XEBEC®
TECHNOLOGY CO.,LTD.

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Your Order

2014.11.1000sn

XEBEC
Crosshole Deburring Tools
Product Catalog

CNC deburring solutions with XEBEC innovative ceramic fiber tools

- XEBEC Brush™ Crosshole
- XEBEC Stone™ Flexible Shaft

XEBEC®
TECHNOLOGY CO.,LTD.

XEBEC *tools are made from a material like none other!*

Unmatched grinding force and cutting power!

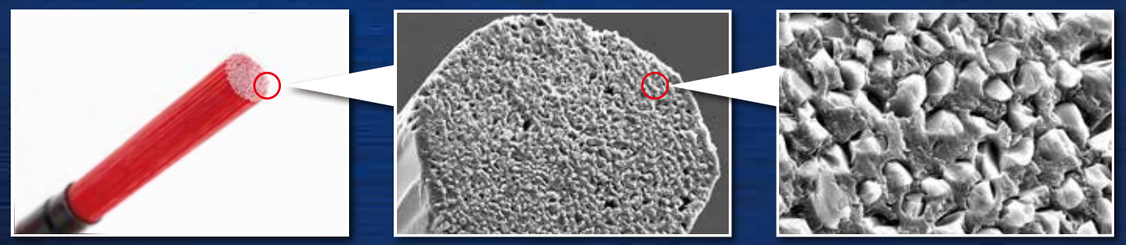
We provide completely new abrasive stones and deburring tools with our revolutionary technology using ceramic fibers.

XEBEC® TECHNOLOGY CO.,LTD.

Bristle and Structure

One bristle has 1,000 cutting edges.

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



3 Features of XEBEC Brush™

1 *Overpowering grinding force.*

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

2 *Consistent cutting edges.*

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.

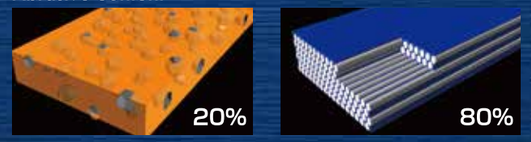
ISO9001 Conformity XEBEC products are manufactured in a plant that meets ISO9001 international quality control and assurance standards.

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.

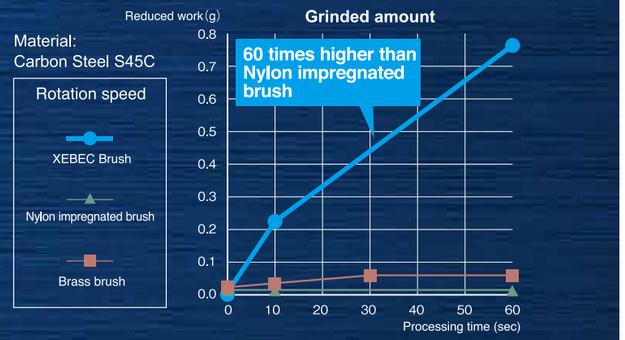
Abrasive content



Handles all sorts of materials up to HRC 65

The brushes can process general materials up to HRC 65They 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 aprox.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.

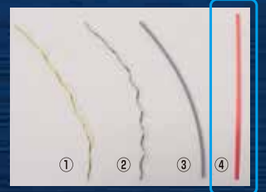
Strength 2 Consistent cutting edges

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

Comparison of brush filament shapes (after use)

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

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

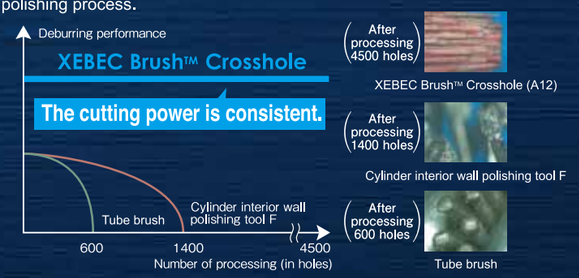


Self-sharpening unique to ceramic fiber

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

The stability of performance make true automation possible.

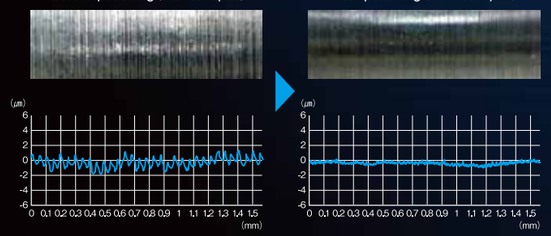
Particularly since this "controllable brush" constantly maintains its stable cutting power, it is possible to automate the deburring and polishing process.



Strength 3 Amazing polishing capacity.

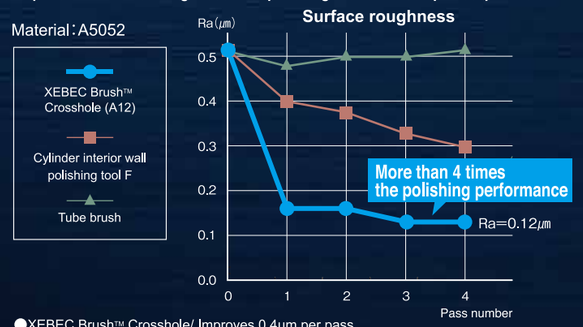
Best achievable surface roughness: Ra = 0.1μm

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



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

Comparison of surface roughness after polishing with other companies' products



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

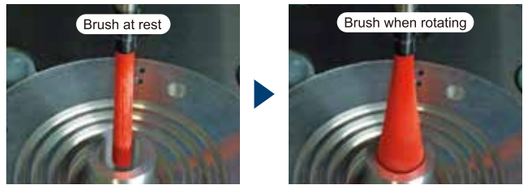
XEBEC TECHNOLOGY CO.,LTD.

XEBEC Brush™ Crosshole

Action Principle and Performance

Action Principle

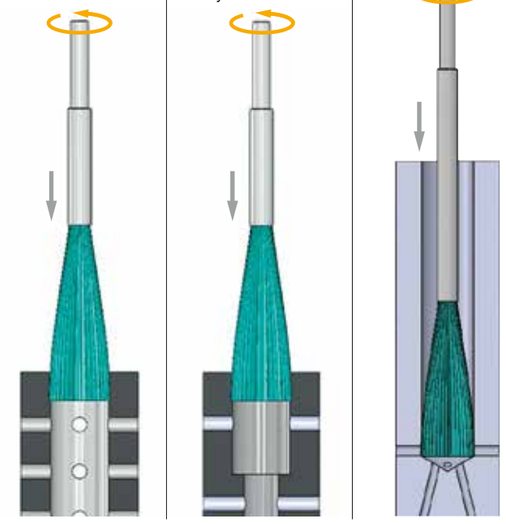
Using the centrifugal force generated by rotation, the high grinding force of the brush tip reliably deburrs the inner walls of cylinders.



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

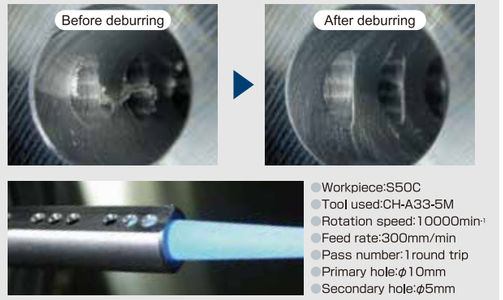
Possible to deburr cylinders of **differing diameters** with a single brush since the bristles spread out to fit to the cylinder.

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



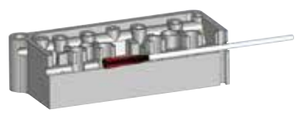
●Workpiece:S50C
●Tool used:CH-A33-5M
●Rotation speed:10000min-1
●Feed rate:300mm/min
●Pass number:1round trip
●Primary hole:φ10mm
●Secondary hole:φ5mm

Successful applications

Cylinder head

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

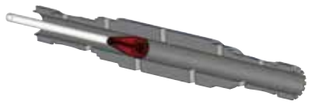
●Tool used:CH-A12-5L ●Rotation speed:8000min-1 ●Feed rate:300mm／min



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-1 ●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-1 ●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-1 ●Feed rate:800mm／min

Automation with XEBEC Brush™

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

Installation / Intended Machine Tool

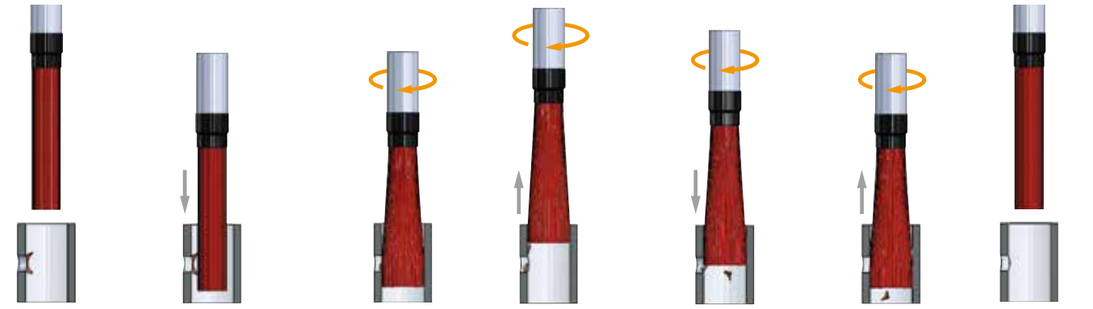
XEBEC Brush™ can, after being mounted to the dedicated sleeve, be attached to machinery with a standard collet chuck, milling chuck, drill chuck, etc.
Attach to an NC machine that meets the requirements below and use under the following recommended processing conditions.

- **Machining center capable of 8000 min-1 or higher (10000 min-1 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 on the brush tip.Using the centrifugal force generated by rotation, the brush tip deburrs and creates a finished edge.



Before insertion	Step 1	Step 2	Step 3	Step 3
	Insert the brush while not in motion.	**Rotate the brush past the cross-hole.**	**Process while pulling the brush back.**	**Process while pushing the brush forward.**
	* If you rotate the brush outside the cylinder, the bristles may be damaged or scattered.	* By processing the brush while pulling it back past the cross-holes, burrs are prevent from being laid flat against the interior surface of the cylinder.	* Burrs are generated upwardly and it surely deburs by processing the brush while pushing forward.	**Stop the brush rotation.** / **Remove the brushwhile it is at rest.**

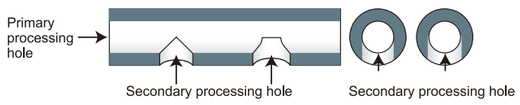
* Deburring effect is increased when processing both clockwise and counterclockwise, achieving a more uniform edge quality.

Usage Notes

- **Use at 7,000 to 12,000 min-1**
- **Usage exceeded maximum rotation speed or processing outside cylinder (outside workpiece) may result tool damage.**
- **Using the brush in the following ways may damage it.**

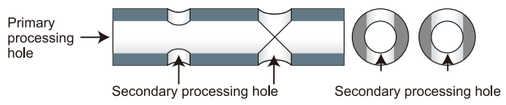
In a T-shapedhole

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.)



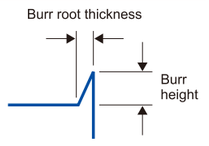
In a cross-shaped hole

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 φ 10 mm and the secondary hole is φ 7 mm or larger.)



What can be processed with XEBEC BrushTM

Burrs that can be processed	Target workpiece materials
Fine burrs whose root is less than 0.1 - 0.2 mm in thickness (about the size that can be bent with a fingernail)	General metals, stainless steel, aluminum, inconel, cast iron, resin, etc. of HRC 65 or less
Target burr area	**Effective area for grinding**
Cross-holes of φ 3.5 mm - φ 20 mm	Brush tip



How to Set the 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
φ3.5~5	φ1.5mmBrush
φ5~8	φ 3mmBrush
φ8~10	φ 5mmBrush

Processing diameter	Brush diameter
φ10~14	φ 7mmBrush
φ14~20	φ11mmBrush

Please refer to Product lineup table on page.7

Set the starting parameters

Rotation speed (S) **Reference 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.

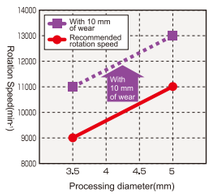
Feed rate (F) **About 300 mm/min** (Adjust the rotation speed and feed rate depending upon the state of the edge)

[Recommended rotation speed based on processing diameter]

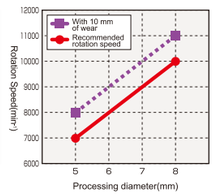
1. The graph below is divided by brush diameter, so please select a tool that can process the diameter that you want to process.
2. The solid line shows the recommended rotation speed and the dotted line shows the diameter that the brush bristles spread out with 10 mm of wear. You can continue to use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

A12(Red) brush

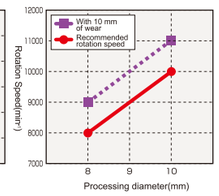
CH-A12-1.5M(φ1.5mm Brush)
Processing Dia.: φ3.5~φ5mm
Starting at : 9000~11000min-1



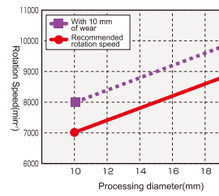
CH-A12-3M/3L(φ3mm Brush)
Processing Dia.: φ5~φ8mm
Starting at : 7000~10000min-1



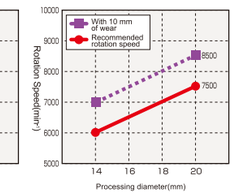
CH-A12-5M/5L(φ5mm Brush)
Processing Dia.: φ8~φ10mm
Starting at : 8000~10000min-1



CH-A12-7M/7L(φ7mm Brush)
Processing Dia.: φ10~φ20mm
Starting at : 7000~9000min-1

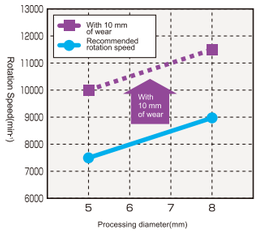


CH-A12-11M/11L(φ11mm)
Processing Dia.: φ14~φ20mm
Starting at : 6000~7500min-1

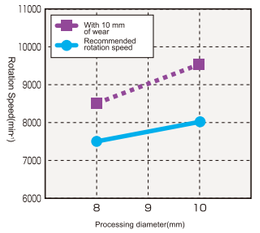


A33 (Blue) Brush

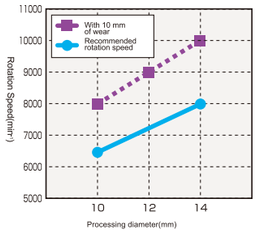
CH-A33-3M/3L(φ3mm Brush)
Processing Dia.: φ5~φ8mm
Starting at : 7500~9000min-1



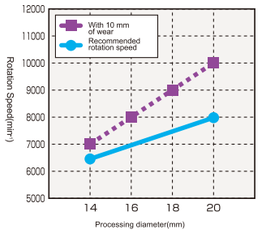
CH-A33-5M/5L(φ5mm Brush)
Processing Dia.: φ8~φ10mm
Starting at : 7500~8000min-1



CH-A33-7M/7L(φ7mm Brush)
Processing Dia.: φ10~φ14mm
Starting at : 6500~8000min-1



CH-A33-11M/11L(φ11mm Brush)
Processing Dia.: φ14~φ20mm
Starting at : 6500~8000min-1



Change the Parameters

- If the burrs are not completely removed.
  → Increase rotation speed in increments of 1,000 min-1.
  (Please note the maximum rotation speed.)
  → Increase number of passes.
- If the burrs are removed and the edge is rounded
- If you want to extend brush tool life.
  → Decrease the rotation speed in increments of 500 min-1.
  (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

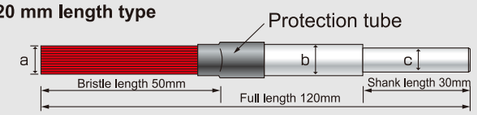
XEBEC Brush™ Crosshole (standard) Lineup

A12(Red) brush

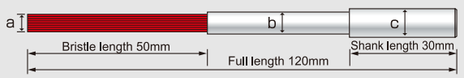
Product code	Target primary processing hole	Brush diameter a	Shaft diameter b	Shank diameter c	Full length L	Maximum rotation speed	Recommended rotation speed
CH-A12-1.5M	φ 3.5～5mm	φ 1.5mm	φ2.5mm	φ 3mm	120mm	20000min-1	9000～11000min-1
CH-A12-3M	φ 5～8mm	φ 3mm	φ 4mm	φ 3mm	120mm	14000min-1	7000～10000min-1
CH-A12-3L				φ 4mm	170mm	12000min-1	
CH-A12-5M	φ 8～10mm	φ 5mm	φ 6mm	φ 6mm	120mm	14000min-1	8000～10000min-1
CH-A12-5L				φ 6mm	170mm	12000min-1	
CH-A12-7M	φ10～20mm	φ 7mm	φ 8mm	φ 6mm	120mm	14000min-1	7000～9000min-1
CH-A12-7L				φ 8mm	170mm	12000min-1	
New CH-A12-11M	φ14～20mm	φ 11mm	φ 12mm	φ 12mm	120mm	14000min-1	6000～7500min-1
New CH-A12-11L				φ 12mm	170mm	12000min-1	

Tool schematic

● 120 mm length type

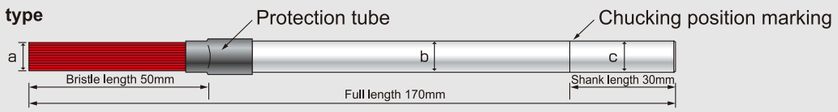


Except CH-A12-1.5M



[CH-A12-1.5M]

● 170 mm length type



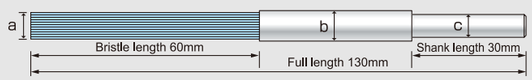
A33(Blue) brush

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-1	7500～9000min-1
CH-A33-3L				φ 4mm	180mm	12000min-1	
CH-A33-5M	φ 8～10mm	φ 5mm	φ 6mm	φ 6mm	130mm	14000min-1	7500～8000min-1
CH-A33-5L				φ 6mm	180mm	12000min-1	
CH-A33-7M	φ10～14mm	φ 7mm	φ 8mm	φ 6mm	130mm	14000min-1	6500～8000min-1
CH-A33-7L				φ 8mm	180mm	12000min-1	
CH-A33-11M	φ14～20mm	φ 11mm	φ 12mm	φ 12mm	130mm	14000min-1	
CH-A33-11L				φ 12mm	180mm	12000min-1	

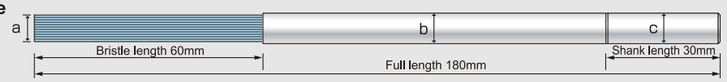
* We offer special orders of 1.5 M diameter brushes. Please contact us for details.

Tool schematic

● 130 mm length type



● 180 mm length type



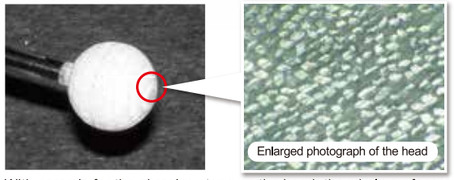
XEBEC Stone™ Flexible Shaft

Materials and Structure

Material

● By making the "Meister Finish" ceramic abrasive stone that uses XEBEC's ceramic fiber brush with the ideal crystal structure for grinding into spheres and cylinders and putting a large number of cutting edges on all surfaces, we have achieved exceptional grinding force.

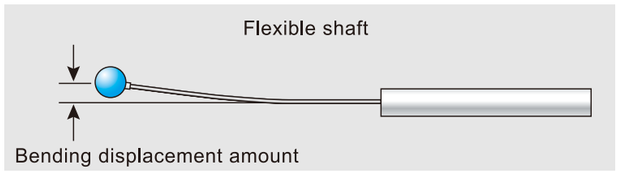
● The self-sharpening cutting edges continuous along the ceramic fiber do not clog, resulting in stable grinding force.

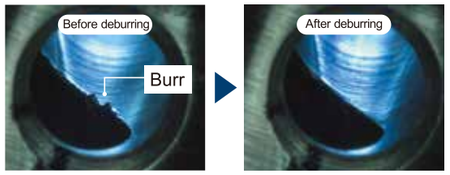


With ceramic for the abrasive stone on the head, the whole surface is a cutting edge.

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

Burrs generated on cross-hole

- Material/Carbon steel S45C
- Rotation speed/5000min-1
- Processing time/1sec
- Primary processing hole diameter
- Secondary processing hole diameter

After deburring

Remove burrs only with point processing
Edge quality ◎ (Excellent)

The edge shape is broken and secondary burrs are generated.
Edge quality × (Poor)

The finish other than the edges is affected.
Edge quality △ (Fair)

Applications / How to Use / Lineup

Successful Applications

Crankshaft

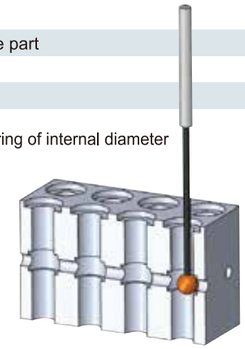
Category	Automotive engine part
Workpiece	Crankshaft
Material	Carbon steel S48C
Process details	Custom machine/ Cross-hole deburring of internal diameter (Pin journal)

- Tool used:CH-PM-5R-C01
- Rotation speed:1500min^{-1}

ABS block

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

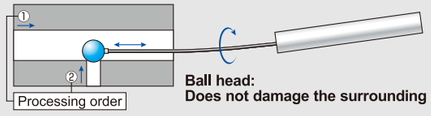
- Tool used:CH-PO-5B
- Rotation speed:6000min^{-1}



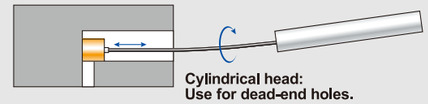
How to use

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.

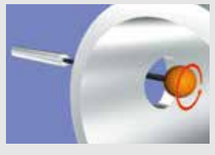


Cylindrical head:
Use for dead-end holes.

* 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.

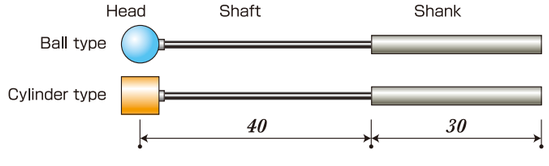
Can also be used to deburr surfaces.



Can also be used for back deburring for contour processing.

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 ϕ3mm	ϕ3mm	Ball type	15000min^{-1}	5000~ 8000min^{-1}
CH-PB-3R	CH-PO-3R	CH-PM-3R		ϕ3×3mm	Cylinder type	15000min^{-1}	
CH-PB-4B	CH-PO-4B	CH-PM-4B	Over ϕ4mm	ϕ4mm	Ball type	13000min^{-1}	
CH-PB-4R	CH-PO-4R	CH-PM-4R		ϕ4×4mm	Cylinder type	13000min^{-1}	
CH-PB-5B	CH-PO-5B	CH-PM-5B	Over ϕ5mm	ϕ5mm	Ball type	12000min^{-1}	
CH-PB-5R	CH-PO-5R	CH-PM-5R		ϕ5×5mm	Cylinder type	12000min^{-1}	
–	–	CH-PM-5R-C01		ϕ5×10mm	Cylinder type	12000min^{-1}	
CH-PB-6B	CH-PO-6B	CH-PM-6B	Over ϕ6mm	ϕ6mm	Ball type	10000min^{-1}	
–	–	CH-PM-10B	Over ϕ10mm	ϕ10mm	Ball type	6000min^{-1}	4000~5000min^{-1}



- Shaft:ϕ1.5×40mm
- Shank:ϕ3×40mm
- Tool length:70mm

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.
* In the case on the right, the brush may be damaged.

[Target burr size]

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

[Using with CNC]

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]

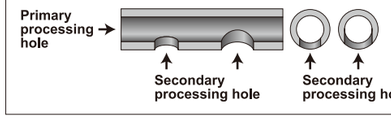
A12(Red) Brush

Product code	Maximum rotation speed
CH-A12-1.5M	20000min^{-1}
CH-A12-3M	14000min^{-1}
CH-A12-5M	
CH-A12-7M	
CH-A12-11M	
CH-A12-3L	12000min^{-1}
CH-A12-5L	
CH-A12-7L	
CH-A12-11L	

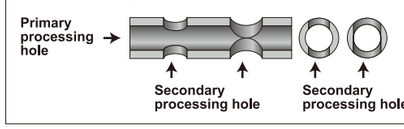
A33(Blue) Brush

Product code	Maximum rotation speed
CH-A33-3M	14000min^{-1}
CH-A33-5M	
CH-A33-7M	
CH-A33-11M	
CH-A33-3L	12000min^{-1}
CH-A33-5L	
CH-A33-7L	
CH-A33-11L	

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 φ10 mm and the secondary hole is φ10 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 φ 10 mm and the secondary hole is φ 7 mm or larger.)



XEBEC Stone™ Flexible Shaft

[Maximum rotation speed]

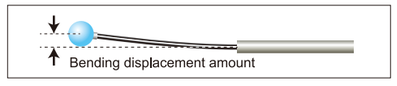
Maximum rotation to each head size is as follows φ10=6000min-1, φ6=10000min-1, φ5=12000min-1,φ4=13000min-1, φ3=15000min-1.If you use at more than the maximum rotation speed, the head and shaft may be damaged and it is dangerous.

[Rotation speed]

As a guide, use each tool at a rotation speed equal to about 60% of its maximum.This provides sufficient grinding performance and moderate conformability, resulting in high processing efficiency and good finish quality.

[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.



[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.

[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]

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.

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 yours eyes, causing blindness.
- Dust generated by machining process may bring up skin irritancy or allergy.