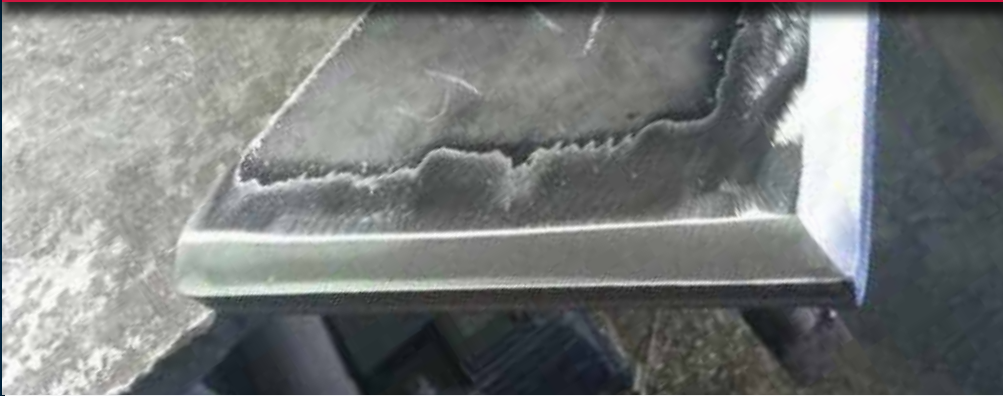


WELD PREP APPLICATIONS



Mill Scale Removal

WHAT IS IT?

- A flaky surface that forms on hot-worked steel
- Formed by surface oxidation during slow cooling
- Consists of magnetite and hematite
- Very poor heat and current conductivity ensures that the arc spot remains too small and that the weld cannot flow effectively, resulting in a convex weld
- The weld contains a lot of silicates because the mill-scale contains impurities

PRODUCTS USED:



1/4" Grinding or
1/8" Combo
Wheel



Pipeline Notch
& Grind Wheel



Coarse Grit
Flap Disc with
Top Size



Resin Fiber
Disc



Dross & Slag Removal & Clean-up

WHAT IS IT?

- Dross is re-solidified metal that contains impurities, oxides and/or nitrides that form on the sides or bottom of the kerf (cut-line)
- Slag is a mix of metal oxides and silicon dioxide, which is a by-product of welding
- Dross must be removed prior to welding. Slag is continuously monitored and cleaned throughout the welding process

PRODUCTS USED:



1/4" Grinding or
1/8" Combo Wheel



Pipeline Notch
& Grind Wheel



Coarse Grit
Flap Disc

CUTTING

Type 1 Flat



BENEFITS:

- Max number of cuts per wheel
- Reduced risk of work-piece interference

CHOOSE WHEN:

- Cutting profiles / extrusions
- Chop and plunge cutting
- Most general-purpose cutting

Type 27 Depressed Center



BENEFITS:

- Increased clearance / offset
- Available with hub for additional clearance / offset

CHOOSE WHEN:

- Flush cutting
- Cutting bolts, rebar, etc.
- Blending / beveling (combo only)

GRINDING

GRINDING WHEEL



PROS

- Fast and aggressive from the start
- Extremely durable
- Low overall product cost-per-part

CONS

- Non-conformable
- Potential to gouge work-piece
- Rough finish
- High noise and vibration level

FLAP DISC



PROS

- Grind and finish at the same time
- Increased control
- Reduced vibration and chatter
- Allows lighter pressure for smooth, better finish
- More durable than a fiber disc

CONS

- Confusion selecting appropriate profile
- Optimal performance dependent
- Less resistant to heat
- Can catch on edges or corners
- Frequently under-used

RESIN FIBER DISC



PROS

- Fast cutting
- Grinds and finishes
- Consistent cut-rate for life of disc
- Lowest initial purchase price
- Good conformability

CONS

- Shortest life, by far
- Susceptible to tearing
- Cut rates deteriorate
- Change-over time

CLEANING

Knot Twist Configurations



BEAD BRUSHES have narrow, tightly twisted knots for high-impact cleaning and aggression. The narrow profile (face) and aggressive cleaning make them popular for cleaning in narrow gaps between weld passes. Also referred to as stringer bead brushes or root pass brushes.



FILLER BRUSHES have additional wire strands and a wider profile (face) for more-aggressive brushing and increased durability. Their wider contact area makes them an excellent choice for cleaning filler passes quickly and efficiently. Also referred to as cable twist brushes.



STANDARD knots are similar to filler brushes but are not twisted tightly all the way to the end, allowing the wire tips to flare, adding conformability and wider contact with the work-piece. Weiler cup brushes feature this knot style to maximize cleaning on large surface areas.

Wheel vs. Cup



Crimped vs. Knot Wire

CRIMPED WIRE

- Increased ability to shed material
- Reduced clogging/loading
- Increased conformability to work-piece

KNOT WIRE

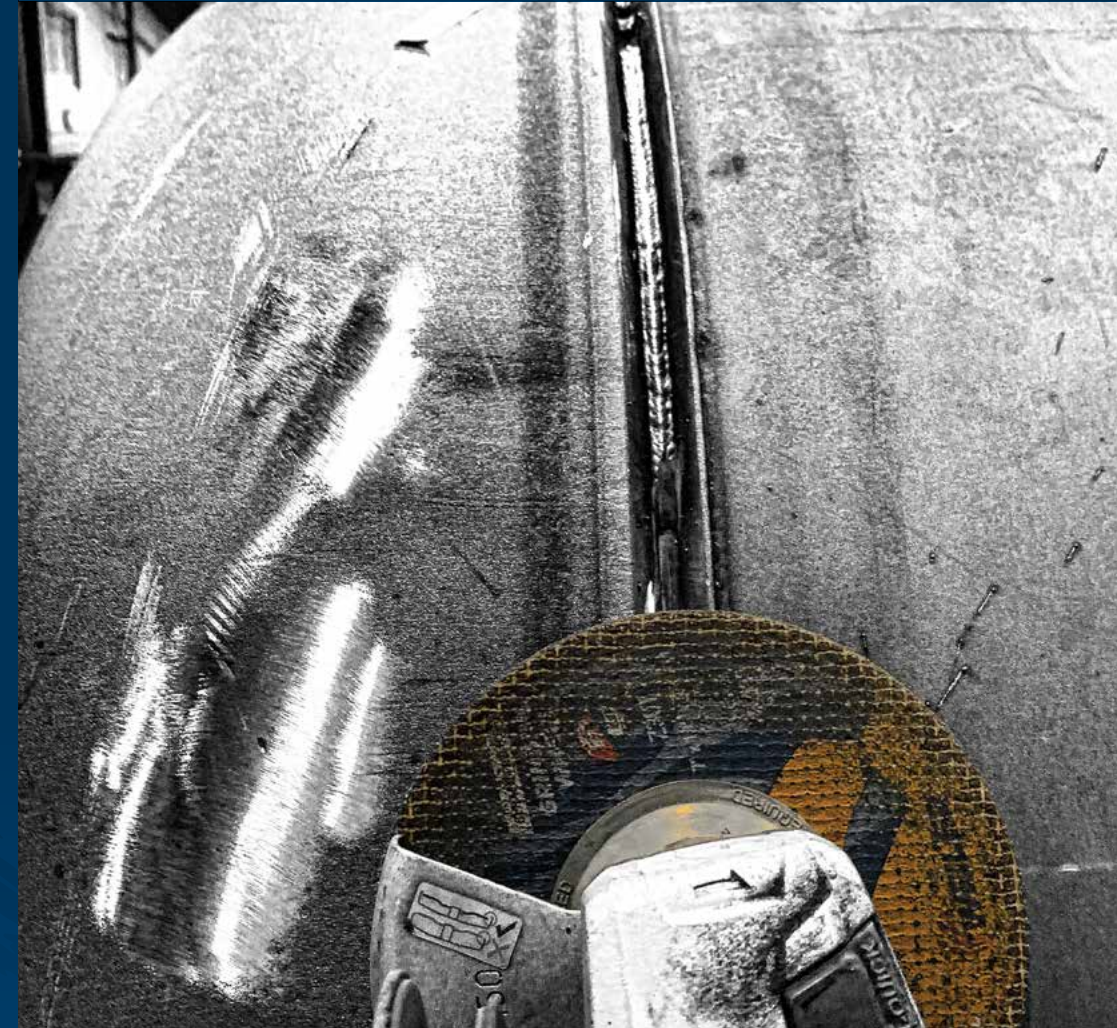
- Increased rigidity
- Increased durability
- Increased aggression - can mar surface
- Less conformable to work-piece

FASTENAL®

877.507.7555 / fastenal.com

MULTI-PASS WELDING GUIDE

FOR OIL & GAS, PRESSURE VESSEL, STRUCTURAL, CONSTRUCTION,
NUCLEAR, AND SHIP BUILDING



PROPER ABRASIVES USAGE AND SELECTION
FOR MULTI-PASS WELDING OPERATIONS



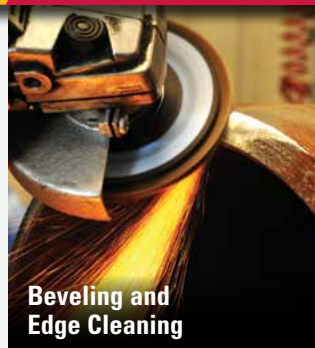
MULTI-PASS WELDING GUIDE

STEP 1

PART PREP



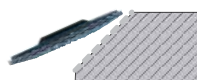
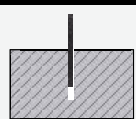
Cutting



Beveling and Edge Cleaning



Facing



Setting the Bevel



#51125 Flap Disc

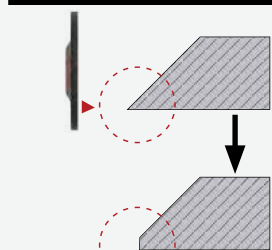


#57120 Grinding Wheel

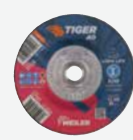
Cleaning the Bevel (torch cut)



#50543 Flap Disc



#58090 Pipeline or Combo Wheel



#57120 Grinding Wheel

JOINT & SURFACE PREP

Any joint, whether tubing, plate, or structural, requires significant prep to ensure strong and consistent weld penetration. Setting the bevel is the first step, and 1/4" grinding discs are a popular choice. Flap discs, like Weiler's Tiger Paw, are an excellent choice because they reduce vibration and increase control when beveling.

Weiler's 1/8" pipeline wheel allows flat grinding, making it an excellent choice to quickly and effectively set the face (land).

Finally, the bevel must be cleaned. To achieve a proper union, it is important to remove any surface residue such as oil, rust, paint, primer, corrosion, burrs, or any impurity on the surface of the steel. Type 29 flap discs are aggressive, easy to control, and highly effective for cleaning, removing pits, and finishing the bevel. For cleaning a bevel that is torch cut use a Tiger aluminum back flap disc.

Beveling

WHAT IS IT?

Pipe beveling is the process where an angle is formed between the edge of the material and a plane perpendicular to the surface.

IS IT IMPORTANT?

Beveling is used to prepare metal for a welded seam by setting a slope on the edge of the metal.

PRODUCTS USED:

1/4" grinding wheels; 1/8" combination wheels; pipeline notch and grind wheels; Type 29 coarse grit flap discs

STEP 2

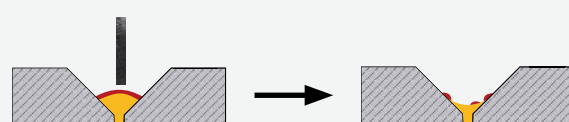
ROOT PASS



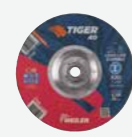
Grinding the Tack Weld



Root Pass Grinding



#58090 Pipeline Wheel



#57104 Combo Wheel

ROOT PASS

With the bevel and face cleaned and set, the joint is tack-welded to prepare for the root pass. The first weld bead applied to joints is called the stringer bead or root pass. The weld must penetrate 100%. Once the root pass is finished, a "U" shaped groove is ground using a notching or pipeline wheel. The objective is to prepare the base so that the next pass (hot pass) can fully penetrate the wall thickness to ensure a strong and solid joint.

Starts / Stops



MECHANICAL WELDING

For mechanical pipe welding, 3/32" Mech notching wheels are recommended for grinding starts and stops. These wheels are thinner than standard pipe notching wheels, allowing the operator to grind the bead without widening or scarring the narrow J and K bevels.



#58066 Mech Wheel

Facing

WHAT IS IT?

Facing is used to create a land, which consists of making a flat surface on the end of the pipe.

IS IT IMPORTANT?

Correct facing makes it easier to line up pipes before welding and also contributes to having a constant root opening between parts.

PRODUCTS USED:

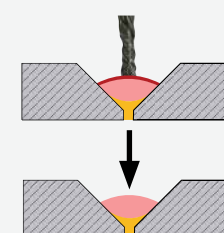
1/8" grinding wheels

STEP 3

HOT PASS



Hot Pass Cleaning



#09000 Bead Brush



#35216 Encapsulated Wheel

HOT PASS

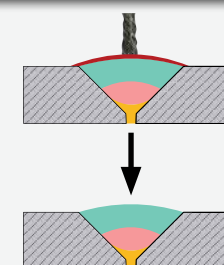
The next welding step is called the hot pass. To achieve maximum penetration of the weld at the ends, the hot pass should start as soon as possible to maintain a high temperature in the joint. When grinding after the root pass, slag residues are formed and exposed at the ends of the first bead. This hot pass is done ASAP to ensure that these residues are burned and flow out of the bead. That is why notching with a pipeline wheel and surface cleaning with a bead brush must be done quickly. **Additional information on brush types is available on the back of this guide.**

STEP 4

FILLER & CAP PASSES



Filler Pass Cleaning



#79802 Filler Brush



#35216 Encapsulated Wheel



#09000 Bead Brush

FILLER & CAP PASSES

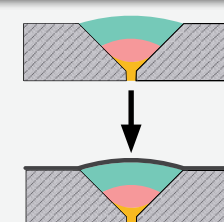
After cleaning the hot pass, the remaining gap must be filled with additional passes. The number of filler passes required will depend on the thickness of the wall and the width of the gap. To ensure optimal weld penetration, a perfectly clean surface is required prior to applying each bead. Root pass brushes or encapsulated brushes can be used to clean filler passes, however, a filler pass brush is a better choice for wider welds. The final and most visible step is called the cap pass.

STEP 5

FINISHING – PIPELINE ONLY



Coating The Seam



#12356 Knot Cup Brush

#40068 Chip & Oil Brush

RE-COATING & FINISHING

The capped pipe joint is typically coated with an epoxy or other protective coating. For this, Weiler recommends wood handle chip and oil brushes. Prior to applying any coating, the surface must be cleaned and prepped for optimal adhesion. Knot cup brushes provide fast, efficient cleaning and surface prep for wider surface areas. Knot wheels are also commonly used.