

Frequently Asked Questions

IPI – DTI Trekscan

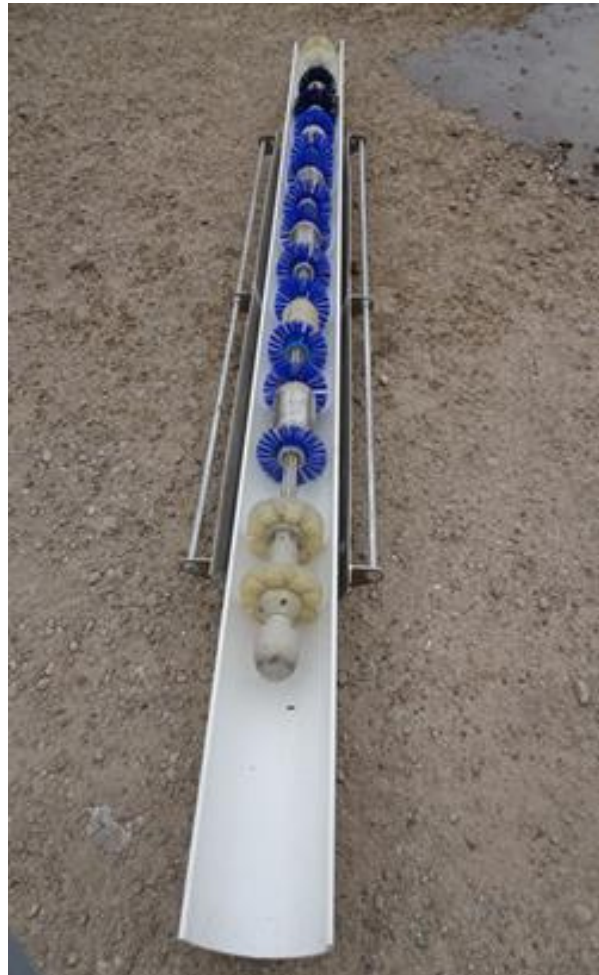


Applus+

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A. Answers

1.0 Measurement

Q1.1 What measurement principle does the tool use?

A The principle of the measurement is the use of fixed straight beam ultrasonic transducer in immersion technique. (non-contact) The distance between the transducers and the pipe surface is between 20 mm and 50 mm. The pipeline needs to be filled a homogenous liquid.

Q1.2 What is the accuracy of the measurement?

A The accuracy of the ultrasonic depth measurement is $\pm 0,2$ mm. For more details see tool specifications, case by case.

Q1.3 What is the measurement resolution?

A Every 1 up to 2.5 mm of an axial movement of the inspection tool a measurement is made with all transducers. Since the transducer beam is approximately 5 mm on the pipe surface there is ample overlap.

Q1.4 Can the tool inspect gas lines?

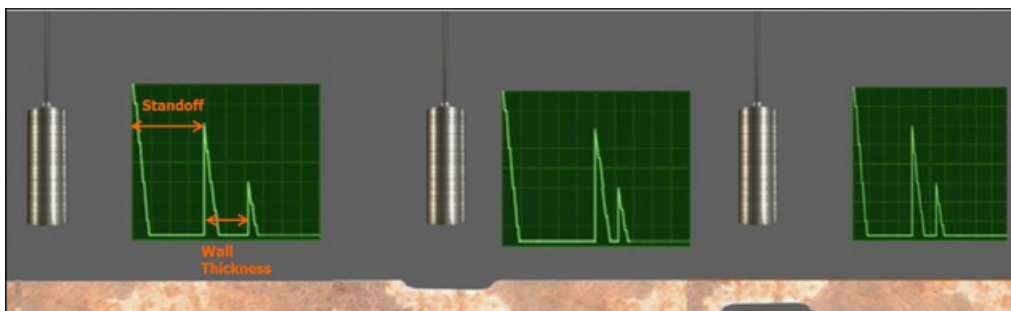
A Gas lines cannot be inspected with an ultrasonic system. However, many Gas lines and gas risers have been inspected with this system after they have been filled with a suitable liquid and in several cases dried after inspection.

Q1.5 Is wax a problem for the measurement?

A The Applus+ DTI Trekscan is a free swimming type of Inline Inspection Tool. In contrary to the PIT crawler, only the wheels of this vehicle are in contact with the pipeline surface. The DTI Trekscan will collect wax, scaling and debris that is in the pipeline, which may hamper the inspection and the ultrasonic results. Therefore, we also offer Pipeline Solutions: pipeline preparation, cleaning, gauging, one-stop shop operations.

Q1.6 What is the circumferential inspection coverage of these tools?

A Circumferential coverage of all the Inline Inspection Tools is 100% with ample overlap



2.0 Pipeline entrance requirements

Q2.1 How is the tool launched?

A The DTI Trekscan system needs open access to the pipeline. Most of the cases it will be a temporary launch/receive facility. The location should be determined with operations. For example:

Existing launch location: In principle no special modification required. Important to review the length, wall thickness and flange connections of the launcher.

No permanent launcher available; A location with low operational impact should be determined, such as at a blind flange, puppy section or in a valve pit. In such a situation the pipeline must be off-line, depressurised and opened. A temporary "Applus+" launcher is used to allow that the tool simply can be launched into the pipeline and keep the liquid in the pipeline. The liquid is essential to perform the ultrasonic inspection. (couplant!)

Q2.2 What are the Pipeline entrance requirements?

A Depending on the scope of work all the options will be discussed. Taking in account the conditions at site and the operational procedure which should be followed. The most fit for work set up shall be accepted. Here by several options:

Launcher-Receiver: Enough space, straight forward inspection site

Bi-directional: Only at one location "at the receiver end" the DTI Trekscan will be retrieved from the pipeline.

Flex hose: The DTI Trekscan will be launched from a hose. Not enough space at the launch/receive location.

Nominal Pipe: Blind flange or other smart location will be the point of insertion.

Removal of valve or puppy section: Leave the operational system intact as much as possible. Low costs for preparations and for commissioning the system.

Connect two Pipelines and work from one location

Q2.3 What is the length of the spool-piece to give sufficient space for the Applus+ launch-tray?

A The standard Applus+ launcher/receiver has a length of approximately 0.5 - 6 mtr. The DTI Trekscan is designed to pass 1D back to back bends hence a spool piece with a length of valve size could be sufficient. However different launching procedures can be followed and shall be discussed with the customer.

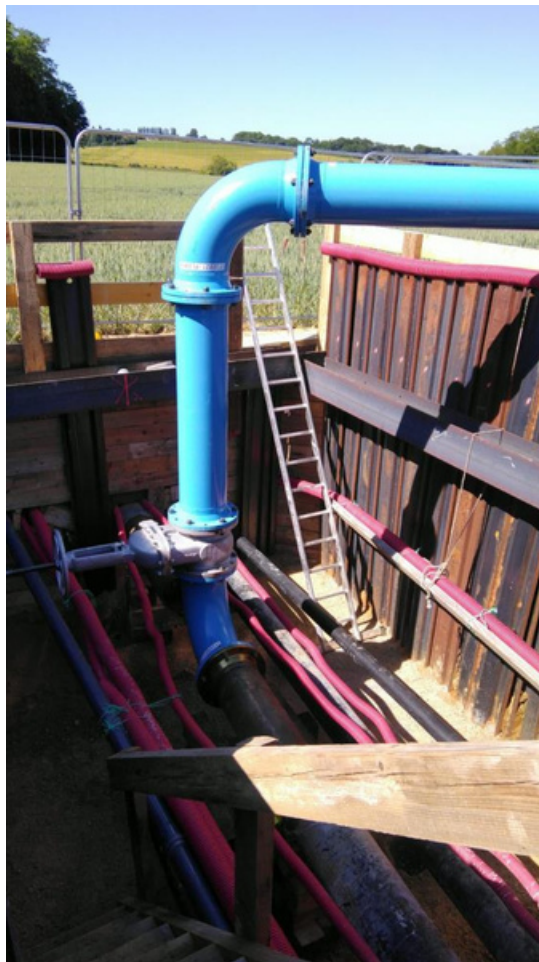
Q2.4 Must there be a sufficient access facility at each end of a pipeline section to launch pigs into the line and retrieve?

A There are two options, single direction inspection or bi-directional inspection. May the pipeline not prepared for ILI type of inspections than each side need to be temporary upgraded for Inline Inspection.

Q2.5 What are the average costs for a pipeline entrance?

A It's important for the operator to understand what he expects from the pigging operations. When the operational procedure is approved, and the scope of work defined. The costs will be differs case by case.

Pigging requirements are deemed non-standard or more complex, there need to be an agreement on the best way to proceed. Launching and recovering the pigs is not always straightforward, either. It is therefore often necessary – before commissioning a pigging operation – to consider the range of options available. This is to develop an effective project execution plan and to demonstrate and predict the viability and cost of a chosen option. In addition to the obvious risks and immediate practical challenges, it is often also necessary to address some significant external factors as contributors to the full lifecycle costs of a pipeline.



3.0 Typical DTI Trekscan Pipelines

Q3.1 Which customer Assets are typical DTI Trekscan applications?

A Typical application for unpiggable tools is for pipelines that may have some of the following:

- ✓ Buried piping
- ✓ Gathering, Transmission, distribution pipelines
- ✓ Cased River, Road or Railroad Crossings
- ✓ Branch connections
- ✓ Through-wall facility penetrations
- ✓ Jetty/Marine Export or Import Dock lines
- ✓ Thermal pipelines (glass houses)
- ✓ Above ground spans
- ✓ Empty - or partly filled pipelines
- ✓ Pipe-section inspection (new)
- ✓ Hydrant
- ✓ Storage piping



Q3.2 What is difficult in small diameter piping?

A The size, diameter, of the pipeline can be restrictive to pigging tools, since most pigs travel through larger diameter pipelines (12 inches and larger). The special crawler / free swimming tools are specially designed for smaller diameters. This expands the inspection options for pipeline operators. Other physical characteristics that pose challenges to pigging:

- ✓ Multi diameter
- ✓ Short radius or heavy wall bends
- ✓ Fabricated ("mitre") bends
- ✓ Thick and thin wall pipe
- ✓ Repair sections
- ✓ Over- or under-sized valves
- ✓ Low flow
- ✓ Product

Q3.3 What are special bends and connection?

- A** Examples of challenging bends/connections:
- ✓ Back to Back bends
 - ✓ Y-connection
 - ✓ Short radius and thin wall bends
 - ✓ Unbarred tees
 - ✓ Fabricated ("mitre") bends
 - ✓ Full bore off takes

Q3.4 Is a pipeline difficult to inspect due to flow and/or access?

- A** The flow within a pipeline affects pigging, as without sufficient flow a pig is more likely to stall or become stuck. The internal cleanliness of the pipe can also cause problems with movement inside the pipe. Pipelines with flow or access restrictions:
- ✓ Difficult of access such as offshore platforms, subsea
 - ✓ Low or no flow
 - ✓ Cleanliness of the pipe
 - ✓ Pipeline without a pig launcher or receiver

Q3.5 Why are older pipelines difficult to inspect?

- A** Other restrictions on pipelines are related to how the pipeline was constructed, especially in older, longer pipes. Some of the restrictions are listed below:
- ✓ Cased road, rail, or river crossings
 - ✓ Bore restrictions
 - ✓ Steep and vertical sections
 - ✓ Installations such as plug valves, dead ends, offtakes
 - ✓ Exotic materials
 - ✓ Coating or insulated liners
 - ✓ Unknown repairs
 - ✓ Expansion sections
 - ✓ Pipeline drawings not available anymore

4.0 Tool capabilities

Q4.1 What bend radius can the tool pass?

- A** The bend radius that can be passed strongly depends on the pipeline diameter and the tool that is used. The DTI Trekscan 6"/8" is specially designed to deal with 1.0D bends. The 10"-14" Tool will pass 1.5D bend radius and larger. Heavy wall, multi diameter, mitre bends, dents or other obstructions in the pipeline can be passed but this sometimes requires special trails or feasibility studies. To establish the inspect ability of a line it is important to know all features that exist in the line.

Q4.2 Can a pipeline with diameter changes be inspected?

- A** In most cases multi-diameter pipelines can be inspected, 6" to 8", 8" to 10" and larger. When the specifications are not standard a trail or feasibility study will be started to identify the required modifications.

Q4.3 What pipeline length can this system inspect?

- A** In the difficult to inspect market in general the inspection length range varies from 500m to 5000m. The DTI Trekscan can inspect up to 50km



Q4.5 How long (time) does an inspection take?

- A** The speed of this inspection vehicle is approximately 1 metres/sec. This will mean that an inspection of a pipeline with a length of 1000m will take about 20 minutes to reach the end.

5.0 Pipeline preparation

Q5.1 How is access made to the pipeline?

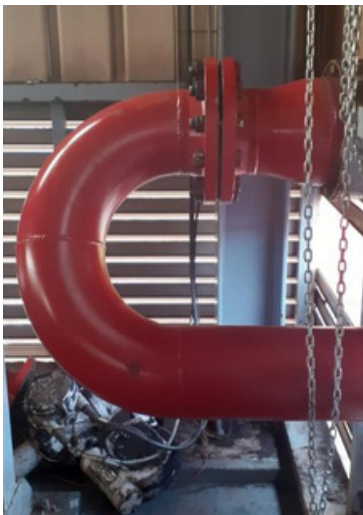
A Because liquid is needed inside the pipeline, access to the pipeline should be made at either an existing launcher site or a well fitted location must be created; for example, by means of removing a valve or puppy section. Open access is required to introduce the inspection tool into the pipeline. Many options for access are possible and have been used.

Q5.2 Can a pig launcher be used?

A Yes, opening the launcher door and introducing the tool at this point into the pipeline is a possible launching scenario.

Q5.3 What kind of pig receiving station is necessary?

A Not necessary, when the flow in the pipeline can be reversed. The DTI Trekscan is a bi-di Inspection Tool.



Q5.4 Must the pipeline be empty during the inspection?

A Since the system uses ultrasonics to perform the measurement a liquid that can act as a couplant is required in the pipeline. This can be a (light) crude oil, (sea) water, diesel or other. It needs to be a homogenous liquid. Mixtures of two different liquids shall be avoided as this may disturb the ultrasonic measurements.

Q5.5 What pumping capacity is required for this tool?

A "The requirements of the pump units to be employed, depends on the type of product in which the cleaning is executed, and the amount of flow and pressure needed. The pump should have an overcapacity of 10% or more. Pump volume: 60-260 m³/h."

6.0 Pipeline solutions

Q6.1 Is cleaning necessary?

A "There are many different reasons for cleaning pipelines for example for maintenance projects, for production increase, for abandonment and for internal inspections. To determine the optimal cleaning procedure depends on the product, type, and amount of pollution. The most known cleaning methods used in the pipeline industry are: High pressure jetting, flushing, sand jetting, chemical solvents, and pigging. To find out whether cleaning is required or which cleaning method will have the best results some research has to be performed to determine the amount and type of pollution. It's important to know your pipeline and product."

Q6.2 Why Pipeline Cleaning?

A There are many different reasons for cleaning pipelines for example for maintenance projects, for production increase, for abandonment and for internal inspections. Too reduce risk and lower costs.

Q6.3 Do you have the capability to deal with debris?

A At the end of the pipeline, the various chemicals are separated from each other and collected for waste processing.

Q6.4 What are the cleaning costs?

A A standard pricing schedule for the cost of the different types of pigging system? Quite simply, there's no such thing as a standard pigging system. Design and develop every solution around the needs and requirements of each client. This is important to ensure that each one of our customers gets the very best solution. And because it is extremely rare to have to identical processes, it's also extremely rare to have two identical pigging systems.



7.0 Pipeline Inspection

Q7.1 How do we determine the ID of the pipeline

A The basic procedure could be the following: First start with a low-density foam pig to review if the pipeline is open, no special obstruction inside the pipeline or any other signs of possible challenges. The next step could be a Bi-Di Gauge pig to determine ID

Q7.2 Time window of inspection?

A The inspection timeline varies case by case but for a standard pipeline the following specifications can be taken in account:

- Inspection speed: 1m/s - 3.6 km/h
- 1000m=approx. 20 minutes inspection time

Setting up depends on scope of work but for a standard pipeline with a distance of 1000 up to 4000m the following basics can be used:

- 3-5 days inspection period per pipeline + field report.
- Multiple cleaning, extra days may occur / required.
- Client prepared the pipeline.

8.0 Reporting

Q8.1 Do we receive a report?

A After each inspection run a DQA (Data Quality Analysis) will be uploaded by the inspection Team. This is the moment we make the first decision to either prepare an extra run, rerun or even a cleaning run. When the data is approved by the team and discussed with the client, within the next 24h-48h a site report (preliminary report) will be handed over to the client. Quick view evaluation with the highlights of the inspection, most severe spots.

Q8.2 When can we expect the Final report?

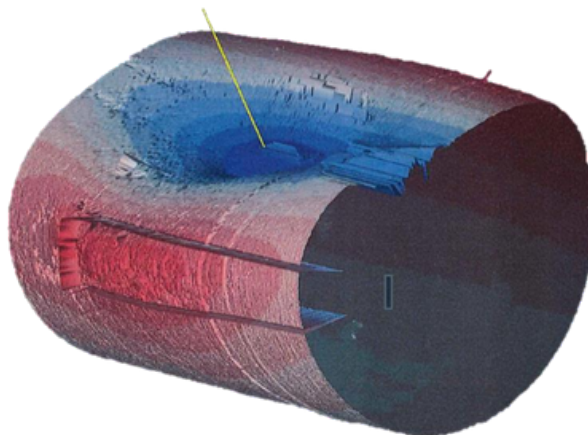
A The final report analysis will start after the site report is handed over and discussed with the client. Depending on the pipeline length and grade of corrosion from 2 weeks after the inspection run a final report will be handed over and in detail discussed with the client. Optional timelines can and will be discussed with the client. Optional reports such as a Fit for Service, Remaining lifetime, comparison and corrosion growth analysis can be discussed.

Q8.3 What kind of information will be in the report?

A Sizing information like internal corrosion, external corrosion, lamination, ovalities, welds, bends, dents and (remaining) wall thickness all with clock position, distance from starting point, distance from previous weld, length and width of these features is available. Also, the Maximum allowable Operating pressure and the burst pressure of each defect is calculated according to the B31G standard. Several graphical presentations will be used to show the features detected in the pipeline in a comprehensible manner. All reporting will be done acc. POF.2016

Q8.4 Can a pipeline integrity report be made based on the results of this tool?

A Yes, an integrity report can be supplied based on the inspection results. Applus+ has also specialised departments for asset integrity management and is capable to provide this type of additional services.



9.0 General

Q9.1 What are the major advantages of a system like this? What are the benefits for the operator?

- A** The benefits for the operators will range with the different types of unpiggable tools used. In general sense most tools will be cost effective, safe and reliable and easy to handle. They also provide the information needed quickly and in a format that will be easy for the operator to read and take the next steps in ensuring a well-maintained pipeline. The Applus DTI RT Trekscan will unburden your operations:
- ✓ 100% coverage with high resolution quantified data: no screening method.
 - ✓ The measuring principle used is ultrasonics that means that the results are quantitative and available in real-time
 - ✓ Pipeline integrity of the entire pipeline vs spot check or screening methods
 - ✓ Extension of remaining lifetime
 - ✓ From the inside of a pipeline all data can be retrieved, difficult locations normally you won't access
 - ✓ Safe costs, no scaffolding, removal of insulation,
 - ✓ Safe work environment, vs scaffolding, rope access and other hazardous situations, areas

Q9.2 Why inline Pipeline Inspections?

- A** With frequent, thorough pipeline inspections are performed, assessors can accurately inspect, identify, mitigate, and communicate potential corruptions, anomalies and cracks. Ultimately, pipeline inspections prevent pipeline bursts, punctures, fractures and buckling. This, in turn, avoids business downtime. Pipeline inspection/cleaning will optimize production quality without compromising your lifetime. Important to maintain the integrity of your pipeline. Uncover important information to fill gaps of the knowledge

Q9.3 Impact of pipelines not being inspected?

- A** With proper and scheduled maintenance of pipelines you decrease the chances of pipeline failing and/or production loss risks. Not inspecting a pipeline may lead to problematic scenarios such as reputation and environmental.

Q9.4 Unpiggable or Difficult to inspect?

- A** Unpiggable will mean for DTI Trekscan no product in the pipeline. The DTI Trekscan is an ultrasonic Inline Pipeline Inspection Tool which requires couplant to measure. Other limitations specified in the specification sheet.

Q9.5 Extend lifespan without shutting down operations?

A The onus is on both the pipeline owner and the regulators (certified body) to ensure the extension exercise works. The pipeline owner will have to demonstrate to the HSE/authorities that they have done all possible to reduce all risks. Knowing that lifespan extension is doable by using modern technologies such as Inline Pipeline Inspection Tools.

Q9.6 What kind of tools are available?

A The DTI Trekscan is especially design to inspect difficult to inspect pipelines. The set of tools are developed in the range from 6" up to 14".

Q9.7 Can I use the pipeline during inspection?

A What may make a line unpiggable. For some operators, the prospect of taking a pipeline out of service for days at a time is not only impractical, but impossible. For example, if an operator cannot tolerate any reduced product flow, several inspection providers are automatically unable to perform an inspection. Depending on the operator's time restrictions, however, some inspection technologies can inspect 100% of an unpiggable line under 24 hours without significantly modifying the line, allowing previously un-inspectable pipelines to be inspected and returned to service in the same day. There are two commonly recognised circumstances where time constraints have a particularly negative effect on inspection services. In some cases, an inspection must be completed quickly to place a line back into normal service in a short period of time. In other instances, an operator may have an extremely small window of opportunity to perform potential remediation and requires immediate inspection results to effectively respond. Depending on the chosen inspection provider, these time constraints no longer deem a line unpiggable, as inspections and data reporting can be produced in a matter of hours, rather than weeks or months.

This capability is not, however, available from every inspection provider. The ability to both inspect and assess over the course of a few days (or less) requires a unique inspection and assessment methodology that is not always available. It is important to fully understand the delivery capabilities of inspection providers to ensure appropriate turn around requirements are met.

Q9.8 Can the tool get stuck?

A In most pigging operations, the pig, sphere, or inline inspection (ILI) tool travels smoothly from launcher to receiver. Occasionally, though, a pig will become stuck or stalled in the pipeline. Many conditions can lead to stuck pigs. Some of the more common causes are:

- ✓ Debris, including wax, building up in front of the pig.
- ✓ Excessive wear or mechanical damage to the pig.
- ✓ Check valves inside the pipe that prevent the pig from passing.

Q9.9 What if the tool gets stuck?

A When the pig didn't reach the receiver safely follow the procedure of a stuck or stalled tool and facilitate their removal:

- ✓ Pinpoint the location of the stuck pig.
- ✓ Determine if the pig can be safely displaced.
- ✓ Prepare the pig removal procedure and discuss the options the customer.
- ✓ The DTI trekscan is a bi-di inspection tool thus by changing the direction of the flow
- ✓ The tool will safely be coming back in the launcher.

Q9.10 Is there an acceptable level of risks?

A The DTI Trekscan is especially designed to inspect pipelines which are normally seen as unpiggable; for example, due to its configuration or never been inspected. Before each inspection a Task Risk assessment will be performed to minimize all risks, internal and with each client

Q9.11 Have you considered the overall cost impact for the pipeline operator including pipe modifications and production deferment?

A Pigging is an operation to remove debris or unwanted deposit build-up in a pipeline. Debris and deposits in a pipeline will result in a pressure build-up and production loss. If no pigging programme exists the debris and deposit build-up could continue to rise which will create greater back pressure on the line, causing higher maintenance on pumps and the line could eventually become blocked. The longer the pipeline is left producing without pigging however, the worse the situation could become. It appears that 65% of the pipeline failures are caused by corrosion. The unscheduled downtime due to repair(s) and maintenance versus regular inspection and /or cleaning are proportional. Applus is flexible in project preparations and execution this will be always in consultant agreed with the client. Project costs will be in open communication with the pipeline operator/owner

Q9.12 Have you considered inspection coverage, quality, and risk?

A The objective of the In-line Pipeline Inspection is to obtain data on the pipeline as part of the baseline and/or revalidation process. The quality and consistency of the data obtained from the field is important for statistical verification. All the latest Inline Inspections tools will record 100% of the full circumference with axial coverage from 1-2.5mm: 100% coverage with ample overlap. Each inspection run must follow a full Quality check: DQA (Data Quality Analysis)

Risk: each project has his own risk assessment. The inspection procedure will be reviewed with the client prior to each inspection. Cleaning, flushing, gauging could be part of the assessment to minimize those risks. The DTI Trekscan is especially designed to inspect challenging pipelines with unknown configurations.

Q9.13 Have you considered the need for the repeat inspections/remaining lifetime may justify modifications to make a pipeline piggable?

- A** Pipelines which are classified as unpiggable with the following purposes such as:
- √ Unsafe work conditions, offshore
 - √ Off-line inspection operations
 - √ Clean short pipeline segments in HCA (High Consequence Area's)
 - √ Economic purposes
 - √ Debris vs clean pipeline
 - √ Modifications should be considered case by case but making a pipeline piggable could
 - √ be a very costly exercise

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