

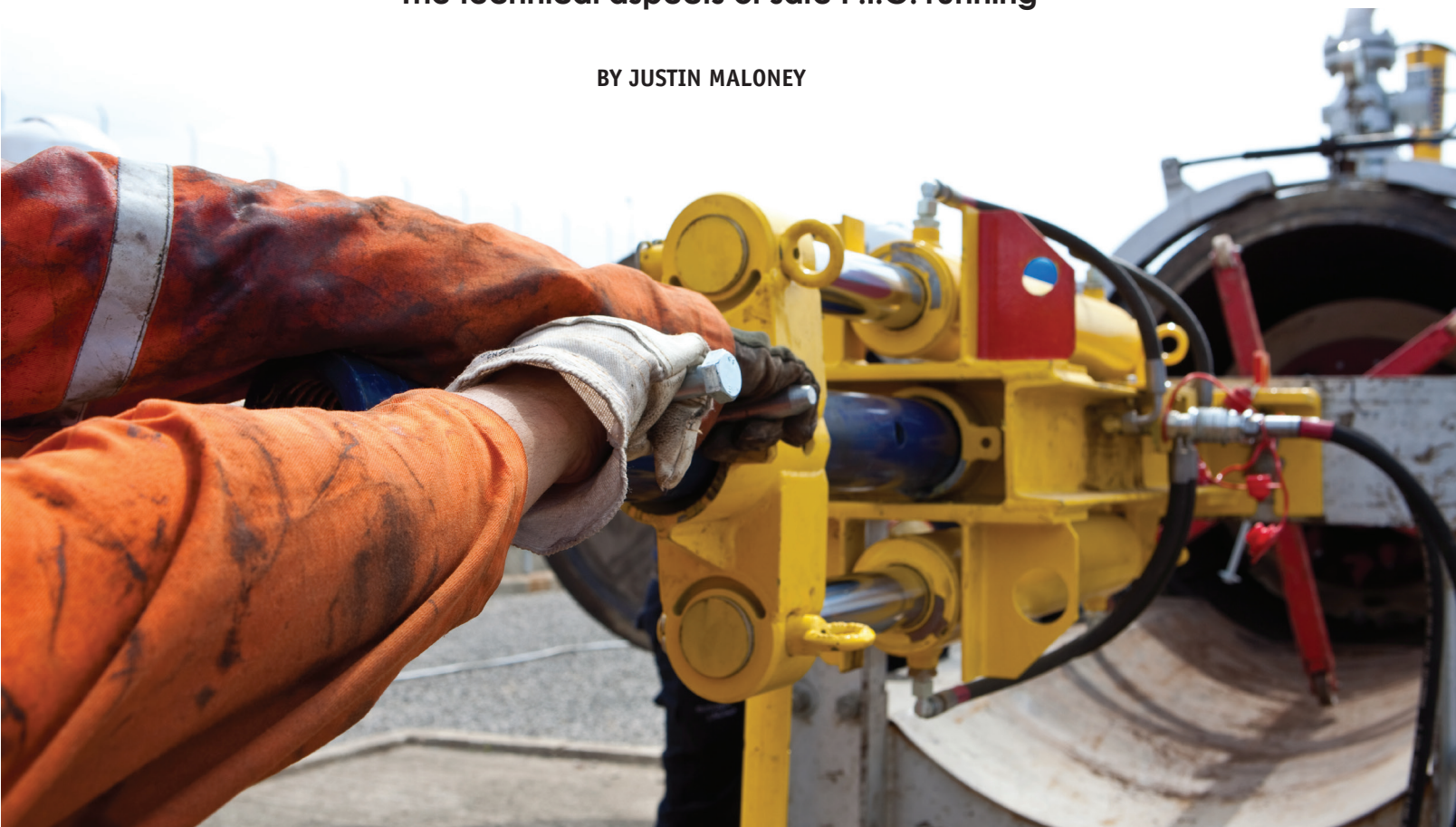
In Meade, Kansas, an Energy Transfer employee received a smart pig from the storage field and blew down the receiver. After blowing it down, the employee attempted to pull the pig out while standing to its' side. When he could not get it to move, he stood directly in front and pulled. Unfortunately, it came loose with high pressure and hit him in the chest killing him instantly. It is believed that there was hydrocarbon freeze behind the pig causing the extreme pressure. The man left behind a wife and 13-year-old son.

Pipeline Integrity Gauges or Pipeline Inspection Gauges are commonly called 'pigs' in the Pipeline industry. Pigs originally got their name when straw or towels wrapped in leather created friction against old wooden pipelines, making a squalling sound like a pig. It was not until years later a name was given to the acronym. Due to the new Gas MEGA Rule in place to improve pipeline safety, pigging operations will increase to ensure compliance and verify the integrity of the pipe. There are many types of pigs including batch, scrubber, gauge, sponge and foam, as well as a variety of smart pigs known as In Line Inspection (ILI) tools. ILI are designed to concentrate on specific areas that pipeline operators may need to focus on from wall thickness, Stress Corrosion Cracking (SCC), to location tracking/recording.

PIPELINE PIGGING AWARENESS

The technical aspects of safe P.I.G. running

BY JUSTIN MALONEY



Because there are numerous hazards associated with pigs, it is important to be cognizant of potential situations that may arise during pigging due to their design and the valves needed to control their launching, flow and delivery.

Note: Never stand in front of an open receiver or receiver door. Never look down an open pipe. Do not rely solely on pressure gauges.

Operations

1. In the pipeline industry, there are a variety of valves used to control flow, but the three most common valves are ball, plug and gate. A needle valve is used to accurately control flow rates and gas measurement disciplines involving low pressure. Traditionally, gate valves are used for complete isolation and their installs have increased on petroleum lines as more in-depth studies are taken to install them in low areas to minimize potential releases. Case in point would be Enbridge's Line 5 Emergency Flow Restriction Device Valve installs (EFRDs). Flow is easier to control with balls, however, they do come with risk. When on a project in which the valve maintenance history is unknown, one should always assume the valve could be leaking. Seals are impacted by product make-up, weather and maintenance such as the appropriate grease for the season and differing grease for stems and seals. This is important to know because a leaking valve undetected can build pressure behind a pig when it is assumed the receiver is blown down.
2. Pay attention to the pig receiver design. The drip line on the bottom will commonly come after the kicker line on a bidirectional launcher/receiver. There may be more than one in some instances and may even follow the kicker line. In addition, attention needs to be made to the depressurization design. Knowing where you can blow pressure during construction and in natural gas operations in comparison to where your pig signal is will help you analyze if there is pressure in front or behind the pig if it stopped near the blow off stack or relief valve area. Knowing the exact length of the pig being run (including odometer rollers on smart pigs when applicable) will help in this area of troubleshooting. Keep in mind that old pig receivers still in operation in some parts of the country do not have adequate blow off designs or pressure reduction/detection equipment. The recently released MEGA rule is also helping address this.

Construction

Note: These industry-recommended best practices while in the field are to be considered when applicable. When considering the implementation of any of these, it is important to discuss and collaborate with the construction team to proactively consider safety and specific project possibilities in relation to scope of work, working environment and potential congestion.

1. Install launcher and receiver above ground to access equipment easier, increase employee ergonomics for line up and welding of pipe and to better manage the safe receiving of pigs.
2. Always depressurize a foreman plug before removing.
3. Do not rely solely on pressure gauges to determine pressure blow off before removing flanges or opening hatches and doors.
4. Consider welding an approved length pup to a reducer on the upstream side of reducer and receiver. This will allow for easier line up into clamps and allow for a pressure relief device upstream from the reducer minimizing trapped pressure behind the pig when received. Install another blow off device downstream in front of the pig close to the entry point. Operate these blow offs appropriately as blow off action is sometimes needed to draw the pig in. They should be open 100% when blowing down.
5. Utilize two pressure gauges on receivers for equipment failure contingency.
6. Never allow personnel to pull on a pig if it is stuck and accessible.
7. Remain clear and utilize machinery at a safe angle.
8. Always stand behind the open pipe receiver plane. All personnel should be kept clear 180 degrees of the opening of the receiver or closed receiver door. Only authorized personnel need to stand on the pipe's side when receiving pigs. All other personnel should remain behind the receiver on pipe side and be clear of operations when pigs are being received.





9. Utilize a receiving system that contains the pigs when received. This will maximize control of tooling under energy release when received in an open environment. In other words, pigs should not be let to go flying everywhere as they end their run in the line. A plan of action, such as pig netting, should be provided to minimize the hazard with an engineering control. Common methods of receiving a pig under control is the use of netting, a modified “knock-down” receiver or a track hoe bucket positioned the appropriate distance from the end of the receiver.
10. Number all foam pigs when received during cleaning operations for validation purposes. This will keep track of how many were launched and received and will also help identify how the drying process is progressing.
11. Remain attentive to the pig design. Pig fins and cups are sometimes designed to capture maximum flow and other times designed for bypass to control speed fluctuations. Fins are sometimes cut to encourage rotation as tool rotation is believed to provide increased accuracy during data collection. These cups pass by welds when they come in and have been known to cause accidents when the cup created a pressure seal against a weld on receivers believed to be blown down. These accidents have also been known to occur in the reducer rather concentric or eccentric.
12. It is important to understand the definition ‘block and bleed’ that was adopted by operators. OSHA defines this as incorporating two valves with a bleed in the middle. However, due to inconsistencies in the industry, there is more than one interpretation and knowing the crew’s interpretation ahead of time is imperative when trying to analyze back pressure on various projects.
13. Maintain focus during field application for line of fire when receiving a pig or loading one. Do not stand near the loading rod when heavy equipment is utilized to seat the pig and never stand near a receiver when a pig is coming in. Some companies use a variety of homemade dampeners including cut up pups to release liquids and pressure to slow the pig before removal and others use netting. In every event, there is pressure pushing that pig that must bypass it, unless it is a tethered pig being pulled by a nylon rope or cable in some instances. Because this pressure will be released, never stand in front or the front 180 degrees from the receiver. There will be rust, air, water and other product and byproducts that will be released suddenly and at high pressure.
14. Know the purpose on the pig run and known condition of the pipeline. Ask how the company’s drip system is designed in the receivers for operations to help prepare for what the pig may bring in which could include brine and sludge. Knowing ahead of time that sludge could contain PCBs, Benzene and H2S will allow you to prepare in scope of work, disposal considerations and PPE requirements.

Operations and Construction

Remain attentive to pig tracking communications. This is done by GPS, pig trackers and geophones to calculate the weld count passes for speed. Continuously communicate known speeds and locations during the first steps when launched to make sure it entered the line successfully and during the last steps when receiving it. If differential pressure pushing the pig changes due to SCADA, weather, meter station deliveries, loop lines, etc., it can affect the pressure needed to receive the pig during operations, not in construction. However, differential pressure can affect cleaning pigs following hydro test in construction and maintenance.

Tracking communications can also help manage general locations when a pig may have gotten stuck near a “T” (with or without bars), road crossing, RR crossing or side bend. While not completely preventable, it is important data gathering because many pipelines were not required to document maintenance and repairs in the past like they are today. This leaves unknowns relative to wall thickness changes, chill rings, diameter changes, elbow degrees, “T” conditions, historic pick up and relays, farm taps, etc. — all of which can affect the successful run of a pig tool.

If you are unsure, always seek additional input from your construction team before proceeding.



Maloney started in the pipeline operations side with *Midwestern Gas Transmission* before pursuing a career in the pipeline construction industry with *Minnesota Limited* in 2012. He founded *Patriot Pipeline Safety, Corp.* and grew the company into one of the leading resources for pipeline security, safety and industry related damage prevention innovations. Today, Maloney prides himself on developing and offering technical coaching and consulting services for the pipeline industry as a way to give back to a busy industry with new professionals. Justin Maloney continues to enjoy being on pipeline right of ways, helping solve complex challenges related to security vulnerabilities, congestion and unknown utilities with his fellow coworkers. He resides in Northern Illinois.

