the transducers and the metal surface of the pipeline. The presence of stress-corrosion cracking and other crack-like features will disturb the guided wave in such a way that an echo is created, and this echo can be detected and measured. This technique is also used to collect coating-disbondment information, which is especially important because SCC typically occurs in areas where the coating has separated from the pipe wall. ●

Total pipeline cleaned with compressed air

BRENNTAG Oil & Gas Europe recently cleaned a 24-in diameter, 140-km long crude oil pipeline at the **Total** refinery in Vlissingen, Netherlands, with its *N-SPEC* cleaning chemicals in combination with its specialized pigging processes. Compressed air was applied as a propelling agent to move the pigs through the pipeline, a technique hardly ever seen before in Europe due to the higher risks involved. Using this technology, Brenntag says that it was able to remove all hydrocarbons from the pipeline and bring the lower explosion

level (LEL) down to zero. In this article, Peter Verkiel, product manager at Brenntag Oil & Gas Europe and manager of the project, elaborates on the topic.

The challenge

The 140-km, 24-in crude pipeline, the lifeline for Total's refinery, had to be modified at two places, and some of the block valves had to be overhauled in order to safeguard the operation of the line for coming years. To perform these activities, the line had to be emptied and cleaned, and most importantly, the environment in the line had to be safe, meaning no danger of explosion during welding and cutting activities. The maximum allowed LEL in this respect was 10% or less.

The work had to be carried out taking account of the following additional requirements:

- a timeframe of approx. five weeks to execute the complete project;
- applying compressed air as a propulsion agent for the pigs;
- minimum waste disposal;
- specific safety precautions as indicated by the client.

Visser & Smit Hanab, the pipeline construction company who was the main contractor for the complete project, called Brenntag in for the cleaning part and to achieve this low LEL within the pipeline by means of its *N-SPEC* advanced chemical cleaning.



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The start-up

Prior to the actual execution of the project, Brenntag co-operated with the client to develop a project execution plan, documenting all elements of the project, and a risk inventory and evaluation (RIE), an analysis of all possible risks and measures to reduce them to an acceptable level for both Brenntag and the client. The project was split into three different phases:

- Phase 1: on-line pre-cleaning of the pipeline with several pigging runs;
- Phase 2: removal of the crude and offline cleaning of the pipeline with *N-SPEC 50* and *N-SPEC 120*, in one single pigging run, followed by cutting/welding services;
- Phase 3: refilling the line.

After both parties agreed on the complete set-up, Brenntag commenced the first phase of the execution.

Phase 1 – on-line pre-cleaning

The first phase involved the pre-cleaning part of the operation. Laboratory tests indicated that *N-SPEC 50*, a special wax and paraffin dispersant, and *N-SPEC 120*, a multi-purpose cleaner, would be most effective for this type of contamination and for the total removal of hydrocarbons. Brenntag carried out the pre-cleaning on-line to avoid having downtime and production losses.

Phase 2 – the pig train

The second phase of the project involved the removal of the crude and all remaining wax, paraffin and heavy carbons inside the line, totalling 40,000 cubic meters.

Pig Train

Applied by Brenntag Oil & Gas
Project: Total/VSH, Rotterdam-Vlissingen, The Netherlands (June 2007)
Pipeline: 140 km / 24"

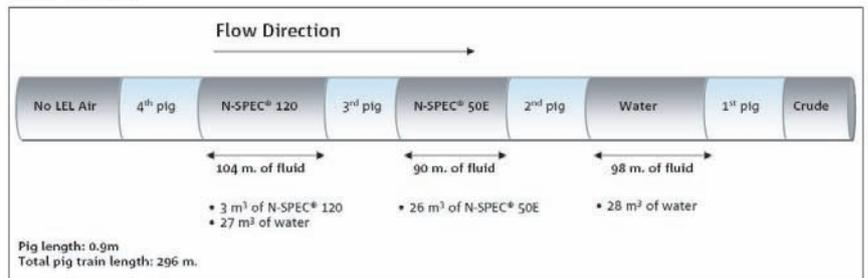


Fig. 1. Diagram of the pig train.

After the line was taken out of service and depressurized, Brenntag established a pig train, comprising four designated pigs interspersed with a column of the required chemicals and water. Compressed air was applied as a propulsion agent: the advantage of this is less waste disposal, and less time required. Also, compared to nitrogen, compressed air has the advantage of presenting no issues involving cold temperatures.

At the receiving site in Vlissingen, Brenntag created a steel dump line from the receiver to a temporary knockout vessel connected to containers. After all pigs were received, the line had to be depressurized again. During the depressurization, the LEL of the out-flowing air was measured by Marsac, an independent company, at three sites: the launching site, the receiving site and the block valve station S3. The results turned out to be outstanding: all sites measured 0% LEL.

Phase 3 – refilling with crude

After completing all required reconstruction and necessary maintenance actions, the line was refilled with crude from the MOT (Maasvlakte oil terminal) in

Rotterdam to Total's refinery in Vlissingen. This was achieved by using two bi-di separation pigs interspersed by a column of approx. 24 cubic meters of water. For this filling procedure, the knockout vessel with demister was used again; all expelled air was blown into the environment without any spray, while the LEL of this air remained at 0%.

Conclusion

Cleaning and emptying a large crude line using compressed air can be done in a safe and economical manner with Brenntag's cleaning chemicals. The specific properties of *N-SPEC* chemicals enable the line to become totally hydrocarbon-free, which can result in a 0% LEL of the air inside the line. The correct application of the product and the right safety precautions are crucial for a successful cleaning operation.

Total and Visser & Smit Hanab were both very pleased with the performance of Brenntag and the cleaning products. Based on this success, Brenntag has already been approached by other companies to carry out similar projects. ●

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