

TECH NOTES

Product Development

Innovative Pigging Solutions For Pipelines

by **Richard Kershaw, Pigtek Ltd.**, Chesterfield, UK

While there are many “proprietary” products available to satisfy most pigging applications, there are occasions when “standard” products are simply unable to perform. This may be due to extreme debris problems, unknown pipeline conditions or diverse pipeline features such as wye pieces, multi/dual diameter pipe sizes or long distance.

Pigtek was formed in 2000 as an independent specialist pigging company, focusing on supplying pigs and ancillary equipment for these specific applications - no matter how diverse.

Being in a specialist market sector allows us to lend our experience to design and configure equipment to meet individual pipeline requirements, and with our innovative approach we have the capability to solve most pipeline pigging problems using specially designed and custom made pigs.

The Pigtek range of products and services is divided into the following;

- Advanced Cleaning Pigs
- Specialist Pigs
- On-Line Pigging Services
- Pig Detection Systems

Advanced Cleaning Pigs

Scale, wax or other debris left to accumulate in a pipeline often leads to corrosion and can cause an imbalance to operating systems through higher pressure, turbulent flow or restricted flow. Removing this debris through the correct pig selection can reduce operating costs, improve flow throughput and enables inhibitors access to bare pipewall.

While many pigs may appear to be very similar, Pigtek Advanced Cleaning Pigs are designed to be exceptionally robust with heavy-duty cleaning capabilities. This level of performance often reduces the number of pig runs required to clean a pipeline and has enabled results to be achieved in extreme conditions.

Magnetic Cleaning Pigs were developed for bulk removal of ferrous debris such as welding rods, coupons, corrosion product etc. and are based on a bi-directional disc design, fitted with a combination of polyurethane guide and seal discs. State-

of-the-art magnetic packages with a multipole design and large surface area are used to provide a huge magnetic field, which ensures an efficient debris pick-up and hold capability.

Depending on the consistency of debris to be removed, we can fit fine gauge wire brush packages for sweeping dust from dry gas pipelines, or firm dense bristles for scouring wax and firm deposits from oil pipelines.

We also have De-Waxing Pigs, designed for crude oil pipelines with wax deposition problems. The pig uses a combination of special scraper discs and an internal Advanced By-Pass system. Pigtek also developed Hard Deposit Removal (HDR) tools for cleaning hard scale and wax from pipelines. The HDR Pin Pig uses steel pins with tungsten carbide tips for scraping debris from the pipewall, while the HDR Plough Pig has hardened steel blades, designed to cut into debris for bulk removal.

Where possible we use Dual Module Pigs. This consists of two separate pig bodies coupled close together using our proven ball joint designs. A Dual Module Pig offers more than double the cleaning capability of a single pig and many combinations can be created to suit the pipeline requirements.

Specialist Pigs

Pigtek has designed and produced many unique pigs to overcome individual pipeline problems. Our involvement usually starts with an initial feasibility study and is often continued through to full-scale trials to test the prototype pigs. Trials offer the added benefit of viewing how the pig is likely to behave in ‘live’ conditions and enables any amendments or fine tuning to be made before final production. We have developed Wye Passing Pigs, High Sealing Pigs, High Temperature Pigs, Long Distance Pigs, Multi Diameter pigs and Dual Diameter Pigs (including a pig capable of traversing a step of 14 inches).

For previously unpigged pipelines or pipelines where large quantities of debris are expected, we have developed our Advanced By-Pass Pigs which are fitted with a number of internal pressure relief



HDR Pin Pig



Advanced Bypass Pig



Dual Module Pig

valves. If the pig becomes stuck due to a buildup of debris, the differential pressure across the pig increases until the pressure relief valves open. Jets of product can then flow through the valves and flush the debris away. The differential pressure will then drop, the valves will close and the pig will continue to traverse the pipeline. Due to the minimal risk of a complete pipeline blockage, the Advanced By-Pass Pig can also be used as a rescue pig to locate and remove stuck pigs.

On-Line Pigging Service

Pigtek is often involved in supervising on-line pigging operations and can provide experience for pig tracking, location of stuck or lost pigs and advanced pipeline cleaning services.

For pipeline cleaning we adopt a progressive approach to minimize the risk of a pig becoming stuck or large quantities of debris blocking the line. Typically, we would follow a program as outlined:

Stage 1 — Pipeline Proving

- Establishing if the pipeline can be pigged



Stage 2 — Pipeline Gauging

- Establishing the size of any restrictions within the pipeline

Stage 2 — Initial Pipeline Cleaning

- Loose Debris Removal and Liquid Removal

Stage 3 — Advanced Cleaning

- Dust Removal
- Ferrous Debris Removal
- Hard Deposit Removal (Wax and Scale)

Depending on the age, condition and history of the line some stages can be omitted. However, we have a detailed pipeline questionnaire to establish how the cleaning program should be structured.

Pig Detection Systems

Pigtek Above Ground Magnetic Pig Tracking Equipment is a portable system that can be used to track most types of pigs at various points along a pipeline route. A sensor is positioned above the pipeline and detects a change in magnetic field when a pig passes beneath it at a depth of up to three meters. Signal output is via a small chart recorder housed in a control unit.



Brush Cleaning Pig

The Acoustic Monitoring Unit was developed to enable a pig to be heard as it travels through a pipeline. When the pig rides over internal weld beads, the noise is filtered and amplified to give a distinct audible sound via headphones. In ideal condi-



On-Site Cleaning

tions the pig can be heard up to 10 kilometers away. The Non-Intrusive Pig Signaller provides an alternative to the traditional penetrating 'flag' type signaller and can be used to detect most types of pigs. Non-Intrusive Signallers offer the benefits of high-reliability, no-leak risk, can be tested in situation and cannot seize up. Another major advantage is that it can be fitted on the 'live' side of ESD valves. Signaller can be provided for offshore, onshore or subsea applications and can be supplied as either a permanent, temporary or portable installation. We can also supply the units with certification to conform to the requirements of various hazardous environments.