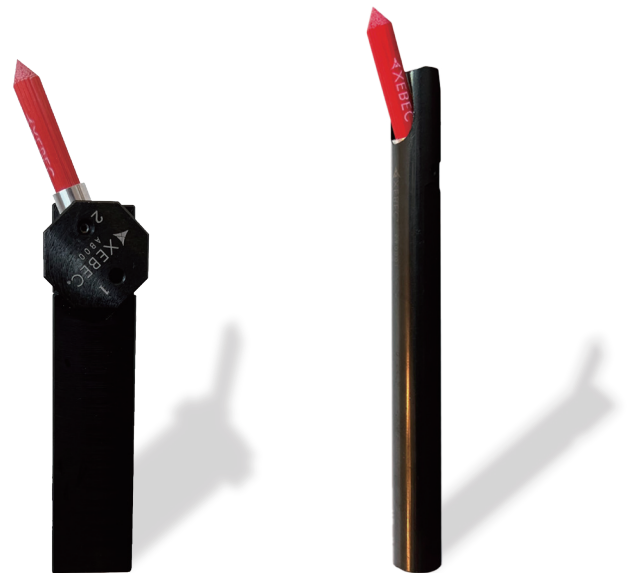# XEBEC
Brush™ Turning

Ceramic fiber brushes
for CNC lathes

Automate deburring and polishing in your CNC lathe

"What if we could make a ceramic fiber brush for CNC lathes. It would represent a major advance in deburring techology."
And so, the idea of a ceramic fiber brush for turning was born. However, it was not realized overnight. Applying our unique brush material to a stationary tool presented many hurdles. Driven by a desire to challenge technological norms and some forward-thinking users who believed in its potential, we have succeeded in developing a solution for automated deburring and polishing in CNC lathes immediately after turning processes. This truly is one of a kind.

Round and square shank types for ID and OD deburring in the same chucking.

Automated deburring on CNC lathes

XEBEC Brush™ Turning is the first practical application of ceramic fiber brushes for deburring on CNC lathes. It is mounted on the turret and used along side other static tools. Removing burrs on the same machine as facing and turning operations realizes important time and cost savings. It also eliminates the variable quality and danger inherent to manual deburring, particularly when the operator has to reach into the machine to deburr by hand.

XEBEC Brush Turning has been tested and proven in a variety of production environments, ranging from job shops to mass production plants. It is ideal for removing micro burrs under 0.01 mm and fine burrs no thicker than 0.1 mm. Brushes are available in three grit equivalents (red, white and blue), two sizes (ϕ2.5 mm and ϕ6 mm), and two shapes (tapered and flat). Typical applications are crosshole deburring (ID and OD), thread deburring, and groove polishing.

Deburring of multiple crossholes

The round shank version (A11-TB025 + TM-SH-06) is 11 mm high, enabling 12 mm bores and ID threads to be deburred. The flexible fibers of the brush deburr multiple crossholes as they are pulled out of a bore. The small brush (ϕ2.5 mm) can negotiate crossholes up to 3 mm in diameter. The large brush (ϕ6 mm) can be used to deburr any size crosshole. Running the spindle clockwise and then counter clockwise results in even deburring of crossholes.

Adjustable brush angle

The brush angle of the square shank type is adjustable to optimize the deburring action, whereas the brush angle of round shank type is fixed at a shallow angle. The advantage of shallow angles (closer to horizontal) is that they allow the flexible fibers to deburr discontinuous surfaces such as crossholes. The square shank type also enables steep brush angles (near perpendicular). This concentrates the grinding power of the ceramic fibers in the tip of the brush, making it ideal for thread deburring.

Specification

Applicable equipment

This tool can be mounted on:

Lathe
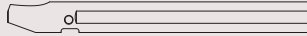(with live tools)

Lathe
(without live tools)

Tool composition

Brush and shank are sold separately. Assemble before use.

Brush unit   Round shank   Square shank

Brushes

Brush (color)	Product code	Brush diameter (mm)	Brush length ℓ (mm)	Matching holder	Fig.
A11 (red)	A11-TB025	φ2.5	15	TM-SH-06	1a
	A11-TB06	φ6	30	TM-SH-S2020 / TM-SH-S2525 / TM-SH-12	1a
	A11-CB06M	φ6	30	TM-SH-S2020 / TM-SH-S2525	1b
A21 (white)	A21-TB06	φ6	30	TM-SH-S2020 / TM-SH-S2525 / TM-SH-12	1a
	A21-CB06M	φ6	30	TM-SH-S2020 / TM-SH-S2525	1b
A32 (blue)	A32-TB06	φ6	30	TM-SH-S2020 / TM-SH-S2525 / TM-SH-12	1a
	A32-CB06M	φ6	30	TM-SH-S2020 / TM-SH-S2525	1b
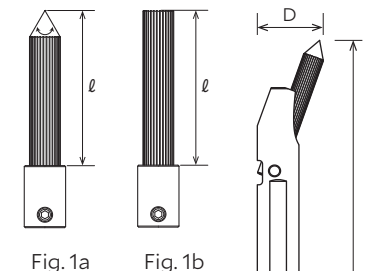
■ Holders must be at least 30 mm inside tool blocks and securely fastened.

Fig. 1a   Fig. 1b   Fig. 2

Round shanks

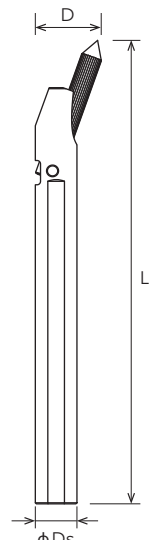| Product code	Length L (mm)	Shank dia. Ds (mm)	Bore size D (mm)	Cutting dia. (mm)	Max. side hole (mm)	Matching brush	Fig.
TM-SH-06	107	φ6	≥11	≥φ12	<φ3	A11-TB025	2
TM-SH-12	133	φ12	≥20	≥φ21	No limit	A11-TB06 / A21-TB06 / A32-TB06	2

Square shanks

Product code	Length L (mm)	Shank height Hs (mm)	Height H (mm)	Shank width Ws (mm)	Width W (mm)	Shank length Ls (mm)	Matching brush	Fig.
TM-SH-S2020	124	20	26	20	24	90	A11-TB06 / A21-TB06 / A32-TB06 / A11-CB06M / A21-CB06M / A32-CB06M	3
TM-SH-S2525	134	25	31	25	24	100	A11-TB06 / A21-TB06 / A32-TB06 / A11-CB06M / A21-CB06M / A32-CB06M	3

Fig. 3a   Fig. 3b

Tool selection

Brush selection

Burr size	Micro fine burrs		
		Burr thickness (≤ 0.1 mm)	
Brush (color)	A11 (red)	A21 (white)	A32 (blue)
Grinding power	→ High		

■ Micro fine burrs have a burr height ≤ 0.01 mm.

Holder selection

Process		Holder	Brush angle
Crosshole deburring		XEBEC Brush Turning Round Shank	Fixed
Thread deburring	ID threads	XEBEC Brush Turning Round Shank	Fixed
	OD threads	XEBEC Brush Turning Square Shank	Set by user

■ Refer to "How to Use: External thread deburring mechanism" for brush angle recommendations.

Applicable burr size

Maximum burr thickness is 0.1 mm. Burrs this size can be easily bent by fingernail.

Burr thickness
Burr height

How to use

Pull the brush, do not push

This is a specialist pull turning and facing tool. Pulling the brush reduces bristle deflection and negotiates discontinuous geometries such as crossholes. The bristles will break if the brush is pushed. The tool must be pulled in the x-axis away from the main spindle when facing and pulled in the z-axis away from the main spindle when ID or OD deburring.


Square shank type
(OD deburring and facing)

Round shank type
(ID deburring)
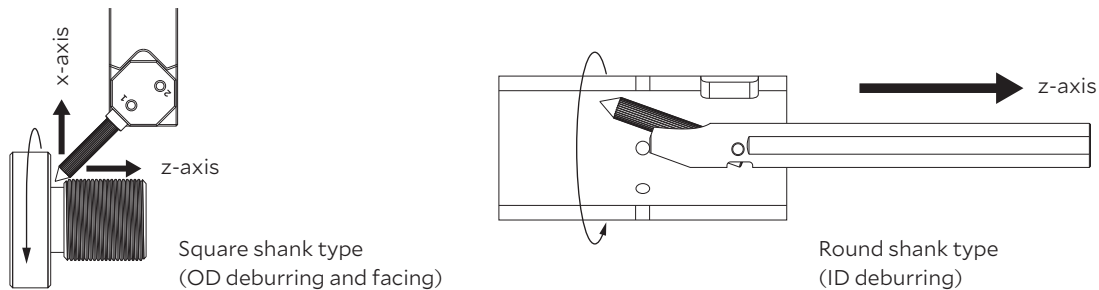
Depth of cut (Round shank)

The brush angle of XEBEC Brush Turning Round Shank is fixed at 20 degrees. Maximum depth of cut is 2.0 mm. Usable bristle length varies with the brush diameter.

Brush diameter (mm)	Brush angle	Max. usable bristle length
φ2.5 (TB025)	20 deg. (Fixed)	3.0 mm
φ6 (TB06)		5.5 mm

Brush angle (Square shank)

The square shank has eleven different angles to match the deburring edge. Arrows indicate permissible cutting direction.

Angle (degrees)	112.5	90	67.5	45	22.5	0	-22.5	-45	-67.5	-90	-112.5
Z-axis ← Spindle Tailstock →											
Cutting direction											

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Depth of cut (Square shank)

The usable bristle length and maximum depth of cut of the square shank vary with the brush angle.
Depth of cut is no more than 2.0 mm. Refer to the following tables for details.

Brush angle	Max. usable bristle length ℓ	
	Facing	OD turning
90 / 0 deg.	15 mm	15 mm
22.5 deg.	5 mm	15 mm
45 deg.	15 mm	15 mm
67.5 deg.	15 mm	5 mm
112.5 deg.	15 mm	5 mm

Brush angle	Max. depth of cut	
	Facing	OD turning
90 / 0 deg.	0.5 mm	0.5 mm
22.5 deg.	2.0 mm	1.0 mm
45 deg.	1.5 mm	1.5 mm
67.5 deg.	1.0 mm	2.0 mm
112.5 deg.	1.0 mm	2.0 mm

■ Refer to "How to Use: External thread deburring mechanism" for brush angle recommendations.

Crosshole deburring mechanism (Round shank)

A shallow brush angle and large depth of cut are required to remove burrs on crossholes.
The pressure exerted on the brush pushes it into a crosshole, with its tapered tip scraping off burrs as the brush is pulled back and out of the hole. If cycle time permits, the workpiece should be rotated both clockwise (CW) and counter-clockwise (CCW) for uniform edge quality.

The maximum crosshole size for the small brush (A11-TB025) is φ3 mm. The bristles of the small brush are stiffer than the larger brush because they are only half the length. This limits the size of crosshole which can be deburred. The large brush (A11-TB06) has no crosshole size restriction.

Rotate the workpiece in both directions if cycle time permits.

External thread deburring mechanism (Square shank)

A steep brush angle is required to remove burrs on an external thread. The recommended brush angle for deburring the crests is 22.5 degrees. This concentrates most of the grinding power in the tip of the brush, while preventing bristles from being deflected on either side of a crest. Spreading and deflection of the brush results in a loss of grinding power and should be avoided.

Shank type	Target edges	Brush type	Brush angle
Square shank	Full thread (incl. start and end)	TB06 (Turning)	22.5 deg.
	Thread (incl. start)		
	Thread (start only)	CB06 (Chamfer)	45 deg.

The workpiece should be rotated clockwise (CW) for a right-hand thread and counter-clockwise (CCW) for a left-hand thread. If the correct rotational direction and brush angle (22.5 deg.) are used, the brush can be pulled easily along the thread. However, the angled brush will catch on the thread and break if the incorrect rotational direction is used.

Rotate the workpiece CW for a right-hand thread. Rotate CCW for a left-hand thread.

Machining parameters

| Parameter	Range (same for all sizes)	Starting parameters (same for all sizes)
Cutting speed (m/min)	60 - 250	150
Feed (mm/rev)	0.1 - 0.5	0.3
Depth of cut (mm)	0.5 - 2.0	1.0 (continuous cutting surface)
		0.5 (discontinuous cutting surface)

■ Use on large burrs will greatly increase brush wear and shorten tool life.
■ Starting parameters vary depending on the brush angle of the square shank. Refer to the manual for details.

Continuous surface   Continuous surface   Discontinuous surface
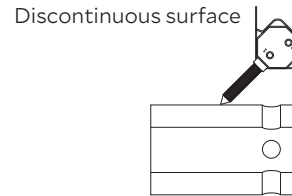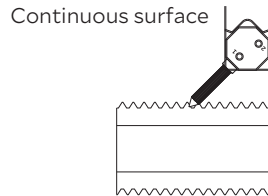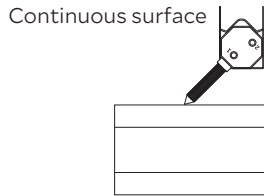
Application examples

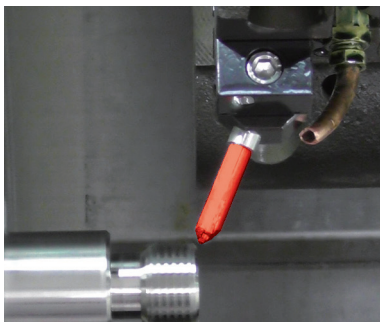### Crosshole deburring
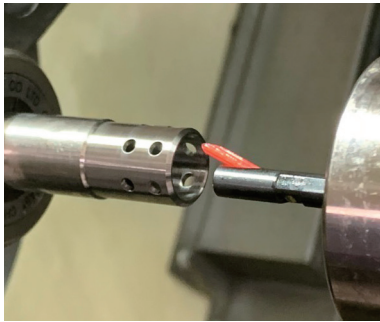
Workpiece material: Carbon steel
Main bore diameter: Outer 16 mm, Inner 12 mm
Crosshole diameter: 3 mm

Brush (color)	Holder	Angle (deg.)	Depth of cut (mm)	Cutting speed (m/min)	Feed rate (mm/rev)	Rotational direction
A11-TB025 (red)	TM-SH-06	20 (Fixed)	1.5	150	0.1	CW + CCW

Thread deburring

Workpiece material: Stainless steel
Thread size: 24 x 2 mm

Brush (color)	Holder	Angle (deg.)	Depth of cut (mm)	Cutting speed (m/min)	Feed rate (mm/rev)	Rotational direction
A32-TB06 (blue)	TM-SH-S2020	22.5	0.5	150	0.1	CW

Groove polishing
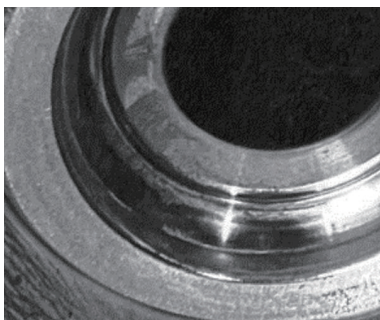
Workpiece material: YXR3 (HRC 60)

Brush (color)	Holder	Angle (deg.)	Depth of cut (mm)	Spindle speed (min⁻¹)
A32-CB06M (blue)	TM-SH-2020	90	1.0	720

Safety Measures

Dust and cutting chips generated when using this product can cause blindness and injury.

Dust and particles generated by this product can cause lung damage, skin irritation, and allergies.

Wear protective gear such as goggles, a face mask, gloves, and earmuffs when using this product. Additionally, ensure your skin is covered with clothing.

Use a dust collector or other means to collect chips, dust, and other substances to prevent them from scattering into the surrounding environment.

Install an enclosure to prevent persons other than the operator from entering the work area and ensure that all persons in the work area wear protective gear.

Be aware of fire risk caused by heating, sparks or other factors when using this product. Do not use the product in the proximity of flammable liquids or in explosion-proof areas.

Operating Precautions

The product may break, fracture or be dislodged from the machine tool, causing operator injury or loss of sight. Observe the following steps to prevent damage to the machine tool, jig, fixture or workpiece:

- Dust and chips generated by using the product can affect the sliding parts of the machine tool. Remove dust and chips by using a sludge collection system, an oil skimmer or other means.
- Use a tool holder that fits the shank of this product.
- Use the product on a machine tool that controls rotational speed.

Discontinue use immediately in the event of abnormal vibration or other abnormal conditions.

The tip of the tool may become overheated when used for a prolonged period of time. This may cause ceramic fiber bristles to break loose and possible operator injury or loss of sight. Adjust the machining time to prevent the workpiece from overheating. Do not touch the machined area of the workpiece with bare hands.

Ensure the product is used within the standard machining parameters.

When setting the depth of cut, make sure that there is no interference between this product and the workpiece.

Pre-use Inspection

Perform a test run after setting up the tool on the machine, making sure it is secured firmly and there is no vibration or other abnormalities.

Make sure that the brush is free of any visible damage or abnormality prior to use.

Your XEBEC Representative

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