



XEBEC TECHNOLOGY CO.,LTD.

ADD. 1-7-25, Koujimachi, Chiyoda-ku, Tokyo, 102-0083, Japan  
TEL. +81-(0)3-3239-3481 FAX. +81-(0)3-5211-8964  
URL <http://www.xebec-tech.com>  
E-mail [info@xebec-tech.com](mailto:info@xebec-tech.com)

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Your Order

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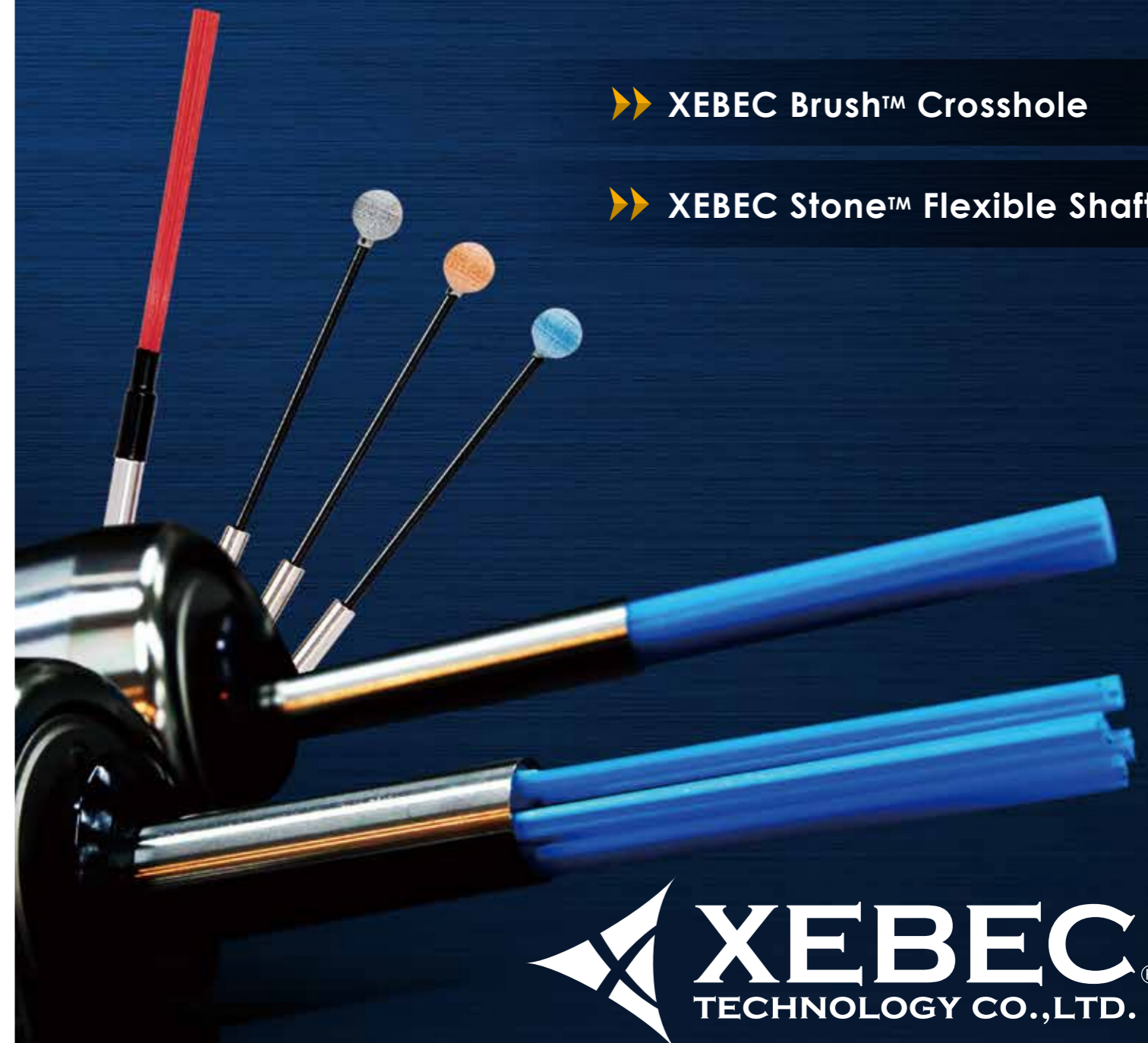
# XEBEC

## Crosshole Deburring Tools Product Catalog

CNC deburring solutions with XEBEC innovative ceramic fiber tools

➤ XEBEC Brush™ Crosshole

➤ XEBEC Stone™ Flexible Shaft



# XEBEC tools are made from a material like none other! Unmatched grinding power and cutting performance!

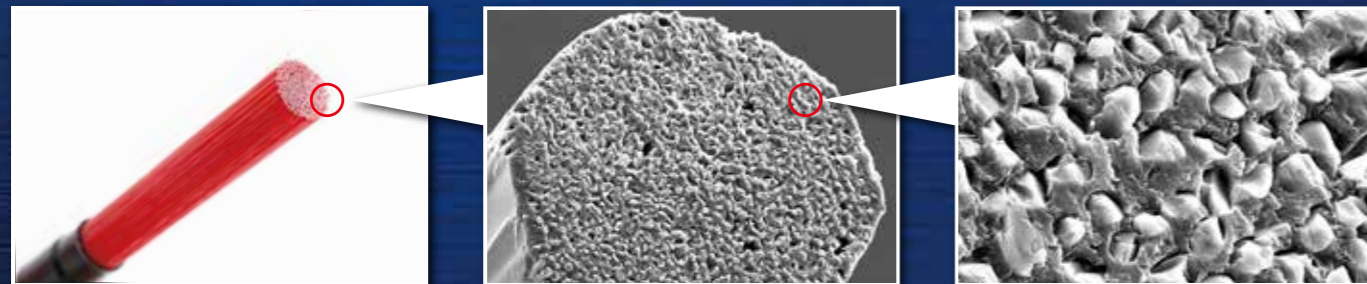
Achieve outstanding performance with Xebec deburring tools manufactured with our revolutionary technology using ceramic fibers



## The Bristle Structure

### One bristle has 1,000 cutting edges.

Each bristle is made by fixing 500 - 1,000 ceramic fibers, each together with a binder. The tips of each of these fibers, a few dozen microns in diameter, form the cutting edges. Continuous cutting edges provide stable and consistent grinding performance.



## 3 Features of XEBEC Brush™

**1 Overwhelming grinding power**  
The high grinding power exhibited by thousands of cutting surfaces reliably removes burrs.

**2 Consistent cutting performance**  
The self-sharpening fiber structure works to the very end without losing grinding power.

**3 No deformation**  
The brushes, made of a high-density fiber structure, have high rigidity and do not become distorted with repeated use.



**Only 1★** Unparalleled deburring tools that use bristles made of our uniquely developed ceramic fibers. **Patented**

XEBEC Tools are a completely new deburring tool using ceramic fibers. We have created unprecedented automated deburring and polishing with our revolutionary materials and technology. We are employed in leading factories in Japan and worldwide, contributing to manufacturing all over the world.

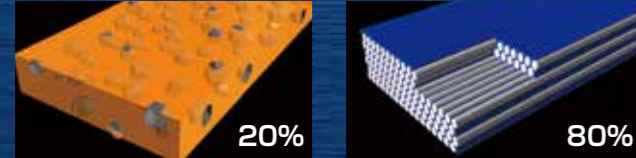
(ISO9001 Conformity) XEBEC products are manufactured in a plant that meets ISO9001 international quality control and assurance standards.

## Strength 1 Overpowering grinding force

Free of abrasive grains. The fiber content ratio is approximately 80%.

Our uniquely developed ceramic fibers themselves are the abrasives; their fiber content ratio is over 80%. The thousands of cutting edges that are made up of the ends of each individual fiber create overpowering grinding power.

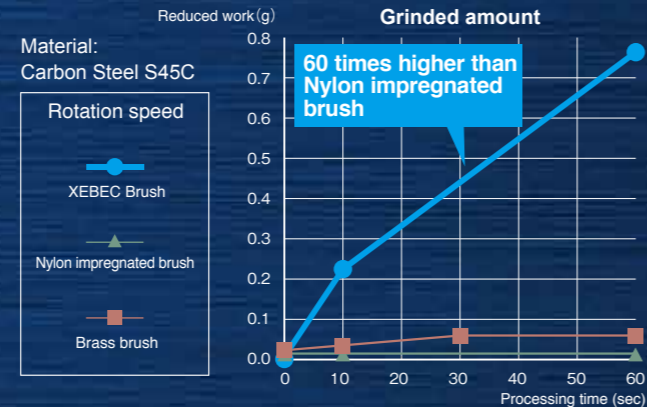
### Abrasive content



Handles all sorts of materials up to HRC 65

The brushes can process general materials up to HRC 65. They can handle hard-to-cut and superhard materials from general metals, aluminum, and resin, to SUS, Inconel, and titanium.

Comparison of grinding capacity with other companies' products



- XEBEC Brush™ Surface/ Grinding approx. 0.22g in 10 sec
- Nylon brush/ Not grinding
- Brass brush/ Not grinding

High grinding power reliably remove burrs  
Grinding power can be adjusted by changing cutting parameters.

## Strength 2 Consistent cutting edges

Even after repeated use, the brushes do not become distorted.

Comparison of brush filament shapes (after use)

- 1 Brass wire
- 2 Steel wire
- 3 Abrasive impregnated nylon brush filament
- 4 XEBEC ceramic fiber bristle (A11: Red)

They maintain their straight shape, and do not spread out like a toothbrush.

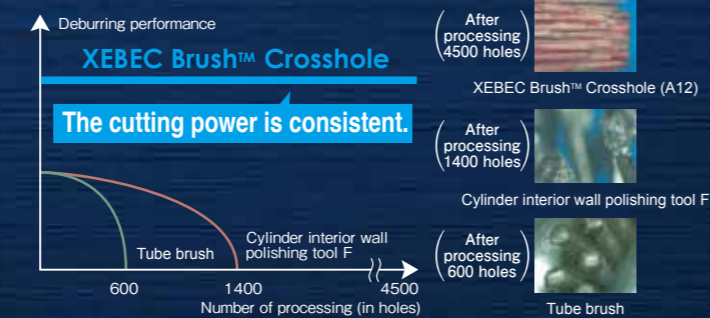


Self-sharpening unique to ceramic fiber

Through the self-sharpening of cutting edges on the fiber ends, the brushes do not become clogged, and new, fresh cutting edges are always exposed.

The stability of performance makes true automation possible.

Particularly since this "controllable brush" constantly maintains its stable cutting power, it is possible to automate the deburring and polishing process.

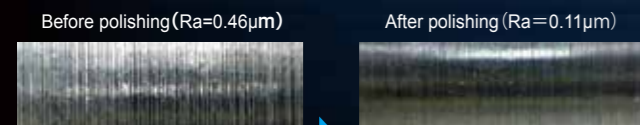


The cutting power is consistent.

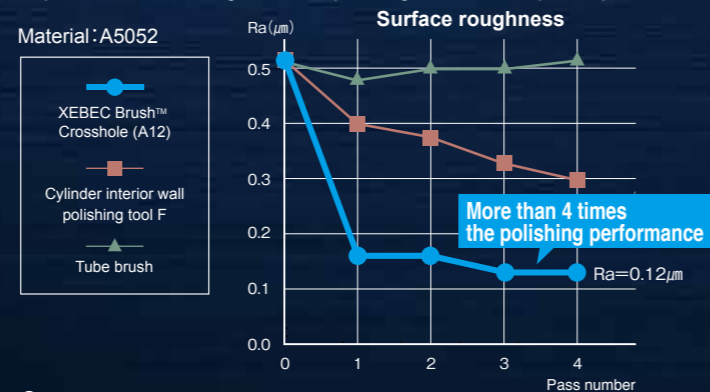
## Strength 3 Amazing polishing capacity

Best achievable surface roughness: Ra = 0.1 μm

The superfine fibers, measured in micrometers, can improve surface roughness in a short time.



Comparison of surface roughness after polishing with other companies' products



- XEBEC Brush™ Crosshole/ Improves 0.4 μm per pass
- Cylinder interior wall polishing tool F/ Improves 0.4 μm per pass
- Tube brush(#600)/No improvement

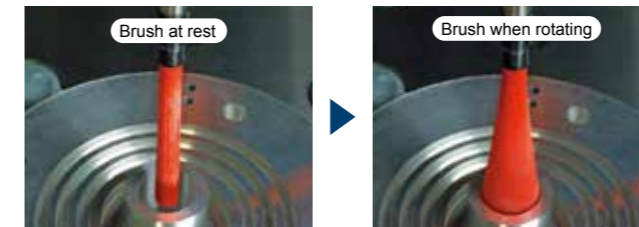
● Material/Stainless steel SUS304 ● XEBEC tool used / CH-A33-7M/S12000/F300

## XEBEC Brush™ Crosshole

### Action Principle and Performance

#### Operating Principle

Using the centrifugal force generated by rotation, the high grinding force of the brush tip reliably deburrs the inner walls of cylinders.



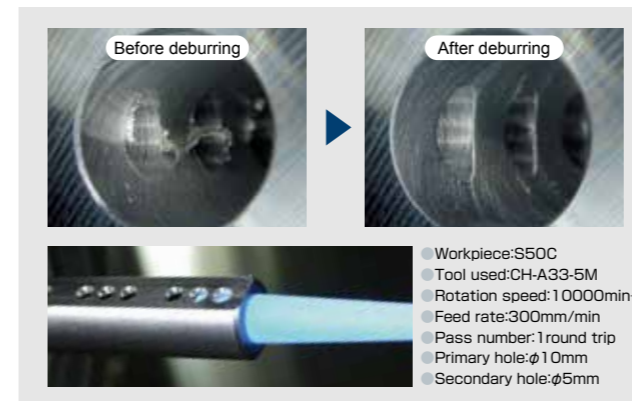
Possible to deburr multiple holes in one simple step since the brush is inserted into the primary processing hole.

Possible to deburr cylinders of differing diameters with a single brush since the bristles spread out to fit to the cylinder.

Possible to deburr holes deep within holes as well since the grinding force is on the tip.

#### Performance

Cross-hole deburring of burrs generated by φ5mm drilling process



- Workpiece: S50C
- Tool used: CH-A33-5M
- Rotation speed: 10000min<sup>-1</sup>
- Feed rate: 300mm/min
- Pass number: 1 round trip
- Primary hole: φ10mm
- Secondary hole: φ5mm

### Successful applications

#### Cylinder head

Category	Automotive engine part	
Workpiece	Cylinder head	
Material	Aluminum casting	
Process details	Machining center/ Cross-hole deburring of internal diameter	

● Tool used: CH-A 12-5L ● Rotation speed: 8000min<sup>-1</sup> ● Feed rate: 300mm./min

#### Drive shaft

Category	Automotive axle part	
Workpiece	Drive shaft	
Material	SCM435	
Process details	Custom machine/ Cross-hole deburring of internal diameter	

● Tool used: CH-A12-7F ● Rotation speed: 10000min<sup>-1</sup> ● Feed rate: 400mm./min

#### Screw

Category	Automotive part	
Workpiece	Screw	
Material	Stainless steel SUS304	
Process details	Machining center/ Cross-hole deburring of internal diameter	

● Tool used: CH-A33-5M ● Rotation speed: 10000min<sup>-1</sup> ● Feed rate: 300mm./min

#### Input shaft

Category	Automotive transmission part	
Workpiece	Input shaft	
Material	SCM	
Process details	Custom machine/ Cross-hole deburring of internal diameter	

● Tool used: CH-A12-7M ● Rotation speed: 10000min<sup>-1</sup> ● Feed rate: 800mm./min

# Automation with XEBEC Brush™

XEBEC Brush™ are tools that allow for the automation of deburring and polishing with machining centers, robots, and specialized machines.

## Intended Machine Tool

XEBEC Brush™ can be attached to machinery with a standard collet chuck, milling chuck, drill chuck, etc. Attach to an NC machine that meets the requirements below and use under the following recommended processing conditions.

- Machining center capable of 8000 min<sup>-1</sup> or higher (10000 min<sup>-1</sup> or higher for the CH-A12-1.5M)
- Electric rotating tool with adjustable speed

\* Cannot be used on lathes without rotating tools or air rotary tools whose speed cannot be adjusted.



## How to Use / Intended Processing

The grinding force is only on the brush tip. Using the centrifugal force generated by rotation, the brush tip deburrs and creates a finished edge.

**Before insertion**

\* If you rotate the brush outside the cylinder, the bristles may be damaged or scattered and may cause injury to the operator.

**Step 1**

Insert the brush while not in motion.

**Step 2**

Rotate the brush past the cross-hole.

Process while pulling the brush back.

\* By processing the brush while pulling it back past the cross-holes, burrs are prevented from being laid flat against the interior surface of the cylinder.

**Step 3**

Process while pushing the brush forward.

\* Pushing the brush forward ensures that burrs that are remaining upward are removed.

**Step 4**

Stop the brush rotation.

Remove the brush while it is at rest.

\* For most effective deburring rotate the brush in the cylinder both clockwise and counterclockwise.

Please carry out the process using a dummy workpiece (as in the above figure) when deburring and polishing the area near the cylinder's borehole. Not using a dummy workpiece may result in the brush coming out of the cylinder and the bristles breaking and scattering.

## Usage Notes

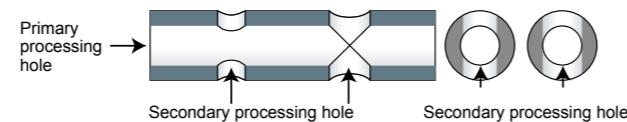
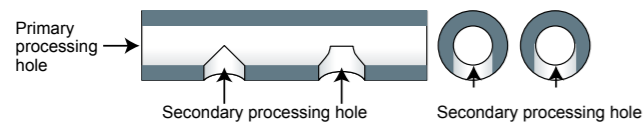
- Use at 7,000 to 12,000 min<sup>-1</sup>
- Process exceeded maximum rotation speed or processing outside cylinder (outside workpiece) may result tool damage.
- Using the brush in the following are not acceptable applications for the XEBEC Brush™ Crosshole.

### In a T-shaped hole

If the diameter of the secondary processing hole is more than 100% of the diameter of the primary processing hole (For example, if the primary hole is φ10 mm and the secondary hole is φ10 mm or larger.)

### In a cross-shaped hole

If the diameter of the secondary processing hole is more than 70% of the diameter of the primary processing hole (For example, if the primary hole is φ10 mm and the secondary hole is φ7 mm or larger.)



### Effective applications for Xebec Brush™

#### Burrs that can be processed

Fine burrs whose root is less than 0.1 - 0.2 mm in thickness (about the size that can be bent with a fingernail)

#### Target burr area

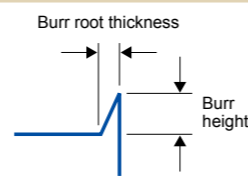
Cross-holes of φ 3.5 mm - φ 20 mm

#### Target workpiece materials

General metals, stainless steel, aluminum, Inconel, cast iron, resin, etc. of HRC 65 or less

#### Effective area for grinding

Grinding area of the brush- only the tip of the bristles



# How to Set the Process Parameter

## How to select a XEBEC Brush™ Crosshole

### [Brush color]

**A12 (Red) Brush** :Aluminum, general steel, etc. (softer materials)

**A33 (Blue) Brush** :Hard-to-cut materials, cast iron, general steel, etc. (harder materials)

### [Brush diameter]

Processing diameter	Brush diameter	Processing diameter	Brush diameter
φ3.5~5	φ1.5mm brush	φ10~14	φ 7mm brush
φ5~8	φ 3mm brush	φ14~20	φ11mm brush
φ8~10	φ 5mm brush		

Please refer to Product lineup table on page.7

## How to set the starting process parameters

**Rotation speed (S)** Refer to the graph below for recommended rotation speeds.

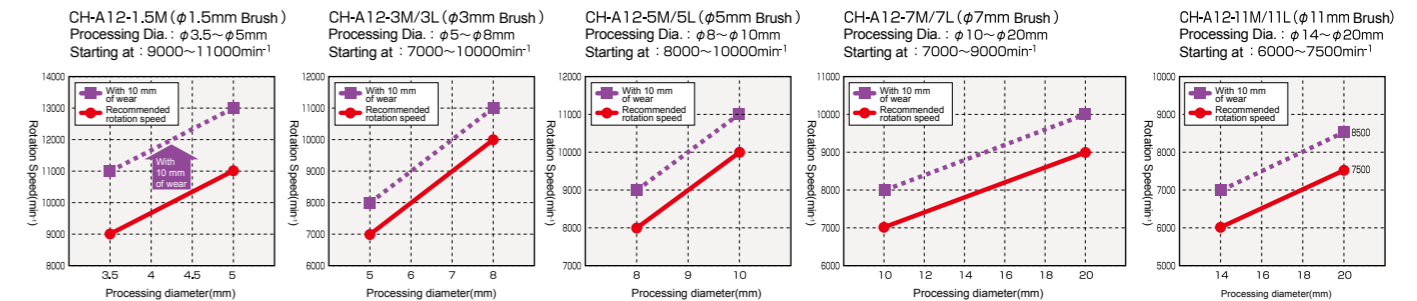
**Direction of rotation** Deburring effect is increased when processing both clockwise and counterclockwise, achieving a more uniform edge quality.

**Feed rate (F)** About 300 mm/min (Adjust the rotation speed and feed rate depending upon the state of the edge)

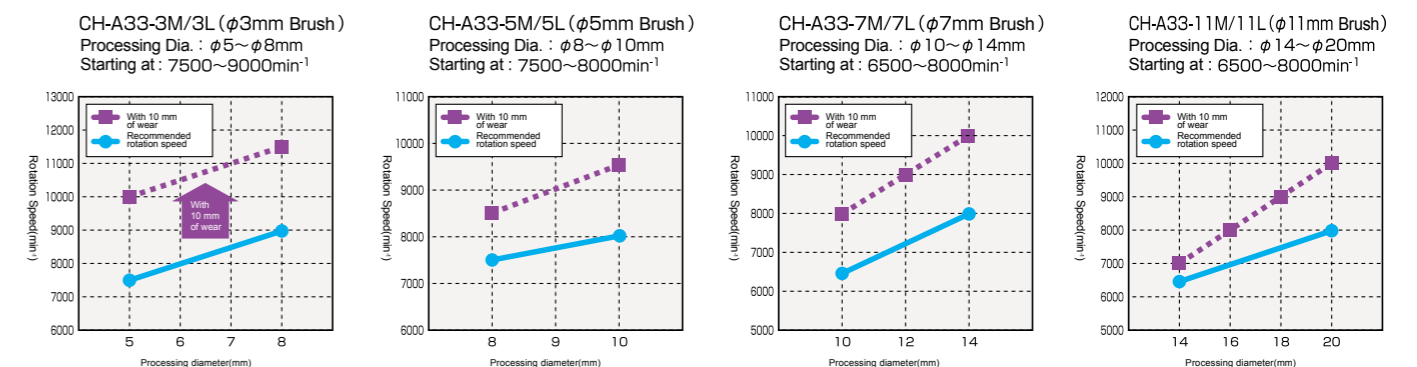
### [Recommended rotation speed based on processing diameter]

1. The graph below is divided by brush diameter, so please select a tool that can process the diameter that you want to process.
2. The solid line shows the recommended rotation speed and the dotted line shows the diameter that the brush bristles spread out with 10 mm of wear. You can continue to use the brush by adjusting (increasing) rotation speed as the tool wears down.

#### A12(Red) Brush



#### A33 (Blue) Brush



## Process Adjustments

- If the burrs are not completely removed.
  - Increase rotation speed in increments of 1,000 min<sup>-1</sup>. (Please note the maximum rotation speed.)
  - Increase number of passes.
- If the edge is too rounded after removing the burrs.
  - Decrease the rotation speed in increments of 500 min<sup>-1</sup>. (Please note the brush spread diameter.)
  - Increase the feed rate in increments of 100 mm/min.

The relationship between grinding power and processing parameters

	Rotation Speed	Feed Rate
To increase grinding power	Increase ↗	Decrease ↘
To reduce grinding power	Decrease ↘	Increase ↗

# Product Lineup

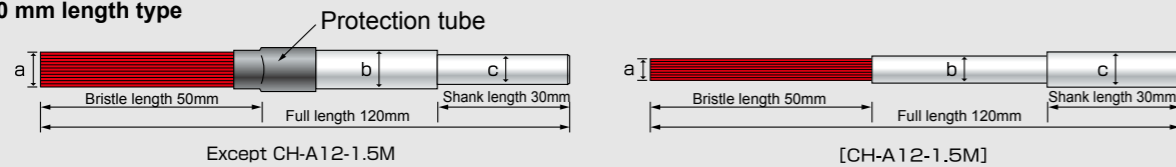
## XEBEC Brush™ Crosshole (standard) Lineup

### A12(Red) Brush

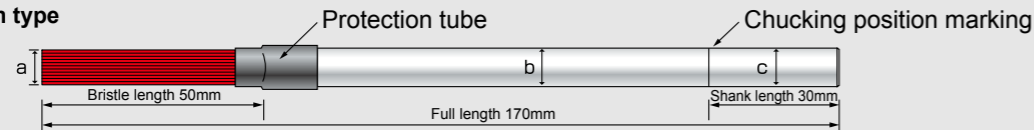
Product code	Target primary processing hole	Brush diameter a	Shaft diameter b	Shank diameter c	Full length L	Maximum rotation speed	Recommended rotation speed
CH-A12-1.5M	φ 3.5~5mm	φ 1.5mm	φ 2.5mm	φ 3mm	120mm	20000min <sup>-1</sup>	9000~11000min <sup>-1</sup>
CH-A12-3M	φ 5~8mm	φ 3mm	φ 4mm	φ 3mm	120mm	14000min <sup>-1</sup>	7000~10000min <sup>-1</sup>
CH-A12-3L			φ 4mm	φ 4mm	170mm	12000min <sup>-1</sup>	
CH-A12-5M	φ 8~10mm	φ 5mm	φ 6mm	φ 6mm	120mm	14000min <sup>-1</sup>	8000~10000min <sup>-1</sup>
CH-A12-5L			φ 6mm	φ 6mm	170mm	12000min <sup>-1</sup>	
CH-A12-7M	φ 10~20mm	φ 7mm	φ 8mm	φ 6mm	120mm	14000min <sup>-1</sup>	7000~9000min <sup>-1</sup>
CH-A12-7L			φ 8mm	φ 8mm	170mm	12000min <sup>-1</sup>	
New CH-A12-11M	φ 14~20mm	φ 11mm	φ 12mm	φ 12mm	120mm	14000min <sup>-1</sup>	6000~7500min <sup>-1</sup>
New CH-A12-11L			φ 12mm	φ 12mm	170mm	12000min <sup>-1</sup>	

### Tool schematic

#### 120 mm length type



#### 170 mm length type



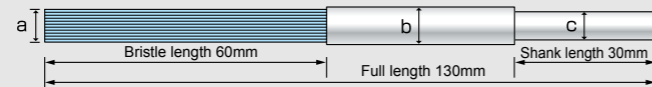
### A33(Blue) Brush

Product code	Target primary processing hole	Brush diameter a	Shaft diameter b	Shank diameter c	Full length L	Maximum rotation speed	Recommended rotation speed
CH-A33-3M	φ 5~8mm	φ 3mm	φ 4mm	φ 3mm	130mm	14000min <sup>-1</sup>	7500~9000min <sup>-1</sup>
CH-A33-3L			φ 4mm	φ 4mm	180mm	12000min <sup>-1</sup>	
CH-A33-5M	φ 8~10mm	φ 5mm	φ 6mm	φ 6mm	130mm	14000min <sup>-1</sup>	7500~8000min <sup>-1</sup>
CH-A33-5L			φ 6mm	φ 6mm	180mm	12000min <sup>-1</sup>	
CH-A33-7M	φ 10~14mm	φ 7mm	φ 8mm	φ 6mm	130mm	14000min <sup>-1</sup>	6500~8000min <sup>-1</sup>
CH-A33-7L			φ 8mm	φ 8mm	180mm	12000min <sup>-1</sup>	
CH-A33-11M	φ 14~20mm	φ 11mm	φ 12mm	φ 12mm	130mm	14000min <sup>-1</sup>	
CH-A33-11L			φ 12mm	φ 12mm	180mm	12000min <sup>-1</sup>	

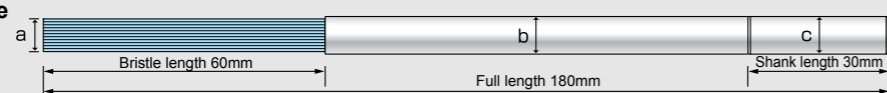
\* We offer special orders of φ1.5 mm brushes. Please contact us for details.

### Tool schematic

#### 130 mm length type



#### 180 mm length type



## New XEBEC Brush™ Crosshole Extra-Long Shank (Custom order only)

[Target primary processing hole] φ5~φ20mm

[Target depth] 140mm (and more) ~400mm \* Please contact us for cross-hole deburring of depth more than 400mm

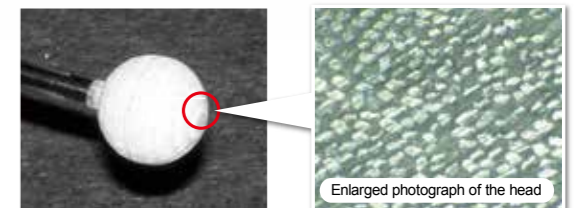
# XEBEC Stone™ Flexible Shaft

## Materials and Structure



### Material

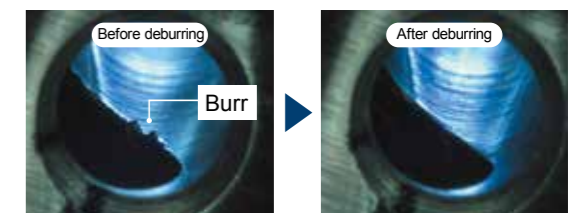
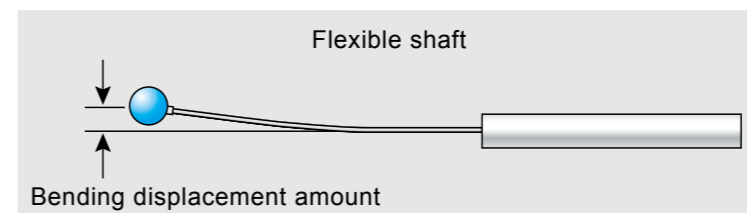
- The XEBEC Stone™ uses the same proprietary structure as XEBEC Meister Finish. It exposes a large number of cutting edges on the entire surface, resulting in exceptional grinding force.
- The self-sharpening cutting edges do not clog, resulting in consistent grinding performance.



With ceramic for the abrasive stone on the head, the whole surface is a cutting edge.

### Structure

- Flexible shaft allows soft contact to workpiece. (This makes it easy to set the cutting amount when using with CNC)



## Comparison of grinding capacity with other companies' products

### Comparison of finish on φ3.5mm drilled cross-hole deburring

Before deburring	After deburring		
Burrs generated on cross-hole	XEBEC Stone™ Flexible Shaft (#220 equivalent Head shape=Ball type)	Other company's diamond bur (#220 equivalent Head shape=Ball type)	Other company's diamond bur (#220 equivalent Head shape=Cylinder type)
	Remove burr only with point processing <b>Edge quality</b> ⊙ (Excellent)	The edge shape is broken and secondary burrs are generated. <b>Edge quality</b> × (Poor)	The finish other than the edges is affected. <b>Edge quality</b> △ (Fair)

\* Material/Carbon steel S45C  
 \* Rotation speed/5000min<sup>-1</sup>  
 \* Processing time/1sec  
 \* Primary processing hole diameter φ5mm  
 \* Secondary processing hole diameter φ3.5mm

# Applications / How to Use / Lineup

## Successful Automated Applications

### Crankshaft

Category	Automotive engine part
Workpiece	Crankshaft
Material	Carbon steel S48C
Process details	Custom machine/ Cross-hole deburring of internal diameter (Pin journal)

- Tool used: CH-PM-5R-C01
- Rotation speed: 1500min<sup>-1</sup>



### ABS block

Category	Automotive brake part
Workpiece	ABS block
Material	Aluminum alloy
Process details	Machining center/ Cross-hole deburring of internal diameter

- Tool used: CH-PO-5B
- Rotation speed: 6000min<sup>-1</sup>



## How to use

### How to set the process parameters

**[Rotation speed]** Even with low rotation speed, XEBEC Stone™ has grinding force. Start with a rotation speed of 1000 min<sup>-1</sup>, and then gradually increase the rotation speed.

**[Depth of cut]** Press lightly to the workpiece, about 1N(100gf, 0.5mm bending displacement)

**[Feed]** F300mm/min. (There is no upper limit for feed rate)

### Examples of "Point Processing" (Insertion from primary processing hole)

Using a head slightly larger than the secondary hole diameter results in efficient deburring.

**Ball head:** Does not damage the surrounding area.

**Cylindrical head:** Use for dead-end holes.

Can also be used to deburr surfaces.

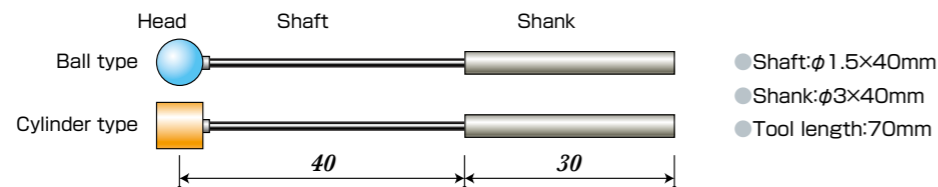
Can also be used for back deburring for contour processing.

\* No head (ceramic stone) vibration while rotating.  
By pressing the head against the work, the shaft bends, softening the impact.

\* Can also deburr diagonal holes.

## XEBEC Ceramic Stone™ Flexible Shaft Product lineup

Product code			Target primary processing hole	Head size	Head shape	Maximum rotation speed	Recommended rotation speed
Blue #800 equivalent	Orange #400 equivalent	Gray #220 equivalent					
CH-PB-3B	CH-PO-3B	CH-PM-3B	Over $\phi 3$ mm	$\phi 3$ mm	Ball type	15000min <sup>-1</sup>	5000~8000min <sup>-1</sup>
CH-PB-3R	CH-PO-3R	CH-PM-3R		$\phi 3 \times 3$ mm	Cylinder type	15000min <sup>-1</sup>	
CH-PB-4B	CH-PO-4B	CH-PM-4B		$\phi 4$ mm	Ball type	13000min <sup>-1</sup>	
CH-PB-4R	CH-PO-4R	CH-PM-4R	Over $\phi 4$ mm	$\phi 4 \times 4$ mm	Cylinder type	13000min <sup>-1</sup>	
CH-PB-5B	CH-PO-5B	CH-PM-5B		$\phi 5$ mm	Ball type	12000min <sup>-1</sup>	
CH-PB-5R	CH-PO-5R	CH-PM-5R		$\phi 5 \times 5$ mm	Cylinder type	12000min <sup>-1</sup>	
—	—	CH-PM-5R-C01	Over $\phi 5$ mm	$\phi 5 \times 10$ mm	Cylinder type	12000min <sup>-1</sup>	
CH-PB-6B	CH-PO-6B	CH-PM-6B		Over $\phi 6$ mm	$\phi 6$ mm	Ball type	10000min <sup>-1</sup>
—	—	CH-PM-10B		Over $\phi 10$ mm	$\phi 10$ mm	Ball type	6000min <sup>-1</sup>



# Precautions for use

## XEBEC Brush™ Crosshole

- \* Use a brush that corresponds to the hole diameter. Failure to do so could lead to bending, deformation, or breaking of the bristles or shaft, and is dangerous.
- \* Be sure to begin rotation only after you have inserted the tool bristles into the cylinder to be processed. Failure to do so could damage or scatter the bristles.

### [Target burr size]

This tool is intended for fine burrs whose root is less than 0.1 mm after machining.

### [Using with CNC machines]

When using on high-precision processing equipment, the abrasive powder may adversely affect the sliding parts, so please be sure to collect any dust and keep clean the equipment.

### [Pre-operation Inspection]

When the tool is machine-mounted, insert the shank into the chuck up to chucking position marking on the tool (30mm from tool end) and fix it tightly.

If you find anything unusual such as vibration during tool operations, stop immediately.

Failure to do so could lead to bending, deformation, or breaking of the bristles or shaft, and is dangerous.

### [Maximum rotation speed]

Product code	Maximum rotation speed
CH-A12-1.5M	20000min <sup>-1</sup>
CH-A12-3M	14000min <sup>-1</sup>
CH-A12-5M	
CH-A12-7M	
CH-A12-11M	
CH-A12-11M	12000min <sup>-1</sup>
CH-A12-3L	
CH-A12-5L	
CH-A12-7L	
CH-A12-11L	

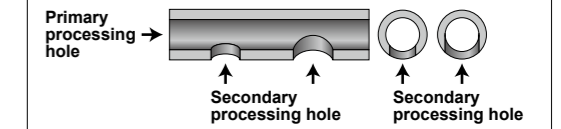
A12(Red) Brush

Product code	Maximum rotation speed
CH-A33-3M	14000min <sup>-1</sup>
CH-A33-5M	
CH-A33-7M	
CH-A33-11M	
CH-A33-3L	12000min <sup>-1</sup>
CH-A33-5L	
CH-A33-7L	
CH-A33-11L	

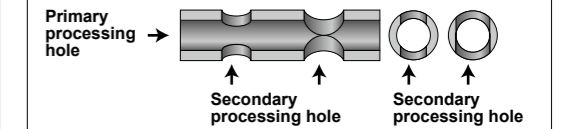
A33(Blue) Brush

\* In the case below, the brush may be damaged.

For T-shaped holes: If the diameter of the secondary processing hole is more than 100% of the diameter of the primary processing hole. (For example, if the primary hole is  $\phi 10$  mm and the secondary hole is  $\phi 10$  mm or larger.)



For cross-shaped holes: If the diameter of the secondary processing hole is more than 70% of the diameter of the primary processing hole. (For example, if the primary hole is  $\phi 10$  mm and the secondary hole is  $\phi 7$  mm or larger.)



## XEBEC Stone™ Flexible Shaft

### [Maximum rotation speed]

Maximum rotation to each head size is as follows  $\phi 10=6000\text{min}^{-1}$ ,  $\phi 6=10000\text{min}^{-1}$ ,  $\phi 5=12000\text{min}^{-1}$ ,  $\phi 4=13000\text{min}^{-1}$ ,  $\phi 3=15000\text{min}^{-1}$ . If you use at more than the maximum rotation speed, the head and shaft may be damaged and it is dangerous.

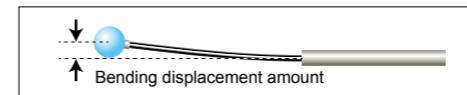
### [Rotation speed]

Even with low rotation speed, XEBEC Stone™ has grinding force. Start with a rotation speed of 1000 min<sup>-1</sup>, and then gradually increase the rotation speed.

### [Depth of Cut, Cutting Load]

As a guide, press lightly to the workpiece, about 1 N (100 gf, 0.5 mm bending displacement).

\* Use a cutting load of 5N or less (i.e., 500gf, with a bending displacement of 2mm or less) when deburring or polishing workpiece.



### [Selection of Head Size]

When inserting through the primary processing hole, select a head slightly larger than the secondary processing hole diameter. If you use a small head, it may enter the secondary hole and the head or shaft may be damaged.

### [Dry / Wet Processing]

Can be used in dry as well as wet (both oil-based and water-soluble) processing. Using the tool with coolant promotes higher durability and better results.

### [Using with CNC machines]

When using on high-precision processing equipment, the abrasive powder may adversely affect the sliding parts, so please be sure to collect any dust and keep clean the equipment.

### [Pre-operation Inspection]

Insert the shank all the way into the tool holding tube, and secure it tightly with shank-fastening screw when mounting on a rotary tool.

Conduct a test run for 1 minute or more before starting the operation and 3 minutes or more after changing a tool to confirm if there is any abnormality including vibration, looseness of the mounting part.

Even if there is no abnormal condition observed in the test run, stop the use immediately in case any abnormality, such as vibration, is observed while using the tool. The sleeve shank may drop off, distort, or break and dangerous.

### [Target burr size]

This tool is intended for fine burrs whose root is less than 0.2 mm after machining.

### [Truing, Dressing]

If the head shape becomes distorted, rotate the tool against an electrodeposited diamond abrasive file while pressing lightly against the outer circumference to adjust the shape. Conduct dressing in the same manner.

## Operator Safety Measures

### [For Protective Equipment]

Always wear protective goggles, gloves and masks when operating the tool. Wear long sleeves, tight cuff, and clothing to minimize skin exposure.

### [Beware of Grinding Powder]

Grinding powder and burrs may scatter within an area around the work as the brush revolves; please stay clear of this area.

### [Caution to Your Surroundings]

The area around your work is hazardous in case flying pieces of fiber rods from the tools and grinding powder may scatter, enclose your working area to prevent other people entering, or have the people surrounding your work area protective equipment as well.

**WARNING** Follow the precautions for use and safety measures for operators above without fail. If you fail to observe them, there are following risks.

- A tool or a part of a tool may crack, drop off, distort or break.
- Broken pieces of a tool or grinding dust may stick into your skin, or at worst stick into your eyes, causing blindness.
- Dust generated by machining process may bring up skin irritancy or allergy.