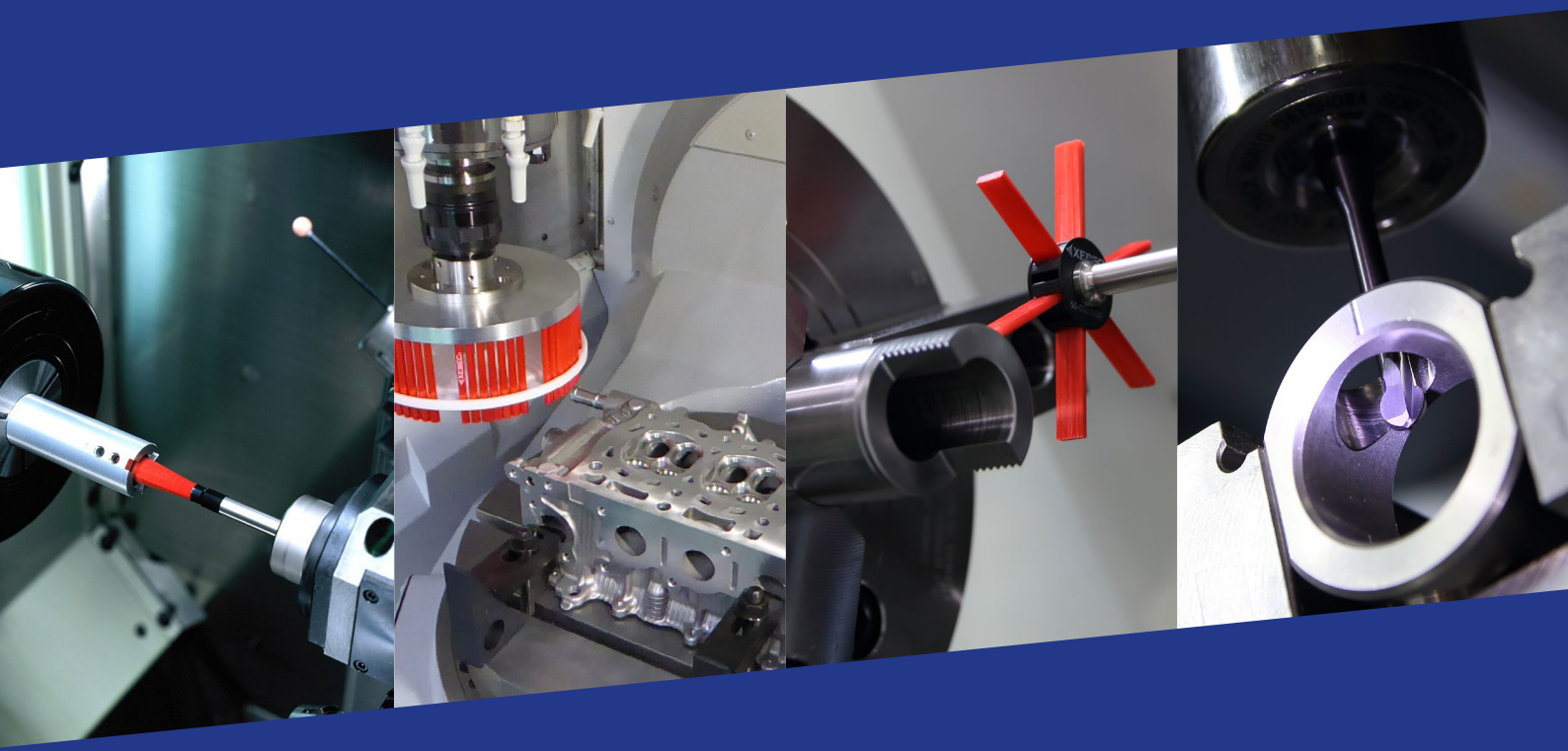
Kemet

Precision Lapping | Polishing | Cleaning | Materialography

DEBURRING & POLISHING TOOLS



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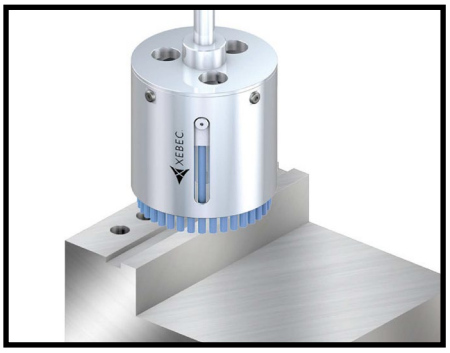
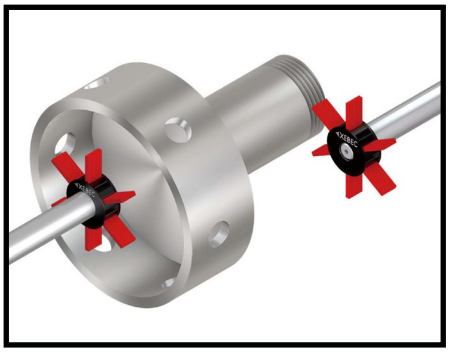
Tool Guide

Deburring and Polishing

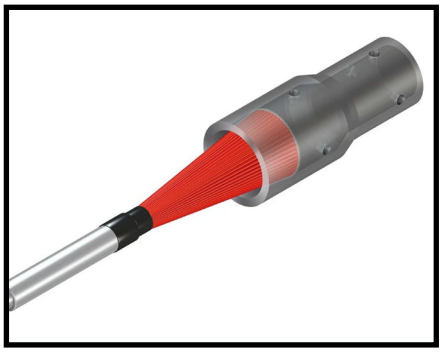
XEBEC Brush™ Surface - **P01**



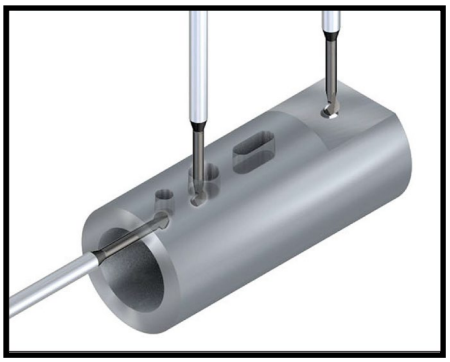
XEBEC Brush™ Wheel Type - **P05**



XEBEC Brush™ Crosshole - **P06**

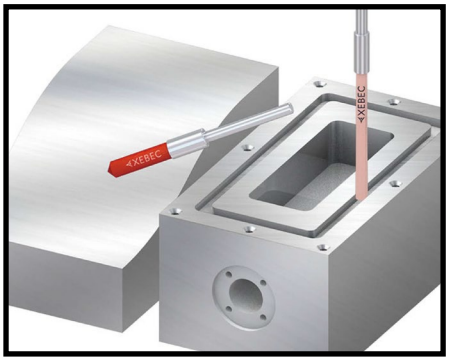


XEBEC Back Burr Cutter and Path™ - **P08**

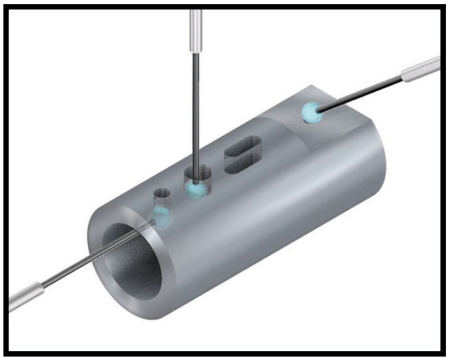


Hand Tools

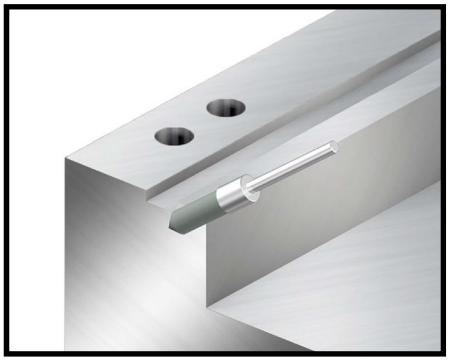
XEBEC Brush™ Surface End Type - **P04**



XEBEC Stone™ Flexible Shaft - **P10**



XEBEC Stone™ Mounted Point - **P11**



Ordering Information

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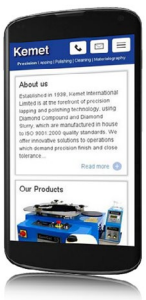
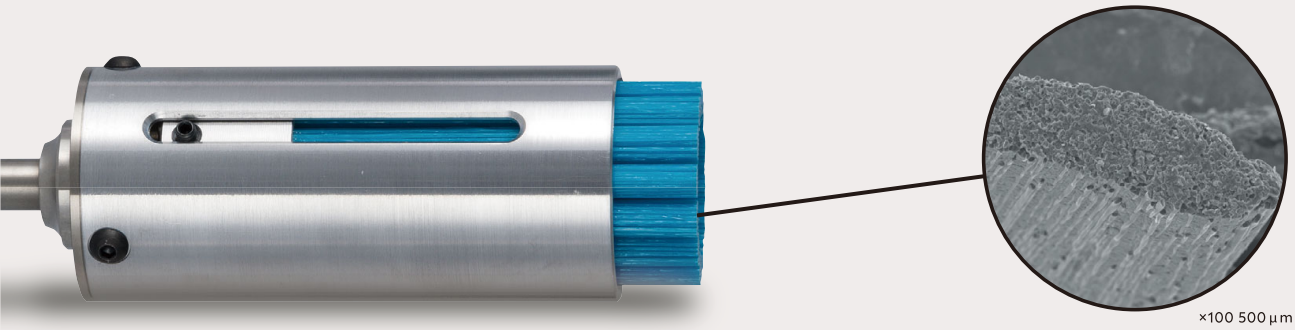


British Chambers of Commerce Accredited

bsi. ISO 9001 Quality Management

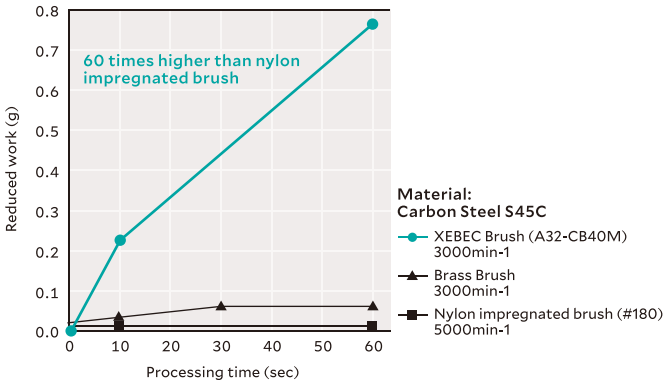
Overwhelming grinding power, Consistent cutting performance, No deformation

XEBEC Brush uses unique abrasive ceramic fiber material instead of abrasive grain.
One bristle consists of 1,000 ceramic fibers that work as cutting edges.
XEBEC Brush provides outstanding grinding ability to complete CNC deburring and polishing in your CNC machine.



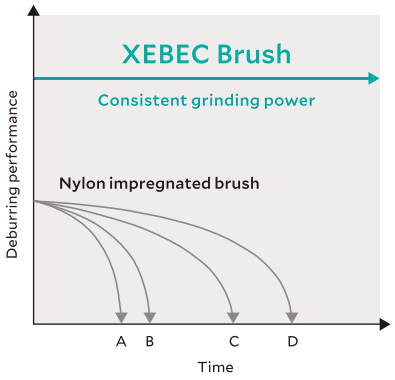
Grinding power

- The content ratio of ceramic fiber is approximately 80%
- Cutting edges on the Brush tips give overwhelming grinding power



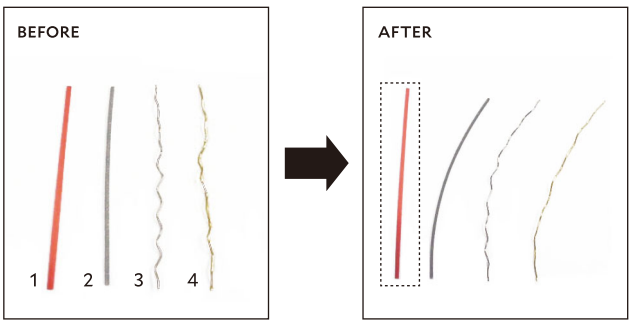
Consistent cutting performance

- New cutting edges are always exposed
- Consistent cutting performance to the end thanks to the structure of the continuous fiber



No deformation

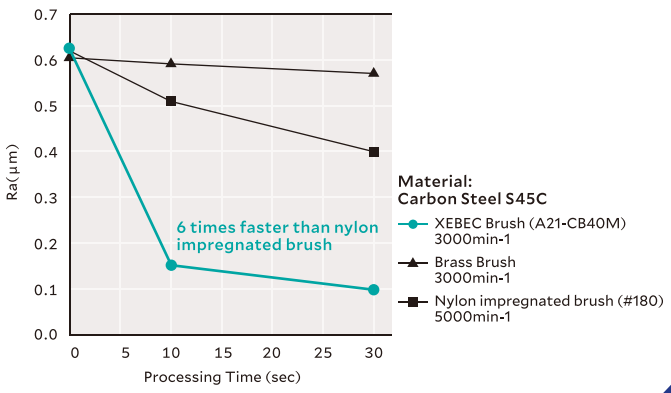
- Maintains its straight shape and does not spread out like a toothbrush
- Easy to manage on mass production lines



1. XEBEC Brush (A11 Red bristle)
2. Abrasive impregnated nylon brush
3. Steel wire brush
4. Brass wire brush

Polishing capacity

- High polishing capability of XEBEC Ceramic Stone is applied to a brush
- Best achievable surface roughness: Ra=0.1 µm or better (Rz=0.4 µm)



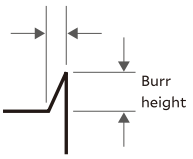
XEBEC Brush™ Surface

Patented

Ideal for deburring, cutter mark removal and surface polishing

Target burr size
Burr root thickness of 0.2mm or less (Burrs are bent with a fingernail)

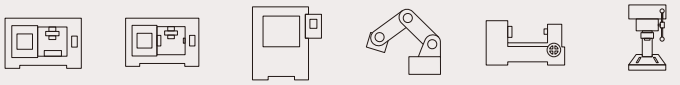
Burr root thickness



Tool composition

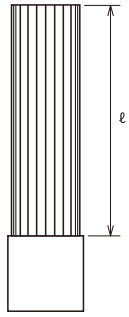
Brush and Sleeve are separate items.
Assemble Brush and Sleeve before use.

Applicable equipment



Brush

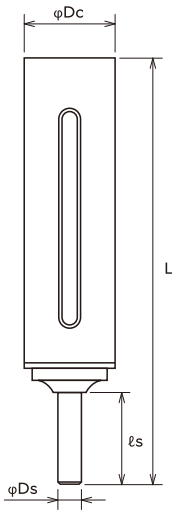
Brush (Color)	Product code	Brush diameter (mm)	Bristle length ℓ (mm)	Matching Sleeve
A13 (Pink)	A13-CB06M	φ 6	30	S06M
	A13-CB15M	φ 15	50	S15M-P
A11 (Red)	A11-CB06M	φ 6	30	S06M
	A11-CB15M	φ 15	50	S15M-P
	A11-CB25M	φ 25	75	S25M
	A11-CB40M	φ 40	75	S40M-SD10
	A11-CB60M	φ 60	75	S60M
	A11-CB100M	φ 100	75	S100M
A21 (White)	A21-CB06M	φ 6	30	S06M
	A21-CB15M	φ 15	50	S15M-P
	A21-CB25M	φ 25	75	S25M
	A21-CB40M	φ 40	75	S40M-SD10
	A21-CB60M	φ 60	75	S60M
	A21-CB100M	φ 100	75	S100M
A32 (Blue)	A32-CB06M	φ 6	30	S06M
	A32-CB15M	φ 15	50	S15M-P
	A32-CB25M	φ 25	75	S25M
	A32-CB40M	φ 40	75	S40M-SD10
	A32-CB60M	φ 60	75	S60M
	A32-CB100M	φ 100	75	S100M



* Bristle bundles are embedded in line on the periphery (except for the A13/A11/A21/A32-CB06M)
* The Brush size is approximate as the tip expands by rotating.

Sleeve

Product code	Brush diameter (mm)	External diameter Dc (mm)	Shank diameter Ds (mm)	Overall length L (mm)	Shank length ℓs (mm)	Matching Brush
S06M	φ 6	φ 10	φ 6	70	29	A13/A11/A21/A32-CB06M
S15M-P	φ 15	φ 18.5	φ 6	90	29	A13/A11/A21/A32-CB15M
S25M	φ 25	φ 30	φ 8	140	30	A11/A21/A32-CB25M
S40M-SD10	φ 40	φ 45	φ 10	140	30	A11/A21/A32-CB40M
S60M	φ 60	φ 65	φ 12	150	35	A11/A21/A32-CB60M
S100M	φ 100	φ 110	φ 16	162	40	A11/A21/A32-CB100M



* When in use, the length of the brush projection is added to the overall length of a sleeve.
* The external cylinder of the S15M-P is made of Fiber Reinforced Plastic (FRP).

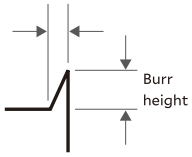
XEBEC Brush™ Surface Extra-Large

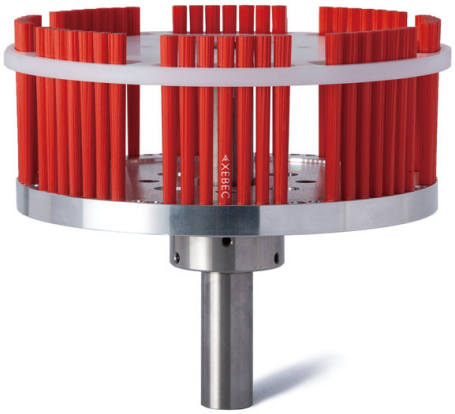
Pat. Pending

Ideal for deburring, cutter mark removal and surface polishing with a width of 100mm or greater

Target burr size
Burr root thickness of 0.2mm or less (Burrs are bent with a fingernail)

Burr root thickness





Tool composition

Brush and Slide Ring are separate items.
Assemble Brush to Slide Ring before use.

Applicable equipment

Brush

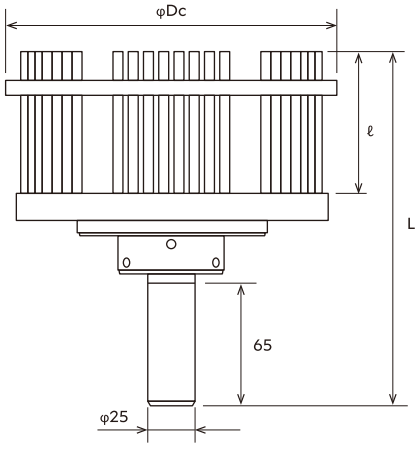
Brush (Color)	Product code	Brush diameter (mm)	Bristle length ℓ (mm)	Matching Slide Ring
A11 (Red)	A11-CB125M	φ 125	75	SR125M
	A11-CB165M	φ 165	75	SR165M
	A11-CB200M	φ 200	75	SR200M
A21 (White)	A21-CB125M	φ 125	75	SR125M
	A21-CB165M	φ 165	75	SR165M
	A21-CB200M	φ 200	75	SR200M
A32 (Blue)	A32-CB125M	φ 125	75	SR125M
	A32-CB165M	φ 165	75	SR165M
	A32-CB200M	φ 200	75	SR200M

* The Brush size is approximate as the tip expands by rotating.

Slide Ring

Product code	Brush diameter (mm)	Outer diameter Dc (mm)	Shank diameter (mm)	Overall length L (mm)
SR125M	φ 125	φ 135	φ 25	187
SR165M	φ 165	φ 176	φ 25	187
SR200M	φ 200	φ 211	φ 25	187

* The Slide Ring consists of a ring, a base holder, and a shank.
* Base holder and shank sizes are same across all Brush diameter. Ring size varies by Brush diameter.
* The total weight of a Brush and a Slide Ring. Φ125: 1920g, φ165: 2320g, φ200: 2750g

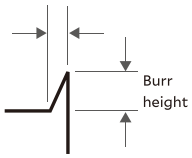


XEBEC Brush™ Surface End Type

Ideal for cutter mark removal and polishing sealed surface

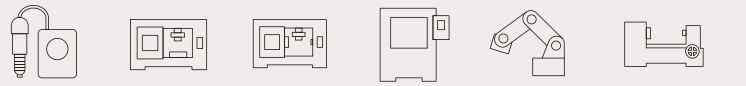
Target burr size
Burr root thickness of 0.1mm or less (Burrs are easily bent with a fingernail)

Burr root thickness



Applicable equipment

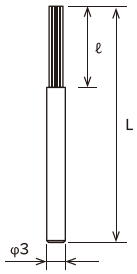
The tool can be used with rotary tools and equipments that can control the rotational speed.



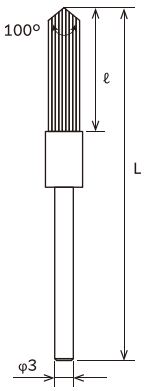
Rotary tool (electric) | Machining center | Combined lathe | Special machine | Robot | General purpose lathe with milling function

Brush (Color)	Product code	Brush diameter (mm)	Shank diameter Dc (mm)	Bristle length ℓ (mm)	Overall length L (mm)	Recommended rotational speed (min-1)	Maximum rotational speed (min-1)
A13 (Pink)	A13-EB01S	φ 1	φ 3	15	52	7000–12000	15000
	A13-EB015S	φ 1.5	φ 3	15	52	7000–12000	15000
	A13-EB02S	φ 2	φ 3	15	52	7000–12000	15000
	A13-EB025S	φ 2.5	φ 3	15	52	7000–12000	15000
	A13-EB03M	φ 3	φ 3	30	67	4000	6000
A11 (Red)	A11-EB01S	φ 1	φ 3	15	52	7000–12000	15000
	A11-EB015S	φ 1.5	φ 3	15	52	7000–12000	15000
	A11-EB02S	φ 2	φ 3	15	52	7000–12000	15000
	A11-EB025S	φ 2.5	φ 3	15	52	7000–12000	15000
	A11-EB06M	φ 5	φ 3	20	57	7000	12000
A21 (White)	A21-EB06M	φ 5	φ 3	20	57	7000	12000
A32 (Blue)	A32-EB06M	φ 5	φ 3	20	57	7000	12000

* The Brush size is approximate as the tip expands by rotating.



A11-EB06M
A21-EB06M



Precautions for Use

For manual operation, do not exceed the maximum load of 2N.
The Brush will break off when:

- being used beyond the maximum rotational speed
- being used beyond the maximum load
- being used with a pneumatic tool

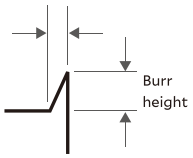
XEBEC Brush™ Wheel Type

Pat. Pending

Ideal for deburring and polishing of inner diameter, side surface and screw thread

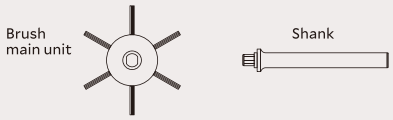
Target burr size
Burr root thickness of 0.1mm or less (Burrs are easily bent with a fingernail)

Burr root thickness

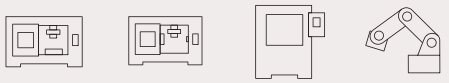


Tool composition

Brush main unit and Shank are separate items.
Assemble a main unit to a shank before use.

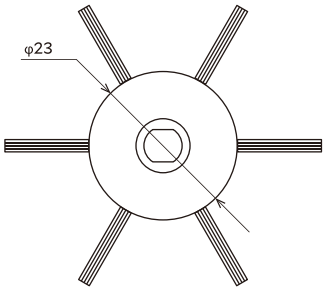


Applicable equipment



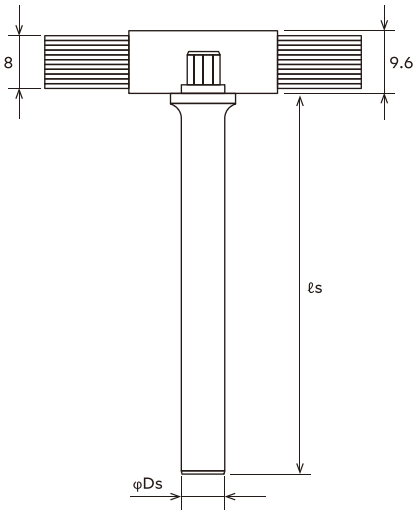
Brush main unit

Brush (Color)	Product code	Brush diameter (mm)	Number of bundles	Matching shank
A11 (Red)	W-A11-50	φ 50	6	W-SH-M/L
	W-A11-75	φ 75	6	



Shank

Product code	Shank diameter Ds (mm)	Shank length ℓs (mm)
W-SH-M	φ 8	70
W-SH-L	φ 12	150

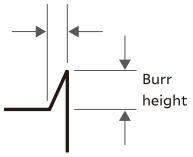


XEBEC Brush™ Crosshole

Ideal for deburring, polishing and cutter mark removal of inner diameter and counterbored part

Target burr size
Burr root thickness of 0.1mm or less (Burrs are easily bent with a fingernail)

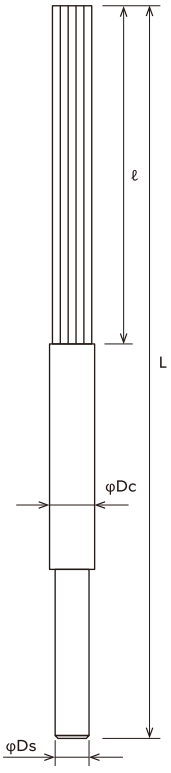
Burr root thickness



Applicable Equipment

The tool can be mounted on an equipment which can control the rotational speed. The tool must be rotated over 8000min-1.

Brush (Color)	Product code	Brush diameter (mm)	Shaft diameter Dc (mm)	Shank diameter Ds (mm)	Bristle length ℓ (mm)	Overall length L (mm)	Maximum rotational speed (min-1)	Target hole diameter (mm)
A12 (Red)	CH-A12-1.5M	φ 1.5	φ 2.5	φ 3	50	120	20000	φ 3.5–5
	CH-A12-3M-TL	φ 3	φ 4	φ 3	50	120	14000	φ 5–8
	CH-A12-3L-TL	φ 3	φ 4	φ 4	50	170	12000	φ 5–8
	CH-A12-5M-TL	φ 5	φ 6	φ 6	50	120	14000	φ 8–10
	CH-A12-5L-TL	φ 5	φ 6	φ 6	50	170	12000	φ 8–10
	CH-A12-7M-TL	φ 7	φ 8	φ 6	50	120	14000	φ 10–20
	CH-A12-7L-TL	φ 7	φ 8	φ 8	50	170	12000	φ 10–20
	CH-A12-11M	φ 11	φ 12	φ 12	50	120	14000	φ 14–20
	CH-A12-11L	φ 11	φ 12	φ 12	50	170	12000	φ 14–20
A33 (Blue)	CH-A33-3M	φ 3	φ 4	φ 3	60	130	14000	φ 5–8
	CH-A33-3L	φ 3	φ 4	φ 4	60	180	12000	φ 5–8
	CH-A33-5M	φ 5	φ 6	φ 6	60	130	14000	φ 8–10
	CH-A33-5L	φ 5	φ 6	φ 6	60	180	12000	φ 8–10
	CH-A33-7M	φ 7	φ 8	φ 6	60	130	14000	φ 10–14
	CH-A33-7L	φ 7	φ 8	φ 8	60	180	12000	φ 10–14
	CH-A33-11M	φ 11	φ 12	φ 12	60	130	14000	φ 14–20
	CH-A33-11L	φ 11	φ 12	φ 12	60	180	12000	φ 14–20



* The Brush size is approximate as the tip expands by rotating.

Precautions for Use

The Brush will break off when:
- being machined beyond the maximum rotational speed
- being used with a pneumatic tool
- being rotated outside the cylinder (outside workpiece)

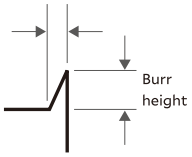
In the following cases, the Brush may break off:
- off-center cross hole and angled cross hole
- t-shaped hole: if the cross hole diameter is equal to or greater than the main bore diameter.
- cross-shaped hole: if the cross hole diameter is more than 70% of the main bore diameter.

XEBEC Brush™ Crosshole Extra-Long

Suitable for deburring, polishing and cutter mark removal of inner diameter and counterbored part exceeding 150mm in depth

Target burr size
Burr root thickness of 0.1mm or less (Burrs are easily bent with a fingernail)

Burr root thickness

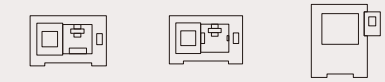


Tool composition

Brush, collar and shank are separate items.
(All special order items)
Assemble brush to the shank with collar before use.

Applicable Equipment

The tool can be mounted on an full cover type equipment which can control the rotational speed. The tool must be rotated over 8000min-1.



Machining center　Combined lathe　Special machine

Brush (Color)	Product code	Brush diameter (mm)	Shank diameter Ds (mm)	Overall length L (mm)	Maximum rotational speed (min-1)
A12（Red）	※	φ 3	φ 4	400	12000
	※	φ 5	φ 6	400	12000
	※	φ 7	φ 8	400	12000
	※	φ 11	φ 12	400	12000
A33（Blue）	※	φ 3	φ 4	410	12000
	※	φ 5	φ 6	410	12000
	※	φ 7	φ 8	410	12000
	※	φ 11	φ 12	410	12000

* This is a special order item. Please contact us for the details.
* The Brush size is approximate as the tip expands by rotating.

Precautions for Use

The Brush will break off when:
- being machined beyond the maximum rotational speed
- being used with a pneumatic tool
- being rotated outside the cylinder (outside workpiece)

In the following cases, the Brush may break off:
- off-center cross hole and angled cross hole
- t-shaped hole: if the cross hole diameter is equal to or greater than the main bore diameter.
- cross-shaped hole: if the cross hole diameter is more than 70% of the main bore diameter.

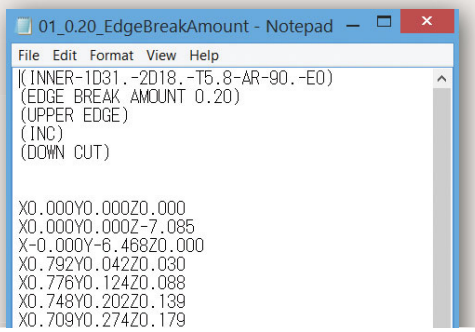
The combination of the spherical deburring cutter and the custom-made tool path enables hole deburring on a 3D curved edge in your CNC machine. High-speed and excellent quality deburring is achieved while maximizing the tool life. The tool path data can be used as soon as being installed on a NC program, saving your time to make your own program.

XEBEC Back Burr Cutter

- Micro-grain cemented carbide : Sharp and long lasting
- Highly heat-resistant AlTiCrN coating : Support materials from non-ferrous (e.g. aluminum) to difficult-to cut materials (e.g. titanium and inconel)
- Helical blade : Cleaner cutting edge and prevents secondary burrs

XEBEC Path

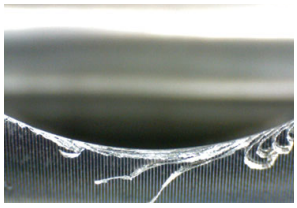
Custom-made tool path (point group data)



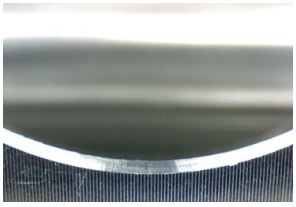
High quality

- Uniform edge shape thanks to an optimal tool path
- Inhibits secondary burrs by calculating optimal cutting angles

Before



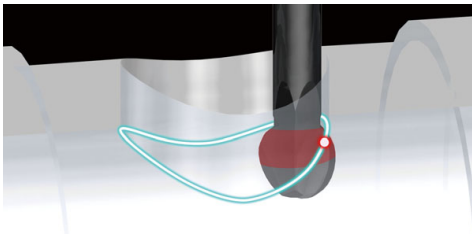
After



5 deburring amounts are provided for each Path. Refer to P33.

Long tool life

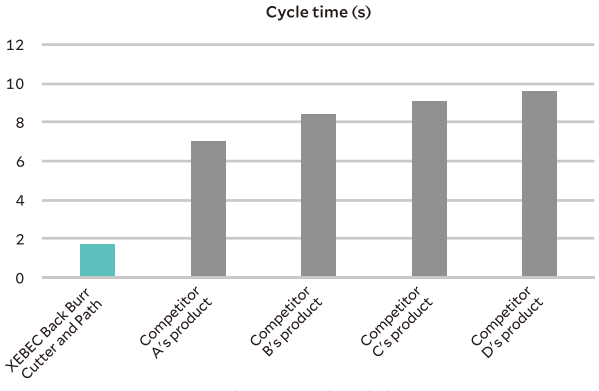
- Using the entire cutting blade by constantly shifting its contact point achieves longer tool life



Range of blade use

Super high-speed machining

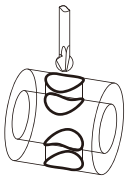
- Cycle time is reduced because of single edge-contouring operation (5 to 10 times faster than conventional tools)



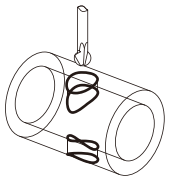
Material: SUS304 Planar hole: φ8×10t

Applicable to various edge shapes

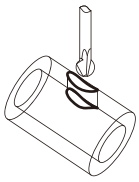
- 1 size of a Cutter supports various edges in different sizes and shapes. The cycle time is shortened by minimizing the number of tools used.



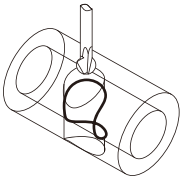
Orthogonal cross hole



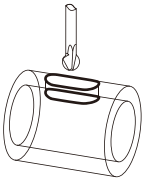
Off-center cross hole



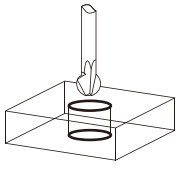
Angled cross hole



Broken cross hole



Slotted hole



Planar hole

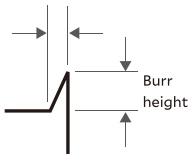
Applicable for tapped holes.

XEBEC Back Burr Cutter and Path™ Patented

Perfect for deburring both front and back of a drilled hole

Target burr size
Burr root thickness of 0.2mm or less (Burrs are bent with a fingernail)

Burr root thickness



Product component

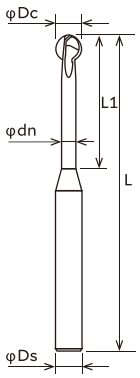
Spherical deburring cutter and custom-made tool Path.
Refer to P33 on how to order XEBEC Path.

Applicable equipment

Machining with 3-axis simultaneous control is required.

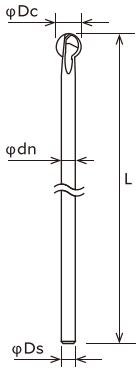
Regular type

Product code	Cutter diameter Dc (mm)	Cutter radius R (mm)	Neck diameter dn (mm)	Shank diameter Ds (mm)	Length under the neck L1 (mm)	Overall length L (mm)	Number of blades
XC-08-A	φ 0.8	0.4	φ 0.48	φ 3	5	60	2
XC-13-A	φ 1.3	0.65	φ 0.78	φ 3	8	60	2
XC-18-A	φ 1.8	0.9	φ 1.1	φ 3	10	60	2
XC-23-A	φ 2.3	1.15	φ 1.4	φ 3	12.5	70	2
XC-28-A	φ 2.8	1.4	φ 1.7	φ 4	15	70	2
XC-33-A	φ 3.3	1.65	φ 2.0	φ 4	17.5	70	2
XC-38-A	φ 3.8	1.9	φ 2.4	φ 4	20	70	2
XC-48-A	φ 4.8	2.4	φ 3.0	φ 6	25	70	2
XC-58-A	φ 5.8	2.9	φ 3.5	φ 6	30	70	2
XC-78-A	φ 7.8	3.9	φ 4.7	φ 8	40	100	3
XC-98-A	φ 9.8	4.9	φ 5.9	φ 10	50	120	3



Straight type

Product code	Cutter diameter Dc (mm)	Cutter radius R (mm)	Neck diameter dn (mm)	Shank diameter Ds (mm)	Overall length L (mm)	Number of blades
XC-18-B	φ 1.8	0.9	φ 1.1	φ 1.1	50	2
XC-23-B	φ 2.3	1.15	φ 1.4	φ 1.4	60	2
XC-28-B	φ 2.8	1.4	φ 1.7	φ 1.7	70	2
XC-33-B	φ 3.3	1.65	φ 2.0	φ 2.0	80	2
XC-38-B	φ 3.8	1.9	φ 2.4	φ 2.4	85	2
XC-48-B	φ 4.8	2.4	φ 3.0	φ 3.0	105	2
XC-58-B	φ 5.8	2.9	φ 3.5	φ 3.5	120	2



Precautions for Use

- XEBEC Buck Burr Cutter is designed for NC machines. Never use it as a hand tool.

Caution

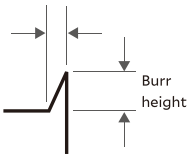
- Advanced preview control function can reduce edge-shape error.
- The processing error of the hole position must be kept as small as possible.

XEBEC Stone™ Flexible Shaft

Flexible shaft allows soft contact with a workpiece and suppresses subtle vibration when being processed. Ideal for deburring both front and back of a drilled hole.

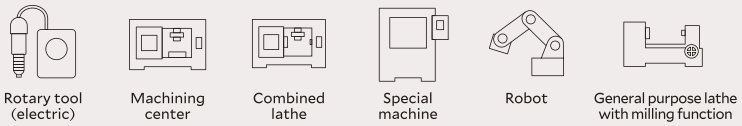
Target burr size
Burr root thickness of 0.1mm or less (Burrs are easily bent with a fingernail)

Burr root thickness



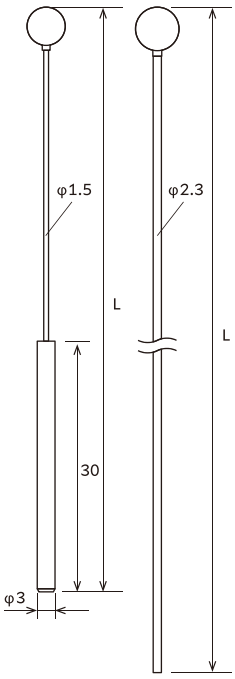
Applicable equipment

The tool can be mounted on an equipment which can control the rotational speed.



Ball type

Equivalent grit (Color)	Product code	Head size (mm)	Shaft diameter (mm)	Shank diameter (mm)	Overall length L (mm)	Recommended rotational speed (min-1)	Maximum rotational speed (min-1)
#800 (Blue)	CH-PB-3B	φ 3	φ 1.5	φ 3	70	5000–8000	15000
	CH-PB-4B	φ 4	φ 1.5	φ 3	70	5000–8000	13000
	CH-PB-5B	φ 5	φ 1.5	φ 3	70	5000–8000	12000
	CH-PB-6B	φ 6	φ 1.5	φ 3	70	5000–8000	10000
#400 (Orange)	CH-PO-3B	φ 3	φ 1.5	φ 3	70	5000–8000	15000
	CH-PO-4B	φ 4	φ 1.5	φ 3	70	5000–8000	13000
	CH-PO-5B	φ 5	φ 1.5	φ 3	70	5000–8000	12000
	CH-PO-6B	φ 6	φ 1.5	φ 3	70	5000–8000	10000
#220 (Gray)	CH-PM-3B	φ 3	φ 1.5	φ 3	70	5000–8000	15000
	CH-PM-4B	φ 4	φ 1.5	φ 3	70	5000–8000	13000
	CH-PM-5B	φ 5	φ 1.5	φ 3	70	5000–8000	12000
	CH-PM-6B	φ 6	φ 1.5	φ 3	70	5000–8000	10000
	CH-PM-10B	φ 10	φ 1.5	φ 3	70	4000–5000	6000
	CH-PM-3B-L	φ 3	φ 1.5	φ 3	150	—	1000
	CH-PM-4B-L	φ 4	φ 2.3	φ 2.3	150	—	3000
	CH-PM-5B-L	φ 5	φ 2.3	φ 2.3	150	—	3000
	CH-PM-6B-L	φ 6	φ 2.3	φ 2.3	150	—	3000
	CH-PM-10B-L	φ 10	φ 2.3	φ 2.3	150	—	2000



CH-PM-4B-L
CH-PM-5B-L
CH-PM-6B-L
CH-PM-10B-L

Cylinder type

Equivalent grit (Color)	Product code	Head size (mm)	Shaft diameter (mm)	Shank diameter (mm)	Overall length L (mm)	Recommended rotational speed (min-1)	Maximum rotational speed (min-1)
#800 (Blue)	CH-PB-3R	φ 3×3	φ 1.5	φ 3	70	5000–8000	15000
	CH-PB-4R	φ 4×4	φ 1.5	φ 3	70	5000–8000	13000
	CH-PB-5R	φ 5×5	φ 1.5	φ 3	70	5000–8000	12000
#400 (Orange)	CH-PO-3R	φ 3×3	φ 1.5	φ 3	70	5000–8000	15000
	CH-PO-4R	φ 4×4	φ 1.5	φ 3	70	5000–8000	13000
	CH-PO-5R	φ 5×5	φ 1.5	φ 3	70	5000–8000	12000
#220 (Gray)	CH-PM-3R	φ 3×3	φ 1.5	φ 3	70	5000–8000	15000
	CH-PM-4R	φ 4×4	φ 1.5	φ 3	70	5000–8000	13000
	CH-PM-5R	φ 5×5	φ 1.5	φ 3	70	5000–8000	12000
	CH-PM-5R-C01	φ 5x10	φ 1.5	φ 3	70	5000–8000	12000

Precautions for Use

The tool will break off when:

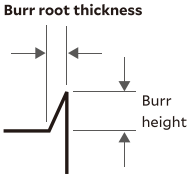
- being processed beyond the maximum rotational speed
- being used with a pneumatic tool

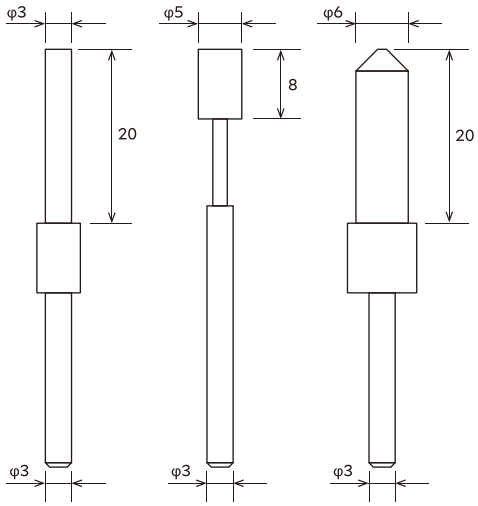
XEBEC Stone™ Mounted Point

Suitable for using with a pneumatic tool at high rotational speed

Target burr size
Burr root thickness of 0.1mm or less (Burrs are easily bent with a fingernail)

Burr root thickness





AX-PM-3R AX-PM-5RF AX-PM-6T

Applicable equipment

Rotary tool (electric) Rotary tool (pneumatic)

Equivalent grit (Color)	Product code	Head Size (mm)	Shank diameter (mm)	Head length (mm)	Maximum rotational speed (min-1)
#220 (Gray)	AX-PM-3R	φ 3	φ 3	20	60000
	AX-PM-5RF	φ 5	φ 3	8	30000
	AX-PM-6T	φ 6	φ 3	20	60000

Mobile Micromotor System

Designed for XEBEC products. Battery-powered tool which is usable where power supply is not available.
An ultra lightweight handpiece reduces work burden for long time use.

Product code	For use with	Maximum rotational speed (min-1)	Standard components
M2P33STX	φ3mm shank	30000	Handpiece with stand, controller on/off foot switch, power cable for charging

*About 5 hours of continuous use

Technical Information

XEBEC Brush™ Surface

How to select

Refer to the chart below and select brush color based on the workpiece material, burr root thickness and target surface.

Deburring

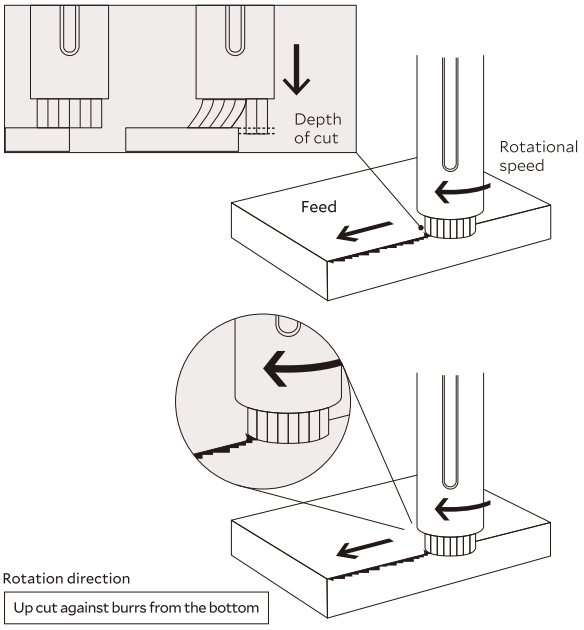
Workpiece material	Resin	Copper / Brass		
		Aluminum		
		General steel		
				Stainless steel
				Heat-resistant steel
				Cast-iron
				Hard-to-cut material
Thickness of burrs	Micro fine burrs			
		Burr root thickness (Up to 0.1mm)		
			Burr root thickness (0.1–0.2mm)	
Brush (Color)	A13(Pink)	A11(Red)	A21(White)	A32(Blue)
Grinding power	→ High			

Cutter mark removal and polishing

Workpiece material	Copper / Brass			
	Aluminum			
		General steel		
				Stainless steel
				Heat-resistant steel
				Cast-iron
				Hard-to-cut material
Target Surface roughness	Ra0.1 µm or better			
		Up to Ra0.1 µm		
Brush (Color)	A13(Pink)	A11(Red)	A21(White)	A32(Blue)
Grinding power	→ High			

Processing conditions: Rotational speed

Recommended rotational speed and maximum rotational speed are different depending on Brush size. See the table below.



Feed rate

Burr root thickness	0.05mm (Can be bent easily)	4000mm/min
	0.1mm (Can be bent)	2500mm/min
Cutter mark removal		300mm/min

Depth of cut

Vertical burrs	0.5mm
Horizontal burrs	1.0mm
Cutter mark removal	0.5mm
Polishing	0.3–1.0mm

Initial processing conditions

Product code	Rotational speed (min⁻¹)		Depth of cut (mm)				Feed rate (mm/min)			Brush projection (mm)
	Recommended	Maximum	Vertical burrs	Horizontal burrs	Cutter mark removal	Polishing	Burr root thickness 0.05mm	Burr root thickness 0.1mm	Cutter mark removal/ polishing	
A13-CB06M	8000	10000	0.5	0.5	0.5	0.3–0.5	4000	2500	300	10
A11-CB06M / A21-CB06M	8000	10000	0.5	0.5	0.5	0.3–0.5	4000	2500	300	10
A32-CB06M	8000	10000	0.3	0.3	0.3	0.2–0.3	4000	2500	300	10
A13-CB15M	4800	6000	1.0	1.0	0.5	0.3–0.5	4000	2500	300	10
A11-CB15M / A12-CB15M / A32-CB15M	4800	6000	0.5	1.0	0.5	0.3–0.5	4000	2500	300	10
A11-CB25M / A21-CB25M / A32-CB25M	4000	5000	0.5	1.0	0.5	0.3–0.5	4000	2500	300	15
A11-CB40M / A21-CB40M / A32-CB40M	2400	3000	0.5	1.0	0.5	0.3–0.5	4000	2500	300	15
A11-CB60M / A21-CB60M / A32-CB60M	1600	2000	0.5	1.0	0.5	0.3–0.5	4000	2500	300	15
A11-CB100M / A21-CB100M / A32-CB100M	960	1200	0.5	1.0	0.5	0.3–0.5	4000	2500	300	15

*In the case of resin, workpiece material may melt or discolor depending on the material.
In such a case, decrease the rotational speed to about 1/10 of the recommended condition.

Dry/Wet Machining

The tool can be used for both dry and wet (oil-based and water-soluble) machining.
Wet machining may improve surface finish quality and tool life.

If burrs remain

1. Increase rotational speed

Increase the rotational speed to the maximum. If burrs still remain, then decrease the feed rate.

Brush diameter (mm)	Product code	Recommended rotational speed (min^{-1})	Maximum rotational speed (min^{-1})
φ 6	A13-CB06M / A11-CB06M / A21-CB06M / A32-CB06M	8000	10000
φ 15	A13-CB15M / A11-CB15M / A21-CB15M / A32-CB15M	4800	6000
φ 25	A11-CB25M / A21-CB25M / A32-CB25M	4000	5000
φ 40	A11-CB40M / A21-CB40M / A32-CB40M	2400	3000
φ 60	A11-CB60M / A21-CB60M / A32-CB60M	1600	2000
φ 100	A11-CB100M / A21-CB100M / A32-CB100M	960	1200
φ 125	A11-CB125M / A21-CB125M / A32-CB125M	800	1000
φ 165	A11-CB165M / A21-CB165M / A32-CB165M	600	750
φ 200	A11-CB200M / A21-CB200M / A32-CB200M	480	600

2. Check the rotation direction of the Brush

For horizontal burrs, up cut is recommended so that the brush tip pushes up the burrs.

3. Change the Brush color

Change the Brush with higher grinding power.
The grinding power of the Brush : Blue > White > Red > Pink
Make sure to select Brush color based on the workpiece material and burr root thickness.

If the edge is too rounded

1. Increase feed rate

To make sharp edge, increase the feed rate in 1000 mm/min increments within the range where burrs can be removed. Increasing the feed rate also helps reduce cycle time.

2. Decrease rotational speed

Decrease the rotational speed in 10 to 20% increments within the range where burrs can be removed.

3. Check the Brush color

The grinding power of the Brush : Blue > White > Red > Pink
Select Brush color based on the workpiece material and burr root thickness.

To extend tool life

1. Increase feed rate

Increase the feed rate in 1000 mm/min increments within the range where burrs can be removed.

2. Decrease rotational speed

Decrease the rotational speed in 10 to 20% within the range where burrs can be removed.

If the surface becomes rough

Check the Brush color

Change the Brush with higher edge quality.
Edge quality of the Brush : Pink > Red > White > Blue
Make sure to select Brush color based on the workpiece material and target surface roughness.

REFERENCE DATA:
SURFACE ROUGHNESS AFTER DEBURRING

	A11(Red)	A21(White)	A32(Blue)
A5052	Approx. Ra0.6 µm, Rz5.0 µm	–	–
S50C	–	Approx. Ra0.2 µm, Rz1.6 µm	–
SUS304	–	–	Approx. Ra0.3 µm,Rz2.4 µm

To improve surface roughness

1. Check the Brush color

Make sure to select appropriate Brush color. Edge quality of the Brush : Pink > Red > White > Blue

2. Wet machining

The tool can be used for both dry and wet (oil-based and water-soluble) machining. Wet machining may improve surface roughness and tool life.

3. Increase the number of passes

When comparing in the same cycle time, increasing the number of passes makes bigger difference than decreasing feed rate.

EXAMPLE

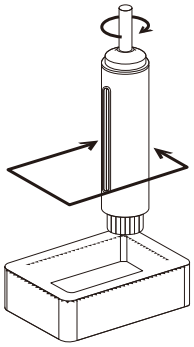
Rotational speed: 4000min-1 Depth of cut : 0.5mm Feed rate: 600mm/min The number of passes: 1	Rotational speed: 4000min-1 Depth of cut: 0.5mm Feed rate: 1200mm/min The number of passes: 2

REFERENCE DATA: TOOL LIFE

Material: Aluminum die-casting
Process details: Deburring after face milling process
Burr root thickness: 0.1mm
Traveling distance: 1000mm/pcs

Tool: A11-CB25M
Rotational speed: 4000min-1
Feed rate: 2400mm/min
Depth of cut: 1.0mm
Used length: 50mm out of 75mm

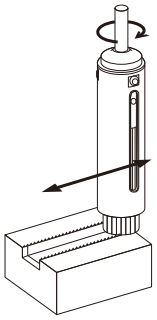
Tool life:
10km
10,000pcs (10km/1000mm)



Material: Carbon Steel S45C
Process details: Deburring after end milling process
Burr root thickness: 0.1mm
Traveling distance: 200mm/pcs

Tool: A21-CB25M
Rotational speed: 4000min-1
Feed rate: 2000mm/min
Depth of cut: 0.5mm
Used length: 50mm out of 75mm

Tool life:
3km
15,000pcs (3km/200mm)

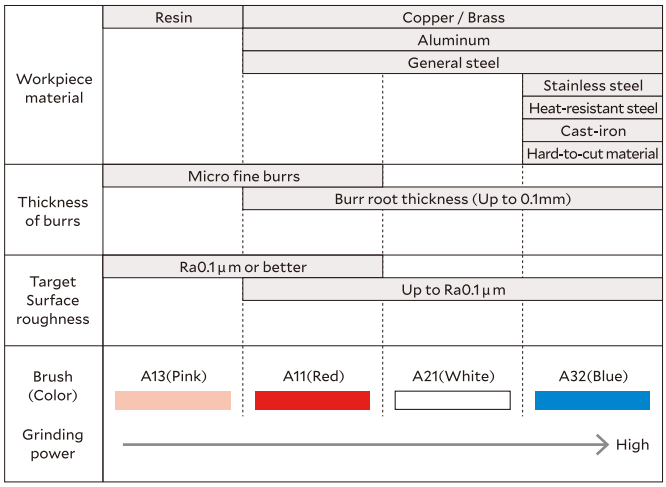


* Tool life significantly varies depending on processing conditions, burr conditions (size and direction) and workpiece material. The above data is not guaranteed. Please use as a guide.

XEBEC Brush™ Surface End Type

How to select

Grinding power differs depending on Brush color.
Refer to the chart and select Brush color based on the workpiece material and burr root thickness.



XEBEC Brush™ Surface Extra-Large

Initial processing conditions

Product code	Rotational Speed (min^{-1})		Depth of cut (mm)				Feed rate (mm/min)			Brush projection (mm)
	Recommended	Maximum	Vertical burrs	Horizontal burrs	Cutter mark removal	Polishing	Burr root thickness 0.05mm	Burr root thickness 0.1mm	Cutter mark removal/ Polishing	
A11-CB125M / A21-CB125M / A32-CB125M	800	1000	0.5	1.0	0.5	0.3–0.5	4000	2500	300	15
A11-CB165M / A21-CB165M / A32-CB165M	600	750	0.5	1.0	0.5	0.3–0.5	4000	2500	300	15
A11-CB200M / A21-CB200M / A32-CB200M	480	600	0.5	1.0	0.5	0.3–0.5	4000	2500	300	15

XEBEC Brush™ Wheel Type

Initial processing conditions

Product code	Cutting speed (m/min)	Rotational speed (min-1)	Feed per bundle (mm/bundle)	Depth of cut (mm)	Feed rate (mm/min)
W-A11-50	250	1600	0.5	0.2	4800
W-A11-75	250	1000	0.5	0.2	3000

Pocessing Conditions Range

Product code	Cutting speed (m/min)	Feed per bundle (mm/bundle)	Depth of cut (mm)	Maximum rotational speed (min^{-1})
W-A11-50	150–350	1.5 or less	0.5 or less	3000
W-A11-75				

* As bristles are worn out, bristle length becomes shorter and increases stiffness, causing bristles to be broken. If bristles breakage occurs, decrease the depth of cut.

If burrs remain

1. Increase the number of passes
2. Decrease the feed per bundle in 10 to 20% increments

To extend tool life

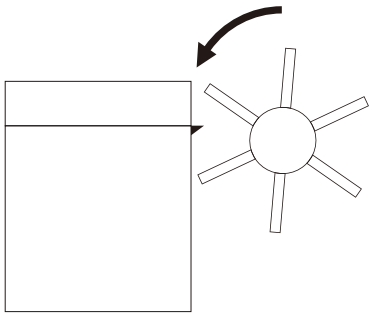
Increase the feed per bundle in 10 to 20% increments

REFERENCE DATA: TOOL LIFE

Material: Carbon Steel S45C
Process details: Deburring after end milling
Burr root thickness: 0.1mm
Traveling distance: 120mm/pcs

Tool: W-A11-50
Cutting speed: 250m/min
(Spindle Speed: 1600min-1)
Feed per bundle: 0.7mm/bundle
(Feed rate: 7000mm/min)
Depth of cut: 0.2mm
Used length: 10mm out of 13.5mm

Tool life:
600m
5,000pcs (600m/120mm)



* Tool life significantly varies depending on processing conditions, burr conditions (size and direction) and workpiece material. The above data is not guaranteed. Please use as a guide.

XEBEC Brush™ Crosshole

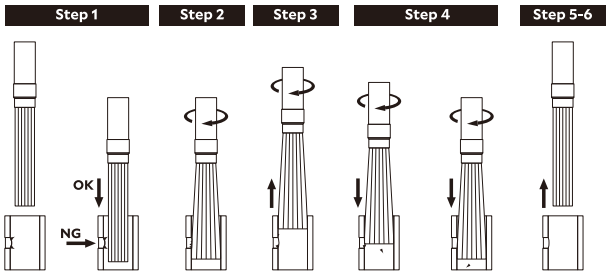
How to Select

Refer to the chart and select Brush color based on the workpiece material and burr root thickness.

Workpiece material	Resin	General steel
	Copper/Brass	Stainless steel
	Aluminum	
		Heat-resistant steel
		Cast-iron
		Hard-to-cut material
Thickness of burrs	Micro fine burrs	
	Burr root thickness (Up to 0.1mm)	
Target Surface roughness	Ra0.1 µm or better	
		Up to Ra0.1 µm
Brush (Color)	A12(Red)	A33(Blue)
Grinding power	High	

* XEBEC Brush has high grinding power on the tip.
The Brush tip needs to be in contact with the processing area.

How to Use



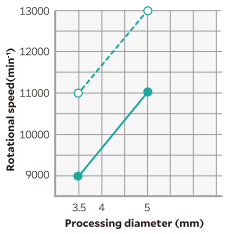
1. Insert the Brush while not in motion.
   * If you rotate the Brush outside the cylinder, the bristles may be damaged or scattered and may cause injury to an operator.
2. Rotate the tool past the crosshole
   * Consistent edge quality can be obtained by rotating the tool in both CW and CCW direction.
3. Process while pulling the Brush back.
   * Pulling the Brush back past the crossholes prevents burrs from being laid flat against the interior surface of the cylinder.
4. Process while pushing the Brush forward.
5. Stop the Brush rotation.
6. Remove the Brush while it is at rest.

Processing conditions: Rotatinal speed

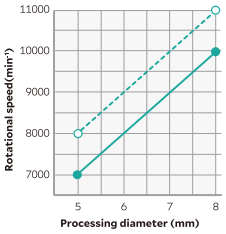
Recommended rotational speed is different depending on Brush diameter. See the diagrams below.

Recommended rotational speed
Rotational speed when the Brush is worn down 10mm

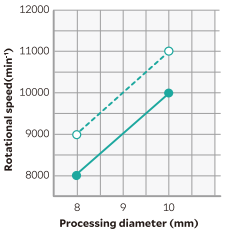
CH-A12-1.5M
Target hole dia.: φ3.5–5mm
Recommended rotational speed: 9000–11000min^{-1}



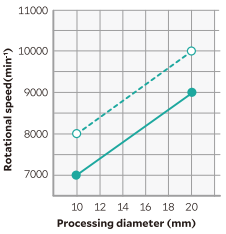
CH-A12-3M/3L
Target hole dia.: φ5–8mm
Recommended rotational speed: 7000–10000min^{-1}



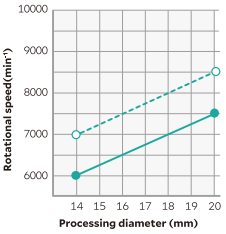
CH-A12-5M/5L
Target hole dia.: φ8–10mm
Recommended rotational speed: 8000–10000min^{-1}



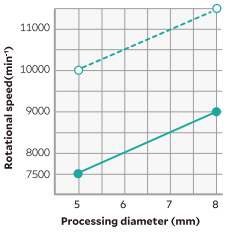
CH-A12-7M/7L
Target hole dia.: φ10-20mm
Recommended rotational speed: 7000-9000min^{-1}



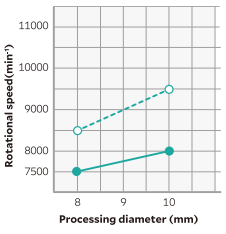
CH-A12-11M/11L
Target hole dia.: φ14-20mm
Recommended rotational speed: 6000-7500min^{-1}



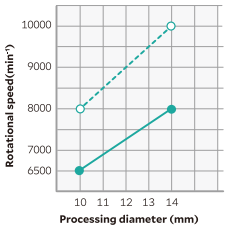
CH-A33-3M/3L
Target hole dia.: φ5–8mm
Recommended rotational speed: 7500–9000min^{-1}



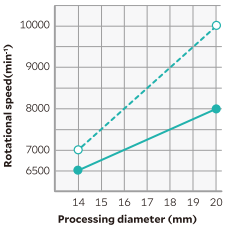
CH-A33-5M/5L
Target hole dia.: φ8–10mm
Recommended rotational speed: 7500–8000min^{-1}



CH-A33-7M/7L
Target hole dia.: φ10–14mm
Recommended rotational speed: 6500–8000min^{-1}



CH-A33-11M/11L
Target hole dia.: φ14–20mm
Recommended rotational speed: 6500–8000min^{-1}



FEED RATE: 300mm/min

If burrs remain

1. Increase rotational speed to the maximum in increments of 1000 min^{-1}

2. Increase the number of passes

If the workpiece cannot be deburred even by the above-mentioned procedures, the machining condition may be incorrect or the burr size is too large. Change the Brush with higher grinding power. The grinding power of the Brush : Blue > Red

To extend tool life

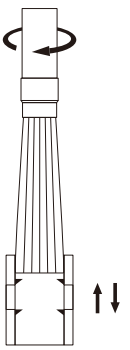
Decrease the rotational speed in 10% increments or increase the feed rate in 10% increments

REFERENCE DATA: TOOL LIFE

Material: Carbon Steel S45C
Process details: Cross hole deburring after drilling process
Burr root thickness: 0.1mm
Hole diameter :
Main bore Φ10mm
Cross hole Φ5mm

Tool: CH-A12-5M
Rotational speed: 10000min-1
Feed rate: 300mm/min
Used length: 10mm out of 50mm

Tool life : 4500 holes



* Tool life significantly varies depending on processing conditions, burr conditions (size and direction) and workpiece material.
The above data is not guaranteed. Please use as a guide.

XEBEC Back Burr Cutter and Path™

Contents of XEBEC Path for Back Burr Cutter

- A set of Path data includes 2 cutting directions (up cutting/down cutting) , 2 modes (incrementa l/absolute) and 5 kinds of deburring amounts. The contents differ depending on the edge type .
- Path data is provided as text data. (An example is shown on the right.)

An example of Path data provided

Target edge
(Inner edges Upper/Lower)

An example of point group data

INNER-1D28.-2D2.2-T1.8-AR0-E0)
(EDGE BREAK AMOUNT 0.11)
(UPPER EDGE)
(INC)
(DOWN CUT)

X0.000Y0.000Z0.000
X0.000Y0.000Z-1.502
X0.460Y0.000Z0.000
X-0.019Y0.130Z0.004
X-0.053Y0.117Z0.009
X-0.079Y0.094Z0.012
X-0.096Y0.067Z0.012

The start points of the Path for the upper and lower edges of the inner diameter are shown above.

Initial processing conditions

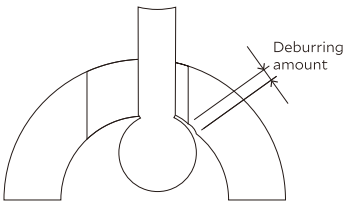
Cutter type	Product code	Cutter diameter Dc (mm)	Projection amount	Aluminum alloy		General steel/Stainless steel	
				Spindle speed (min^{-1})	Feed rate (mm/min)	Spindle speed (min^{-1})	Feed rate (mm/min)
Regular tpye	XC-08-A	φ 0.8	5D	20000	650	20000	600
	XC-13-A	φ 1.3	5D	20000	650	20000	600
	XC-18-A	φ 1.8	5D	20000	650	20000	600
	XC-23-A	φ 2.3	5D	18000	950	15000	750
	XC-28-A	φ 2.8	5D	15000	1400	12500	1000
	XC-33-A	φ 3.3	5D	12700	1250	10600	1050
	XC-38-A	φ 3.8	5D	11000	1600	9200	1200
	XC-48-A	φ 4.8	5D	8500	1600	7200	1100
	XC-58-A	φ 5.8	5D	7000	1200	6000	900
	XC-78-A	φ 7.8	5D	5400	1600	4500	1350
	XC-98-A	φ 9.8	5D	4300	1300	3600	1100
Straight type	XC-18-B	φ 1.8	10D	4400	220	4400	220
	XC-23-B	φ 2.3	10D	3500	220	3500	220
	XC-28-B	φ 2.8	10D	2800	220	2800	220
	XC-33-B	φ 3.3	10D	2400	190	2400	190
	XC-38-B	φ 3.8	10D	2000	160	2000	160
	XC-48-B	φ 4.8	10D	1600	120	1600	120
	XC-58-B	φ 5.8	10D	1300	100	1300	100

* Processing conditions of straight type (B) depends on projection amount. (Conditions on the table above are for projection amount 10D.)
* The spindle speed and table feed are rough standards for initial processing.
* If the spindle speed and /or table feed fail to meet the standard conditions listed in the table, or an abnormal vibration or noise occurs, decrease the spindle speed and table feed at an equal rate. Make sure to maintain the feed per rev (fn).

Deburring amounts and cumulative error

Product code	Cutter diameter (mm)	Deburring Amount (mm)					Allowable Cumulative Error (mm)
		1	2	3	4	5	
XC-08-A	φ 0.8	0.02	0.04	0.06	0.08	0.10	0.03
XC-13-A	φ 1.3	0.04	0.06	0.08	0.10	0.12	0.05
XC-18-A / B	φ 1.8	0.07	0.09	0.11	0.13	0.15	0.08
XC-23-A / B	φ 2.3	0.07	0.09	0.11	0.13	0.15	0.09
XC-28-A / B	φ 2.8	0.08	0.11	0.14	0.17	0.20	0.10
XC-33-A / B	φ 3.3	0.08	0.11	0.14	0.17	0.20	0.11
XC-38-A / B	φ 3.8	0.09	0.13	0.17	0.21	0.25	0.12
XC-48-A / B	φ 4.8	0.10	0.15	0.20	0.25	0.30	0.15
XC-58-A / B	φ 5.8	0.10	0.15	0.20	0.25	0.30	0.18
XC-78-A	φ 7.8	0.10	0.15	0.20	0.25	0.30	0.18
XC-98-A	φ 9.8	0.10	0.15	0.20	0.25	0.30	0.18

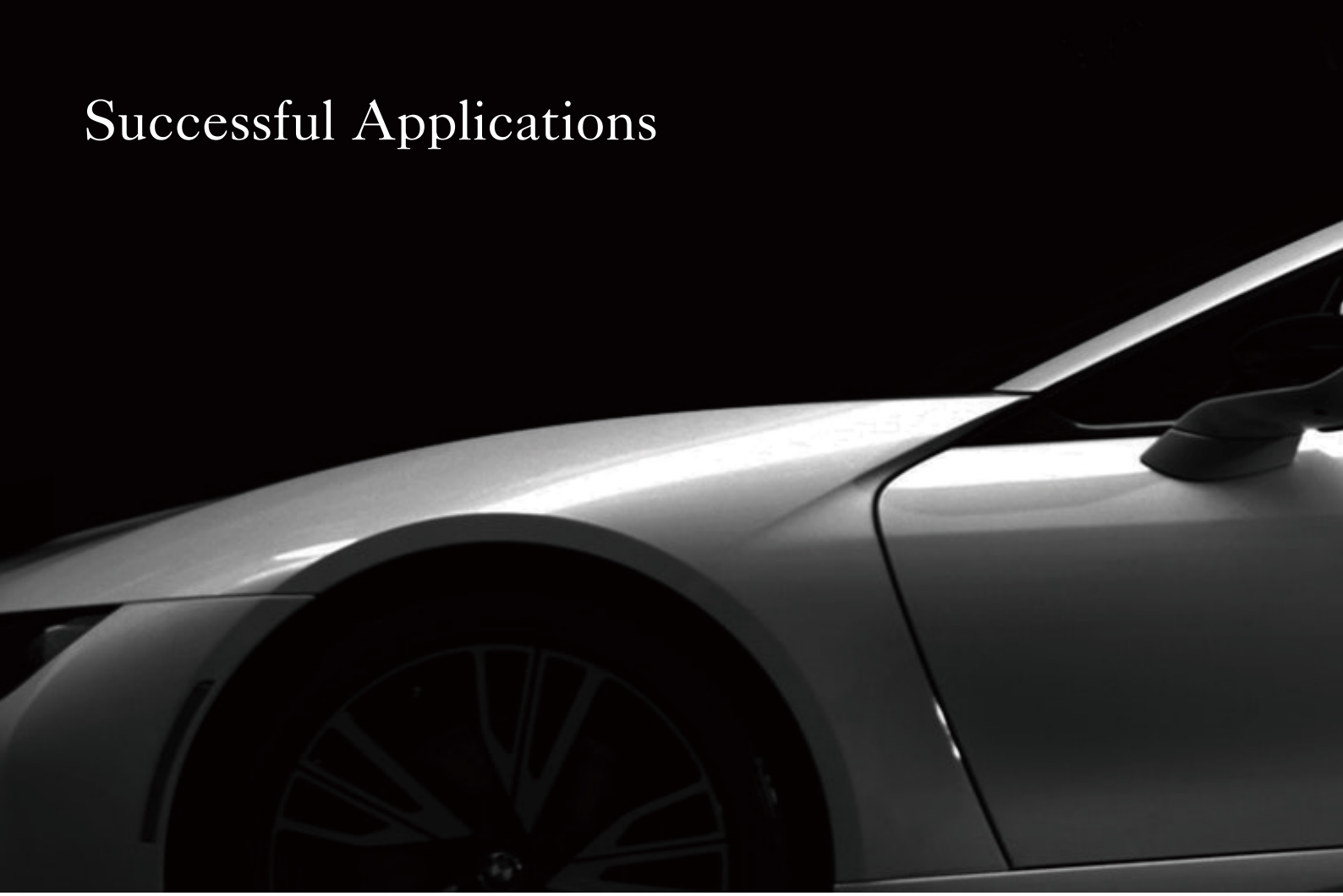
Deburring amount is a width of an edge after deburring with the Cutter as shown in the picture.



Line-up of XEBEC Back Burr Path for Tapped Hole

Tap Size	Applicable cutter type and code	Cutter diameter Dc (mm)	Deburring Amount (mm)
M3	XC-23-A / B	φ 2.3	0.11
M4	XC-28-A / B	φ 2.8	0.14
M5	XC-33-A / B	φ 3.3	0.14
M6	XC-38-A / B	φ 3.8	0.17
M8	XC-48-A / B	φ 4.8	0.20
M10	XC-58-A / B	φ 5.8	0.20
M12	XC-78-A	φ 7.8	0.20
M16~24	XC-98-A	φ 9.8	0.20

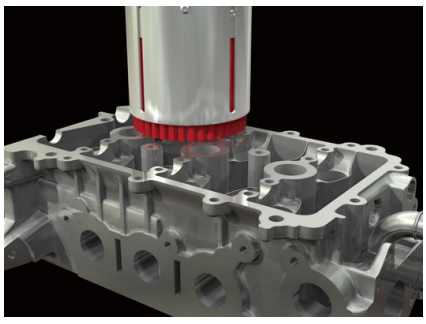
Successful Applications



Gasoline-fueled vehicles

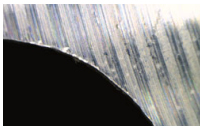
Adopted in engine parts which require high precision among other automotive parts.

Cylinder head - deburring

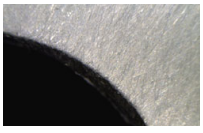


Material：ADC12
Previous process：
Face milling
Tool：
XEBEC Brush™ Surface
（A11-CB100M）

Before



After



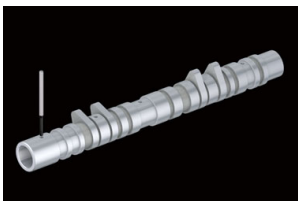
Problem

Deburring with a nylon brush was time-consuming and burrs remained after the deburring process. Sludges of a nylon brush contaminated the coolant and caused extra work to remove the dirt attached to the workpiece.

Effect

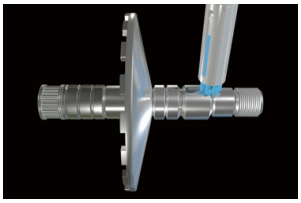
Achieved high-feed processing and cycle time shortened by 80%.
Additionally, the dirt of the coolant was reduced to 1/3 or less and saved a lot of time washing off the dirt on workpiece.

Camshaft - deburring



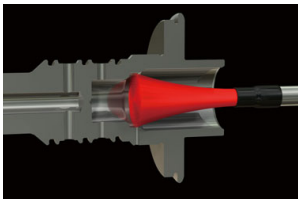
Material：FCD
Previous process：Drilling
Tool：
XEBEC Back Burr Cutter and Path™
（XC-38-A）

Pulley - deburring



Material：Scr420
Previous process：Side milling
Tool：
XEBEC Brush™ Surface
（A32-CB25M）

Input shaft - deburring



Material：SCM
Previous process：Drilling
Tool：
XEBEC Brush™ Crosshole
（CH-A12-7M）

Electric and hybrid vehicles

Introduced in electric and hybrid vehicle parts.

Cooling parts - deburring

Material：Aluminum
Previous process：
Face milling
Tool：
XEBEC Brush™ Surface
（A11-CB40M）

Before

After

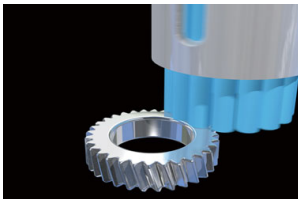
Problem

Burrs are generated on the outer periphery of the pins. Manual deburring was time-consuming and the edge quality was inconsistent. Horizontal burrs were not removed completely by a nylon brush.

Effect

Succeeded in CNC deburring with a simple tool path. The edge quality becomes stable and the cycle time was decreased.

Pinion gear - deburring



Material：S45C
Previous process：Gear cutting
Tool：
XEBEC Brush™ Surface
（A32-CB40M）

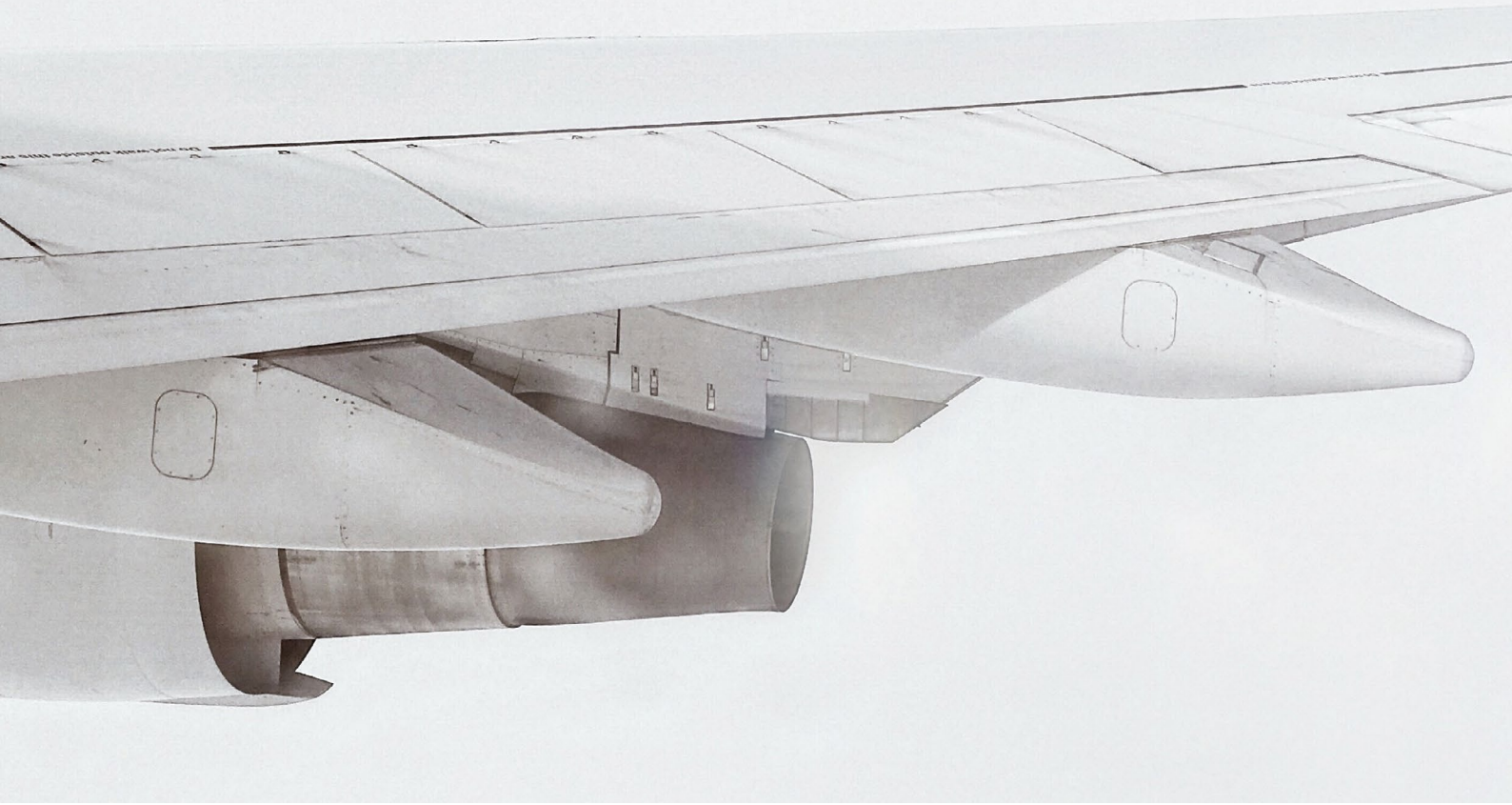
Yoke - deburring

Material：SCM
Previous process：Drilling
Tool：
XEBEC Back Burr Cutter and Path™
（XC-58-A）

Control box - deburring

Material：Aluminum alloy
Previous process：Face milling
Tool：
XEBEC Brush™ Surface
（A11-CB25M）

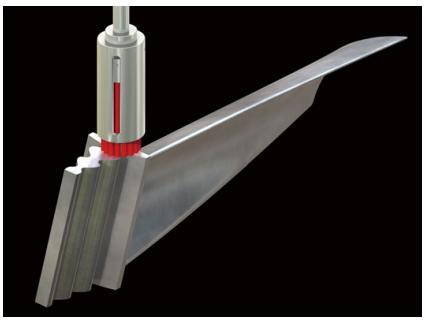
Successful Applications



Aircrafts

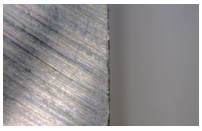
Adopted in deburring and polishing of aircraft parts which require high precision.

Turbine blade - deburring



Material：SUS316
Previous process：
Ball-end milling
Tool：
XEBEC Brush™ Surface
（A11-CB25M）

Before



After

Problem

In order to avoid defective pieces, the parts were manually deburred using a file but it was time-consuming.

Effect

CNC deburring shortened cycle time and the scrap rate went to zero.

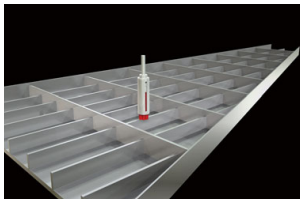
Blisk - deburring

Material：Inconel
Previous process：
Ball-end milling
Tool：
XEBEC Brush™ Surface
（A21-CB25M）

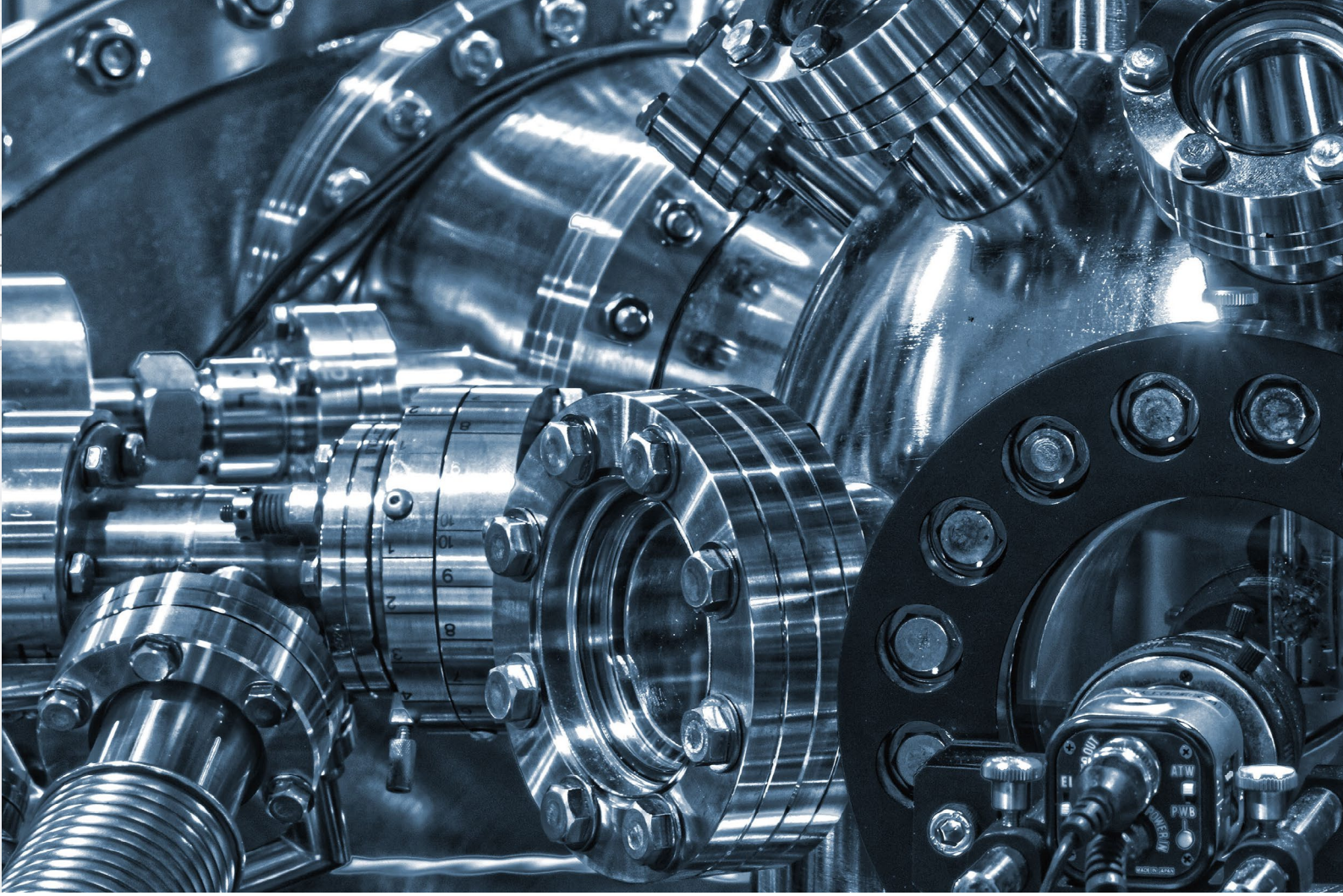
Turbine disk - deburring

Material：Inconel
Previous process：
Grinding
Tool：
XEBEC Brush™ Surface
（A11-CB40M）

Wing rib - deburring



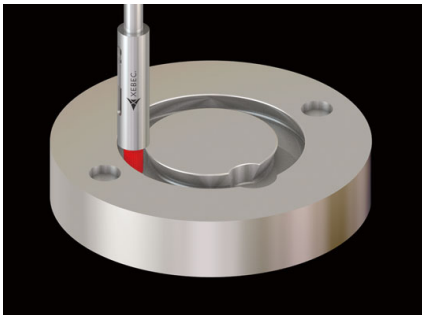
Material：Aluminum
Previous process：End milling
Tool：
XEBEC Brush™ Surface
（A11-CB25M）



Other fields

Adopted in various fields such as semiconductor, construction machinery and medical parts.

Vacuum device - cutter mark removal



Material：Iron-based
Previous process：
End milling
Tool：
XEBEC Brush™ Surface
（A11-CB06M）

Before

After

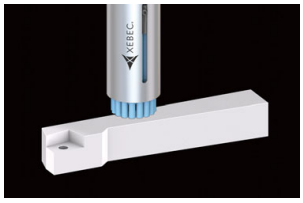
Problem

Manual polishing on sealing surface was time-consuming. Polishing process was depending on a worker's skill and daily workload was limited.

Effect

Rough to medium polishing was successfully operated on machine and manual polishing was shortened from 35 minutes to 1 minute.

Tool holder - deburring



Material：Iron-based
Previous process：
Face milling
Tool：
XEBEC Brush™ Surface
（A32-CB40M）

Hydraulic component - deburring

Material：SCM
Previous process：Drilling
Tool：
XEBEC Back Burr Cutter and Path™
（XC-58-A）

Artificial bone - cutter mark removal

Material：SUS
Previous process：End milling
Tool：
XEBEC Brush™ Surface
（A32-CB06M）

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