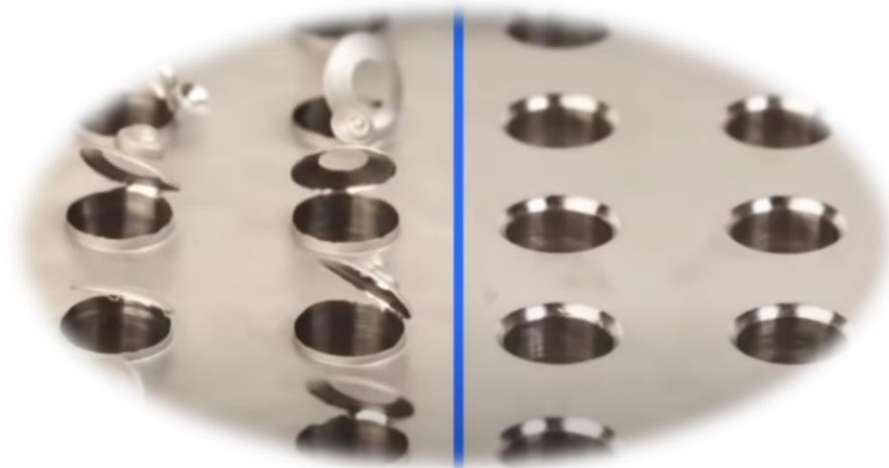


DEBURRING T / BACK COUNTERBORING



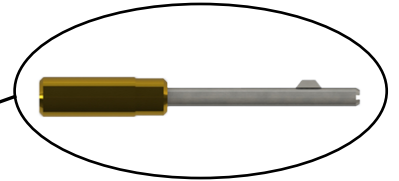
 **STM**
SYSTEMY i TECHNOLOGIE MECHANICZNE

ul. Dziewosłoby 14/1 - 04-403 Warszawa
Tel: +48 22 6735548
E-mail: info@stmech.pl - www.stmech.pl

MICHIGAN DEBURRING TOOL

*Deburring in push and/or pull - Long-lasting, high-quality components.
Designed for high-volume productions - Lower operating costs, reduced cost per hole.
Blade adjustment can be done in the machine - Quick change of blade and pin in the machine.
Simple, robust, reliable construction - Standard from \varnothing 1 to 31mm.
Possibility of building special tools*

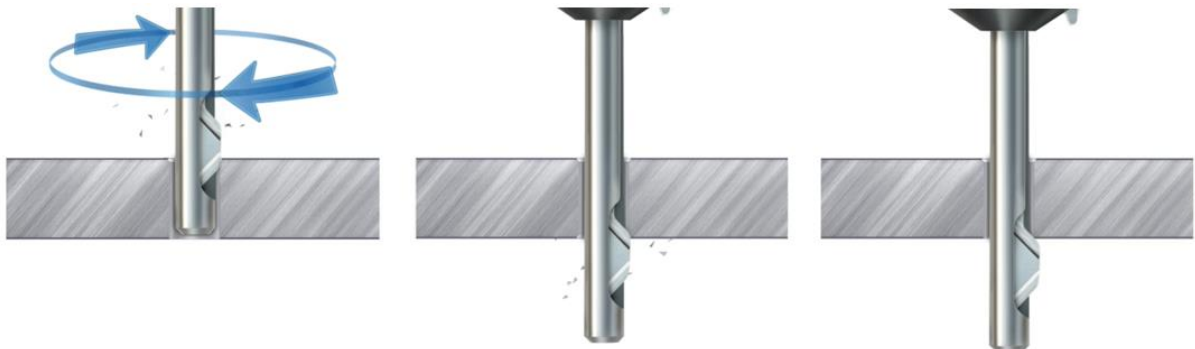
Micro Series from 1.00 to 2.34mm



Modular Series from 1.45 to 6.4mm



Autolock Series from 6.5 to 31mm



MADE IN
USA 

Modular Series from 1.45 to 6.4mm

BODY

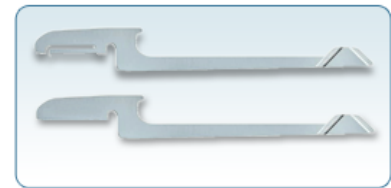
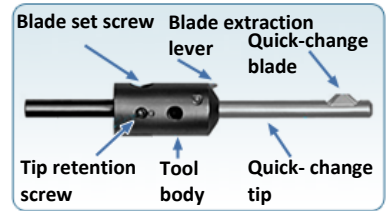
Key component of the modular system. Presetting is only necessary when first mounted on the spindle; there is no need to check during any subsequent change of tip or blade, as quick-change components assume precise positions. The lateral locking and unlocking grain of the tip allows for quick and easy changes directly on the machine. The lateral screw allows for adjustment of the blade elevation and its rapid replacement—half a turn is sufficient to go from maximum blade elevation to the extraction position, an operation that can be performed directly on the machine.

TIP

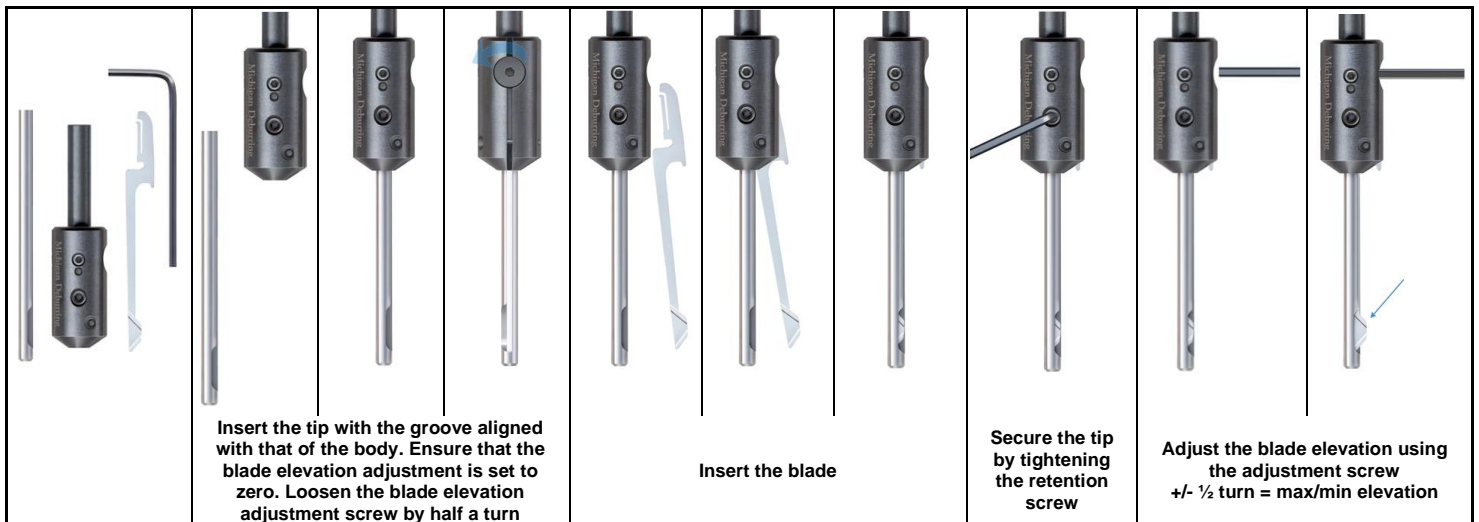
The small-diameter tips, such as A, B, and C types (Ø1.45-2.3mm), are made from raw drill blanks, while the larger-diameter models like D, E, F, and G types (Ø2.4-6.4mm) are crafted from high-quality tool steel. These features make it a component with a long lifespan and low cost. Additionally, it can be replaced quickly and easily directly in the machine.

BLADE

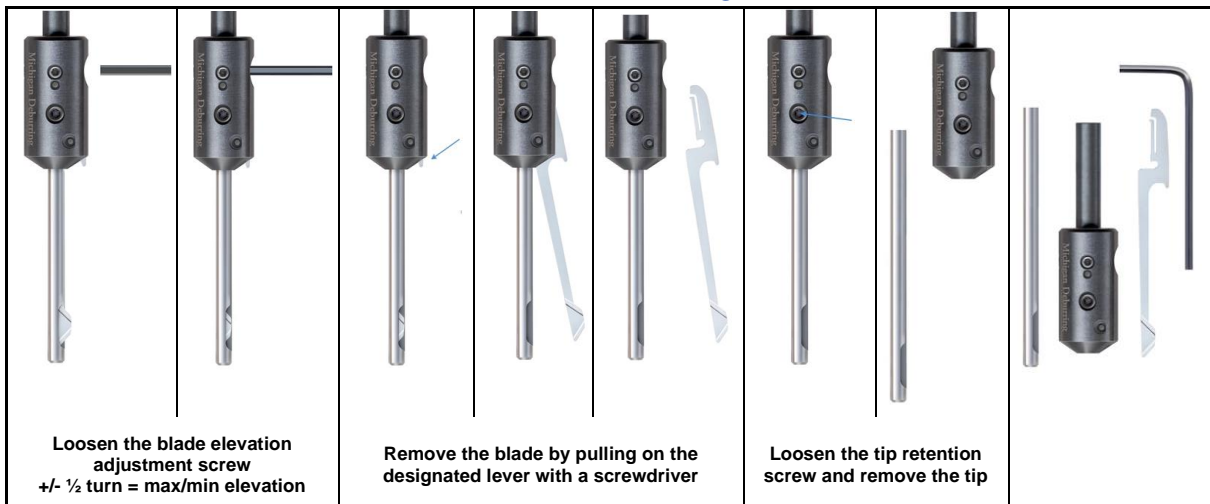
The adjustable quick-change blade also functions as a spring. The blade has a stroke limitation that prevents excessive elevation and subsequent breakage. With the adjustment screw fully tightened, maximum elevation is achieved, resulting in a very aggressive cutting action. Loosening the screw by a quarter turn provides a softer adjustment. Adjust the blade elevation to the minimum height that allows you to achieve the desired result; this way, it will exert less force. Blade elevation adjustment is also used to compensate for blade wear, increasing the projection as the cutting edge wears out



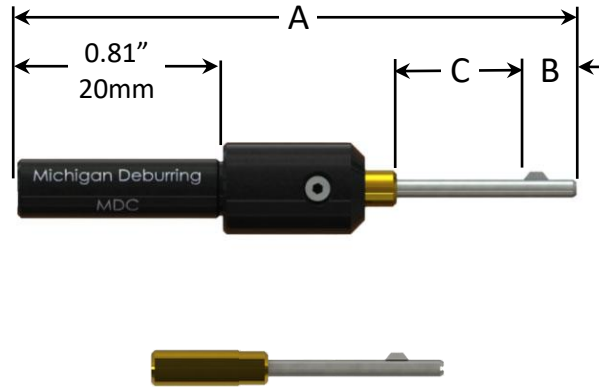
MODULAR SERIES TOOL ASSEMBLY



BLADE AND TIP REPLACEMENT



MDC TYPE - 1.00mm – 2.34mm (.040" - .092") holes



mm		inches		Tip	Tip	A	B	C
Min	Max	Min	Max	Pull + Push	Pull-only	mm	mm	mm
1.00	1.06	.0400	.0410	MDC0400-B	MDC0400-R	48.25	3.80	6.35
1.07	1.13	.0420	.0440	MDC0420-B	MDC0420-R	48.25	3.80	6.35
1.14	1.22	.0450	.0480	MDC0450-B	MDC0450-R	48.25	3.80	6.35
1.23	1.31	.0485	.0510	MDC0485-B	MDC0485-R	50.00	4.00	7.90
1.32	1.36	.0520	.0530	MDC0520-B	MDC0520-R	50.00	4.00	7.90
1.37	1.44	.0540	.0560	MDC0540-B	MDC0540-R	50.00	4.00	7.90
1.45	1.55	.0570	.0610	MDC0570-B	MDC0570-R	52.30	4.80	9.65
1.56	1.65	.0615	.0650	MDC0615-B	MDC0615-R	53.35	4.80	11.20
1.66	1.74	.0655	.0680	MDC0655-B	MDC0655-R	54.10	4.80	11.20
1.75	1.82	.0690	.0710	MDC0690-B	MDC0690-R	56.10	5.30	12.70
1.83	1.89	.0720	.0740	MDC0720-B	MDC0720-R	56.10	5.30	12.70
1.90	1.97	.0750	.0770	MDC0750-B	MDC0750-R	56.10	5.30	12.70
1.98	2.03	.0780	.0800	MDC0780-B	MDC0780-R	56.90	6.10	12.70
2.04	2.12	.0805	.0830	MDC0805-B	MDC0805-R	56.90	6.10	12.70
2.13	2.22	.0840	.0870	MDC0840-B	MDC0840-R	56.90	6.10	12.70
2.23	2.34	.0880	.0920	MDC0880-B	MDC0880-R	56.90	6.10	12.70

MDC-HOLDER: Body

TYPE A - 1.45mm – 1.75mm (.057" - .069") holes



Working range				Complete Tool Code (Code for pull-only blade)	Components codes		
mm		inches			Body	Tip	Blade
Min	Max	Min	Max				
1.45	1.55	.0570	.0620	TA-0570-5252S (TA-0570-R52S)	HA-0570	P-0570	BA5252S (Push+pull)
1.60	1.65	.0625	.0665	TA-0625-5252S (TA-0625-R52S)	HA-0625	P-0625	
1.70	1.75	.0670	.0695	TA-0670-5252S (TA-0670-R52S)	HA-0670	P-0670	BAR52S (Pull-only)

TYPE B - 1.80mm – 1.95mm (.070" - .076") holes



Working range				Complete Tool Code (Code for pull-only blade)	Components codes		
mm		inches			Body	Tip	Blade
Min	Max	Min	Max				
1.80	1.80	.0700	.0725	TB-0700-5252S (TB-0700-R52S)	HB-0700	P-0700	BB5252S (Push+pull)
1.85	1.90	.0730	.0755	TB-0730-5252S (TB-0730-R52S)	HB-0730	P-0730	
1.95	1.95	.0760	.0780	TB-0760-5252S (TB-0760-R52S)	HB-0760	P-0760	BBR52S (Pull-only)

TYPE C - 2.00mm – 2.30mm (.079" - .093") holes



Working range				Complete Tool Code (Code for pull-only blade)	Components codes		
mm		inches			Body	Tip	Blade
Min	Max	Min	Max				
2.00	2.05	.0785	.0815	TC-0785-5252S (TC-0785-R52S)	HC-0785	P-0785	BC5252S (Push+pull)
2.10	2.15	.0820	.0855	TC-0820-5252S (TC-0820-R52S)	HC-0820	P-0820	
2.20	2.25	.0860	.0885	TC-0860-5252S (TC-0860-R52S)	HC-0860	P-0860	BCR52S (Pull-only)
2.30	2.35	.0890	.0930	TC-0890-5252S (TC-0890-R52S)	HC-0890	P-0890	

TYPE F - 4.00mm – 4.75mm (.156" - .187") holes



Working range				Complete Tool Code (Code for pull-only blade)	Components codes		
mm		inches			Body	Tip	Blade
Min	Max	Min	Max				
4.00	4.15	.1560	.1655	TF-1560-4545P (TF-1560-R45P)	HF-1560	P-1560	BF4545P (Push+pull)
4.20	4.35	.1660	.1710	TF-1660-4545P (TF-1660-R45P)	HF-1660	P-1660	
4.40	4.45	.1715	.1765	TF-1715-4545P (TF-1715-R45P)	HF-1715	P-1715	BFR45P (Pull-only)
4.50	4.55	.1770	.1815	TF-1770-4545P (TF-1770-R45P)	HF-1770	P-1770	
4.60	4.75	.1820	.1865	TF-1820-4545P (TF-1820-R45P)	HF-1820	P-1820	Different blade configurations upon request

TYPE G - 4.80mm – 6.45mm (.187" - .255") holes



Working range				Complete Tool Code (Code for pull-only blade)	Components codes		
mm		inches			Body	Tip	Blade
Min	Max	Min	Max				
4.80	4.95	.1870	.1930	TG-1875-4545P (TG-1875-R45P)	HG-1875	P-1875	BG4545P (Push+pull)
5.00	5.15	.1935	.2025	TG-1935-4545P (TG-1935-R45P)	HG-1935	P-1935	
5.20	5.25	.2030	.2085	TG-2030-4545P (TG-2030-R45P)	HG-2030	P-2030	BGR45P (Pull-only)
5.30	5.45	.2090	.2125	TG-2090-4545P (TG-2090-R45P)	HG-2090	P-2090	
5.50	5.55	.2130	.2180	TG-2130-4545P (TG-2130-R45P)	HG-2130	P-2130	Different blade configurations upon request
5.60	5.75	.2185	.2275	TG-2185-4545P (TG-2185-R45P)	HG-2185	P-2185	
5.80	5.95	.2280	.2355	TG-2280-4545P (TG-2280-R45P)	HG-2280	P-2280	Different blade configurations upon request
6.00	6.15	.2360	.2415	TG-2360-4545P (TG-2360-R45P)	HG-2360	P-2360	
6.20	6.35	.2420	.2495	TG-2420-4545P (TG-2420-R45P)	HG-2420	P-2420	Different blade configurations upon request
6.40	6.45	.2500	.2555	TG-2500-4545P (TG-2500-R45P)	HG-2500	P-2500	

TYPE H - 6.4mm – 8.2mm (.253" - .324") holes



Size Nominal	Working range				Complete Tool Code (Code for pull-only blade)	Blade
	Min mm	Max mm	Min inches	Max inches		
6.5	6.4	6.9	.253	.272	TH-249-065-4545P (TH-249-065-R45P)	BH4545P (Push+pull)
7.0	6.9	7.4	.273	.291	TH-269-070-4545P (TH-269-070-R45P)	BHR45P (Pull-only)
7.5	7.4	7.9	.292	.311	TH-288-075-4545P (TH-288-075-R45P)	
8.0	7.9	8.2	.312	.324	TH-308-080-4545P (TH-308-080-R45P)	Different blade configurations upon request

TYPE J1 - 8.2mm – 10.2mm (.325" - .403") holes



Size Nominal	Working range				Complete Tool Code (Code for pull-only blade)	Blade
	Min mm	Max mm	Min inches	Max inches		
8.3	8.2	8.4	.325	.332	TJ-320-083-4545P (TJ-320-083-R45P)	BJ4545P (Push+pull)
8.5	8.4	8.6	.333	.340	TJ-328-085-4545P (TJ-328-085-R45P)	
8.7	8.6	8.9	.341	.351	TJ-336-087-4545P (TJ-336-087-R45P)	BJR45P (Pull-only)
9.0	8.9	9.4	.352	.371	TJ-347-090-4545P (TJ-347-090-R45P)	
9.5	9.4	9.9	.372	.391	TJ-367-095-4545P (TJ-367-095-R45P)	Different blade configurations upon request
10.0	9.9	10.2	.392	.403	TJ-387-100-4545P (TJ-387-100-R45P)	

TYPE J2 - 10.2mm – 12.9mm (.404" - .509") holes



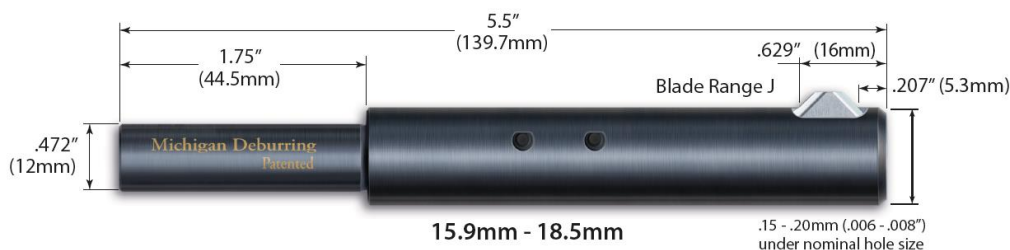
Size Nominal	Working range				Complete Tool Code (Code for pull-only blade)	Blade
	Min mm	Max mm	Min inches	Max inches		
10.3	10.2	10.4	.404	.410	TJ-399-103-4545P (TJ-399-103-R45P)	BJ4545P (Push+pull) BJR45P (Pull-only) Different blade configurations upon request
10.5	10.4	10.9	.411	.430	TJ-406-105-4545P (TJ-406-105-R45P)	
11.0	10.9	11.4	.431	.450	TJ-426-110-4545P (TJ-426-110-R45P)	
11.5	11.4	11.9	.451	.469	TJ-446-115-4545P (TJ-465-115-R45P)	
12.0	11.9	12.4	.470	.489	TJ-465-120-4545P (TJ-465-120-R45P)	
12.5	12.4	12.6	.490	.497	TJ-485-125-4545P (TJ-485-125-R45P)	
12.7	12.6	12.9	.498	.509	TJ-493-127-4545P (TJ-493-127-R45P)	

TYPE J3 - 12.9mm – 15.8mm (.510" - .621") holes



Size Nominal	Working range				Complete Tool Code (Code for pull-only blade)	Blade
	Min mm	Max mm	Min inches	Max inches		
13.0	12.9	13.4	.510	.528	TJ-505-130-4545P (TJ-505-130-R45P)	BJ4545P (Push+pull) BJR45P (Pull-only) Different blade configurations upon request
13.5	13.4	13.9	.529	.548	TJ-524-135-4545P (TJ-524-135-R45P)	
14.0	13.9	14.4	.549	.568	TJ-544-140-4545P (TJ-544-140-R45P)	
14.5	14.4	14.9	.569	.588	TJ-564-145-4545P (TJ-564-145-R45P)	
15.0	14.9	15.4	.589	.607	TJ-584-150-4545P (TJ-584-150-R45P)	
15.5	15.4	15.6	.608	.621	TJ-603-155-4545P (TJ-603-155-R45P)	

TYPE J4 - 15.8mm – 18.9mm (.622" - .746") holes



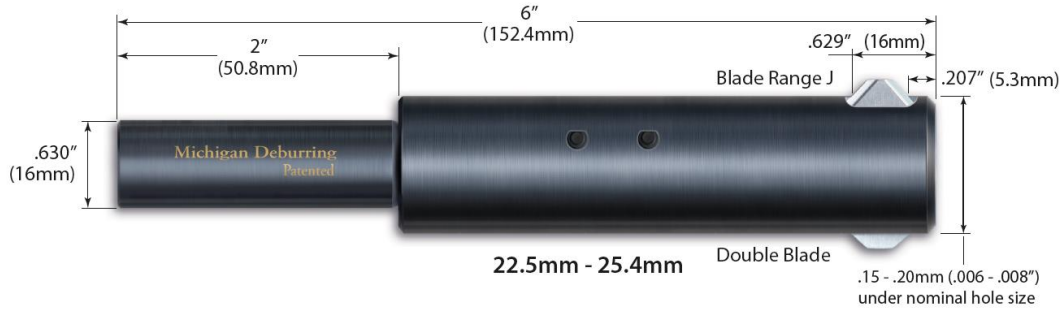
Size Nominal	Working range				Complete Tool Code (Code for pull-only blade)	Blade
	Min mm	Max mm	Min inches	Max inches		
15.9	15.8	16.3	.622	.641	TJ-617-159-4545P (TJ-617-159-R45P)	BJ4545P (Push+pull) BJR45P (Pull-only) Different blade configurations upon request
16.0	15.9	16.4	.628	.647	TJ-623-160-4545P (TJ-623-160-R45P)	
16.5	16.4	16.9	.648	.666	TJ-643-165-4545P (TJ-643-165-R45P)	
17.0	16.9	17.4	.667	.686	TJ-662-170-4545P (TJ-662-170-R45P)	
17.5	17.4	17.9	.687	.706	TJ-682-175-4545P (TJ-682-175-R45P)	
18.0	17.9	18.4	.707	.725	TJ-702-180-4545P (TJ-702-180-R45P)	
18.5	18.4	18.9	.726	.746	TJ-721-185-4545P (TJ-721-185-R45P)	

TYPE J5 - 18.9mm – 22.4mm (.747" - .884") holes



Size Nominal	Working range				Complete Tool Code (Code for pull-only blade)	Blade
	Min mm	Max mm	Min inches	Max inches		
19.0	18.9	19.4	.747	.766	TJ-741-190-4545P (TJ-741-190-R45P)	BJ4545P (Push+pull) BJR45P (Pull-only) Different blade configurations upon request
19.5	19.4	19.9	.767	.785	TJ-761-195-4545P (TJ-761-195-R45P)	
20.0	19.9	20.4	.786	.805	TJ-780-200-4545P (TJ-780-200-R45P)	
20.5	20.4	20.9	.806	.825	TJ-800-205-4545P (TJ-800-205-R45P)	
21.0	20.9	21.4	.826	.844	TJ-820-210-4545P (TJ-820-210-R45P)	
21.5	21.4	21.9	.845	.864	TJ-839-215-4545P (TJ-839-215-R45P)	
22.0	21.9	22.4	.865	.884	TJ-859-220-4545P (TJ-859-220-R45P)	

TYPE J6 - 22.4mm – 26.0mm (.885" - 1.022") holes



Size Nominal	Working range				Complete Tool Code (Code for pull-only blade)	Blade
	mm		inches			
	Min	Max	Min	Max		
22.5	22.4	22.9	.885	.904	TJ-879-225-4545P (TJ-879-225-R45P)	BJ4545P (Push+pull) BJR45P (Pull-only) Different blade configurations upon request
23.0	22.9	23.4	.905	.923	TJ-899-230-4545P (TJ-899-230-R45P)	
23.5	23.4	23.9	.924	.943	TJ-918-235-4545P (TJ-918-235-R45P)	
24.0	23.9	24.4	.944	.963	TJ-938-240-4545P (TJ-938-240-R45P)	
24.5	24.4	24.9	.964	.982	TJ-958-245-4545P (TJ-958-245-R45P)	
25.0	24.9	25.4	.982	.998	TJ-977-250-4545P (TJ-977-250-R45P)	
25.4	25.3	26.0	.999	1.022	TJ-993-254-4545P (TJ-993-254-R45P)	
26.0	25.9	26.4	1.020	1.059	TJ-1015-260-4545P (TJ-993-260-R45P)	
27.0	26.9	27.4	1.059	1.098	TJ-1054-270-4545P (TJ-1054-270-R45P)	
28.0	27.9	28.4	1.098	1.138	TJ-1093-280-4545P (TJ-1093-280-R45P)	
29.0	28.9	29.4	1.138	1.177	TJ-1133-290-4545P (TJ-1133-290-R45P)	
30.0	29.9	30.4	1.177	1.217	TJ-1172-300-4545P (TJ-1172-300-R45P)	
31.0	30.9	31.4	1.217	1.256	TJ-1211-310-4545P (TJ-1211-310-R45P)	

BLADES

S cutting edge – Neutral

Ideal for carbon and alloyed steel, cast iron

P cutting edge – Positive

Ideal for stainless steel, ductile steel, aluminum, brass, etc.

R: pull-only cutting edge

A, B, C tools:

- Only 5252S or R52S blades available
- Supplied with 5252S blade unless otherwise specified

D,E,F,G,H, J tools:

- Supplied with 4545P blade unless otherwise specified

Custom configurations available upon request

Blade coding

B	A	52	52	S
---	---	----	----	---

Blade = B

Tool type:

A-B-C-D-E-F-G-H-J

Push cutting edge angle:

45°, 52°, 60° - R= Pull-only

Cutting edge:

P = Positive

S = Neutral

Pull cutting edge angle:

45°, 52°, 60°

A-B-C type Blade coding			
Blade type	Push angle	Pull angle	Cutting edge
5252S	52	52	S
R52S	*R	52	S
D-E-F-G-H-J type Blade coding			
Blade type	Push angle	Pull angle	Cutting edge
4545P	45	45	P
4560P	45	60	P
6060P	60	60	P
R45P	*R	45	P
R60P	*R	60	P
4545S	45	45	S
4560S	45	60	S
6060S	60	60	S
R45S	*R	45	S
R60S	*R	60	S



SPEED AND WORKING CYCLE

It is possible to perform two different types of work cycles based on usage. Cycle A is used for the majority of applications, while cycle B is recommended for CNC use and in case of a high thickness transition between the entry and exit on the other side.

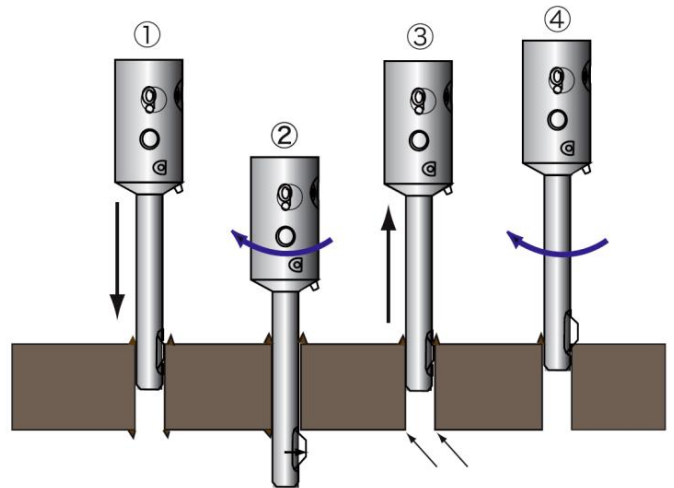
CYCLE A

1. Hole entry in rotation with deburring while entering.
Optional feed pause for sustained deburring.
2. Passage through hole still in rotation, deburring while exiting.
Optional feed pause for sustained deburring.
3. Retraction from the hole while still in rotation, or stopping the spindle.



CYCLE B

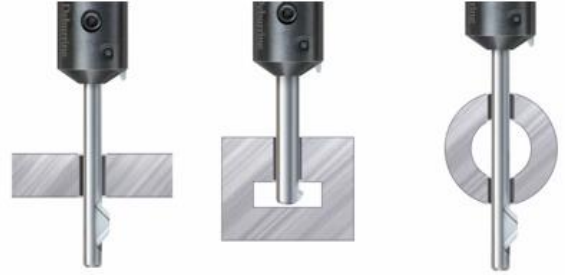
1. Hole entry with stationary spindle.
2. Exit to the other side until the blade is completely open.
Start the rotation and the feed pulling up through the hole with speeds adequate for the hole diameter and material.
Pause the feed for as long as necessary to obtain the desired deburring or chamfer size.
Slow feed to disengage the blade from the cutting action.
Stop spindle rotation.
3. Retraction from the hole with stationary spindle until the blade is completely open
4. Start the rotation and the feed pushing back towards the hole with speeds adequate for the hole diameter and material
Pause the feed for as long as necessary to obtain the desired deburring or chamfer size
Slow feed to disengage the blade from the cutting action.
Stop spindle rotation and proceed to the next hole.



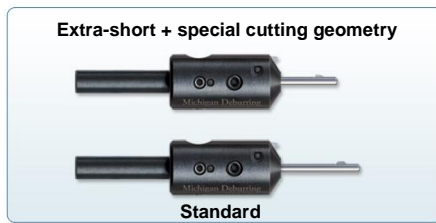
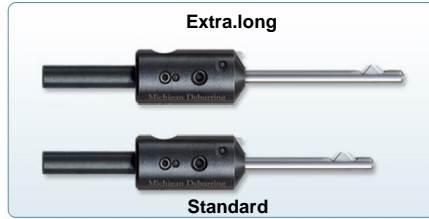
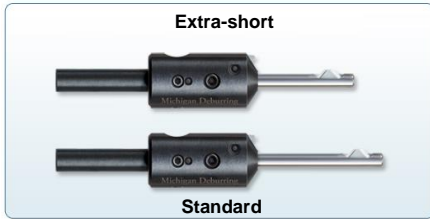
Material	m/min	mm/rev
AVP	23-38	0.08-0.25
Aluminum	27-46	0.08-0.20
Cast iron	12-12	0.08-0.25
Low carbon steel	18-30	0.10-0.28
High carbon steel	14-24	0.08-0.25
Stainless steel	6-12	0.08-0.25
Alloyed steel	8-15	0.08-0.25

SPECIAL TOOLS

Although standard tools can handle most applications, sometimes the geometry of the parts or working conditions do not allow their use. Special tools can be designed to meet the specific needs of the customer. Here are some examples:

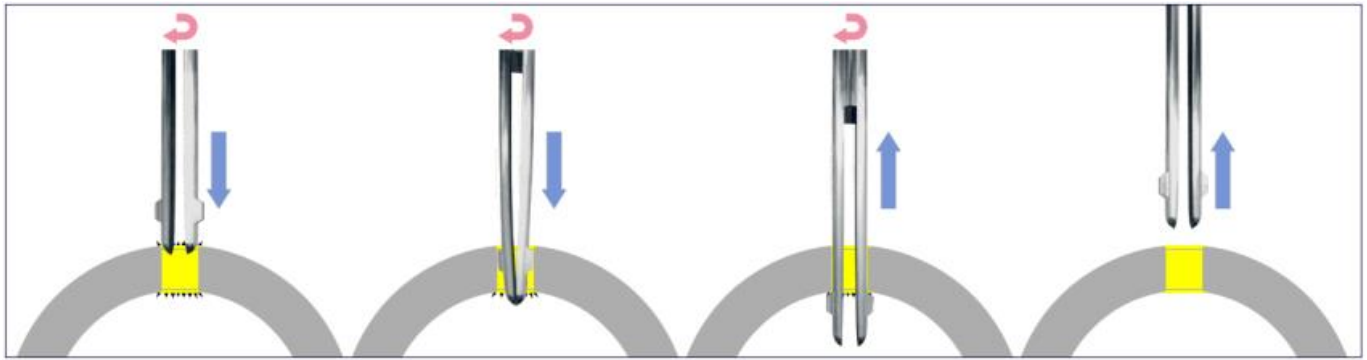


- Tip length (extra-short or extra-long tools)
- Reduced tip projection (tight spaces on the exit side)
- Reduced blade height (presence of shoulders)
- Cutting angle (difficult materials)



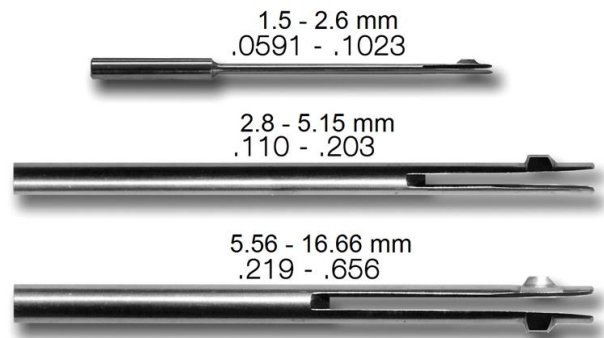
ELASTIC DEBURRING TOOL

*Deburring in one pass.
Works in both push and pull directions.
Simple and robust, solid construction.
Suitable for mass production.
Adaptable to any type of machine
From 1.5 to 16.6mm*



OPERATING SPEED

Hole Ø mm	Rotation rpm	Feed mm/rev
1.5 - 5	1500 - 1750	0.02 - 0.10
6 - 9	800 - 1000	0.02 - 0.15
10 +	600 - 650	0.05 - 0.20

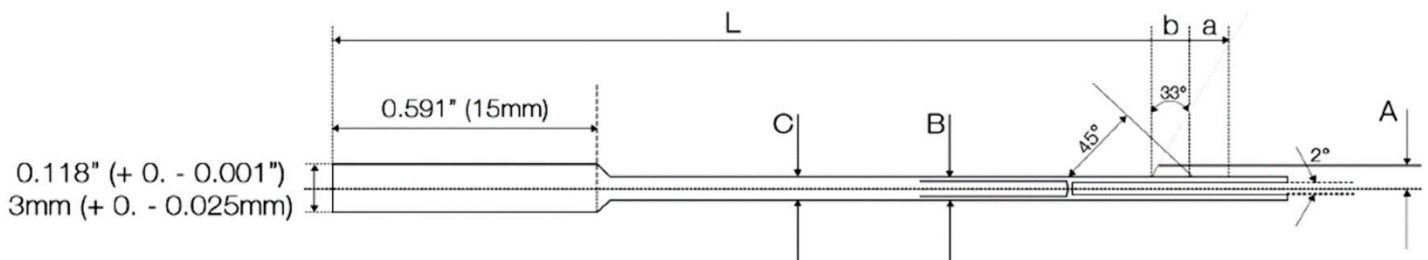


BB-1.5 / BB-6 Single Cutting edge

BB-1.5 - BB-4
BB-5 - BB-6

a=2mm (0.079")
a=2mm (0.079")

b=2.5mm (0.098")
b=3.0mm (0.118")



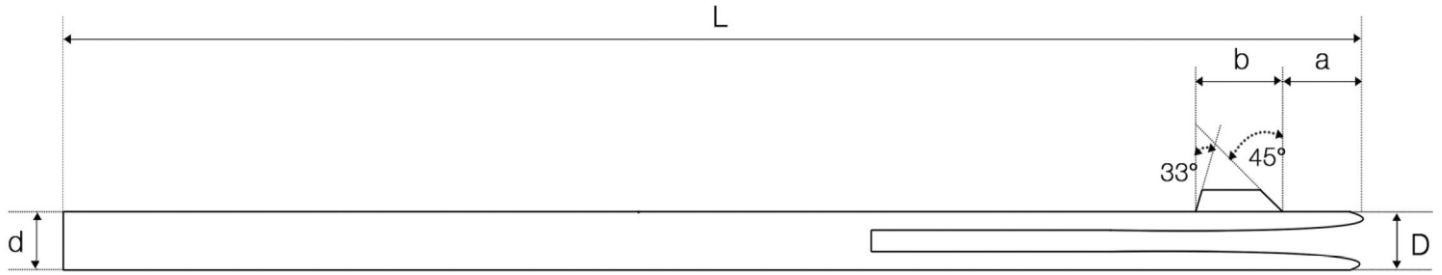
BB-1.5 - BB-4
BB-1.5 - BB-4

a=2mm(0.079")
a=2mm(0.079")

b=2.5mm(0.098")
b=3mm(0.118")

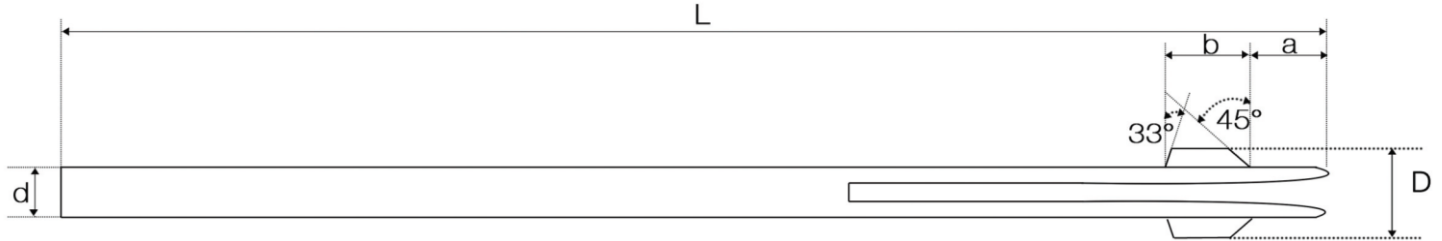
Tool	Working range		C - Stem diameter Tolerance +0/-0.1		L Total Length		A		B	
	Inches	mm	Inches	mm	inches	mm	inches	mm	inches	mm
BB-1.5	.0591-.0630	1.5-1.6	.055	1.4	1.97	50	.055	1.4	.019	0.5
BB-1.6	.0630-.0670	1.6-1.7	.059	1.5			.059	1.5		
BB-1.7	.0670-.0709	1.7-1.8	.063	1.6			.063	1.6		
BB-1.8	.0709-.0748	1.8-1.9	.067	1.7	2.36	60	.067	1.7		
BB-1.9	.0748-.0788	1.9-2.0	.071	1.8			.071	1.8		
BB-2	.0788-.0866	2.0-2.2	.075	1.9			.075	1.9		
BB-4	.0866-.0945	2.2-2.4	.083	2.1	3.15	80	.083	2.1	.039	1.0
BB-5	.0945-.1023	2.4-2.6	.091	2.3			.091	2.3		
BB-6	.1023-.1103	2.6-2.8	.098	2.5			.098	2.5		

BB-7 / BB-13 Single Cutting edge



Tool	Working range		d – Stem diameter Tolerance +0/-0.25		L Total length		a		b		D	
	inches	mm	Inches	mm	Inches	mm	inches	mm	inches	mm	inches	mm
BB-7	.110-.125	2.80-3.18	.108	2.75	4.00	101.6	.125	3.18	.175	4.45	.157	4.00
BB-8	.125-.140	3.18-3.55	.124	3.15							.171	4.34
BB-9	.140-.156	3.55-3.96	.141	3.58							.187	4.75
BB-10	.156-.172	3.96-4.36	.155	3.94							.218	5.54
BB-11	.172-.187	4.36-4.74	.171	4.34							.234	5.94
BB-12	.187-.203	4.74-5.15	.186	4.72							.250	6.35
BB-13	.203-.219	5.15-5.56	.202	5.13					.245	6.22	.670	6.78

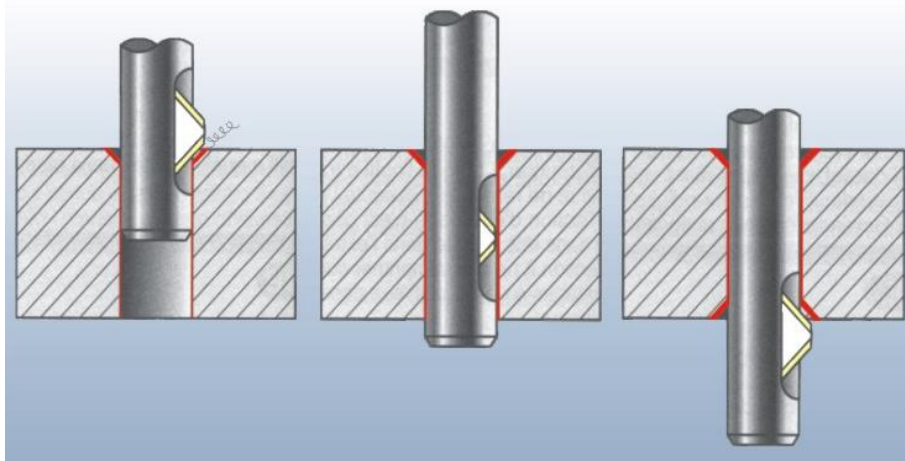
BB-14 / BB-42 Double Cutting edge



Tool	Working range		d – Stem diameter Tolerance +0/-0.25		L Total length		a		b		D	
	inches	Mm	inches	mm	Inches	mm	inches	mm	inches	mm	inches	mm
BB-14	.219-.234	5.56-5.94	.218	5.54	4.00	101.6	.255	6.48	.245	6.22	.312	7.92
BB-15	.234-.250	5.94-6.35	.233	5.92							.328	8.33
BB-16	.250-.266	6.35-6.75	.249	6.32							.343	8.71
BB-17	.266-.281	6.75-7.13	.265	6.73							.359	9.12
BB-18	.281-.297	7.13-7.54	.280	7.11							.375	9.53
BB-19	.297-.313	7.54-7.95	.296	7.52							.390	9.91
BB-20	.313-.328	7.95-8.33	.312	7.92							.406	10.31
BB-21	.328-.343	8.33-8.71	.327	8.31							.422	10.72
BB-22	.343-.359	8.71-9.11	.342	8.69							.437	11.10
BB-23	.359-.375	9.11-9.52	.358	9.09							.453	11.51
BB-24	.375-.390	9.52-9.90	.374	9.50	4.43	112.7	.315	8.00	.245	6.22	.500	12.70
BB-25	.390-.406	9.90-10.31	.389	9.88							.515	13.08
BB-26	.406-.421	10.31-10.69	.405	10.29							.531	13.49
BB-27	.421-.437	10.69-11.10	.420	10.67							.547	13.89
BB-28	.437-.453	11.10-11.51	.436	11.07	5.50	139.7	.345	8.76	.275	6.99	.593	15.06
BB-29	.453-.468	11.51-11.88	.452	11.48							.609	15.47
BB-30	.468-.484	11.88-12.29	.472	11.86							.625	15.86
BB-31	.484-.500	12.29-12.70	.483	12.77							.640	16.26
BB-32	.500-.515	12.70-13.08	.499	12.67	7.00	177.8	.385	9.78	.305	7.75	.687	17.45
BB-33	.515-.531	13.08-13.49	.514	13.05							.703	17.86
BB-34	.531-.546	13.49-13.87	.530	13.46							.718	18.24
BB-35	.546-.563	13.87-14.30	.545	13.84							.734	18.64
BB-36	.563-.578	14.30-14.68	.562	14.27	7.50	190.5	.415	10.54	.405	10.29	.750	19.06
BB-37	.578-.594	14.68-15.09	.577	14.65							.765	19.43
BB-38	.594-.609	15.09-15.47	.593	15.06							.781	19.84
BB-39	.609-.625	15.47-15.87	.608	15.44							.796	20.22
BB-40	.625-.641	15.87-16.26	.624	15.84	8.37	212.6	.445	11.30	.435	11.05	.874	22.20
BB-41	.641-.656	16.26-16.66	.639	16.23							.891	22.63
BB-42	.656-.672	16.66-17.07	.655	16.64							.906	23.01

Retracting blade deburring tool ECO Series

Deburring - Bevelling - Simple, fast, economical.
Works in both push and pull directions. Replaceable HSS blade.
Standard tools from Ø2 to 19mm



BLADE TYPE

Each standard tool is supplied with a double-action HSS blade (DA) unless otherwise specified.

DA: double action, works in both push and pull directions

BA: backward action, only works in pull direction

Other available blades: 45° angle (for intersecting holes)



DA

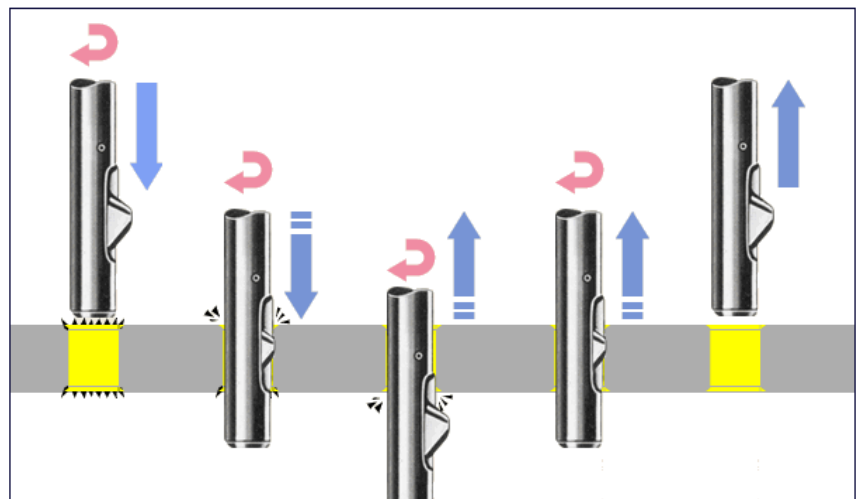


BA

OPERATING SPEED

Hole Ø mm	Rotation rpm	Feed mm/rev
2 – 5	1500 – 1750	0.02 – 0.10
6 – 9	800 – 1000	0.02 – 0.15
10 +	600 – 650	0.05 – 0.20

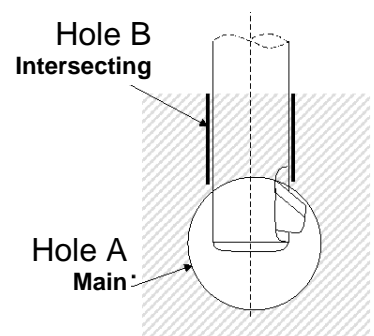
1. Start – Rapid feed
2. Feed as per table above, or waiting time depending on material and desired chamfer size
3. Rapid feed
4. Feed as per table above, or waiting time depending on material and desired chamfer size
5. Rapid feed
6. End



DEBURRING INTERSECTING HOLES

When deburring intersecting holes, attention must be paid to the dimensional ratio between the main hole and the intersecting hole. The main hole A should be at least 3 times larger than the intersecting hole B to avoid damaging the tool. If the main hole A has a size ratio between 3 and 12 times the intersecting hole B, then it is necessary to use a 45° blade (available on order). The standard blade can be used if the main hole A is larger than 12 times the intersecting hole B.

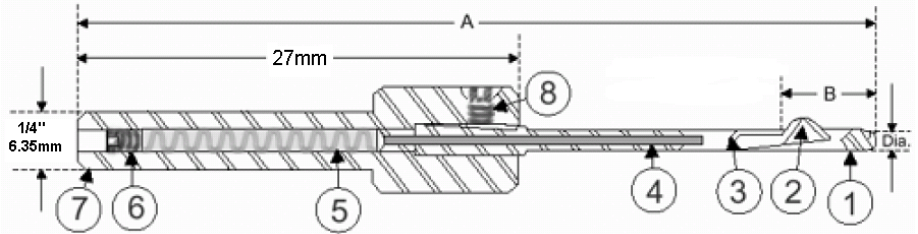
Dimensional ratio of intersecting holes A / B =	
>3	Not possible
3 – 12	45° blade
12 +	Standard blade



TYPE A (TWO-PARTS CONSTRUCTION)

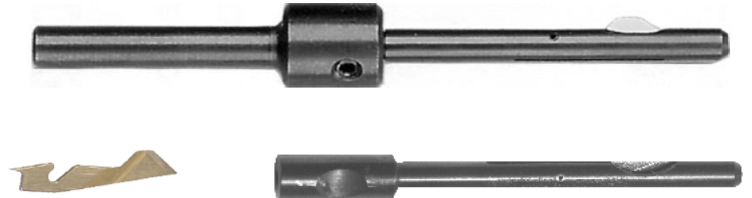
CODE	HOLE		DIMENSIONS		BLADE
	Hole Ø inches	Hole Ø mm	A mm	B mm	
.0781	5/64"	2.0	86	11.5	3/32
.0938	3/32"	2.4*			
.0984		2.5			
.1094	7/64"	2.8*			
.1181		3.0			
.1250	1/8"	3.2*			1/8
.1378		3.5			
.1406	9/64"	3.6*			
.1562	5/32"	3.95*			
.1575		4.0			
.1719	11/64"	4.35*	105	18.3	5/32
.1772		4.5			
.1875	3/16"	4.75*			
.1968		5.0			3/16
.2031	13/64"	5.2*			

* UPON REQUEST



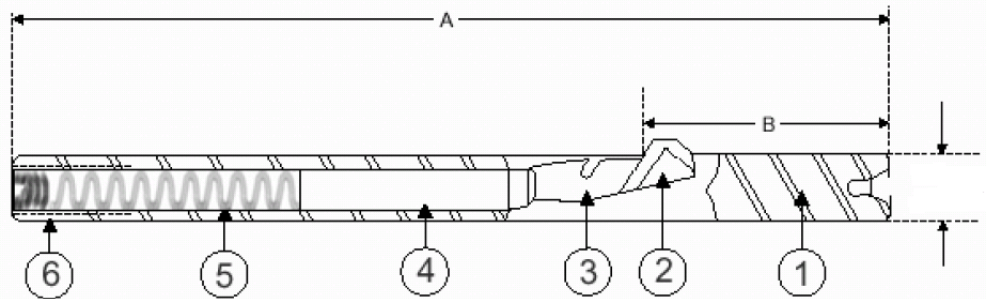
Dia: 0.075 – 0.13mm più piccolo del diametro nominale

- 1. Tip
- 2. Blade
- 3. Locking pin
- 4. Push rod
- 5. Push spring
- 6. Set screw
- 7. Body
- 8. Locking screw



TYPE B

- 1. Body
- 2. Blade
- 3. Locking pin
- 4. Push rod
- 5. Push spring
- 6. Set screw



Diameter: 0.15 – 0.2mm smaller than nominal diameter

CODE	HOLE		DIMENSIONS		BLADE
	Hole Ø inches	Hole Ø mm	A mm	B mm	
.2165		5.5	114.5	22.0	#1
.2188	7/32"	5.56*			
.2344	15/64"	5.95*			
.2362		6.0			
.2500	1/4"	6.35*			
.2559		6.5			
.2656	17/64"	6.75*			
.2756		7.0			
.2812	9/32"	7.15*			
.2953		7.5			
.2969	19/64"	7.55*	24.5	#2	
.3125	5/16"	7.95*			
.3150		8.0			
.3281	21/64"	8.35*			
.3346		8.5			
.3438	11/32"	8.75*			
.3543		9.0			
.3594	23/64"	9.15*			
.3740		9.5			
.3750	3/8"	9.55*			127.0
.3906	25/64"	9.95*			
.3937		10.0			
.4062	13/32"	10.31*			
.4134		10.5			
.4219	27/64"	10.75*	139.7	26.2	
.4331		11.0			
.4375	7/16"	11.15*			
.4528		11.5			
.4531	29/64"	11.51*			

* UPON REQUEST



CODE	HOLE		DIMENSIONS		BLADE
	Hole Ø inches	Hole Ø mm	A mm	B mm	
.4688	15/32"	11.85*	139.7	26.2	#3-1/2
.4724		12.0			
.4844	31/64"	12.3*			
.4921		12.5			
.5000	1/2"	12.7*			
.5118		13.0			
.5156	33/64"	13.1*			
.5313	17/32"	13.5			
.5469	35/64"	13.9*			
.5512		14.0			
.5625	9/16"	14.3*			
.5709		14.5			
.5781	37/64"	14.7*			
.5906		15.0			
.5938	19/32"	15.1*			
.6094	39/64"	15.5			
.6250	5/8"	15.9*			
.6299		16.0			
.6406	41/64"	16.3*			
.6496		16.5			
.6563	21/32"	16.7*			
.6693		17.0			
.6719	43/64"	17.1*			
.6875	11/16"	17.5			
.7087		18.0			
.7283		18.5			
.7480		19.0			
.7500	3/4"	19.1*			

GMO DEBURRING TOOL

Deburring - Micro-deburring from $\varnothing 0.8\text{mm}$

Hard metal blades with high durability

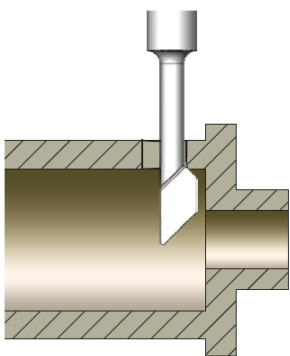
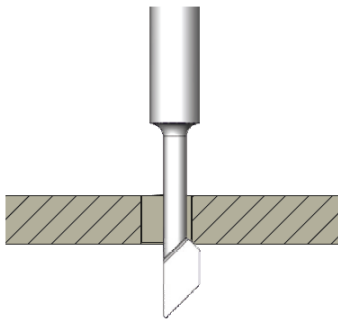
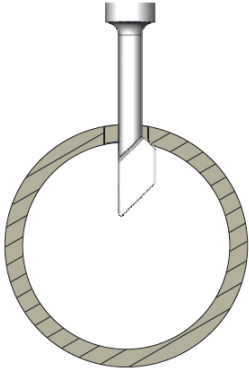
Wide selection of blades

Adjustable working diameter

Fast working cycle

Ideal for use on CNC machines

Deburring of flat or curved profiles



FEATURES

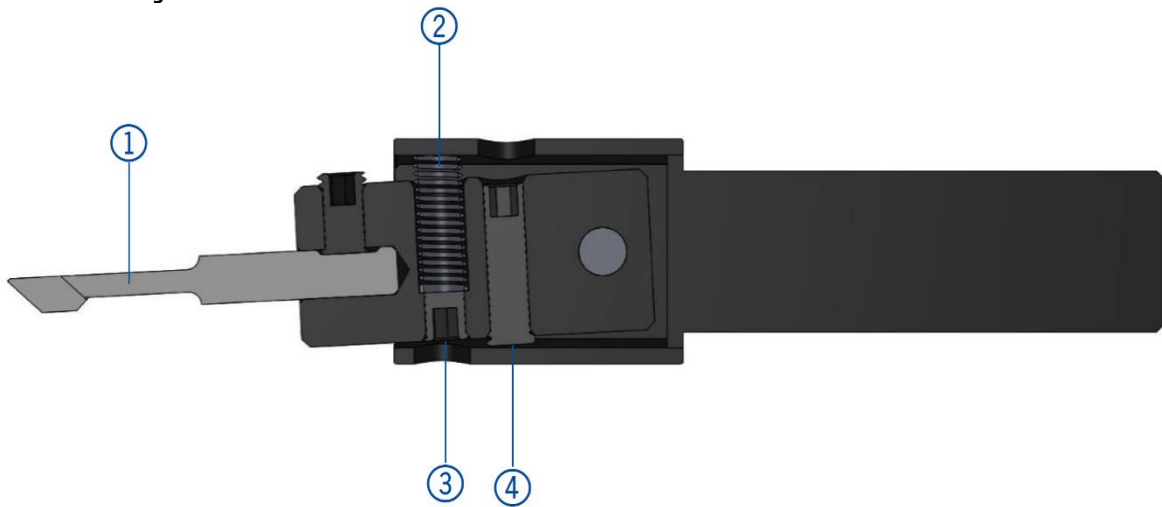
- Suited for deburring holes from $\varnothing 0,80\text{mm}$ to $\varnothing 15,0\text{mm}$
- Different interchangeable blade holders based on the working diameter
- Screw for adjusting the blade offset for fine adjustment of the deburring diameter
- Adjustable deburring force through the selection of 4 types of compression springs and the ability to regulate spring compression using the dedicated screw
- Different blade sizes depending on the working diameter
- Different cutting edges for pull-only deburring or push-pull deburring
- Different cutting edge angles to deburr intersecting holes in conditions of strong curvature
- Capability to supply special blades

1: Hard metal blade

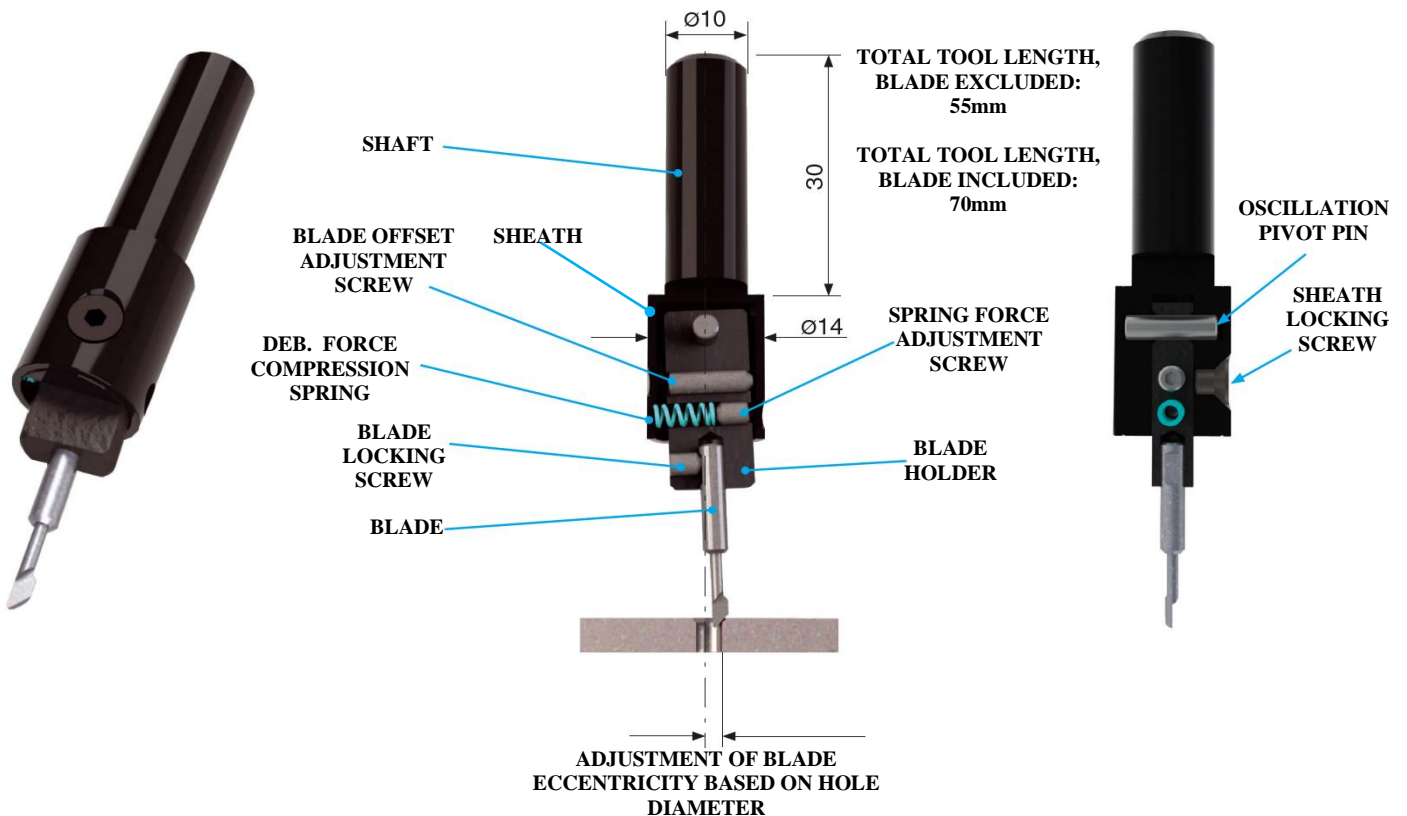
2: Compression spring for adjusting the deburring force

3: Adjustment screw for deburring force

4: Blade offset adjustment screw



TOOL COMPONENTS



With the GMO deburring tool, two different work cycles or deburring methods are possible

DEBURRING WITH BLADE OSCILLATION (WITH SPRING)

- Quick deburring cycle (axial entry, oscillating blade)
- Adaptation of the cutting edge to the hole edge (blade oscillation during cutting action)

RIGID DEBURRING (WITHOUT SPRING)

- For larger holes and more aggressive deburring
- Chamfers of known size and well-defined profiles are produced

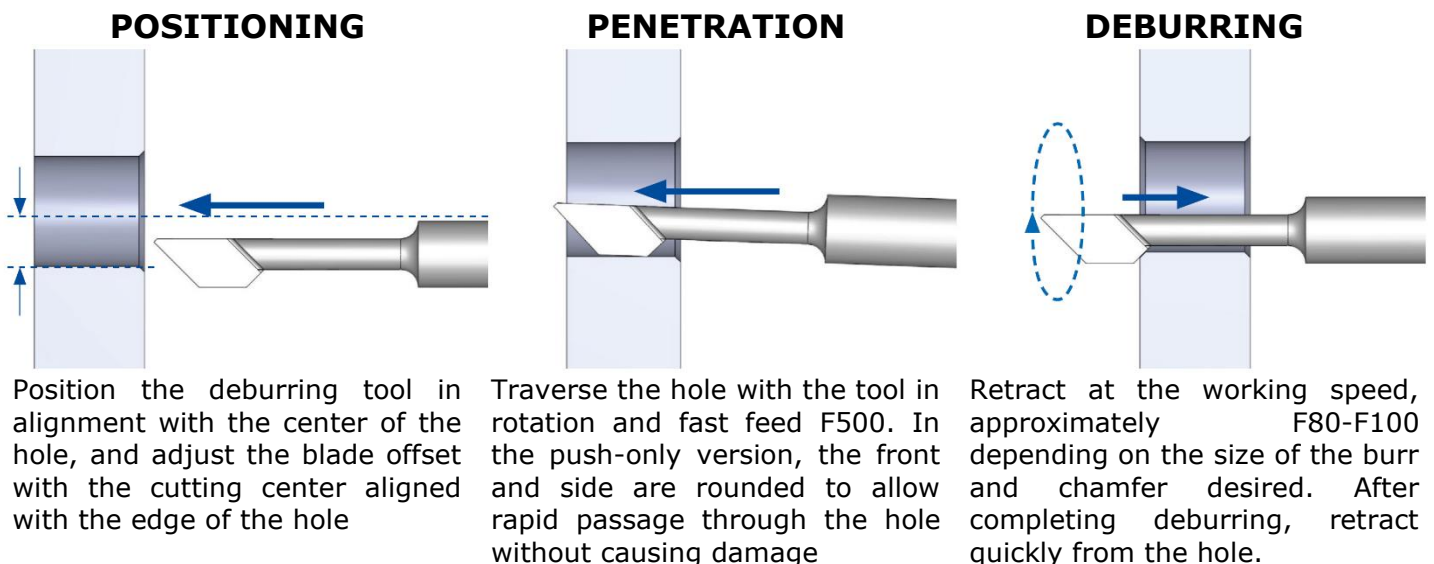
TECHNICAL SUPPORT

In the GMO tools page on our website (www.tecnimetal-tm.com, products page, GMO) you will find:

- Useful simulation tool; by entering processing data, the tool configuration (blade and blade holder) and the CNC program will be provided.
- Instructional videos for GMO configuration and usage demonstration

DEBURRING WITH BLADE OSCILLATION (WITH SPRING)

- 1.** Adjust the deburring diameter using adjustment screw 4 for offset regulation.
- 2.** Position the tool at the center of the hole.
- 3.** Tool in rotation, fast feed until complete penetration of the wall.
- 4.** Retract with working feed (F80-F100) to perform deburring.
- 5.** Rapidly retract from the hole once deburring is completed.

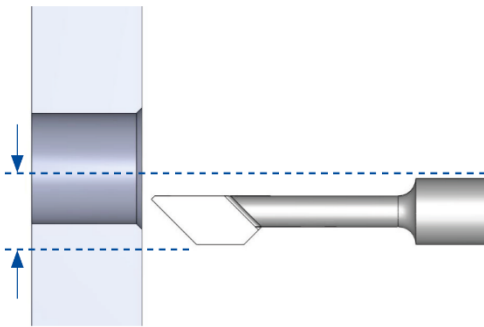


It is possible to adjust the deburring force and the size of the chamfer by choosing the type of spring and adjusting its compression. It is also possible through the adjustment of the working speed and, if necessary, by introducing a pause during operation.

RIGID DEBURRING (WITHOUT SPRING)

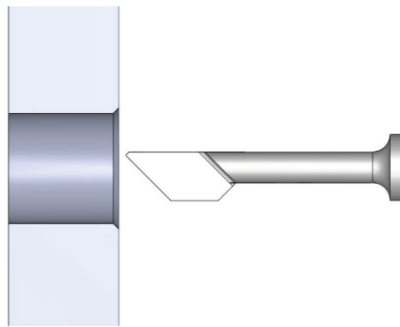
1. Replace the spring with the adjustment screw M3 x 10 mm.
2. Adjust the chamfer diameter by adjusting the screws (ref. 3 and 4). Blade offset, spindle aligned with the hole.
3. Off-axis positioning for hole penetration.
4. Traverse the hole with stationary tool and rapid feed.
5. Re-position the tool along the hole axis (point 2 coordinates).
6. Start rotation and retract at the working feed to perform the deburring.
7. Stop the rotation and position the tool off-axis again.
8. Exit the hole with rapid feed.

BLADE OFFSET ADJUSTMENT



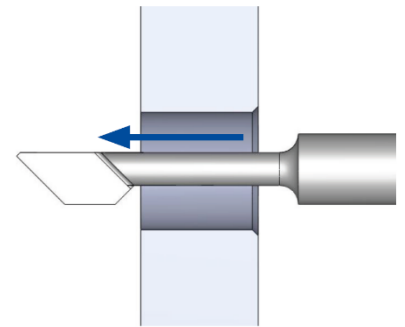
Position the deburring tool aligned with the hole axis, and adjust the blade offset with the cutting center aligned with the edge of the hole.

OFF-AXIS POSITIONING



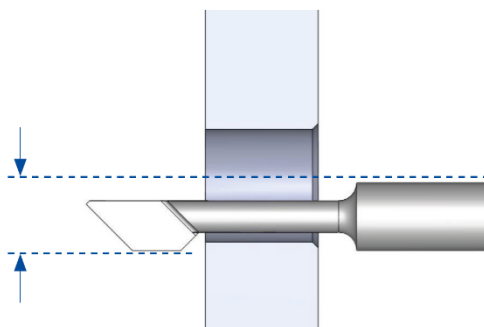
Off-axis positioning to ensure that the blade does not touch the walls of the hole during penetration.

PENETRATION



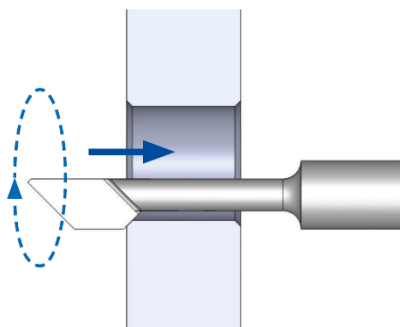
Traverse the hole with stationary tool and rapid feed.

ON-AXIS POSITIONING



Re-position the tool along the hole axis (deburring position)

DEBURRING



Start rotation and retract at the working feed. Then, stop the rotation and position the tool off-axis again to exit the hole.

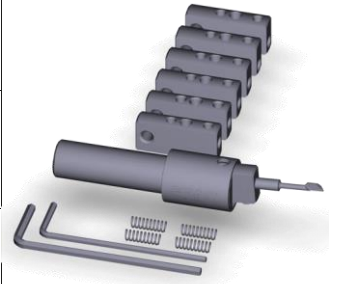
Blade coding examples

The standard blades have a 45° inclination and work only in pulling motion, while form B blades work in both pushing and pulling motions. Both types are available in a W25 configuration with a 25° inclination for deburring in intersections of highly curved holes.

Pull-only 45°	GMO-S.. A..	ex. GMO-S23A45
Push-pull 45°	GMO-S.. BA..	ex. GMO-S23BA5
Pull-only 25°	GMO-S.. A.. W25	ex. GMO-S23A5W25
Push-pull 25°	GMO-S.. BA.. W25	ex. GMO-S23BA5W25

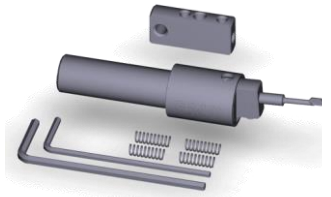
GMO 1 Sets - Deburring tool complete with accessories (blades excluded to be ordered separately)

Item	Content	Accessories codes
GMO-SET1	1x Body 6x Blade holders 4x Springs 2x Allen keys	Blade holders: E00, E05, E10, E15, E20, E25 Springs: F40, F50, F55, F63
GMO-SET1V Weldon	1x Body 6x Blade holders 4x Springs 2x Allen keys	Blade holders: E00, E05, E10, E15, E20, E25 Springs: F40, F50, F55, F63
GMO-SET1XL Extra Large Weldon	1x Body 6x Blade holders 4x Springs 2x Allen keys	Blade holders: EX00, EX05, EX10, EX15, EX20, EX25 Springs: F63, F80, F90, F100

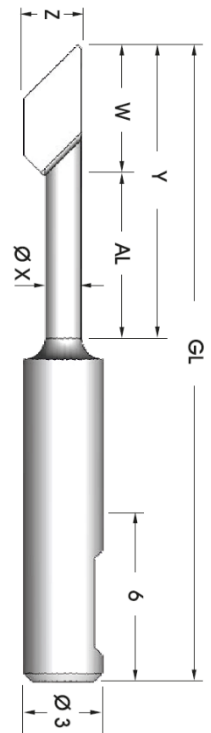


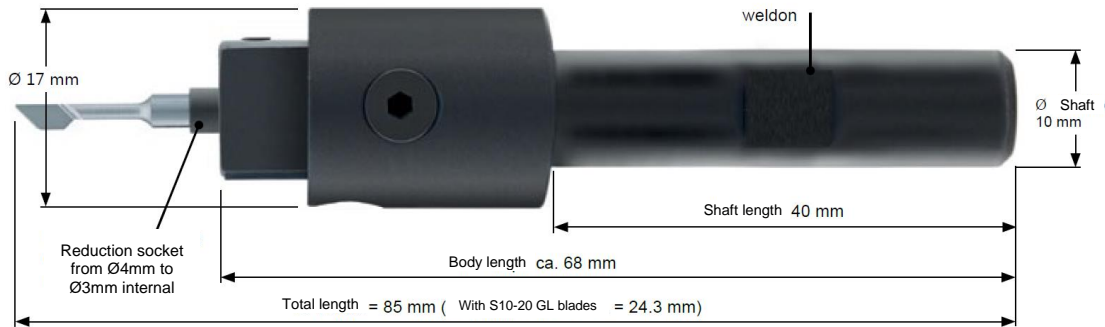
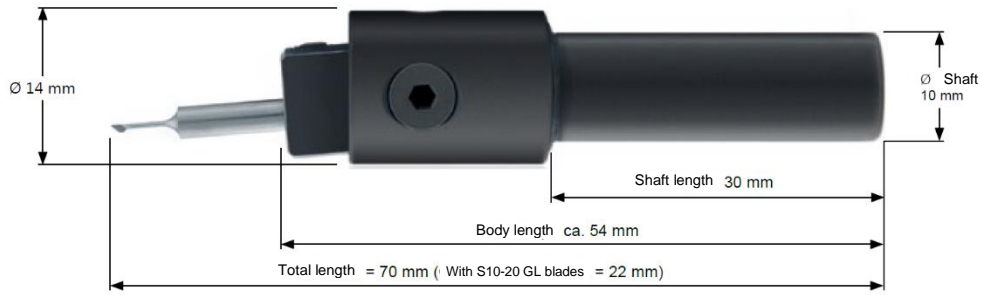
GMO 2 Sets - Deburring tool with single blade holder (specify the GMO-E blade holder in the order, blades excluded to be ordered separately)

Item	Content	Accessories codes
GMO-SET2	1x Blade of choice 1x Body 1x Blade holders 4x Springs 2x Allen keys	Blade: not included Blade holder: of choice, included Springs: F40, F50, F55, F63
GMO-SET2V Weldon	1x Blade of choice 1x Body 1x Blade holders 4x Springs 2x Allen keys	Blade: not included Blade holder: of choice, included Springs: F40, F50, F55, F63
GMO-SET2XL Extra Large Weldon	1x Blade of choice 1x Body 1x Blade holders 4x Springs 3x Allen keys	Blade: not included Blade holder: of choice, included Springs: F63, F80, F90, F100



GMO blade	Hole diameter [mm]	Hole depth [mm]		AL	GL	W	ØX	Y	Z
GMO-S08(B)-A2(-W25)	0,8 - 1,0	2,0		2	22,0	1,40	0,5	3,40	0,75
GMO-S08(B)-A3(-W25)	0,8 - 1,0	3,0		3	22,0	1,40	0,5	4,40	0,75
GMO-S10(B)-A3(-W25)	1,0 - 1,2	3,0		3	22,0	2,00	0,65	5,00	0,95
GMO-S10(B)-A4(-W25)	1,0 - 1,2	4,0		4	22,0	2,00	0,65	6,00	0,95
GMO-S12(B)-A3(-W25)	1,2 - 1,5	3,0		3	22,0	2,65	0,70	5,65	1,10
GMO-S12(B)-A4(-W25)	1,2 - 1,5	4,0		4	22,0	2,65	0,70	6,65	1,10
GMO-S12(B)-A5(-W25)	1,2 - 1,5	5,0		5	22,0	2,65	0,70	7,65	1,10
GMO-S15(B)-A4(-W25)	1,5 - 2,0	4		4	22,0	3,10	1,00	7,10	1,40
GMO-S15(B)-A5(-W25)	1,5 - 2,0	5		5	22,0	3,10	1,00	8,10	1,40
GMO-S15(B)-A6(-W25)	1,5 - 2,0	6		6	22,0	3,10	1,00	9,10	1,40
GMO-S15(B)-A7(-W25)	1,5 - 2,0	7		7	22,0	3,10	1,00	10,10	1,40
GMO-S20(B)-A5(-W25)	2,0 - 2,5	5		5	22,0	3,80	1,40	8,80	1,90
GMO-S20(B)-A6(-W25)	2,0 - 2,5	6		6	22,0	3,80	1,40	9,80	1,90
GMO-S20(B)-A7(-W25)	2,0 - 2,5	7		7	22,0	3,80	1,40	10,80	1,90
GMO-S20(B)-A8(-W25)	2,0 - 2,5	8		8	22,0	3,80	1,40	11,80	1,90
GMO-S20(B)-A10(-W25)	2,0 - 2,5	10		10	22,0	3,80	1,40	13,80	1,90
GMO-S20(B)-A12(-W25)	2,0 - 2,5	12		12	22,0	3,80	1,40	15,80	1,90
GMO-S23(B)-A5(-W25)	2,3 - 7,5	5		5	24,3	5,00	1,40	10,00	2,20
GMO-S23(B)-A6(-W25)	2,3 - 7,5	6		6	24,3	5,00	1,40	11,00	2,20
GMO-S23(B)-A7(-W25)	2,3 - 7,5	7		7	24,3	5,00	1,40	12,00	2,20
GMO-S23(B)-A8(-W25)	2,3 - 7,5	8		8	24,3	5,00	1,40	13,00	2,20
GMO-S23(B)-A10(-W25)	2,3 - 7,5	10		10	24,3	5,00	1,40	15,00	2,20
GMO-S23(B)-A12(-W25)	2,3 - 7,5	12		12	24,3	5,00	1,40	17,00	2,20
GMO-S40(B)-A17(-W25)	4,0 - 14,0	17		17	29,0	5,90	3,00	22,90	3,90
GMO-S40(B)-A25(-W25)	4,0 - 14,0	25		25	37,0	5,90	3,00	30,90	3,90





BLADE HOLDER

Standard and V model



Code	Working range
GMO-E00	0.8-2.5mm
GMO-E05	2.5-3.5mm
GMO-E10	3.5-4.5mm
GMO-E15	4.5-5.5mm
GMO-E20	5.5-6.5mm
GMO-E25	6.5-14.0mm

XL model only



Code	Working range
GMO-EX00	0.8-2.5mm
GMO-EX05	2.5-3.5mm
GMO-EX10	3.5-4.5mm
GMO-EX15	4.5-5.5mm
GMO-EX20	5.5-6.5mm
GMO-EX25	6.5-14.0mm

SPRINGS

Standard and V model



Code	
GMO-F40S	Soft (Al, brass)
GMO-F50S	Medium (steel)
GMO-F55	Strong (stainless)
GMO-F63	Extra-strong

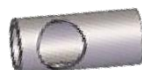
Solo per modello XL



Code	
GMO-FXL63	Soft (Al, brass)
GMO-FXL80	Medium (steel)
GMO-FXL90	Strong (stainless)
GMO-FXL100	Extra-strong

SCREW SETS – PIN – REDUCTIONS

CodE	
GMO-M3X3	TPS M3x3 screw
GMO-M3X4	M3x4 E00 screw
GMO-M3X5	M3x5 E05 screw
GMO-M3X10	
GMO-M3X4S	



Cod.	
GMO-PASS	
GMO-RHXL43	Reduction socket

GMO DEBURRING ENDMILLS

Cutting angles of 45° and 25° ideal for every application.

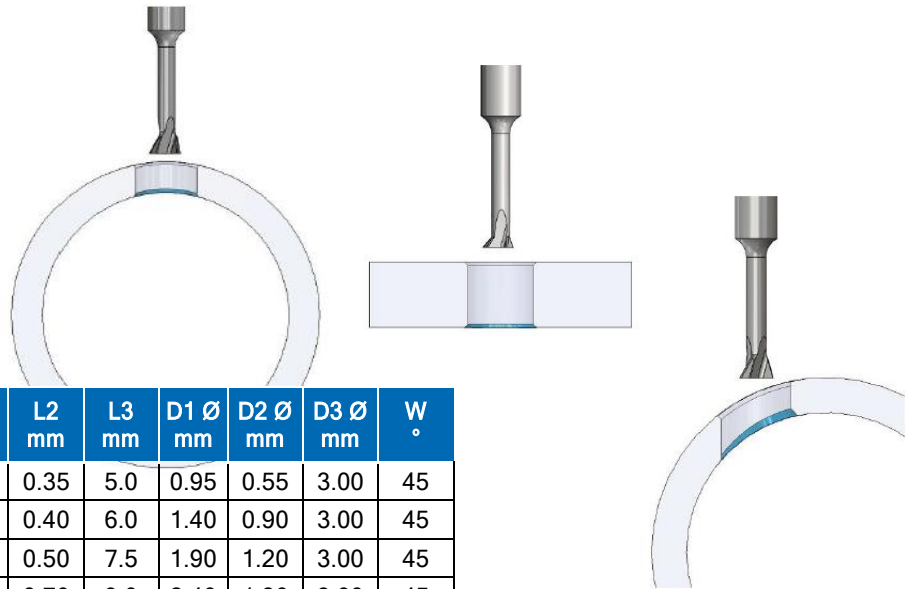
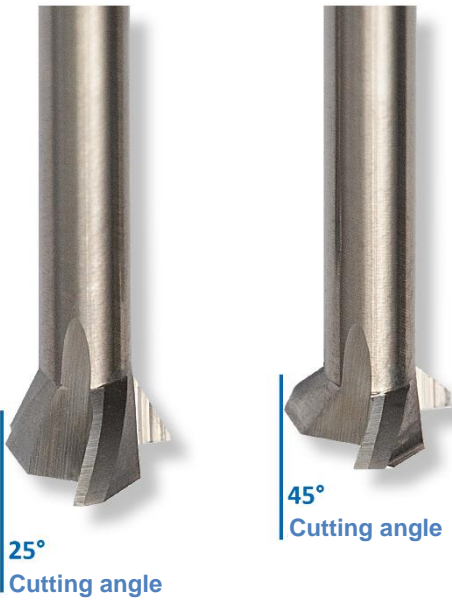
Suitable for deburring curved edges.

High-quality carbide tool with special coating.

Extremely long lifespan.

Can be used for holes from \varnothing 1.0 mm.

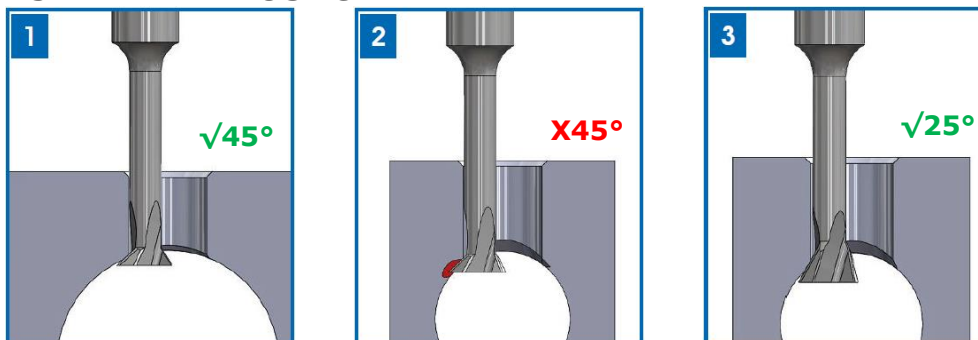
Wide range of sizes



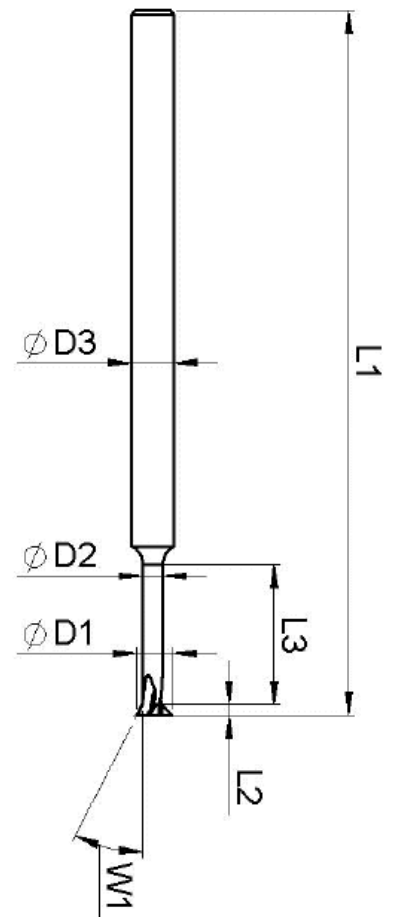
45° endmill	Hole \varnothing mm	Hole depth mm	L1 mm	L2 mm	L3 mm	D1 \varnothing mm	D2 \varnothing mm	D3 \varnothing mm	W °
GMO-EF10	1,0	5,0	50	0,35	5,0	0,95	0,55	3,00	45
GMO-EF15	1,5	6,0	50	0,40	6,0	1,40	0,90	3,00	45
GMO-EF20	2,0	7,5	50	0,50	7,5	1,90	1,20	3,00	45
GMO-EF25	2,5	9,0	60	0,70	9,0	2,40	1,30	3,00	45
GMO-EF30	3,0	11	70	0,75	11,0	2,85	1,70	3,00	45
GMO-EF40	4,0	14	80	0,90	14,0	3,80	2,40	4,00	45
GMO-EF50	5,0	17	100	1,10	17,0	4,80	3,00	5,00	45
GMO-EF60	6,0	20	100	1,35	20,0	5,80	3,50	6,00	45

25° endmill	Hole \varnothing mm	Hole depth mm	L1 mm	L2 mm	L3 mm	D1 \varnothing mm	D2 \varnothing mm	D3 \varnothing mm	W °
GMO-EF10-W25	1,0	5,0	50	0,60	5,0	0,95	0,55	3,00	25
GMO-EF15-W25	1,5	7,0	50	0,70	6,0	1,40	0,90	3,00	25
GMO-EF20-W25	2,0	8,0	50	0,90	7,5	1,90	1,20	3,00	25
GMO-EF25-W25	2,5	10,0	60	1,35	9,0	2,40	1,30	3,00	25
GMO-EF30-W25	3,0	12,0	70	1,40	11,0	2,85	1,70	3,00	25
GMO-EF40-W25	4,0	15	80	1,70	14,0	3,80	2,40	4,00	25
GMO-EF50-W25	5,0	17	100	2,15	17,0	4,80	3,00	5,00	25
GMO-EF60-W25	6,0	20	100	2,70	20,0	5,80	3,50	6,00	25

25° ENDMILL USAGE



Unfavorable ratio between entry diameter and intersection diameter for the use of the 45° cutter. Risk of collision (red area in the image)



GMO DEBURRING ENDMILLS

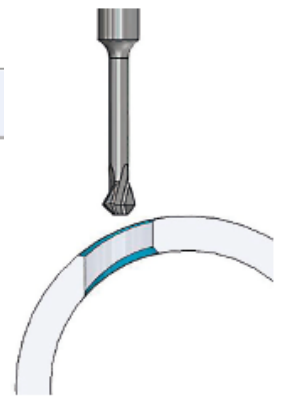
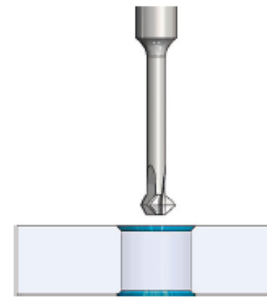
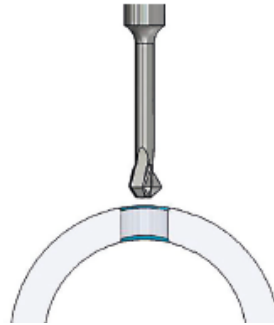
Cutting angles of 45° and 25° ideal for every application.

Suitable for deburring curved edges.
High-quality carbide tool with special coating.

Extremely long lifespan.

Can be used for holes from \varnothing 1.0 mm.

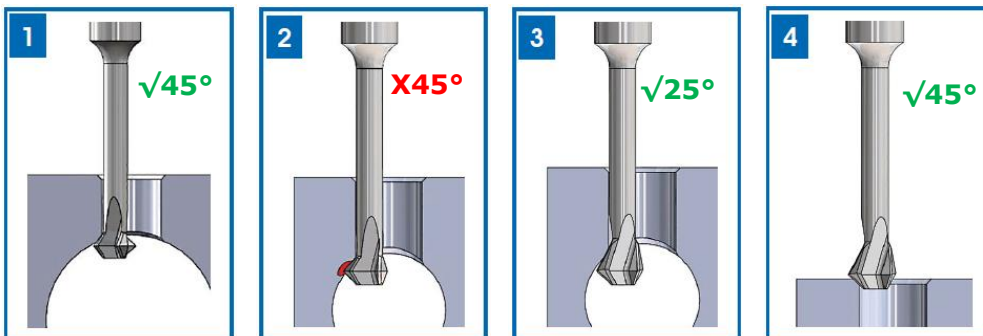
Wide range of sizes



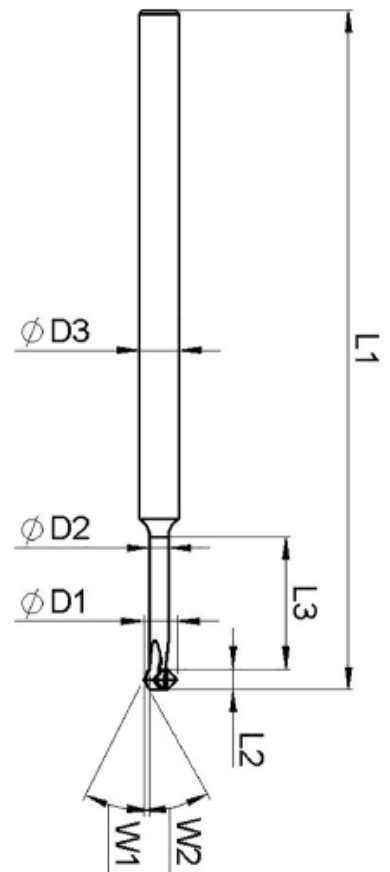
45° - 45° endmill	Hole \varnothing mm	Hole depth mm	L1 mm	L2 mm	L3 mm	D1 \varnothing mm	D2 \varnothing mm	D2 \varnothing mm	W1 °	W2 °
GMO-EF10-B	1,0	5,0	50	0.60	5.0	0.95	0.55	3.00	45	45
GMO-EF15-B	1,5	6,0	50	0.75	6.0	1.40	0.90	3.00	45	45
GMO-EF20-B	2,0	7,5	50	1.00	7.5	1.90	1.20	3.00	45	45
GMO-EF25-B	2,5	9,0	60	1.40	9.0	2.40	1.30	3.00	45	45
GMO-EF30-B	3,0	11	70	1.50	11.0	2.85	1.70	3.00	45	45
GMO-EF40-B	4,0	14	80	1.85	14.0	3.80	2.40	4.00	45	45
GMO-EF50-B	5,0	17	100	2.30	17.0	4.80	3.00	5.00	45	45
GMO-EF60-B	6,0	20	100	2.85	20.0	5.80	3.50	6.00	45	45

25° - 45° endmill	Hole \varnothing mm	Hole depth mm	L1 mm	L2 mm	L3 mm	D1 \varnothing mm	D2 \varnothing mm	D2 \varnothing mm	W1 °	W2 °
GMO-EF10-B-W25	1,0	5,0	50	0.85	5.0	0.95	0.55	3.00	25	45
GMO-EF15-B-W25	1,5	6,0	50	1.00	6.0	1.40	0.90	3.00	25	45
GMO-EF20-B-W25	2,0	7,5	50	1.40	7.5	1.90	1.20	3.00	25	45
GMO-EF25-B-W25	2,5	9,0	60	2.00	9.0	2.40	1.30	3.00	25	45
GMO-EF30-B-W25	3,0	11	70	2.15	11.0	2.85	1.70	3.00	25	45
GMO-EF40-B-W25	4,0	14	80	2.65	14.0	3.80	2.40	4.00	25	45
GMO-EF50-B-W25	5,0	17	100	3.35	17.0	4.80	3.00	5.00	25	45
GMO-EF60-B-W25	6,0	20	100	4.20	20.0	5.80	3.50	6.00	25	45









25° ENDMILL USAGE

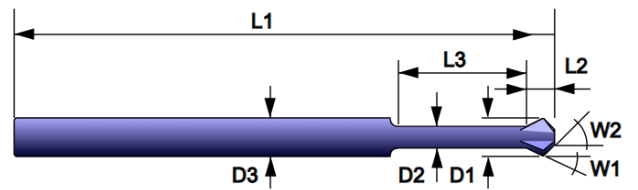
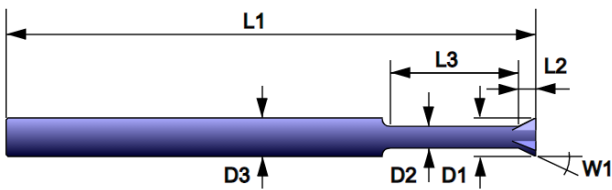


Unfavorable ratio between entry diameter and intersection diameter for the use of the 45° cutter. Risk of collision (red area in the image)



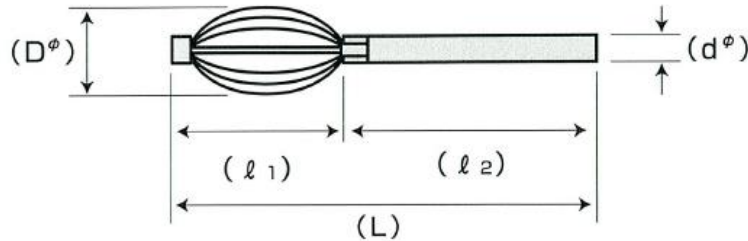
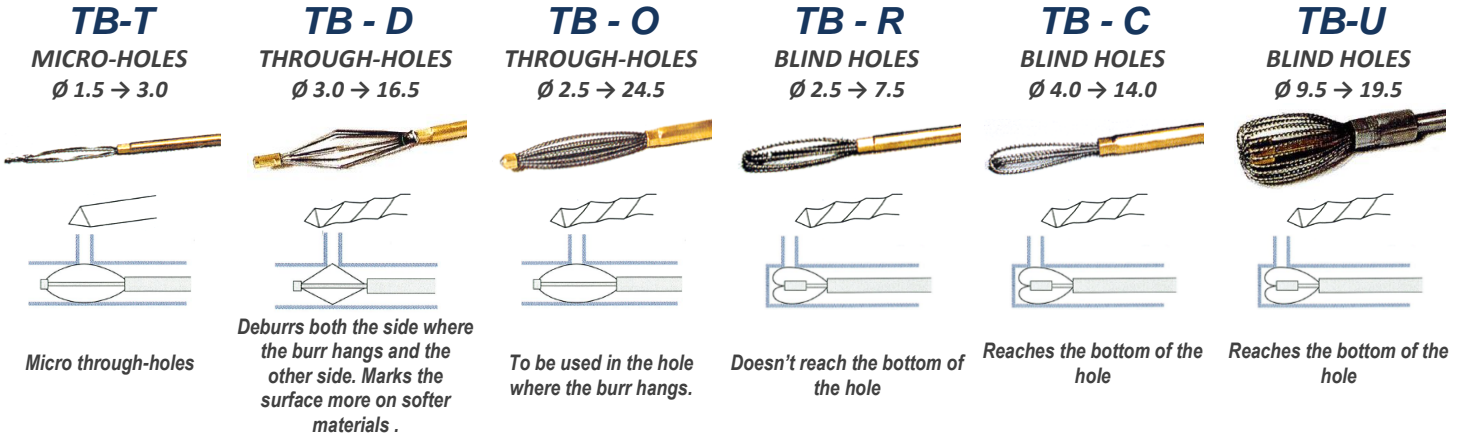
MODELS SUMMARY

	Code	Hole \varnothing	L1	L2	L3	D1	D2	D3	W1	W2
	GMO-EF10	1.0	50	0.35	5.00	0.95	0.55	3.00	45°	-
	GMO-EF10-W25			0.60					25°	-
	GMO-EF10-B			0.60					45°	45°
	GMO-EF10B-W25			0.85					25°	45°
	GMO-EF15	1.5	50	0.40	6.00	1.40	0.90	3.00	45°	-
	GMO-EF15-W25			0.70					25°	-
	GMO-EF15-B			0.75					45°	45°
	GMO-EF15-B-W25			1.00					25°	45°
	GMO-EF20	2.0	50	0.50	7.50	1.90	1.20	3.00	45°	-
	GMO-EF20-W25			0.90					25°	-
	GMO-EF20-B			1.00					45°	45°
	GMO-EF20-B-W25			1.40					25°	45°
	GMO-EF25	2.5	60	0.70	9.00	2.40	1.30	3.00	45°	-
	GMO-EF25-W25			1.35					25°	-
	GMO-EF25-B			1.40					45°	45°
	GMO-EF25-B-W25			2.00					25°	45°
	GMO-EF30	3.0	70	0.75	11.0	2.85	1.70	3.00	45°	-
	GMO-EF30-W25			1.40					25°	-
	GMO-EF30-B			1.50					45°	45°
	GMO-EF30-B-W25			2.15					25°	45°
	GMO-EF40	4.0	80	0.90	14.0	3.80	2.40	4.00	45°	-
	GMO-EF40-W25			1.70					25°	-
	GMO-EF40-B			1.85					45°	45°
	GMO-EF40B-W25			2.65					25°	45°
	GMO-EF50	5.0	100	1.10	17.0	4.80	3.00	5.00	45°	-
	GMO-EF50-W25			2.15					25°	-
	GMO-EF50B			2.30					45°	45°
	GMO-EF50-B-W25			3.35					25°	45°
	GMO-EF60	6.0	100	1.35	20.0	5.80	3.50	6.00	45°	-
	GMO-EF60-W25			2.70					25°	-
	GMO-EF60-B			2.85					45°	45°
	GMO-EF60-B-W25			4.20					25°	45°



TB DEBURRING TOOLS

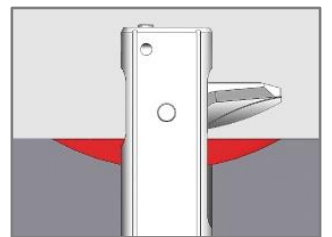
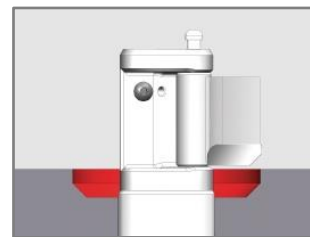
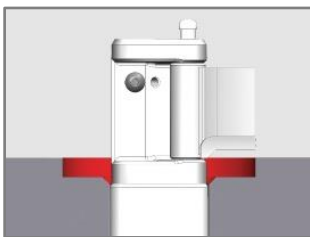
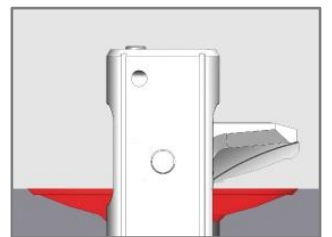
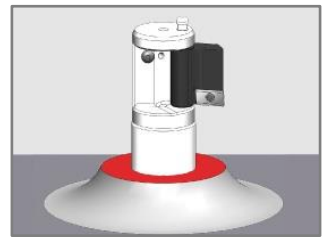
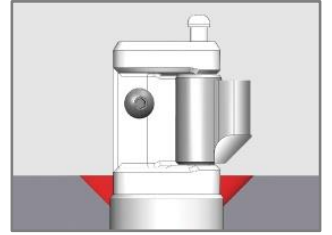
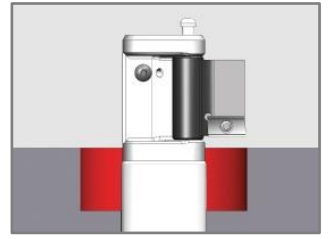
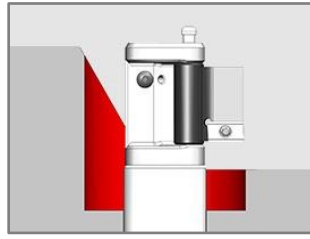
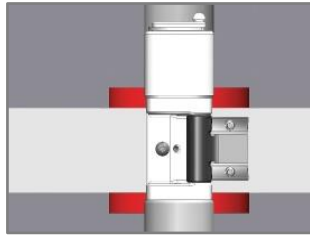
The TB deburring tools are particularly effective in the presence of hanging burrs, where the use of normal brushes does not always ensure the removal of the burr, or the brushes do not have a satisfactory lifespan. ~800rpm up to Ø10mm – 500rpm from 10.5 to 25mm - with or without lubricant



Hole Ø mm	Code	L	ℓ1	ℓ2	dØ	Code	L	ℓ1	ℓ2	dØ	Code	L	ℓ1	ℓ2	dØ	Code	L	ℓ1	ℓ2	dØ	Code	L	ℓ1	ℓ2	dØ				
1,5	TBT20	130	30	100	3																								
2,0	TBT25	130	30	100	3																								
2,5	TBT30	130	30	100	3						TBO30	130	30	100	3	TBR30	130	30	100	3									
3,0	TBT35	130	30	100	3	TBD35	130	30	100	3	TBO35	130	30	100	3	TBR35	130	30	100	3									
3,5						TBD40	130	30	100	3	TBO40	130	30	100	3	TBR40	130	30	100	3									
4,0						TBD45	130	30	100	3	TBO45	130	30	100	3	TBR45	130	30	100	3	TBC50	130	30	100	3				
4,5						TBD50	130	30	100	3	TBO50	130	30	100	3	TBR50	130	30	100	3	TBC55	130	30	100	3				
5,0						TBD55	130	30	100	4	TBO55	130	30	100	4	TBR55	130	30	100	4	TBC60	130	30	100	4				
5,5						TBD60	130	30	100	4	TBO60	130	30	100	4	TBR60	130	30	100	4	TBC65	130	30	100	4				
6,0						TBD65	130	30	100	4	TBO65	130	30	100	4	TBR65	140	40	100	4	TBC70	130	30	100	4				
6,5						TBD70	135	35	100	5	TBO70	135	35	100	5	TBR70	140	40	100	5	TBC75	130	30	100	5				
7,0						TBD75	135	35	100	5	TBO75	135	35	100	5	TBR75	140	40	100	5	TBC80	130	30	100	5				
7,5						TBD80	135	35	100	6	TBO80	135	35	100	6	TBR80	140	40	100	6	TBC85	130	30	100	6				
8,0						TBD85	135	35	100	6	TBO85	135	35	100	6					TBC90	130	30	100	6					
8,5						TBD90	135	35	100	6	TBO90	135	35	100	6					TBC95	135	35	100	6					
9,0						TBD95	140	40	100	6	TBO95	140	40	100	6					TBC100	135	35	100	6					
9,5						TBD100	140	40	100	6	TBO100	140	40	100	6									TBU100	140	40	100	6	
10,0																				TBC110	135	35	100	6	TBU105	140	40	100	6
10,5						TBD110	140	40	100	6	TBO110	140	40	100	6									TBU110	140	40	100	6	
11,0																				TBC120	135	35	100	6	TBU115	140	40	100	6
11,5						TBD120	140	40	100	6	TBO120	140	40	100	6									TBU120	140	40	100	6	
12,0																				TBC130	140	40	100	6	TBU125	140	40	100	6
12,5						TBD130	150	50	100	6	TBO130	145	45	100	6									TBU130	140	40	100	6	
13,0																				TBC140	140	40	100	6	TBU135	140	40	100	6
13,5						TBD140	150	50	100	6	TBO140	145	45	100	6									TBU140	140	40	100	6	
14,0																				TBC150	140	40	100	6	TBU145	140	40	100	6
14,5						TBD150	150	50	100	6	TBO150	150	50	100	60									TBU150	140	40	100	6	
15,0																								TBU155	140	40	100	6	
15,5						TBD160	150	50	100	6	TBO160	150	50	100	60									TBU160	150	50	100	6	
16,5						TBD170	150	50	100	6																			
17,5											TBO180	150	50	100	60									TBU180	150	50	100	6	
19,5											TBO200	150	50	100	60									TBU200	150	50	100	6	
24,5											TBO250	150	50	100	60														

* Available in special sizes and lengths upon request

BACK COUNTERBORING



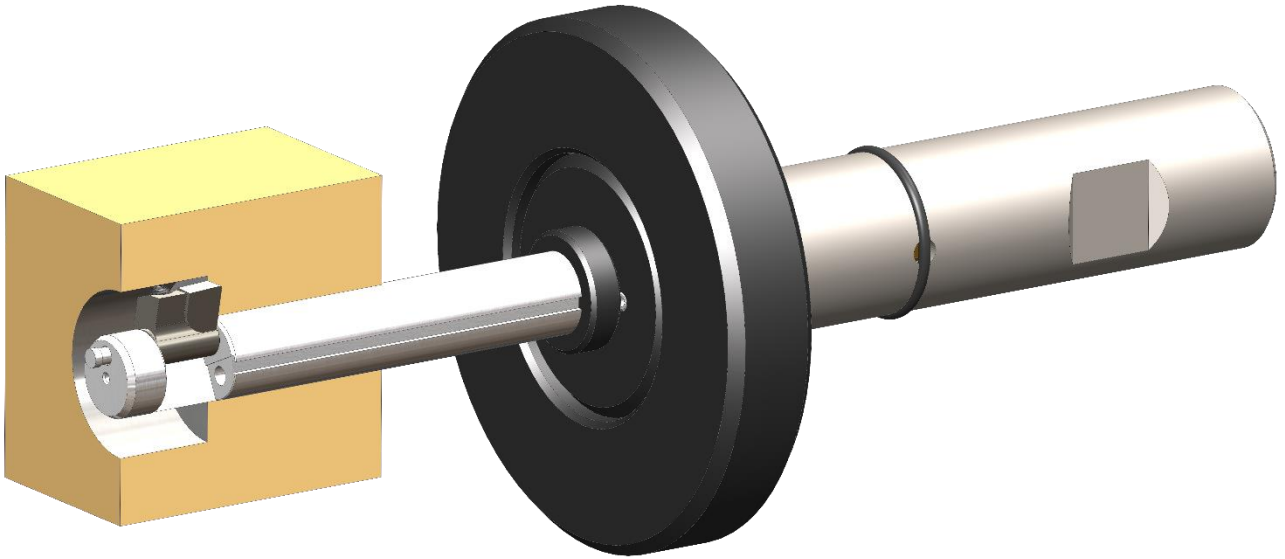
STEINER
INGENUOUS CUTTING TOOLS



Inertial Back counterboring tools

Standard models

High reliability – Reduced delivery time



INERTIAL FLYWHEEL

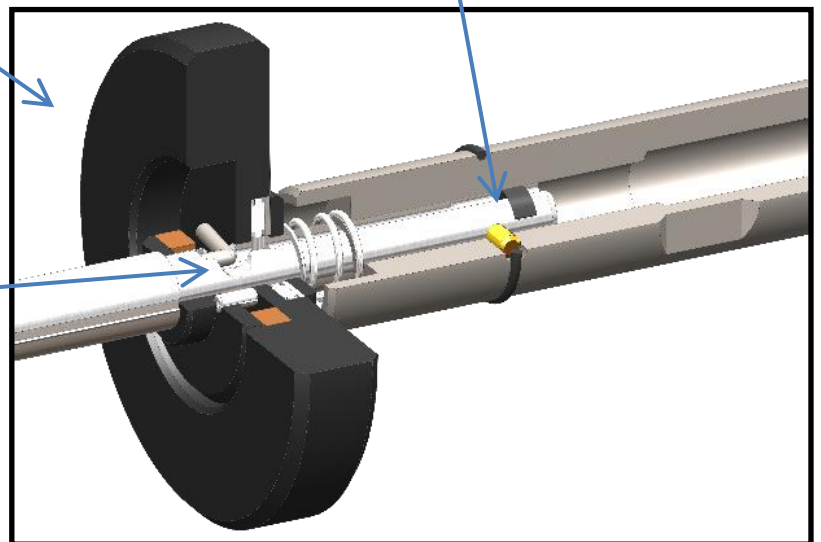
The opening/closing of the blade is operated by a mechanism that holds it in position. This way, even interrupted cutting applications are not a problem

SAFETY PIN

Calibrated to break in case of excessive force. The shank detaches from the tool, preventing damage to the deburring tool, workpiece, and machine spindle. Easy and quick restoration for a prompt resumption of work

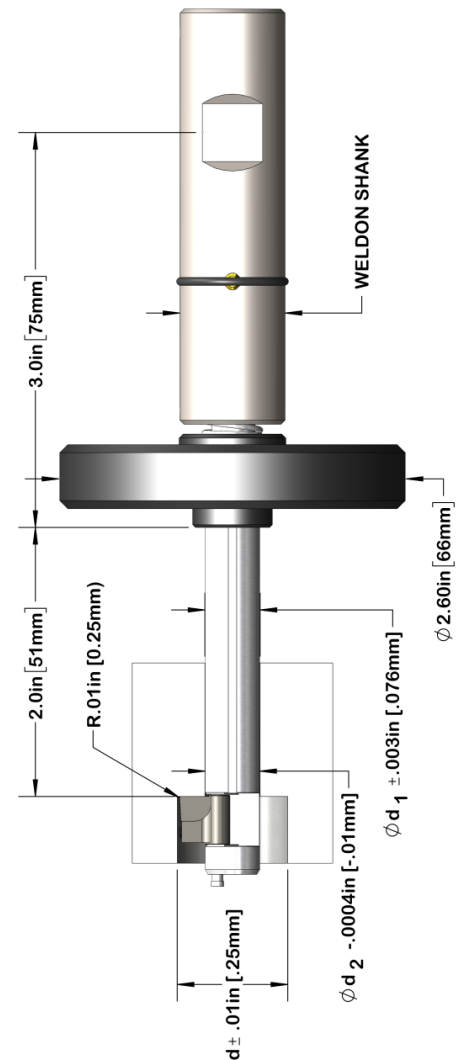
SPARE PARTS KIT

Available for restoration in case of breakage or wear, it includes: Safety pins, Control rod, Blade pin, etc.



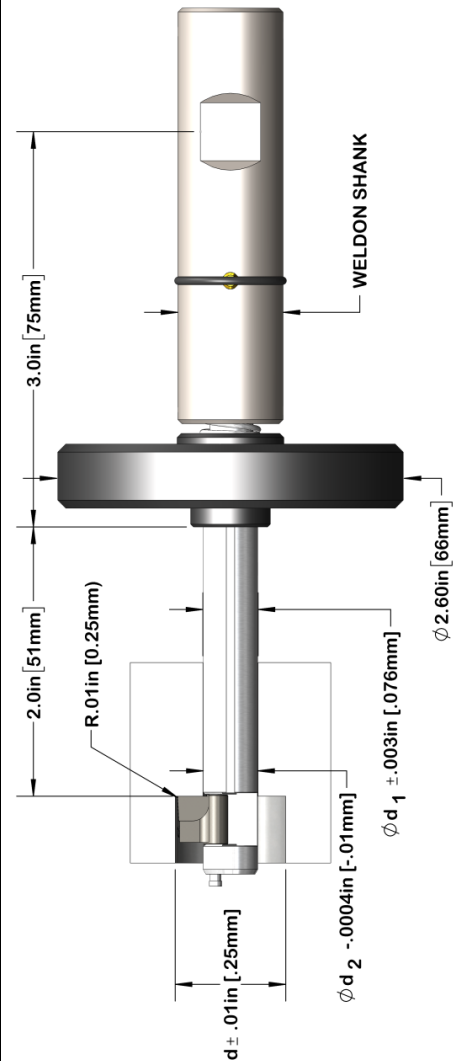
Ø 9.5mm(.375") – 15.5mm(.610") counterbore

Counterbore		Hole		Shaft		Shank	Codes	
mm	inch	mm	inch	mm	inch	Weldon mm	Autofacer Code	Blade Code
9.5	0.374	6.5	.256	6.4	.251	20	AF25-6.50M	CB25-9.50M
		7.0	.276	6.9	.270		AF25-7.00M	
10.0	0.394	6.5	.256	6.4	.251	20	AF25-6.50M	CB25-10.00M
		7.0	.276	6.9	.270		AF25-7.00M	
10.5	0.394	6.5	.256	6.4	.251	20	AF25-6.50M	CB25-10.50M
		7.0	.276	6.9	.270		AF25-7.00M	
11.0	0.433	6.5	.256	6.4	.251	20	AF25-6.50M	CB25-11.00M
		7.0	.276	6.9	.270		AF25-7.00M	
		7.5	.295	7.4	.290		AF28-7.50M	CB28-11.00M
11.5	0.453	6.5	.256	6.4	.251	20	AF25-6.50M	CB25-11.50M
		7.0	.276	6.9	.270		AF25-7.00M	CB28-11.50M
		7.5	.295	7.4	.290		AF28-7.50M	
		8.0	.315	7.9	.310		AF31-8.00M	CB31-11.50M
		8.5	.335	8.4	.330		AF31-8.50M	
12.0	0.472	6.5	.256	6.4	.251	20	AF25-6.50M	CB25-12.00M
		7.0	.276	6.9	.270		AF25-7.00M	CB28-12.00M
		7.5	.295	7.4	.290		AF28-7.50M	
		8.0	.315	7.9	.310		AF31-8.00M	CB31-12.00M
		8.5	.335	8.4	.330		AF31-8.50M	
12.5	0.492	6.5	.256	6.4	.251	20	AF25-6.50M	CB25-12.50M
		7.0	.276	6.9	.270		AF25-7.00M	CB28-12.50M
		7.5	.295	7.4	.290		AF28-7.50M	
		8.0	.315	7.9	.310		AF31-8.00M	CB31-12.50M
		8.5	.335	8.4	.330		AF31-8.50M	
13.0	0.512	6.5	.256	6.4	.251	20	AF25-6.50M	CB25-13.00M
		7.0	.276	6.9	.270		AF25-7.00M	CB28-13.00M
		7.5	.295	7.4	.290		AF28-7.50M	
		8.0	.315	7.9	.310		AF31-8.00M	CB31-13.00M
		8.5	.335	8.4	.330		AF31-8.50M	
13.5	0.531	7.5	.295	7.4	.290	20	AF28-7.50M	CB28-13.50M
		8.0	.315	7.9	.310		AF31-8.00M	CB31-13.50M
		8.5	.335	8.4	.330		AF31-8.50M	
		9.0	.354	8.9	.349		AF34-9.00M	CB34-13.50M
14.0	0.551	7.5	.295	7.4	.290	20	AF28-7.50M	CB28-14.00M
		8.0	.315	7.9	.310		AF31-8.00M	CB31-14.00M
		8.5	.335	8.4	.330		AF31-8.50M	
		9.0	.354	8.9	.349		AF34-9.00M	CB34-14.00M
		9.5	.374	9.4	.369		AF38-9.50M	
		10.0	.394	9.9	.389		AF38-10.00M	
14.5	0.571	8.0	.315	7.9	.310	20	AF31-8.00M	CB31-14.50M
		8.5	.335	8.4	.330		AF31-8.50M	CB34-14.50M
		9.0	.354	8.9	.349		AF34-9.00M	
		9.5	.374	9.4	.369		AF38-9.50M	CB38-14.50M
		10.0	.394	9.9	.389		AF38-10.00M	
15.0	0.591	8.0	.315	7.9	.310	20	AF31-8.00M	CB31-15.00M
		8.5	.335	8.4	.330		AF31-8.50M	CB34-15.00M
		9.0	.354	8.9	.349		AF34-9.00M	
		9.5	.374	9.4	.369		AF38-9.50M	CB38-15.00M
		10.0	.394	9.9	.389		AF38-10.00M	
15.5	0.610	8.0	.315	7.9	.310	20	AF31-8.00M	CB31-15.50M
		8.5	.335	8.4	.330		AF31-8.50M	CB34-15.50M
		9.0	.354	8.9	.349		AF34-9.00M	
		9.5	.374	9.4	.369		AF38-9.50M	CB38-15.50M
		10.0	.394	9.9	.389		AF38-10.00M	
		10.5	.413	10.4	.408		AF40-10.50M	CB40-15.50M
11.0	.433	10.9	.428	AF40-11.00M				



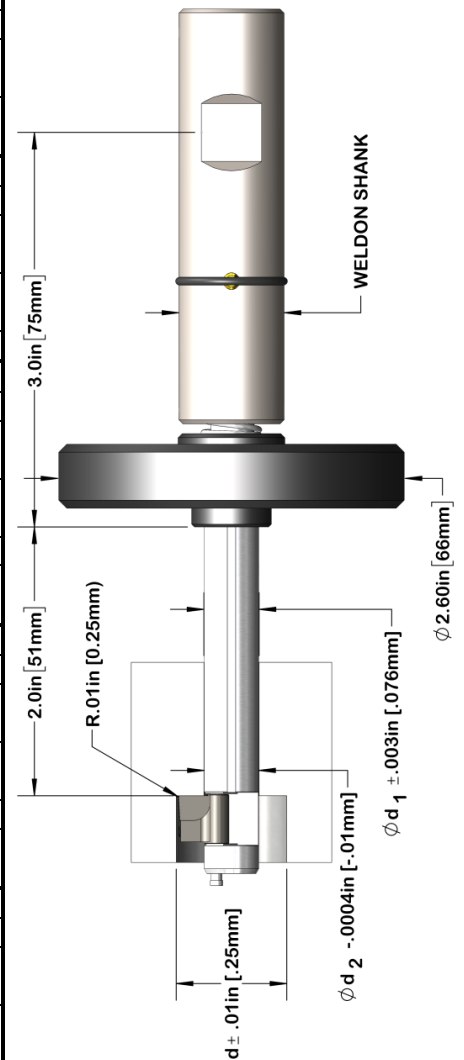
Ø 16mm(.630") – 20mm(.787") counterbore

Counterbore		Hole		Shaft		Shank	Codes	
mm	inch	mm	inch	mm	inch	Weldon mm	Autofacer	Blade
							Code	Code
16.0	0.630	8.0	.315	7.9	.310	20	AF31-8.00M	CB31-16.00M
		8.5	.335	8.4	.330		AF31-8.50M	
		9.0	.354	8.9	.349		AF34-9.00M	CB34-16.00M
		9.5	.374	9.4	.369		AF38-9.50M	CB38-16.00M
		10.0	.394	9.9	.389		AF38-10.00M	
		10.5	.413	10.4	.408		AF40-10.50M	CB40-16.00M
		11.0	.433	10.9	.428		AF40-11.00M	
16.5	0.650	9.0	.354	8.9	.349	20	AF34-9.00M	CB34-16.50M
		9.5	.374	9.4	.369		AF38-9.50M	CB38-16.50M
		10.0	.394	9.9	.389		AF38-10.00M	CB40-16.50M
		10.5	.413	10.4	.408		AF40-10.50M	
		11.0	.433	10.9	.428		AF40-11.00M	CB44-16.50M
		11.5	.453	11.4	.448		AF44-11.50M	
17.0	0.669	9.0	.354	8.9	.349	20	AF34-9.00M	CB34-17.00M
		9.5	.374	9.4	.369		AF38-9.50M	CB38-17.00M
		10.0	.394	9.9	.389		AF38-10.00M	CB40-17.00M
		10.5	.413	10.4	.408		AF40-10.50M	
		11.0	.433	10.9	.428		AF40-11.00M	CB44-17.00M
		11.5	.453	11.4	.448		AF44-11.50M	
17.5	0.689	9.0	.354	8.9	.349	20	AF34-9.00M	CB34-17.50M
		9.5	.374	9.4	.369		AF38-9.50M	CB38-17.50M
		10.0	.394	9.9	.389		AF38-10.00M	CB40-17.50M
		10.5	.413	10.4	.408		AF40-10.50M	
		11.0	.433	10.9	.428		AF40-11.00M	CB44-17.50M
		11.5	.453	11.4	.448		AF44-11.50M	
18.0	.709	9.0	.354	8.9	.349	20	AF34-9.00M	CB34-18.00M
		9.5	.374	9.4	.369		AF38-9.50M	CB38-18.00M
		10.0	.394	9.9	.389		AF38-10.00M	CB40-18.00M
		10.5	.413	10.4	.408		AF40-10.50M	
		11.0	.433	10.9	.428		AF40-11.00M	CB44-18.00M
		11.5	.453	11.4	.448		AF44-11.50M	
		12.0	.472	11.9	.467		AF47-12.00M	CB47-18.00M
18.5	0.728	9.5	.374	9.4	.369	20	AF38-9.50M	CB38-18.50M
		10.0	.394	9.9	.389		AF38-10.00M	CB40-18.50M
		10.5	.413	10.4	.408		AF40-10.50M	
		11.0	.433	10.9	.428		AF40-11.00M	CB44-18.50M
		11.5	.453	11.4	.448		AF44-11.50M	
		12.0	.472	11.9	.467		AF47-12.00M	CB47-18.50M
		12.5	.492	12.4	.487		AF50-12.50M	
		13.0	.512	12.9	.507		AF50-13.00M	CB50-18.50M
19.0	0.748	10.5	.413	10.4	.408	20	AF40-10.50M	CB40-19.00M
		11.0	.433	10.9	.428		AF40-11.00M	CB44-19.00M
		11.5	.453	11.4	.448		AF44-11.50M	
		12.0	.472	11.9	.467		AF47-12.00M	CB47-19.00M
		12.5	.492	12.4	.487		AF50-12.50M	
		13.0	.512	12.9	.507		AF50-13.00M	CB50-19.00M
19.5	0.768	10.5	.413	10.4	.408	20	AF40-10.50M	CB40-19.50M
		11.0	.433	10.9	.428		AF40-11.00M	CB44-19.50M
		11.5	.453	11.4	.448		AF44-11.50M	
		12.0	.472	11.9	.467		AF47-12.00M	CB47-19.50M
		12.5	.492	12.4	.487		AF50-12.50M	
		13.0	.512	12.9	.507		AF50-13.00M	CB50-19.50M
		13.5	.531	13.4	.526		AF53-13.50M	CB53-19.50M
14.0	.551	13.9	.546	AF53-14.00M				
20.0	0.787	10.5	.413	10.4	.408	20	AF40-10.50M	CB40-20.00M
		11.0	.433	10.9	.428		AF40-11.00M	CB44-20.00M
		11.5	.453	11.4	.448		AF44-11.50M	
		12.0	.472	11.9	.467		AF47-12.00M	CB47-20.00M
		12.5	.492	12.4	.487		AF50-12.50M	
		13.0	.512	12.9	.507		AF50-13.00M	CB50-20.00M
		13.5	.531	13.4	.526		AF53-13.50M	
		14.0	.551	13.9	.546		AF53-14.00M	CB53-20.00M



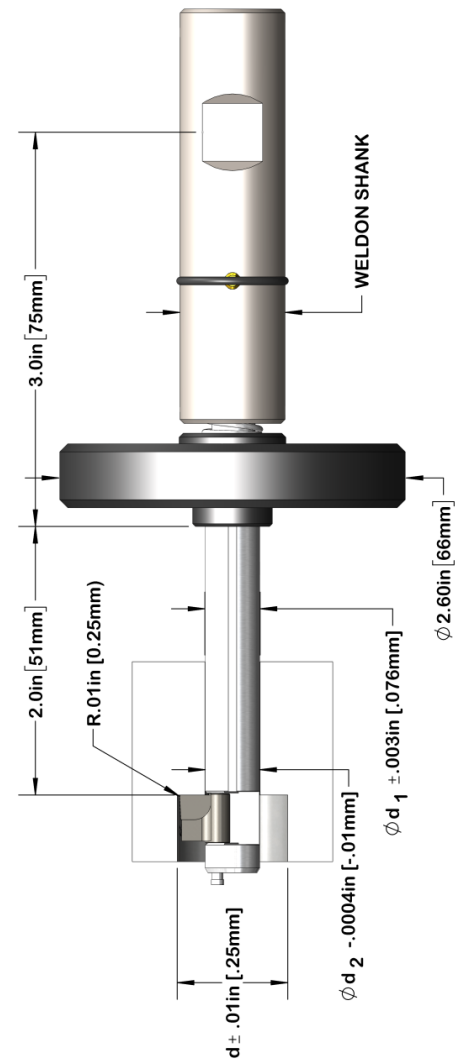
Ø 20.5mm(.807") – 23.5mm(.925") counterbore

Counterbore		Hole		Shaft		Shank	Codes	
d		d1		d2		Weldon	Autofacer	Blade
mm	inch	mm	inch	mm	inch	mm	Code	Code
20.5	0.807	10.5	.413	10.4	.408	20	AF40-10.50M	CB40-20.50M
		11.0	.433	10.9	.428		AF40-11.00M	
		11.5	.453	11.4	.448		AF44-11.50M	
		12.0	.472	11.9	.467		AF47-12.00M	CB47-20.50M
		12.5	.492	12.4	.487		AF50-12.50M	CB50-20.50M
		13.0	.512	12.9	.507		AF50-13.00M	
		13.5	.531	13.4	.526		AF53-13.50M	CB53-20.50M
		14.0	.551	13.9	.546		AF53-14.00M	
21.0	0.827	10.5	.413	10.4	.408	20	AF40-10.50M	CB40-21.00M
		11.0	.433	10.9	.428		AF40-11.00M	
		11.5	.453	11.4	.448		AF44-11.50M	CB44-21.00M
		12.0	.472	11.9	.467		AF47-12.00M	CB47-21.00M
		12.5	.492	12.4	.487		AF50-12.50M	CB50-21.00M
		13.0	.512	12.9	.507		AF50-13.00M	
		13.5	.531	13.4	.526		AF53-13.50M	CB53-21.00M
		14.0	.551	13.9	.546		AF53-14.00M	
21.5	0.846	11.5	.453	11.4	.448	20	AF44-11.50M	CB44-21.50M
		12.0	.472	11.9	.467		AF47-12.00M	
		12.5	.492	12.4	.487		AF50-12.50M	CB50-21.50M
		13.0	.512	12.9	.507		AF50-13.00M	
		13.5	.531	13.4	.526		AF53-13.50M	CB53-21.50M
		14.0	.551	13.9	.546		AF53-14.00M	
		14.5	.571	14.4	.566		AF56-14.50M	CB56-21.50M
		22.0	0.866	11.5	.453		11.4	.448
12.0	.472			11.9	.467	AF47-12.00M		
12.5	.492			12.4	.487	AF50-12.50M	CB50-22.00M	
13.0	.512			12.9	.507	AF50-13.00M		
13.5	.531			13.4	.526	AF53-13.50M	CB53-22.00M	
14.0	.551			13.9	.546	AF53-14.00M		
14.5	.571			14.4	.566	AF56-14.50M	CB56-22.00M	
15.0	.591			14.9	.585	AF59-15.00M	CB59-22.00M	
15.5	.610			15.4	.605	AF59-15.50M		
22.5	0.886			11.5	.453	11.4	.448	20
		12.0	.472	11.9	.467	AF47-12.00M		
		12.5	.492	12.4	.487	AF50-12.50M	CB50-22.50M	
		13.0	.512	12.9	.507	AF50-13.00M		
		13.5	.531	13.4	.526	AF53-13.50M	CB53-22.50M	
		14.0	.551	13.9	.546	AF53-14.00M		
		14.5	.571	14.4	.566	AF56-14.50M	CB56-22.50M	
		15.0	.591	14.9	.585	AF59-15.00M	CB59-22.50M	
		15.5	.610	15.4	.605	AF59-15.50M		
		23.0	0.906	11.5	.453	11.4	.448	
12.0	.472			11.9	.467	AF47-12.00M		
12.5	.492			12.4	.487	AF50-12.50M	CB50-23.00M	
13.0	.512			12.9	.507	AF50-13.00M		
13.5	.531			13.4	.526	AF53-13.50M	CB53-23.00M	
14.0	.551			13.9	.546	AF53-14.00M		
14.5	.571			14.4	.566	AF56-14.50M	CB56-23.00M	
15.0	.591			14.9	.585	AF59-15.00M	CB59-23.00M	
15.5	.610	15.4	.605	AF59-15.50M				
23.5	0.925	11.5	.453	11.4	.448	20	AF44-11.50M	CB44-23.50M
		12.0	.472	11.9	.467		AF47-12.00M	
		12.5	.492	12.4	.487		AF50-12.50M	CB50-23.50M
		13.0	.512	12.9	.507		AF50-13.00M	
		13.5	.531	13.4	.526		AF53-13.50M	CB53-23.50M
		14.0	.551	13.9	.546		AF53-14.00M	
		14.5	.571	14.4	.566		AF56-14.50M	CB56-23.50M
		15.0	.591	14.9	.585		AF59-15.00M	CB59-23.50M
15.5	.610	15.4	.605	AF59-15.50M				



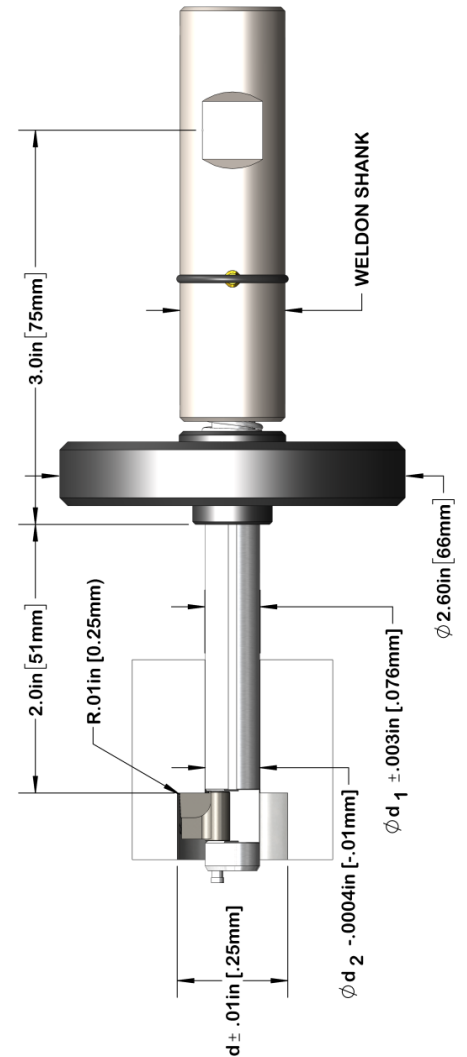
Ø 24.0mm(.945") – 27.5mm(.1.083") counterbore

Counterbore		Hole		Shaft		Shank	Codes	
d		d1		d2		Weldon	Autofacer	Blade
mm	inch	mm	inch	mm	inch	mm	Code	Code
24.0	0.945	12.0	.472	11.9	.467	20	AF47-12.00M	CB47-23.50M
		12.5	.492	12.4	.487		AF50-12.50M	CB50-23.50M
		13.0	.512	12.9	.507			
		13.5	.531	13.4	.526		AF53-13.50M	CB53-23.50M
		14.0	.551	13.9	.546			
		14.5	.571	14.4	.566		AF56-14.50M	CB56-23.50M
		15.0	.591	14.9	.585			
		15.5	.610	15.4	.605		AF59-15.50M	CB59-23.50M
24.5	0.965	12.0	.472	11.9	.467	20	AF47-12.00M	CB47-24.00M
		12.5	.492	12.4	.487		AF50-12.50M	CB50-24.00M
		13.0	.512	12.9	.507			
		13.5	.531	13.4	.526		AF53-13.50M	CB53-24.00M
		14.0	.551	13.9	.546			
		14.5	.571	14.4	.566		AF56-14.50M	CB56-24.00M
		15.0	.591	14.9	.585			
		15.5	.610	15.4	.605		AF59-15.50M	CB59-24.00M
25.0	.984	12.0	.472	11.9	.467	20	AF47-12.00M	CB47-25.00M
		12.5	.492	12.4	.487		AF50-12.50M	CB50-25.00M
		13.0	.512	12.9	.507			
		13.5	.531	13.4	.526		AF53-13.50M	CB53-25.00M
		14.0	.551	13.9	.546			
		14.5	.571	14.4	.566		AF56-14.50M	CB56-25.00M
		15.0	.591	14.9	.585			
		15.5	.610	15.4	.605		AF59-15.50M	CB59-25.00M
25.5	1.004	12.0	.472	11.9	.467	20	AF47-12.00M	CB47-25.50M
		12.5	.492	12.4	.487		AF50-12.50M	CB50-25.50M
		13.0	.512	12.9	.507			
		13.5	.531	13.4	.526		AF53-13.50M	CB53-25.50M
		14.0	.551	13.9	.546			
		14.5	.571	14.4	.566		AF56-14.50M	CB56-25.50M
		15.0	.591	14.9	.585			
		15.5	.610	15.4	.605		AF59-15.50M	CB59-25.50M
26.0	1.024	12.5	.492	12.4	.487	20	AF50-12.50M	CB50-26.00M
		13.0	.512	12.9	.507		AF50-13.00M	CB50-26.00M
		13.5	.531	13.4	.526			
		14.0	.551	13.9	.546		AF53-13.50M	CB53-26.00M
		14.5	.571	14.4	.566			
		15.0	.591	14.9	.585		AF56-14.50M	CB56-26.00M
15.5	.610	15.4	.605	AF59-15.50M	CB59-26.00M			
26.5	1.043	12.5	.492	12.4	.487	20	AF50-12.50M	CB50-26.50M
		13.0	.512	12.9	.507		AF50-13.00M	CB50-26.50M
		13.5	.531	13.4	.526			
		14.0	.551	13.9	.546		AF53-13.50M	CB53-26.50M
		14.5	.571	14.4	.566			
		15.0	.591	14.9	.585		AF56-14.50M	CB56-26.50M
15.5	.610	15.4	.605	AF59-15.50M	CB59-26.50M			
27.0	1.043	12.5	.492	12.4	.487	20	AF50-12.50M	CB50-27.00M
		13.0	.512	12.9	.507		AF50-13.00M	CB50-27.00M
		13.5	.531	13.4	.526			
		14.0	.551	13.9	.546		AF53-13.50M	CB53-27.00M
		14.5	.571	14.4	.566			
		15.0	.591	14.9	.585		AF56-14.50M	CB56-27.00M
15.5	.610	15.4	.605	AF59-15.50M	CB59-27.00M			
27.5	1.083	12.5	.492	12.4	.487	20	AF50-12.50M	CB50-27.50M
		13.0	.512	12.9	.507		AF50-13.00M	CB50-27.50M
		13.5	.531	13.4	.526			
		14.0	.551	13.9	.546		AF53-13.50M	CB53-27.50M
		14.5	.571	14.4	.566			
		15.0	.591	14.9	.585		AF56-14.50M	CB56-27.50M
15.5	.610	15.4	.605	AF59-15.50M	CB59-27.50M			



Ø 28mm(1.102") – 33mm(1.299") counterbore

Counterbore		Hole		Shaft		Shank	Codes	
d		d1		d2		Weldon	Autofacer	Blade
mm	inch	mm	inch	mm	inch	mm	Code	Code
28.0	1.102	12.5	.492	12.4	.487	20	AF50-12.50M	CB50-28.00M
		13.0	.512	12.9	.507		AF50-13.00M	
		13.5	.531	13.4	.526		AF53-13.50M	
		14.0	.551	13.9	.546		AF53-14.00M	CB53-28.00M
		14.5	.571	14.4	.566		AF56-14.50M	CB56-28.00M
		15.0	.591	14.9	.585		AF59-15.00M	CB59-28.00M
		15.5	.610	15.4	.605		AF59-15.50M	
28.5	1.122	13.5	.531	13.4	.526	20	AF53-13.50M	CB53-28.50M
		14.0	.551	13.9	.546		AF53-14.00M	
		14.5	.571	14.4	.566		AF56-14.50M	CB56-28.50M
		15.0	.591	14.9	.585		AF59-15.00M	CB59-28.50M
		15.5	.610	15.4	.605		AF59-15.50M	
		13.5	.531	13.4	.526		AF53-13.50M	
14.0	.551	13.9	.546	AF53-14.00M				
29.0	1.142	14.5	.571	14.4	.566	20	AF56-14.50M	CB56-29.00M
		15.0	.591	14.9	.585		AF59-15.00M	CB59-29.00M
		15.5	.610	15.4	.605		AF59-15.50M	
		14.5	.571	14.4	.566		AF56-14.50M	CB56-29.50M
29.5	1.161	15.0	.591	14.9	.585	20	AF59-15.00M	CB59-29.50M
		15.5	.610	15.4	.605		AF59-15.50M	
		14.5	.571	14.4	.566		AF56-14.50M	
30.0	1.181	15.0	.591	14.9	.585	20	AF59-15.00M	CB59-30.00M
		15.5	.610	15.4	.605		AF59-15.50M	
		14.5	.571	14.4	.566		AF56-14.50M	
30.5	1.201	15.0	.591	14.9	.585	20	AF59-15.00M	CB59-30.50M
		15.5	.610	15.4	.605		AF59-15.50M	
		14.5	.571	14.4	.566		AF56-14.50M	
31.0	1.220	15.0	.591	14.9	.585	20	AF59-15.00M	CB59-31.00M
		15.5	.610	15.4	.605		AF59-15.50M	
		14.5	.571	14.4	.566		AF56-14.50M	
31.5	1.240	15.0	.591	14.9	.585	20	AF59-15.00M	CB59-31.50M
		15.5	.610	15.4	.605		AF59-15.50M	
		14.5	.571	14.4	.566		AF56-14.50M	
32.0	1.260	15.0	.591	14.9	.585	20	AF59-15.00M	CB59-32.00M
		15.5	.610	15.4	.605		AF59-15.50M	
		15.0	.591	14.9	.585		AF59-15.00M	
32.5	1.280	15.5	.610	15.4	.605	20	AF59-15.50M	CB59-32.50M
		15.0	.591	14.9	.585		AF59-15.00M	
33.0	1.299	15.0	.591	14.9	.585	20	AF59-15.00M	CB59-33.00M
		15.5	.610	15.4	.605		AF59-15.50M	
		15.0	.591	14.9	.585		AF59-15.00M	



Spare parts kits

Include:

- Activation pin, control rod,
- retention Seeger, safety pins (3pz),
- O-Ring, Blade pin.

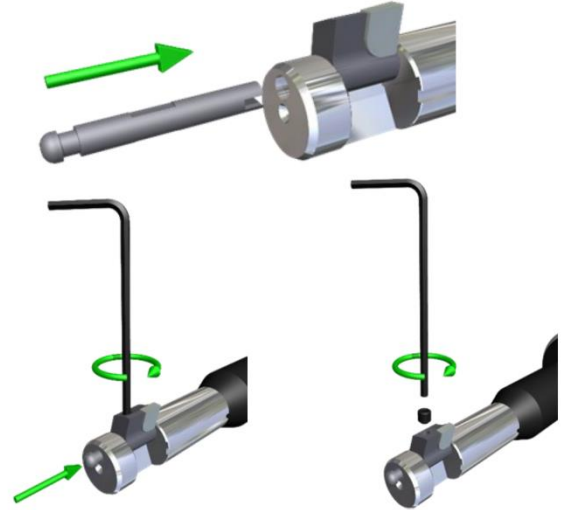
Kit code	Tool size	Safety pin code
SPK-AF25	25	203020-02
SPK-AF28	28	203020-02
SPK-AF31-34	31, 34	203020-02
SPK-AF38-40	38, 40	204020-02
SPK-AF44-47	44, 47	204020-02
SPK-AF50-53	50, 53	205020-02
SPK-AF56-59	56, 59	205620-02

Cutting speed

Speed	Fe	Steel	Stainless steel	Cast iron	Aluminum
m/min	91	67	46	107	183
mm/rev	0.028-0.038	0.028-0.038	0.028-0.038	0.038-0.050	0.050-0.063
SFM	300	220	150	350	600
IPR	.001-.002	.001-.002	.001-.002	.0015-.0025	.002-.003

Blade installation

1. Insert the blade pin through the passage hole in the body and the blade. Rotate it until it engages with the tang of the control rod.
2. With the blade in the open position, rotate the tool's clutch until the alignment mark on the blade pin is parallel to the allen key and the set screw seat. This will align the set screw with the flat on the pin.
3. Apply a drop of Loctite threadlocker (provided). Tighten the set screw to 0.7-1.1Nm, being careful not to exceed this value, and ensure that the set screw is aligned with the flat on the pin. In the case of blades with a double set screw, install the second one in series, tightening to 0.7Nm.



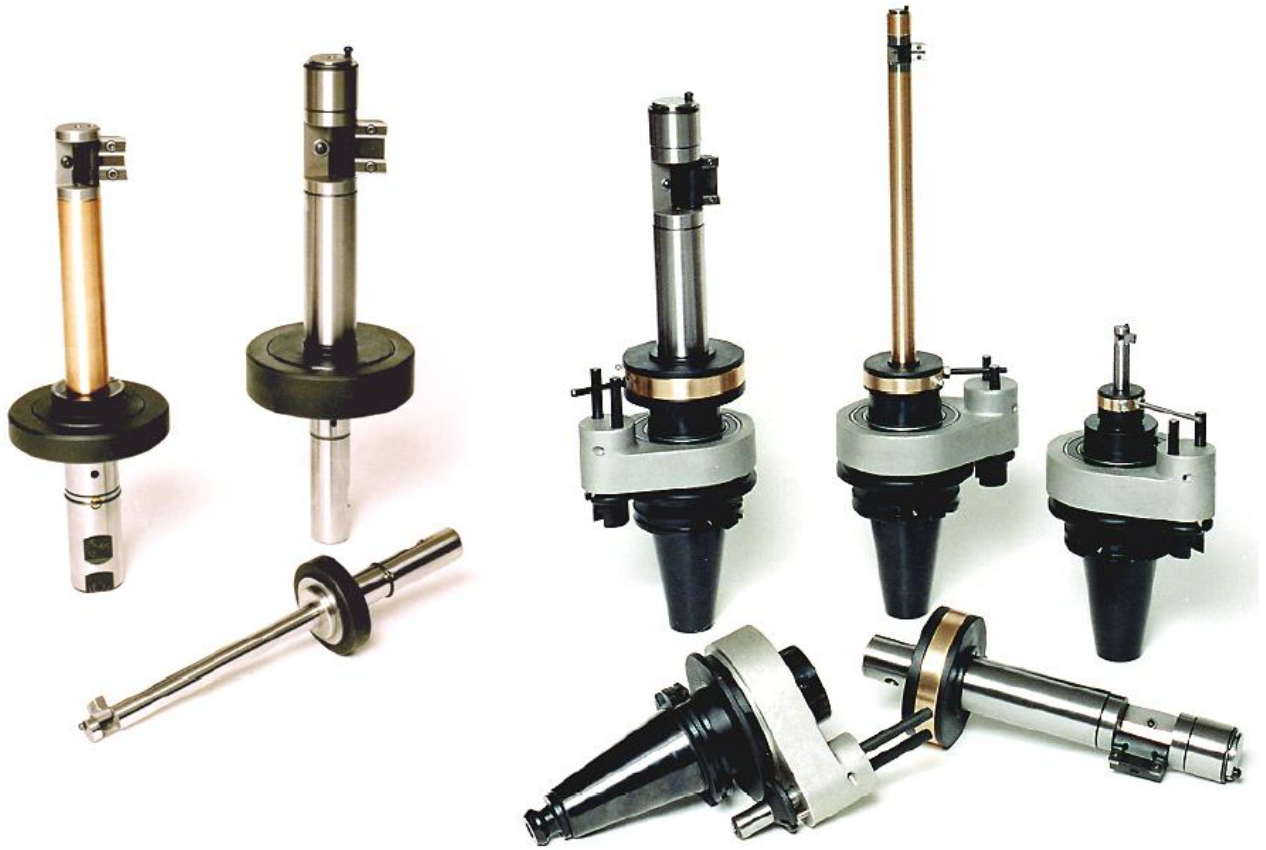
Verification: To check that the set screw is positioned on the flat reference, slightly loosen the set screw and try to pull out the pin. If positioned correctly, the pin should not come out but should slide slightly and then lock in place.

Working cycle

1. Coolant through the spindle OFF, external coolant ON, enter the hole with clockwise rotation at 500-800rpm
2. Advance until reaching a position that allows the blade to open safely.
3. Reverse the spindle rotation counterclockwise at 500-800g/min. Note: Do not stop the spindle while switching from clockwise to counterclockwise rotation (non-stop reversal). The blade opens. After 1-3 turns, increase the speed to the cutting speed. Coolant through the spindle ON
4. Retract, performing the back counterboring to the desired depth. Pause for 1-3 turns at the end of chamfering to clean the cut.
5. Advance until reaching a level that allows the blade to close safely. Coolant through the spindle OFF, leave the external coolant ON.
6. Set the rotation to 500-800g/min and reverse it by switching to clockwise rotation.

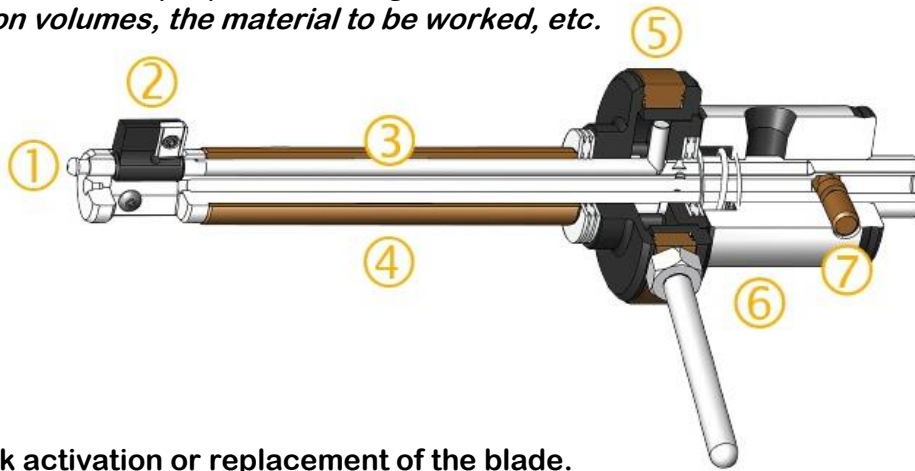
*We can provide special tools
for your specific application*

SPECIAL TOOLS



Autofacer is a tool that allows for fully automatic circular machining from the other side of a through hole. Circular machining includes counterboring, faceting, enlarging, flaring, deburring, creating a spherical radius, or a combination of these operations. This is achieved thanks to a blade folded inside the tool body, allowing it to pass through the entry hole. Once the tool has entered the workpiece, the blade is mechanically opened, performing the cutting operation. The distinguishing features of the Autofacer are:

- A clutch that mechanically opens and closes the blade, ensuring high reliability of the entire process
- The blade is mechanically held open during the machining process, allowing for the execution of challenging and interrupted cutting operations without issues
- The Autofacer body uses the through hole as support during the cutting action, enabling high cutting speeds even with substantial passage lengths or large-diameter counterbores.
- Braze-bonded or mechanically secured insert blades are produced in the geometry and configuration required by the customer's application. This allows for combining multiple operations into a single blade, maximizing time savings (e.g., counterboring and deburring or internal and/or external radiusing)
- There are different methods for opening/closing the blade, and the most suitable system for the customer's application is proposed, taking into consideration factors such as the machine tool used, production volumes, the material to be worked, etc.



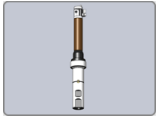
1. Blade pin: Quick activation or replacement of the blade.
2. Blade: With insert or brazed, different grades and coatings depending on the application (including PCD)
3. Coolant through spindle: available for tools with shaft diameter ≥ 16 mm
4. Shaft: Guides and supports the tool during the cutting action, preventing sticking in the hole
5. Clutch: Reliably opens and closes the blade, allowing interrupted cutting operations by holding the blade in the open position
6. Shank: Available in many configurations, including Weldon metric or inches, integral CV, BT, NMYB, or HSK, for transfer, high precision AF6, etc.
7. Safety pin: prevents damage caused by axial overload

MAXIMUM COUNTERBORE DIAMETER IN RELATION TO ENTRY HOLE DIAMETER

Entry hole diameter	Maximum counterbore diameter
6.35 – 12.7 mm	Entry hole \varnothing x 1.9
12.8 – 19 mm	Entry hole \varnothing x 2.1
> 19 mm	Entry hole \varnothing x 2.2



BLADE OPENING SYSTEMS



THRUST/REVERSAL CONE ACTIVATION

By applying pressure, the cone grips the surface of the workpiece
By reversing the rotation, the blade either opens or closes
Very reliable, suitable for all machines, both CNC and manual
Equipped with a safety pin in the shank to safeguard the tool



INERTIAL ACTIVATION

Blade opening/closing through rapid rotation reversal
Ideal for modern CNC machines capable of rapid spindle accelerations
Equipped with a safety pin in the shank to safeguard the tool



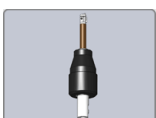
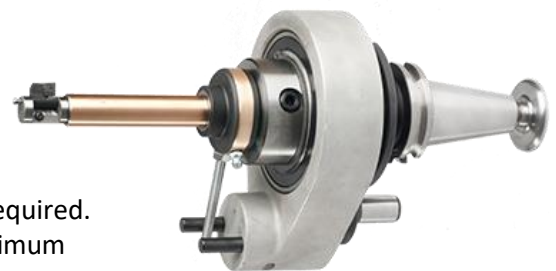
PAD ACTIVATION

To open/close the blade, the pad grips the internal diameter of the pilot hole.
Ideal for large passage diameters, over 50mm.
The tool is very sensitive to the precision of the passage hole.
Equipped with a safety pin in the shank to safeguard the tool



TORQUE BAR ACTIVATION

For the opening/closing, an anti-rotation system for the actuation rod is required.
A highly reliable system used for high-volume productions where the maximum level of reliability is required.
Equipped with a safety pin in the shank to safeguard the tool



AIR/COOLANT ACTIVATION

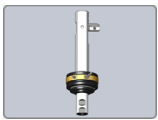
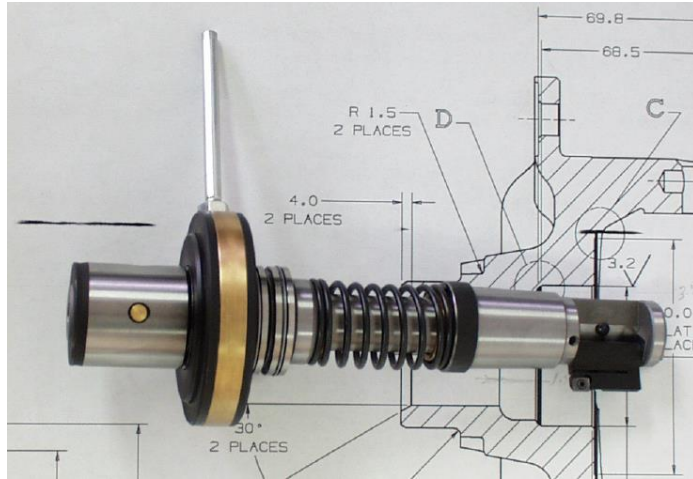
The pressure of the coolant or air opens the blade.
The blade closure is entrusted to a spring system.
Very easy to program.
Requires filtration of at least 10 microns.
Note: It does not have a safety pin.





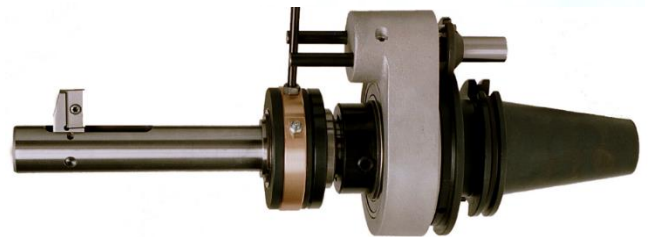
GUIDE BEARING

Finishing tool available for a torque bar activation system. A tapered bushing ensures precise support inside the hole. Adjustable insert cartridge.



EXTENDED WORKING RANGE

The different blade activation system allows counterboring diameters over 2.2 times the inlet diameter. Model available starting from entry hole diameter of 16mm. Activation with torque bar or coolant.



APPLICATION SECTORS

AUTOMOTIVE

Differential boxes and supports, planetary gears, axles, etc.
 Transmissions: gearboxes, housings, supports, etc.
 Steering joints and columns
 Connecting rods, engine blocks, 4WD steering hubs

AEROSPACE

Engine compartment
 Landing gear components
 Turbine shafts, bearing housings
 Helicopter rotors
 Torque meter housings

HEAVY EQUIPMENT

Engine blocks, Cantilever supports
 Attachment forks, Swing arms
 Attachment brackets, Structures
 Flywheel cover boxes

POWER GENERATORS

Housings and supports for steam turbines and gas turbines, Turbine shafts
 Compressor components

MARINE

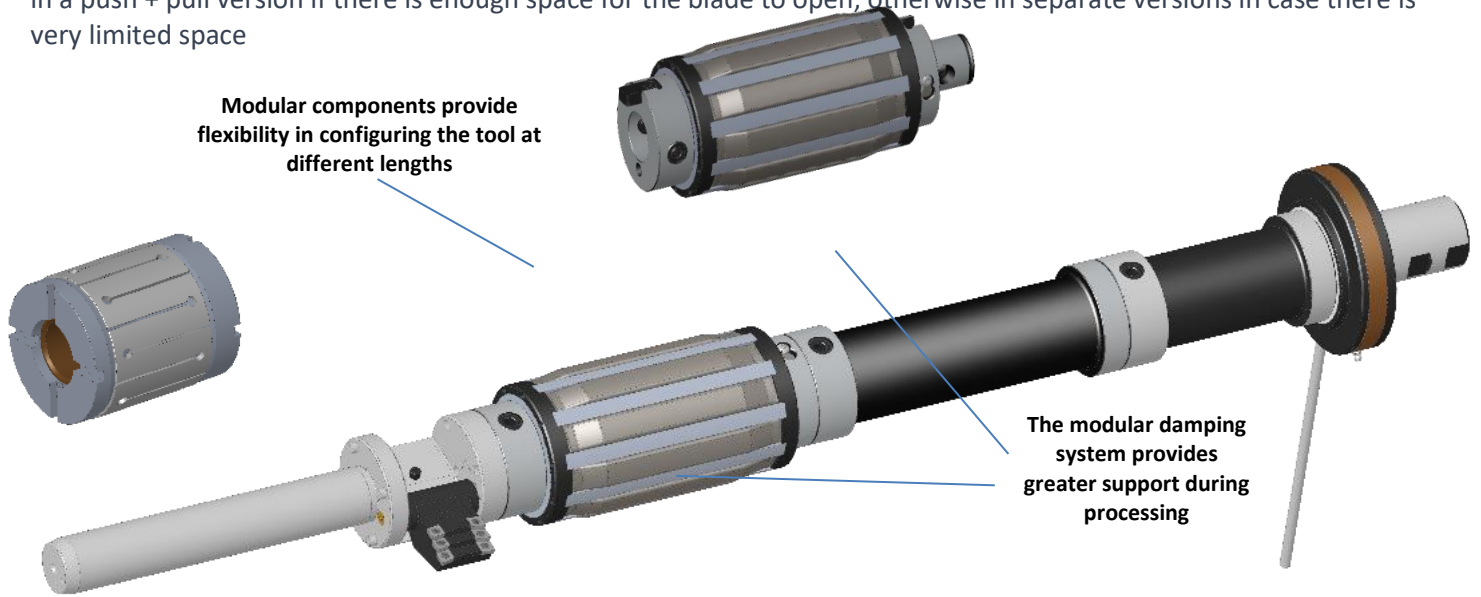
Gearboxes
 Submarine components
 Engine blocks, Ballasts, Manifolds
 PUMPS AND VALVES
 Pump housings
 Valve seats, Valve bodies
 Impellers and rotors

DEFENSE

Components for tanks and armored vehicles
 Various components

KA MODEL – OIL & GAS VALVES

To significantly reduce processing times and optimize operations within the production processes of gate valves. The expandable bushing provides support to the tools during the cutting action. We can design custom expandable bushings or use the ones already owned by the customer. The insert holder blades for working pockets can be provided in a push + pull version if there is enough space for the blade to open, otherwise in separate versions in case there is very limited space



In case it is necessary to use boring heads for precision finishing, the previous processing with Autofacer greatly reduces processing times as there will be a known roughing diameter, and it will no longer be necessary to perform numerous empty passes. Having a preparation diameter instead of a weld, we will also reduce the risks of collisions and damages.

Modular

High-precision extensions are used to assemble the tool to the necessary length for processing.

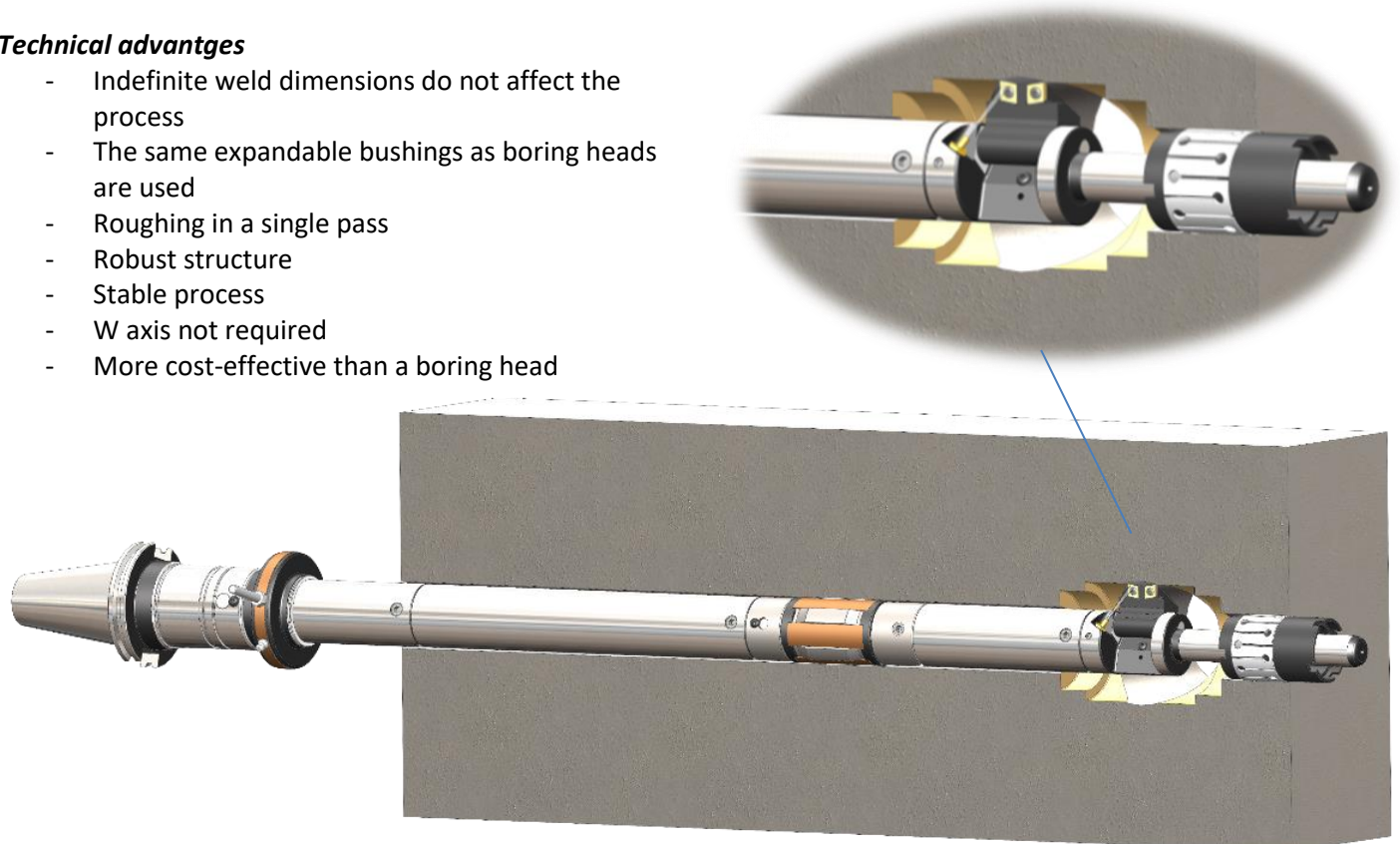
Modular components are standard.

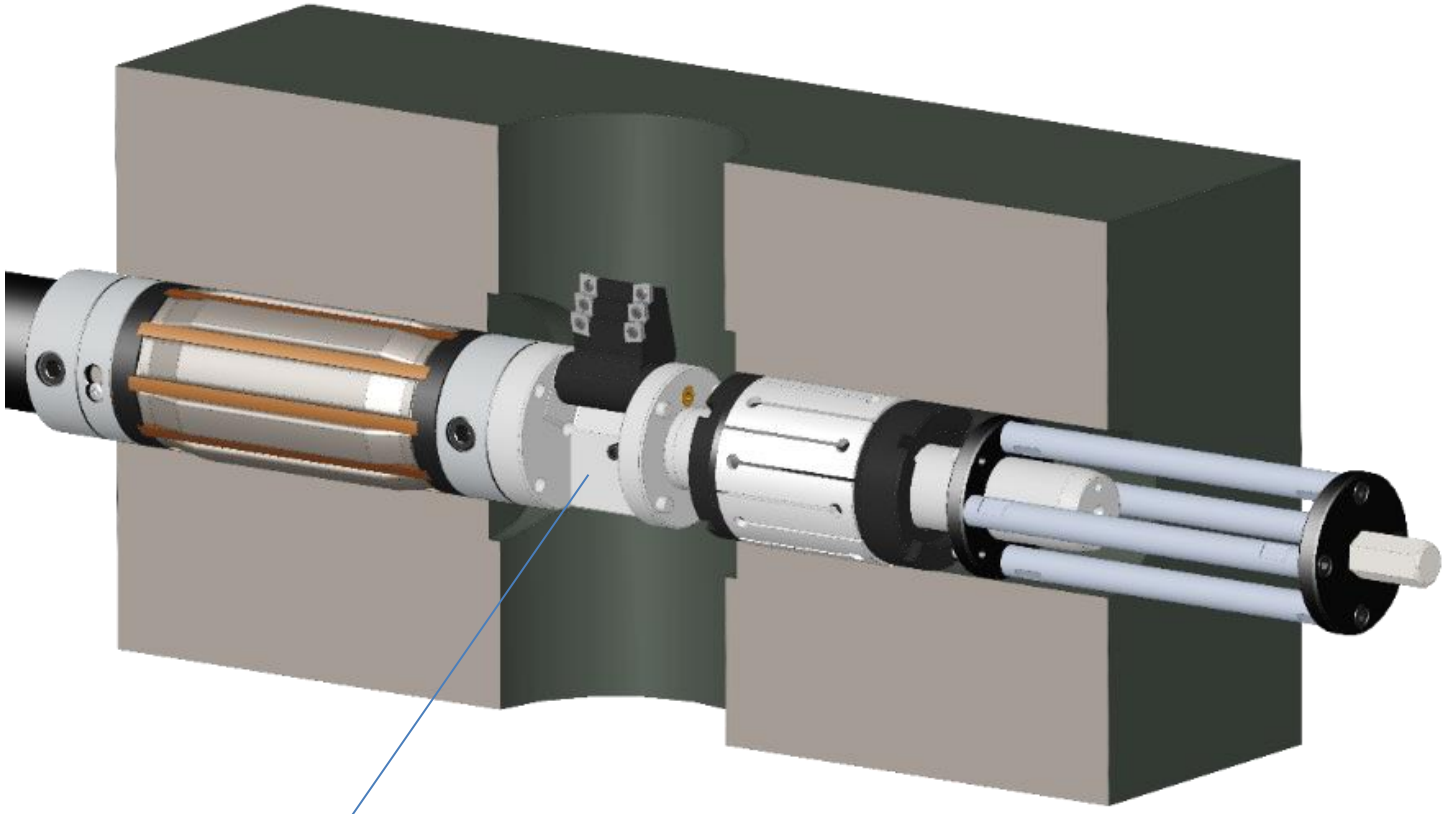
There are semi-standard models for valves from 2" to 7" (50-178mm).

Dampers reduce vibrations during cutting action

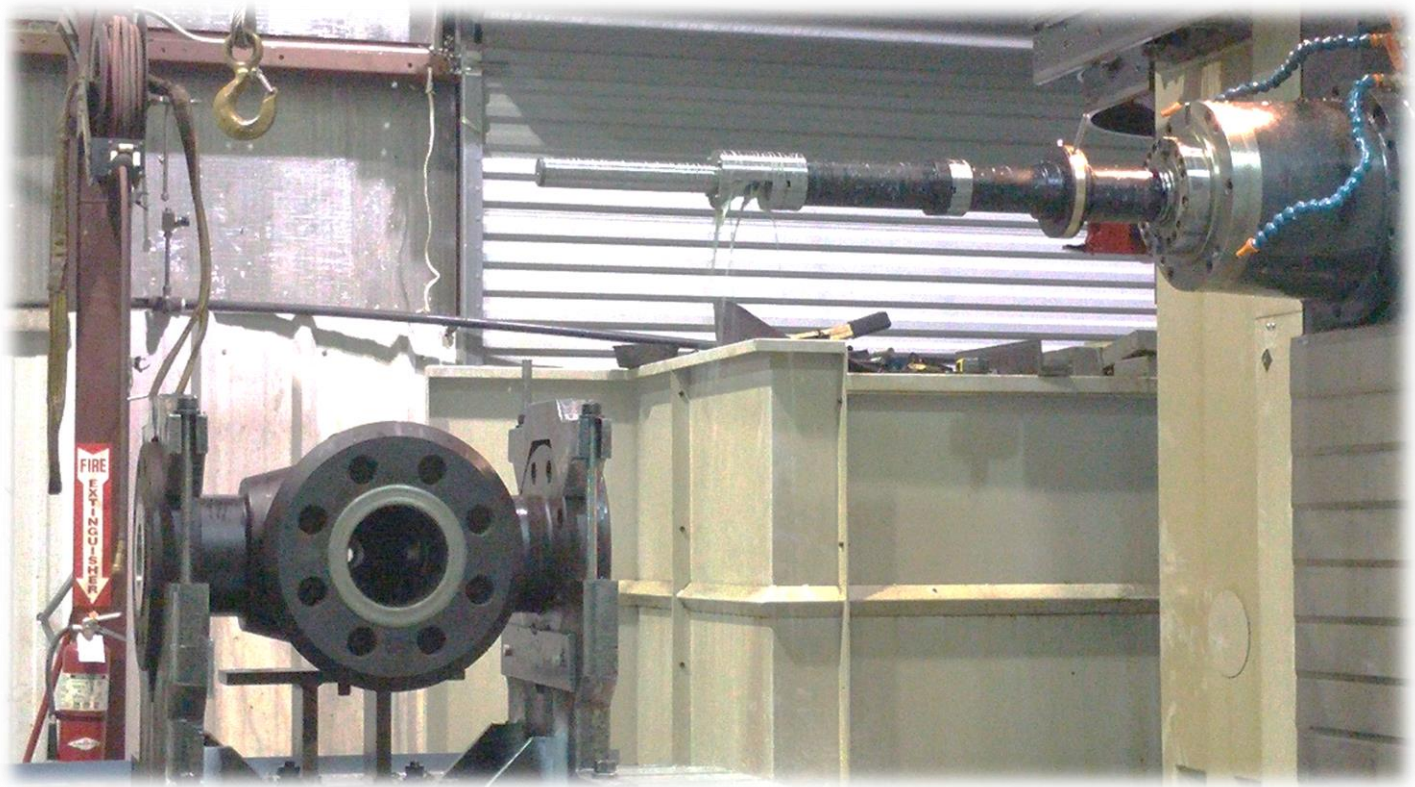
Technical advantages

- Indefinite weld dimensions do not affect the process
- The same expandable bushings as boring heads are used
- Roughing in a single pass
- Robust structure
- Stable process
- W axis not required
- More cost-effective than a boring head





The KA Autofacer can be used without problems in the presence of seats or pockets with Inconel overlay



ENTRY HOLE DIAMETER CLEARANCE – PILOT HOLE DIAMETER

- A. For entry holes with a diameter up to 19mm, the pilot shaft has a diameter 0.05mm smaller than the minimum diameter of the entry hole.
- B. For entry holes from 19.1mm to 50.8mm inclusive, the pilot shaft has a diameter 0.08mm smaller than the minimum diameter of the entry hole.
- C. For entry holes from 50.9mm to 76.2mm inclusive, the pilot shaft has a diameter 0.1-0.13mm smaller than the minimum diameter of the entry hole.
- D. For entry holes beyond 76.3mm, the pilot shaft has a diameter 0.13-0.15mm smaller than the minimum diameter of the entry hole.

Hole diameter	Clearance between diameters
6.35 – 19.00mm	0.05mm
19.10-50.8mm	0.08mm
50.9-76.2mm	0.1-0.13mm
76.3+ mm	0.13-0.15mm

MAXIMUM COUNTERBORE DIAMETER IN RELATION TO THE ENTRY HOLE DIAMETER

For an entry hole up to 12.7mm, the maximum working diameter has a ratio of 1.9

For an entry hole from 12.8 to 19mm, the maximum working diameter has a ratio of 2.1

For an entry hole above 19.1mm, the maximum working diameter has a ratio of 2.2

Entry hole diameter	Maximum working diameter ratio
6.35 – 12.7 mm	1.9
12.8 – 19 mm	2.1
19 + mm	2.2

SPEED AND FEED

The back counterbore tools must work with very slow feeds at high rotational speeds. The table shows the maximum values for rotational speed and feed for a given working diameter.

To obtain the appropriate spindle speed in revolutions per minute, use the following formula.

$$\text{Rotational speed (rpm)} = \frac{1000 \times \text{Cutting speed (m/min)}}{3.1416 \times \text{working diameter (mm)}}$$

Data based on a maximum ratio of 1.5 between the entry hole and the working diameter						
Reduce the values for a higher ratio between the two diameters						
Tool size	Feed Speed	Brass	Aluminum	Cast iron	Steel	Stainless
25-50	Feed (mm/rev)	0.076	0.076	0.038	0.038	0.025
	Cutting speed (m/min)	244	244	91	91	60
53-75	Feed (mm/rev)	0.127	0.127	0.050	0.050	0.038
	Cutting speed (m/min)	244	244	91	91	60
81-94	Feed (mm/rev)	0.152	0.152	0.076	0.076	0.050
	Cutting speed (m/min)	244	244	91	91	60
10-11	Feed (mm/rev)	0.203	0.203	0.100	0.100	0.063
	Cutting speed (m/min)	244	244	91	91	60
12-15	Feed (mm/rev)	0.254	0.254	0.152	0.127	0.076
	Cutting speed (m/min)	244	244	91	91	60
16-21	Feed (mm/rev)	0.381	0.381	0.203	0.152	0.089
	Cutting speed (m/min)	244	244	91	91	60
≥ 22	Feed (mm/rev)	0.508	0.508	0.304	0.254	0.100
	Cutting speed (m/min)	244	244	91	91	60

THE REPORTED VALUES SHOULD BE CONSIDERED AS MAXIMUM AND PURELY INDICATIVE, THERE MAY BE SIGNIFICANT VARIATIONS DEPENDING ON THE FOLLOWING VARIABLES. ALWAYS START WITH LOW VALUES AND INCREASE GRADUALLY.

- DIFFERENT TYPES OF MATERIAL
- INTERRUPTED CUT
- NON-PLANAR COUNTERBORING
- ETC.

What to check before using Autofacer

- Manually open and close the blade. Verify that the movement is smooth and without snags
- Check that the blade is correctly and safely mounted on the pin with the locking screw tightened against the flat of the pin (see “Instructions for the blade installation” below)
- Check the tightness of the blade’s locking screw, whether a secondary locking screw is present and whether thread-locking compound is applied to them. In the “open” position, the blade must be firmly resting against the guiding shaft’s head.
- In the “closed” position the blade must not be protruding from the outside diameter of the guiding shaft and must be firmly held closed with no excessive movement.
- If excessive movement is still present in the “open” position, check the whole blade-pin-screws assembly again
- Check whether the blade is clear of obstacles that could damage it in the “open” position

Suggestions for programming and usage

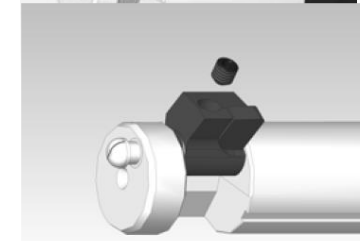
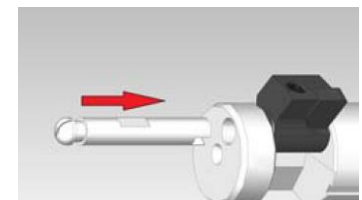
- Check the recommended speeds and feeds
- Check the work cycle for your specific tool
- Check that the blade is installed correctly (see “Instructions for the blade installation” below)
- Read the troubleshooting and blade re-sharpening instructions
- DO NOT activate the through spindle coolant before the blade is fully open and ready to work
- Stop the through spindle coolant flow BEFORE reversing the rotation to close the blade
- TOOL WITH A SAFETY PIN MUST BE LIFTED AT LEAST 72mm ABOVE THE WORKPIECE BEFORE MOVING Laterally. This is needed to allow the shank to fully separate from the rest of the tool without causing damage if the safety pin broke.
- The blade must be clear of any obstacle before opening



Instructions for the blade installation

NOTE: THE AUTOFACER RELIABILITY DEPENDS ON THE CORRECT TIGHTENING OF THE BLADE ON THE PIN'S FLAT

- Remove the protective wax, if present
- Some blades come with two locking screws
- Remove the external locking screw (if two are present), then the internal one
- NOTE: short blades and non-brazed blades come with only one locking screw
- Make sure that the inner-most screw doesn't interfere with the blade pin entry
- If the blade comes with only one locking screw, completely unscrew it and apply a drop of the supplied thread locking compound onto it, to avoid it loosening because of vibrations. Reinsert the screw and bring it right up to the blade pin hole. Only use flat-pointed screws.
- Remove the blade pin from the tool
- While holding the tool's shank, rotate the clutch clockwise as far as it goes
- Place the blade in the “open” position and slide the pin in, rotating it until it engages the tang on the control rod
- Bring the locking screw perpendicularly in contact with flat on the blade pin. To ensure the retention of the blade, slightly move the pin while tightening the locking screw. Lightly loosen and tighten it back again to ensure perfect coupling. DO NOT tighten with excessive torque (0.7-1.1Nm).
- Test the mechanism by rotating the clutch by hand to the left and to the right until both the fully open and fully closed positions are reached. When fully closed the blade must be firmly held against the tool's head
- If present, insert and tighten the second locking screw (only use flat-pointed screws)



Maintenance

Every model must be disassembled, checked and cleaned periodically.

Lubrication

- If through spindle coolant is used, additional lubrication is not needed
- If through spindle coolant is NOT used, the clutch must be disassembled and greased every 10 hours of working time.
Suggested lubricants:
M1 grease (lubriplate No.930-AA) for generic use
M2 grease (MO-LITH No.2) I lithium molybdenum grease
- If the Autofacer hasn't been used for a long time, lubricate it before use
- If the Autofacer will not be used for a long time, lubricate it generously and apply rust protection before storing it

Inspection

The Autofacer should be inspected monthly to check for wear of the various components

It is advised to periodically check the opening and closing of the blade by hand to ensure that the movement is smooth and without snags

DISASSEMBLY

- Remove the safety pin retention ring with a small screwdriver
- Remove the safety pin with a hammer and a small punch.
- Remove the shank, and all the body and clutch components referring to the drawing provided with the tool.
- Remove the blade and the control rod.
- Thoroughly wash every component from dirt and grease using solvent.

INSPECTION OF THE COMPONENTS

- Inspect the wear of every component.
- With the tool body held between centers, check its concentricity to be under 0.05mm
- Inspect the control rod.
- Inspect the activation pin.
- Inspect the thrust washers, the clutch, and the flywheel.

RE-ASSEMBLY

- Assemble all the components referring to the drawing provided with the tool. Using M1 grease, lubricate every component during assembly, especially every moving component and the clutch body.
- Replace the control rod.
- Check the functionality by repeatedly operating the blade manually, ensuring that the clutch offers slight resistance but the movement is not freely rotating.
- Install the blade following the instructions and verify its operation by manually actuating it.

Instructions for adjustable blade

The blade is equipped with an eccentric bushing.

By rotating the bushing, the blade's protrusion can be adjusted, thus varying the counterbore's diameter. Once the counterbore's diameter is set, a locking screw holds the bushing in place.

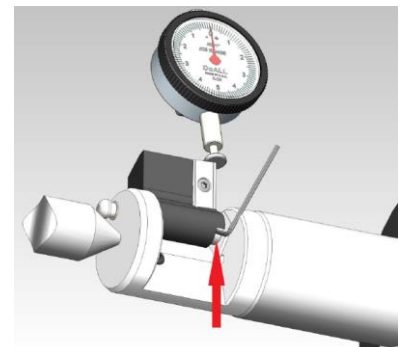
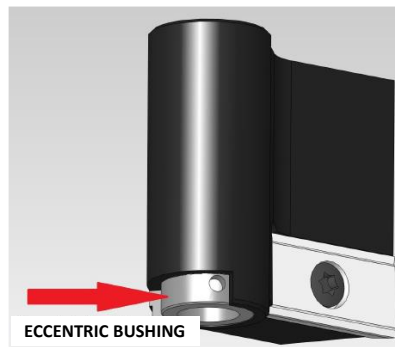
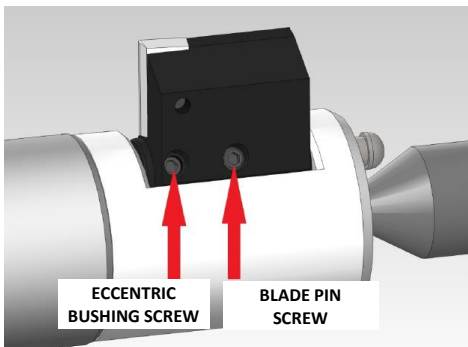
To adjust it, mount the AUTOFACER between centers, ensure that the blade is correctly installed and locked against the pin's flat (see "Instructions for the blade installation" above).

Lightly loosen all the locking screws.

Calculate the counterbore diameter from the radius measured with the blade in the "open" position.

Use a small allen key or similar tool to rotate the eccentric bushing until the desired radius/counterbore diameter is reached.

Tighten the screw closest to the AUTOFACER's body to lock the eccentric bushing, then tighten the blade pin's locking screw.



TROUBLESHOOTING

SAFETY PIN BREAKING

Generally, the breakage of the safety pin is caused by too high working pressure, which is due to the wear of the cutting edge of the blade. Check the blade, replace, or sharpen if necessary.

The breakage can be caused by hard spots in the material or too fast feed. Replace the pin, check the feed and speed, and repeat the work cycle. If the pin breaks again, increase the speed by 25% and reduce the feed by 25%.

The breakage can also be caused by high working pressure due to a large blade radius. If the blade radius is greater than 0.4mm, reduce by 50% or more, the recommended value as the maximum feed.

High working pressure is also present in the case of angled chamfers to be deburred (large working surface in relation to the diameter). In this case, reduce by 50% or more, the recommended value as the maximum feed and, if necessary, also the rotation speed.

Excessive working pressure can also be caused by the upper strip of the brazed insert with a value below the center due to incorrect sharpening operation. DO NOT re-sharpen the upper strip of the blades.

CHIPS NOT BREAKING

If the chip does not break, it may be due to too slow feed, and there is a risk that it wraps around the tool and prevents the blade from closing. Increase the feed by 0.03-0.08mm/rev and occasionally stop the feed during cutting to break the chip and evacuate it from the work area.

THE BLADE IS NOT LOCKED ON THE PIN

Some blade models have two locking crews mounted in series, one for gripping the pin and the second for safety locking, while others have only one. Replace the screws, ensure correct tightening on the flat of the pin, and apply Loctite. Follow the instructions above for the correct blade assembly.

THE BLADE DOES NOT COMPLETELY OPEN OR CLOSE

Check the alignment of the locking screw with the flat on the pin, ensure the correct installation of the blade, disassemble and reassemble the Autofacer, ensuring that there are no chips stuck anywhere and/or any damage to the tool.

PIN BREAKING

The blade was not installed correctly

BLADE SKIPPING

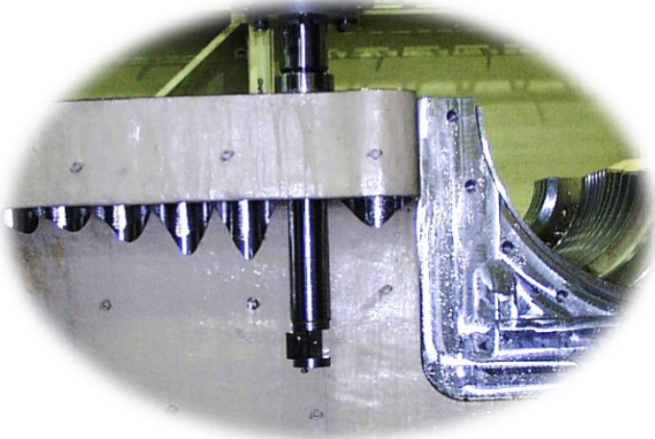
Check the condition and play of the outer bushing on the stem with guide bushing.

Ensure that the play between the diameter of the guide bushing and the entry hole is not too large, it should be no more than 0.25mm and not less than 0.05mm.

Increase the feed by 0.03-0.08mm/rev.

FREE MOVEMENT OF THE CLUTCH

If the clutch moves freely and, consequently, the blade opens freely, inspect the condition of the clutch assembly by disassembling it.



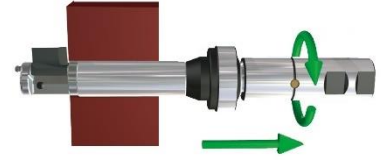
THRUST ACTIVATION



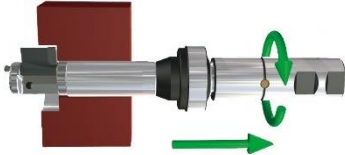
External coolant ON, coolant through the spindle OFF. Feed into the right-hand rotating hole (100 rpm) until the thrust cone contacts the surface.



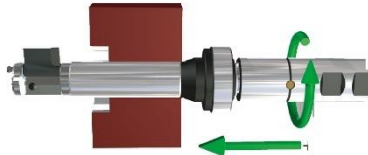
Compress the cone by 1.5mm. Reverse the rotation to open the blade. Note: Ensure clearance from obstacles. After 1-3 turns, bring it up to working speed. Activate the coolant through the spindle.



Approach the work surface rapidly. The tool is designed to operate at high rotational speeds with low feed.



Perform the machining at the recommended cutting speed. A brief pause in the final position is advisable to clear the cut (1-3 turns).

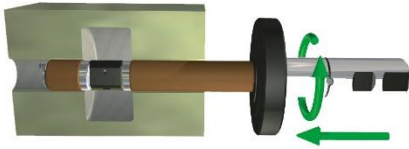


Lower the speed to 100 rpm, fast feed until the cone makes contact with the surface.

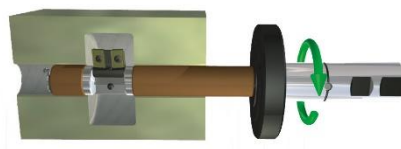


External coolant ON, coolant through the spindle OFF. Compress the cone by 1.5mm. Reverse the rotation to close the blade. Quickly retract from the hole to complete the work cycle.

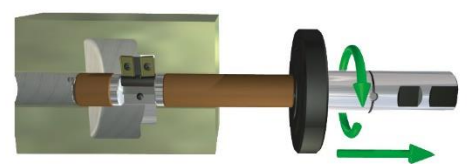
INERTIAL ACTIVATION



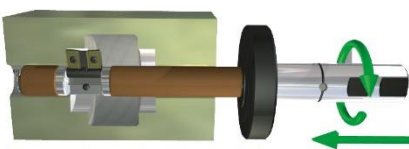
External coolant ON, coolant through the spindle OFF. Enter the hole in a clockwise rotation (rotational speed 300-800 rpm) until it passes through and position in an obstacle-free area for blade opening.



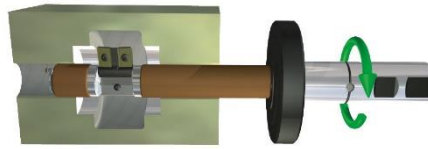
Reverse the rotation quickly at 300-800 rpm (do not program spindle stop between directions). The blade opens in the cutting position. After 1-3 turns, bring it up to working speed. Activate the coolant through the spindle.



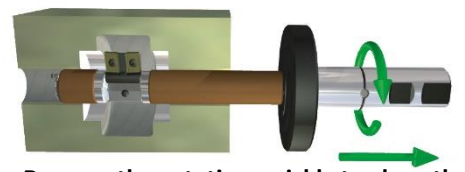
Approach the work surface rapidly. Perform the machining at the recommended cutting speed. A brief pause in the final position is advisable to clean the cut (1-3 turns).



If the model includes the front milling option, rapid feed for approaching the front surface, machining at the recommended speed, and a brief pause to clean the cut (1-3 turns).

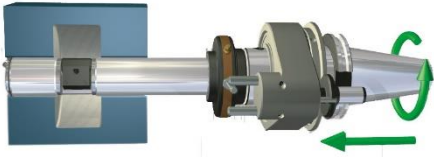


Position the blade in an obstacle-free area. External coolant ON, coolant through the spindle OFF.

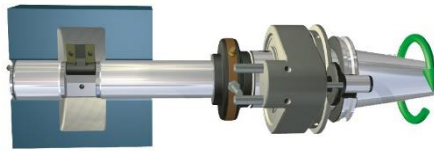


Reverse the rotation quickly to close the blade at 300-800 rpm (do not program spindle stop between directions). Rapid exit to disengage from the hole.

TORQUE BAR ACTIVATION



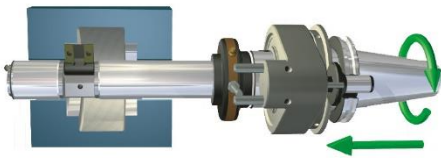
External coolant ON, coolant through the spindle OFF. Enter the hole with right-hand rotation (100 rpm).



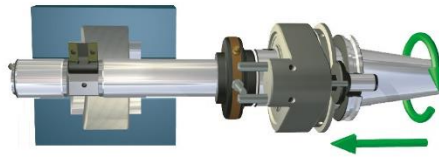
Reverse the rotation at 100 rpm. The blade opens in the cutting position. After 1-3 turns, bring it up to working speed. Activate the coolant through the spindle.



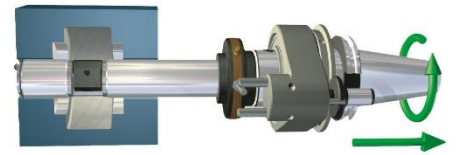
Approach the work surface rapidly. Perform the machining at the recommended cutting speed. A brief pause in the final position is advisable to clean the cut (1-3 turns).



If equipped with the front milling option, use rapid feed for approaching the front surface, perform the machining at the recommended speed, and make a brief pause to clean the cut (1-3 turns)



Position the blade in an obstacle-free area. External coolant ON, coolant through the spindle OFF.



Set the rotation at 100 rpm, reverse the rotation to close the blade. Rapid exit to disengage from the hole.

