



*by Imre Karetka, product manager, brushes, Pferd Inc.*

# BRUSH AWAY BURRS

Advancements in abrasive brushes assist manufacturers in efficiently and effectively deburring machined parts



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abricators gain a competitive edge when a tool can be used for more than one application. Hybrid solutions help to meet the need for multiple applications on a single machine, be it a laser/punch or a saw/drill combo. When it comes to deburring, whether it's a wheel, disc or brush, operators need a single solution that can work with a variety of materials, from hard alloys to soft aluminum and everything in between.

While the equipment, technology and related software have experienced significant advances over the past two to three decades as they relate to machining, developments in the secondary processes of deburring, polishing and other surface conditioning have also improved to keep pace.

Deburring of machined parts can take many forms. From the use of a hand file to coated abrasive belts, from tumbling to abrasive brush deburring, they all are common ways to remove unwanted burrs after machining. →



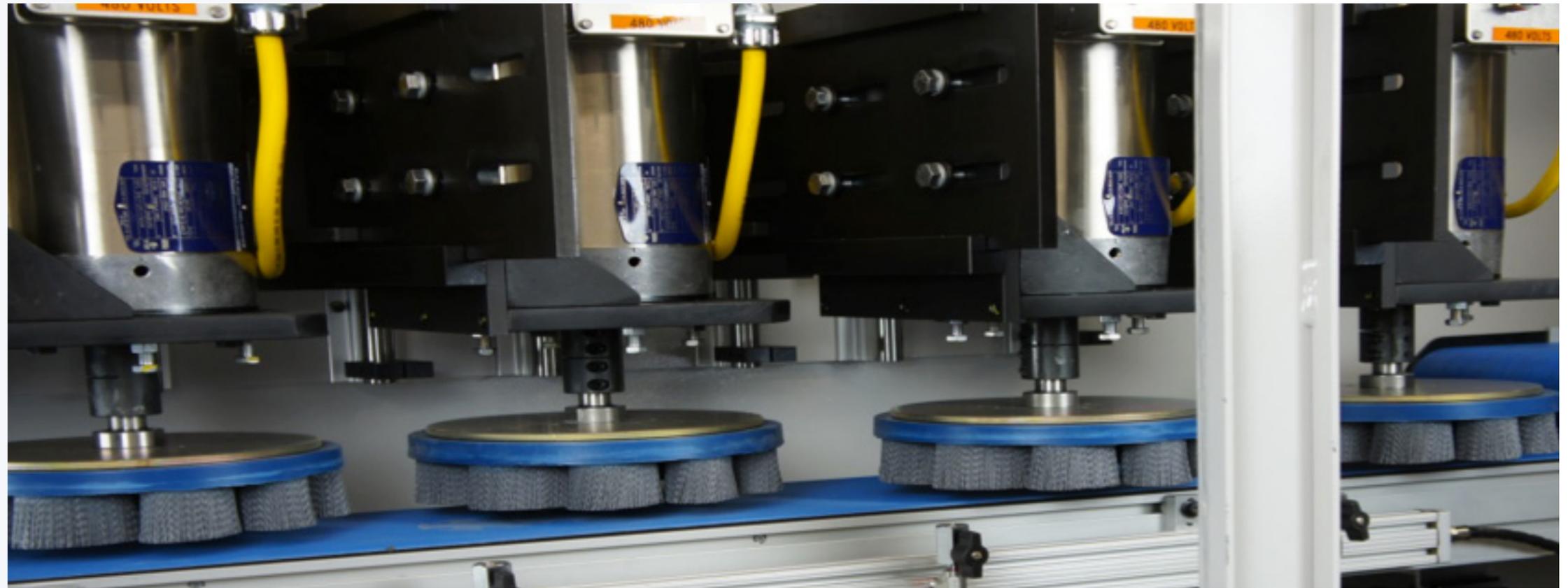
*A robot performing a deburring process using an M-Brad abrasive filament brush.*



## BRUSHES ARE BEST

With the development of more advanced alloys as well as developments in composite and carbon fiber materials, deburring tools, including abrasive brushes, also need to improve to meet the deburring and surface conditioning needs of manufacturers. The use of brushes tends to yield very repeatable deburring and surface conditioning results. The flexibility, adaptability and speed of burr removal are the biggest advantages of brushes over other deburring and surface conditioning methods.

For example, by extending the trim length of the brush, workpieces with uneven surfaces can be successfully deburred. Even workpieces with surface variations of as much as 2 in. or 3 in., such as camshafts and heat exchangers, can be consistently and evenly deburred using a brush with a long-enough trim length. The aggressiveness of a long-trim brush can also be manipulated with variations in filament geometry as well as the grit size and grain type.



Larger, more stubborn burrs require more aggressive brushes with coarser grit size (80 grit) and abrasive grain type (ceramic) and larger filament size (0.045 in. by 0.090 in.), while smaller burrs and removal of only sharp edges can use brushes with smaller filament size (0.010-in. filament dia.), finer grit size (1,000 grit) and less aggressive grain type (aluminum silicate).

## FILAMENT BRUSH SOLUTIONS

The use of wire brushes is a common method of deburring machined parts. →

*Deburring automotive parts with Pferd's 10-in. M-Brad composite disc brushes on a custom-designed CNC machine.*

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However, the deburring equipment is specifically designed to deal with the forces and stresses inherent to wire brush deburring. Dedicated machines where wire brushes are used are built with heavier frames including thicker enclosures, larger bearings, shuttle tables, part fixtures and larger horsepower motors.

These components need to be able to handle the heavier and more aggressive deburring nature of wire brushes. Parts such as large automotive gears with heavier burrs as well as those with surface

contaminants such as drill pipes are commonly deburred and cleaned with wire brushes.

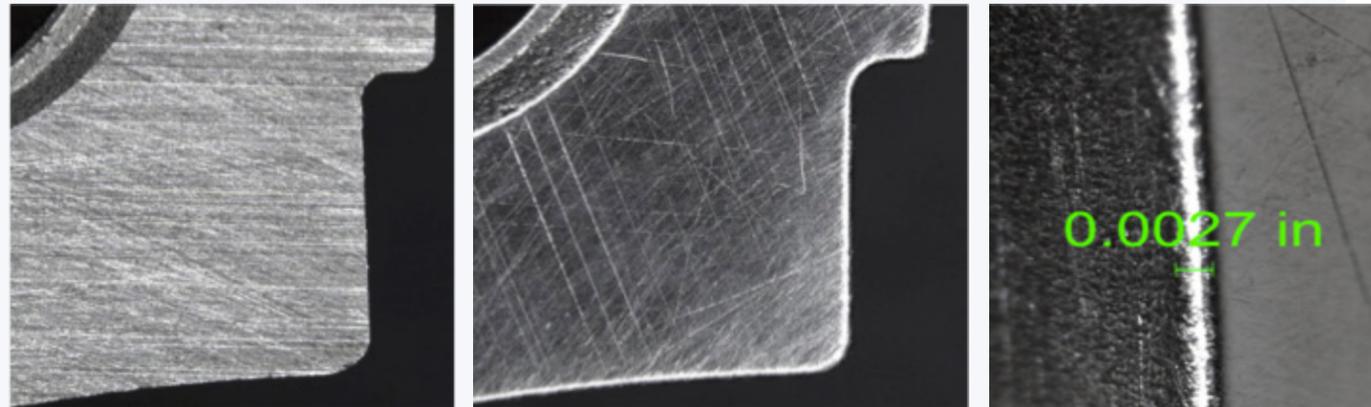
Although wire-filled brushes can and are used to deburr machined parts, it is recommended to use abrasive filament brushes for deburring inside dedicated CNC machining centers that also perform the machining operation. The reason is that the hardness of the wire in carbon steel wire brushes (50 to 55 HRC) is such that when the wire filaments break off due to fatigue, the wire strands can damage slides and other internal components.

Pferd's M-Brad abrasive filament brushes are an example of a deburring solution for machined parts, particularly the composite disc brushes for use in CNC and robotic machines. The disc brushes deburr, hone, clean and polish and are also an excellent solution for edge radiusing. Wire brushes are recommended for custom-built CNC machines versus composite brushes, which can be used on off-the-shelf CNC machines.

All M-Brad brushes, which include wheel brushes, stem mounted

brushes, cup brushes and tube brushes, utilize a 6.12 nylon monofilament that evenly encapsulates various abrasive grit particles on the surface of the filament as well as throughout the entire nylon filament.

However, to efficiently remove burrs, the abrasive brush must allow for a gradual cutting action that provides the user with maximum control. Ideally, this should be the case on a variety of materials, from soft aluminum to hard titanium →



The left image shows shows an automotive part prior to deburring; the middle image shows the part after deburring. The right image shows a close-up of the deburred edge after 20 sec.



A deburring machine with robotic loading and unloading.

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and carbide. Fortunately, the M-Brad brushes work on materials as tough as nickel alloys to materials as soft as leather.

## COST-EFFECTIVE DEBURRING

For high-volume deburring applications, or for applications where the parts are large and difficult to manipulate, it is common practice to use robots to load heavy parts into the deburring machine or present the large parts to the abrasive brushes for deburring.

Sizing and programming the robots for deburring is a complex exercise, which should be performed by individuals who are trained and can understand and manipulate the interaction between brushes and workpieces. Unique orientation and presentation of brushes to the workpiece in combination with rotational forces on the brush can and, in many cases, do induce vibrations in the robotic arm that need to be controlled and countered.

Whether it's on a robotic arm in a

dedicated machine or a handheld tool, deburring with abrasive brushes is a cost-effective solution because of longer service life and consistent results, meaning fewer rejected parts. This translates into increased profitability and competitiveness for customers.

Every deburring and surface conditioning application result is dependent on the needs of the end user and functionality of the part. The best option when faced with deburring of machined parts is to consult individuals in the deburring industry with application experience.

At Pferd, customers can provide the company with their application requirements and work with company engineers to design a custom solution, if need be. No matter the customer request, Pferd will process customer-submitted parts at the company's on-site lab in Milwaukee in order to provide deburring parameters for customers to perform at their own sites. ●

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