



Metalworking

7 Things Machinists Need to Know When Choosing Abrasives

James Langford | Aug 13, 2024

To get the most out of abrasives in machine shops, you need to know a lot more than the old tip for using sandpaper: “rough side down.”

That’s according to Norton | Saint-Gobain Abrasives’ National Account Manager Brad Heraghty, who notes that, given the wide array of high-quality abrasive products on the market today, choosing one can be a confusing exercise.

“We manufacture more than half a million different part numbers, and choosing the best one for the job comes down to what you’re trying to accomplish,” he says. “You shouldn’t pick an abrasive product that will be overkill for the application, thereby wasting money, but you also need to consider efficiency.”

To make it simpler, Heraghty groups abrasives into five broad categories based on business units:

- **Bonded abrasives:** A group largely composed of wheels—surface grinding wheels, bench and pedestal wheels, centerless grinding wheels and so on.
- **Coated abrasives:** A group that includes traditional sandpaper and abrasive belts as well as pressure-sensitive adhesive (PSA) discs like you might use on an orbital sander or pencil grinder.
- **Non-woven products:** Includes hand pads and convolute wheels such as the ones used to deburr parts, not to mention the hard, screw-on wheels found on right-angle grinders. These are primarily for weld preparation and cleanup afterward.
- **Superabrasives:** Products such as CBN, or cubic boron nitride, and diamond that provide greater precision and overall grinding performance, although at a higher price point.
- **Thin wheels:** Easily mistaken for bonded wheels but labeled “organic” because they use a resin bond that breaks down with heat.

“An organic wheel provides higher stock removals but is less suitable if you need to hold tight tolerances,” Heraghty says. “It’s the opposite of a vitrified bonded wheel, which is brittle, almost like glass, and best for precision grinding and lighter stock removal.”

Don't Settle for the Wrong Choice

He warns readers to take such advice with a grain of salt, however, since abrasive selection is dependent on material, application, production quantities, budget constraints and a host of other factors.

To prove his point, Heraghty describes one of the company's high-performance fiber discs. "Let's say you have a right-angle grinder and need to remove a lot of material. Our **RazorStar** engineered product is designed to grind very quickly but also cuts cool with reduced pressure. That's important for operator comfort."

By comparison, he says that a traditional (and less expensive) aluminum oxide wheel requires the operator to "really lean into it," ultimately producing fewer parts and going home tired.

There are seven key factors to consider in **abrasive selection**, he says:

1. Material to be ground and its hardness
2. Severity of the grinding operation
3. Finish and accuracy required
4. Area of grinding contact
5. Wheel speed
6. Wet or dry grinding
7. Horsepower

He strongly encourages seeking external support from your abrasive supplier.

"I understand that our customers are masters of their craft, but they should utilize the resources available to them," Heraghty says. "Call us or MSC Industrial and ask for advice in these situations. Maybe we'll propose a different product or an adjustment to the grinding parameters, but we might also tell you not to change a thing. Long story short, there's no reason to settle for the wrong abrasive, not when there are so many options to choose from."

Try Abrasives Training to Boost Productivity

Abrasive selection "basically boils down to a few questions," says Bill Veeninga, a key account manager for 3M's Safety & Industrial Business Group. "What materials are you grinding, what do you hope to achieve in terms of stock removal, and are you looking to refine the finish?" he says. "That will dictate which product you should use, whether it's a portable, bonded, coated or non-woven abrasive."

Some shops lean toward general-purpose abrasives, or "tweeners," due to A) their lower cost and B) the notion that operators will fail to achieve the potential benefits of a high-performance product like **3M's Cubitron**, he notes.

"That's unfortunate," he says. "For instance, you'll typically get the job done more quickly with a fiber disc in certain applications, but many shops will use a flap disc instead because they're more forgiving. By investing in some operator training, the shop will see greater throughput as well as maximum value for their abrasive spend."

In the same vein, some managers and purchasing personnel might complain that operators throw away discs that have many hours of life left. Why buy a more expensive product, even if it does provide more performance? Here again, a little training will bring big benefits.

In the case of the fiber disc just mentioned, Veeninga equates it to buying a race car and putting the wrong tires on it—the shop floor equivalent of using a backup pad that's too soft.

"In this situation, the minerals aren't allowed to stand up and do the work for you," he explains. "The wheel loads up and grows dull because the coated abrasive can't break down and expose new cutting edges. This is exactly what we've designed precision-shaped grain products like 3M's new family of Cubitron 3 products to do."

Finally, failure to keep current on technology and ask for a helping hand from your abrasives supplier can mean losing out on recently introduced improvement opportunities. Veeninga points to quick-change mounting systems as one example.

"Attachment methods like PSA, hook and loop, and traditional backup pads with a retainer nut are perfectly fine for many applications, but 3M has developed a backing system that lets the operator give the wheel a quarter-turn to secure the disc," he says. "This is much faster than the traditional alternative, and even though it is an added cost, we're finding that many people prefer it thanks to its convenience and overall cost reduction."

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