MANUAL

GMO tools
Sonderwerkzeuge

GMO deburring tools (patented)

Deburring of bore inside and outside edges within seconds

Contents

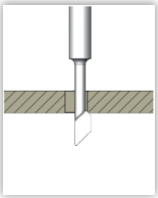
Possible applications

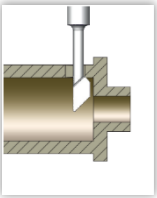
The GMO deburrer is designed for quick deburring of inner and outer edges of bores. Can be deburred:

- Drilling in flat surfaces
- Drilling in curved surfaces
- Holes next to walls

Due to the possibility of very finely adjusting the swing-out dimension, bores that are very close to a wall can also be deburred.

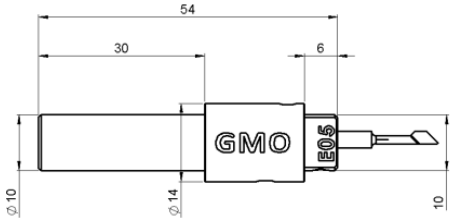
Application examples



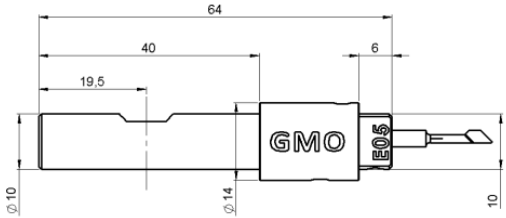


Technical specifications

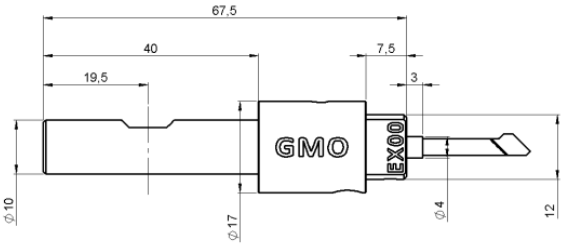
Standard: Tool-Ø 14mm, Shaft-Ø 10x30mm **without** clamping surface



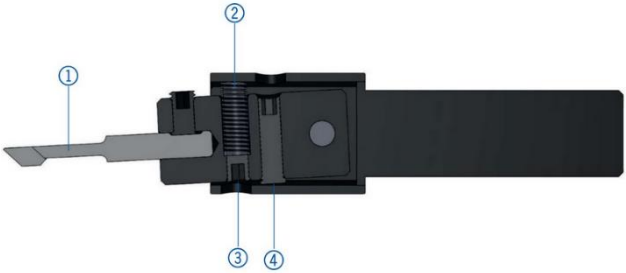
Version V: Tool-Ø 14mm, Shaft-Ø 10x40mm **with** clamping surface



Version XL: Tool-Ø 17mm, Shaft-Ø 10x40mm with clamping surface
(Version XL is designed for stronger springs)



Deburrer Components



① Solid carbide blades
② Compression spring
③ Setting screw for adjusting the spring force
④ Adjusting screw for setting the swiveling dimension depending on the bore diameter

Advantages

- Deburring process in seconds
- Deburring the smallest bores from Ø 0.80 mm
- Carbide cutting tools
- Continuously adjustable deburring diameter
- Ideal for use in CNC processing machines
- Large selection of cutting tools
- Deburring flat and curved bore edges
- Choice of two deburring processes

Selection of the compression spring

Four different compression springs with different compression forces are available. The spring is selected depending on the deburring thickness or material properties. With e.g. aluminum "weak" (F40), with stainless steel "strong" (F55).

In addition, the compressive force can be adjusted using the adjusting screw (item 3, fig. on page 5). The spring force or the spring pressure is to a large extent decisive for the deburring strength.

Spring overview

Material	For Basic-holder Standard / V	For Basic-holder XL
Aluminium, Brass, ... (soft)	F40	FXL63
Steel (normal)	F50	FXL80
Stainless steel	F55	FXL90
Highly tempered steel (hard)	F63	FXL100

Replacement of the compression spring

1. Loosen the countersunk screw ① and move the sleeve ②.
   (Caution: hold the spring back with your finger)
2. Push the sleeve ② forwards or backwards until the spring ③ free.
3. Replace spring ③ , sleeve ② back into the starting position move and fix with countersunk screw ①.

The tool does not have to be reset after replacing the spring.

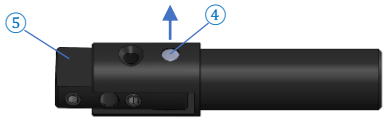
Selection of the Insert

The GMO tool inserts are required to adjust the deburring diameter of the tool. See page 10 "Overview of blades and inserts".

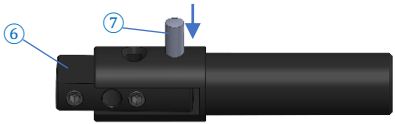
Replacement of the Insert

If you want to change the insert, please proceed as follows:

1. Remove blade ①, loosen countersunk screw ② and pull off sleeve ③. (Caution: hold the spring back with your finger)



2. Press out dowel pin ④ in direction of arrow and remove insert ⑤.



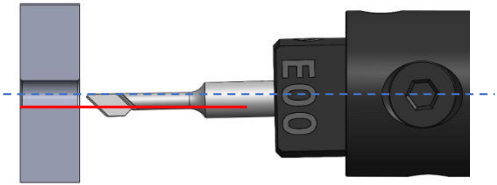
3. Insert new insert ⑥ Pay attention to the alignment and lightly grease the bearing point. Take new dowel pin ⑦ out of original packaging and insert in direction of arrow.

Only use the original dowel pin included in the set!
Check for ease of movement before further processing!

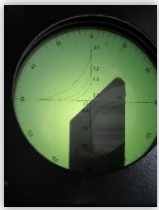
Setting the swing-out dimension

In order to ensure clean deburring of the hole edge, it is important to set the deburrer's swing-out dimension correctly. The adjustment must be very precise, especially when drilling close to walls.

Please proceed as follows:



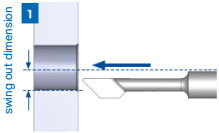
To set the swing-out dimension, the insert is tilted using the adjusting screw (item 4, fig. on page 5) until the cutting edge meets the edge of the hole in the middle of the outer cutting edge. This can be done directly in the machine or with the help of an optical presetter.



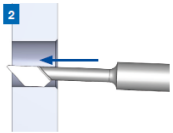
For bores that are close to the walls, the tool must be set using the transition edge between the inner and outer cutting edge so that it does not hit the wall!

Deburring with spring force

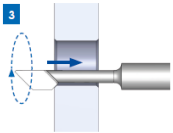
Deburring with spring force	
1.	Set the diameter to be deburred using the adjusting screw (item 4, fig. on page 5).
2.	Position the tool in the center of the hole.
3.	Drive into the hole at full speed until the tool cutting edge is below the edge of the hole to be deburred.
4.	Move back with a small feed to deburr the hole.
5.	Drive out of the bore again with full feed and full speed.



Position the center axis of the deburrer on the center of the hole. Set the swing-out dimension so that the center of the cutting edge meets the edge of the hole. The tool is pushed towards the axis against the spring force.



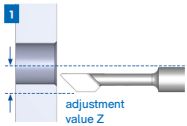
Plunge into the hole with a rotating tool and high feed. The leading edge of the tool is rounded to allow for easy plunging and to prevent damage to the outer bevel.



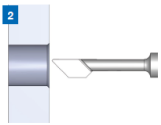
Only immerse until the tool swings outwards and the shoulder of the tool rests against the hole. Then move back out of the hole with a low feed, depending on the desired deburring intensity. The burr is removed because the blade is pressed against the edge to be deburred by the spring force. As soon as the cutting surface is free, move out of the hole in rapid traverse.

Deburring with a rigid setting

Deburring with rigid adjustment (without compression spring)	
1.	Replace spring with set screw M3 x 10 mm.
2.	Set the diameter to be deburred with the adjusting screw (items 3 and 4, fig. on page 5).
3.	Position the tool over the hole and, with the spindle stopped and oriented, move away from the center of the hole.
4.	Drive into the hole at low speed until the cutting edge is below the edge of the hole to be deburred.
5.	Position the spindle in the middle of the hole and switch on the spindle rotation.
6.	Move back with a small feed to deburr the hole.
7.	Switch off spindle rotation, orient spindle and move away from the center of the hole.
8.	Drive out of the hole with full feed.

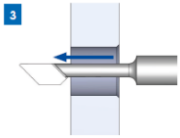


Position the center axis of the deburrer on the center of the hole. Set the swing-out dimension so that the center of the cutting edge meets the edge of the hole.

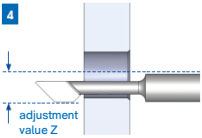


Adjust the spindle or the workpiece in the Z direction so that the cutting edge can move through the hole without touching it.

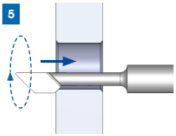
Deburring with a rigid setting



After orienting the cutting edge, move through the hole in rapid traverse without rotation.



Then reset the spindle or the workpiece by the adjustment value.



Turn on the rotation and slowly move up until the desired bevel is reached.

Turn off rotation. Orientate the spindle and move the tool or workpiece by the adjustment value so that you can move out of the hole in rapid traverse.

The rigid setting is preferable if there is a lot of burr formation or if a defined chamfer is to be created.

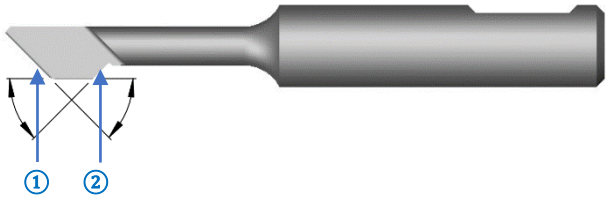
Important:

Oriented stopping of the spindle must be possible on the machine side.

Selection of the deburring blade

The solid carbide cutting edges are available in different versions. First you have to decide whether only the inner edge or both the inner and outer edges should be deburred. We offer cutting edges with a 25° cutting angle especially for curved bore edges, and customer-specific special solutions with, for example, an extended recess are also possible.

Shape of the deburring blade



① **Outer cutting edge 45°**
- cutting (for external and internal processing) or
- rounded = not cutting (internal processing only)

② **Internal cutting edge 45° (standard)**
Also available with a 25° angle for special applications (e.g. with curved bore edges).

Versions of the deburring blade

The deburring blades are available in the following versions:

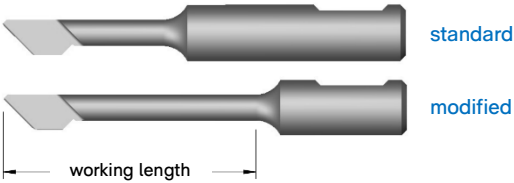
1. STANDARD
   = Inner cutting edge sharp at 45°
   Only for deburring the inner edge. The outer cutting edge is rounded off.

2. FORM B
   = Inner and outer cutting edge sharp, each with 45°
   For deburring the inside and outside edges.

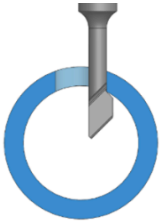
3. FORM W25
   = Inner cutting edge sharp at 25°
   For strongly curved inner edges.

4. FORM B/W25
   = Inner edge sharp at 25° and outer edge sharp at 45°
   For strongly curved inner edges and outer edges.

5. Special blade
   = e.g. extended working length
   If none of the cutting edges from the standard range fit, a special cutting edge can be adapted to the customer's deburring situation.



Why 25° cutting angle?



Cutting angle 45°

Ratio of cross hole to through hole OK

Cutting angle 45°

Ratio of cross hole to through hole too small. The cutting edge would damage the bore wall.

Cutting angle 25°

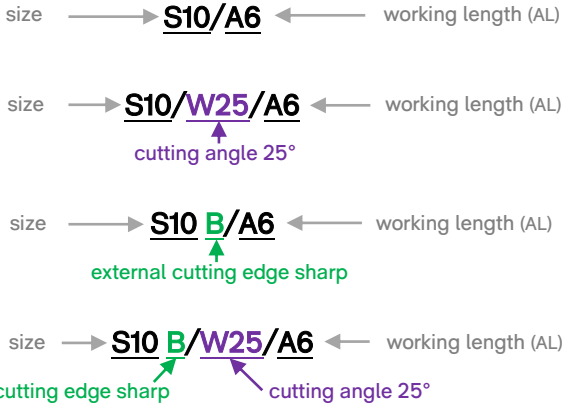
A flatter cutting angle creates more free space. Ratio of cross hole to through hole can be deburred at 25°.

If the ratio between the cross bore (d) and the through bore (D) is greater than 0.5, a cutting edge with a 25° cutting angle should be selected.

$$d : D = \text{max. } 0{,}5$$

Designation of the deburring edges

The designation of the GMO deburring blade always begins with "GMO S..." and then includes this information:



The cutting blade size indicates from which diameter the cutting edge can be used. Example: S10 = from Ø 1.0mm

Special feature:

An X is always put in front of special deburring blades:

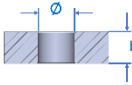
XGMO S10/A...

Further designations that describe the corresponding modification can also be added. For example:

XGMO S10/A6/**K3** = changed head length

XGMO S10/A6/**GL26** = changed overall length

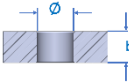
Overview of blades and inserts



bore-Ø [mm]	bore-depth [mm]	Recommended use for Standard & V basic holders	Recommended use for basic holder XL	Recommended GMO cutting blade
0,80 – 1,00	2,0	E00	-	S08...A2
0,80 – 1,00	3,0	E00	-	S08...A3
1,00 – 1,20	3,0	E00	-	S10...A3
1,00 – 1,20	4,0	E00	-	S10...A4
1,20 – 1,50	3,0	E00	-	S12...A3
1,20 – 1,50	4,0	E00	-	S12...A4
1,20 – 1,50	5,0	E00	-	S12...A5
1,50 – 2,00	4,0	E00	EX00	S15...A4
1,50 – 2,00	5,0	E00	EX00	S15...A5
1,50 – 2,00	6,0	E00	EX00	S15...A6
1,50 – 2,00	7,0	E00	EX00	S15...A7
2,00 – 2,50	5,0	E00	EX00	S20...A5
2,00 – 2,50	6,0	E00	EX00	S20...A6
2,00 – 2,50	7,0	E00	EX00	S20...A7
2,00 – 2,50	8,0	E00	EX00	S20...A8
2,00 – 2,50	10,0	E00	EX00	S20...A10
2,00 – 2,50	12,0	E00	EX00	S20...A12
2,50 – 3,50	5,0	E05	EX05	S23...A5
2,50 – 3,50	6,0	E05	EX05	S23...A6
2,50 – 3,50	7,0	E05	EX05	S23...A7
2,50 – 3,50	8,0	E05	EX05	S23...A8
2,50 – 3,50	10,0	E05	EX05	S23...A10

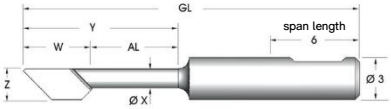
bore-Ø [mm]	Bore-depth [mm]	Recommended use for Standard & V basic holders	Recommended use for basic holder XL	Recommended GMO cutting blade
2,50 – 3,50	12,0	E05	EX05	S23...A12
3,00 – 3,50	6,0	E05	EX05	S30...A6
3,00 – 3,50	10,0	E05	EX05	S30...A10
3,00 – 3,50	14,0	E05	EX05	S30...A14
3,50 – 4,50	5,0	E10	EX10	S23...A5
3,50 – 4,50	6,0	E10	EX10	S23...A6
3,50 – 4,50	7,0	E10	EX10	S23...A7
3,50 – 4,50	8,0	E10	EX10	S23...A8
3,50 – 4,50	10,0	E10	EX10	S23...A10
3,50 – 4,50	12,0	E10	EX10	S23...A12
3,50 – 4,50	6,0	E10	EX10	S30...A6
3,50 – 4,50	10,0	E10	EX10	S30...A10
3,50 – 4,50	14,0	E10	EX10	S30...A14
4,00 – 5,00	17,0	-	EX05	S40...A17
4,00 – 5,00	25,0	-	EX05	S40...A25
4,50 – 5,50	5,0	E15	EX15	S23...A5
4,50 – 5,50	6,0	E15	EX15	S23...A6
4,50 – 5,50	7,0	E15	EX15	S23...A7
4,50 – 5,50	8,0	E15	EX15	S23...A8
4,50 – 5,50	10,0	E15	EX15	S23...A10
4,50 – 5,50	12,0	E15	EX15	S23...A12
4,50 – 5,50	6,0	E15	EX15	S30...A6
4,50 – 5,50	10,0	E15	EX15	S30...A10
4,50 – 5,50	14,0	E15	EX15	S30...A14
5,00 – 6,00	17,0	-	EX10	S40...A17
5,00 – 6,00	25,0	-	EX10	S40...A25
5,50 – 6,50	5,0	E20	EX20	S23...A5
5,50 – 6,50	6,0	E20	EX20	S23...A6

Overview of blades and inserts



bore-Ø [mm]	Bore-depth [mm]	Recommended use for Standard & V basic holders	Recommended use for basic holder XL	Recommended GMO cutting blade
5,50 – 6,50	7,0	E20	EX20	S23...A7
5,50 – 6,50	8,0	E20	EX20	S23...A8
5,50 – 6,50	10,0	E20	EX20	S23...A10
5,50 – 6,50	12,0	E20	EX20	S23...A12
5,50 – 6,50	6,0	E20	EX20	S30...A6
5,50 – 6,50	10,0	E20	EX20	S30...A10
5,50 – 6,50	14,0	E20	EX20	S30...A14
6,00 – 7,00	17,0	-	EX15	S40...A17
6,00 – 7,00	25,0	-	EX15	S40...A25
6,50 – 7,50	5,0	E25	EX25	S23...A5
6,50 – 7,50	6,0	E25	EX25	S23...A6
6,50 – 7,50	7,0	E25	EX25	S23...A7
6,50 – 7,50	8,0	E25	EX25	S23...A8
6,50 – 7,50	10,0	E25	EX25	S23...A10
6,50 – 7,50	12,0	E25	EX25	S23...A12
6,50 – 7,50	6,0	E25	EX25	S30...A6
6,50 – 7,50	10,0	E25	EX25	S30...A10
6,50 – 7,50	14,0	E25	EX25	S30...A14
5,00 – 6,00	17,0	-	EX20	S40...A17
5,00 – 6,00	25,0	-	EX20	S40...A25
5,50 – 6,50	5,0	-	EX25	S40...A17
5,50 – 6,50	6,0	-	EX25	S40...A25

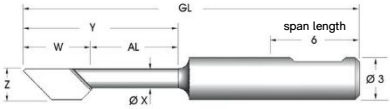
Dimensions of the deburring blades



GMO deburring blade	bore-Ø to be deburred [mm]	AL	GL	W	X	Y	Z
GMO S08 A2	0,8 – 1,0	2	22,0	1,40	0,50	3,40	0,75
GMO S08 A3	0,8 – 1,0	3	22,0	1,40	0,50	4,40	0,75
GMO S10 A3	1,0 – 1,2	3	22,0	2,00	0,65	5,00	0,95
GMO S10 A4	1,0 – 1,2	4	22,0	2,00	0,65	6,00	0,95
GMO S12 A3	1,2 – 1,5	3	22,0	2,65	0,70	5,65	1,10
GMO S12 A4	1,2 – 1,5	4	22,0	2,65	0,70	6,65	1,10
GMO S12 A5	1,2 – 1,5	5	22,0	2,65	0,70	7,65	1,10
GMO S15 A4	1,5 – 2,0	4	22,0	3,10	1,00	7,10	1,40
GMO S15 A5	1,5 – 2,0	5	22,0	3,10	1,00	8,10	1,40
GMO S15 A6	1,5 – 2,0	6	22,0	3,10	1,00	9,10	1,40
GMO S15 A7	1,5 – 2,0	7	22,0	3,10	1,00	10,1	1,40
GMO S20 A5	2,0 – 2,5	5	22,0	3,80	1,40	8,80	1,90
GMO S20 A6	2,0 – 2,5	6	22,0	3,80	1,40	9,80	1,90
GMO S20 A7	2,0 – 2,5	7	22,0	3,80	1,40	10,8	1,90
GMO S20 A8	2,0 – 2,5	8	23,0	3,80	1,40	11,8	1,90
GMO S20 A10	2,0 – 2,5	10	24,0	3,80	1,40	13,8	1,90
GMO S20 A12	2,0 – 2,5	12	25,0	3,80	1,40	15,8	1,90
GMO S23 A5	2,3 – 7,5	5	24,3	5,00	1,40	10,0	2,20
GMO S23 A6	2,3 – 7,5	6	24,3	5,00	1,40	11,0	2,20
GMO S23 A7	2,3 – 7,5	7	24,3	5,00	1,40	12,0	2,20
GMO S23 A8	2,3 – 7,5	8	24,3	5,00	1,40	13,0	2,20

All specified cutting edges are standard cutting edges. Special solutions, for example with an extended working length (AL), can be implemented on request.

Dimensions of the deburring blades



GMO deburring blade	bore-Ø to be deburred [mm]	AL	GL	W	X	Y	Z
GMO S23 A10	2,3 – 7,5	10	25,0	5,00	1,40	15,0	2,20
GMO S23 A12	2,3 – 7,5	12	26,0	5,00	1,40	17,0	2,20
GMO S30 A6	3,0 – 8,0	6	24,3	5,50	1,80	11,0	2,90
GMO S30 A10	3,0 – 8,0	10	25,0	5,50	1,80	15,0	2,90
GMO S30 A14	3,0 – 8,0	14	28,0	5,50	1,80	19,0	2,90
GMO S40 A17	4,0 – 15,0	17	29,0	5,90	3,00	22,9	3,90
GMO S40 A25	4,0 – 15,0	25	37,0	5,90	3,00	30,9	3,90

Maximum deburring strength

GMO deburring blade	bore-Ø [mm]	max. deburring strength [mm]
GMO S08	0,8 – 1,0	0,25
GMO S10	1,0 – 1,2	0,30
GMO S12	1,2 – 1,5	0,40
GMO S15	1,5 – 2,0	0,40
GMO S20	2,0 – 2,5	0,50
GMO S23	2,3 – 7,5	0,80
GMO S30	3,0 – 8,0	1,10
GMO S40	4,0 – 15,0	0,90

The deburring result varies depending on the material, cutting parameters and application. The values given are the theoretically maximum achievable bevel sizes.

Deburring example

Example of internal deburring with compression spring

Material :	11SMn30K
Bore-Ø:	2,20 mm
Deburring time:	approx 1,3 Sec.
Speed:	500 rpm
Feed:	100 mm/min

The tool is pre-positioned in the middle, with a small safety distance (e.g. 2 mm) above the hole to be deburre

Move in rapid traverse in front of the edge of the hole.

Drive into the hole with high feed (max. 30m/min.) until the tool deflects outwards again.

Retract with feedrate F100. This removes the burr.

When the cutting edge is free or the desired chamfer size is reached, return the tool to the starting position with high feed (max. 30m/min.).

The greater the curvature of the bore edge, the greater the spring force must be set and the speed reduced.

Cutting data (recommendation)

Material	Feedrate [mm/min]	Speed [rpm]
non-ferrous metals	150 to 200	Flat surface: 300 to 500 Curved surface: 200 to 300
unalloyed steels	100 to 150	
high-alloy steels	50 to 100	

Problem solving

Problem	possible cause	suggested solution
chamfer too big	excessive spring pressure	reduce spring pressure
chamfer uneven	speed too high	reduce speed
	unfavorable bore ratio	use a 25°-blade
unclean deburring	spring pressure too low	increase spring pressure
	swivel dimension too small	further swing out
	unfavorable bore ratio	use a 25°-blade
secondary burr	excessive spring pressure	reduce spring pressure
	feed too high	reduce feed
edge rattled	spring pressure too low	increase spring pressure
	feed too low	increase feed
	speed too high	reduce speed

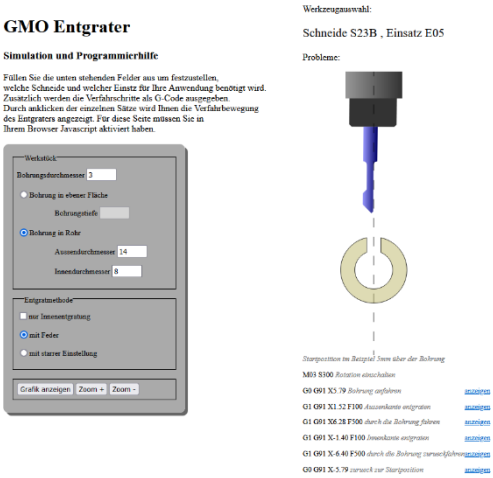
For application problems, please contact technical support at:

www.gmo-tools.de/contact

Online simulation and programming help

You can use the simulation tool on our website to support you in tool selection and to make programming easier for you.

Here you can enter your drilling data and you will receive the correct tool combination for the respective application as well as the CNC data set, which you can transfer to your machining program.



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