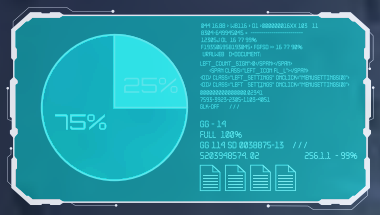
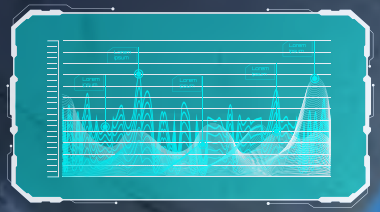
XEBEC® | DEBURRING TECHNOLOGIES

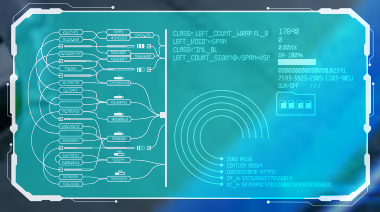
deburringtechnologies.com

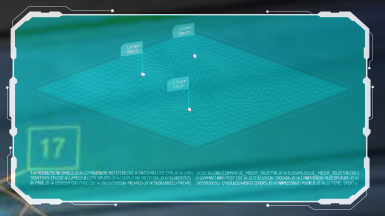
Advanced Manufacturing Solutions

Energy









DEBURRING & FINISHING

- Cross Holes
- Finishing & Polishing
- Cutter Mark Removal
- Edge Break

Advanced Manufacturing Solutions

Energy

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DEBURRING & FINISHING

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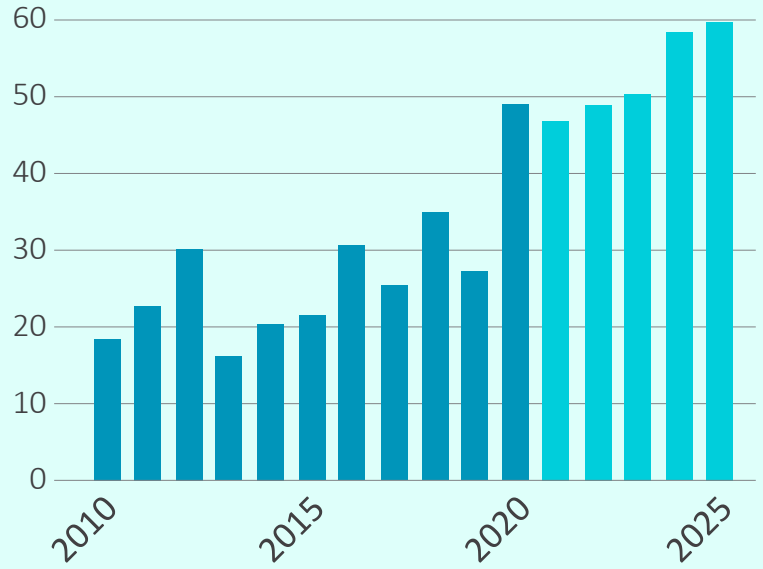
More Power

The rise in energy consumption in our society is exponential. It seems the more we have, the more we need. Demand for new, more efficient generation capacity is growing. Traditional sources remain strong, in addition to ever-expanding renewable energy infrastructures. But not all manufacturers are prepared to increase production.

US Annual Electric Capacity Additions

Projected to 2025 (Gigawatts)



SOURCE: U.S. Energy Information Administration, Annual Energy Outlook 2021

Today's challenges are fueling an evolution in manufacturing

A new generation of engineers has risen to the challenge. Designing new technologies and innovative manufacturing methods - they are setting new standards of efficiency. Their ingenuity will increase production despite skilled labor shortages. Encouraging manufacturers to invest in machines that equip them to handle the surge in demand for more power.

Feeling the pressure

The current demand for energy production is accelerating, with no signs of letting up. It may feel like you can't produce parts fast enough. This can add increased pressure to process engineers to develop new systems that speed up production. So, how do you increase volume without sacrificing quality?

Are You Equipped to Meet Your Production Goals?

Engineering solutions

Innovations in automated deburring and finishing can make a huge impact on productivity by allowing precious labor hours to be allocated elsewhere. While improved quality and the elimination of scrap provide the savings needed to reinvest in modern tools and equipment.

Quality Over Quantity. Do You Have to Choose?

Product quality is of particular concern in energy manufacturing. So, engineers are rightly cautious about introducing new or unfamiliar finishing processes. But, it is becoming increasingly obvious that the old-fashioned methods of manual deburring are a burden to production time.

The perfect fit for tight tolerances

The manufacturing and finishing techniques of the future are automated. And many of the tolerances are too tight to be achieved by hand. Which means you must rise to meet the growing demand for your components by automating the finishing process - cutting production time, and ensuring consistent quality in your operations.

Finish precision parts on the machine

DOWNLOAD THE PDF:
Energy Industry Use Case Study

Labor hours for manual deburring can be better spent elsewhere

Often, there is untapped potential within manufacturers' ranks. You can provide employees opportunities to gain new skills, certifications and degrees so they can move up or change course as your company evolves structurally, technologically and otherwise.

READ THE FULL STORY ON OUR BLOG:
Upskilling to Overcome the Labor Shortage in Manufacturing

Upskill your team members to fill vital roles and prepare them for a role in your company's future.

Inconsistencies in Manual Deburring Can Result in Rework and Scrapped Parts

When working with complex and intricate products that require tight tolerances, precision is make-or-break. You can't afford to scrap a nearly completed part because a slip of the hand altered the edge break or a distracted laborer over-worked a radius.

In reality, a clean edge break simply can't be consistently achieved manually. Scrapping an expensive part in the deburring stage can cause backups across the board.

Eliminate Rework and Scrapped Parts by Modernizing Your Deburring Operation

READ THE FULL STORY ON OUR BLOG:
5 Lean Manufacturing Challenges to Meet with Xebec Deburring Solutions

Use Xebec Brush in a Robotic Arm for Fast, Consistent Finishing

Innovations in Automated Manufacturing Technologies.

New technologies for machining and deburring can provide incredible time savings, in the speed of production, and the elimination of rework or scrapped parts. These technologies also provide the security of quality consistency. Because sacrificing quality is not an option.

Modernization of your deburring operations can equal enormous savings and productivity gains. It is the most efficient way to help your team meet the most demanding of productivity goals.

READ THE FULL STORY ON OUR BLOG:
How Xebec Deburring Products Help Manufacturers Conquer Today's Challenges

IMPROVING QUALITY

Xebec products safely achieve outstanding repeatable part quality to meet the most demanding industry standards.

INCREASING PRODUCTIVITY

Innovative products for a wide range of manufacturing processes & products that decrease processing time and increase throughput.

REDUCING COSTS

Longer tool life, faster processes and lower scrap levels equals the greatest value, resulting in lowest cost per piece.

Valve Plate

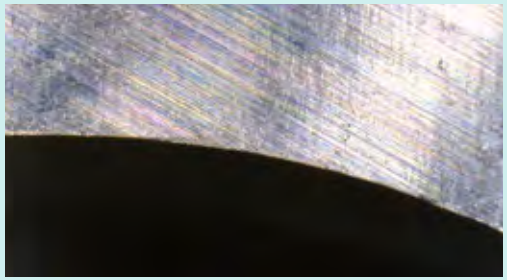
Workpiece information

Industry	Energy
Part name	Gas Compressor Valve Plate
Material type	400 Stainless
Cutting process	Surface Deburring & Finishing

Processing conditions

Tool	XEBEC™ Brush Surface (A21-CB40M)
Processing detail	Deburring and finishing of edges, Fine surface finishing of detailed parts
Spindle Speed	1,400 RPM
Feed Rate	90 IPM

Before



After

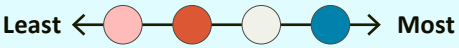
LEARN MORE ABOUT
XEBEC Brush™ Surface

TOOL XEBEC Brush™ Surface

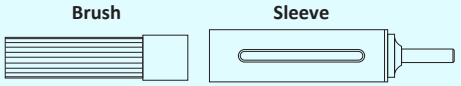
Available in Diameters:
6, 15, 25, 40, 60, 100 mm

Available Colors (Aggressiveness):
Pink, Red, White, Blue

Aggressiveness indicated by Color:



Brush Requires Brush Sleeve to Operate:

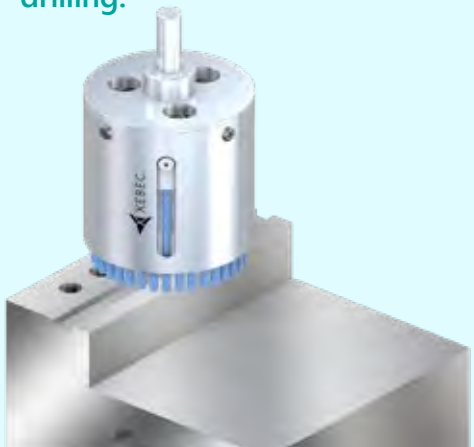


XEBEC Brush™ Surface

Ideal for:

- **Surface Deburring**
- **Cutter Mark Removal**
- **Edge Radius**
- **Surface Finishing**
- **Polishing**

Deburring & finishing following face-milling, end-milling & drilling.



Turbine Vane

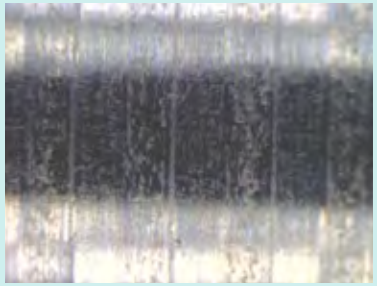
Workpiece information

Industry	Energy
Part name	Gas Compressor Turbine Blade
Material type	Steel
Cutting process	Surface Deburring & Finishing

Processing conditions

Tool	XEBEC™ Brush Surface (A32-CB15M)
Processing detail	Deburring and finishing of edges, surface finishing of aerodyanamic part
Spindle Speed	3,500 RPM
Feed Rate	50 IPM

Before



After

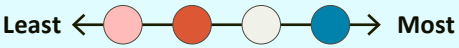
LEARN MORE ABOUT
XEBEC Brush™ Surface

TOOL XEBEC Brush™ Surface

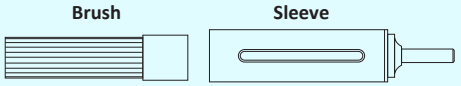
Available in Diameters:
6, 15, 25, 40, 60, 100 mm

Available Colors (Aggressiveness):
Pink, Red, White, Blue

Aggressiveness indicated by Color:



Brush Requires Brush Sleeve to Operate:

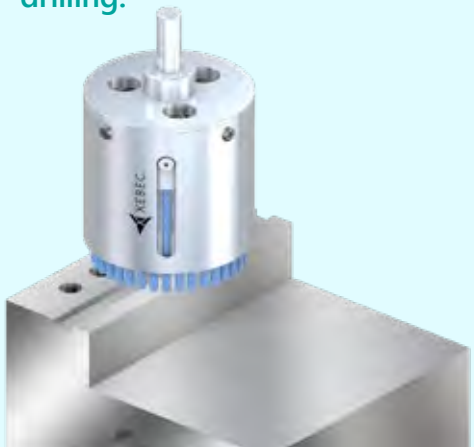


XEBEC Brush™ Surface

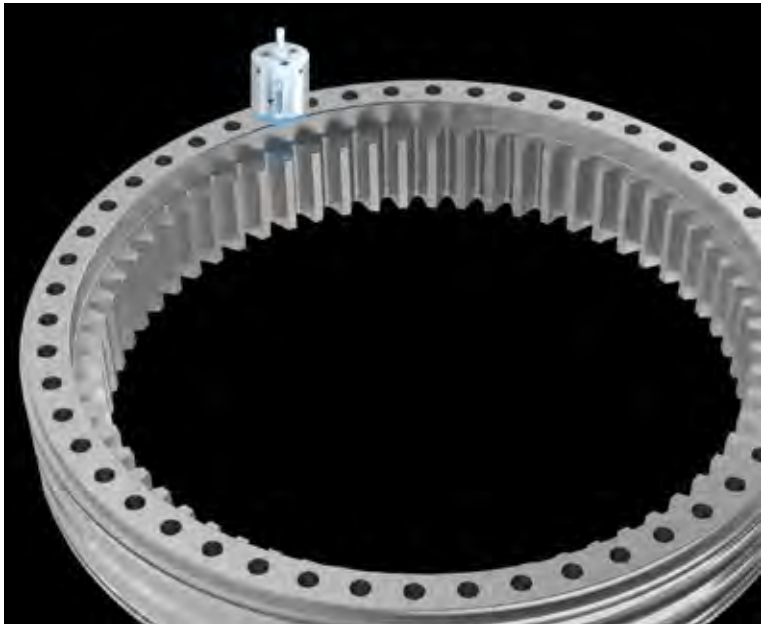
Ideal for:

- **Surface Deburring**
- **Cutter Mark Removal**
- **Edge Radius**
- **Surface Finishing**
- **Polishing**

Deburring & finishing following face-milling, end-milling & drilling.



Turbine Ring Bearing



Workpiece information

Industry	Energy
Part name	Pitch Bearing for Wind Turbine
Material type	Steel Alloy
Cutting process	Surface Deburring & Finishing

Processing conditions

Tool	XEBEC™ Brush Surface (A32-CB100M)
Processing detail	Deburring and finishing of edges and surface area
Spindle Speed	600 RPM
Feed Rate	70 IPM

TOOL XEBEC Brush™ Surface

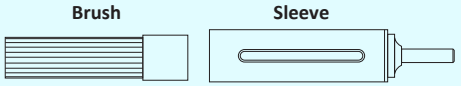
Available in Diameters:
6, 15, 25, 40, 60, 100 mm

Available Colors (Aggressiveness):
Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ← → **Most**

Brush Requires Brush Sleeve to Operate:

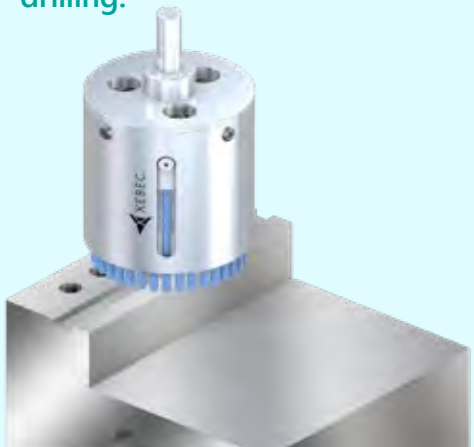


XEBEC Brush™ Surface

Ideal for:

- **Surface Deburring**
- **Cutter Mark Removal**
- **Edge Radius**
- **Surface Finishing**
- **Polishing**

Deburring & finishing following face-milling, end-milling & drilling.



LEARN MORE ABOUT
XEBEC Brush™ Surface

Main Shaft

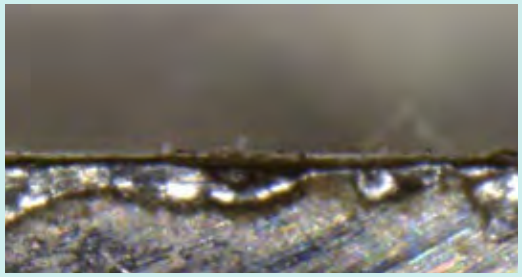
Workpiece information

Industry	Energy
Part name	Main Shaft
Material type	Forged Steel
Cutting process	Surface Finishing

Processing conditions

Tool	XEBEC™ Brush Surface Extra-Large (A32-CB165M)
Processing detail	Finishing of edges and large surface area
Spindle Speed	600 RPM
Feed Rate	85 IPM

Before



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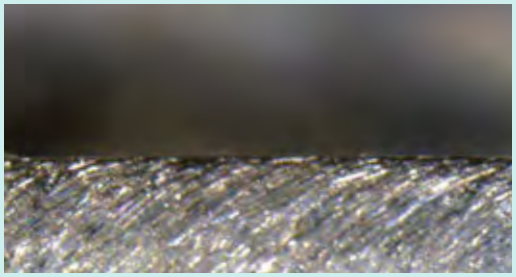


LEARN MORE ABOUT
XEBEC Brush™ Surface Extra-Large

TOOL XEBEC Brush™ Surface Extra-Large

Available in Diameters:
125, 165, 200 mm

Available Colors (Aggressiveness):
Red, White, Blue

Aggressiveness indicated by Color:

Least ← → **Most**

Brush Requires Slide Ring to Operate:

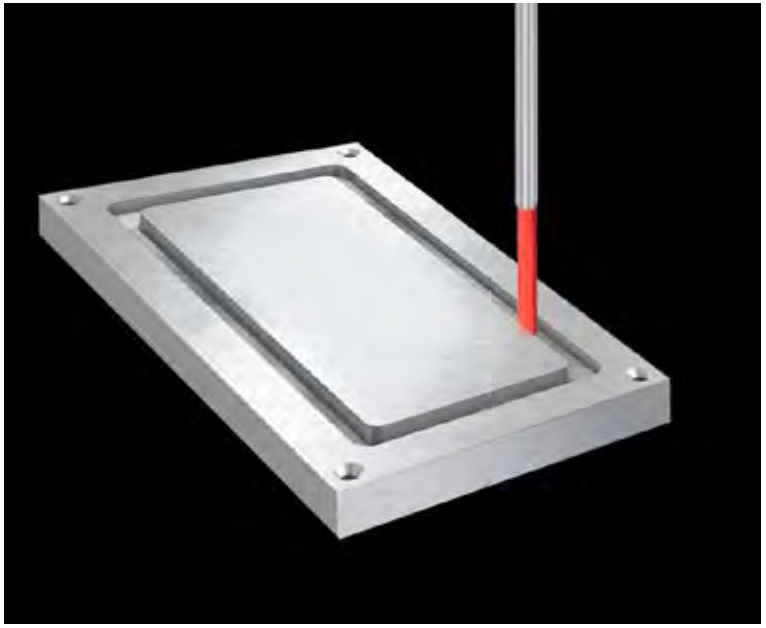
XEBEC Brush™ Surface Extra-Large

Ideal for:

- **Surface Deburring**
- **Cutter Mark Removal**
- **Edge Radius**
- **Surface Finishing**
- **Polishing**

For large parts with surface widths greater than 4 inches. Deburring & finishing following face-milling, end-milling & drilling.

Channeled Plate



Workpiece information

Industry	Energy
Part name	Channeled Plate
Material type	Aluminum Alloy
Cutting process	Surface Deburring & Finishing

Processing conditions

Tool	XEBEC™ Brush End Type (A11-EB025S)
Processing detail	Deburring and finishing of channeled surface feature
Spindle Speed	6,500 RPM
Feed Rate	100 IPM

TOOL XEBEC Brush™ End Type

Available in Diameters:
1, 1.5, 2, 2.5, 3, 5 mm

Available Colors (Aggressiveness):
Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ← → **Most**

XEBEC Brush™ End Type

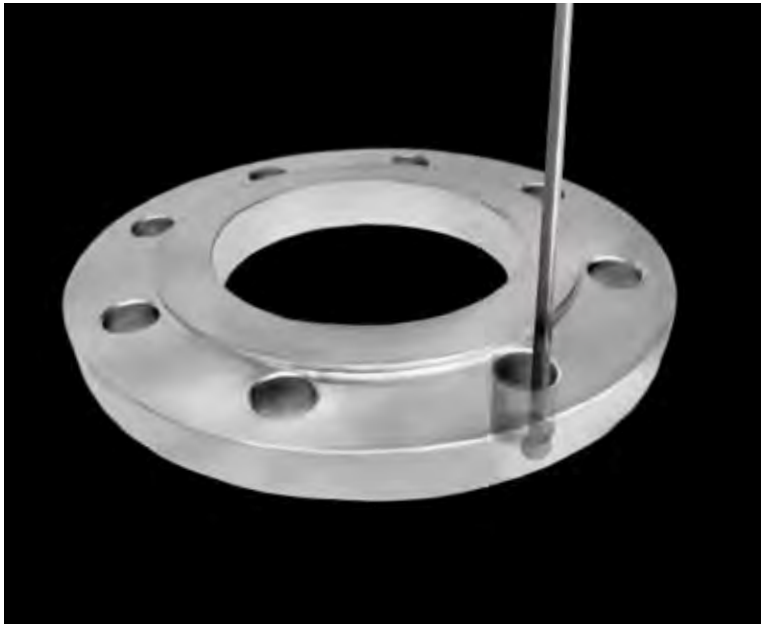
Ideal for:

- **Detailed, Intricate Parts**
- **Surface Deburring**
- **Cutter Mark Removal**
- **Polishing**

Cutter-mark removal, polishing and finishing of parts with narrow features.

LEARN MORE ABOUT
XEBEC Brush™ End Type

Flange



Workpiece information

Industry	Energy
Part name	Flange
Material type	Stainless
Cutting process	Crosshole Deburring

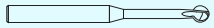
Processing conditions

Tool	XEBEC™ Back Burr Cutter (XC-78-B)
Processing detail	Deburring inside and outside edges of mounting holes with chamfered edges.

TOOL

XEBEC™ Back Burr Cutter & Path

Spherical Cutting Tool



Custom Path Data

The tool can be mounted on machining center (XYZ-axis) or combined lathe (XZY or XZC-axis). 3-axis simultaneous control is required.

Machining Center

Combined Lathe

XEBEC™ Back Burr Cutter & Path

Ideal for:

- **Deburring Difficult Holes**
- **Inner and Outer Diameters**
- **Irregular, Off-Center Holes**

One Cutter size supports various edges in different sizes and shapes.

LEARN MORE ABOUT
XEBEC™ Back Burr Cutter & Path

Shaft Collar

Workpiece information

Industry	Energy
Part name	Shaft Collar
Material type	Alluminum Alloy
Cutting process	Crosshole Deburring & Finishing

Processing conditions

Tool	XEBEC™ Stone Flexible Shaft (CH-PM-10B)
Processing detail	Deburring of inner and outer edges of holes.
Spindle Speed	5,000 RPM
Depth of Cut	0.016"

TOOL XEBEC Stone™ Flexiblte Shaft

Head Styles:

Cylinder Sphere

Available in Diameters:
3, 4, 5, 6, 10 mm

Stone color and grit:

Blue #800 Orange #400 Gray #220

XEBEC Stone™ Flexible Shaft

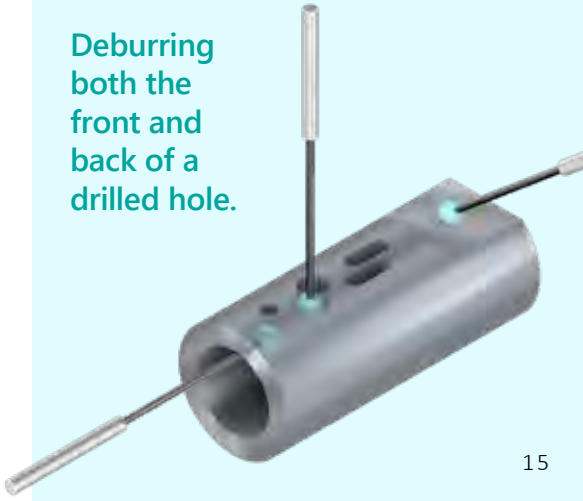
Ideal for:

- **Deburring Cross Holes**
- **Soft Contact**
- **Suppresses Vibrations**

Available styles:

- **Extended Flexible Shaft**
- **Cylinder or Sphere Heads**

Deburring both the front and back of a drilled hole.



LEARN MORE ABOUT
XEBEC Stone™ Flexible Shaft

Shaft Connector

Workpiece information

Industry	Energy
Part name	Shaft Connection
Material type	High-Temp Alloy
Cutting process	Crosshole Deburring & Finishing

Processing conditions

Tool	XEBEC™ Brush Crosshole (CH-A33-11L)
Processing detail	Deburring and finishing inner wall diameter
Spindle Speed	7,000 RPM
Feed Rate	15 IPM

TOOL XEBEC Brush™ Crosshole

Available in Diameters:
1.5, 3, 5, 7, 11 mm

Available Colors (Aggressiveness):
Red, Blue

Aggressiveness indicated by Color:
Least ← → **Most**

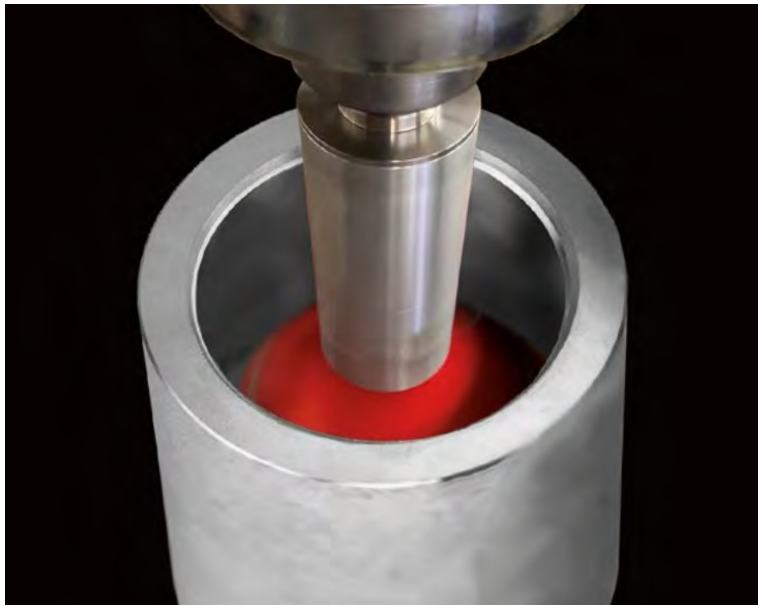
Length
Standard and Extended Lengths

XEBEC Brush™ Crosshole
Ideal for:
- **Cross Hole Deburring**
- **Inner Walls of Cylinders**

Brush tip flares under centrifugal force to remove burrs along inner walls of the hole.

LEARN MORE ABOUT
XEBEC Brush™ Crosshole

Large Inner Diameter



Workpiece information

Part name	Large Diameter Cross Hole
Material type	17-4 Stainless Steel
Cutting process	Deburring ID Hole

Processing conditions

Tool	XEBEC™ Brush Surface (A11-CB25M)
Processing detail	Deburring of large inner diameter of hole.
Spindle Speed	2,800 RPM
Brush Projection Specified for Inner Diameter Application	3.15"
Flared Target Diameter	4.5"

For large diameter cross holes, XEBEC™ Brush Surface and Sleeve can be used similarly to XEBEC™ Crosshole Brush.

Allow calculated brush projection amount to achieve optimal flare from centrifugal force to the target diameter.

For more informatiuon about this unique application, see page 29 of Xebec Deburring Technologies 2019 Catalog.

DISCUSS AN APPLICATION:
Contact Us

SPECIAL USE APPLICATION OF THE TOOL:

XEBEC Brush™ Surface

Under centrifugal force the flexible tip-cutting fibers of the brush can flare to make contact with the inner wall surface at the appropriate angle. Contact must be made with brush tips and care should be taken not to contact the side of the brush.

TOOL **XEBEC Brush™ Surface**

Brush sizes that can be used for special large diameter cross hole applications:

15, 25, 40 mm

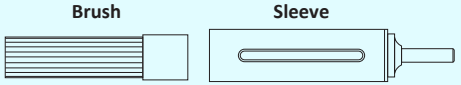
Color (Aggressiveness):

Red or White

Aggressiveness indicated by Color:

Least ← → **Most**

Brush Requires Brush Sleeve to Operate:



Threaded Compressor Fitting

Workpiece information

Industry	Energy
Part name	Threaded Fitting
Material type	Stainless
Cutting process	Surface Deburring & Finishing

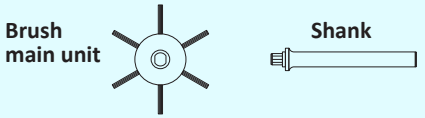
Processing conditions

Tool	XEBEC™ Wheel Brush (W-A11-75)
Processing detail	Deburring and finishing of outer diameter of threads and inner diameter.
Spindle Speed	1,250 RPM
Feed Rate	150 IPM

TOOL XEBEC™ Wheel Brush

Available in Diameters:
50, 75 mm

Requires reusable Shank to operate
70 or 150 mm Shank lengths

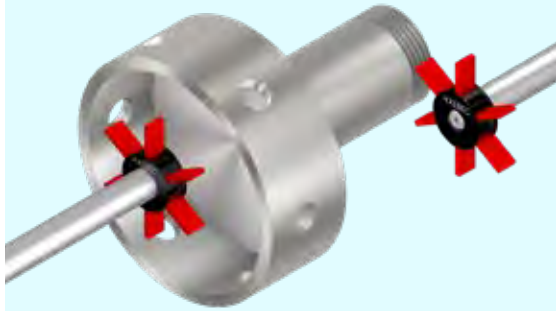


Available Colors (Aggressiveness):
Red

XEBEC™ Wheel Brush
Ideal for:

- **Deburring and Polishing**
- **Side Surfaces**
- **Inner and Outer Diameters**

Can be used in CNC and robotic machines.



LEARN MORE ABOUT
XEBEC™ Wheel Brush

XEBEC® Success Stories

How Automated Deburring Saved Over $275,000

A Real Example of Moving from a Manual Deburring Process to an Automated Process using Xebec Brush™ Surface

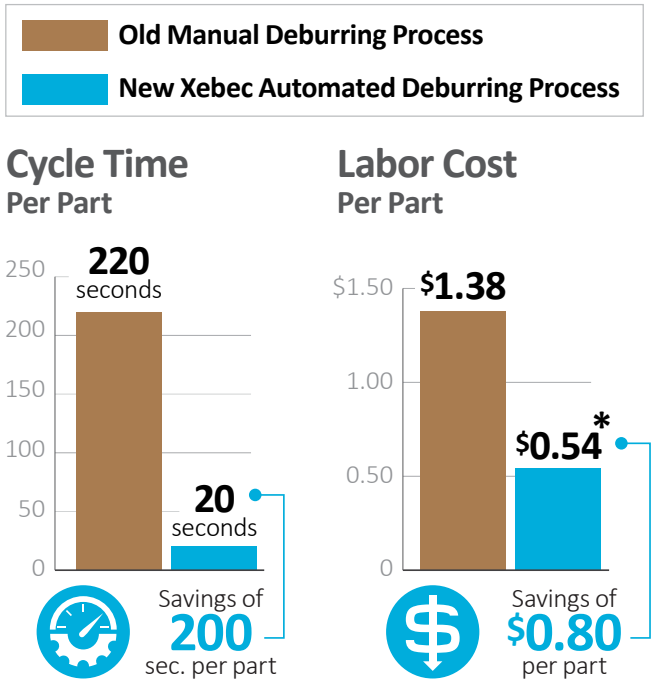
Wow, there we go again. At Xebec, we continue to help people with deburring problems become heroes in their own company. Check out this amazing cost savings example from the firearms industry.

Our customer was manually deburring the two parts shown in the calculations below. By switching to an automated process, utilizing a ceramic Xebec surface brush, they are looking at an estimated savings of over $275k per year.

Labor Cost

Manual	Machine
$22/hr	$80/hr

At first glance, manual deburring appears to cost less.



Example 1:

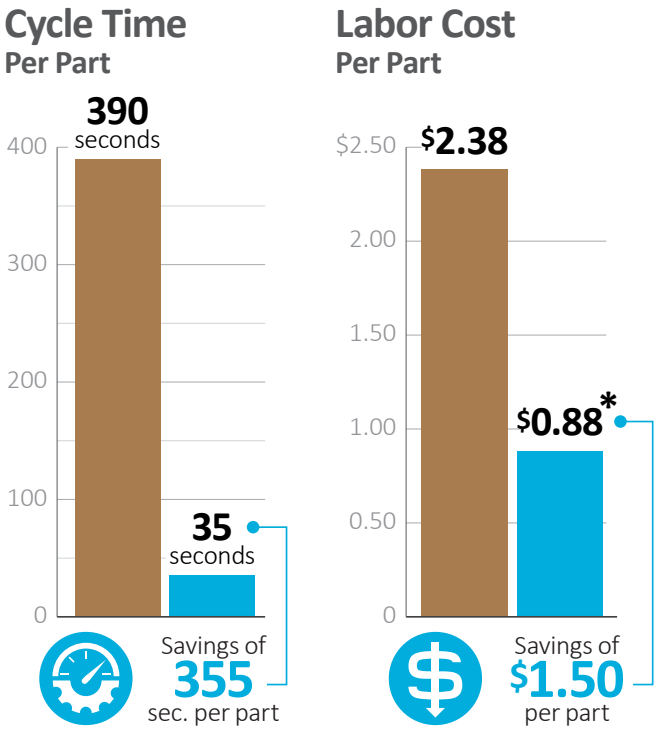
Estimated annual cost savings of $96,058

- Original manual deburring process had a cycle time of 220 seconds per part. With labor burden rates at $22 per hour, that equates to $1.34 in labor cost per part.
- New Xebec automated process has a cycle time of 20 seconds per part. With machine costs at $80 per hour, that equates to just $0.44 cost per piece. Add in the cost of the ceramic brush $0.10 per piece ($149.27 / 1500 pieces) and you have a total cost per piece of just $0.54.
- Manual deburring $1.34 per part – Xebec deburring $0.54 per part = $0.80 savings per part
- Customer is making 10,000 of these parts per month (120k per year).
- 120,000 pieces multiplied by $0.80 per piece cost savings = $96,058

***Cost includes all tool expenses.**

Xebec 15mm Surface Brush: $149.27 each

Total Brush cost for 120,000 parts: $11,941.60 or $0.10/part



In addition to cost savings, part quality and consistency are greatly improved with the Xebec Brush.

Example 2:

Estimated annual cost savings of $180,000

- Original manual deburring process had a cycle time of 390 seconds per part. With labor burden rates at $22 per hour, that equates to $2.38 in labor cost per part.
- New Xebec automated process has a cycle time of 35 seconds per part. With machine costs at $80 per hour, that equates to just $0.78 cost per piece. Add in the cost of the ceramic brush $0.10 per piece ($149.27 / 1500 pieces) and you have a total cost per piece of just $0.88.
- Manual deburring $2.38 per part – Xebec deburring $0.88 per part = $1.50 savings per part
- Customer is making 10,000 of these parts per month (120k per year).
- 120,000 pieces multiplied by $1.50 per piece cost savings = $180,000

Xebec cost savings initiatives also assist with resource management. This initiative alone created a platform to reduce a group equivalent of six full time employees. Not only does this offer cost savings, but also gives the end user an opportunity to redeploy those valuable resources elsewhere.

In addition to cost savings, our ceramic fibers are second to none and ensure a consistent and greatly improved finish to their product. We are very proud of our product and our company and would love to help you be a hero in your company as well as we continue to help the resurgence of American manufacturing, by redefining perfection.

Are you ready to modernize your deburring process?

LEARN MORE ABOUT
Cost Savings with XEBEC™

Surface Deburring & Finishing

YouTube Click to Play Video: **@ Xebec Deburring Technologies**

- Surface Deburring, Finishing and Polishing
- Deburring after machine processing and finishing of edges
- Precision parts such as recievers and bolt carriers that must be deburred while maintaining edge quality with out secondary burrs
- Grinding and finishing of flat or uneven surfaces
- CNC machine applications, following milling passes

Crosshole Deburring & Finishing

YouTube Click to Play Video: **@ Xebec Deburring Technologies**

- Crosshole deburring, polishing of inner wall surfaces of cylinders
- Effectively removes burrs generated around cross-holes under rotational/centrifugal force
- Soft contact abrasive for deburring crossholes and detailed finishing of parts
- Flexible tool shafts allow soft contact with work piece

Detailed Finishing

YouTube Click to Play Video: **@ Xebec Deburring Technologies**

- Wide variety of tool shapes and sizes for detailed and intricate part finishing
- Chamfers, edge breaks, burrs, blending, finishing, polishing, EDM scale removal and more
- Use by hand, with Xebec Micro Motor, ultrasonic polishers, robots or CNC machines.

Xebec® Ceramic Fiber

The ceramic fibers are woven to create self-sharpening filaments that maintain consistent cutting action on the tips. Unlike wire and abrasive impregnated nylon brush filaments, the unique design of the Xebec fiber rod maintains its shape with no deformation even after repeated use. This leads to consistent performance time after time.

More than a brush - performs like a cutting tool.

FINE FINISHING

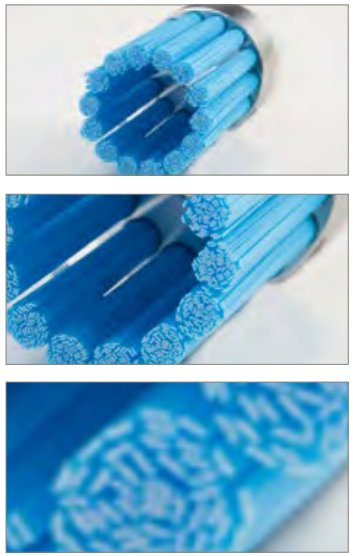
up to

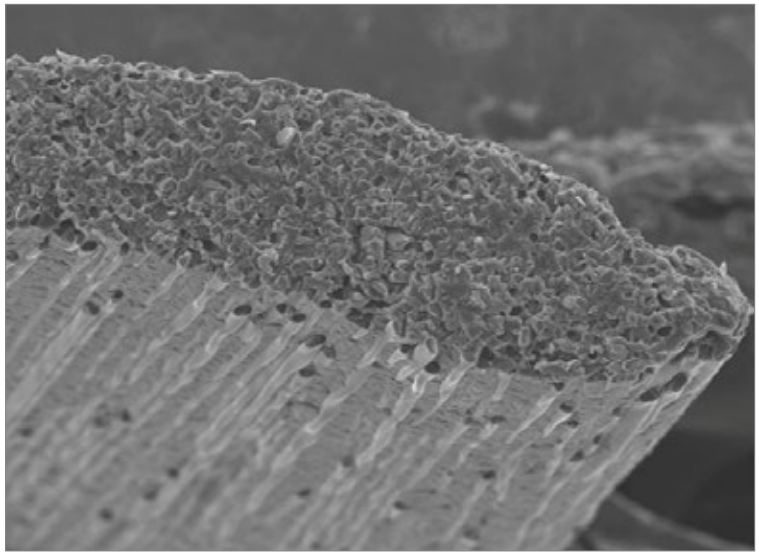
3.937 Ra

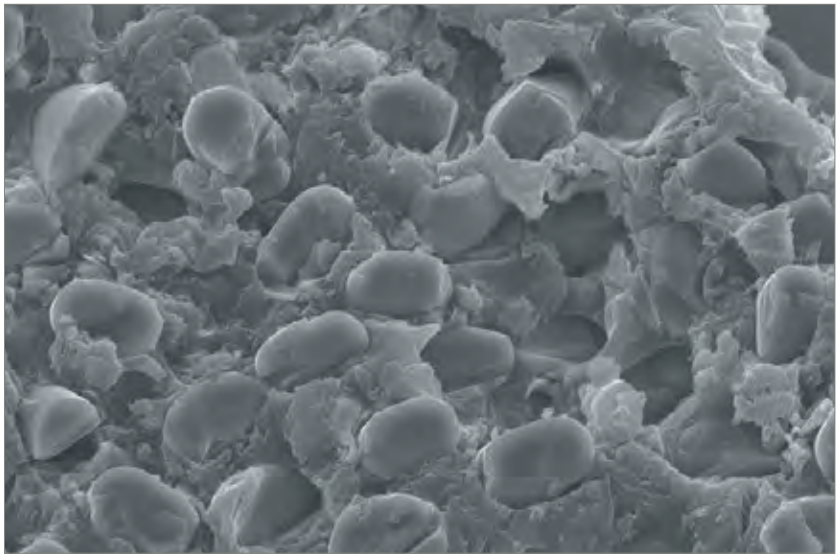
µi microinches

(**0.1 *µm*** micrometers)

Continuous Ceramic Fibers







Watch Xebec FAQ's: Your Questions Answered

YouTube Click to Play Video:
@ Xebec Deburring Technologies

READ THE FULL STORY ON OUR BLOG:
Ceramic Fiber Brush: The Deburring Brush that Performs Like a Cutting Tool

FLEXIBLE BRISTLES

XEBEC Brush™

Ceramic Fibers are formed into bristles to produce tip cutting Brushes

Cuts from the tip

SOLID

XEBEC Stone™

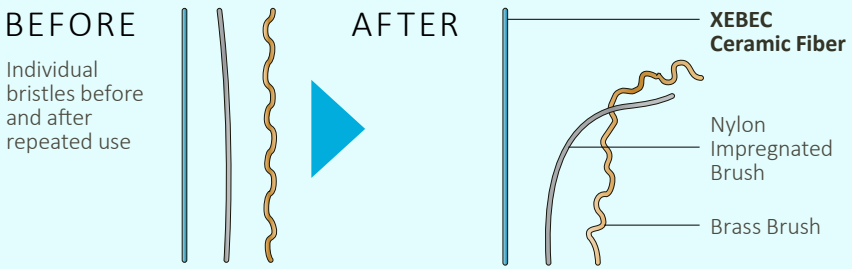
Ceramic Fibers are formed into Stones capable of cutting on all sides

Cuts on all sides

YouTube Click to Play Video: @ Xebec Deburring Technologies

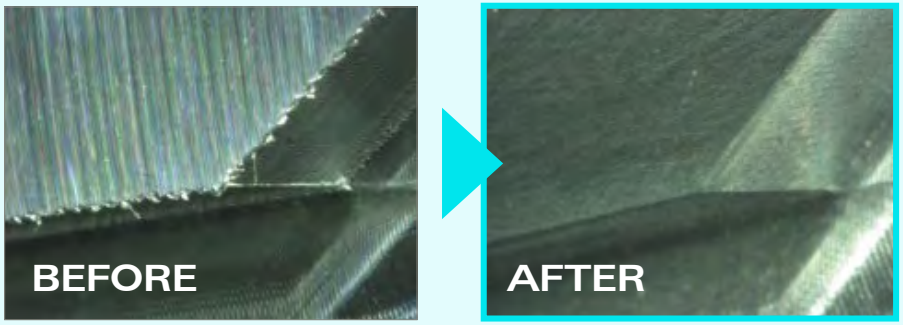
No Deformation

Bristles made from Xebec™ ceramic fiber filament maintain their shape even after repeated use. Which means the grinding power is not diminished over time and performance quality is consistently fine.



Self-Sharpening Effect

New cutting edges are continuously exposed through tool use. Which means tool remains “sharp” and product performance is consistently high.

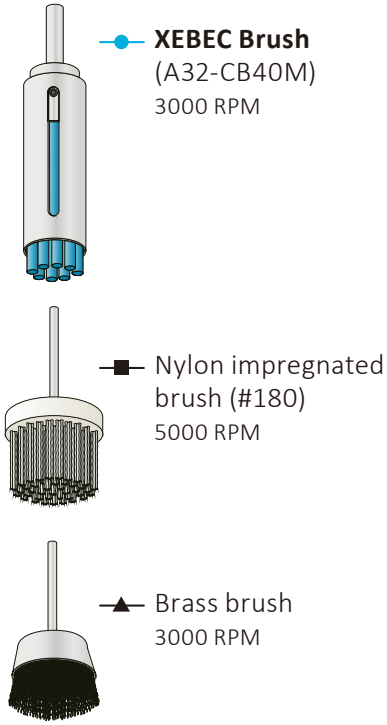


Flexibility and Grinding Power

All Xebec brushes are made from the same proprietary ceramic fibers manufactured into rods, or bristles, of different thicknesses. The greater the bristle thickness, the more aggressive the cutting action. Thicker bristles will remove more material, faster. Thinner bristles are more flexible and able to conform to the shape of the workpiece for finishing and polishing without altering part dimensions or features. Brush color indicates the relative thickness of the bristles.

The Advantages of Ceramic Fiber

Xebec Ceramic Fiber brushes remove more material faster than nylon impregnated or brass finishing brushes.

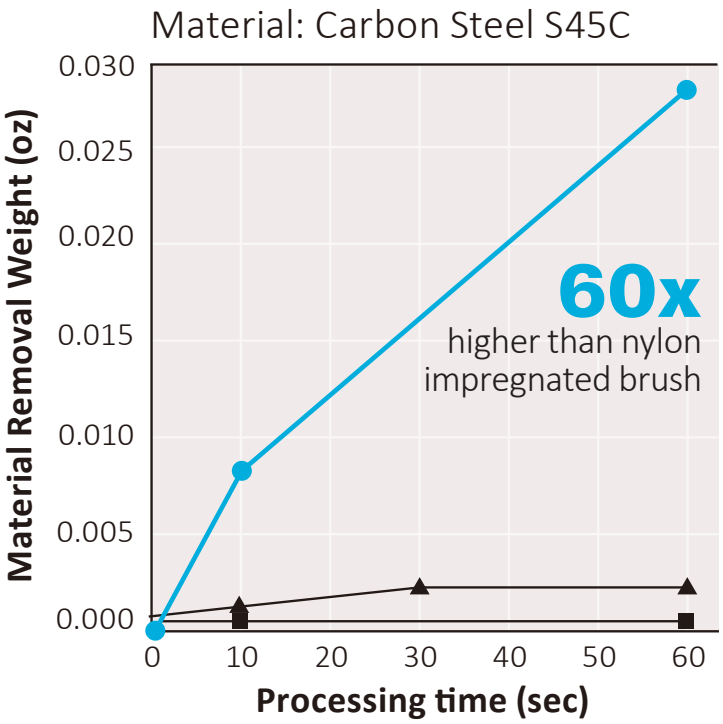


XEBEC Brush
(A32-CB40M)
3000 RPM

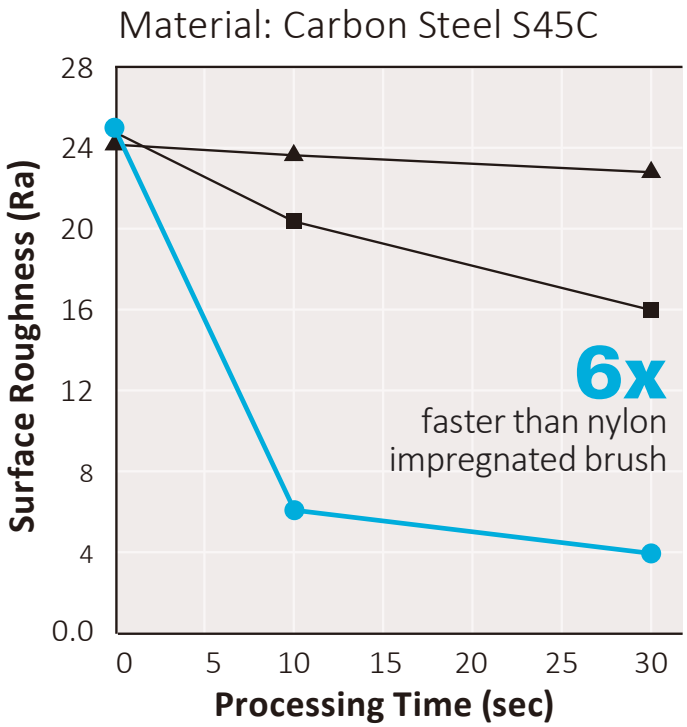
Nylon impregnated brush (#180)
5000 RPM

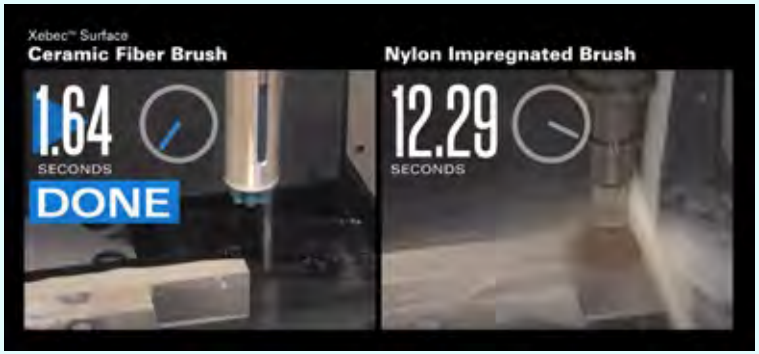
Brass brush
3000 RPM

Grinding power



Polishing capacity





Xebec Blows Away Nylon Brushes

YouTube Click to Play Video:
@ Xebec Deburring Technologies

All Xebec brushes are made from the same proprietary ceramic fibers which are manufactured into rods, or bristles of different thicknesses. **The greater the bristle thickness, the more aggressive the cutting action.**

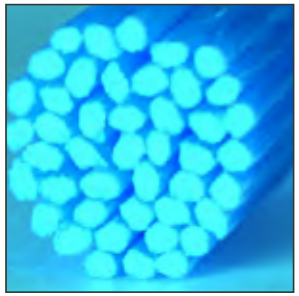
Brush Color

Signifies the relative thickness of the bristles

Will not change part dimensions or features

Will conform to slight workpiece variations

Able to run at higher speeds, extend tool life



3-4 times more aggressive than white

Aggressiveness

LEAST ⟷ MOST

Flexibility

Ability to conform to the work piece

Target Material

SOFTEST ⟷ HARDEST

- Resins, Plastics
- Aluminum, Copper, Brass, General Steel
- Cast Metal, Stainless, Heat-Resistant Steel

Target Burr Size

- Micro Fine
- up to 0.008”
- up to 0.004”

Target Finish

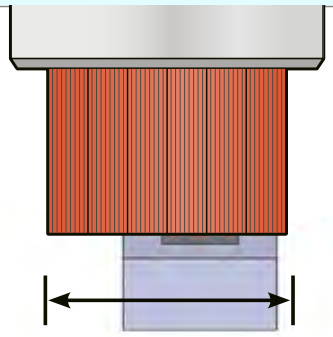
- 4 Ra or better
- Finish up to 4 Ra

Surface Deburring & Finishing Brushes

Choosing the Ideal Brush Size

Choose a brush 1.5 to 2 times wider than the width of the work piece surface.

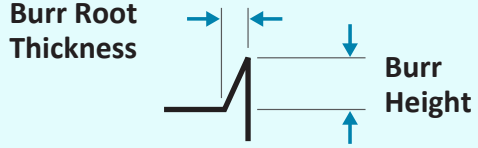
1.5-2x **larger than the surface width**



This allows the brush to engage the edge at 90° for optimal grinding power. Using a larger brush than the surface width will also require the fewest number of passes and minimize cycle time.

Target Burr Size

Burr Root Thickness of **0.008”** or less (Burrs are bent with a fingernail)



XEBEC™ Back Burr Cutter & Path

Spherical deburring Cutter with a custom-made tool Path. For CNC deburring of entry and exit holes in a single pass.

Spherical Cutting Tool

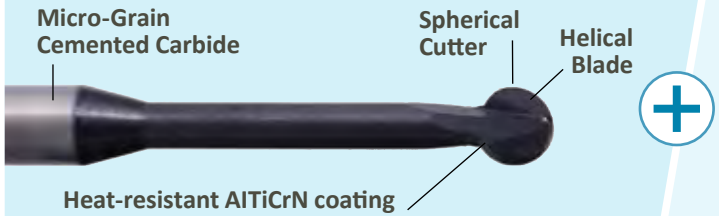
Custom Path Data

The tool can be mounted on machining center (XYZ-axis) or combined lathe (XZY or XZC-axis). 3-axis simultaneous control is required.

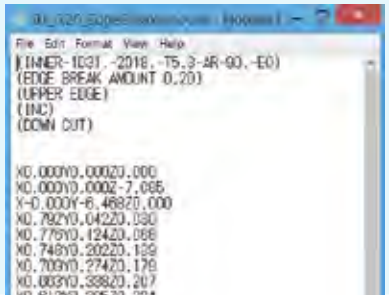
Machining Center

Combined Lathe

Xebec™ Back Burr Cutter



Xebec™ Generated Custom Tool Path



Custom Point Group Data

Up and Down Cutting Directions

Incremental and Absolute Modes

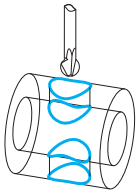
5 levels of Depth of Cut

Once approved, the Path Data is provided via email for immediate use on machine.

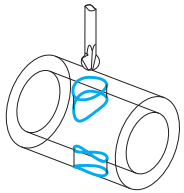
For a variety of edge shapes

One Cutter size supports various edges in different sizes and shapes.

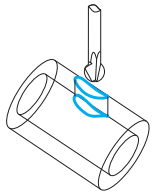
Orthogonal cross hole



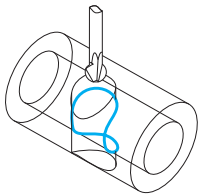
Off-center cross hole



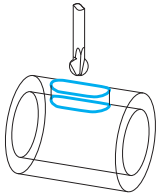
Angled cross hole



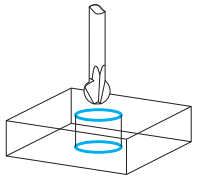
Broken cross hole



Slotted hole



Planar hole

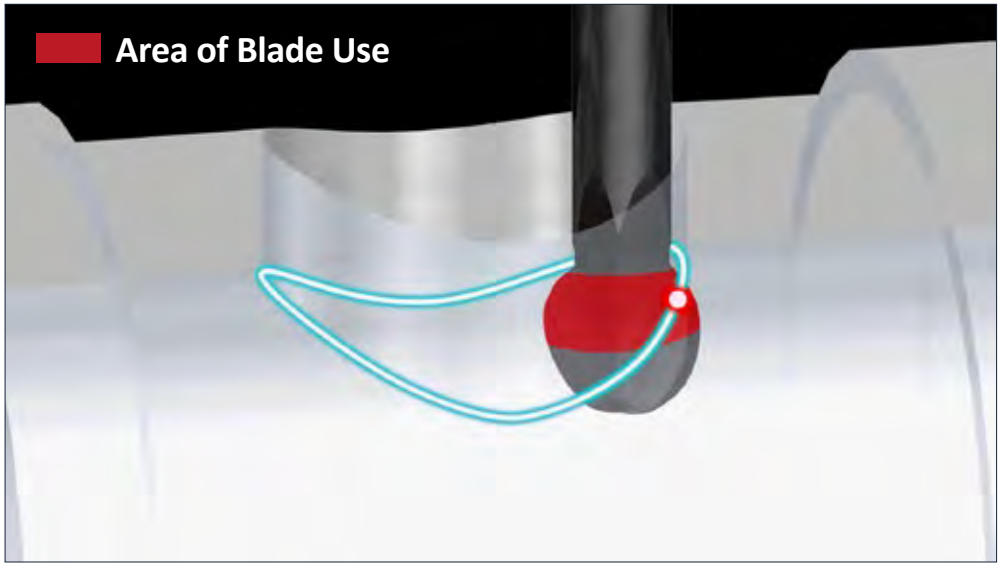


Custom Path Data

For complicated edge profiles

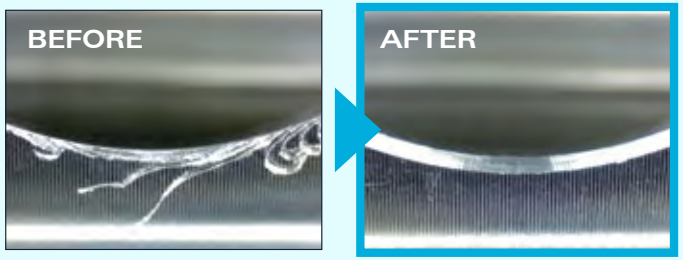
Longer Tool Life

Uses the entire cutting blade by constantly shifting the contact point



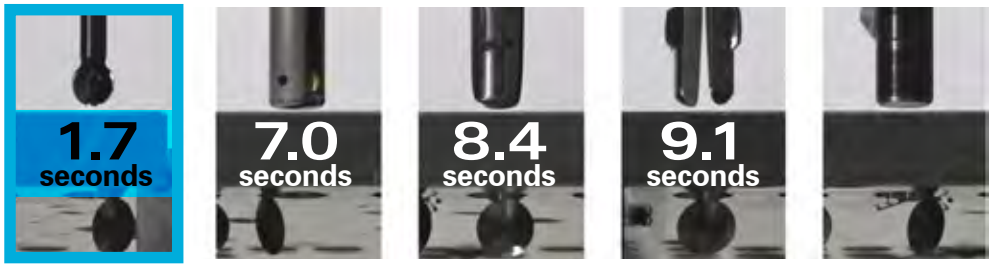
YouTube Click to Play Video:
@ Xebec Deburring Technologies

Stainless Steel



Tapped Holes

3 to 5 times Faster than Similar Tools



Back Burr Cutter & Path | Tool A | Tool B | Tool C

YouTube Click to Play Video:
@ Xebec Deburring Technologies

Uniform edge shape by consistent deburring amount

XEBEC Back Burr Cutter & Path Setup Guide

Glossary

XEBEC Back Burr Cutter (Cutter)

The spherical cutter specially designed for deburring

XEBEC Path (Path)

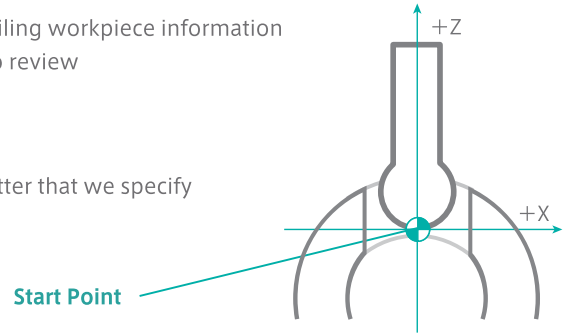
The custom-made NC data set (XYZ points' data) generated for optimal deburring

Path Code Sheet

The confirmation sheet detailing workpiece information and the Start Point for you to review

Start Point

The initial position of the Cutter that we specify



Product component

Path (delivered by email)

- Text data
- Instruction manual
- Path Code Sheet

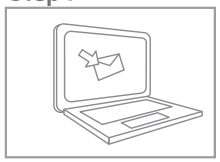
Cutter (sold separately)

Steps

Start

- Path delivered by email

Step1



Preparation

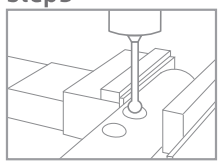
- Confirm the dimensions of the target edge
- Check the Cutter diameter
- Make sure there is no tool interference
- Check the machining conditions
- Select Cutter type (A/B) and order

Step2

Program Preparation

- Select the suitable Path data
  (INCREMENTAL/down cut data is recommended for the first try)
- Check the Start Point
- Copy and paste the Path data to the machine

Step3



Machining

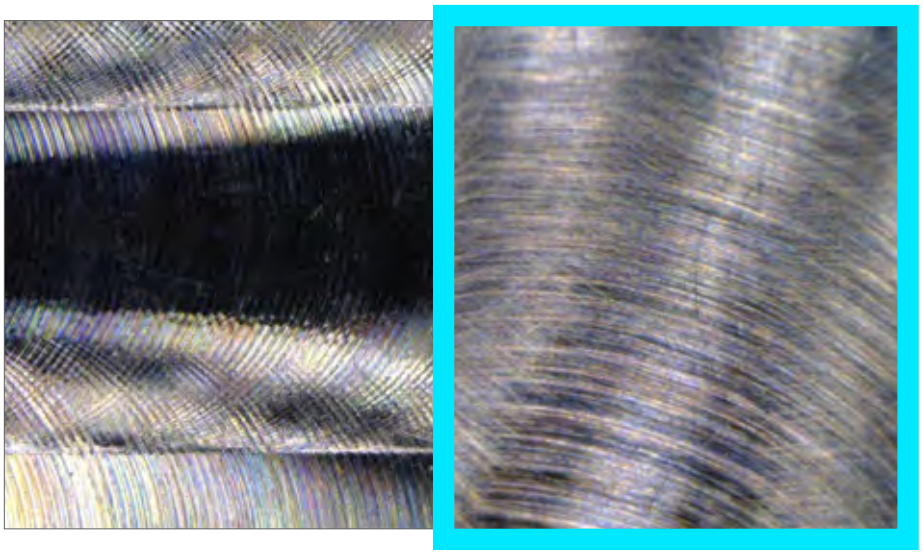
- Air cutting
- Actual machining
- Check the result

STAINLESS STEELS	**300 Series** **400 Series**	**PH Series**
LOW ALLOY STEELS	**Low Carbon** **Medium Carbon** **S45C**	**SCM**
HEAT RESISTANT ALLOYS	**Nickel Alloys** **Titanium Alloys**	**Inconel** **Tantalum**
HIGH HARDNESS STEELS	**High Carbon** **Tungsten** **Chromium**	**Molybdenum** **Cast Steel**
NON-FERROUS ALLOYS	**Aluminum Alloys** **Zinc Alloys** **Copper Alloys**	**Brass** **Bronze**
POLYMERS	**Plastics** **Resins**	**Composites**
CAST IRON	**Gray Cast** **Ductile Cast**	**Alloy Cast**

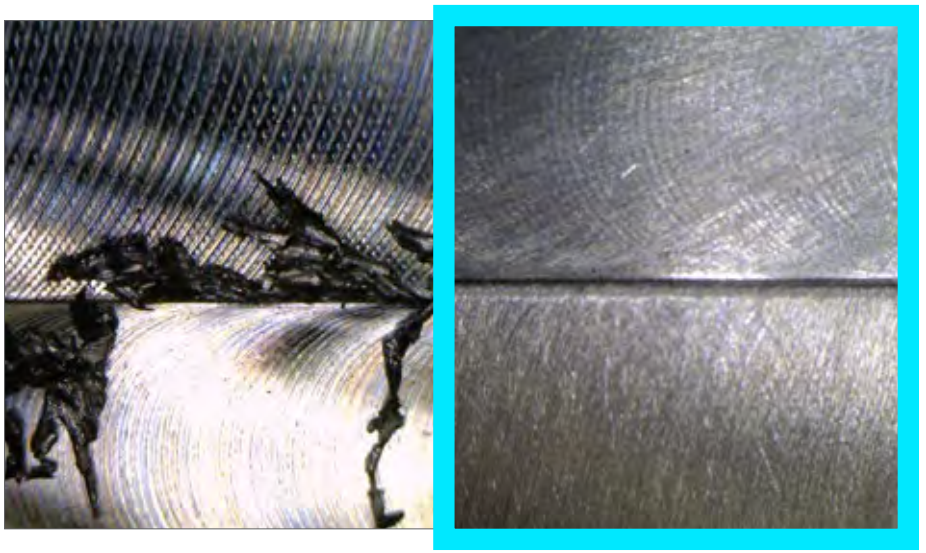
FOR A RANGE OF MATERIALS

up to 65 Rc

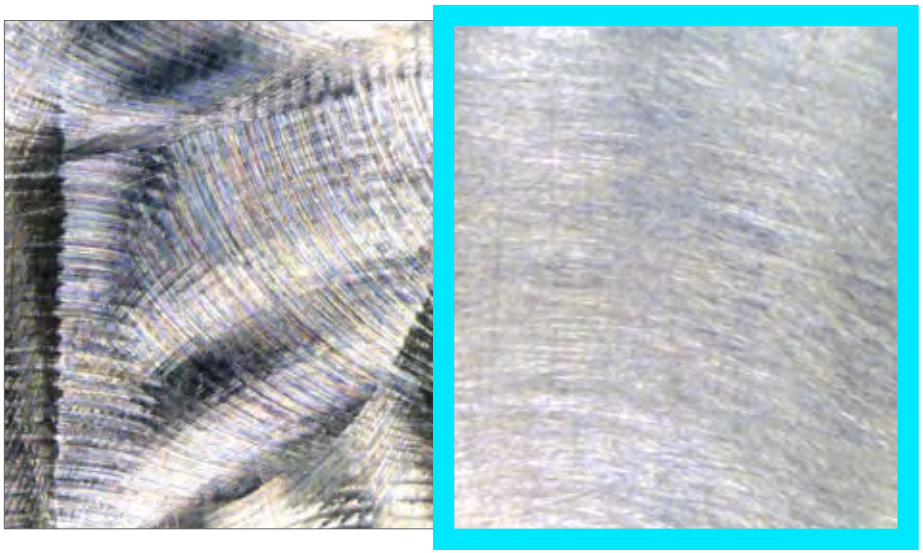
Deburring & Finishing Results



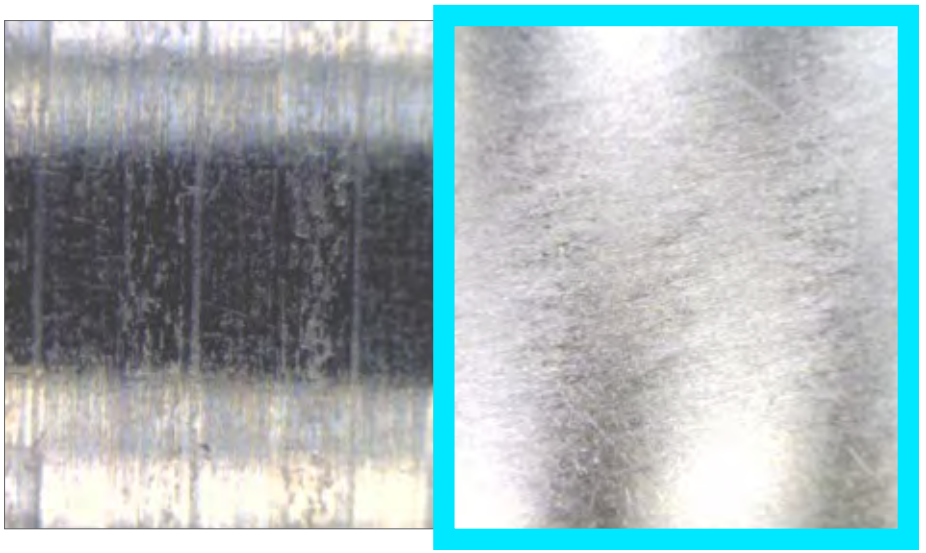
SURFACES



SURFACE FEATURES

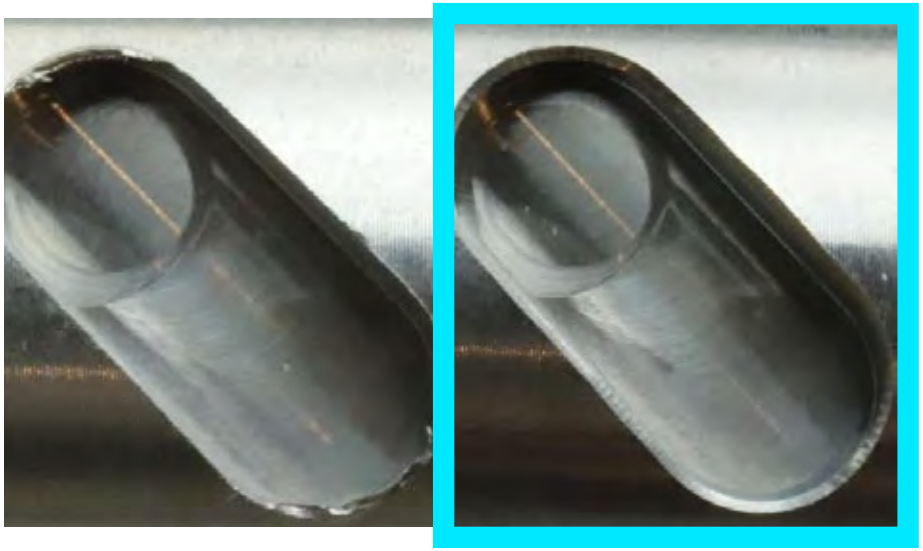


CUTTER MARK REMOVAL

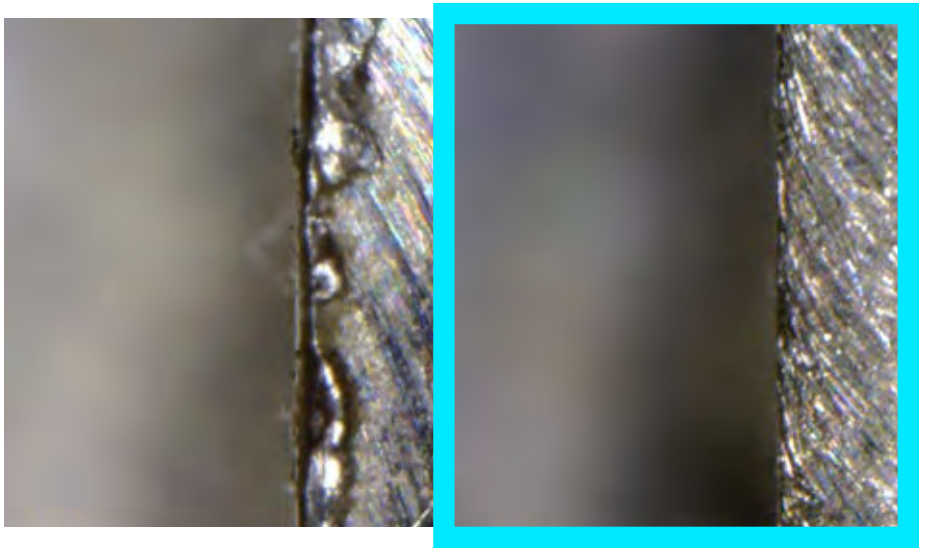


POLISHING

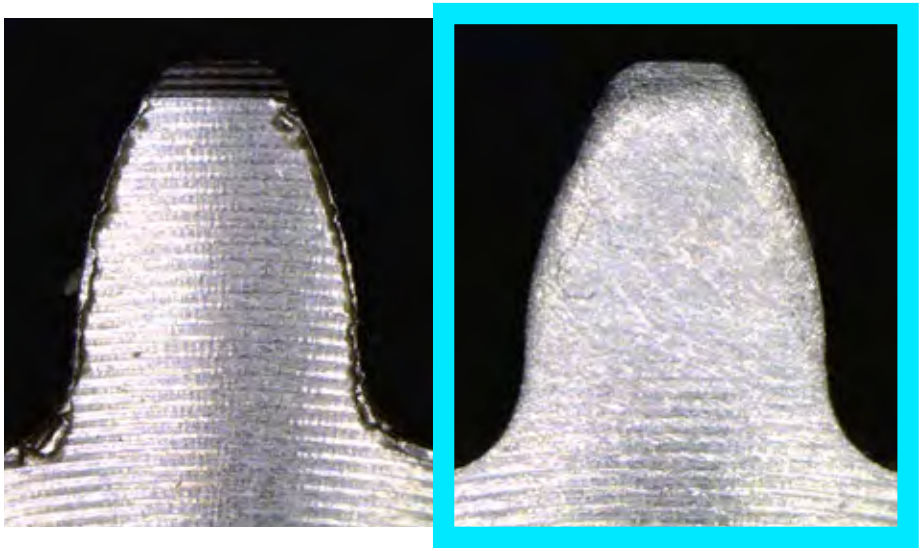
Deburring & Finishing Results



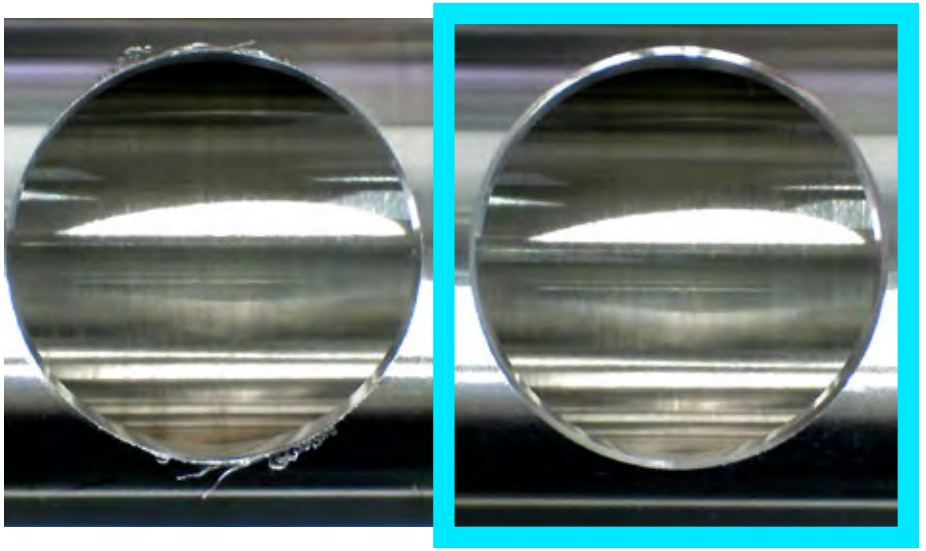
CHANNELED, BROKEN SURFACES



EDGES

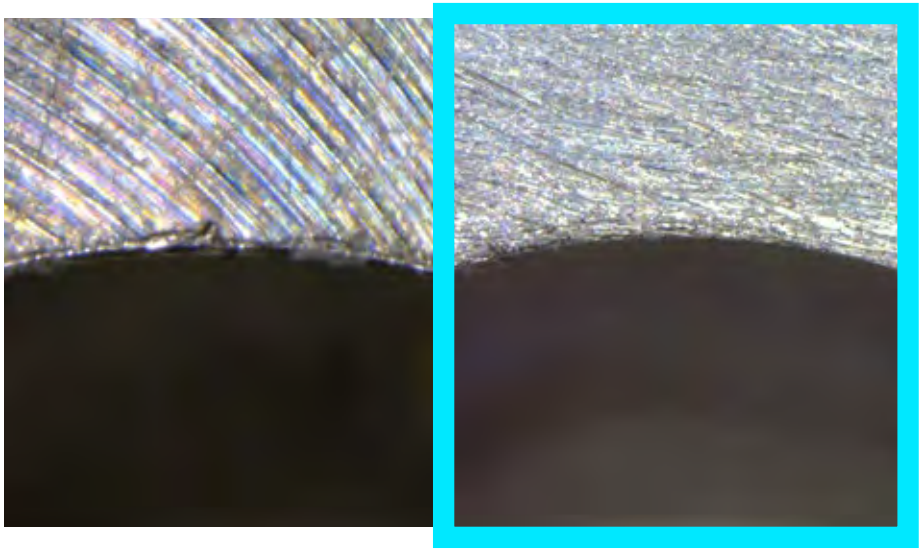


RADIUSED EDGE

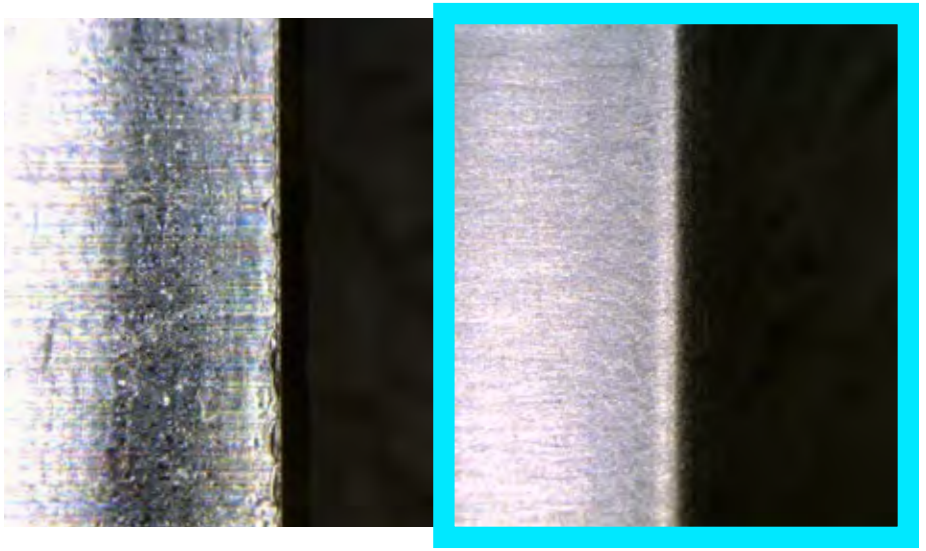


CHAMFERED EDGE

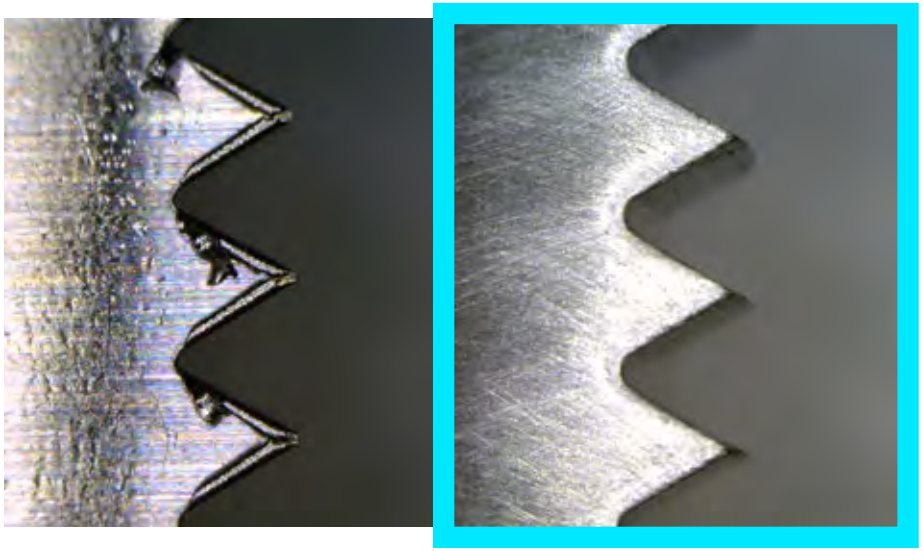
Deburring & Finishing Results



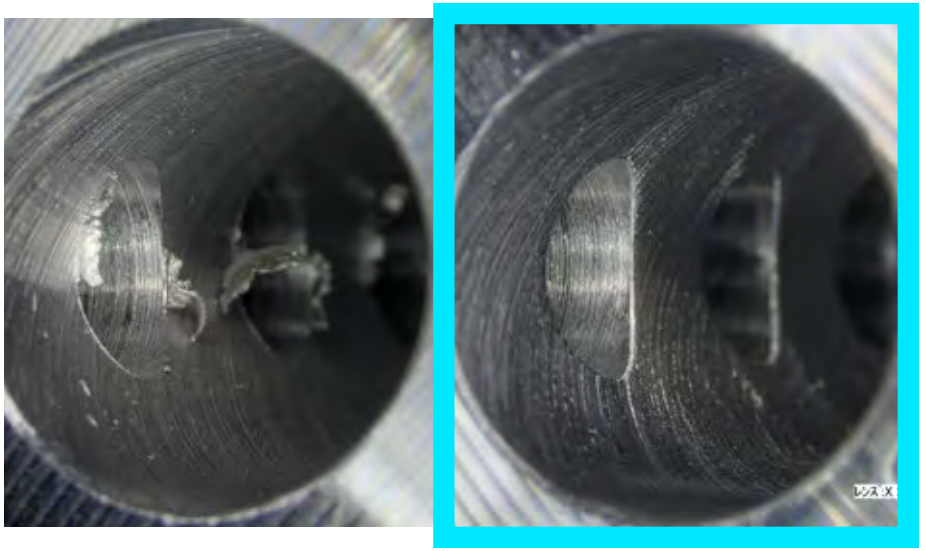
INNER WALL DIAMETERS



OUTER WALL DIAMETER



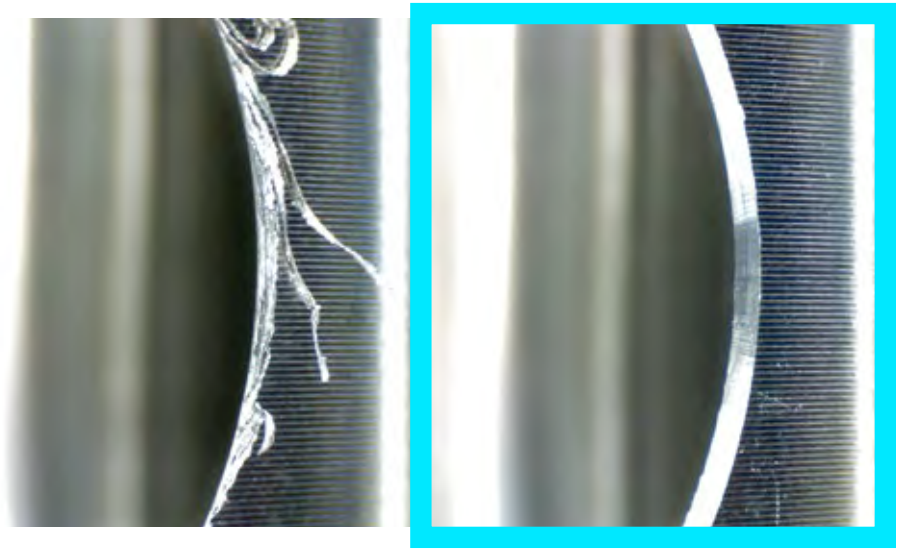
THREADED DIAMETERS



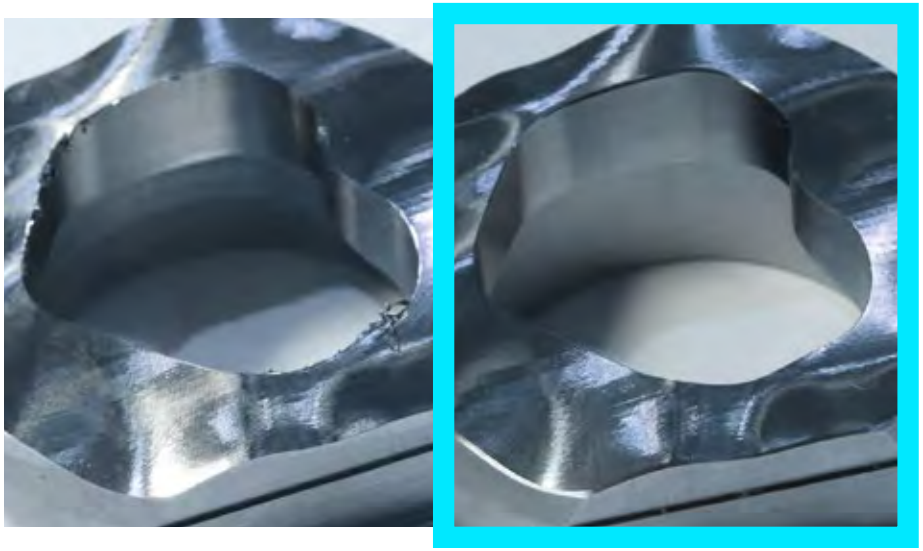
CROSS HOLES

Deburring & Finishing Results

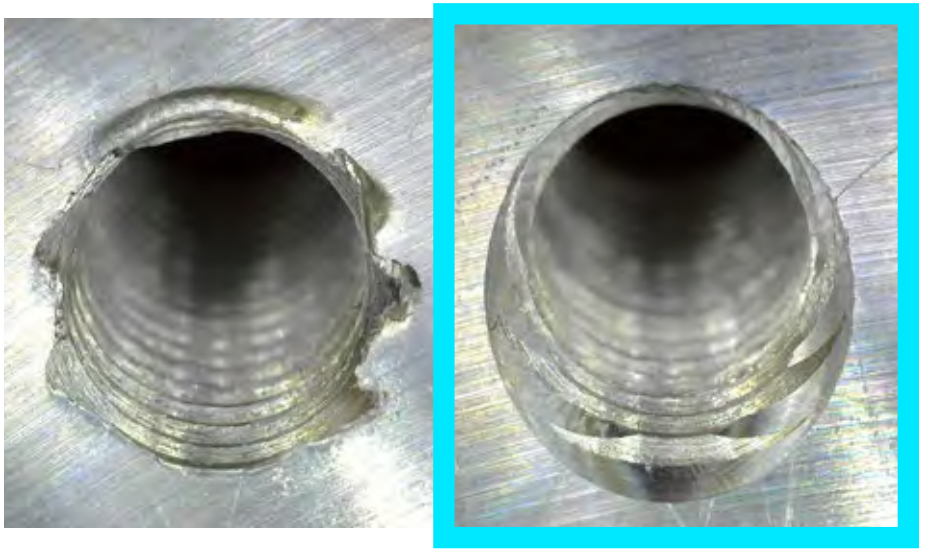
BORES



ELLIPTICAL HOLES

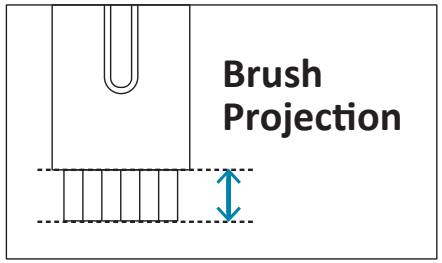


COMPLEX EDGE PROFILES



THREADED HOLES

Set Brush Projection

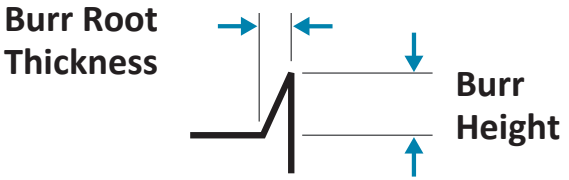


Brush Size Diameter	6 mm	15 mm	25 mm	40 mm	60 mm	100 mm
Brush Projection All Grades (in)	**0.3125-0.375"**	**0.375-0.5625"**	**0.5-0.625"**	**0.5-0.625"**	**0.5-0.75"**	**0.5-0.75"**

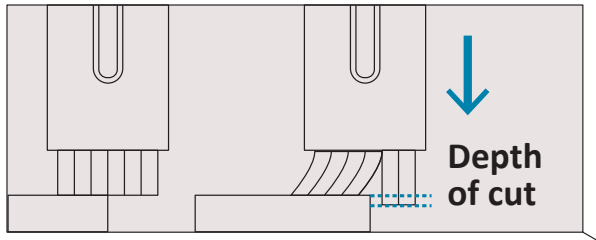
Brush projection below 0.2” increases grinding power and may affect finish

Target Burr Size

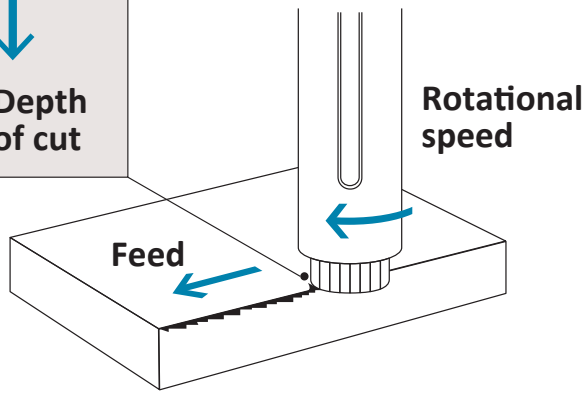
Burr Root Thickness of **0.008”** or less
(Burrs are bent with a fingernail)

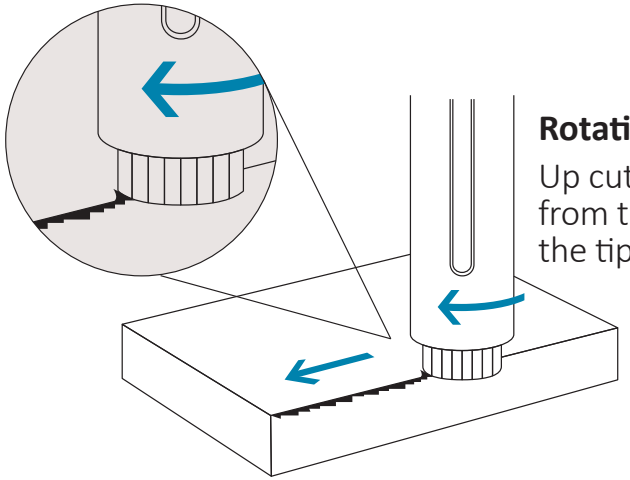


Workpiece Engagement



Engage part with the tip of the brush. Avoid contacting the side of the brush.





Rotation direction

Up cut against burrs from the bottom with the tip of the brush

Depth of Cut

All Brush Grades
(Inches)

Polishing	Vertical Burr	Horizontal Burr	Heavy Burr
0.012”	**0.020”**	**0.040”**	**0.060”**

Tips for Maximizing Brush Performance

More than a brush - performs like a cutting tool.

Use of Coolant/Oil will optimize results

- **It will Extend Tool Life**
- **Improves Surface Finish**

MAXIMIZING DEBURRING OPERATION

1. Increase RPM to the maximum allowed
2. Decrease feed rate in 10% increments
3. Do not change original parameters, but increase number of passes
4. Try a more aggressive brush that will increase grinding power

MAXIMIZING TOOL LIFE

1. Decrease RPM in 10% increments
2. Increase feed rate by 10% increments
3. Try another brush color A13 Pink, A21 White, A11 Red, A32 Blue with the same parameters

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