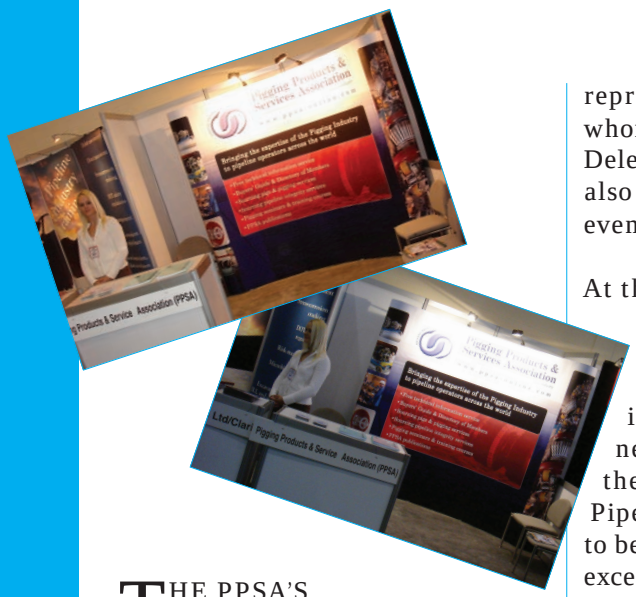
October, 2006

Pigging Industry News
the newsletter of the Pigging Products & Services Association

The PPSA at IPC in Calgary



THE PPSA'S newly-designed display stand had its first outing in Calgary in September when the Association attended the bi-ennial International Pipeline Conference and Exhibition, colloquially known as IPC. As many readers will know, this is one of the main meeting places for the international oil and gas pipeline industry, and this year over 350 technical papers were presented over the conference's four days, in up to 12 simultaneous tracks. The exhibition was also bigger than ever before, with around 150 companies and organizations represented, a fair number of whom were also PPSA members. Delegate and visitor figures were also higher than the last time the event was held, in 2004.

At the exhibition, a number of PPSA members were able to spend time staffing the booth, and for the remainder it was looked after by its neighbour Clarion, who shared the adjoining booth with Global Pipeline Monthly. Gill Hornby is to be congratulated for the excellent design of the new PPSA display, which was both eye-catching and informative.

It is always good to see the PPSA being prominently represented at such events, as it provides a good opportunity of explaining the Association's aims to stand visitors, as well as being able to distribute copies of the member's Directory and Buyers' Guide and membership information. Attending the IPC was undoubtedly a worthwhile opportunity to promote both the Association and the business of pigging in general.

Alaskan pipe problems fuel demand for pigging information

THE PPSA's web site (www.ppsa-online.com) came into play in a big way during BP's problems in Alaska in August: the number of hits on the site nearly doubled. There was also a flurry of telephone enquiries from the US press – including Reuters and US broadcasting stations – which were dealt with by our US technical team. The US public is now probably better informed about pigging that any other in the world! In August, the site had 82,882 hits, compared with 48,543 in July and 61,639 in September, proving again that the PPSA really does work for its members.

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Industry news

Happy Birthday to Spetzneftegaz

MOSCOW-based PPSA member Spetzneftegaz celebrated the 15th anniversary of its foundation in September with a great party and an interesting technical visit. The company hosted the celebrations over 14-19 September, and invited its clients, its staff, and other distinguished guests – including the PPSA – to a banquet in Moscow, followed by a technical visit to its development and manufacturing centre in Ekaterinburg. Among the company's latest achievements that the visitors were shown was the MFL+ intelligent pig, designed to detect longitudinal cracks without the liquid-couplant issues associated with ultrasonics. The technical visit was preceded by a magnificent party, culminating in the company's chairman Mr A Kostkin cutting the birthday cake, and entertainment provided by some of Russia's greatest performing artists.

Mr Kostkin cuts the cake (see Spetzneftegaz story, left).

Want to see inside an operating pipeline?

FOR SOME pigging-company clients, seeing is believing, which explains why **Rosen** has developed what it calls its 'optical observation device' (OPD). The OPD is designed to put a high-quality camera, complete with its own lighting, in one of the company's robust pipeline-inspection units.

The device can make an in-line visual inspection of a pipeline, capturing the visual information on a built-in recording unit for review later. The resulting visualization can be used for a variety of purposes, such as verification of pipeline cleaning or optical investigations of dents, installations, fittings, or repairs, and can therefore be an ideal solution for customers who would like to perform a baseline inspection of a pipeline for dents, cleanliness, status of the installation, and the presence of water. The OPD works in pipeline of diameters 16-56in containing transparent products.

Interlocks prevent valve control errors

THE NEW *QL* and *GL* mechanical valve interlocks from **Smith Flow Control** are designed to ensure that potentially-hazardous valve operations are performed in the correct sequence, eliminating the possibility of operator error or deliberate sabotage. The interlocks are intended for integration with any size of ball, plug, gate, butterfly, or globe valve.

Mechanical interlocks are typically used to support Permit-to-Work procedures such as safety relief valve changeover, pig-trap loading and retrieval, or filter changeover. Because they replace the original handwheels or levers, the *QL* and *GL* interlocks are easily retrofitted to operational plant without requiring shut-down. In addition, their fitting does not compromise the certified pressure envelope of host valves. Fitting kits can either be bespoke to match the topworks of a specific make and model of valve, or as universal fittings. The latter option allows the interlocks to be re-sited and re-used if the original plant is decommissioned. A novel feature is on-site lock re-coding, which allows plant managers to quickly adapt interlocking sequences to changes in process logic.

Designed for long-term operation in the harshest of onshore and offshore conditions, the two new interlocks are made from 316 stainless steel and are also available to order in Duplex and SuperDuplex. The standard finish is a bright yellow polyester powder coat (to RAL1021) which is designed to have high visibility in poor conditions. Operation is by cast stainless steel 'coded card' keys, which simply push in and pull out of anti-ingress and weather-sealed apertures in the lock body. Lock mechanisms are totally maintenance-free.

Major pipeline service contract in Asia-Pacific ....

ABERDEEN-based **BJ Process and Pipeline Services** has been awarded a contract to provide pipeline precommissioning services in China. The services will be carried out on the Chunxiao gas complex development located offshore Nigbo.

The gas complex is a central part of China's largest offshore gas project, forming a major component of the Xihu Trough development project, China's largest offshore gas project. The 350-km long subsea pipeline which will run to the onshore terminal at Ningbo, in Zhejiang Province, will eventually deliver gas from the central processing platform offshore. The gas will be used to supply energy throughout the Zhejiang Province and Shanghai.

A number of pipelines make up the complex Chunxiao gas development. BJ PPS is providing precommissioning services, including flooding, cleaning, gauging, and hydrotesting for the following:

- a 63-km long, 8-in diameter line from the CEP offshore complex to the PH platform;
- a 19-km long, 16-in diameter, pipeline from the CHX-WHPA platform to the CEP offshore complex
- a 25-km long, 12-diameter, pipeline from the DQ-WHPA Platform to the CEP offshore complex.

The company is also providing dewatering, chemical swabbing, and nitrogen packing for the 345-km long, 28-in diameter, pipeline that extends from the CEP offshore complex to the SGPP onshore plant.

The current contract in China follows a successful pipeline precommissioning operation carried out by the company on the Hangzhou Bay Pipeline Project. In addition, BJ PPS has been awarded a contract to provide pipeline pre-commissioning and a variety of start- up services for the new PTT Pipeline Project in Thailand.

... and precommissioning completed on the BTC

BJ Process and Pipeline Services has successfully completed a challenging pipeline precommissioning operation in Turkey on the Baku-Tbilisi-Ceyhan (BTC) crude oil pipeline project, which was constructed by a joint venture consisting of several Turkish and international pipeline construction companies, including **Streicher**, **Haustadt & Timmerman**, **Gunsayil** and **Alarko**.

The BTC pipeline network runs from Baku, Azerbaijan, to Ceyhan, Turkey. BJ PPS provided a variety of critical pipeline precommissioning services for section B, the 42-in diameter, 465-km long, section of the pipeline in Turkey that runs between Erzurum and Sivas. The company's precommissioning services included initial air cleaning and the preliminary caliper survey, followed by flooding, hydrotesting, bulk dewatering, swabbing, air-drying, and the final caliper survey.

There were considerable logistical challenges for both transporting equipment, and servicing the pipeline, as the route traverses three mountain ranges at up to 2800m above sea level. Due to the high elevations, BJ PPS provided high-pressure multi-stage flooding pumps to ensure that the pipeline precommissioning would be completed swiftly and effectively. The demanding operation was further complicated by the client's compressed schedule for completion, and to meet the

required deadline, BJ PPS mobilized the largest spread of equipment in its history. In addition to three independent flooding and hydrotesting spreads, three air-cleaning and caliper survey spreads were used to prepare the 27 sections of pipeline for flooding and hydrotesting.

Brush solutions keep pigs in place

WHEN THE predecessors of **Cottam Bros** began manufacturing brushes in 1858, the traditional industries in their area were shipbuilding and coal mining. Times have changed, and neither of these industries exist in Sunderland today; yet, through adaptation and a willingness to explore new markets, the company has survived and is now at the forefront of technical brush design and manufacture.

The history of brushes can be traced back to prehistoric times when twigs were bound together to make rudimentary sweeping brooms. The methods of manufacture may have changed drastically, and though today's pipeline brushes bear very little resemblance to those early prototypes, the principles remain the same. The bristles of a brush can provide flexibility, resistance, and strength, all of which are essential ingredients for effectively inspecting or cleaning a pipeline.

Cottam Bros has been designing and manufacturing brushes for pipeline pigs for over 30 years, and though its initial focus was on inspection brushes using MFL technology, today the company manufactures a variety of brushes for pipeline cleaning as well as inspection.

Pipeline contract for the PoG project

HALLIBURTON'S production optimization division has been awarded a pipeline and process services (PPS) contract by **Technip Oceania Pty Ltd** for testing and pre-commissioning services for the **North West Shelf Venture's** Perseus-over-Goodwyn (PoG) project. Operated by **Woodside Energy Ltd**, the PoG development is located 134km off the NW coast of Western Australia, and is one of several developments being undertaken within the larger North West Shelf area. Woodside is further developing the Perseus gas/condensate field via a subsea tieback to the Goodwyn A platform, approximately 15km NE of the field.

The PPS work scope will be completed over a two-month period starting in November, and will involve the pre-flooding of spools and associated assemblies, riser filling, post tie-in leak testing, bulk dewatering and an option for umbilical monitoring during lay. "Halliburton is developing an excellent working relationship with Technip across all services, and we look forward to working with both them and Woodside on this project," said Lars Hallgren, PPS global business development manager at the company's production optimization division. "There are considerable opportunities arising in Australasia and, indeed, in the Asia Pacific region, and we are making a firm commitment to the area with the appointment of key personnel and significant investment in expanding our fleet of equipment."

The human factor

ALBERT Buschgens, Managing Director of Netherlocks, looks at safe operating practice in the oil, gas, and chemical-processing industries, and outlines the case for mechanical key interlock systems.

THE oil, gas, and chemical-processing industries generally have a disciplined approach to design and operating practice, governed largely by recognized international standards and enforced by regulators and certification authorities. While good practice begins with good design, both are inevitably hostage to the 'human factor'. The following often-quoted, unattributed, statistic is an interesting illustration of this point: "70% of reported incidents in the oil and gas industry worldwide are attributable to human error and account for in excess of 90% of the financial loss to the industry". Pipeline pigging is an extremely-dangerous operation in cases where it is not

done safely: key interlocks guarantee the safety by eliminating human error.

Risk and responsibilities

The UK Health and Safety at Work Act (1974) places responsibilities on people who design, manufacture, or supply equipment for use at work to ensure that, as far as is reasonably practicable, it is safe.

Internationally, there are strong indications of a fundamental shift of emphasis in safety legislation from prescriptive regulations to the risk-management approach. This approach places primary legal responsibility on owners and operators to adopt 'best practice' in technology and methodology to ensure safety. This evolving change ensures accountability but does not necessarily lead to accident prevention. Asset owners and operators are perhaps more liable than ever before, and can no longer plead conformance to prescribed standards when things go wrong.

The UK led the way with changing the principle of legal responsibility by enacting the Pipelines Regulations (1996) Act which became a statute in April, 1996. In the US, Congress has been updating US legislation since 1996/97 along similar lines. This legislative trend is set against the international trend of downsizing or contracting-out key functions for commercial reasons, and suggests a potential conflict of priorities. The 'job for-life' that produced the 25-year dedicated company employee is disappearing, and is being replaced by higher levels of process automation and increasing dependence on partnering with contractors.

This so-called 'casualization' of on-site labour inevitably increases the risk of accidents through human error, and demands higher levels of applied safety systems to mitigate this risk. Reliance on written safety procedures is an act of faith in the alertness and goodwill of the worker. Accident prevention and violation reduction require physical systems that compel compliance: one such solution is mechanical key interlocking.

What are key interlocks?

Key interlock systems are dual-keyed mechanical-locking devices that operate on a 'key transfer' principle to control the sequence in which process equipment may be operated. They are widely accepted as an effective safety-management tool, and are being adopted by many of the world's oil, gas, and chemicals majors. Interlocks are also recommended in a number of internationally-recognized standards for specific process applications including:

- API RP 14E: Design and installation of offshore production platform piping systems (Para. 5.8.b2)
- Relief device piping – API RP 520: Pressure relieving systems for refinery services (Part 11, Section 4)
- Isolation valve requirements, 1996 No 825
- The Pipelines Safety Regulations (UK) (Section 6)
- Guidance on Regulations (para. 37), published by UK Health & Safety Executive
- EN 764-7:2002

Modern key-interlock systems for oil, gas, chemical-processing, and pipeline systems did not emerge until the early 1980s, Since then, acknowledgement of their effectiveness has led to increasing levels of use and growing recommendations within international standards and codes of practice. The hardware is relatively simple, and is based on specialized mechanical locks designed as integral-fit attachments to the host equipment. Typically they are applied to valves, closures, switches, actuators, or any other piece of equipment that is operated by human intervention. The 'open' or 'closed' status of an interlocked valve, or the 'on' or 'off' status of an interlocked switch, can only be changed by inserting a unique coded key: inserting the key unlocks the operating mechanism (for instance, a handwheel or pushbutton) enabling operation of the valve or switch.

Operating the unlocked equipment immediately traps the initial (the inserted) key: when the operation is complete, a secondary (previously-trapped) key may then be released, thereby locking the equipment in the new position. This secondary key will be coded in common with the next lock (on the next piece of equipment) in the sequence. By this simple coded-key transfer principle a

'mechanical logic' system is created which obviates any possibility of operator error.

Mechanical key-interlock systems are suited for integration with permit-to-work (PtW) procedures; indeed, the Cullen Report on the public enquiry into the Piper Alpha offshore rig disaster (in 1990) strongly recommends the use of locking systems integrated with PtW procedures, especially where routine procedures cannot be accomplished in the time-scale of a single work shift. In the same vein, ongoing surveillance of the UK chemicals industry by the Health & Safety Executive (HSE) found that one-third of all accidents in the chemical industry were maintenance related – the most significant factor being the absence of, or an inadequacy in, PtW systems. In addition to the standards referred to above, the Technical Guidance Notes (published by the HSE) supporting interpretation of the UK Pipeline Safety Regulations (1996) Act [PSR 1996] recommend interlocks as a suitable safety system in the operation of pig traps.

Primary and secondary safety systems

Whether a process module is of simple design with basic functions controlled by manually-operated valves, or of complex design controlled by mainframe distributed-logic control (DLC) systems, key interlocks can provide a reliable mechanical assurance of safe operating practice in which an operator's scope for error is eliminated. DLC-controlled systems invariably incorporate electrical interlocking ('trips'), although these are usually limited only to governing the operation of high-criticality motorized valves (MOVS). Associated services valves (such as for venting) may be manually operated, and will therefore not be recognized by the DLC-management system. Correct operation of these valves may still be critical or semi-critical, and may be dependent solely on the operator following written operating instructions.

In DLC-managed systems, key interlocks can form a vital link between managed and unmanaged valves. In these circumstances, the key interlocks are not intended as the primary safety system but as a secondary back-up to the primary (DLC) system. Designs have been developed in recent years to provide key interlocking solutions that offer the only total form of interdependent control over the operation of both MOVS and manually-operated valves in one fully-integrated system. When applied to MOVS, the interlock design ensures that the failsafe function of the valve is never compromised.

In process systems where the valving and/or control components are all manually-operated (i.e. not DLC controlled), key interlocks become the primary safety system. They are particularly suitable as the primary safety system for remote locations where power is unavailable.

Whether adopted as a primary or secondary safety system, key interlocks can be customized to intelligent format by electronic tagging of the individual keys. This is done by fitting each key with a chip which is read by a tag reader in the control room key cabinet. The key cabinet system incorporates a standard PC which manages the system software, and can be interfaced with the mainframe DLC system by a simple connection.

Conclusion

The global trend of contracting-out site operations inevitably translates into the 'casualization' of labour which, in turn, leads to an increased risk of accidents through human error or deliberate violations. Well-designed interlocking systems can mitigate these risks, either by eliminating error or by greatly inhibiting the potential for violations. Well-designed key-interlock systems are always operator friendly: they require no additional work effort from the operator than normal procedures and, most importantly, should never permit more than one key to be free at any one time. The message is: "keep it simple, and let's make it safe".

The Pigging Products & Services Association

presents

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Aberdeen · 22nd November, 2006

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Email: ppsa@ppsa-online.com

Venue information:

Aberdeen 22nd November
The Marcliffe Hotel, North Deeside Road, Pitfodels, Aberdeen AB15 9YA, Scotland, UK.
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The Pigging Products & Services Association
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PPSA Seminar, Aberdeen, 22 November

Programme details

Pigging a pipeline with a high wax content, by Alf Tordal, Statoil AS, Norway

Applying ultrasound for in-line inspection: the issues, by Dr Michael Beller, NDT, Stutensee, Germany

Automatic multiple pig launching system, by David Bacon, Pipeline Engineering, UK

Cost- and time-effective repairs of faulty pipeline valves and fittings, by Mark Sim, TDW Offshore Services AS, Norway

Online monitoring of absolute stress values in pipelines, by Dave Russell, Weatherford P&SS, Musselburgh, UK

Providing innovative solutions for more challenging pipelines, by Dave Bell, GE Oil & Gas, PII Pipeline Solutions, UK

The ideas workshop
chaired by Roland Palmer-Jones, Penspen Integrity, Newcastle-upon-Tyne, UK

Pipeline integrity management strategy for ageing offshore pipelines, by Christine Clausard, Macaw Engineering, UK

A new cleaning approach for black powder removal, by Dr Hubert Lindner, Rosen Technology & Research Centre, Germany

Understanding the results of an intelligent pig inspection, by Roland Palmer-Jones, Penspen Integrity, Newcastle-upon-Tyne, UK

Pigging the unpiggable, by Rolf Spørkel, AGR Pipetech AS, Norway

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☆ free copies of *An introduction to pipeline pigging*
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