How-to

Tips for Preparing and Cleaning Pipeline Welds

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In ***pipeline construction***, weld quality is paramount. Every weld is X-rayed — so any weld defect costs time and money to repair. Properly preparing and cleaning the base material is the first step toward ensuring quality welds and minimizing defects in the demanding pipeline environment.

There are many types of surface conditioning products that can be used before, during and after welding in pipeline construction. Choosing the right product helps ensure high weld quality while also saving time, so welders can be more efficient under tight timelines. Consider the various options for preparing and cleaning pipeline materials and welds, along with best practices for each solution.

Prepping Pipe for Welding

The first step is to prepare the bevel. Pipe is generally delivered to the jobsite with a bevel already created. However, it will require cleaning and shoring up the land, which is the flat portion at the end of the bevel, using a ***grinding wheel***. This flat area allows for proper spacing between the two pipe ends so they can be aligned and tacked together for welding. A notching wheel or ***1/4-inch grinding wheel*** work well for this task.

When using a grinding wheel, don't dwell too long in any one spot, as this can gouge the material. Instead, keep the wheel in motion and travel the circumference around the land, while keeping the wheel as flat as possible.

Once the land has been created, the bevel and interior diameter of the pipe opening should be cleaned for welding. The right tool for cleaning the bevel depends on how much rust is on the pipe. Operator preference also plays a role. The most common way to clean a bevel is with a wire wheel, but it depends on the condition of the pipe.

Cleaning the Pipe

Base material condition can vary greatly when pipes arrive on the jobsite. There is typically some rust on the pipe — how much depends on the length of time since manufacturing and the pipe storage conditions. The more time that passes between manufacturing of the pipe and preparing it for welding, the greater the chances more rust has accumulated.

If the pipe has only light surface rust, it requires a different conditioning product than if it has heavier rust.

Wire Brushes and Wheels: Light surface rust can typically be removed with a hand wire brush or wheel. Wire brushes efficiently remove loose material on the surface of the pipe without changing the base metal.

Product options in this category include hand wire brushes for small-diameter pipe or ***power wire wheels***, such as stringer bead wheels, and ***wire cup brushes*** for larger-diameter pipe and faster cleaning. Wire wheels can be used to clean the pipe surface prior to welding and for cleaning the welds between passes. Cup brushes tend to clean more surface area and often clean faster, but they also tend to create a kickback if the cup hits the wrong part of the pipe. Both products clean effectively. While the choice often comes down to operator preference, wire wheel brushes are most commonly used.

Note, wire products also work well to remove any burrs that may have formed while creating the land. Because wire wheels and brushes are designed to let the wire tips do the work, it's important to orient the tool so only the wire tips hit the work surface. This promotes the most effective cleaning action, reducing the urge for the operator to push harder. It also helps extend product life and reduce the risk of wire breakage. With a wire brush, apply light pressure — just slightly more than the weight of the grinder — to let the wire tips do the work.

Flap Discs: If the base material has more than light surface rust — perhaps even pits in the steel — it requires a more aggressive product to clean the metal. The bevel must always be completely cleaned and any rust or pits removed from the material.
Flap discs are a good option in this situation — especially a ***60-grit flap disc*** — to efficiently grind out any rust, pits, and imperfections on the pipe, while also minimizing the potential for gouging that can occur with a grinding wheel.

Flap discs are available in many different material types. A disc with an aluminum backing is more rigid, which is ideal for maintaining the edge of the bevel without rounding the material. Rounding the edges of the bevel during cleaning can be detrimental to properly filling the weld.

Interpass Cleaning

Following the root pass, it is necessary to grind the weld to ensure proper penetration for the next pass or hot pass. This can be done using a ***1/8-inch grinding wheel*** along the root pass, which helps create a flat or U-shape at the bottom of the weld.

With subsequent welds laid down after the hot pass, use a wire brush to clean away any imperfections or slag. This prepares the metal for each weld layer. A narrow-faced wire wheel works well for this. If the V-groove of the weld joint is wider, such as filler passes with larger-diameter pipes, choose a brush with a wider face that is designed to clean larger areas.

When two welders work on opposite sides of the pipe on larger-diameter pipes, the starting and stopping points for each welder are typically at the 12 o'clock and 6 o'clock positions. The point where the welds join and overlap is called the button. While this area can be more difficult to clean, avoid banging the wire wheel on the button, as this will damage the wires. Use normal pressure and allow the brush more dwell time to clean this area.

The same wire wheel used for interpass cleaning can also be used to clean the weld and remove any slag from the cap pass. Some wire wheels use a dual-hex nut design that simplifies periodic flipping of the wheel to help promote the self-sharpening ability of the wire tips. Choosing a wheel with this design helps deliver maximum cleaning action, long life, and safer use. An encapsulated stringer bead wheel is another option for cleaning between weld passes. Only the wire tips are exposed from the encapsulation.

These brushes offer several advantages, including longer product life and aggressive cleaning action. And because there are no long wires outside of the encapsulation, long wire breakage is eliminated. Be

aware that the operator has less flexibility with an encapsulated wire brush because of the short trim length of the wires. When choosing this option, look for an encapsulated wheel that uses a heat-stabilized encapsulation that gradually wears away to expose a consistent short trim. This makes it suitable for cleaning hot welds without overheating.

Key Safety Practices

Following proper safety procedures can help maximize product performance and efficiency, while also contributing to a safer environment for operators and nearby workers.

No matter which product is in use, operators should always use a tool guard to improve safety and wear proper safety gear such as face and eye protection and gloves. Most manufacturers' tool and accessory instructions include specifications about the recommended safety gear.

Also, be sure the RPM rating of the wheel or disc meets or exceeds the recommended RPM rating of the grinder for safest use. Just because a product fits a specific tool does not mean it was designed to be safely used with it.

Grinding wheels with a harder bond tend to load, which refers to base material accumulating on the wheel due to the heat of the grinding process. Some operators form chips or notches around the edge of a grinding wheel to clean a wheel that loads, but this is a dangerous practice that can result in flying debris. Instead, look for a wheel with the appropriate bond strength for pipeline welding.

At the end of the day, quality and productivity are important — but safety is critical. Choosing the right product to prepare and clean the base material for welding — and following some key best practices — helps prolong product life, improve operator efficiency and benefit safety on the pipeline jobsite.

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