The RIGHT ABRASIVE

DETERMINING THE BEST ABRASIVE FOR POST-PROCESSING WELD GRINDING STARTS BY UNDERSTANDING THE FAMILY OF ABRASIVE PRODUCTS

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Photos courtesy of Norton|Saint-Gobain
and within those families are variations in wheel hardness grit size, disc or wheel shape, backing material and more. Knowing what will work best for a given situation is often determined by trial and error. When focusing on the abrasive product families, there are four to choose from:

• Bonded abrasive thin wheels (grinding wheels)
• Coated abrasive fiber discs
• Coated abrasive flap discs
• Non-woven abrasive discs

Various differences
Understanding the make-up and differences among each product family helps in the decision-making process. Bonded abrasive thin wheels, or grinding wheels, are made up of two main components: bond and abrasive. The powder-like bond and abrasive are mixed, pressed in a mold and then baked to make a rigid wheel. Changing the quantity or type of bond or abrasive affects the performance of the grinding wheel accordingly. More bond creates

Seasoned welders and metalworkers know that welding encompasses more than just laying the bead to adjoin the metal pieces to create the final product. After the weld is finished, a post-processing step is typically required.

The type of post-processing varies, depending on the customer requirements. Most of the time, a right-angle grinder mounted with an abrasive product is involved. Several abrasive product families are available, and within those families are variations in wheel hardness grit size, disc or wheel shape, backing material and more. Knowing what will work best for a given situation is often determined by trial and error. When focusing on the abrasive product families, there are four to choose from:

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Flap discs come in three configurations, including type 27, which is ideal for blending and standard work.

Norton’s Type 29 or conical flap discs are typically used for aggressive cutting.
a harder wheel and improves the product’s lifespan, while less bond creates a softer wheel and produces a freer cutting action in the grind zone. Coarser grit abrasive improves the cut rate as well as life, while finer grit abrasive produces a better surface finish and requires less pressure.

Fiber discs are a coated abrasive made up of a thin backing material coated with two layers of a resin. Between these two layers of resin are the abrasive grains, which are exposed and visibly protrude from the disc. The same principles apply as with coarser and finer grit abrasives in grinding wheels, but the abrasive grains have a more dramatic effect on the weld due to this high exposure. Grain types are best matched to the material being ground. The backing material plays a role in the cutting action and product lifespan as well. A thicker and more rigid backing improves life and cut rate, while a thinner and more flexible backing conforms more to the work and produces better surfaces finishes. These guidelines also apply when choosing a hard or soft back-up pad.

Flap discs are overlapped pieces of coated abrasive arranged around the outer rim of a hub and adhered with strong glue. The overlapping method allows for more abrasive material to be mounted on the hub and improves disc life while keeping the benefits of the higher grain exposure. Like the fiber disc, the grain types and grit sizes can be changed according to the cut rate and surface finish requirements. Normally these products are available in three configurations:

- High density for more flaps and improved life
- Type 27 for blending and standard work
- Type 29 or conical for more aggressive cutting

An example of a small weld with a width less than ½ in. and a height less than ¼ in.

An example of a heavy weld showing the height that is well suited for grinding wheels and coarse grit fiber discs.
Non-woven abrasive discs are composed of fibrous material where the abrasive is bonded to the fibers by a resin. This random assortment of grain and fiber gives the disc a compliant cutting action as it conforms to the point of contact more readily. The result is a better surface finish or lower surface roughness average (Ra). Coarser grit non-wovens, while not as aggressive as fiber discs, flap discs or grinding wheels, can still provide an aggressive cut that may be sufficient for the application.

Best application scenarios
Each of these abrasive product families has a place in the post-processing of a weld. Now that each family has been defined, here are some application examples where they would be most useful.

Bonded abrasive thin wheels (grinding wheels)
- Welds larger than ½ in. wide by ½ in. high – use 5-in. diameter or larger to reduce the number of wheel changes needed
- Welds smaller than ½-in. wide by ½-in. high – use 5-in. diameter or smaller to reduce the weight and improve ease of use for smaller welds
- Frequent abrasive product changes are not practical – working in areas that are secluded or where there are limitations on how many tools the welder can bring, such as scaffolding
- Cutting action is aggressive, such as interior/exterior corner welds
- Rigid wheel allows for control at the point of contact to avoid grinding into non-grind areas
- Surface finish is not critical

Coated abrasive fiber discs
- Cut rate is the primary concern
- Ability to change discs readily
- Overhead work where the weight of the grinder is important
- Less pressure required to grind – reduces fatigue
- Confined spaces where grinding wheel breakage could pose more of a risk
- Blending the weld to the parent material without overgrinding
- Small work areas where a small angle grinder is the tool of choice

Norton Blaze F980 fiber discs are a good choice for hard-to-grind materials and alloys, such as stainless steel, inconel, titanium and super alloys.

Norton Blaze R980P flap discs provide a good balance of fast cut and extended product life.

Norton leverages a special resin chemistry with its non-woven discs to resist shedding when used on sharp edges. While the product is ideal for deburring operations, it is capable of light weld removal.
Non-woven abrasive discs
- Small welds ¼-in. wide by ¼-in. high where overgrinding is a concern, such as thin-walled sheet metal
- Cleaning up discoloration
- Cleaning up weld splatter
- Difficult to reach welds – fillet welds that require clean up
- Decorative surface finish requirements

While this list does not account for every weld grinding scenario, it provides a starting point to determine the best abrasive product family for the application. With some experimentation and support from a local abrasive supplier, an effective grinding solution is well within reach. ▶

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Coated abrasive flap discs
- Product life and cut rate combination important
- Conformability to the weld to blend into the parent material where grinding on either side of the weld is allowable
- Confined spaces where grinding wheel breakage could pose more of a risk
- Forgiving cutting action – avoid large gouges
- Better surface finish than a grinding wheel or fiber disc, grit for grit
- Overhead work where the weight of the grinder is important
- Removing weld splatter without overgrinding – 50 grit or finer

Norton’s depressed center wheels excel in aggressive weld removal applications by providing excellent cut rate and product life.