

# 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 post the cross-hole.

- By processing the brush while pulling back past the cross-holes, burrs are prevented from being 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.

Please carry out the dummy workpiece (as in the above figure) process using a dummy workpiece. Do not use a dummy workpiece in the area near the cylinder's borehole. Not using a dummy workpiece may result in burrs coming out of the burr hole 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 1-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.)

**Burs that can be processed**

Fine burs 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

**Process 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
φ3.5-5	φ1.5mm brush
φ5-8	φ3mm brush
φ8-10	φ5mm 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.**

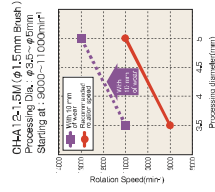
**Direction of rotation** : Deburring effect is increased when processing both clockwise and counterclockwise, achieving a more uniform edge quality.

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

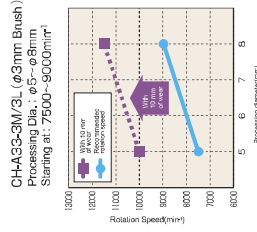
### [Recommended rotation speed based on processing diameter]

- The graph below is divided by brush diameter, so please select a tool that can process the diameter that you want to process.
- 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.
- If you want to extend brush tool life.
  - Decrease the rotation speed in increments of 500 min<sup>-1</sup>.
  - Decrease the brush spread diameter.
  - Increase the feed rate in increments of 100 mm/min.

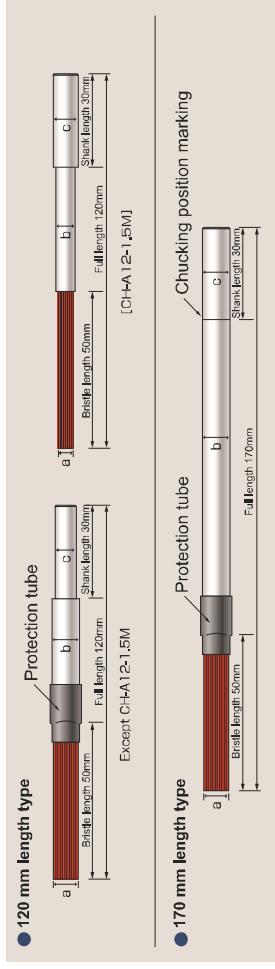
Relationship between grinding power and processing parameters	Rotation Speed	Feed Rate
To increase grinding power	Increase	Decrease
To reduce grinding power	Decrease	Increase

## 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
CHA12-1.5M	φ 3.5~5mm	φ 1.5mm	φ 2.5mm	φ 3mm	120mm	20000min <sup>-1</sup>	9000~11000min <sup>-1</sup>
CHA12-3M	φ 5~8mm	φ 3mm	φ 4mm	φ 5mm	120mm	14000min <sup>-1</sup>	7000~10000min <sup>-1</sup>
CHA12-3L	φ 5~8mm	φ 3mm	φ 4mm	φ 5mm	170mm	12000min <sup>-1</sup>	7000~10000min <sup>-1</sup>
CHA12-5M	φ 8~10mm	φ 5mm	φ 6mm	φ 8mm	120mm	14000min <sup>-1</sup>	8000~10000min <sup>-1</sup>
CHA12-5L	φ 8~10mm	φ 5mm	φ 6mm	φ 8mm	170mm	12000min <sup>-1</sup>	8000~10000min <sup>-1</sup>
CHA12-7M	φ 10~20mm	φ 7mm	φ 8mm	φ 12mm	120mm	14000min <sup>-1</sup>	7000~9000min <sup>-1</sup>
CHA12-7L	φ 10~20mm	φ 7mm	φ 8mm	φ 12mm	170mm	12000min <sup>-1</sup>	7000~9000min <sup>-1</sup>
CHA12-11M	φ 14~20mm	φ 11mm	φ 12mm	φ 17mm	120mm	14000min <sup>-1</sup>	6000~7500min <sup>-1</sup>
CHA12-11L	φ 14~20mm	φ 11mm	φ 12mm	φ 17mm	170mm	12000min <sup>-1</sup>	6000~7500min <sup>-1</sup>

### Tool schematic

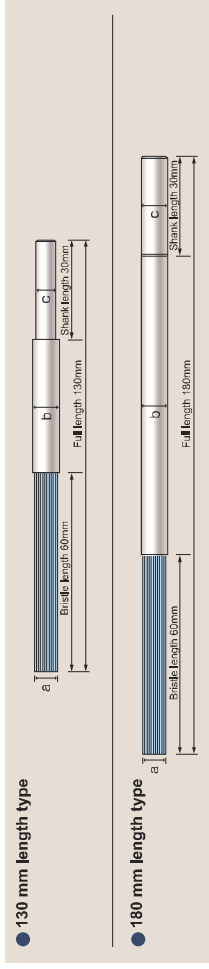


### A33(Blue) Brush

Product code	Target primary processing hole	Brush diameter a)	Shaft diameter b)	Shank diameter c)	Full Length L	Maximum rotation speed	Recommended rotation speed
CHA33-3M	φ 5~8mm	φ 3mm	φ 4mm	φ 5mm	130mm	14000min <sup>-1</sup>	7500~9000min <sup>-1</sup>
CHA33-3L	φ 5~8mm	φ 3mm	φ 4mm	φ 5mm	180mm	12000min <sup>-1</sup>	7500~9000min <sup>-1</sup>
CHA33-5M	φ 8~10mm	φ 5mm	φ 6mm	φ 8mm	130mm	14000min <sup>-1</sup>	7500~8000min <sup>-1</sup>
CHA33-5L	φ 8~10mm	φ 5mm	φ 6mm	φ 8mm	180mm	12000min <sup>-1</sup>	7500~8000min <sup>-1</sup>
CHA33-7M	φ 10~14mm	φ 7mm	φ 8mm	φ 12mm	130mm	14000min <sup>-1</sup>	6500~8000min <sup>-1</sup>
CHA33-7L	φ 10~14mm	φ 7mm	φ 8mm	φ 12mm	180mm	12000min <sup>-1</sup>	6500~8000min <sup>-1</sup>
CHA33-11M	φ 14~20mm	φ 11mm	φ 12mm	φ 18mm	130mm	14000min <sup>-1</sup>	6500~8000min <sup>-1</sup>
CHA33-11L	φ 14~20mm	φ 11mm	φ 12mm	φ 18mm	180mm	12000min <sup>-1</sup>	6500~8000min <sup>-1</sup>

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

### Tool schematic



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

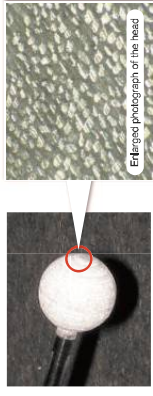
[Target primary processing hole] φ5~φ20mm \* Please contact us for cross-hole deburring of depth more than 400mm  
 [Target depth] 140mm (and more) ~400mm

## Materials and Structure



### Material

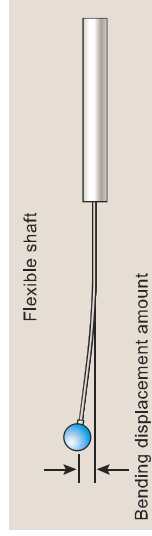
- The XEBEC Stone™ uses the same proprietary structure as XEBEC Meister Finish. It exposes a large number of cutting edges on the entire surface, resulting in exceptional grinding force.
- The self-sharpening cutting edges do not clog, resulting in consistent grinding performance.



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

### Structure

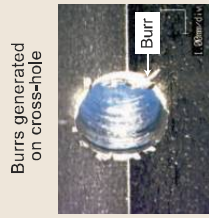
- Flexible shaft allows soft contact to workpiece. (This makes it easy to set the cutting amount when using with CNC)



## Comparison of grinding capacity with other companies' products

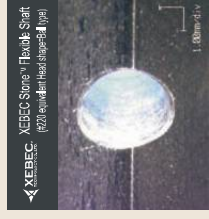
### Comparison of finish on φ 3.5mm drilled cross-hole deburring

#### Before deburring



- Remove burrs only with point processing **Edge quality** (Excellent) (Fair)
- The edge shape is broken and secondary burrs are generated. **Edge quality** (Poor)

#### After deburring



- Remove burrs only with point processing **Edge quality** (Excellent) (Fair)
- The finish other than the edges is affected. **Edge quality** (Fair)

\*Material: Carbon steel S45C  
 \*Rotation speed: 5000min<sup>-1</sup>  
 \*Processing time/ sec.  
 \*Primary processing hole diameter φ3mm  
 \*Secondary processing hole diameter φ3.5mm