

XEBEC Brush™ Crosshole Extra-Long Instruction Manual (1/2)

Read this instruction manual before using this product. Failure to do so can result in serious injury or death. This instruction manual must be kept in the vicinity of the machine at all times so that it is accessible to the operator.

This is a customized product. Read the following carefully.

This product is customized according to the design modifications specified by you, the client, and manufactured by XEBEC TECHNOLOGY CO., LTD. Before using this product, read the following and proceed to use the product if you agree with the content. Irrespective of whether you agree with the following, proceeding to use the product will be taken as agreement.

Product testing

This product is a remodeling of a standard product according to the design modifications specified by you, the client, and XEBEC has not performed product testing of this customized product. Understand that safety testing and performance testing has been performed on our standard products.

Disclaimer

XEBEC accepts no liability for damages incurred due to any of the following:

- (1) Injury or damage due to failure to observe the instructions in the Instruction Manual
- (2) Injury or damage occurring due to specification differences between the customized product and the standard product
- (3) Any other reasons that are unattributable to XEBEC

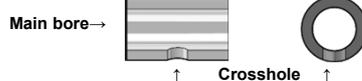
WARNING

Be sure to observe the contents of this manual. Using the product in a way that is not consistent with the contents of this manual may result in serious injury or death.

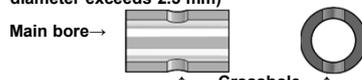
WARNING

- There is the risk of operator loss of sight or injury resulting from this product detaching from the processing equipments, bristles breaking off, workpieces breaking, etc. There is also the risk of damage to machines, jigs, and workpieces.
- Fragments, cutting particles, burrs, etc., occur due to processing with this product, and these can pierce the eyes or skin of workers causing loss of sight and injury.
- Dust occurring as a result of processing with this product can cause lung damage, irritate skin, and bring on allergic reactions.
- Even if there is no problem at the pre-work check, if vibration or other abnormality occurs during use, discontinue use immediately. Continuing to use the product when there is an abnormality presents the risk of operator loss of sight or injury resulting from this product detaching from the processing equipment, failure or detaching of the grindstone part, workpieces breaking, etc.
- Do not use the product while exceeding the maximum rotational speed, depth of cut, or brush projection, as there is the risk of operator loss of sight or injury resulting from this product detaching from the processing equipment, bristles breaking off, workpieces breaking, etc.
- Machining at a constant point for a prolonged time causes the tip of the tool to become hot which presents the risk of operator loss of sight or injury resulting from bristles coming loose or breaking off. Adjust the processing times on locations being processed so that it does not become hot. Also be careful not to touch the locations being processed directly with bare hands after use.
- Use the tool suitable to the hole diameter. There is the risk of operator loss of sight or injury resulting from bristles breaking off, parts breaking, etc., if a tool not suitable to the hole diameter is used.
- Start rotation of the product after the product has been inserted from the tip up to the collar into the cylinder to be machined. Using the product in ways other than described in this document or rotating it outside the cylinder presents a risk of operator loss of sight or injury resulting from bristles breaking, parts fragmenting, etc.

- The following examples illustrate situations that present the risk of operator loss of sight or injury resulting from bristles breaking, parts fragmenting, etc.
- A) T-junction intersection: The diameter of the crosshole exceeds 50% of the diameter of the main bore (e.g., main bore diameter is 10 mm, crosshole diameter exceeds 5 mm)



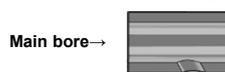
- B) Cross intersection: The diameter of the crosshole exceeds 25% of the diameter of the main bore (e.g., main bore diameter is 10 mm, crosshole diameter exceeds 2.5 mm)



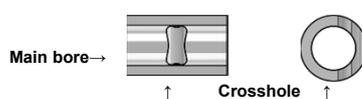
- C) Multiple intersections: These types may require special measures such as increasing the collar width. Please contact XEBEC for a consultation.



- D) Inclined crosshole: This product cannot be used.



- E) Off-center crosshole: This product cannot be used.



NOTICE

Furthermore, as a result of the situations described above, there is also the risk of damage to machining tools, jigs, and workpieces.

Operator Safety Protection

Use of protective equipment

Wear personal protective gear including goggles, masks, gloves, and earmuffs to prevent loss of sight, injury, or lung damage caused by damaged parts flying off the product. Wear clothing with long sleeves or other clothing that does not expose the skin, and fasten the cuffs and hems tightly.

Attention to the work area

- Install an enclosure so that persons other than the operator do not enter the work area, and ensure that all persons, if any, in the work area are wearing protective equipment.
- Keep the floor of the work area clean at all times to prevent the risk of slipping or tripping on dust, cutting particles, oil, water, or other substance.
- There is the risk of fire caused by heating, sparks, or other factor resulting from use of the product. Do not use the product close to a flammable liquid or in an explosive atmosphere. Also be sure to enact fire prevention measures.

Precaution regarding cutting particles

Fragments, cutting particles, and other substances generated during work will be scattered into the surrounding area. Be sure to use a dust collector or other means to collect them.

Pre-Work Check

Perform test operation for 1 minute or more before starting work, and for 3 minutes or more after the machine tool or product was changed, and check that there is no looseness, vibration, or other abnormality of the machine and the part where the product is installed. When doing this, insert the product into the bore from tool tip up to the collar, then start rotation.

Precautions for Use

Starting and stopping rotation

- **WARNING** When starting work, insert the product into the bore from tool tip up to the collar, then start rotation. Also, when stopping work, make sure rotation has stopped completely while the tool tip is still inside the bore.

Installation onto a machining center or other machine

- **WARNING** When installing onto machining equipment, securely attach the tool shank by 30 mm or more into a tool holder (a milling chuck is recommended) that has a collet length of 30 mm or more. If gripped with a grip length less than the specified one, this product may fall from the machining equipment due to vibrations during the machining. There is the risk that this may cause operator loss of sight or injury.

- When the product is used with precision machining equipment, there is the risk that cutting particles may have an adverse effect on the equipment sliding parts. Be sure to properly collect cutting particles and wash thoroughly.
- Please use fully-enclosed machine tools.
- When installing, use a chuck that is correct for the shank diameter.
- Install and use on processing equipment that can control the rotational speed.

Features

- This product is used for removal of post-machining fine burrs with a root thickness of 0.1 mm or less, and for removal of fine burrs from the inside of cylinders with inner diameters of $\phi 5$ mm - $\phi 20$ mm.
- Centrifugal force generated by rotation causes the brush to expand and remove fine burrs (root thickness of 0.1 mm or less) from the crosshole inside the cylinder.
- It polishes and removes black scale from the inside surface of the cylinder, and removes cutting particles and foreign matter from the hole bottom surface.
- The abrasive material is ceramic fiber that contains no abrasive grains at all.
- The brush tip generates grinding power. The tip of the bristle removes burrs and finishes the edges.
- CNC deburring and cutter mark removal can be achieved by installing onto a machining center or other machining equipment.
- The original brush material (ceramic fibers) enables consistent deburring and polishing capability without changes to the cutting performance or brush shape.
- The brushes, brush holders, and collars are consumables. The shank can be reused.



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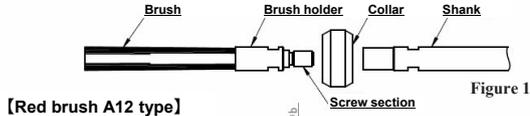
XEBEC Brush™ Crosshole Extra-Long Instruction Manual (2/2)

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Product Specifications

- Use the correct tool for the target machining hole diameter.
- Shanks and collars of the red brush type and blue brush type are common components.
- **A collar with an inner diameter of 0.2 mm to 0.3 mm smaller than the processing hole is appropriate. XEBEC customizes the product down to increments of $\phi 0.1$ mm to suit the workpiece.**

Bristle color	Usable machining hole diameters	Brush diameter a	Collar diameter b	Shank diameter c	Spanner width d	Overall length L
Red	$\phi 5$ mm - $\phi 8$ mm	$\phi 3$ mm	$\phi 4.8$ mm - $\phi 7.8$ mm	$\phi 4$ mm	3.2 mm	400 mm
	$\phi 8$ mm - $\phi 10$ mm	$\phi 5$ mm	$\phi 7.8$ mm - $\phi 9.8$ mm	$\phi 6$ mm	5 mm	400 mm
	$\phi 10$ mm - $\phi 20$ mm	$\phi 7$ mm	$\phi 9.8$ mm - $\phi 19.8$ mm	$\phi 8$ mm	6 mm	400 mm
	$\phi 14$ mm - $\phi 20$ mm	$\phi 11$ mm	$\phi 13.8$ mm - $\phi 19.8$ mm	$\phi 12$ mm	10 mm	400 mm
Blue	$\phi 5$ mm - $\phi 8$ mm	$\phi 3$ mm	$\phi 4.8$ mm - $\phi 7.8$ mm	$\phi 4$ mm	3.2 mm	410 mm
	$\phi 8$ mm - $\phi 10$ mm	$\phi 5$ mm	$\phi 7.8$ mm - $\phi 9.8$ mm	$\phi 6$ mm	5 mm	410 mm
	$\phi 10$ mm - $\phi 14$ mm	$\phi 7$ mm	$\phi 9.8$ mm - $\phi 13.8$ mm	$\phi 8$ mm	6 mm	410 mm
	$\phi 14$ mm - $\phi 20$ mm	$\phi 11$ mm	$\phi 13.8$ mm - $\phi 19.8$ mm	$\phi 12$ mm	10 mm	410 mm



[Red brush A12 type]

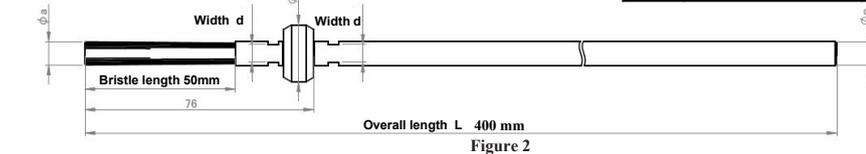


Figure 2

[Blue brush A33 type]

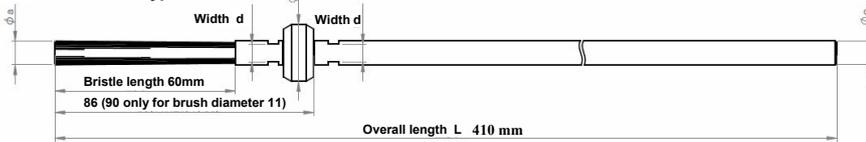


Figure 3

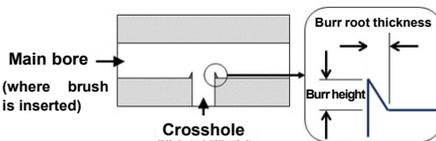
Assembling the tool

- The shank shall be attached to the brush section by following the procedure as shown in figure 1; attach the collar on the shank, screw the brush holder into the shank, **securely insert the holder all the way to the end (no gap at mating surface)**, and using two wrenches, **securely tighten to fit within the range of permissible clamping force** as shown in the table at right.
- Tightening with a force at or less than the lower limit of permissible clamping force may cause loosening during rotation, and tightening with a force exceeding the upper limit may cause rupturing of screw/machine screw section. Please strictly comply with the limitation of the permissible clamping force.
- After fixing it, make sure that there is no gap between the mating surface of the brush holder and the shank, and the collar rotates freely without any load.
- Any gap between the mating surfaces between the brush holder and the shank, or inability or difficulty to rotate the collar, suggests the possible contamination of foreign substance such as chips. Please disassemble and clean them.

Usable machining hole diameters	Permissible clamping force
$\phi 5$ mm - $\phi 8$ mm	0.4 Nm - 0.8 Nm
$\phi 8$ mm - $\phi 10$ mm	1.5 Nm - 3.0 Nm
$\phi 10$ mm - $\phi 20$ mm	2.7 Nm - 5.4 Nm
$\phi 14$ mm - $\phi 20$ mm	9.5 Nm - 19 Nm

How to Use

Definitions of crossholes and burrs with this product



Maximum rotational speed

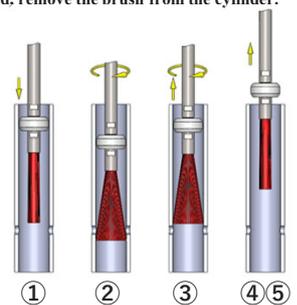
- Values for the standard product are included here as a reference for the maximum rotational speed. As these values can only be considered reference points, the user should take it upon themselves to set their own conditions, testing the product starting with conditions that produce the least load, with due consideration for safety.
- Consider the following values as for reference only.

Usable machining hole diameters	Maximum rotational speed (min ⁻¹)
$\phi 5$ mm - $\phi 8$ mm	12000 min ⁻¹
$\phi 8$ mm - $\phi 10$ mm	12000 min ⁻¹
$\phi 10$ mm - $\phi 20$ mm	12000 min ⁻¹
$\phi 14$ mm - $\phi 20$ mm	12000 min ⁻¹

Procedure for use

- ① With brush rotation stopped, insert the brush past the collar into the main bore.
- ② Start brush rotation when it has been inserted past the crosshole.
*Starting machining from a point past the crosshole while pulling the brush back will prevent burrs from being pressed flat against the inner diameter of the cylinder.
- ③ Machine while pulling or pushing the brush.
* Because the burrs are now standing, machining while pushing will reliably remove the burrs.
- ④ Stop the brush rotation while it is inside the cylinder.
- ⑤ After brush rotation has stopped, remove the brush from the cylinder.

- Machining in both the forward and reverse rotation directions will improve the deburring effects and provide a more even edge quality.
- As necessary, repeating steps ① through ⑤ again from the opposite side of the workpiece after cutting in steps ① through ⑤ may be more effective.
- The side surface of the brush does not generate grinding power.



Cautions during test operations

- If the machine tool in use is the high speed ATC specification, the retraction of tool change could cause bending of the shank, so **the speed of tool change should be decelerated.**
- **Test operation should be performed with rotational speed at or lower than 6000 min⁻¹, and a feed rate of 300 mm/min or less** to check that there is no problem such as breakage of the brush bristle, vibration of the tool, or a loosened screw for securing the brush holder.
- If there are burrs remaining, increase the rotational speed, reduce the feed rate, or increase the number of passes.
- **If the total diameter of crossholes in the range machined by this product exceeds 50% of the diameter of the main bore**, the load on the brush will become large, so even if there is no problem revealed during test operations, the rotational speed should be increased with caution while confirming that problems such as bristles breaking, the tool vibrating, or looseness of the screw securing the brush holder do not occur.
- It may be necessary to widen the collar width if all of the followings apply. Please contact XEBEC for a consultation: 1. There are multiple cross holes 2. The width of each opening is equal to or greater than the width of the collar 3. In processing the cross hole at the deepest recess of the main bore, the collar needs to pass over openings at the front side.
- Please use it in wet processing (using in dry processing may cause premature burning or abrasion of the collar so that the collar needs to be replaced more frequently).

Tool life management

- The collar is a consumable component subject to abrasion, so that an increase of vibration suggests the necessity of **replacement with a new collar (periodical replacement, or replacement simultaneous with brushes is recommended)**. Depth of wear should be kept to a maximum of $\phi 0.5$ mm for both the inside diameter and outside diameter of the collar. If the surface of the main bore is rough, the collar may wear more rapidly.
- If round out at the end of the tool tip exceeds 0.5 mm, stop usage, and please **replace with a new shank (periodical replacement is recommended)**. (Continuing usage with round out exceeding 0.5 mm is very dangerous due to possible breakage of the shank causing a projection hazard as a result of metal fatigue)



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