

PORTABLE TEMPORARY PIG LAUNCHER

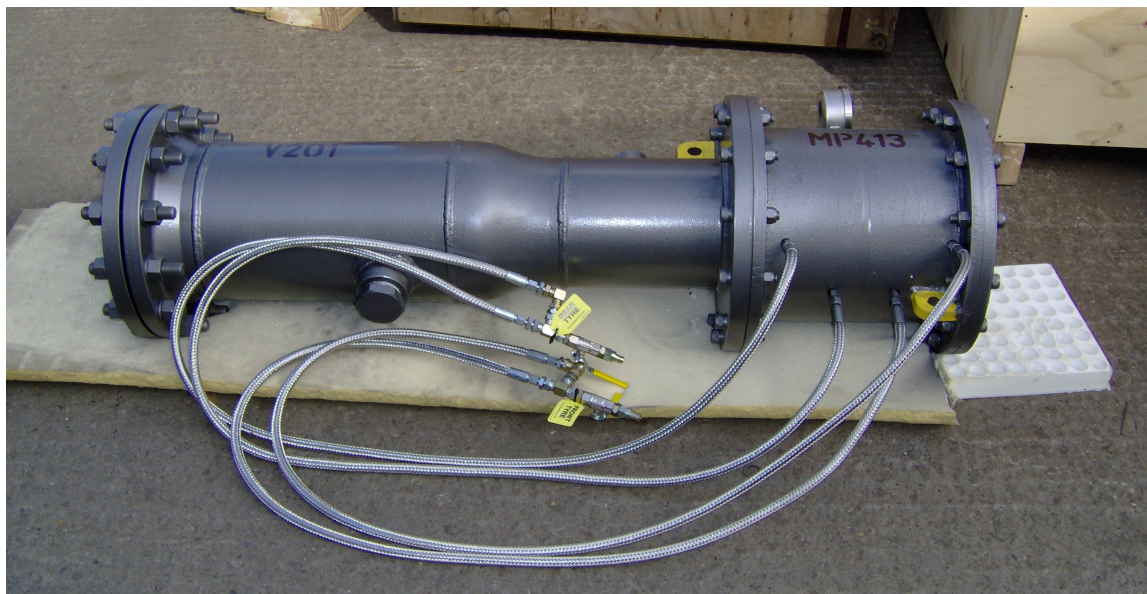
By Tom Cornthwaite, Inpipe Products Ltd., Catterick Garrison, UK

ABSTRACT

Given that until recently pipeline pigging has often only been an afterthought of those designing pipelines there are many occasions when pig launching can be difficult. Initially pig launchers might not be placed in ideal locations along the pipeline and there are often cases where space is limited and conditions are not conducive to the fitting of a standard launcher.

Retrofitting pig launching equipment can also be extremely costly, particularly if the number of launches required are relatively few. There are also many cases where temporary launchers are required, yet these have even fewer available standards to work to.

International Pipeline Products Ltd of Catterick Garrison, UK have developed a solution that allows straightforward, temporary and cost effective pig launching and receiving for low pressure functions. Adding to the cost effectiveness of the product is the fact that the mechanism relies not on a pipe I/D but a pipe O/D, which, considering how it is usually the O/D that is constant in the pipeline to ensure standardised clamps and stands vastly increases the range of applications for each individual product across a pipeline.



Portable Temporary Pig Launcher in preparation for despatch

INTRODUCTION

Pipeline design and technology has not always been able to keep up with demand. Tight timescales determined by market demands have in many cases caused consideration to pipeline pigging to be an afterthought. Also with the process of pipeline pigging is still somewhat of a black art that many are not entirely familiar with, the general quality of pipeline design for pigging can at times lack the forward thinking required.

Current launchers can limit adaptability to pipeline pigging with existing designs being costly and difficult to add to existing, live pipelines. The hot work required and the precision of

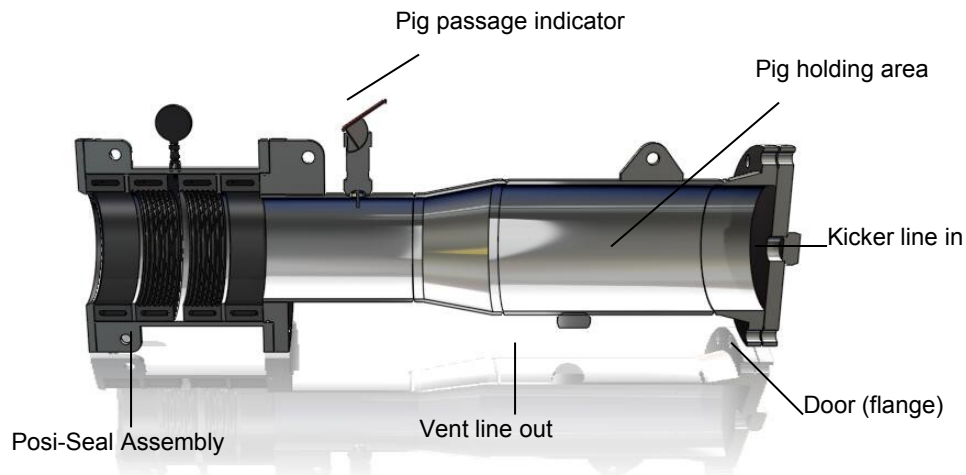
manufacturing the launcher itself makes the cost of installation high, which does little to encourage installation.

Launchers are relatively similar and whilst some provide features such as allowing multiple pigs to be launched there is little in the way of adaptability of launchers. Once a launcher has been installed it is fixed in its capabilities. Typically in situations where a temporary launching solution is required a high pressure plug can be used to seal the end of the pipeline and allow a pig to be launched without a full launching system. Unless a reducer is added to the line with the intention of being plugged it becomes difficult to load the pig into the line. The vice-jaws that hold the plug in place can cause damage to the inside of the pipe and also it is difficult to vent the pipeline using this kind of system. Intended additional launcher assembly on existing lines may also incur hot work that could be unfavourable with regard to the contents of the pipeline.

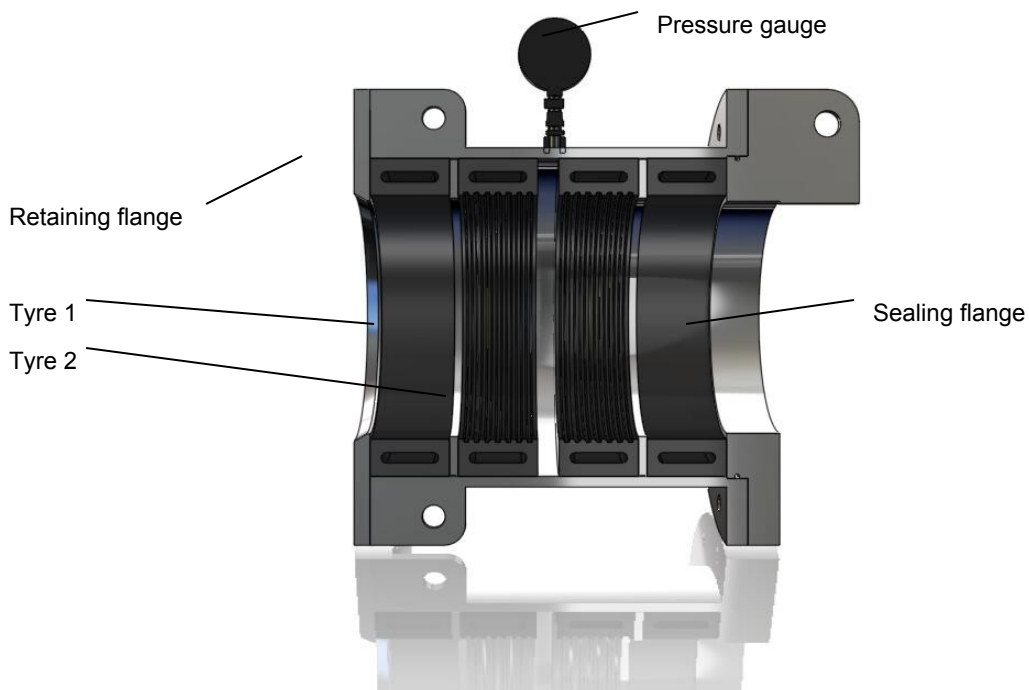
International Pipeline Products of Catterick UK have developed an alternative launching system that could potentially be used in many awkward situations where pigging is required but difficult to carry out. The Portable Temporary Pig Launcher (PTPL) as it is known does this by utilising a pressure dependant fixing, rather than a fixed mechanical system such as a pair of flanges

ANATOMY OF THE PTPL

The portable temporary pig launcher is similar to a standard pig launcher in that it comprises an opening, pig area, reducer, kicker line and vent line. The main difference is the interface with the pipeline itself. Rather than connecting using a mechanical fixing such as a pair of flanges to seal the launcher with the pipe, the use of InPipe's patented positive-seal system to connect with the pipe and seal the connection provides many advantages over existing launchers.



The positive-seal system is essentially a series of tyres that sit within a housing and have a greater I/D than the O/D of the intended pipeline. The PTPL can be easily slid over the pipeline and once the tyres are inflated, the grip that these tyres provide creates a seal with a resistance up to 25 bar of internal pressure. Once the PTPL is gripped onto the pipeline, the pig can then be loaded into the launcher; the pig chamber can be sealed and loaded through the kicker line.



In the same way as a standard launcher; provision has been made to vent the trap before launching. The pig can also be received in the same way i.e. the same process as launching but reversed like one would with a standard receiver. This process, other than operating the interacting series of external tyres, is the same process that operators are already familiar with.

BENEFITS AND OPPORTUNITIES FOR PIPELINE PIGGING WITH THE PORTABLE TEMPORARY PIG LAUNCHER

The obvious advantage is that the launcher does not need to be manufactured to suit a particular I/D rather to fit the O/D which is of course far more standardised across the industry. This is beneficial to the manufacturer because it enables standardisation of parts, which as a consequence means that a more attractive price can be achieved. Standardisation of parts can also mean greater reliability since unusual pipe schedules do not require one-off, unproven designs.

Since an inflatable tyre that has the ability to expand is being used for sealing against the pipe a degree of flexibility is allowed - a greater tolerance to the pipe O/D is permissible. This could be advantageous in many instances, such as where corrosion has reduced the O/D of a pipe to be used, or where the pipe is in any way damaged, since the tyres should still form a sealed unit.

There are also obvious benefits to the time required to install the PTPL compared to a standard launcher. This is down to the fact that the inflatable tyre only needs to be slid over a pipeline and inflated, rather than operated in a time consuming mechanical process.

A removable launcher/receiver can also have the benefit of being easier to maintain and clean, by virtue of the fact that it isn't permanently attached to the pipeline, and the operator can gain access to either end for cleaning or removal of pigged substances.

A closure door is optional with this product. Removing the closure door reduces cost and can potentially help with health and safety issues given that poorly operated or manufactured closure doors can be a danger, but the alternative can involve time consuming removal and reapplication of a blind flange. The launcher can be pre-loaded with the pig required by removing the flange/door at the rear of the unit. Pre-loading may be of benefit to cases where little provision has given to the pig handling area, for instance below a platform¹.

The PTPL is an unobtrusive launcher product that can reduce the cost of line alteration by removing the necessity for a permanent pig trap, reducer and closure. The way in which the PTPL interacts with the pipeline through the use of a tyre ensures that no damage is done to the pipeline.

There are many potential applications for the PTPL when pigging during construction of a pipeline, where sections that ultimately will not require a permanent pig station need pigging. The use of this more sophisticated design could potentially be quicker to install on lines than other temporary devices, and also quicker to uninstall and reuse elsewhere

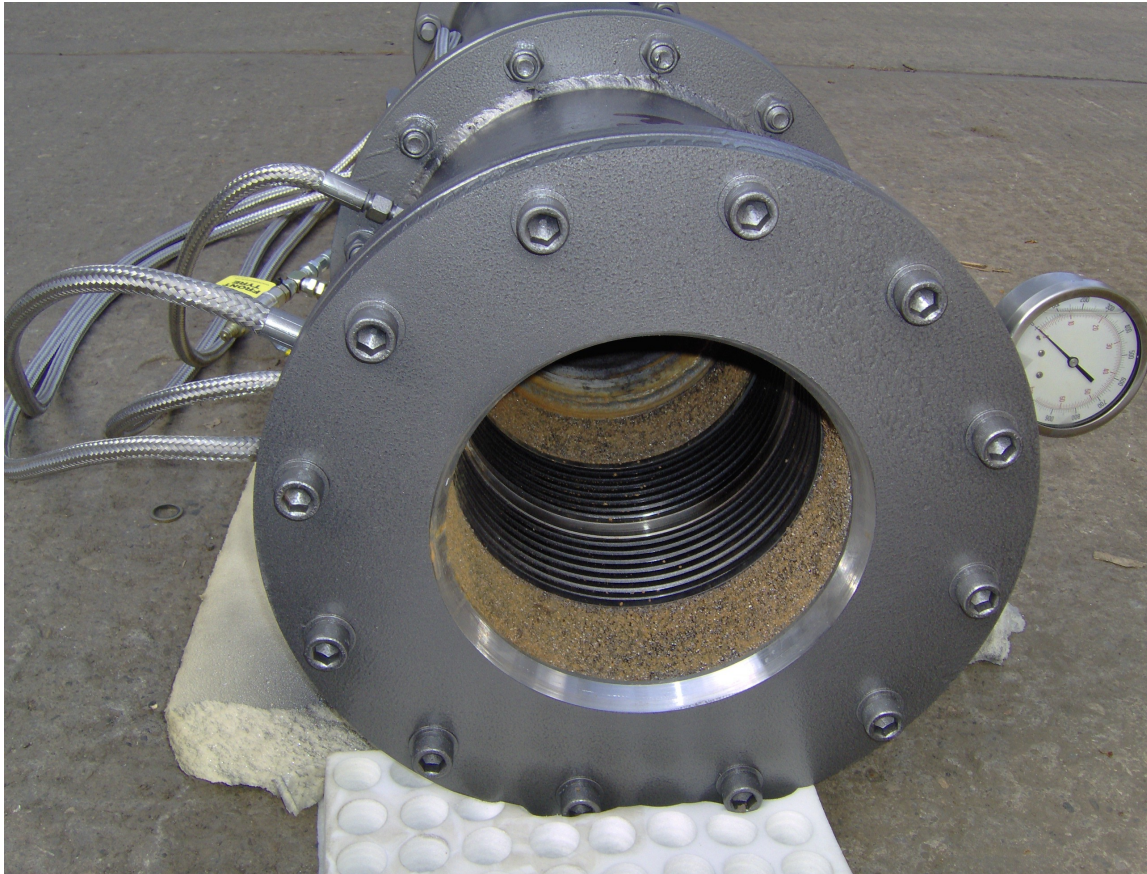
CASE STUDY

The PTPL was developed in answer to a customer scenario where a pig had to be launched into an open ended pipe on a platform where no hot work could commence.

A new pipeline was required between platforms in Norwegian sector following a leakage in an existing line. This meant that oil production had to be routed through another pipeline. Upon completion it was the intention of the operators to pig and hydrotest the line from riser end to riser end. The risers had been previously cut to avoid modifications during a layout reconstruction. Initially it was the intention of the client that a pair of plugs would be used to pig and hydrotest the line, one internal and one external. The location of the riser end on one platform was another consideration as it was located beneath the platform and difficult to reach, rendering significant installation work undesirable.

The concept of an external plug using the posi-seals had been suggested at InPipe previously, but the concept leant itself to pig launching given the low pressures required. Because of the ease of application, the client chose InPipe and the concept put forward.

The posi-seals had been previously used on internal testers, and despite expertise with these, testing for proof of concept was crucial. Initially a sealing test was carried out by energising the tyres and filling the gap between with a higher pressure than that of the line. A full test showed that the tyres were actually more effective than on an internal tester application, thus surpassing expectations. The customer requirement of a pressure to pig the line, approximately 5/6 bar was easily achieved, with a maximum pressure of 25 bar achieved in testing.



The PTPL being prepared for despatch

In this instance the PTPL was supplied with a clamp and a pair of safety harnesses to meet customer safety requirements and the posi-seals were energised by a water pump. The seals themselves comprised a pair of ribbed tyres for sealing sandwiched between a pair of gritted tyres for grip.

The PTPL performed as intended and allowed the team working on the Norwegian pipeline to pig a new pipeline in difficult circumstances.

WHEN SHOULD A PTPL BE USED?

A PTPL is extremely practical as mentioned previously, though obviously there are times when a standard pig launcher/receiver system is still preferential. There are certainly awkward circumstances which require temporary launchers to maintain pipeline integrity, as highlighted in a number of papers^{2,3}. Firstly consideration must be given to the application of the pipeline and the constituent material that is used therein. Being permanent, a standard launcher is better for lines that contain a material that requires the line to be pigged regularly and if possible should be used in place of a PTPL. A permanent launcher can also stand the high pressures required of day to day use and hydrostatic testing.

The main concern in using a PTPL or indeed any similar device that relies on externally mounted would be tyre slippage or failure if used at inappropriately high pressures. The device is not designed to be a replacement for a standard, permanent launcher/receiver, rather, designed to meet a customer specification in a low pressure setting. Obviously this must be made explicitly

clear to customers when ordering or using a PTPL. Supplementary safety systems should be used with the PTPL, preferably a mechanical fixing such as a harness and clamp. Potentially the design could be altered to incorporate a vice jaw mechanism, however, careful and considered use of the PTPL would make such a requirement unnecessary. Whilst it was pointed out that the device could be useful on lines that have corroded, caution should be given to badly corroded lines where the additional stress of energising the tyres on the line may cause line failure.

If used as part of a regular and controlled pigging program, the loads that are placed on the PTPL when used as a launcher/receiver should not be too severe. One concern with using a PTPL when used as a receiver is that an accumulation of wax or debris could cause difficulties once the product is removed. Care has to be given to ensure that in the pipeline being pigged the accumulation of material being pigged is not excessively demanding of the PTPL. Excessive build up of debris could cause loading/unloading issues. The use of a series of low-efficiency pigs or bypass pigs to reduce volume is the most straightforward strategy⁴ when using a PTPL to receive pigs

The main concern is that the PTPL should not be used in pipelines over 25 bar. Of course the friction generated by the tyres, whilst producing a sizeable level of resistance, is not enough to make the PTPL suitable for all pipelines and over 25 bar there could be safety issues. Another consideration of when a PTPL system should be used is the overall space requirement and the potential need for access of cranes or lifting equipment. The device is heavy and thus it is essential to ensure that the site is appropriate before installation.

ALTERNATIVE APPLICATIONS

As demonstrated, the external tyre system has many benefits in pipeline maintenance, working on the more standardised O/D, creating a seal against the pipe and allowing a larger tolerance band for factors such as corrosion.

Working on externally mounted products can potentially save manufacturing companies money through the greater degree of standardisation and provide greater reliability through the wider tolerance band. The unobtrusive nature can also be applicable in a range of applications.

Applications could include section isolation and repair, hydrostatic testing, plugging. Some devices already exist to fulfil these applications, however potentially there is more room for development in the field of pipeline pigging for systems like this one.

The PTPL mechanism allows the pipeline pigger to consider different types of launcher that can be used at one station and allows greater flexibility in pipeline design. 'Blank' stations could potentially be added at reduced cost in the knowledge that just one PTPL is required to launch the pigs from any of these stations.

The launching unit itself could potentially be adapted to suit the purpose of the job. More compact launching systems could be built in for pipes that are awkward to reach. Also there would be potential to incorporate multiple pig launching applications though this might not be in high demand given the temporary nature of the product.

SUMMARY

There are many avenues for development for pipeline pigging products; in this case a customer driven brief has allowed a company to develop a product which has many derived benefits as a result of its function.

By using externally acting tyres, the PTPL is more standardised, more cost effective, quicker to install and uninstall, suitable for areas where hot work can not be done and is more adaptable for the customer.

In general the PTPL is an interesting product in that it offers pipeline users an alternative solution in pipeline launching and receiving.

REFERENCES

4.7.1 Pig Handling, 'All About Pigging', Cordell & Vanzant

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'Pigging as a Flow Assurance Solution – Avoiding Slug Catcher Overflow' – Aidan O'Donoghue, Pipeline Research Limited, Glasgow UK, Presented at PPSA London Seminar 2005

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4.7.1 Pig Handling, 'All About Pigging', Cordell & Vanzant

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'Emerging Issues of the Next 10-20 Years' – Nathan Stevenson, Shell UK Ltd, Presented at PPSA Aberdeen Seminar 2004

³ 'Pipeline Flooding, Dewatering and Venting' – Dr Aidan O'Donoghue, Pipeline Research Limited, Glasgow UK, Presented at PPSA London Seminar 2004

⁴ 'Pigging as a Flow Assurance Solution – Avoiding Slug Catcher Overflow' – Aidan O'Donoghue, Pipeline Research Limited, Glasgow UK, Presented at PPSA London Seminar 2005