Operational Advantages of Power Brushes

Power Brushes Do Not Remove Base Material

Wire brushes clean surfaces in the same manner as sand-blasting. Because of using superior quality hardened steel wire rotating at a high rate of speed, the brushes have the ability to separate surface contaminants from base material. Wire brushes will not remove base material or change part dimensions.

Wire Brush

Abrasive Wheel

Brushes Are Non-Loading

Unlike non-woven, bonded and coated abrasives, wire brushes will not load when brushing soft materials or when used to remove paint and similar coatings.

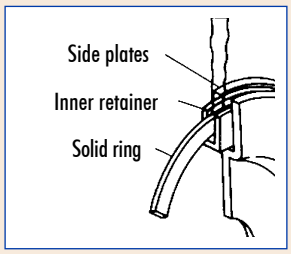
This resin fiber disc did not work very long before the grains became loaded with material.

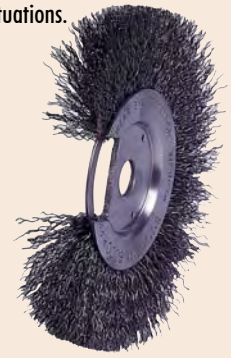
This power brush, however, can keep on working without ever becoming loaded with material.

Construction Advantages of Weiler Power Brushes

Weiler's Solid Ring Construction

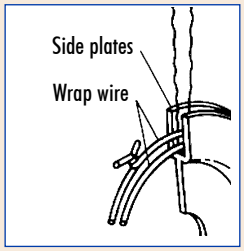
Our construction ensures that the brush will run smoother and last longer, even in the toughest application situations.





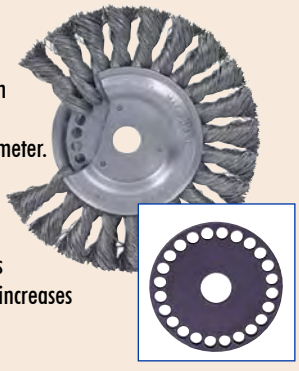
Competitor's Wrap-Wire Construction

Brushes made using the old wire wrapping method lack balance and permit wires to move around at the base, shortening their life.



Weiler's Individual Knot Hole Construction

Weiler's knot wheels are constructed with an internal steel plate that has equally spaced individual holes around the perimeter. Wire is inserted through each hole and twisted into a knot. Each hole has precisely the same wire count, thereby assuring perfect balance. This eliminates vibration, reduces operator fatigue and increases brush life.

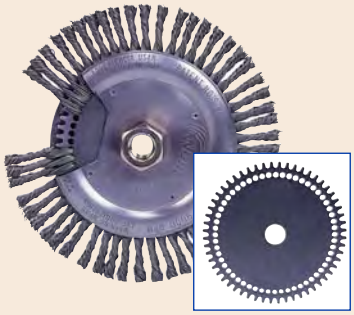


Competitor's Knot Construction

Competitor knot wheel construction is commonly characterized by the placement of multiple knots into a single slot in the knot plate. The primary disadvantage of this type of construction is the lack of precise control of the knot location. As the brush wears, the knots have a tendency to move. In addition to creating vibration, this movement is detrimental to brush life and brushing aggression.

Weiler's Roughneck® Weld Cleaning Brushes Patented Construction

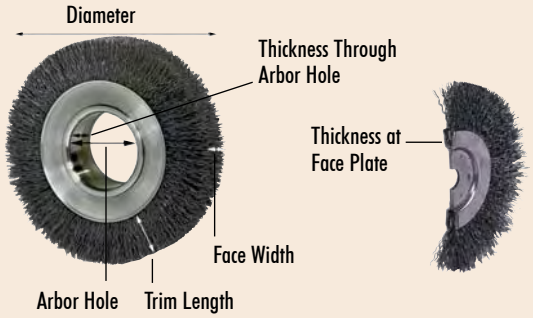
Each knot is twisted through its own hole and locked into an individual sprocket tooth. This prevents the knots from moving, providing a stronger striking action on the work surface, longer brush life and less operator fatigue. This results in the most aggressive weld cleaning in the market with the lowest cost-per-piece brushed.



Product Attributes

Brush Terminology

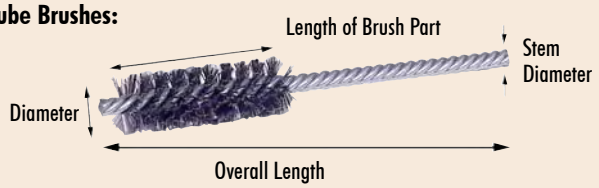
Wheel Brushes:



Cup Brushes:

Stem-Mounted End Brushes:

Tube Brushes:



Fill Materials

Steel Wire:
Heat-treated, high-tensile steel wire, drawn to exacting Weiler specification is used in all Weiler brushes with a wire diameter of .008 and above. This wire provides superior fatigue resistance and excellent brushing action.

Low Carbon Steel:
Generally used in .003 and .005 wire diameters for fine surface work.

Stainless (Type 302) Wire:
Highly corrosion resistant. Recommended where contamination or "after rust" is a problem, such as brushing stainless steel or non-ferrous metals. All Weiler stainless steel brushes are made with Type 302 stainless steel wire.

Non-Ferrous:
Brass, Bronze and Aluminum are some of the non-ferrous wires available in Weiler power brushes for special applications.

Animal:
Horsehair - A very durable material. The tail hair is stiff and the mane hair is soft. It can be blended with other materials such as synthetics. Used in a variety of brushes for scratch-free cleaning.

Goat hair - This soft material is mainly used in our miniature brushes for polishing.

Natural:
Tampico - Produced from the stem of the Mexican agave plant. Its texture is soft to medium with good durability. Used for scrubbing and washing applications. It is heat, alkali and acid resistant. The natural color is off-white but it may be dyed or bleached.

Synthetic:
Nylon - Resistant to most acids and alkalis. Long wearing nylon has the greatest use in cleaning applications. It is available straight or crimped.

Polypropylene - Available in strip brushes.

Stainless Steel Wire Brushes:

There is an increasing need for stainless steel wire brushes in a variety of industries, such as the nuclear, aircraft, electronics, chemical, shipbuilding and missile industries.

Weiler's complete line of stainless steel brushes are made using Type 302 stainless steel wire. This wire was developed to provide long brush life and corrosion resistance. Using a stainless steel brush when brushing aluminum, stainless steel and other high strength alloys eliminates the danger of "after rust". When these alloys are brushed with carbon steel wire, a deposit of carbon material remains which can cause rust. Type 302 brush wire is austenitic.

Once a stainless steel brush has been used on carbon steel, it should never be used on stainless steel since rusting can occur. To avoid contamination, all stainless brushes should be stored away from areas (such as steel work benches) where carbon steel particles might come in contact with the brush. It is recommended that a stainless steel surface be passivated with a solution of 10-20% nitric acid, after brushing, to ensure its resistance to corrosion.

Most stainless steel types look alike. How can you determine whether or not you really have Type 302 stainless steel wire in your brush? Stainless steel wire has magnetic properties as a result of the wire drawing process. Type 302 stainless wire will lose its magnetic properties if a wire strand is heated red with a match. If the wire strand retains its magnetic properties after heating, it is not Type 302.

Care Of Stainless Steel Wire Brushes:
For critical operations, stainless steel wire brushes should be degreased before beginning the operation. Brushes that are stored after use should also be degreased and stored in plastic wrapping. If stored unprotected for any length of time, the brush could collect foreign matter due to its magnetic properties, and leave "after rust" when reused.

Power Brush Operating Information

Brushing Speeds

1. Power brushes, like cutting tools, operate most effectively when the speed and pressure of the operation are properly matched to the demands of the application. In most operations, the highest speed and lightest pressure will ensure the fastest brushing action and longest brush life.

2. Increasing brush speed increases the face hardness and brushing action; therefore, a fine wire brush rotating at a higher speed will often produce the same results as a coarser wire brush rotating at a slower speed. Finer wire operating at a higher speed is generally preferred and will provide a longer brush life.

3. MSFS - Maximum Safe Free Speed (RPM) is the maximum speed at which the brushes may be used safely and is not necessarily the optimum speed for a given application. Operating speed should be determined by the application, but should not exceed the MSFS (RPM) for which the brush is rated.

4. Make sure spindle size and motor of machine are large enough to accommodate the diameter of brush to be used (see table on pg. 18).

Brushing Pressure

Avoid excessive pressure when using a wire brush.
Excessive pressure causes over-bending of the filaments and heat build-up resulting in filament breakage, rapid dulling and reduced brush life.

Instead of greater pressure, try the following:

1. A brush with more aggressive action (increase filament diameter, decrease trim length, different brush type, i.e., knot type instead of crimped type)
2. Higher surface speed (increase RPM or brush diameter)

Important Note: Never exceed the recommended Maximum Safe Free Speed or RPM rating of the brush.

Correct
Wire Tips Doing the Work

Incorrect
Excessive Pressure Causes Wire Breakage

Recommended Surface Speeds For Brushing Applications

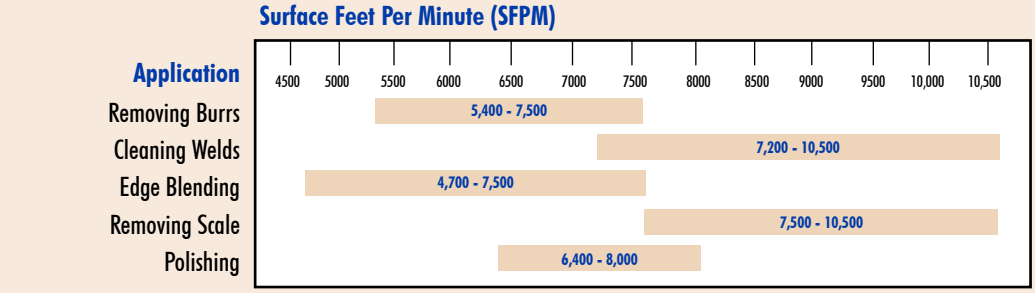


Table of Surface Speeds
(Peripheral Speed in Ft./Min.)

$$SFPM = \frac{\text{Dia. (Inches)} \times RPM}{12}$$

RPM	Diameter (Inches)							
	2	3	4	6	8	10	12	15
1000	525	785	1,050	1,575	2,100	2,625	3,150	3,925
1500	785	1,175	1,575	2,350	3,150	3,925	4,725	5,900
1750	915	1,375	1,850	2,750	3,650	4,550	5,500	6,800
2500	1,300	1,950	2,625	3,925	5,250	6,550	7,850	9,825
3000	1,575	2,350	3,125	4,725	6,275	7,850	9,425	11,775
3450	1,800	2,700	3,600	5,400	7,200	9,000	11,000	13,500
4000	2,100	3,150	4,175	6,275	8,375	10,475	—	—
6000	3,125	4,700	6,275	9,425	—	—	—	—
10,000	5,250	7,850	10,500	—	—	—	—	—
15,000	7,850	11,775	15,750	—	—	—	—	—
20,000	10,450	15,700	20,950	—	—	—	—	—

Important: When running a wire brush, a rule of thumb is to run it a "mile a minute" or a minimum of 5,000 Surface Feet Per Minute (SFPM). Normally, higher surface speeds result in faster cycle times and longer brush life. However, never exceed the Maximum Safe Free Speed (MSFS) or RPM of the brush.

Example: A 6" diameter wheel running at 3,450 RPM has a surface speed of 5,400 SFPM.

Power Brush Operating Information

Minimum Spindle (Shaft) Diameter for Brushes of Various Sizes

(From ANSI Standard B165.1)

Outside Diameter of Wheel Brush	Maximum Face Width of Wheel Brush	Minimum Outside Diameter of Spindle (Shaft)
2"	1/4"	1/4"
3"	3/4"	1/4"
3" (heavy-duty)	1"	3/8"
4"	1"	3/8"
6"	1-1/4"	1/2"
8"	1-1/4"	5/8"
10"	2"	3/4"
12"	3"	1"
14"	3"	1-1/4"
15"	3"	1-1/4"
16"	3"	2"

Note: These diameters are based on the wheel brush being mounted next to the supported end of the shaft rather than the unsupported end in order to minimize overhang.

Recommended Motor Sizes

Brush Diameter	Motor Size	RPM
4"	1/4 HP	3,450
6"	1/2 HP	3,450
8"	3/4 HP	3,450
10"	1 HP	1,750
12"	1 HP	1,750
15"	1-1/2 HP	1,750

Note: This chart is based on 1" brush face.

- ¥ Select a brush that is compatible with the horsepower of the machine (see chart above).
- ¥ Select the largest diameter brush that will fit on the machine with all guards in place.

Self-Sharpening Tip for Wire Wheel Brushes

When using wire wheel brushes without nuts, periodically reverse the direction of rotation to take advantage of the self-sharpening action that will result. Remove the brush from the spindle, flip the wire brush 180ß and remount the brush securely.

Remove

Flip 180ß

Remount Securely

Conversion Charts (Inches to Millimeters; 1"=25.4mm, 1mm=.03937")

Brush Diameter	
Inches	Millimeters
2-3/4"	70mm
3"	76mm
3-1/2"	89mm
4"	102mm
5"	127mm
6"	152mm
7"	178mm
8"	203mm
10"	254mm
12"	305mm
14"	356mm
15"	381mm
16"	406mm

Arbor Hole Size	
Inches	Millimeters
1/4"	6.4mm
3/8"	9.5mm
1/2"	12.7mm
5/8"	15.9mm
3/4"	19.0mm
7/8"	22.2mm
1"	25.4mm
1-1/8"	28.6mm
1-1/4"	31.8mm
1-1/2"	38.1mm
1-3/4"	44.5mm
2"	50.8mm

Brush Face Width	
Inches	Millimeters
1/8"	3.0mm
1/4"	6.4mm
3/8"	9.5mm
1/2"	12.7mm
5/8"	15.9mm
3/4"	19.0mm
7/8"	22.2mm
1"	25.4mm
1-1/8"	28.6mm
1-1/4"	31.8mm
1-1/2"	38.1mm
2"	50.8mm

Product Selection

Crimped vs. Knot Wire Brushes

Crimped Wire Brushes:

- Made of heat-treated wire that is crimped to allow individual filaments to support each other.
- Provide flexibility for light to medium duty brushing action.
- Use on parts that could be damaged by the impact of a knot brush.
- Use for a broad range of applications.

Knot Wire Brushes:

- Made of heat-treated straight wire filaments twisted as a single unit like a piece of cable or wire rope.
- Provide less flexibility and more aggressive brushing action in heavy-duty applications.
- Use on parts requiring high-impact action.
- Use to remove large burrs and heavy contamination, such as multiple layers of rust, scale, paint or oxides.

Knot Configurations

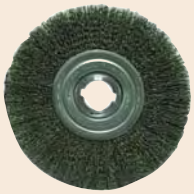
Standard Twist:
A slight tuft at the end of the wire knot provides some flexibility for use on irregular surfaces.

Cable Twist:
The wire is tightly twisted to the end of the knot, providing very aggressive brushing action.

Stringer Bead Twist:
The wire is very tightly twisted to the end of the knot, creating a narrow face with high-impact action, primarily used for weld cleaning.

Trim Length

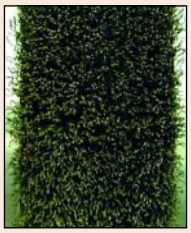
Long trim brushes
are more conformable and are able to follow contoured surfaces.



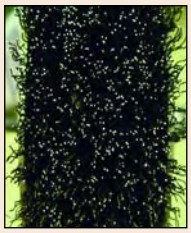
Short trim brushes
are faster acting and suited for more severe brushing action.

Fill Density

High density brushes
produce faster brushing action, longer brush life and finer surface finishes.



Low density brushes
offer greater flexibility for surface cleaning operations on irregular surfaces.



Wire Size

It is recommended to use:
Very Fine to Fine Wire for light-duty applications
Medium to Coarse Wire for heavy-duty applications
To maximize brush life, always use the finest wire that will accomplish the job.

Wire	Coarse		Medium to Coarse		Medium		Fine		Very Fine	
Gauge #	20	24	25	30	33	34	35	38	43	47
Dia. in Inches	.035	.023	.020	.014	.0118	.0104	.0095	.008	.006	.005
Dia. in Millimeters	0,89	0,58	0,51	0,36	0,30	0,26	0,24	0,20	0,15	0,13

Wire sizes in decimals of an inch are shown in all tables.
American Steel Wire Equivalent Gauge (Formerly Washburn & Moen)

Polyflex® Encapsulated Brushes

Polyflex Encapsulated Brushes are ideal for extremely demanding applications. They are especially well-suited for users with the following types of requirements:

- Extreme brushing pressure - Encapsulation protects wires from over-flexing and extends brush life relative to conventional knot and crimped wire brushes.
- Severe cleaning operations - Encapsulation holds the wire tips rigidly in place and creates the most aggressive brushing action that can be achieved with a wire brush.

In order to optimize the performance of encapsulated brushes, selection of the correct elastomer is critical. The following is a description of the three types of elastomers and their performance attributes.

Burgundy (Standard)
General purpose elastomer; suitable for most manufacturing applications.

Orange (Heavy-Duty)
A more heavy-duty elastomer than burgundy; used for more demanding applications found in steel fabrication.

Black (Extra Heavy-Duty)
A heat stabilized elastomer that does not wear easily; used primarily for cleaning pipeline welds. Minimizes smearing on hot parts.

Product Selection Chart

	Cleaning, Surface Prep, Roughening, Weld Cleaning, Remove Oxides & Rust	Surface Finishing (Functional, Aesthetic, Decorative, Satin)	Heavy Deburring	Light Deburring & Edge Blending	Deflashing
Crimped Wheels	● ● ●	● ●		● ● ●	
Knot Wheels	● ● ●		● ● ●		● ● ●
Crimped Cups	●	●		●	
Knot Cups	●		●		
Crimped Stem-Mounted	● ●			● ●	
Knot Stem-Mounted	● ●		● ●		● ●
Encapsulated	● ● ● ● ●		● ● ● ● ●		● ● ● ● ●
Power & Hand Tube	●	●		●	
Miniature	●	●		●	

Product & Application Key

- ● Right Angle Grinder
- ● Straight Grinder
- ● High Speed Pencil Grinder
- ● Bench/Pedestal Grinder
- ● Right Angle Die Grinder
- ● Die Grinder
- ● Hand Drill/Drill Press

Application Solution Guide

There are many variables in power brush applications. If the power brush you are using does not accomplish the desired results, select a solution from the suggestions below for your specific application or call Weiler's **Application Engineering Hotline at 888-299-2777.**

Problem	Recommended Solutions
Brush works too fast	• Select a brush with longer filaments • Select a brush with a smaller diameter wire • Select a brush with a narrower face and/or lower fill density • Select a brush with a smaller outside diameter • Operate the brush at a slower RPM
Brush works too slowly	• Select a brush with shorter filaments • Select a brush with a larger diameter wire • Select a brush with a wider face and/or higher fill density • Select a brush with a larger outside diameter • Operate the brush at a faster RPM
Brushing action rolls or peens the burr over instead of removing burr	• Select a brush with a wider face and/or higher fill density • Select a brush with a larger diameter wire • Select a brush with shorter filaments • Operate the brush at a faster RPM
Finer final finish required	• Select a brush with longer filaments • Select a brush with a smaller diameter wire • Operate the brush at a higher RPM • Select a brush with a wider face and/or higher fill density • Replace the wire brush with a nylon abrasive brush (Nylox®)
Coarser final finish required	• Select a brush with shorter filaments • Select a brush with a narrower face and/or lower fill density • Operate the brush at a slower RPM • Select a brush with a larger diameter wire
Non-uniform brushing action	• Select a brush with longer filaments • Select a brush with a narrower face and/or lower fill density • Automate the operation to reduce human variables
Filaments break off	• Reduce pressure • Select a brush with a smaller diameter wire
Short brush life	• Select a brush with a smaller diameter wire • Reduce pressure • Select a brush with a wider face and/or higher fill density

Call our Application Engineering Hotline at 888-299-APPS (2777). If the problem is too complex to be solved over the phone, we will determine if an evaluation should be conducted at our in-house lab or your facility. Either way, Weiler will provide the most cost-effective solution for your specific application.