

Cross hole

Chamfering/Deburring
Tooling catalog

クロス穴

エックスツール

XT001



エヌエックスホルダ
NX Holder



シーエックスドリル

CX-Drill



KREUZ Co.,Ltd.

株式会社クロイツ

MADE IN JAPAN

Cross hole chamfering/deburring

Cross hole chamfering tool line-up

NXholder

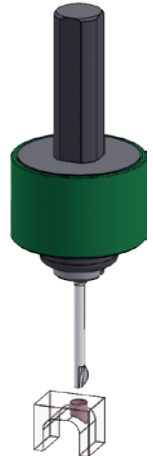
[NX holder]

Even irregular opening shapes can be chamfered using a special cutter.

- Restrictions on cross hole shapes are significantly reduced, allowing manual work to be replaced with automation.
- The chamfer cutter is manufactured according to the shape of the cross hole.
- Available the hole diameter for inserting the tool is $\Phi 1.0$ and the mating hole is $\Phi 0.1$.
- The chamfer cutter is made of carbide.
- There is no need to re-setting the tool length, etc, on exchanging the chamfer cutter.



[Click here to see the processing process](#)

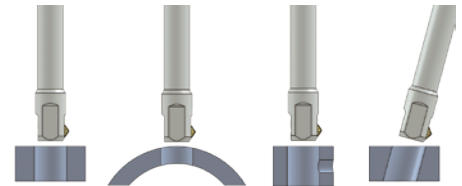


XTOOL

[X TOOL]

Chamfering of the entrance and exit of holes is completed in one pass.

- Use the size that matches the hole diameter.
- Use according to the axis center of the hole to be inserted.
- The diameter of the hole to be inserted is $\phi 4\text{mm}$ to $\phi 16.8\text{mm}$.
- The material of the replaceable tip is carbide.
- Tips exchanging can be easily replaced with a flathead screwdriver.



[Click here to see the processing process](#)



CX-Drill

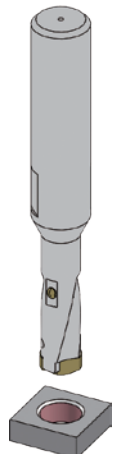
[CX-Drill]

Drilling and chamfering of the entrance and exit are performed at the same time.

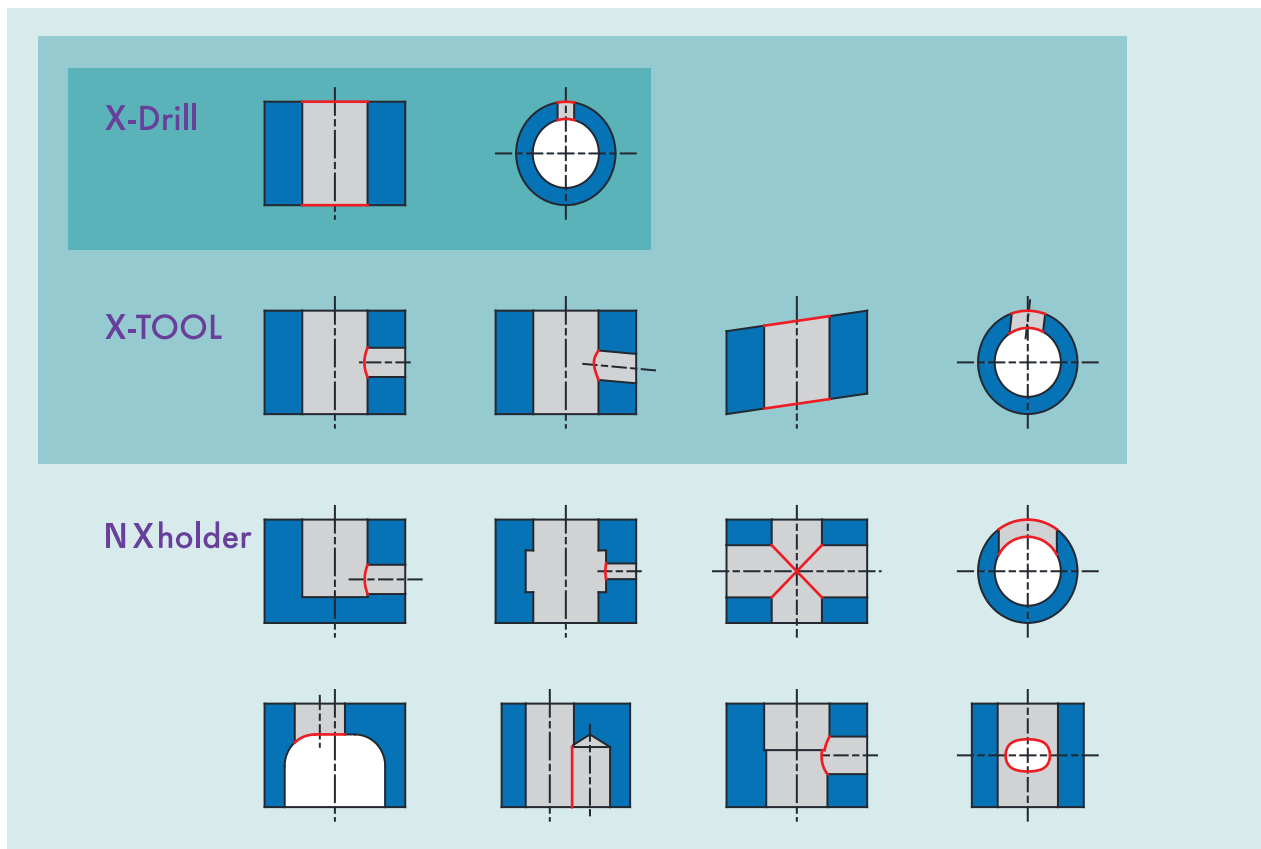
- A chamfering tip, which is also used for X-TOOL, is attached to the body of the drill.
- Drill holes and chamfer the entrance and exit at the same time.
- Compatible drill diameters are $\phi 8\text{mm}$ to $\phi 16.8\text{mm}$.
- The drill head and chamfering tip are replaceable.
- As the drill head is fixed with a clamp screw, it can be easily replaced.



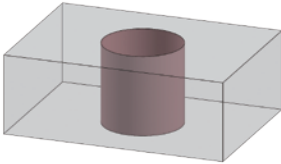
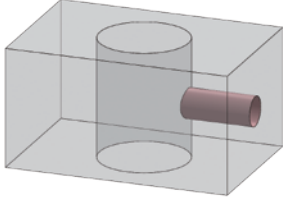
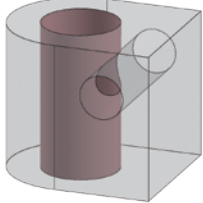
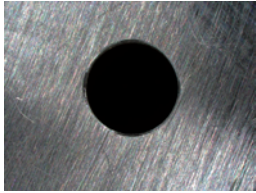
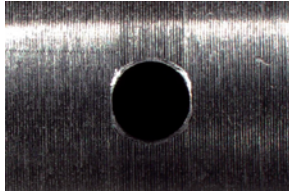
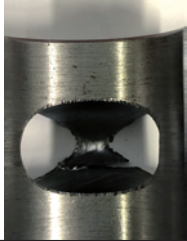
[Click here to see the processing process](#)



Typical example of cross hole



Chamfering example

	X-Drill	X-TOOL	NX holder
Hole shape			
After processing			
Facility Material Hole (cross hole) Machining direction	Tapping center SS400 $\phi 8.45\text{mm}$ $\phi 8.45\text{mm}$	NC lathe SC r 420H $\phi 6\text{mm}$ と $\phi 2\text{mm}$ $\phi 6\text{mm}$	Machining center FCD450 $\phi 28\text{mm}$ と $\phi 16\text{mm}$ $\phi 28\text{mm}$
Processing location	Drilling holes and chamfering doorways	Opening of secondary hole ($\phi 2$)	Irregular shaped opening with offset right angle intersections

Target hole shape

In addition to right-angled cross hole between the primary and secondary holes, chamfering of various opening shapes is also applicable.

For example, diagonal holes, deep grooves, same-diameter coaxial orthogonal holes, different diameter coaxial orthogonal holes, exit part R, parallel offset, step, and different diameter orthogonal offset.

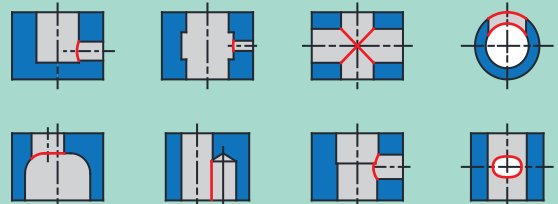
Right angle cross hole



Diagonal cross hole



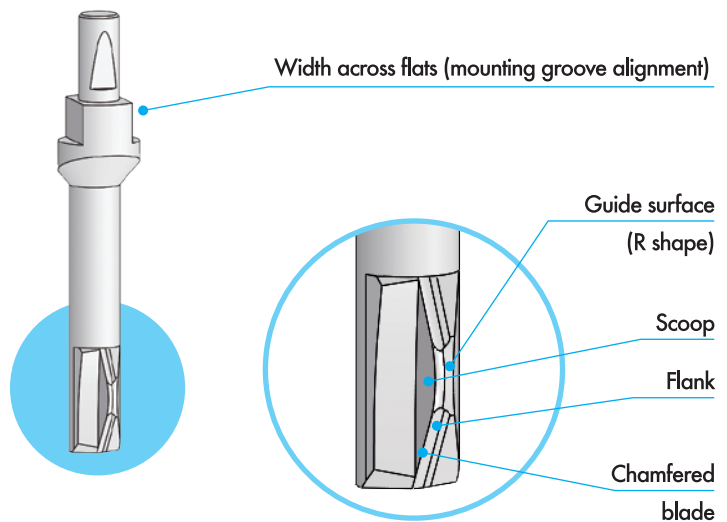
Irregular cross hole



Chamfer cutter shape

The top of the tip that comes into contact with the inner wall of the hole has an R-shaped guide surface with no cutting edge, it helps to avoid damage the inner diameter.

Tool specifications such as overall length, blade length, and shape are determined according to the shape of the workpiece.

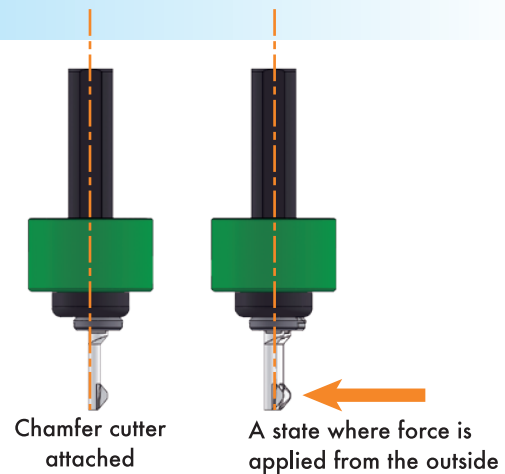


NX holder movement

The mounting hole is offset from the center so that when the chamfer cutter is attached to the NX holder, it will be offset from the center.

In addition that, the part where the chamfer cutter is attached is always pushed outward from the center by a spring.

When force is applied to the chamfer cutter from the outside during machining, the chamfer cutter moves in the axial direction of the holder, and when the force is removed, it returns to its original position.

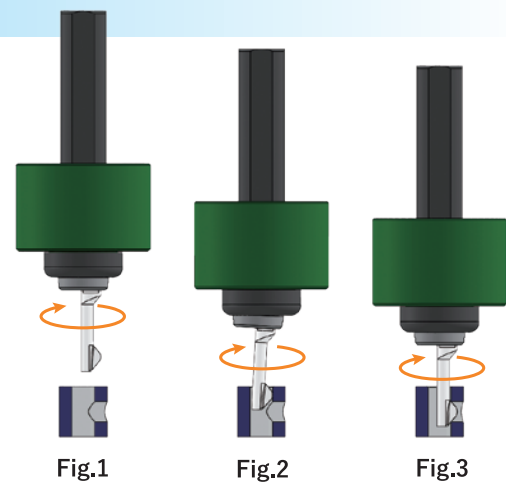


How chamfering works

Insert the tool while rotating it (Fig.1).

When the chamfering cutter makes contact at the entrance, the cutter, which is pressed by a spring, moves toward the center of the hole while chamfering (Fig. 2).

When it moves to the opening of the side hole, the chamfer cutter that was in contact with the inner diameter pops out and performs the chamfering (Fig. 3).



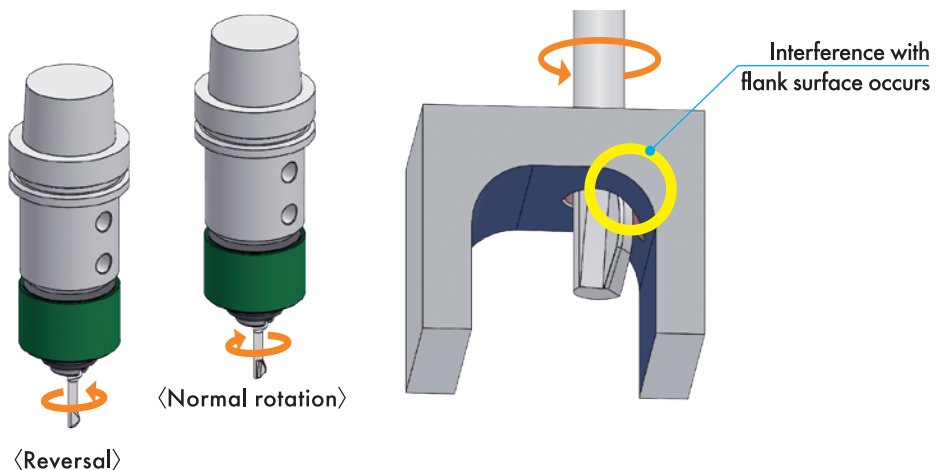
Forward rotation only or forward/reverse rotation processing

Chamfering an opening with a simple shape of right-angled cross hole, such as a hole drilled in a flat plate, can be completed by using only one screw for normal rotation.

However, when chamfering a secondary hole from a primary hole, or chamfering an opening with an irregular shape such as an

oval, there will be places where the flank will interfere with the opening before the cutter edge hits it.

In such cases, it is necessary to perform chamfering using a set of two screws, one for forward rotation and one for reverse rotation.



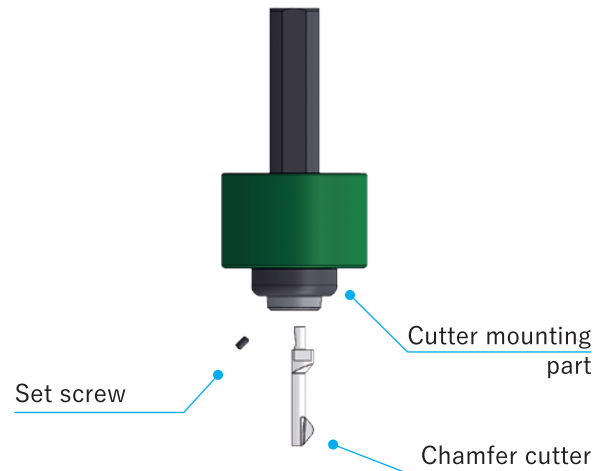
To attach the chamfer cutter to the NX holder

To attach the chamfer cutter to the NX holder,

- ① Align the width across flats of the cutter with the groove on the cutter mounting part,
- ② Insert the shaft part of the chamfer cutter,
- ③ Fix with the set screw.

It is easy to do as explained above, it can be replaced even if it keeps attaching to the machine tool.

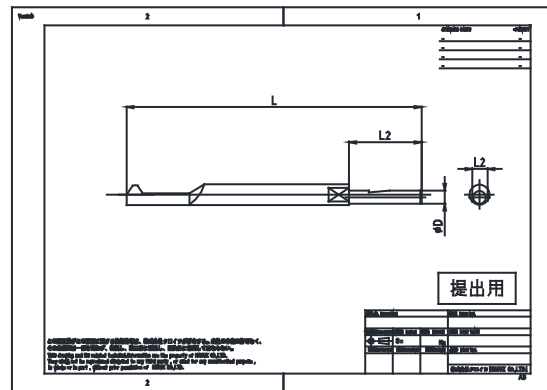
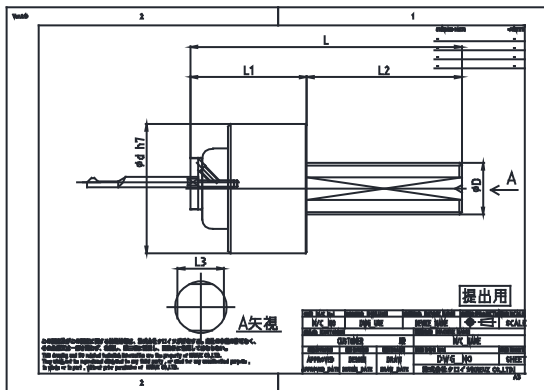
Additionally, since the chamfering cutter's total length is controlled, there is no need to set tools after changing the cutter.



Product number code control




We control our all product that deliver to customer by number code. Thereby, possible to respond promptly for any request after purchasing.

This is done to ensure that the tooling reflects the conditions determined by trial processing tests.

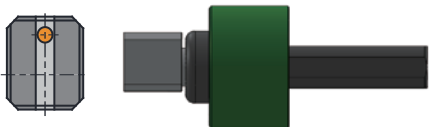


Holder lineup


Standard type

B-25	Insertion hole diameter $\phi 2.5 \sim \phi 5$	B-40	Insertion hole diameter $\phi 4 \sim \phi 10$	B-60	Insertion hole diameter $\phi 8 \sim$
					
<p>〈Cutter mounting part〉</p> <p>Installation size $\phi 2.5$</p> <p>Width across two sides 3</p> <p>Cutter maximum diameter $\phi 4$</p>		<p>〈Cutter mounting part〉</p> <p>Installation size $\phi 4$</p> <p>Width across two sides 5</p> <p>Cutter maximum diameter $\phi 8$</p>		<p>〈Cutter mounting part〉</p> <p>Installation size $\phi 6$</p> <p>Width across two sides 7</p> <p>Cutter maximum diameter $\phi 10$</p>	


Attachment type

C-40	Insertion hole diameter $\phi 12 \sim$
	
<p>〈Cutter mounting part〉</p> <p>Installation size $\phi 4$</p> <p>Width across two sides 5</p> <p>Cutter maximum diameter $\phi 8$</p>	

Compact type limited to small diameter holes

D-25	Insertion hole diameter $\phi 1.0$ (When back chamfering) \sim
	
<p>〈Cutter mounting part〉</p> <p>Installation size $\phi 2.5$</p> <p>Width across two sides 5</p> <p>Cutter maximum diameter $\phi 8$</p>	

Special type for back chamfering for automatic lathes

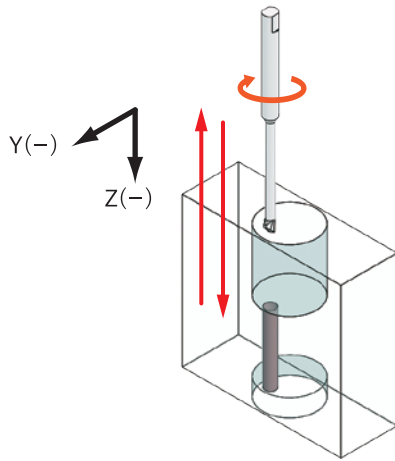
E-25	Insertion hole diameter $\phi 1.0$ (When back chamfering) \sim
	
<p>〈Cutter mounting part〉</p> <p>Installation size $\phi 2.5$</p> <p>Width across two sides 5</p> <p>Cutter maximum diameter $\phi 8$</p>	

Processing example

Concentric processing /forward rotation only

Processing location $\phi 3$ hole back chamfering

Features: The exit of the $\phi 3$ hole is close to the inner wall of the cylindrical surface, and the distance from the top surface is over 50 mm.



Equipment used Tapping machine
Rotating object Tool
Holder alignment Concentric
Rotation Forward rotation only
Machining conditions Rotation speed $n(\text{min}^{-1})$ 2000
Feed rate $F(\text{mm}/\text{min})$ 100
Feed amount $f_z(\text{mm}/\text{rev})$ 0.05

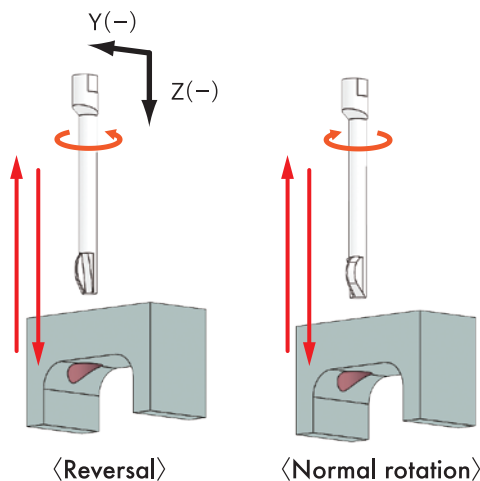
[Reference program]

```
N01 G54
G00 G90 X0 Y0 S100
G43 Z50 H13 M03
Z-25,
G01 Z-62.4 F100
S2000
G01 Z-61,F100
Z-25 F3000
G00 Z50,M05
M30
```

Concentric machining /Forward and reverse rotation

Processing location $\phi 6$ hole back chamfering

Features: The exit of the $\phi 6$ through-hole is wide open and extends over the R shape.



Equipment used: Machining center
Rotating object Tool
Holder alignment Concentric
Rotation Forward and reverse
Machining conditions Rotation speed $n(\text{min}^{-1})$ 1000
Feed rate $F(\text{mm}/\text{min})$ 50F
Feed amount $f_z(\text{mm}/\text{rev})$ 0.05

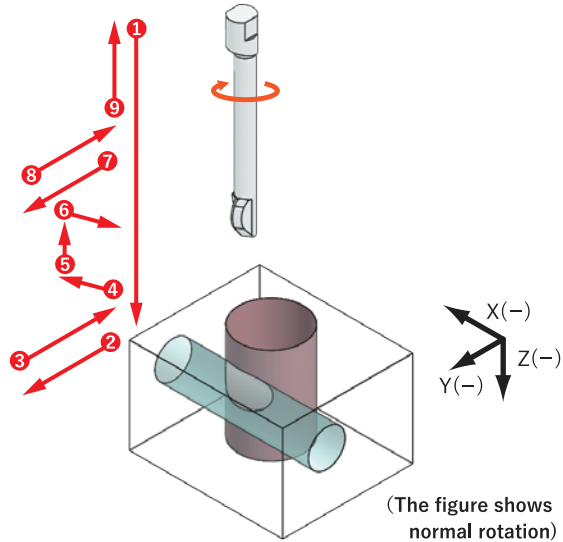
[Reference program]

T1 M06	T2 M06
N01 G54	N02 G54
G00 G90 X0 Y0 S100	G00 G90 X0 Y0 S100
G43 Z100.0 H13 M04	G43 Z100.0 H13 M03
Z62.0	Z62.0
G01 Z40.5 F500	G01 Z40.5 F500
M05	M05
S1000 M03	S1000 M04
Z42.5 F50	Z42.5 F50
Z40.5	Z40.5
M05	M05
S100 M04	S100 M03
Z62.0 F500	Z62.0 F500
G00 Z100.0 M05	G00 Z100.0 M05
M01	M30

Eccentric machining /Forward and reverse rotation

Processing location $\phi 20$ hole cross hole chamfering
Irregular opening shape with $\phi 20$ hole and $\phi 10$ hole offset
and intersecting at right angles.

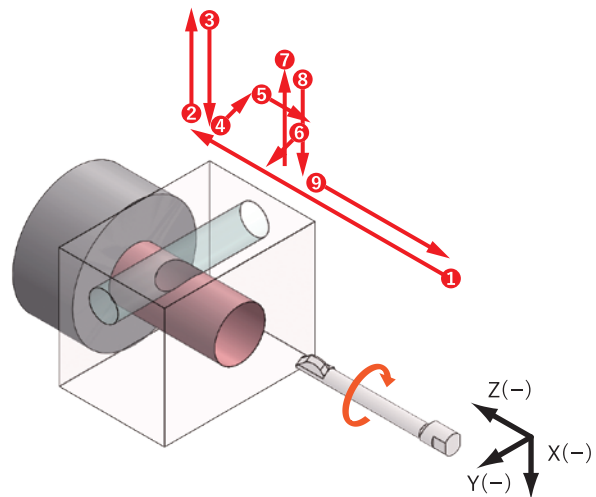
Equipment used Compound lathe
Rotating object Tool
Holder alignment Eccentricity
Rotation Forward and reverse
Machining conditions Rotation Forward and reverse
Feed rate F(mm/min) 100
Feed amount fz(mm/rev) 0.05



[Reference program]

T1 M06	T2 M06
N01 G54	N02 G54
G00 G90 X0 Y0 S400	G00 G90 X0 Y0 S400
G43 Z50 H13 M03	G43 Z50 H13 M04
Z-17.266	Z-17.266
G01 X3.991 F60	G01 X3.991 F60
G04 P1.	G04 P1.
G00 X1.667	G00 X1.667
G01 Y-1.358	G01 Y1.358
Z-15 F30	Z-15 F30
Y0 F60	Y0 F60
X3.991	X3.991
G04 P1.	G04 P1.
G00 X0	G00 X0
Z50,M05	Z50,M05
M01	M30

Equipment used Compound lathe
Rotating object Tool
Holder alignment eccentricity
Rotation Forward and reverse
Machining conditions Rotation Forward and reverse
Feed rate F(mm/min) 100
Feed amount fz(mm/rev) 0.05



[Reference program]

G00 X500 Z700	
G50 S3000	
M110 G138	M110 G138
G94 M146 M15	G94 M146 M15
G00 X0 Z3 T1010	G00 X0 Z3 T1212
SB=400 (Tool Rotation)	SB=400 (Tool Rotation)
C0	C0
M13	M14
G00 Y0	G00 Y0
Z-17.266	Z-17.266
G01 X3.991 F60	G01 X3.991 F60
G04 F1	G04 F1
G00 X1.667	G00 X1.851
G01 Y-1.358	G01 Y1.358
Z-15. F30	Z-15. F30
Y0 F60	Y0 F60
X3.991	X3.991
G04 F1	G04 F1
G00 X0	G00 X0
Z3	Z3
G136	G136
G95 M12 M09	G95 M12 M09
M109	M109
G00 X500	G00 X500
Z700	Z700
M01	M02

How to order

STEP
1

Please let us know the size, shape, depth,
and precautions of the cross hole.

STEP
2

Examine the specifications and submit a quotation
within 5 business days

STEP
3

Trial processing tests for a fee
(Upon request)

STEP
4

Order

STEP
5

Confirm the approved drawings with customer

STEP
6

After approval, start manufacturing and shipping

Regarding STEP3 trial processing test (for a fee)

Trial processing test (STEP.3) is available for a fee. Please refer to the procedure below for details.

STEP
1

Please contact us detailed drawings of the processing areas,
processing procedures,
and the processing machine you plan to use.

STEP
2

Manufacture a chamfer cutter according
to the area to be processed.

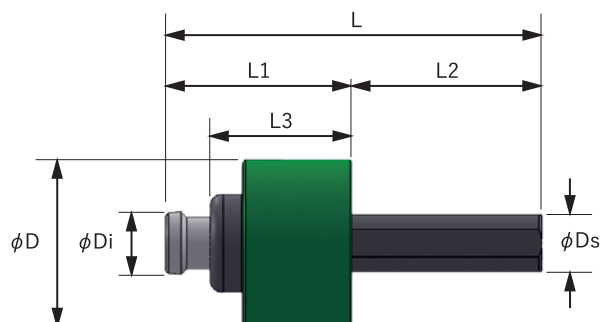
STEP
3

Trial processing test.
The equipment used will be our in-house compound lathe,
tapping machine, or machining center.
Attendance Inspection upon request

If you need the paid trial machining test and order the NX holder and chamfer
cutter as a set within 3 months after the test is completed,
You get two complimentary chamfer cutters for each NX holder.
Please take advantage of this opportunity. (Note: only first purchase

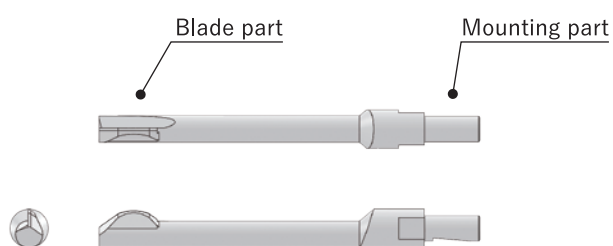
Dimensions

[Holder body]



Type (**は標準)	L1 mm	L2 mm	L3 mm	φDs mm	φDi mm	φD mm
B-**	50	40・50・60	45	16・20・25・32	20	53
C-**	70		43.5		13.5	37
D-25	49.3		35		18	18
E-25	44	30・40・50				

[Chamfer cutter]



(Reference: For forward rotation)

- The maximum tool diameter is $\phi 4$ to $\phi 10$.
- The material is carbide.
- Produced in a shape that matches the area to be chamfered
- We assign product numbers to all chamfer cutters and manage them individually.

Precautions for use

- When installing the chamfer cutter on the NX holder, be sure to match the phase.
- When performing eccentric machining, please match the phase of the NX holder

XTOOL

〈X TOOL〉

X-TOOL is a tool that can complete chamfering and deburring of the entrance and exit of a drill hole and the side hole opening of a primary hole in one pass.

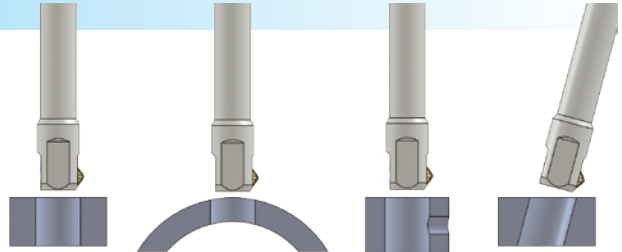
Hole shape

It is possible to chamfer not only the entrance and exit of holes drilled perpendicularly to a flat plate but also horizontal holes (*1, *2) drilled in the primary hole or holes drilled diagonally (*3), etc.

*1: Possible processing from either the secondary side or the primary side.

*2: The diameter of the side hole to be chamfered from the primary side will be $\Phi 0.5\text{mm}$ or more.

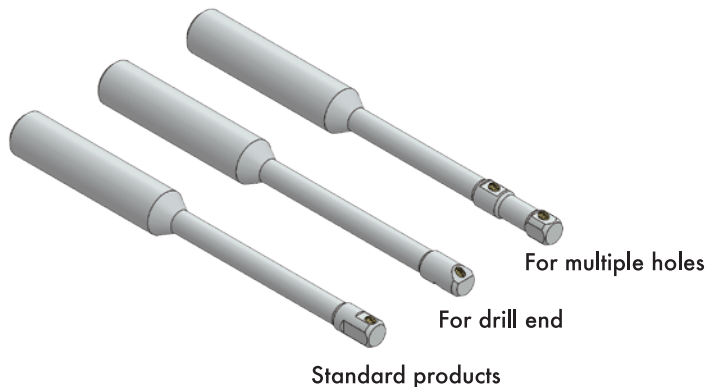
*3: The angle of inclination of the hole is up to 10 degrees.



Standard products and made to order

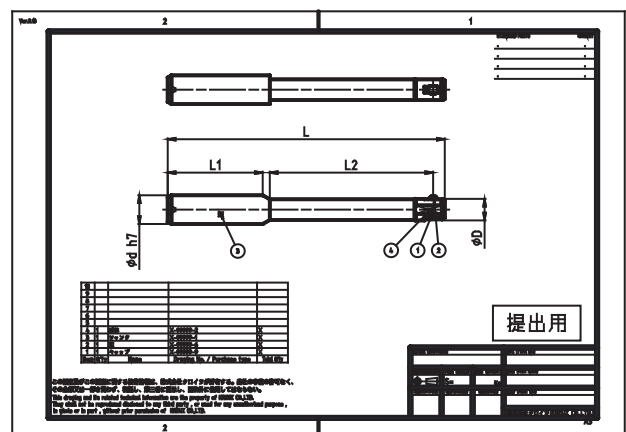
X-TOOL has standard products and made-to-order products to respond to the wide range of customer's need such as the size, position, and number of holes to be chamfered.

Work piece that cannot be processed with standard products, we can suggest or recommend to process with custom-made products. Please contact with us.



Product number code control

We control our all product that deliver to customer by number code. Thereby, possible to respond promptly for any request after purchasing.

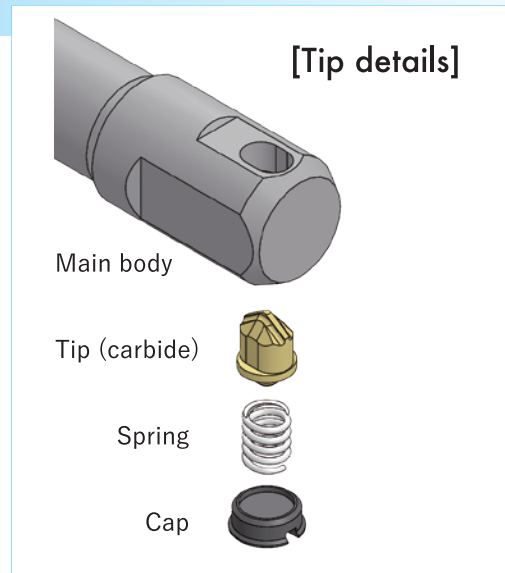


Hole shape/Standard products and made to order/Product number code control

Replacing the tip

The X-TOOL consists of four parts including the main body, and has a structure in which a spring constantly pushes out the chip.

Replacing the tip can be done simply by removing the cap with a flathead screwdriver, making it easy, reliable, and quick.

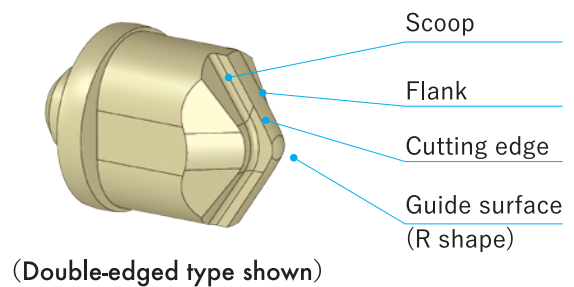


Chip shape

The top of the tip that comes into contact with the inner wall of the hole has an R-shaped guide surface with no cutting edge, making it difficult to damage the inner diameter.

The standard cutting edge angle is 90° , but this can be changed as an option.

There are two types of inserts: the single-edged type is used for chamfering the entrance and exit of holes drilled in flat plates, and the double-edged type is used for chamfering horizontal holes drilled in primary holes.



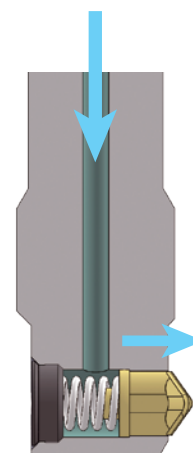
Increase the amount of chamfering using oil holes

An oil hole is drilled in the shank.

Normally, chamfering is performed using only spring force, but the amount of chamfering can be increased by using coolant or compressed air.

〈Note〉

- Recommended coolant pressure is up to 1MPa.
- Recommended air pressure is 0.2MPa.
- This applies when compressed air can be supplied using an automatic machine or a special machine.

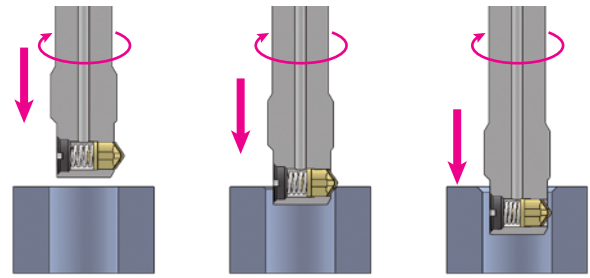


How chamfering works

Align the drill hole and the X-TOOL concentrically and insert while rotating in the normal direction.

When the tip held down by the spring comes into contact with the entrance edge, it is pushed toward the center while chamfering, and the feed chamfering is completed until the tip enters the drill hole.

The exit side is chamfered by pulling it out in the same way after the chip has been removed



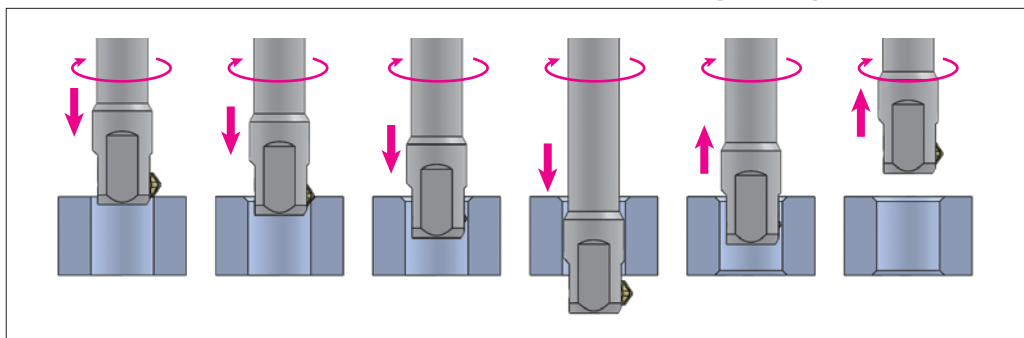
Processing procedure

There are two types of X-TOOL tips: single-edged and double-edged.

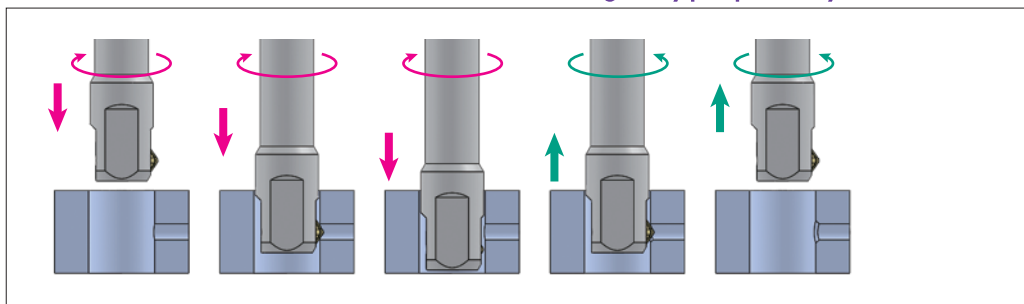
The processing method differs depends on the chips specification.

That method changes depends on the processing position.

■Single- edged (Relatively flat openings such as the entrance and exit of single-edged drill holes)




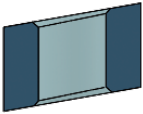
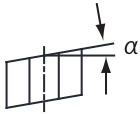
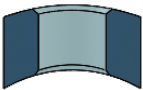
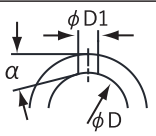

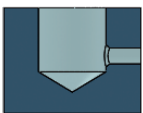

■Double-edged (Opening of the horizontal hole drilled in the double-edged type primary hole)



〈Note〉

- The single-edged type requires forward rotation only, and the double-edged type requires forward and reverse rotation.
- Although depending on the shape of the opening, except right-angled cross hole on the flat plate requires forward/reverse rotation with double-edged type.
- Depending on the size of the burr and the material of the workpiece, it is necessary to reciprocate processing the opening entrance by rotating it forward or backward.

Selection method

Characteristics of processed areas		Blade type	Standard	Made-to-order
	Orthogonal cross hole	Single- edged	○	○
	 $\alpha = \text{up to } 10 \text{ degrees}$	Single- edged	○	○
	 $\alpha = \text{up to } \phi D1 \leq 4 \times \phi D$	Single- edged	○	○
	Side hole	Double- edged	○	○
	Side hole near the drill end	Double- edged	×	○
	Multiple side holes	Double- edged	×	○

If you can provide us with information showing the parts to be processed, we will respond processing possibility.

Our sales office or website

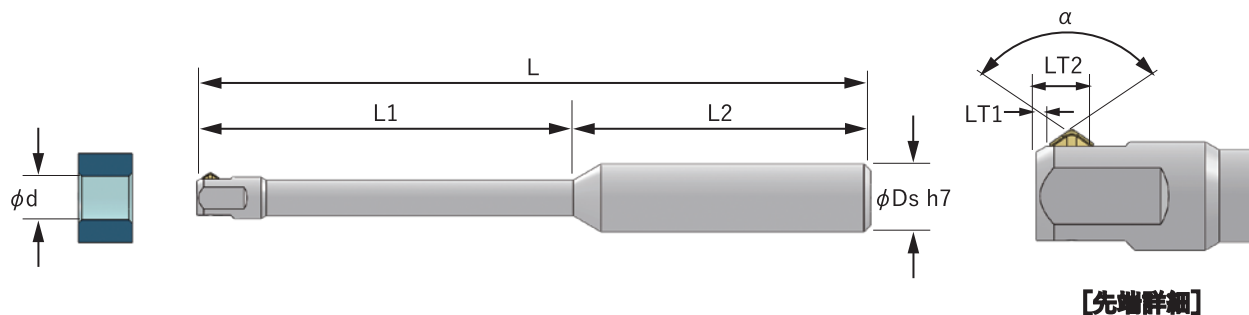
Please contact us :

www.kreuz.jp

How to order (first time only)

	Standard products	Made-to-order
STEP 1	Please select from the standard product lineup.	Please let us know the size, shape, depth, and precautions of the cross hole.
STEP 2	After receiving your consultation, we will provide you with a quote within 3 business days.	We review the specifications and submit a quote within 5 business days.
STEP 3	Order	
STEP 4	We submit the approved drawings. (Within 5 business days)	
STEP 5	After receiving your approval, we start manufacturing and shipping. (Production lead time: approximately 1 month)	

X Tool | Standard product



hole diameter φd (specified in 0.1mm increments)	length of neck L1 (mm)	full length L (mm)	shank length L2 (mm)	Shank diameter φDs (mm)	Tip length		chip angle α (deg)	Chip shape
					LT1 (mm)	LT2 (mm)		
4.0~4.5	40	80	40	6・8・10	0.7	2.7	90	single edge ・ double edge
	60	100						
4.6~4.9	40	80						
	60	100						
	80	120						
5.0~5.4	40	80						
	80	120						
	120	160						
5.5~5.9	50	90						
	100	140						
	150	190						
6.0~7.9	50	90						
	100	140						
	150	190						
	200	240						
8.0~9.9	50	90						
	100	140						
	150	190						
	200	240						
10.0~11.9	50	90						
	100	140						
	150	190						
	200	240						
				8・10	2.10	5.90		
			10.12					

hole diameter ϕd (specified in 0.1mm increments)	length of neck L1 (mm)	full length L (mm)	shank length L2 (mm)	Shank diameter ϕDs (mm)	Tip length		chip angle α (deg)	Chip shape
					LT1 (mm)	LT2 (mm)		
12.0~15.9	50	100	50	10・12・16	2.65	6.85	90	single edge ・ double edged
	100	150						
	150	200						
	200	250						
16.0~16.8	50	100		12・16・20				
	100	150						
	150	200						
	200	250						

[About hole diameter]

Since the size is in 0.1mm increments, please round up all sizes below 1/100.

Example) When the hole diameter is $\phi 5.95\text{mm}$, $\phi d=6.0\text{mm}$.

CX-Drill

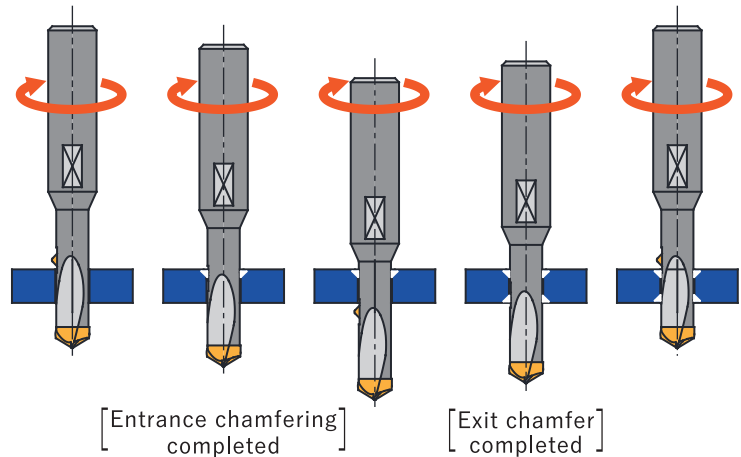
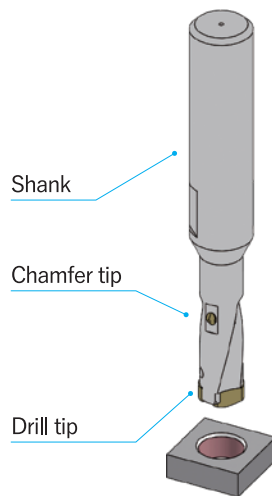
This tool allows you to drill holes and chamfer the front and back sides at the same time. The X-TOOL mechanism is builed into the drill.

Drilling and chamfering can be done in one pass.

In order to chamfer while drilling, attached X-TOOL tip to the shank of the drill.

Drill a hole as a normal drill process, and then feed the X-DRILL while rotating to chamfer the entrance side.

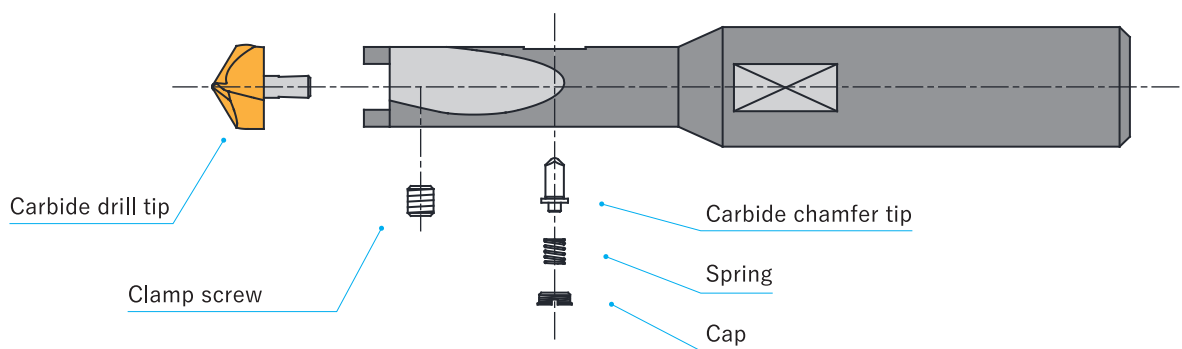
Further, feed the chamfering tip to the position where it completely comes out, and then return it. Chamfered at the exsist opening by retuning.



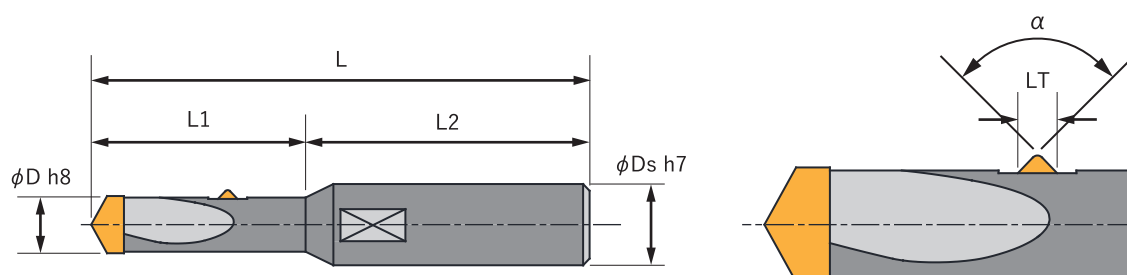
Both drill tips and chamfer tips can be easily replaced.

Both the drill tip and chamfer tip are made of carbide, and each is replaceable.

The drill tip can be replaced by simply removing the clamp screw and the chamfer tip by removing the cap.



Dimensions



1xD

Drill diameter ϕD (Specified in 0.05mm increments)	Length of neck L1 (mm)	Full length L (mm)	Shank length L2 (mm)	Shank diameter ϕDs (mm)	Chip length	Chip angle	Coating		
					LT (mm)	α (deg)			
8.00~8.95	33	73	40	10	3.80	90	None TiN TiAlN DLC		
9.00~9.95	34	74		10・12					
10.00~10.95	35	75							
11.00~11.95	36	76							
12.00~12.95	38	88	50	10・12・16	4.20			90	None TiN TiAlN DLC
13.00~13.95	39	89							
14.00~14.95	40	90							
15.00~15.95	41	91							
16.00~16.80	42	92							

2xD

Drill diameter ϕD (Specified in 0.1mm increments)	Length of neck L1 (mm)	Full length L (mm)	Shank length L2 (mm)	Shank diameter ϕD_s (mm)	Chip length	Chip angle	Coating
					LT (mm)	α (deg)	
12.00~12.90	61	111	50	10·12·16	4.20	90	None TiN TiAlN DLC
13.00~13.90	63	103					
14.00~14.90	65	115					
15.00~15.90	67	117					
16.00~16.80	67	119					





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※Product specifications may change without notice
for technical improvment.

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