



November 2014

When to Replace a Pigs Cleaning Elements

Pipeline pigs come in many sizes and configurations. Some pigs are designed to be disposed of after being run. Other pigs can be run numerous times before requiring disposal. Still other pigs are manufactured with the idea of being refurbished as they wear out. Each of the pig types mentioned above have their advantages. However, this article will focus on when to refurbish pigs that are designed to be rebuilt.

Rebuildable pigs may have an initial cost that is slightly higher than disposable pigs, but the cost to rebuild is significantly lower when compared to purchasing a new disposable type pig. Moreover, rebuildable type pigs typically provide better service when it comes to cleaning a pipeline. This is because of their ability to be configured in most any way imaginable, adding cups, discs, brushes and magnets to a single body. Rebuildable pigs typically come in the form of a metal or hard plastic body with the cleaning elements fastened to the body. These types of pigs are by nature more rigid, heavier and more aggressive than their counter parts.

All pipeline pigs and their components have a life span. There is not a definitive answer as to how long any pig and its components may last. Pipeline environment, line length, pig speed, type and amount of debris, wall thickness, temperature and product all play a part in determining how long a pig will last before needing to be replaced or refurbished. Some pigs may provide a longer life service than others simply because they are being run in a different pipeline environment than the same type of pig being run in a separate pipeline.

The simple truth is all pigs and their parts must be replaced at some point in time; no pig is designed to last forever. So when does a pipeline operator know when the time has come to replace a pig and or its cleaning elements? This question can be answered by using the analogy of servicing an automobile. When a vehicle is purchased new, the manufacturer recommends regular maintenance to extend the life of any car. This maintenance includes changing the oil and other fluids on a regular basis, replacing tires as they wear out, inspecting and replacing brake pads and rotors among many other parts. The fact is, mechanical parts wear out and must be replaced as they begin to reach their intended life span. Automobile parts are replaced because we want to get longevity from our purchase and we want to maintain and operate a safe vehicle. Pipeline pigs are no different. *We would not attempt to drive a car with worn out brake pads, therefore it stands to reason we would not insert a worn out cleaning pig into a multi-million dollar pipeline asset.*

When a pig is new, its cleaning elements are robust and designed to fit into the pipeline in a specific way to achieve the best possible results. The more runs a pig achieves, it begins to wear out, meaning its cleaning elements (cups, discs and brushes) begin to reduce in diameter and become less effective. This results in debris being left behind, slower run times due to poor seal and the risk of pig stoppage in the pipeline; essentially a worn out pig will not achieve the results it was intended to achieve and could ultimately result in lost time and money for the pipeline operator. This can all be avoided by simply inspecting a pig prior to each run and replacing its components as necessary.

With a few standard tools such as wrenches and sockets, the refurbishment of a pig in the field can take as little as ten minutes or up to a couple hours depending on pig type and size. Typically the only elements that require replacement are cups, discs and brushes. All other components that do not come into contact with the pipe wall (spacers, magnets, bumpers, pig mandrel) will have a considerably longer life span but they too will need to be inspected on a regular basis and replaced at some point in time to maintain the pig's integrity.

When inspecting a pig's cleaning elements, attention should be given to pig wear, even or uneven, and any noticeable damage to components. Any component with uneven wear or damage should be replaced immediately. In most cases the cups and discs will have worn evenly, will not be damaged but will begin to show a loss in diameter and will need to be measured to ensure the OD is compatible with the specific ID of the pipeline the pig will be run in. Measuring the cleaning elements will require the use of a standard tape measure and some simple math. Stretch the tape measure across the diameter of the cup and note that dimension. Then measure 45-degrees over, noting that dimension too, then averaging the two measurements taken. A more exact cup diameter measurement may be made by measuring the circumference and then dividing by 3.143 or by using a PI tape, which converts the circumferential measurement to diameter.

As an example, new pig cups and discs are usually larger than the internal pipe diameter. A new, standard 20-inch cup will measure 20-inches in diameter for a 20-inch pipeline. This gives additional scraping against the pipe interior and provides adequate pig seal for most pipe wall thickness applications. Due to the oversized diameter, the cup wear will be accelerated initially until the cup OD approaches the pipe ID. When this occurs, the cup wear rate is greatly reduced thereby giving a longer wear life.

In addition, all urethane is biodegradable and should be stored properly to ensure its integrity is not compromised. All urethane and assembled pigs should be stored indoors, out of direct sunlight. When stored properly, urethane has a maximum shelf life of two years. Any urethane components, whether new or used that exceeds two years of age should be replaced before being run through a pipeline.

When proper pig maintenance is applied and a pig's elements are replaced as outlined above, then that pig will continue to provide optimum results and its life span will be drastically lengthened, thus providing the pipeline operator a pig that can be trusted to achieve the results it was designed for, eliminating lost time, money and ensuring every pig run is accomplished in a safe and effective manner.

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