Fill Material

Fill Material Terminology

Our industrial brushes are supplied with synthetic, abrasive nylon, natural and wire bristles. The bristles are the working action of the brush and deserve plenty of attention in designing your industrial brush tool. Bristle characteristics vary for each type of material. Bristles may be stiff or soft, thick or thin, repel or absorb water, chemical and/or heat resistant, flexible to a greater or lesser extent, and resistant to bending or abrasion. Another factor in determining bristle selection is the purpose the brush serves during use in the application. Bristles perform varying functions such as cleaning, sealing, guiding, applying pressure, wiping, cutting, abrading or polishing.

Other factors include brush density of the bristle. Brush density appearance can be affected by the bristle being made with a crimp or level (straight) characteristic. Crimped material has a wave in the bristle and provides a denser brush appearance. It produces a continuous and more even brush action. Crimp is measured by amplitude (depth of the crimp) and frequency (number of crimps per inch). Level or straight bristles provide a lesser brush density appearance. The bristle length or trim is exposed view and the working strength of the brush. The surface of the bristles is uniform and flat. Tanis Incorporated technical sales and engineering staff will provide assistance with your selection.

Synthetic Filaments

Nylon filament offers a combination of excellent bend recovery, abrasion resistance and chemical resistance. All nylons absorb water in wet conditions reducing the filament stiffness. Nylon has the highest heat deflection temperature, but is prone to oxidation embrittlement with long exposures to high temperatures. Nylon filaments are made with different characteristics, available in crimped or level (straight) fibers, several filament diameters and colors. Nylon filaments range from .003" to .090" diameters.

Nylon 6 is a quality filament that provides durability at a lower cost for several applications. Wet conditions reduce stiffness by 80%.

Nylon 6.6 is a high quality nylon filament that has improved wet and dry stiffness compared to Nylon 6. It has excellent bend recovery and abrasion resistance. Heat stabilizer additive makes this filament less prone to oxidation.

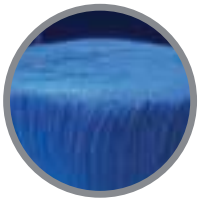
Nylon 6.12 is a superior grade, high quality nylon filament. This nylon offers excellent bend recovery and abrasion resistance. Low moisture absorption makes it an excellent filament choice for wet applications. This filament can be made in an “X” shape with high performance and excellent wear characteristics.

Quill is a hollow 6.12 filament. The filament is used in a variety of applications. This is commonly used in paint brushes and tape dispenser brushes.

Anti-Static Nylon filaments are able to dissipate an electric charge. Anti-static nylon eliminates the problems generated by static electricity in many applications by providing a rapid dissipation of static charge. Past conductive nylon materials had to be grounded in order to dissipate charges whereas antistatic materials inhibit the generation of static charges.

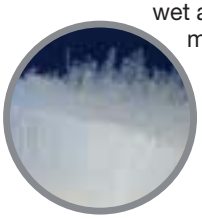
Polypropylene is a top quality and versatile filament for a wide variety of applications. It has excellent wet stiffness and flex fatigue resistance. It is inert to most solvents, oils and chemicals and is especially good at resisting strong acids and bases. Polypropylene has a good bend recovery, but susceptible to taking a set more easily than other synthetic materials.

Polypropylene has limited natural sunlight resistance which is greatly improved with a black colored filament. It can be made with different characteristics to improve solvent resistance and dry applications. It can be made in a triangular or “X” shape and made flagged or unflagged for improved surface contact and liquid retention. Polypropylene filaments are made with crimped or level (straight) fibers, several filament diameters, and colors. Polypropylene is available in .006" to .060" filament diameters. Shaped polypropylene is available in larger sizes.



Polyester

Polyester is an economical substitute for nylon 6.6 or 6.12 in many applications. It has improved abrasion resistance compared to polypropylene, but not as good as nylon. Polyester has excellent bend recovery, solvent resistant oxidation resistance at high temperatures. It has good resistance to sunlight. Properties in wet or dry applications do not change significantly because it does not absorb much water. It is an ideal filament for many wet applications. Heat stabilizer additive makes filament less prone to oxidation. Polyester can be made in a “X” shape for improved liquid retention. Polyester filaments are made with crimped or level (straight) fibers, several filament diameters and colors. Polyester filaments range from .006" to .075" diameters.

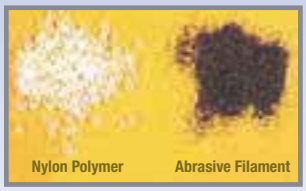


PFA

PFA is filament made with Teflon® material. This filament is inert to most chemicals and is excellent material for high temperature applications for continuous use limit at 500° F. PFA is available in .020" and .035" filament diameters.

Abrasive Nylon Filaments

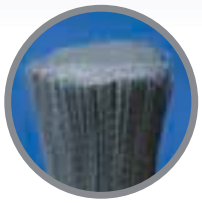
An abrasive filament that combines nylon and abrasive grit in a special formulation to deliver strength, stiffness when wet, durability and chemical resistance. The abrasive grit is uniformly dispersed throughout the filament. This is a unique filament because the sharp cutting edges of grit can be he held firmly against any surface no matter what shape it is. As the brush moves against the surface, the cutting edges of the grit make good contact because the flexible filaments bend at various angles to fit the surface contour. Abrasive filaments are aggressive on the sides as well as the tips.



Nylon and Grit


Abrasive Filament

Abrasive filament is most often made with nylon 6.12 for use in wet or dry applications. Nylon 6 or 6.6 is suitable for dry applications and can be treated against thermal degradation. Filaments are available in a broad combination of grit sizes (600 grit to 46 grit), loading and diameters (.012" to .60"). Grit loadings range from 20% by weight of grit to 40%. Abrasive filaments are embedded with silicon carbide or aluminum oxide. Silicate is a fine abrasive filament with a .008" diameter and 1000 grit for micro-finishes.


Silicone Carbide

CeramiX® Brushes contain 3M™ grain 321 that provides enhanced cutting action up to 3 to 5 times faster than traditional abrasive filaments. The mineral wears away in smaller pieces, consistently leaving more mineral in the filament to work on the part surface. Refer to page 17 for grit and filament diameter ranges.

Silicon Carbide is harder, sharper and more aggressive than aluminum oxide and is preferred for finishing ferrous metals. Refer to page 17 for grit and filament diameter ranges.

Silicate is a fine grade abrasive filament for fine finishing and cleaning. Refer to page 17 for grit and filament diameter ranges.


Aluminum Oxide

Natural Filaments

All natural fibers are dependable substitutions for applications where synthetic filaments are not suited. Our natural filament offering includes horse hair, goat hair, tampico and bristle (boar or hog hair) for industrial applications. Artist brushes use natural fibers including bristle, ox hair, sable and camel hair.

Horse Hair is produced from the mane or tail hair and each provide a different stiffness and texture. It is best known for its ability to polish without being abrasive while cleaning the surface. This natural fiber is excellent for picking up dust and fine powders. Horsehair can be mixed with other natural fiber, synthetic and wire materials for specific customer applications. Horsehair colors include brown, black, mixed grey, silver grey and white.

Goat Hair is a very fine, soft natural fiber either black or white in color. It is used for very short trim soft brushes. Goat hair has a blunt tip, but retains a large volume of fluid.

Tampico is a natural fiber produced from Agave plants in Mexico. It has exceptional water retention characteristics, excellent biodegradability, superior heat and chemical resistance. It has a soft to medium texture and will soften when it absorbs water. It is able to withstand high temperatures without melting, but will discolor.

Bristle is a natural fiber with very thick butts and split ends used primarily in brush applications to carry liquids. Bristle is also referred to as hog, pig or boar hair. Bristle is used mainly in paint and artist brushes or twisted-in wire brushes. It maintains shape and stiffness in use over a long period of time. Bristle comes in gray, black or white (natural) colors.

Wire Fill Materials

High Carbon Steel is hard drawn, high-tensile strength wire with excellent fatigue resistance and brush action. Brushes with a wire diameter from .004" to .006" are used for fine surface work. Available in .004" to .014" wire diameters.

Stainless Steel Type 302 and Type 304 are the two types of stainless steel most commonly used in brushes. Type 302 is nonmagnetic, extremely tough, ductile and is excellent for corrosion resistance. Type 304 is the most widely used stainless steel and is similar to Type 302. Type 302 and Type 304 become slightly magnetic when cold worked and have excellent fabrication and welding characteristics. Recommended where contamination or “after rust” is a problem such as brushed stainless steel and on ferrous metals. Available in .003" to .020" wire diameters.

Stainless Steel Type 316 maintains a higher tensile strength at elevated temperatures. It also offers superior corrosion resistance in chlorides and many other environments than Type 304. Best choice for highly contaminated applications. Available in .003" to .020" wire diameters.

Brass is a non-ferrous and softer wire compared to steel and stainless steel. It has a high conductivity effective for reducing heavy static in a concentrated area. Brass is corrosion resistant and an excellent choice for cleaning scratch susceptible surfaces. Available in .003" to .020" wire diameters.

Phosphorous Bronze is a non-ferrous wire with excellent corrosion resistance, good fatigue life and high electrical conductivity for reducing static in a concentrated area. Bronze is used for better corrosion resistance and greater strength than brass. Available in .003" to .020" wire diameters.

FILAMENTS

General Fiber Characteristics

Over the past 30 years, Tanis experience has led us to work with a variety of materials to meet our customer's needs. This includes horse hair, pig bristle, goat hair, natural vegetable fibers, different grades of nylon, polypropylene, polyester and a variety of metal filaments. These filaments are available to produce the brush that best provides the results to your specific use or industry.

General Fiber Characteristics

CHARACTERISTICS	POLYPROPYLENE	NYLONS	POLYESTER	POLYSTYRENE	NATURAL VEGETABLE FIBERS	PET
Abrasion Resistance	Fair	Excellent	Good	Poor	Poor	Good
Flex Life	Excellent	Excellent	Good	Poor	Poor	Good
Bend Recovery	Good	Excellent	Excellent	Poor	Poor	Good
Resistance to Taking a Set	Fair	Good	Good	Excellent	Good	Good
General Solvent	Excellent	Excellent	Excellent	Poor	Good	Excellent
Flicking Action (Springiness)	Good	Excellent	Excellent	Excellent	Good	Excellent
Retention of Stiffness (in Water)	Excellent	Good-Poor	Excellent	Excellent	Good-Fair	Excellent

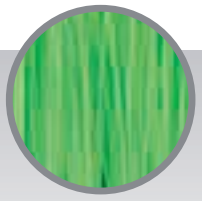
Synthetic Fiber Properties

PROPERTY	POLYPROPYLENE	6 NYLON	6.6 NYLON	6.12 NYLON	POLYESTER	POLYSTYRENE	TEFLON®	PEEK	PET
Tensile Strength (PSI) x 1000	50-55	50-65	45-50	40-45	30-45	15-20	15	19	50
Stiffness Modules (PSI) x 1000	740	480	520	480	445	500	150	1100	500
Water Absorption (%)	< 0.01	9	9	3	0.50	< 0.03	<0.03	0.4	0.4
Softening Point (Fahrenheit)	212°	250°	280°	250°	240°	200°	500°	560°	260°
Melting Point (Fahrenheit)	320°	410°	495°	410°	430°	350°	590°	649°	450°

Filaments

Polypropylene

Polyester



X-Shape Polyester

Nylon

Natural Vegetable Fibers

FILAMENT MATTERS

Performance Brushes

Choosing the right filament is essential for optimal brush performance—whether it is enhancing the cleaning properties of the brush, eliminating surface scratching or solving a unique application challenge.

Chemical and Environmental Resistance

RESISTANCE TO	POLYPROPYLENE	NYLON 6, 6.6, 6.12	POLYESTER	POLYSTYRENE	PET
Dilute Acids	Excellent	Good-Poor	Good	Good	Good
Dilute Alkalias	Excellent	Excellent	Good	Good	Good
Alcohols, Vegetable Oils	Excellent	Good	Excellent	Poor	Excellent
Gasoline, Petroleum Distillates	Good	Excellent	Excellent	Poor	Excellent
Turpentine	Good	Excellent	Excellent	Poor	Excellent
Benzine, Aromatic Hydrocarbons	Fair-Good	Excellent	Excellent	Poor	Excellent
Acetone, Ketones	Excellent	Good	Excellent	Poor	Excellent
Ethyl Acetate, Esters	Good	Good-Excellent	Excellent	Poor	Excellent
Trichlorethylene, Chlorinated Hydrocarbons	Fair-Good	Good-Excellent	Good-Fair	Poor	Fair
Prolonged Exposure to Hot Water	Fair-Good	Good	Good-Fair	Good	Good
Resistance to Sunlight*	Fair	Fair	Good	Good	Good

***Black color greatly increases resistance to sunlight.**

THE RIGHT FILAMENT FOR YOUR PROJECT

FILAMENTS

CONFIGURATOR

Disc Brushes

TYPES

COMPOSITE

SHELL MILL

MINI

PATTERNS

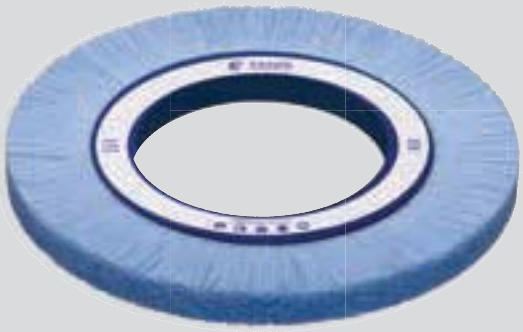
TURBO

TUFTED

TEARDROP

DENSE

Wheel Brushes



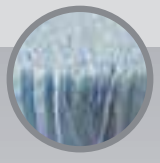
TYPES

NARROW FACE

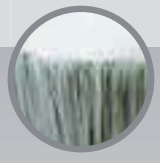
STEM MOUNT

WIDE FACE

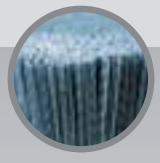
FILAMENT OPTIONS



CeramiX®



Aluminum Oxide



Silicon Carbide

Alumina Silicate

Diamond

ABRASIVE

BRUSHES

SAFETY CONSIDERATIONS

Brush Usage Recommendations

Safety Information: Many Brush Manufacturers mark some safety warnings, recommendations and usage restrictions directly to the product. It is not always practical to include even the most limited safety information on the brush itself. Therefore, the operator must read, study, understand and comply to all instructions supplied in or on the product container as well as those marked on the product itself prior to brush use. The operator should also refer to the safety and operating information printed in the brush or power tool manufacturer's catalog, instruction manual and other literature.

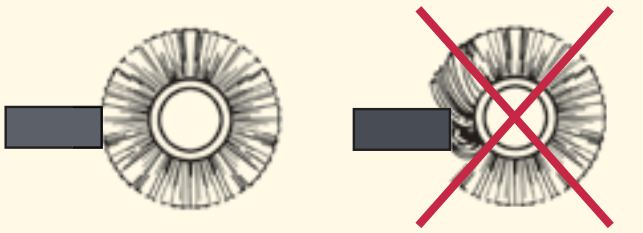
Pressure: Avoid excessive pressure when using a power brush. Excessive pressure causes over-bending of the filaments and heat build-up resulting in filament breakage, rapid dulling and reduced brush life. Instead of greater pressure on a brush, it is suggested that you try:

1. A brush with a more aggressive cutting action (increased wire size, decreased filament length, change to a different brush type, i.e. knot type instead of crimped wire type), **or**
2. Higher speed (increased R.P.M., increased brush diameter)

Important Note: Never exceed the recommended MAXIMUM SAFE FREE SPEED R.P.M. (MSFS) rating of the brush. *(See Figure 1)*

Warning: In normal power brushing operations, the material being removed, such as burrs, scale, dirt, weld slag or other residue, will fly off the brush with considerable force along with brush filaments which break off due to fatigue.

Figure 1



CORRECT
(Tips doing the work)

INCORRECT
(Excessive pressure can cause wire breakage)

The POTENTIAL OF SERIOUS INJURY EXISTS for both the brush operator and others in the work area (possible 50 feet or more feet from the brush). To protect against this hazard before rotating the brush, during rotation, and until rotation stops, operators and others in the area must wear safety goggles, full face shields and use protective clothing and equipment.

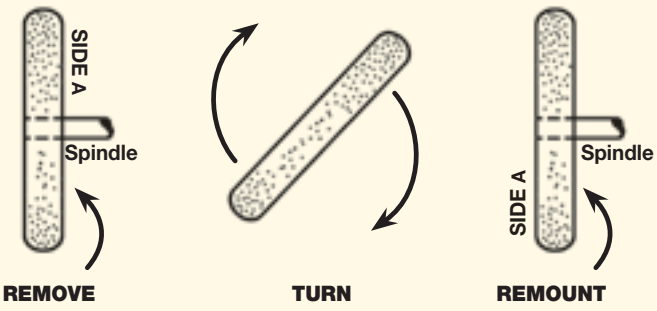
You must follow all operator and safety instructions, as well as all common safety practices which reduce the likelihood or severity of physical injury.

Inspection and Storage: Upon receipt, inspect brushes for damage, rust, and deterioration. Store in original containers in a clean, dry location. Do not allow distortion of brush filaments/components or foreign matter to become lodged in brush face.

Brushing Problems: DO NOT ALLOW UNSAFE OPERATIONS TO CONTINUE. Occasionally, due to worn bearings, a bent spindle, an unusual application, operator abuse or inappropriate use, a brush may fail. Do not continue to use a failed brush or one which is functioning improperly (i.e., throwing filaments, out of balance, etc.), as this increases the possibility for further brush failure and hazard of injury. The cause of the failure should be evaluated and corrected immediately.

Self-Sharpening: When using wire wheel brushes, periodically reverse the direction of rotation to take advantage of the self-sharpening action that will result. This may be accomplished by removing the brush from the spindle and turning it side-for-side and remounting securely. *(See Figure 2)*

Figure 2



IMPORTANT:
A Safety Slip is included with each shipping package for power brushes. All operators should read and understand safety information thoroughly and completely before using the brush. Keep the safety slip with the brush. **All operators must read it.**

ABRASIVE AND POWER BRUSH SAFETY REQUIREMENTS SUMMARY

Protective Equipment: Appropriate protective equipment (such as full face shields, respirator, etc.) must be used where a possibility of injury exists that can be prevented by such equipment.

Safety Goggles: Safety Goggles and Full Face Shields **MUST BE WORN** by all operators **AND OTHERS IN THE AREA** of power brush operations. Persons within 50 or more feet may be with in danger zone. Comply with the requirements of ANSI B165.1 “Safety Requirements–Power Brushes”. Also see ANSI B7.1 “Safety Requirements—For the Use, Care and Protection of Abrasive Wheels”.

Safety Gloves and Protective Clothing: Appropriate protective clothing must be used where there is a possibility of injury that can be prevented by such clothing. The use of safety gloves is recommended.

Guards: Keep all machine guards in place at all times.

Speeds: Observe all speed restrictions indicated on the brushes, containers, labels or printed in pertinent literature. “MSFS” or “MAX.SFS” means Maximum Safe Free Speed (R.P.M.)-spinning free with no work applied: For reasons of safety, the “MSFS/MAX.SFS” should not be exceeded under any circumstances *(see ANSI 3.1.8 for more information).*

Dust and Fumes: Wear respiratory protection to avoid this hazard (see ANSI Z88.2).

Before Starting Brush: Use eye protection and safety equipment. Inspect brush for rust, damage, speed limit, etc. If no-load speed marked on the power tool is higher than the brush speed limit, do not mount brush. Inspect and jog machine to assure the brush is mounted properly and securely, machine guards are in place, no vibration, etc. Run machine at operating speed for at least one minute before applying work—**DO NOT STAND IN FRONT OF OR IN LINE WITH BRUSH.**

Safety Standard: Comply with the Safety Standards of the American National Standards Institute, ANSI B165.1 and ANSI B165.2 “Safety Requirements-Power Brushes”.

California Propostion 65:
WARNING: This product may contain a chemical known to the state of California to cause cancer and birth defects or other reproductive harm.

Availability of ANSI Standards:

Contact: ANSI, 1430 Broadway, New York, NY 10018 or www.ansi.org

“This information for users is provided solely as a public service. These recommendations are not necessarily complete for any particular application, and you should follow common sense safety considerations. Federal, state or local laws or regulations must be strictly obeyed, and control over these recommendations.”

CeramiX® Abrasive Brushes with 3M™ Abrasive Grain 321

A superior ceramic abrasive grain creates a superior abrasive brush

The technology dates back to 1981, when 3M™ Company (St. Paul, MN) introduced the first commercial application of sol gel abrasive grain. The advantages of this grain stem from how it's manufactured and is evident in the grain's microstructure.

The production of conventional fused abrasive grain (such as aluminum oxide or silicon carbide), is a process in which the raw materials are fused or melted together, cooled and then crushed. This process results in crystal structures that are usually quite large.

In comparison, sol gel abrasive grain is the product of a chemical process in which an alumina precursor is prepared, gelled, dried, crushed into particles and then sintered to form abrasive grains. These ceramic abrasive grains may be embedded in a nylon polymer and the combination extruded into abrasive nylon filaments. The ceramic abrasive particles produced through sol gel processes have a finer crystalline structure than their conventional counterparts. Individual fused aluminum oxide abrasive grains typically comprise one to three alumina crystals; sol gel abrasive grains consist of many multitudes of alumina crystals.

Fractured 321 Grain
(Courtesy of 3M™)

Crystalline Structure

The benefit of this crystalline structure is that as the outermost crystals in the abrasive grain become worn during use they are expelled in very small fragments, leaving a greater amount of grain in the filament to continue abrading the part surface. The nylon filaments containing this special ceramic abrasive grain deliver improved productivity.

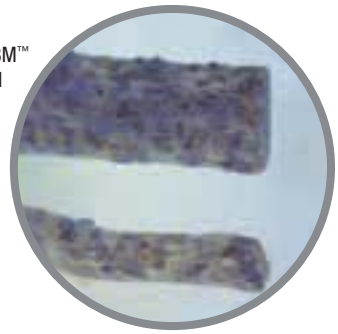
Sol Gel Abrasive Grains

3M™ Ceramic Abrasive Grains with Platelets

Two-Phase Microstructure

The 3M™ ceramic abrasive grain 321 also has a unique two-phase microstructure, a combination of fine crystals and a platelet phase. The platelets serve to reinforce the abrasive grains to withstand greater abrasion forces. The random orientation of the platelets also deflects fractures into multiple directions, creating a jagged irregular surface after the grain fractures. This continuous self-sharpening and jagged grain surface provide superior abrasion for filaments containing 321 ceramic abrasive grains.

Nylon Filament with 3M™ Abrasive Grain 321



Three Key Benefits

Three key traits which contribute to its elevated status: **fracture toughness, hardness, and self-sharpening qualities**. These features equate to increased productivity for CeramiX® abrasive nylon brushes, made with proprietary 3M™ 321 ceramic abrasive grain embedded throughout the filament.

CeramiX® Brushes

CeramiX nylon abrasive brushes are made exclusively in North America by Tanis, Inc. in Delafield, Wisconsin and are used as flexible filing tools in deburring and surface conditioning applications. Their flexibility allows these brushes to conform to irregular surface shapes. Brush designs have been developed for use in power tools, robotic cells and CNC applications to eliminate the need for time-consuming and inconsistent hand deburring operations.

Tanis' abrasive nylon brushes are available in multiple configurations: tube or burr brushes (also known as twisted-in-wire), strip brushes and composite formed disc, mini-disc and radial wheels. CeramiX® high-performance brushes cut 3 to 5 times faster on ferrous metal surfaces due to the properties of the 321 ceramic abrasive grain and CeramiX® performs well under high stress and heat conditions.

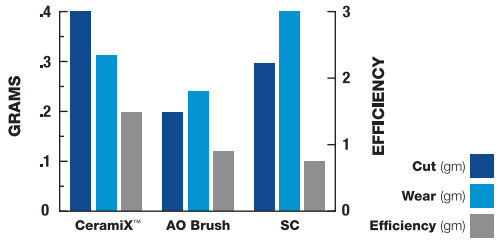
CeramiX® abrasive nylon filament is available in 220, 180, 120, 80 and 46 grit sizes, in a variety of filament diameters including a heavy-duty rectangular shape. Tanis regularly designs and manufactures custom brushes in CeramiX® and other filaments to suit customers' specific applications.

CeramiX® Performance with 3M™ Abrasive Grain 321

Cutting Action

CeramiX® proprietary abrasive brushes provide enhanced cutting action up to 3 to 5 times faster than traditional abrasive filaments.

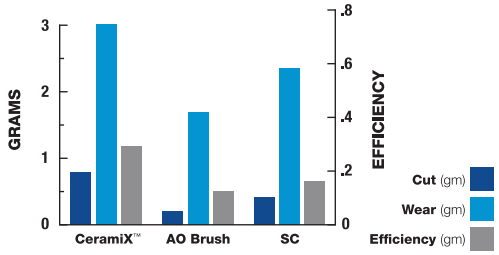
ALUMINUM PLATE
T6 Aluminum Plate,
1750 RPM



Brush Life

The mineral grain in CeramiX® brushes wears away in smaller pieces, leaving more mineral to work on the part surface.

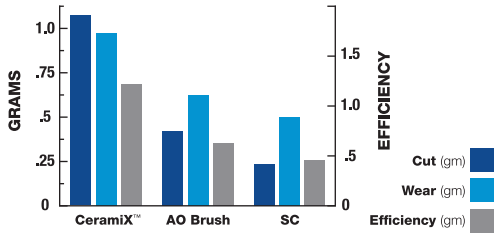
PERFORATED CRS
Perforated CRS A366 Plate,
1750 RPM



Increased Throughput

CeramiX® abrasive brushes reduce cycle times, enabling you to increase throughput. The controlled surface abrading action provides a consistent surface finish.

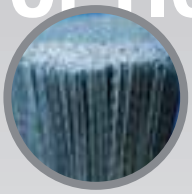
CRS STEEL PLATE
1008 CRS Plate,
1750 RPM



ABRASIVE GRAIN OPTIONS

3M™ Grain 321 used in CeramiX® Brushes
cuts 3 to 5 times faster on ferrous metal surfaces compared to traditional abrasive nylons. The mineral grain in CeramiX® brushes wears away in smaller chunks leaving more mineral available to continuously work on the part surface.

Aluminum Oxide
is more impact resistant compared to silicon carbide and less likely to fracture. AO is preferred for finishing soft metals or other materials where a smooth finish is required.



Silicon Carbide
is harder, sharper and more aggressive than aluminum oxide and is preferred for finishing ferrous metals.

Alumina Silicate
is a hard ceramic with low thermal expansion. This fine grain abrasive filament is well-suited for fine finishing and cleaning.

Diamond
is a hard ceramic with low thermal expansion. This fine grain abrasive filament is well-suited for fine finishing and cleaning.
(See page 31 for more information on Diamond.)

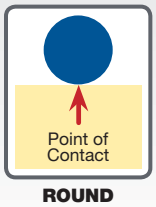
ABRASIVE FILAMENT		GRIT SIZE 46	80	120	180	220	240	320	400	500	600	1000	1800
CeramiX®	Filament Diameter Options (inches)	.065 x .080	.040, .055	.028, .040	.035	.022							
		.068 x .090	.045 x .090										
Silicon Carbide		.060, .045	.040, .050	.022, .040	.035		.030	.022		.018			
		.070	.045 x .090										
Aluminum Oxide					.035		.030	.022		.018	.012	.010	
Diamond				.040		.024	.040		.020		.012	.010	.012

FILAMENT TYPES

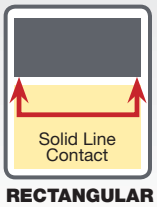
» **Round Crimped:** Optimizes brush conformability

» **Round Level:** Maximizes brush density *(Diamond Only)*

» **Rectangular:** Maximum contact with part surface



ROUND
FILAMENT



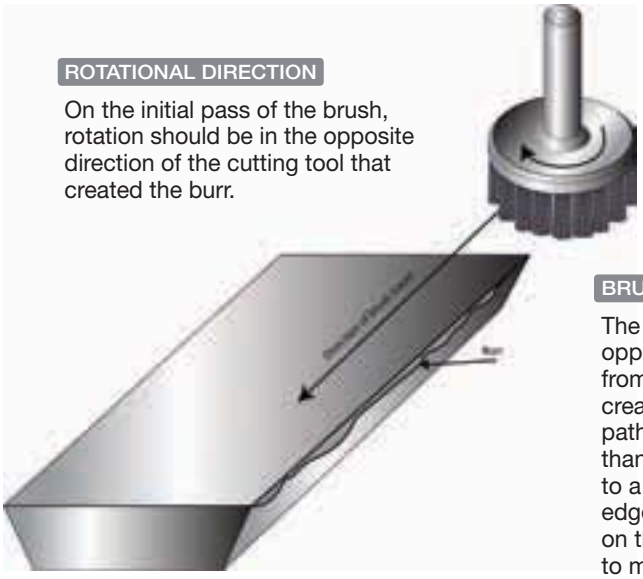
RECTANGULAR
FILAMENT

Abrasive Nylon Disc Brushes

DISC DIAMETER	DRY APPLICATION STARTING RPM	RECOMMENDED MOTOR SIZE (BASED ON A 1" BRUSH FACE)
2"	1,750 - 2,500	1/4 HP
3"	1,750 - 2,500	1/4 HP
4"	1,750 - 2,500	1/4 HP
5"	1,500 - 1,750	1/4 HP
6"	1,250 - 1,750	1/2 HP
8"	800 - 1,200	3/4 HP
10"	700 - 800	1 HP
12"	600 - 700	1 HP
14"	500 - 600	1 HP

DISC DIAMETER	FEED RATE STAINLESS STEEL / ALLOY STEELS	FEED RATE MILD STEEL / CAST IRON	FEED RATE ALUMINUM / NON-FERROUS
2"	12 - 18" /min	25 - 30" /min	35 - 50" /min
3"	12 - 18" /min	25 - 30" /min	35 - 50" /min
4"	12 - 18" /min	25 - 30" /min	35 - 50" /min
5"	12 - 18" /min	25 - 30" /min	35 - 50" /min
6"	12 - 18" /min	25 - 30" /min	35 - 50" /min
8"	12 - 18" /min	25 - 30" /min	35 - 50" /min
10"	12 - 18" /min	25 - 30" /min	35 - 50" /min
12"	12 - 18" /min	25 - 30" /min	35 - 50" /min
14"	12 - 18" /min	25 - 30" /min	35 - 50" /min

Abrasive nylon disc brushes work best at speeds allowing fairly deep penetration of the work piece into the brush filaments. Faster speeds do not typically work as well as slower speeds, since the maximum RPM listed on the brush is not the optimum working speed. A good rule of thumb is to stay below 2,500 SFPM in dry applications and 3,500 SFPM with coolant.

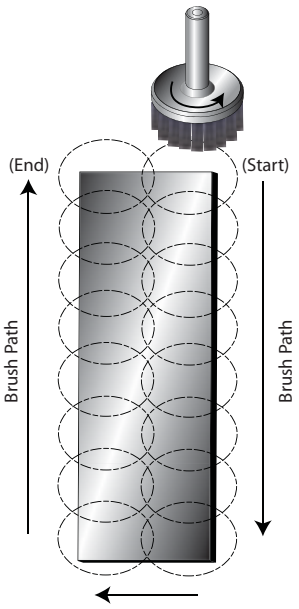


ROTATIONAL DIRECTION

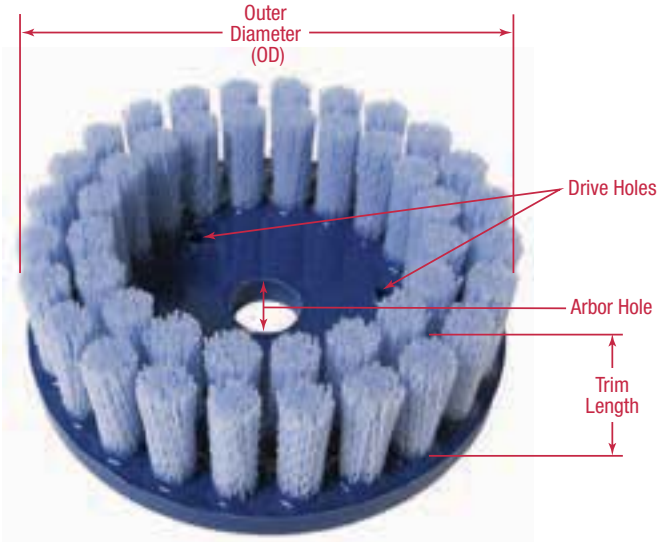
On the initial pass of the brush, rotation should be in the opposite direction of the cutting tool that created the burr.

BRUSH PATH

The ideal brush path is in the opposite direction of travel from the cutting tool that created the burr. The brush path should also be longer than the cutting tool path, to a point where the trailing edge of the brush is effective on the end of the part. Lastly, to maximize the amount of filament that is striking the part, the center line of the brush should be offset from the center of the part.



Disc Brush Terminology



PENETRATION (POINT OF CONTACT)

The abrasive action occurs when the sides of the brush filament slide across the part surface or edge of the part. When the correct balance between speed (RPM), penetration, dwell time and abrasive grit size are achieved, then optimum life and cut can be obtained.

Recommended penetration rates for abrasive nylon disc brushes are from .075"–.100". This will allow long brush life with aggressive abrasive action.

CORRECT
Point of Contact

INCORRECT
Point of Contact

Abrasive Nylon Wheel Brushes

WHEEL DIAMETER	DRY APPLICATION STARTING RPM	RECOMMENDED MOTOR SIZE (BASED ON A 1" BRUSH FACE)
4"	2,000 - 3,000	1/4 HP
5"	2,000 - 3,000	1/4 HP
6"	1,500 - 2,000	1/2 HP
8"	1,200 - 1,500	3/4 HP
10"	1,000 - 1,200	1 HP
12"	800 - 1,000	1 HP
14"	800 - 900	1 HP

Abrasive nylon wheel brushes work best at speeds allowing fairly deep penetration of the work piece into the brush filaments. Faster speeds do not typically work as well as slower speeds, since the maximum RPM listed on the brush is not the optimum working speed. A good rule of thumb is to stay below 2,500 SFPM in dry applications and 3,500 SFPM with coolant. When operating multiple wheel brushes on a common shaft, multiply the HP requirements listed above times the number of brushes in use.

SURFACE SPEED (PERIPHERAL SPEED IN FEET PER MINUTE)						
RPM	4" DIA	6" DIA	8" DIA	10" DIA	12" DIA	14" DIA
900	950	1400	1900	2350	2800	3350
1150	1200	1800	2400	3000	3600	4200
1200	1250	1900	2500	3200	3800	4400
1500	1550	2350	3150	3900	4700	5500
1750	1800	2750	3650	4550	5500	6400
2000	2100	3100	4200	5200	6300	7300
2400	2500	3800	5000	6100	7500	8800
2800	2900	4400	5850	7300	8800	10200
3000	3100	4700	6300	7800	9400	11000
3200	3350	5000	6700	8400	10200	11700
3450	3600	5400	7200	9000	11000	12600
3750	3900	5900	7800	9800	11800	13700
4000	4200	6300	8400	10500	12500	N/A
4500	4700	7200	9400	11900	14100	N/A
5000	5200	7800	10500	13100	π Dia (inches) X RPM /12	
5400	5600	8500	11300	N/A	π Dia (inches) X RPM /12	
6000	6300	9400	12500	N/A	π Dia (inches) X RPM /12	

Wheel Brush Terminology

PENETRATION (POINT OF CONTACT)

The abrasive action occurs when the sides of the brush filament slides across the part surface or edge of the part. When the correct balance between speed (RPM), penetration, dwell time and abrasive grit size are achieved, then optimum life and cut can be obtained.

Recommended penetration rates for abrasive nylon disc brushes are from .075"–.100". This will allow long brush life with aggressive abrasive action.

CORRECT
Point of Contact

INCORRECT
Point of Contact

Considerations When Selecting Filament for a Tanis Abrasive Nylon Brush

GRIT SIZE

120 grit is our recommended starting point for most applications. From there you can move either down or up in grit size, for a more aggressive cutting action or more of a polishing action. The chart on page 17 shows our abrasive nylon filament/grit size options.

TRIM LENGTH AND BRUSH DENSITY

A brush with a short trim length is rigid and used for high speed cutting. Longer trim lengths are more flexible and used for conforming to irregular surfaces. Likewise, a brush with a lower fill density has greater flexibility and ability to conform, as well as increased resiliency. High fill density brushes are used for deburring and when high speed cutting is required.

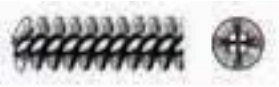
Long Trim, Low Density

Short Trim, High Density

Twisted Brush Stem Construction

Single Stem/Single Spiral (SS/SS)
Filament is twisted between two stem wires with a single layer of filament.

Double Stem/Single Spiral (DS/SS)
Filament is twisted between four stem wires, with two stem wires on each side for additional strength and higher density fill.



Double Stem/Double Spiral (DS/DS)
Filament is twisted between four stem wires with two layers of bristles. Each layer is perpendicular to the other with a single stem wire in each quadrant. The highest brush density and highest strength twisted wire brush available.

Brush Tip Styles

Continuous End

Cut off End

Operating Recommendations

When mounting a twisted brush in a collet or chuck, it is recommended to minimize the overhang of the stem to under an inch. This is particularly true with power tube brushes, and it is important to avoid any load conditions and operating speeds that can cause stem deflections and destructive bending. A safe operating speed from 100-500 RPM is recommended for most twisted brushes.

To reach into deeper holes we recommend the use of collet-ready shank mounted brushes or drill extension rods rather than increasing stem overhang.

Before Starting the Twist Brush Rotation

- Secure the brush in the chuck.
- Ensure clockwise brush rotation—counter clockwise rotation can cause the brush to come apart and release the filament.
- Securely clamp the workpiece. Make sure all machine guards are in position.
- Align the brush with the workpiece to ensure the brush rotates on its true center line and avoid stem deflection.
- Guide the brush into the hole before starting the brush rotation.
- Always wear eye protection and protective clothing!

Other Considerations:

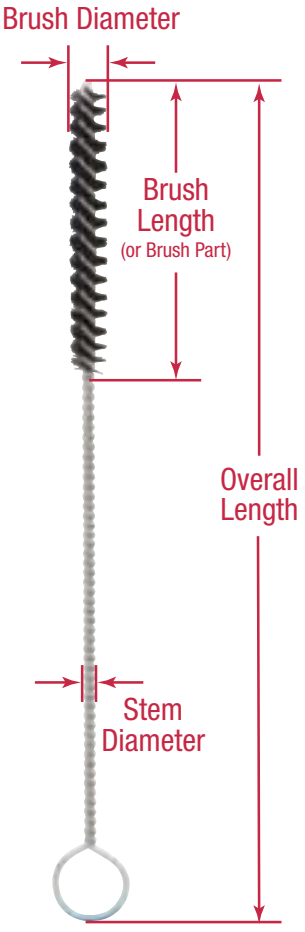
Wire Options
- Coated
- Galvanized
- Stainless Steel

Filament Options
- Abrasive Nylon
- CeramiX®
- Brass
- Carbon Steel
- Horse Hair
- Nylon
- Stainless Steel
- Crimped, Level or Color Options

Gauge
- Stem Diameter

Other
- Shank Type
- Tubing
- Coupling
- Loop
- No Loop

Twist Brush Terminology



Troubleshooting – Abrasive Nylon Brushes

Brush too aggressive
- Reduce filament diameter and/or grit size
- Reduce surface speed by reducing RPM
- Increase trim length and decrease fill density
- Increase feed rate
- Use a smaller diameter brush

Brush not aggressive enough
- Increase filament density and/or grit size
- Increase surface speed by increasing RPM
- Decrease trim length
- Reduce feed rate
- Use a larger diameter brush

Brush not conforming enough to part
- Increase trim length
- Reduce filament density
- Use a smaller diameter brush
- Reduce surface speed by reducing RPM
- Reduce feed rate

Final finish too rough
- Increase surface speed by increasing RPM
- Use a larger diameter brush
- Use a finer abrasive filament
- Use a coolant or cutting oil
- Use a buffing compound

Final finish too smooth
- Reduce surface speed by reducing RPM
- Use a smaller diameter brush
- Increase filament density and/or grit size

Filament smearing/melting
- Reduce surface speed by reducing RPM
- Decrease brush diameter
- Use a coolant or lubricant

More action needed on edges parallel to brush axis
- Reduce surface speed by reducing RPM
- Reduce feed rate
- Keep longer brush contact on problem area

More action needed on edges perpendicular to brush axis
- Reduce surface speed by reducing RPM
- Increase feed rate
- Oscillate brush on problem area

Brush action not uniform enough
- Increase trim length
- Reduce filament density
- Use automated equipment for brush motion

Short brush life
- Increase filament density
- Reduce pressure/depth of interference

SUGGESTIONS FOR

MAXIMIZING BRUSH PERFORMANCE

FEATURE	INCREASE	DECREASE
Diameter	Increasing outside diameter at a constant RPM increases surface speed: SFPM (Surface Feet Per Minute). Increasing surface speed increases work results.	Assuming constant RPM, a decrease in tool diameter decreases surface speed.
RPM	Increasing RPM at a constant outside diameter increases surface speed.	Assuming same diameter brush, decreasing RPM decreases surface speed.
Trim Length	Allows the filament to be more flexible, and to conform more readily to irregular surfaces.	Stiffens filament action, thereby increasing work accomplished.
Filament Size	Provides faster cutting action and thereby increases work accomplished. ***NOTE:*** *Coarser filament/grit sizes work faster than finer filament/grit sizes, with faster wear.*	Provides superior surface finish and maximize tool life. ***NOTE:*** *For best results, choose minimum diameter and increase as needed.*
Grit Size	Provides faster cutting action and thereby increases work accomplished. ***NOTE:*** *Coarser filament/grit sizes work faster than finer filament/grit sizes, with faster wear.*	Provides superior surface finish and maximize tool life. For best results, choose minimum grit size and increase as needed.
Filament Density	Provides more filament to do work, thereby increasing work accomplished.	Provides greater brush flexibility; leaving more room for individual filaments to conform to irregular workpiece shapes.