

### How the pipeline pigging process works

J.R. MORGAN, Enduro, Tulsa, Oklahoma

Pipeline pigging sounds complicated, but it does not need to be. At its core, it is simply moving a tool through your pipeline to clean it, inspect it or move product from point A to point B. The challenge is not understanding the process, it is choosing the right tool and running it correctly. That is where most problems happen.

Pipeline pigging is the process of running a tool through a pipeline to clean, inspect or separate product. It plays a critical role in maintaining flow efficiency and preparing lines for inline inspection (ILI). Pipeline pigging is used to clean, inspect and maintain pipelines by sending a device (pig) through the line. This pig:

- Cleans pipelines by removing debris and buildup
- Separates products in batching operations
- Prepares pipelines for ILI
- Improves flow efficiency and reduces risk.

**Types of pipeline pigs used in pigging operations.** Each type of pipeline pig is designed for a specific function. Choosing the right one depends on pipeline conditions and the objective of the run. Common pipeline pig types include:

- **Cleaning pigs:** Remove debris, wax and buildup
- **Batching pigs:** Separate different products in the line
- **Inspection pigs (ILI tools):** Collect pipeline integrity data
- **Gauge pigs:** Identify restrictions or deformation.

**Why pipeline pigging is important.** Pipeline pigging directly impacts inspection accuracy, flow efficiency and long-term pipeline integrity. Pigging programs help:

- Remove debris and buildup (choosing the right pig for wax buildup)
- Prevent corrosion and blockages
- Improve flow efficiency
- Prepare pipelines for ILI
- Maintain regulatory compliance.

Without proper cleaning and preparation, debris inside the pipeline can interfere with inspection tools and reduce the accuracy of inspection results.

**Choosing the right pipeline pig.** Choosing the correct pig is critical to the success of any pigging operation. The wrong pig can:

- Miss debris or buildup
- Become stuck in the pipeline
- Reduce inspection accuracy
- Increase operational costs (OPEX).

Choosing the right pipeline pig depends on:

- Pipeline diameter and geometry
- Product type
- Type of debris or buildup
- Cleaning or inspection objectives.

The author's company designs and manufactures pigs for various pipeline sizes and applications—from standard cleaning runs to complex pipeline conditions.

**How does a pipeline pig work?** A pipeline pig travels through the line under pressure while maintaining contact with the pipe wall. As it moves, it can remove debris, push out liquids, separate products or prepare the pipeline for inspection. The exact configuration depends on what the operator is trying to accomplish and on the conditions inside the pipeline. That is

why pig design matters. A pig that works well in one line may not be the right choice for another. The pigging process typically follows these key steps:

- **#1 Pipeline evaluation:** Before pigging begins, operators evaluate:
  - Pipeline diameter and length
  - Flow conditions and pressure
  - Type of debris or buildup.
- **#2 Pig selection:** The right pig is selected based on:
  - Cleaning requirements
  - Pipeline geometry
  - Inspection goals.

Choosing the wrong pig can reduce effectiveness and increase costs.

- **#3 Pig launching:** The pig is inserted into the pipeline through a launcher and driven forward by product flow or gas pressure. Pipeline pig trays are used to handle pipeline pigs safely and efficiently.
- **#4 Pig tracking:** Tracking equipment is used to monitor the pig's location and ensure it moves through the pipeline as expected.
- **#5 Cleaning or inspection run:** As the pig travels through the pipeline:
  - Debris is removed
  - Liquids are displaced
  - The pipe wall is cleaned or inspected.
- **#6 Pig receiving:** The pig is captured at the receiving station and removed from the pipeline.

**When should you use pipeline pigging?** Pipeline pigging is commonly used before ILI, when flow efficiency decreases, when debris or buildup is present and after construction or maintenance. One of the most important uses of pigging is preparing pipelines for ILI tools by properly cleaning the pipeline to ensure inspection sensors maintain accurate contact with the pipe wall.

Proper pipeline cleaning ensures inspection sensors maintain proper contact with the pipe wall, improving data quality and reducing the risk of missed anomalies. Cleaning pigs used in pipeline pigging are specifically designed to support pigging operations and enhance overall pipeline inspection performance.

How do you know if your pipeline is ready for inspection? Knowing when a pipeline is clean enough is critical to a successful ILI run. A pipeline is typically ready when:

- Debris recovery is minimal
- Each run removes less material than the last
- Pig movement becomes consistent
- Little to no ferrous debris is present.

If significant debris is still being recovered, additional cleaning is usually required.

**Cleaning pigs used in pipeline pigging.** There are various pipeline cleaning pigs designed to support pigging operations and pipeline inspection preparation. Selecting the right pipeline cleaning pig is critical to achieving effective cleaning and preparing pipelines for inspection. These pigs include:

- **Smooth transition support (STS) cleaning pigs:** Designed for reliable performance in pipelines that include wall changes, fittings and other challenging features.
- **Advantage cleaning pigs:** Rugged steel-bodied pigs engineered for reliable cleaning, batching and debris removal.
- **Dual diameter cleaning pigs:** Engineered for pipelines with changing diameters or multi-diameter segments.
- **Urethane cleaning pigs:** Durable pigs used for sealing and cleaning in various applications.
- **Foam cleaning pigs:** Lightweight pigs used for light cleaning and product displacement.

**Support for engineers and project teams.** For many engineers and project managers, especially early in their careers, pipeline cleaning and pigging can be unfamiliar territory. You may be responsible for planning an ILI run—but not have years of field experience to rely on. That is where working with the right team makes a difference. To maintain pipeline integrity, it is essential to:

- Develop a cleaning or maintenance plan
- Select the right pigs and configurations
- Interpret debris and run results
- Troubleshoot issues before they impact your inspection.

**Takeaway.** Pipeline pigging plays a critical role in maintaining the safety, efficiency and reliability of pipeline systems. By removing debris, improving flow performance and preparing pipelines for ILI, pigging helps operators identify potential issues before they become costly failures. Whether used during routine maintenance, after construction or prior to inspection activities, pigging remains an essential practice for extending pipeline life and ensuring optimal operational performance. **P&GJ**