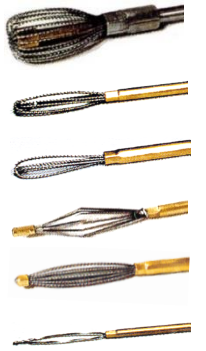
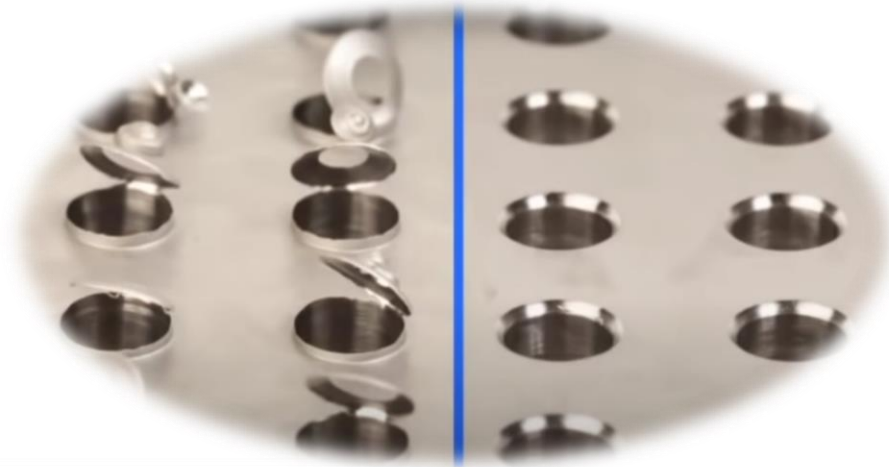


DEBURRING T / BACK COUNTERBORING



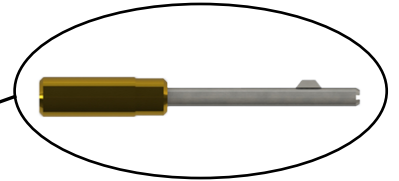
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MICHIGAN DEBURRING TOOL

*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 producing special tools*

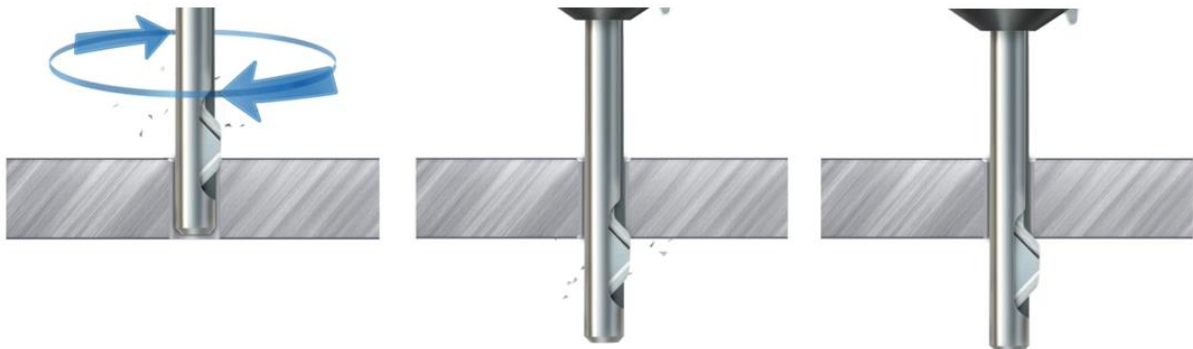
Micro Series from 1.00 to 2.34mm



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

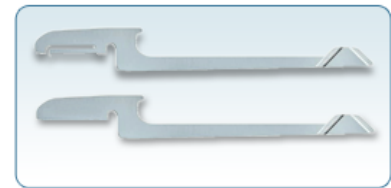
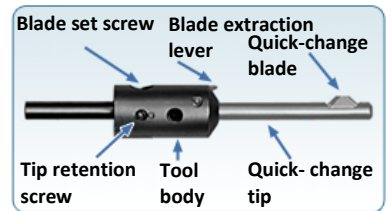
Key component of the modular system. Presetting is only necessary when first mounted on the spindle; there is no need to check during any subsequent change of tip or blade, as quick-change components assume precise positions. The lateral locking and unlocking grain of the tip allows for quick and easy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

TIP

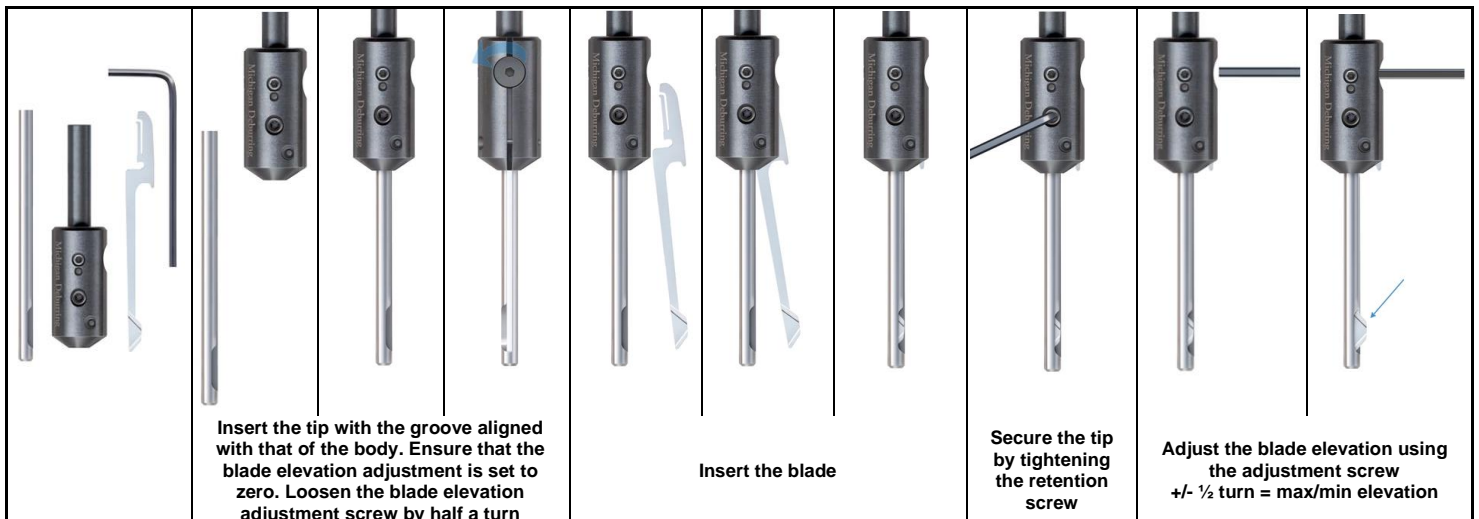
The small-diameter tips, such as A, B and C types (Ø1.45-2.3mm), are made from raw drill blanks, while the larger-diameter models like D, E, F, and G types (Ø2.4-6.4mm) are crafted from high-quality tool steel. These features make it a component with a long lifespan and low cost. Additionally, it can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

BLADE

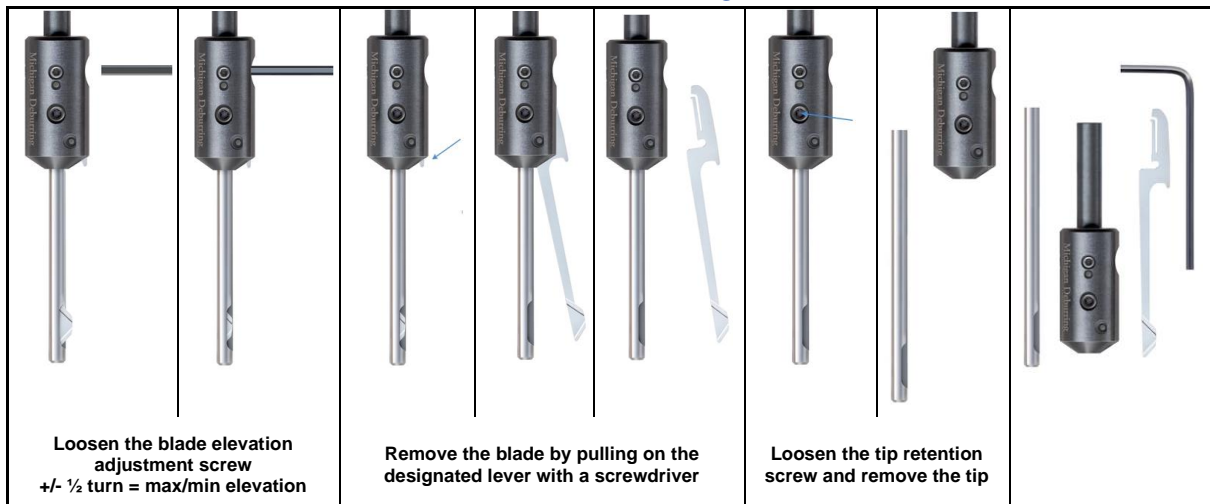
The adjustable quick-change blade also functions as a spring. The blade has a stroke limitation that prevents excessive elevation and subsequent breakage. With the adjustment screw fully tightened, maximum elevation is achieved, resulting in a very aggressive cutting action. Loosening the screw by a quarter turn provides a softer setting. 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.



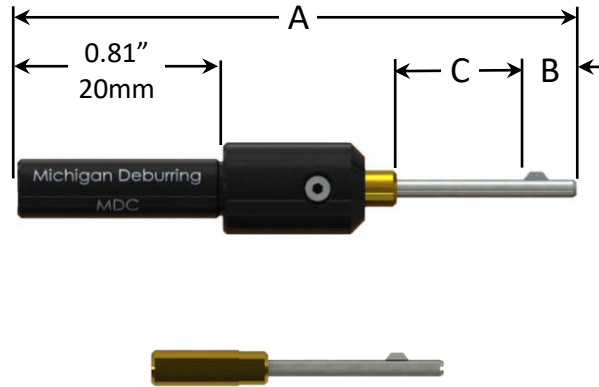
MODULAR SERIES TOOL ASSEMBLY



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 | | |
|---------------|------|-------|-------|--|------------------|--------|------------------------|
| Min | Max | Min | Max | | Body | Tip | Blade |
| 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 | | |
|---------------|------|-------|-------|--|------------------|--------|------------------------|
| Min | Max | Min | Max | | Body | Tip | Blade |
| 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 | | |
|---------------|------|-------|-------|--|------------------|--------|------------------------|
| Min | Max | Min | Max | | Body | Tip | Blade |
| 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 D - 2.40mm – 3.15mm (.094" - .124") holes



| Working range | | | | Complete Tool Code (Code for pull-only blade) | Components codes | | | |
|---------------|------|-------|-------|--|------------------|---------------|-------------------------------|---|
| Min | Max | Min | Max | | Body | Tip | Blade | |
| 2.40 | 2.45 | .0935 | .0975 | TD-0935-4545P (TD-0935-R45P) | HD-0935 | P-0935 | BD4545P (Push+pull) | |
| 2.50 | 2.55 | .0980 | .1035 | TD-0980-4545P (TD-0980-R45P) | HD-0980 | P-0980 | | |
| 2.60 | 2.70 | .1040 | .1085 | TD-1040-4545P (TD-1040-R45P) | HD-1040 | P-1040 | | |
| 2.75 | 2.85 | .1090 | .1125 | TD-1090-4545P (TD-1090-R45P) | HD-1090 | P-1090 | | BDR45P (Pull-only) |
| 2.90 | 2.95 | .1130 | .1175 | TD-1130-4545P (TD-1130-R45P) | HD-1130 | P-1130 | | |
| 3.00 | 3.05 | .1180 | .1195 | TD-1180-4545P (TD-1180-R45P) | HD-1180 | P-1180 | | Different blade configurations upon request |
| 3.10 | 3.15 | .1200 | .1245 | TD-1200-4545P (TD-1200-R45P) | HD-1200 | P-1200 | | |

TYPE E - 3.20mm – 3.95mm (.125" - .155") holes



| Working range | | | | Complete Tool Code (Code for pull-only blade) | Components codes | | |
|---------------|------|-------|-------|--|------------------|---------------|---|
| Min | Max | Min | Max | | Body | Tip | Blade |
| 3.20 | 3.25 | .1250 | .1295 | TE-1250-4545P (TE-1250-R45P) | HE-1250 | P-1250 | BE4545P (Push+pull) |
| 3.30 | 3.45 | .1300 | .1355 | TE-1300-4545P (TE-1300-R45P) | HE-1300 | P-1300 | |
| 3.50 | 3.55 | .1360 | .1400 | TE-1360-4545P (TE-1360-R45P) | HE-1360 | P-1360 | |
| 3.60 | 3.65 | .1405 | .1465 | TE-1405-4545P (TE-1405-R45P) | HE-1405 | P-1405 | BER45P (Pull-only) |
| 3.70 | 3.85 | .1470 | .1515 | TE-1470-4545P (TE-1470-R45P) | HE-1470 | P-1470 | |
| 3.90 | 3.95 | .1520 | .1555 | TE-1520-4545P (TE-1520-R45P) | HE-1520 | P-1520 | Different blade configurations upon request |

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



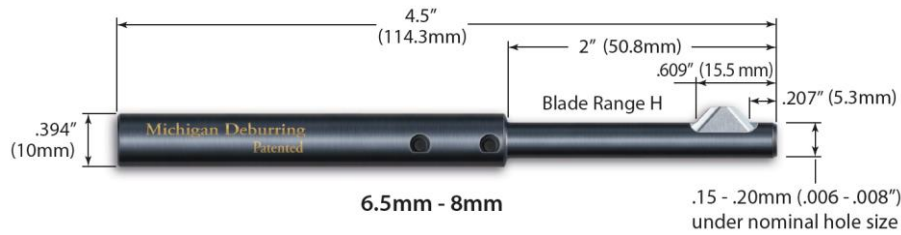
| Working range | | | | Complete Tool Code (Code for pull-only blade) | Components codes | | |
|---------------|------|--------|-------|--|------------------|--------|---|
| mm | | inches | | | Body | Tip | Blade |
| Min | Max | Min | Max | | | | |
| 4.00 | 4.15 | .1560 | .1655 | TF-1560-4545P (TF-1560-R45P) | 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 | |
| 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 | |
| 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



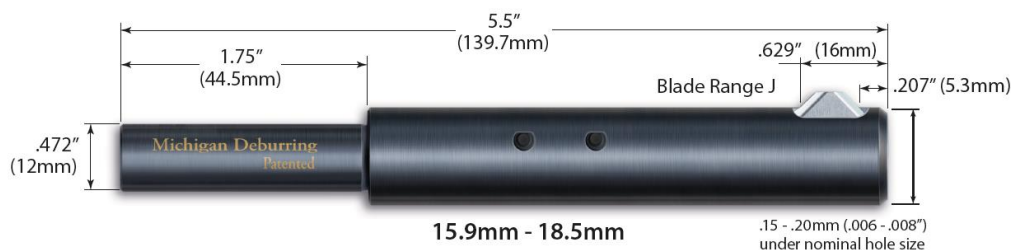
| Size Nominal | Working range | | | | Complete Tool Code (Code for pull-only blade) | Blade |
|-----------------|---------------|-----------|---------------|---------------|--|---|
| | Min mm | Max mm | Min inches | Max inches | | |
| 10.3 | 10.2 | 10.4 | .404 | .410 | TJ-399-103-4545P (TJ-399-103-R45P) | 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



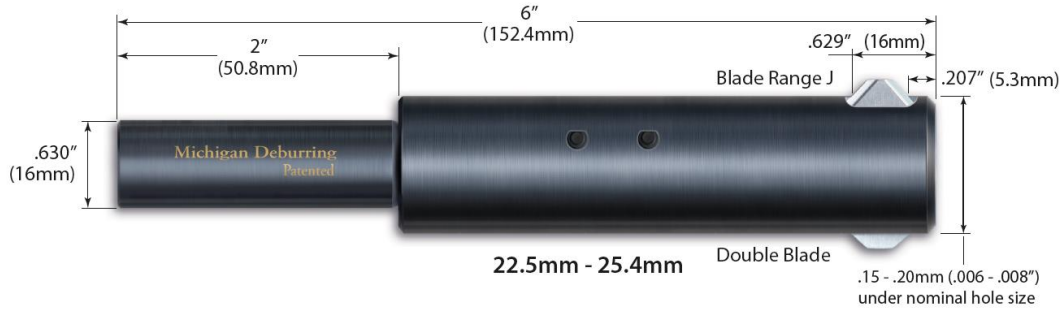
| Size Nominal | Working range | | | | Complete Tool Code (Code for pull-only blade) | Blade |
|--------------|---------------|--------|------------|------------|--|--|
| | Min mm | Max mm | Min inches | Max inches | | |
| 15.9 | 15.8 | 16.3 | .622 | .641 | TJ-617-159-4545P (TJ-617-159-R45P) | BJ4545P (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 the application. Cycle A is used for the majority of applications, while cycle B is recommended for CNC use and in case of high material.

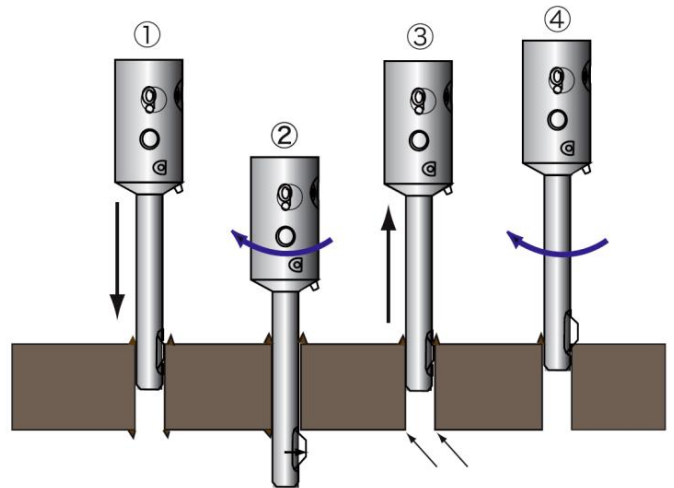
CYCLE A

1. Hole entry in rotation with deburring during push.
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

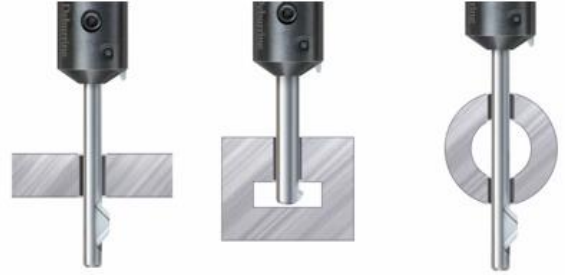
1. Hole entry with stationary spindle.
2. Exit to the other side until the blade is completely open.
Start the rotation and the feed pulling up through the hole with speeds adequate for the hole diameter and material.
Pause the feed for as long as necessary to obtain the desired deburring or chamfer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



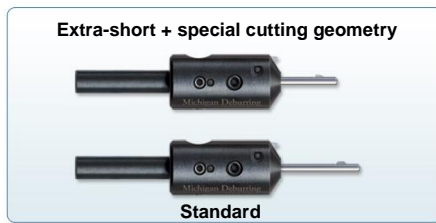
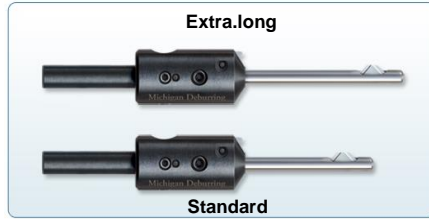
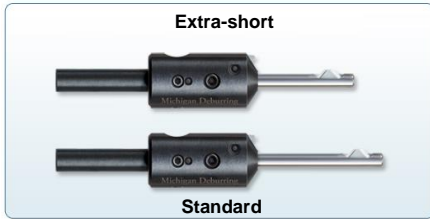
| Material | m/min | mm/rev |
|-------------------|-------|-----------|
| AVP | 23-38 | 0.08-0.25 |
| Aluminum | 27-46 | 0.08-0.20 |
| Cast iron | 12-12 | 0.08-0.25 |
| Low carbon steel | 18-30 | 0.10-0.28 |
| High carbon steel | 14-24 | 0.08-0.25 |
| Stainless steel | 6-12 | 0.08-0.25 |
| Alloyed steel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

SPECIAL TOOLS

Although standard tools can handle most applications, sometimes the part geometry or working condition do not allow their use. Specialty tools can be designed to meet the specific needs of the customer. Possible modifications include:

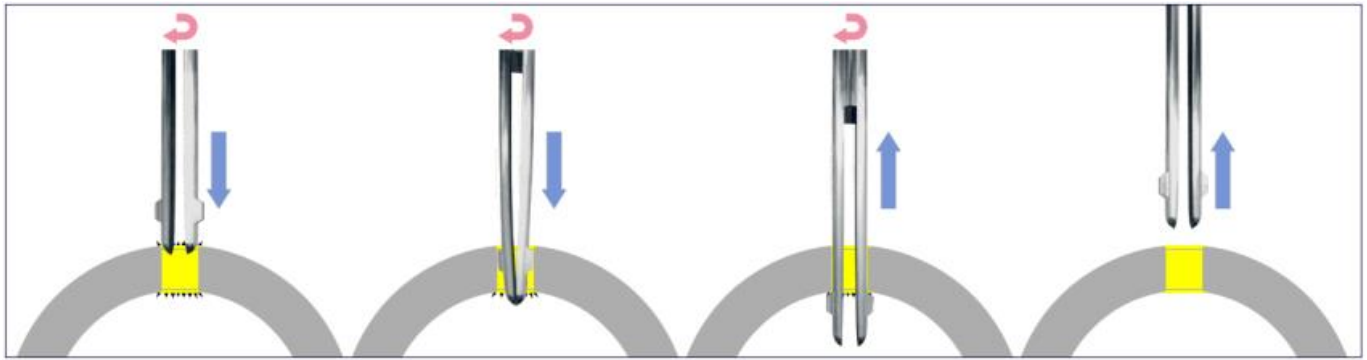


- Tip length (extra-short or extra-long holes)
- Reduced tip projection (tight spaces on the exit side)
- Reduced blade height (presence of shoulders)
- Cutting angle (difficult materials)



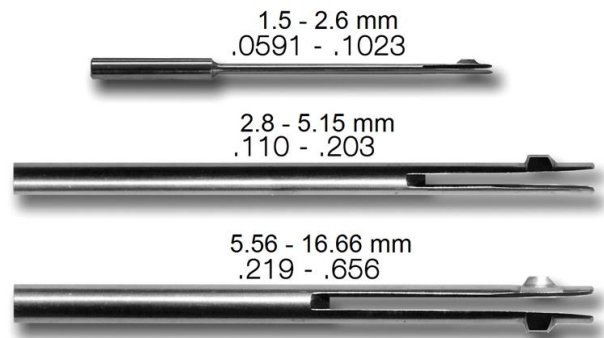
ELASTIC DEBURRING TOOL

*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

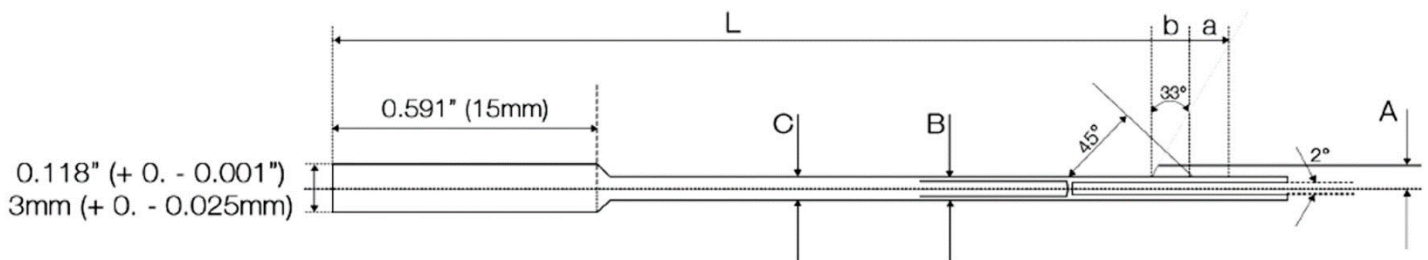
| Hole Ø mm | Rotation rpm | Feed mm/rev |
|--------------|-----------------|----------------|
| 1.5 - 5 | 1500 - 1750 | 0.02 - 0.10 |
| 6 - 9 | 800 - 1000 | 0.02 - 0.15 |
| 10 + | 600 - 650 | 0.05 - 0.20 |



BB-1.5 / BB-6 Single Cutting edge

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

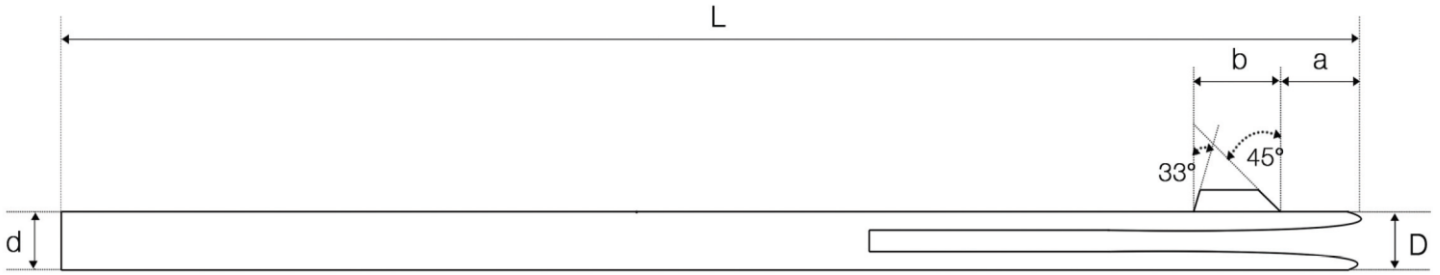
a=2mm (0.079") b=2.5mm (0.098")
a=2mm (0.079") b=3.0mm (0.118")



BB-1.5 - BB-4 a=2mm(0.079") b=2.5mm(0.098")
BB-1.5 - BB-4 a=2mm(0.079") b=3mm(0.118")

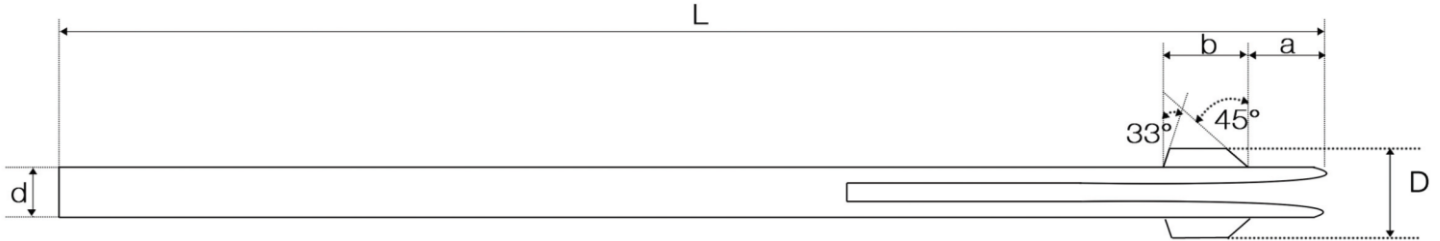
| Tool | Working range | | C - Stem diameter Tolerance +0/-0.1 | | L Total Length | | A | | B | |
|--------|---------------|---------|--|-----|-------------------|----|--------|-----|--------|-----|
| | Inches | mm | Inches | mm | inches | mm | inches | mm | inches | mm |
| BB-1.5 | .0591-.0630 | 1.5-1.6 | .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 | .019 | 0.5 |
| 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 |

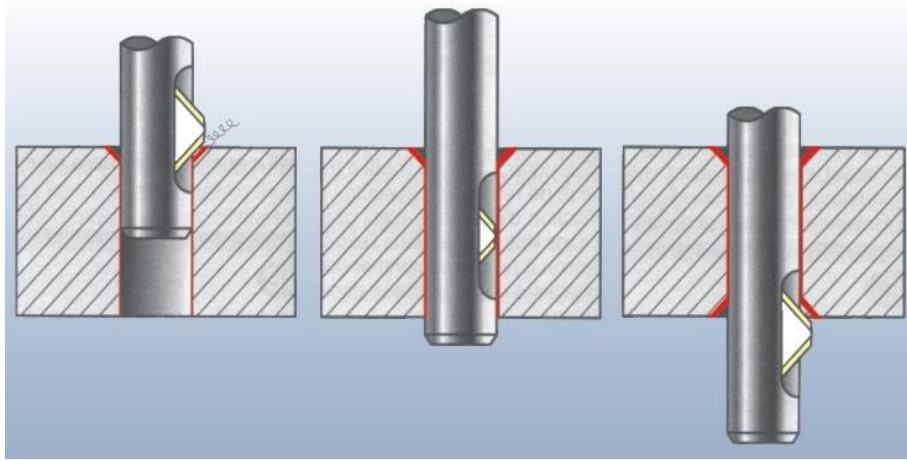
BB-14 / BB-42 Double Cutting edge



| 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 - Beveling - 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

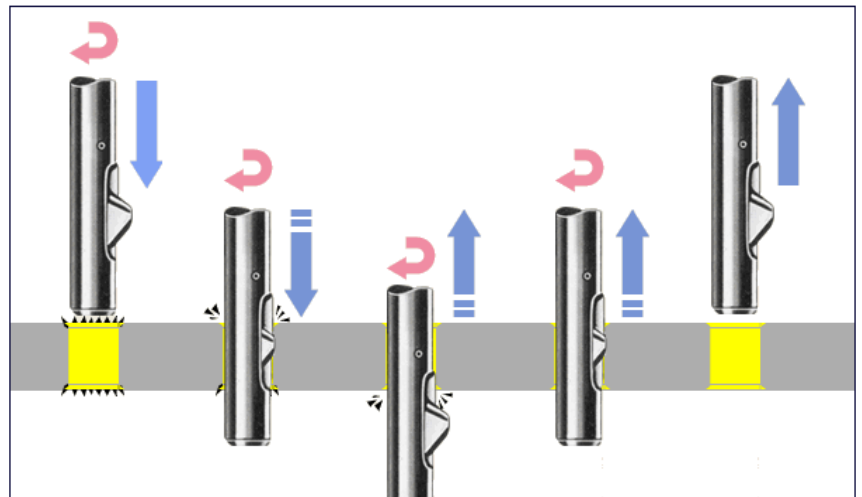


BA

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 |

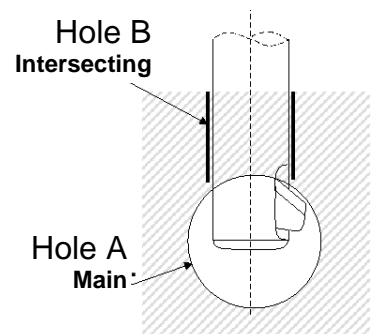
1. Start – Rapid feed
2. Feed as per table above, or waiting time depending on material and desired chamfer size
3. Rapid feed
4. Feed as per table above, or waiting time depending on material and desired chamfer size
5. Rapid feed
6. End



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.

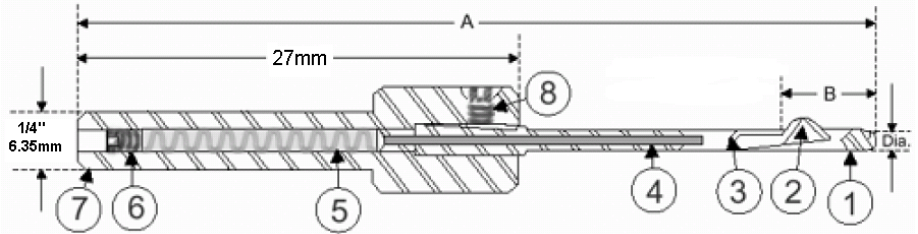
| Dimensional ratio of intersecting holes A / B = | |
|--|----------------|
| >3 | Not possible |
| 3 – 12 | 45° blade |
| 12 + | Standard blade |



TYPE A (TWO-PARTS CONSTRUCTION)

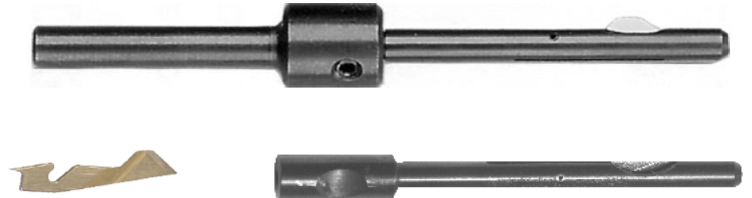
| CODE | HOLE | | DIMENSIONS | | BLADE |
|-------|---------------|-----------|------------|------|-------|
| | Hole Ø inches | Hole Ø mm | A mm | B mm | |
| .0781 | 5/64" | 2.0 | 86 | 11.5 | 3/32 |
| .0938 | 3/32" | 2.4* | | | |
| .0984 | | 2.5 | | | |
| .1094 | 7/64" | 2.8* | | | |
| .1181 | | 3.0 | | | |
| .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



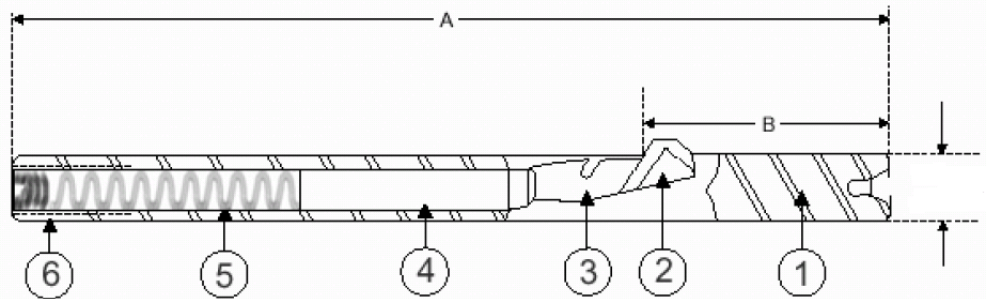
Dia: 0.075 – 0.13mm più piccolo del diametro nominale

- 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* | | | |
| .4331 | | 11.0 | 139.7 | 26.2 | #3-1/2 |
| .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* | 163.6 | 33.3 | #4 |
| .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

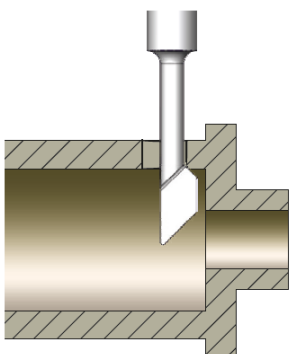
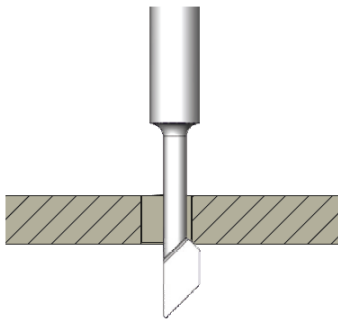
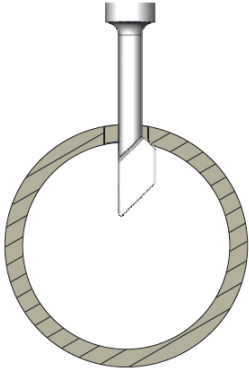
Wide selection of blades

Adjustable working diameter

Fast working cycle

Ideal for use on CNC machines

Deburring of flat or curved profiles



FEATURES

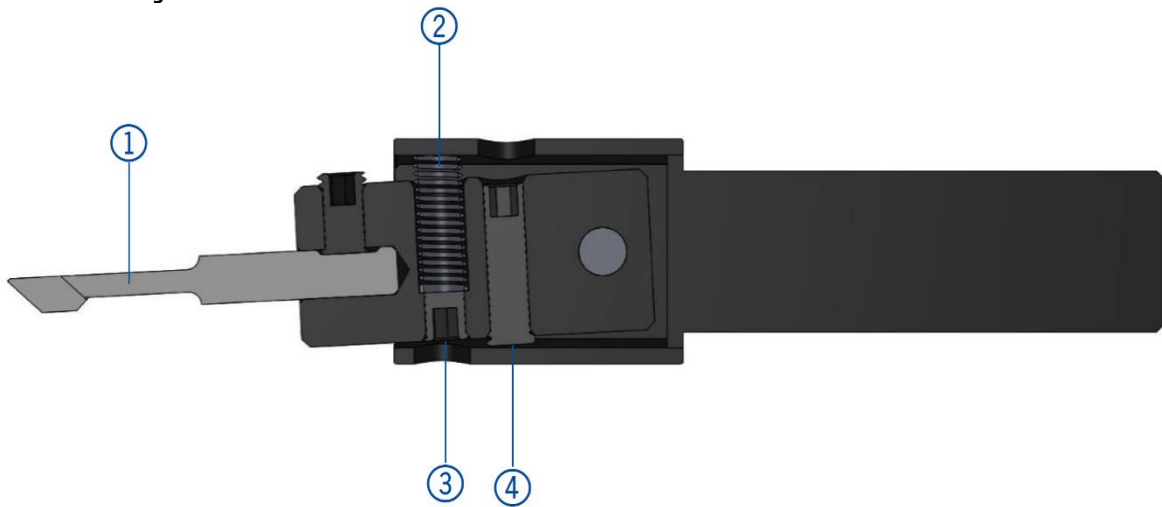
- Suited for deburring holes from $\varnothing 0,80\text{mm}$ to $\varnothing 15,0\text{mm}$
- Different interchangeable blade holders based on the working diameter
- Screw for adjusting the blade offset for fine adjustment of the deburring diameter
- Adjustable deburring force through the selection 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

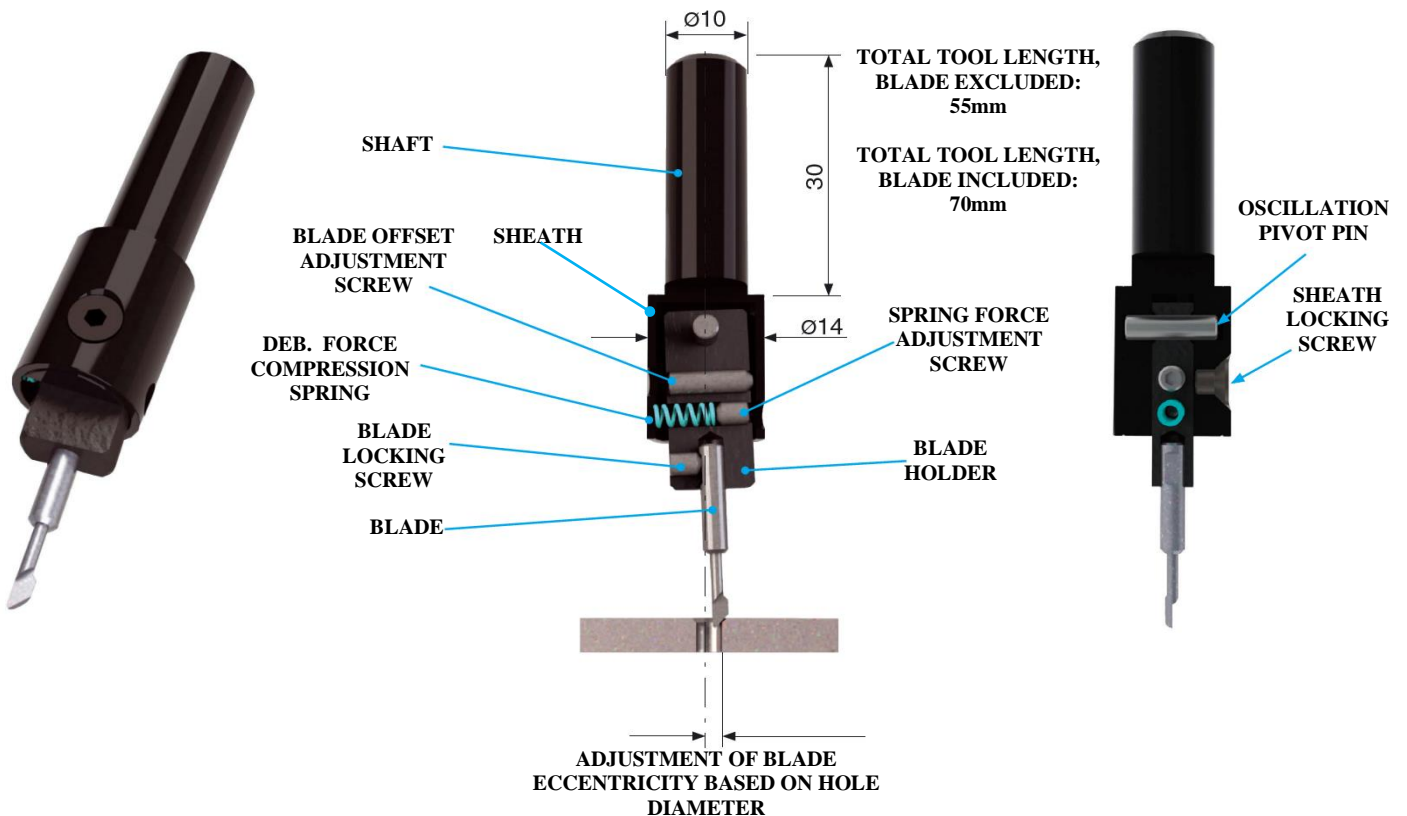
2: Compression spring for adjusting the deburring force

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

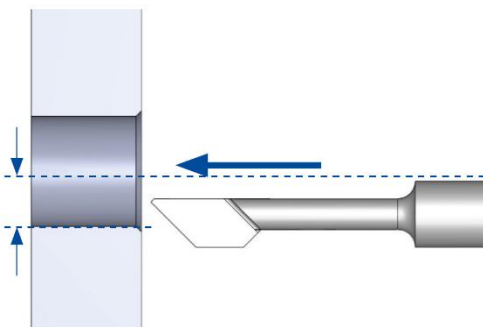
In the GMO tools page on our website (www.tecnimetal-tm.com, products page, GMO) you will find:

- 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)

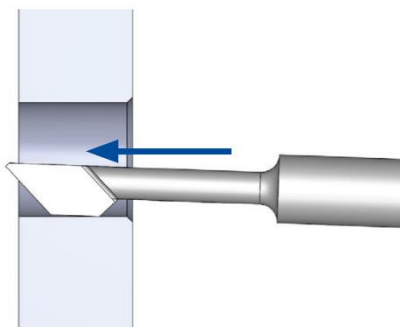
- 1.** Adjust the deburring diameter using adjustment screw 4 for offset regulation.
- 2.** Position the tool at the center of the hole.
- 3.** Tool in rotation, fast feed until complete penetration of the wall.
- 4.** Retract with working feed (F80-F100) to perform deburring.
- 5.** Rapidly retract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

POSITIONING



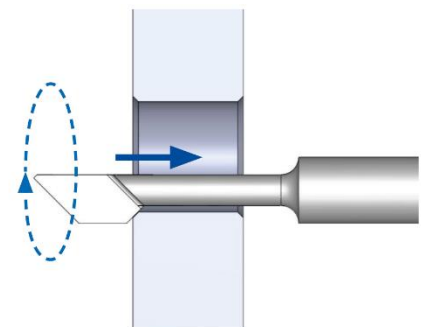
Position the deburring tool in alignment with the center of the hole, and adjust the blade offset with the cutting center aligned with the edge of the hole

PENETRATION



Traverse the hole with the tool in rotation and fast feed F500. In the push-only version, the front and side are rounded to allow rapid passage through the hole without causing damage

DEBURRING



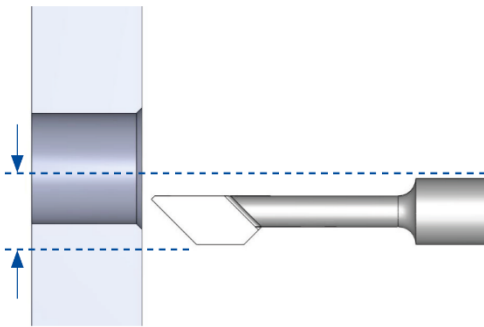
Retract at the working speed, approximately F80-F100 depending on the size of the burr and chamfer desired. After completing deburring, retract quickly from the hole.

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)

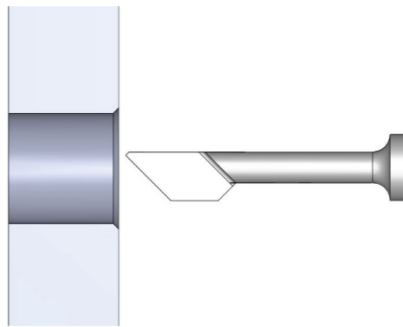
1. Replace the spring with the adjustment screw M3 x 10 mm.
2. Adjust the chamfer diameter by adjusting the screws (ref. 3 and 4). Blade offset, spindle aligned with the hole.
3. Off-axis positioning for hole penetration.
4. Traverse the hole with stationary tool and rapid feed.
5. Re-position the tool 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



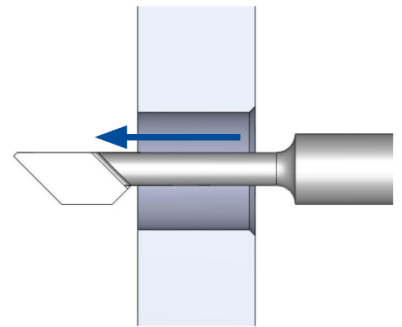
Position the deburring tool aligned with the hole axis, and adjust the blade offset with the cutting center aligned with the edge of the hole.

OFF-AXIS POSITIONING



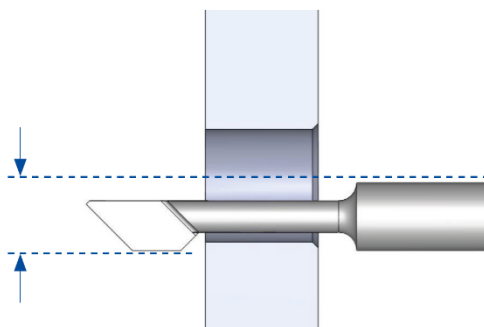
Off-axis positioning to ensure that the blade does not touch the walls of the hole during penetration.

PENETRATION



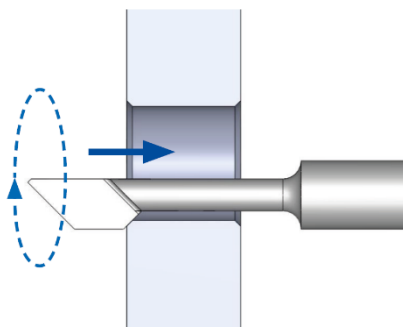
Traverse the hole with stationary tool and rapid feed.

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.

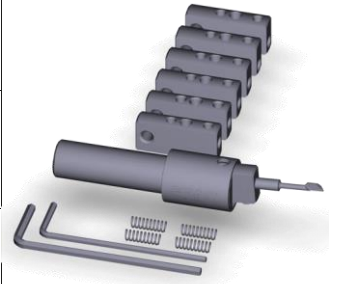
Blade coding examples

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 |

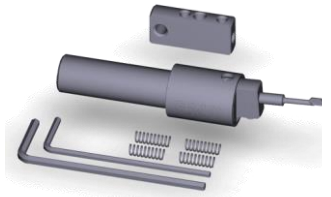
GMO 1 Sets - Deburring tool complete with accessories (blades excluded to be ordered separately)

| 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 |

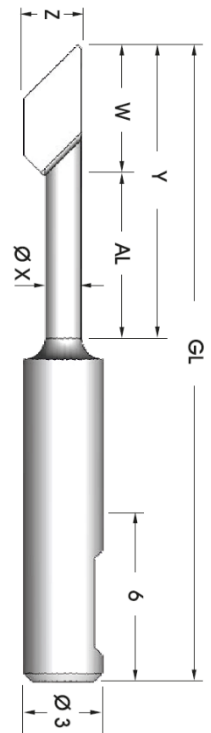


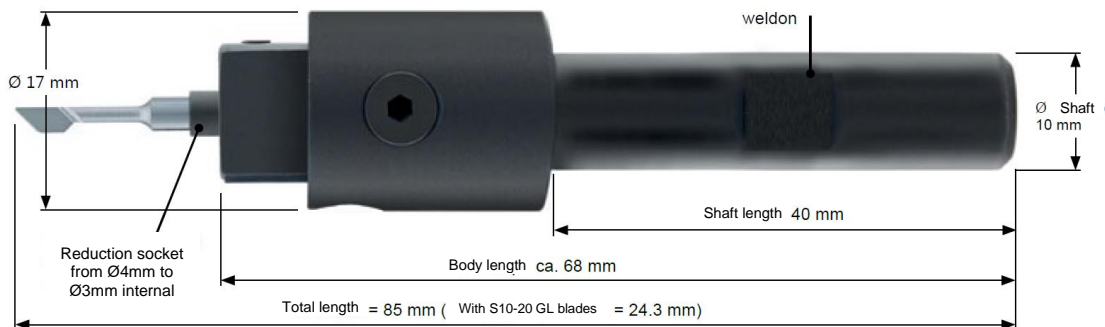
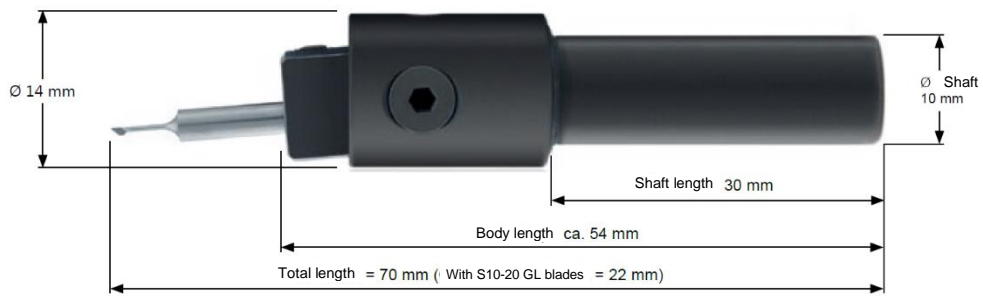
GMO 2 Sets - Deburring tool with single blade holder (specify the GMO-E blade holder in the order, blades excluded to be ordered separately)

| 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 |

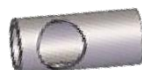
Solo per modello XL



| 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.

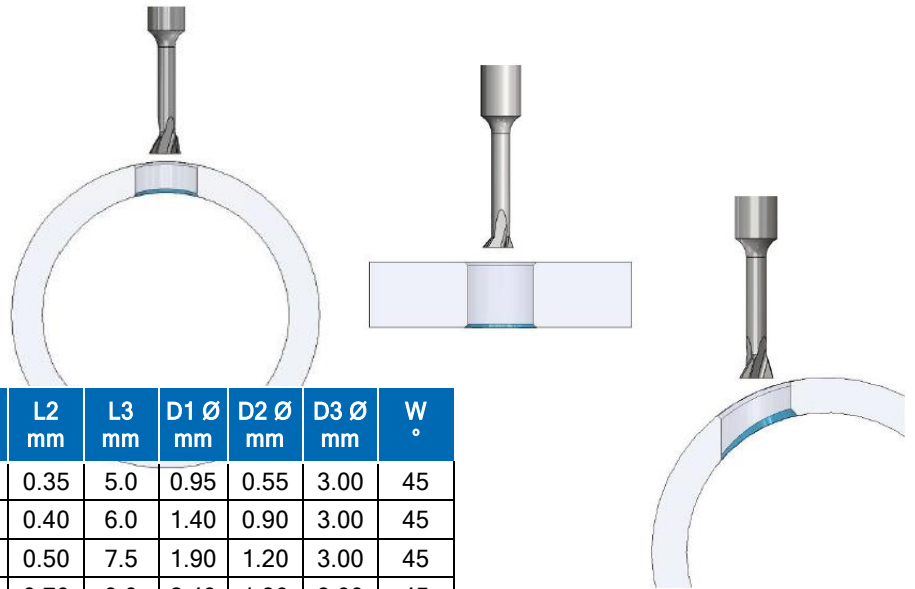
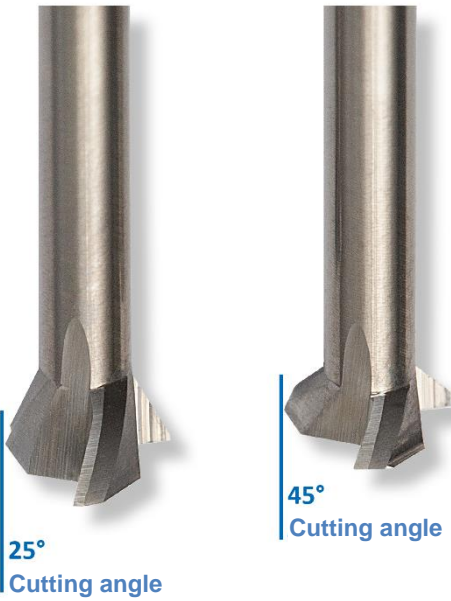
Suitable for deburring curved edges.

High-quality carbide tool with special coating.

Extremely long lifespan.

Can be used for holes from \varnothing 1.0 mm.

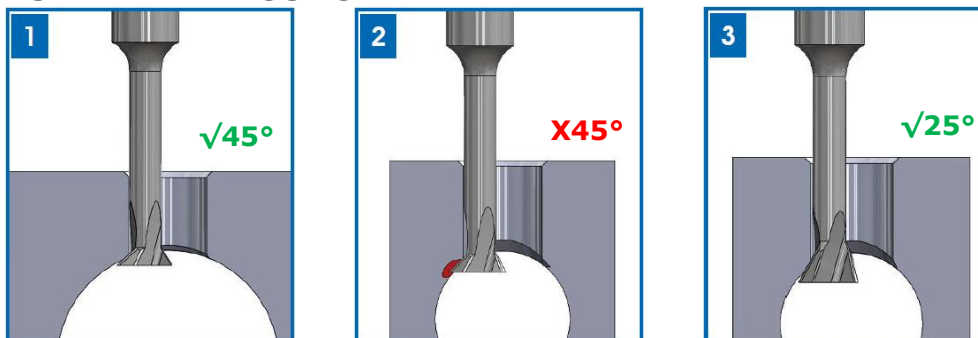
Wide range of sizes



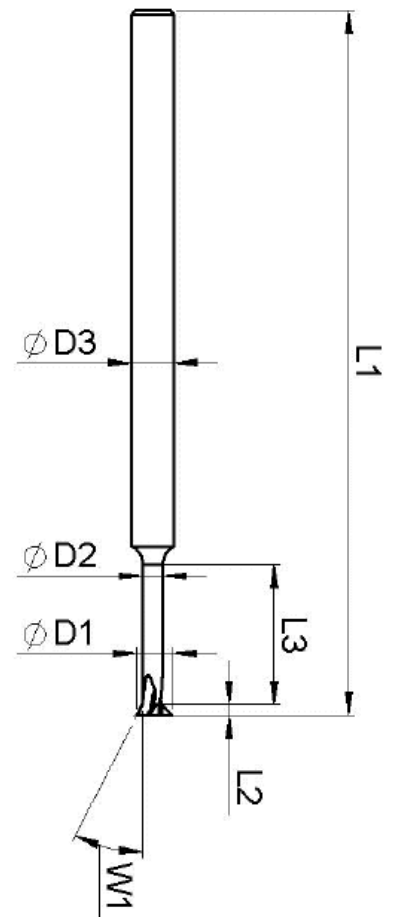
| 45° endmill | Hole \varnothing mm | Hole depth mm | L1 mm | L2 mm | L3 mm | D1 \varnothing mm | D2 \varnothing mm | D3 \varnothing mm | W ° |
|-------------|-----------------------|---------------|-------|-------|-------|---------------------|---------------------|---------------------|-----|
| GMO-EF10 | 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

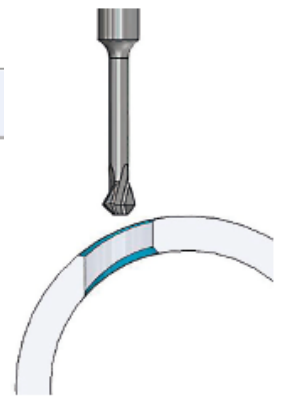
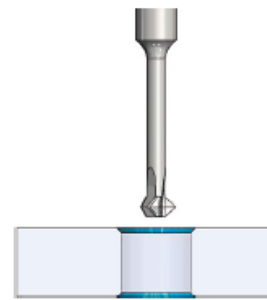
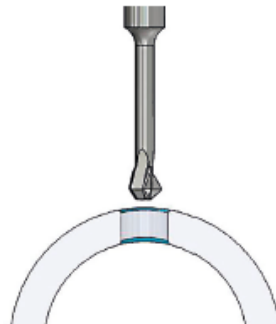
Cutting angles of 45° and 25° ideal for every application.

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.

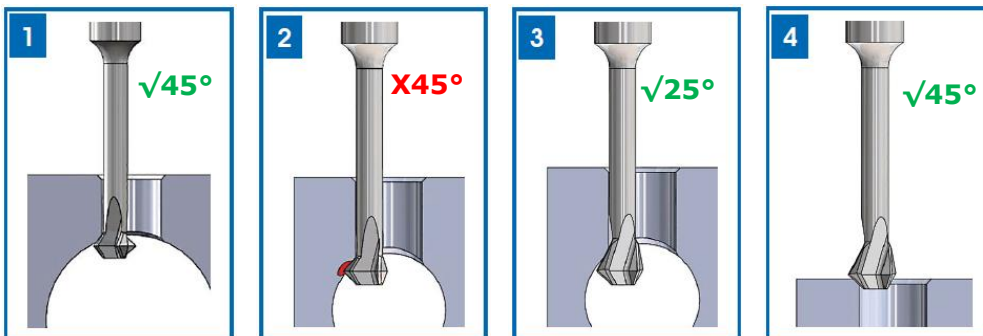
Wide range of sizes



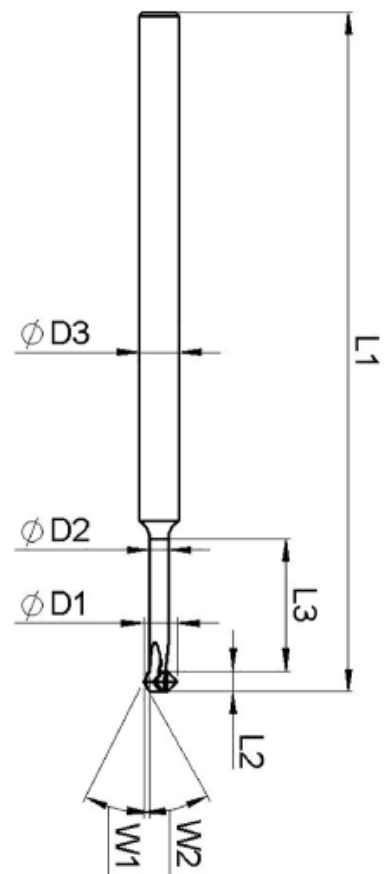
| 45° - 45° endmill | Hole \varnothing mm | Hole depth mm | L1 mm | L2 mm | L3 mm | D1 \varnothing mm | D2 \varnothing mm | D2 \varnothing mm | W1 ° | W2 ° |
|-------------------|-----------------------|---------------|-------|-------|-------|---------------------|---------------------|---------------------|------|------|
| 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

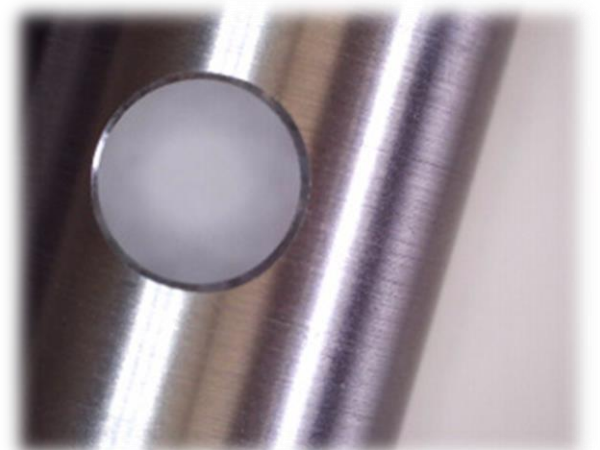
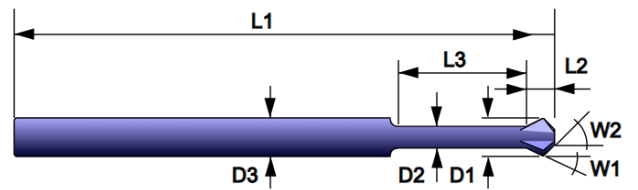
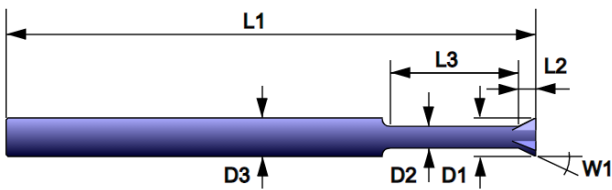


Unfavorable ratio between entry diameter and intersection diameter for the use of the 45° cutter. Risk of collision (red area in the image)



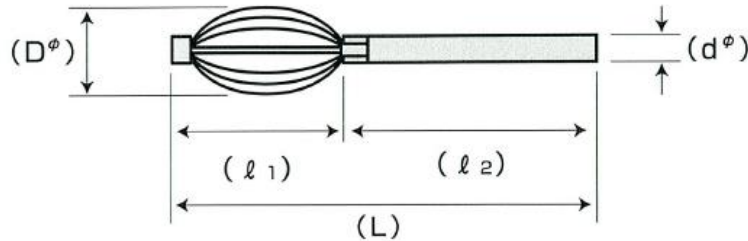
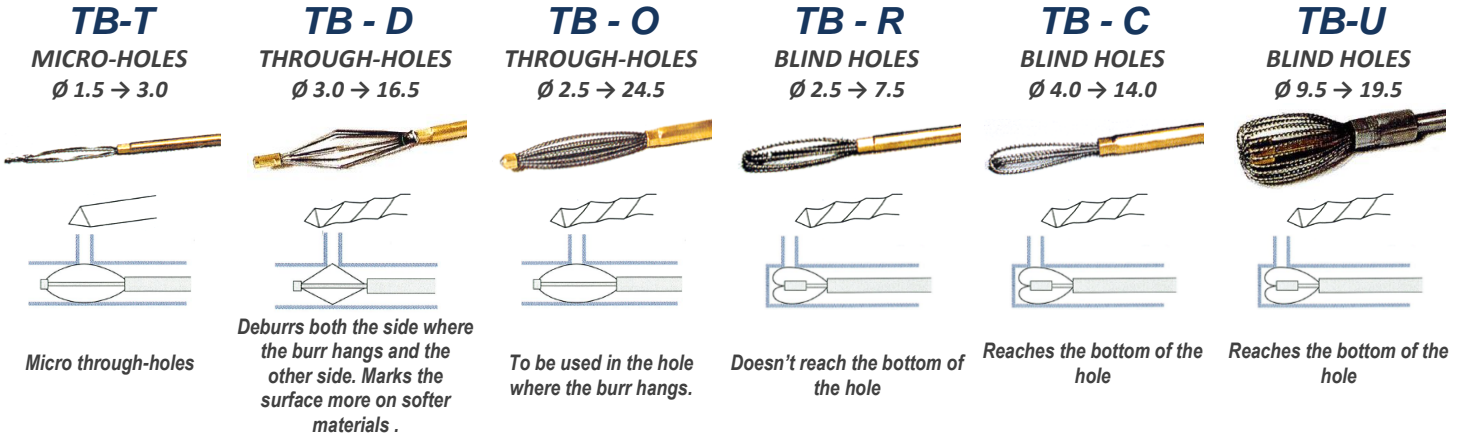
MODELS SUMMARY

| | Code | Hole Ø | 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

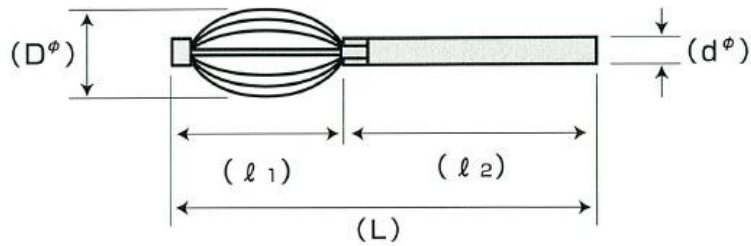
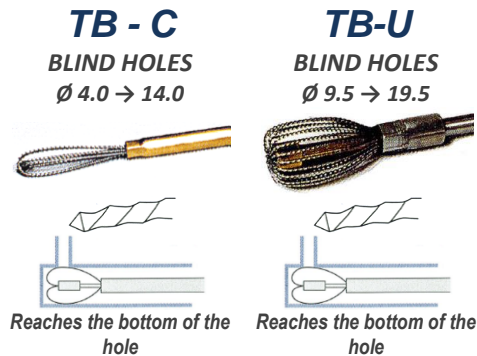


| Hole Ø mm | Code | L | ℓ1 | ℓ2 | dφ | Code | L | ℓ1 | ℓ2 | dφ | Code | L | ℓ1 | ℓ2 | dφ | Code | L | ℓ1 | ℓ2 | dφ | Code | L | ℓ1 | ℓ2 | dφ | | | | |
|-----------------|-------|-----|----|-----|----|--------|-----|----|-----|----|--------|-----|----|-----|----|-------|-----|----|-----|--------|--------|-----|-----|-----|--------|-----|----|-----|---|
| 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 | | | | | | | | | | | | | | |
| 10,0 | | | | | | | | | | | | | | | | | | | | | TBU100 | 140 | 40 | 100 | 6 | | | | |
| 10,5 | | | | | | TBD110 | 140 | 40 | 100 | 6 | TBO110 | 140 | 40 | 100 | 6 | | | | | TBC110 | 135 | 35 | 100 | 6 | TBU105 | 140 | 40 | 100 | 6 |
| 11,0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11,5 | | | | | | TBD120 | 140 | 40 | 100 | 6 | TBO120 | 140 | 40 | 100 | 6 | | | | | TBC120 | 135 | 35 | 100 | 6 | TBU115 | 140 | 40 | 100 | 6 |
| 12,0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12,5 | | | | | | TBD130 | 150 | 50 | 100 | 6 | TBO130 | 145 | 45 | 100 | 6 | | | | | TBC130 | 140 | 40 | 100 | 6 | TBU125 | 140 | 40 | 100 | 6 |
| 13,0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13,5 | | | | | | TBD140 | 150 | 50 | 100 | 6 | TBO140 | 145 | 45 | 100 | 6 | | | | | TBC140 | 140 | 40 | 100 | 6 | TBU135 | 140 | 40 | 100 | 6 |
| 14,0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14,5 | | | | | | TBD150 | 150 | 50 | 100 | 6 | TBO150 | 150 | 50 | 100 | 60 | | | | | TBC150 | 140 | 40 | 100 | 6 | TBU145 | 140 | 40 | 100 | 6 |
| 15,0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15,5 | | | | | | TBD160 | 150 | 50 | 100 | 6 | TBO160 | 150 | 50 | 100 | 60 | | | | | | | | | | | | | | |
| 16,5 | | | | | | TBD170 | 150 | 50 | 100 | 6 | | | | | | | | | | | | | | | | | | | |
| 17,5 | | | | | | | | | | | TBO180 | 150 | 50 | 100 | 60 | | | | | | | | | | | | | | |
| 19,5 | | | | | | | | | | | TBO200 | 150 | 50 | 100 | 60 | | | | | | | | | | | | | | |
| 24,5 | | | | | | | | | | | TBO250 | 150 | 50 | 100 | 60 | | | | | | | | | | | | | | |

* Available in special sizes and lengths upon request

TB L - XL DEBURRING TOOLS

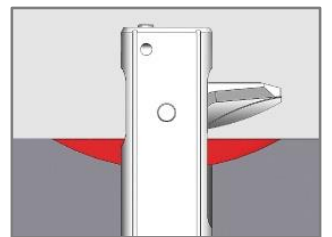
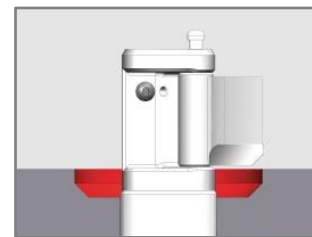
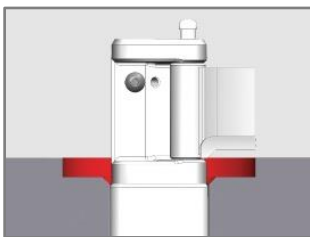
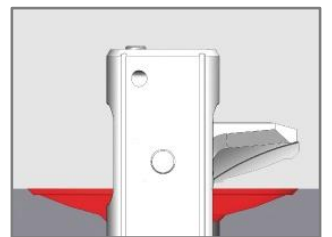
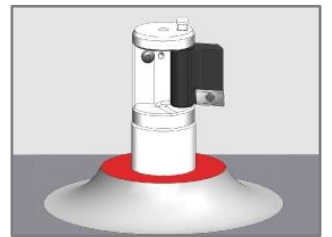
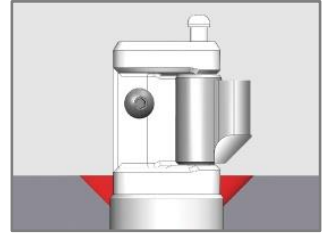
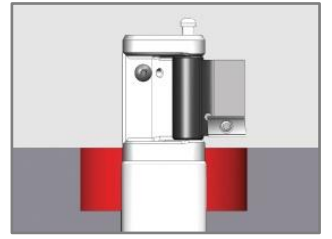
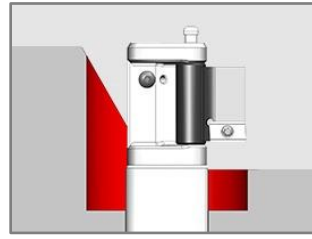
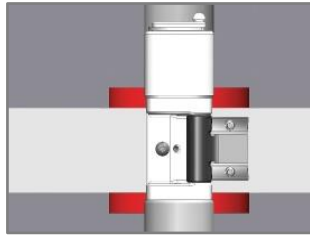
The TB deburring tools are particularly effective in the presence of hanging burrs, where the use of normal brushes does not always ensure the removal of the burr, or the brushes do not have a satisfactory lifespan. ~800rpm up to Ø10mm - 500rpm from 10.5 to 25mm - with or without lubricant



| Ø Hole mm | Cod. | L | ℓ1 | ℓ2 | dφ | Cod. | L | ℓ1 | ℓ2 | dφ | Ø Hole mm | L | ℓ1 | ℓ2 | dφ | Cod. | L | ℓ1 | ℓ2 | dφ | |
|-----------|---------|-----|----|-----|----|----------|-----|----|-----|----|-----------|-----|----|-----|----|-----------|-----|----|-----|----|--|
| 5,5 | TBC60-L | 220 | 30 | 250 | 4 | | | | | | | | | | | | | | | | |
| 6,0 | TBC70-L | 220 | 30 | 250 | 5 | TBC70-XL | 480 | 30 | 450 | 5 | | | | | | | | | | | |
| 6,5 | TBC75-L | 220 | 30 | 250 | 5 | TBC75-XL | 480 | 30 | 450 | 5 | | | | | | | | | | | |
| 7,0 | TBC80-L | 220 | 30 | 250 | 5 | TBC80-XL | 480 | 30 | 450 | 5 | | | | | | | | | | | |
| 7,5 | TBC85-L | 220 | 30 | 250 | 6 | TBC85-XL | 480 | 30 | 450 | 6 | | | | | | | | | | | |
| 8,0 | TBC90-L | 220 | 30 | 250 | 6 | TBC90-XL | 480 | 30 | 450 | 6 | | | | | | | | | | | |
| 8,5 | TBC95-L | 220 | 35 | 255 | 6 | TBC95-XL | 485 | 35 | 450 | 6 | | | | | | | | | | | |
| 9,0-9,5 | | | | | | | | | | | TBU100-L | 220 | 40 | 260 | 6 | TBU100-XL | 490 | 40 | 450 | 6 | |
| 10,0 | | | | | | | | | | | TBU105-L | 220 | 40 | 260 | 6 | TBU105-XL | 490 | 40 | 450 | 6 | |
| 10,5 | | | | | | | | | | | TBU110-L | 220 | 40 | 260 | 6 | TBU110-XL | 490 | 40 | 450 | 6 | |
| 11,0 | | | | | | | | | | | TBU120-L | 220 | 40 | 260 | 6 | TBU120-XL | 490 | 40 | 450 | 6 | |
| 12,0 | | | | | | | | | | | TBU130-L | 220 | 40 | 260 | 6 | TBU130-XL | 490 | 40 | 450 | 6 | |
| 13,0 | | | | | | | | | | | TBU140-L | 220 | 40 | 260 | 6 | TBU140-XL | 490 | 40 | 450 | 6 | |
| 14,0 | | | | | | | | | | | TBU150-L | 220 | 40 | 260 | 6 | TBU150-XL | 490 | 40 | 450 | 6 | |
| 15,0 | | | | | | | | | | | TBU160-L | 220 | 50 | 270 | 6 | TBU160-XL | 500 | 50 | 450 | 6 | |
| 17,0 | | | | | | | | | | | TBU180-L | 220 | 50 | 270 | 6 | TBU180-XL | 500 | 50 | 450 | 6 | |
| 19,0 | | | | | | | | | | | TBU200-L | 220 | 50 | 270 | 6 | TBU200-XL | 500 | 50 | 450 | 6 | |
| 20,0-21,0 | | | | | | | | | | | TBU220-L | 220 | 50 | 270 | 6 | TBU220-XL | 500 | 50 | 450 | 6 | |

* Available in special sizes and lengths upon request

BACK COUNTERBORING



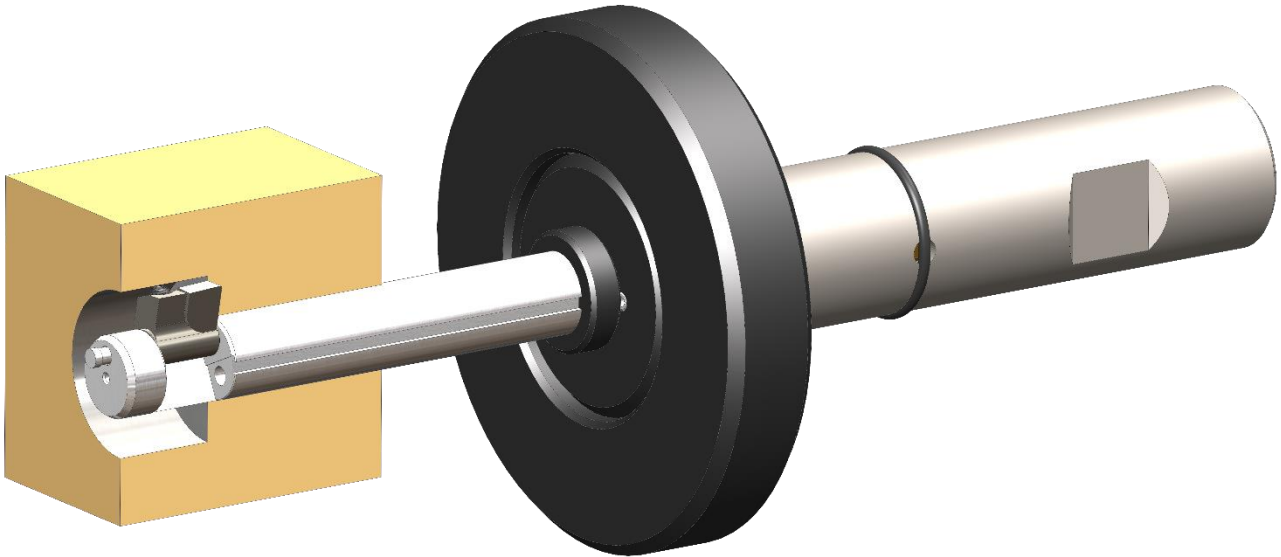
STEINER
INGENIOUS CUTTING TOOLS



Inertial Back counterboring tools

Standard models

High reliability – Reduced delivery time



INERTIAL FLYWHEEL

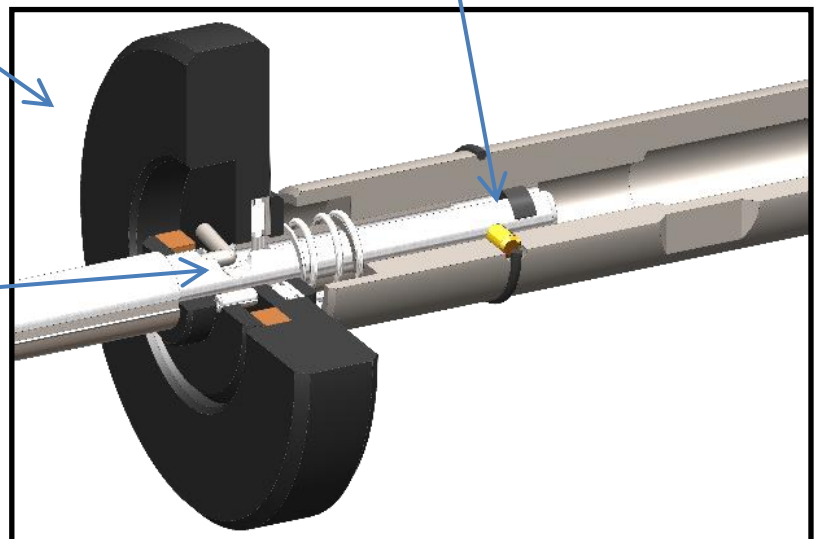
The opening/closing of the blade is operated by a mechanism that holds it in position. This way, even interrupted cutting applications are not a problem

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

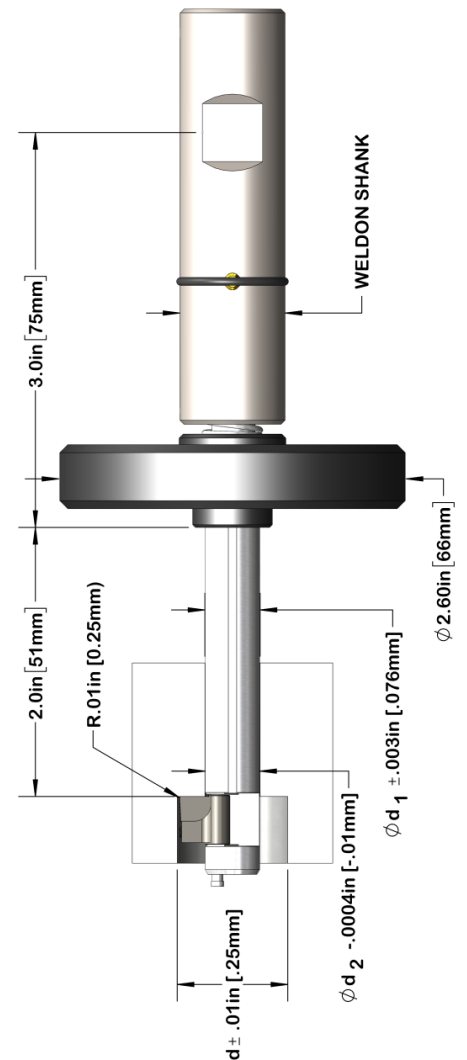
SPARE PARTS KIT

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



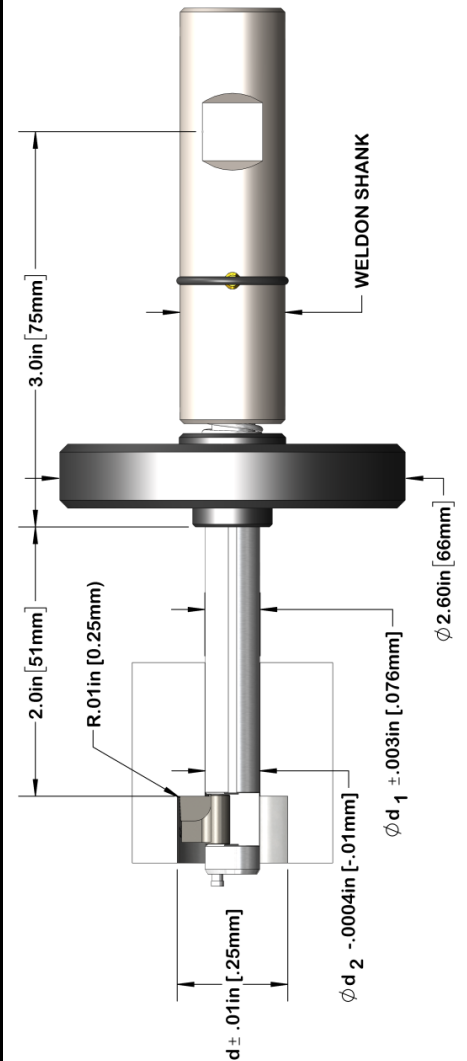
Ø 9.5mm(.375") – 15.5mm(.610") counterbore

| 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 | | | | |



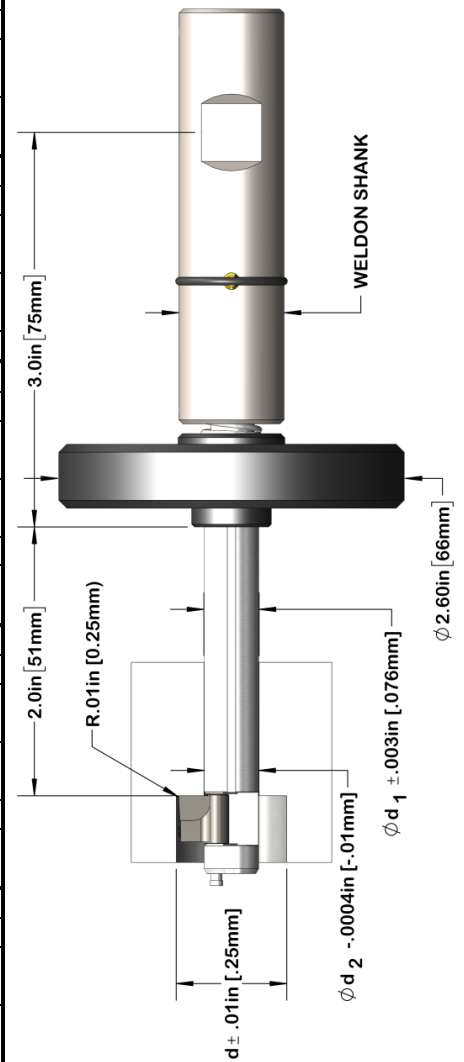
Ø 16mm(.630") – 20mm(.787") counterbore

| 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 | |
| 14.0 | .551 | 13.9 | .546 | AF53-14.00M | CB53-19.50M | | | |
| 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 |



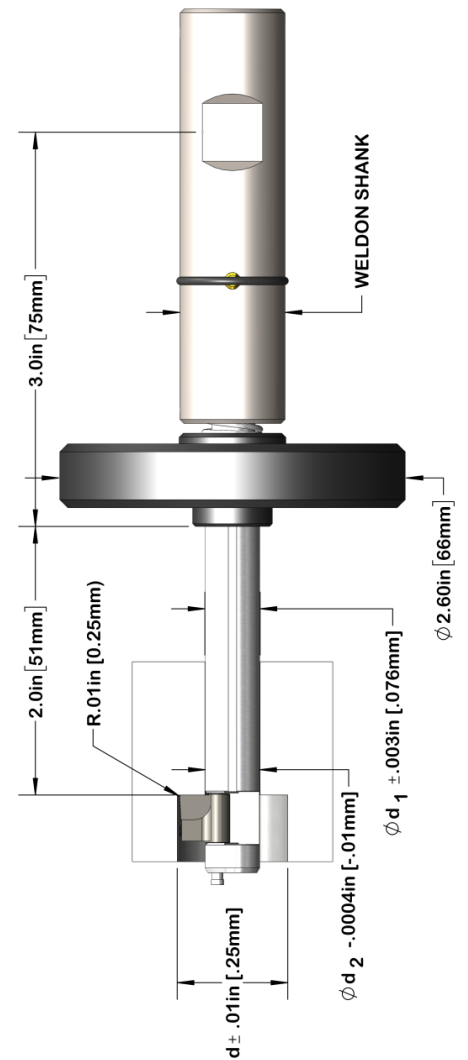
Ø 20.5mm(.807") – 23.5mm(.925") counterbore

| 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 | CB47-21.50M |
| | | 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 | CB47-22.00M | |
| 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 | CB47-22.50M | |
| | | 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 | CB47-23.00M | |
| 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 | CB47-23.50M |
| | | 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 | | | | |



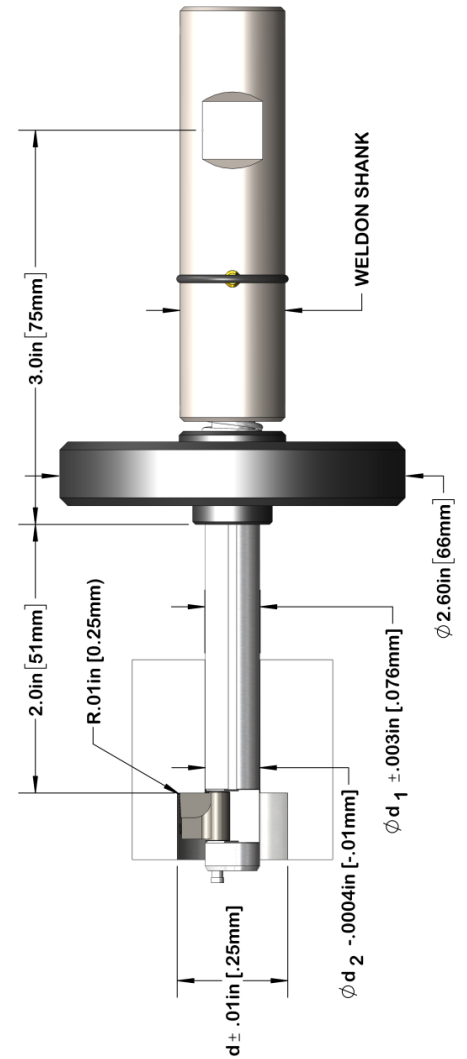
Ø 24.0mm(.945") – 27.5mm(.1.083") counterbore

| 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 | | 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 | |
| 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 | | AF50-13.00M | |
| | | 13.5 | .531 | 13.4 | .526 | | AF53-13.50M | CB53-24.00M |
| | | 14.0 | .551 | 13.9 | .546 | | AF53-14.00M | |
| | | 14.5 | .571 | 14.4 | .566 | | AF56-14.50M | CB56-24.00M |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-24.00M |
| | | 15.5 | .610 | 15.4 | .605 | | AF59-15.50M | |
| 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 | | AF50-13.00M | |
| | | 13.5 | .531 | 13.4 | .526 | | AF53-13.50M | CB53-25.00M |
| | | 14.0 | .551 | 13.9 | .546 | | AF53-14.00M | |
| | | 14.5 | .571 | 14.4 | .566 | | AF56-14.50M | CB56-25.00M |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-25.00M |
| | | 15.5 | .610 | 15.4 | .605 | | AF59-15.50M | |
| 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 | | AF50-13.00M | |
| | | 13.5 | .531 | 13.4 | .526 | | AF53-13.50M | CB53-25.50M |
| | | 14.0 | .551 | 13.9 | .546 | | AF53-14.00M | |
| | | 14.5 | .571 | 14.4 | .566 | | AF56-14.50M | CB56-25.50M |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-25.50M |
| | | 15.5 | .610 | 15.4 | .605 | | AF59-15.50M | |
| 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 | CB53-26.00M |
| | | 13.5 | .531 | 13.4 | .526 | | AF53-13.50M | |
| | | 14.0 | .551 | 13.9 | .546 | | AF53-14.00M | CB56-26.00M |
| | | 14.5 | .571 | 14.4 | .566 | | AF56-14.50M | |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-26.00M |
| 15.5 | .610 | 15.4 | .605 | AF59-15.50M | | | | |
| 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 | CB53-26.50M |
| | | 13.5 | .531 | 13.4 | .526 | | AF53-13.50M | |
| | | 14.0 | .551 | 13.9 | .546 | | AF53-14.00M | CB56-26.50M |
| | | 14.5 | .571 | 14.4 | .566 | | AF56-14.50M | |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-26.50M |
| 15.5 | .610 | 15.4 | .605 | AF59-15.50M | | | | |
| 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 | CB53-27.00M |
| | | 13.5 | .531 | 13.4 | .526 | | AF53-13.50M | |
| | | 14.0 | .551 | 13.9 | .546 | | AF53-14.00M | CB56-27.00M |
| | | 14.5 | .571 | 14.4 | .566 | | AF56-14.50M | |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-27.00M |
| 15.5 | .610 | 15.4 | .605 | AF59-15.50M | | | | |
| 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 | CB53-27.50M |
| | | 13.5 | .531 | 13.4 | .526 | | AF53-13.50M | |
| | | 14.0 | .551 | 13.9 | .546 | | AF53-14.00M | CB56-27.50M |
| | | 14.5 | .571 | 14.4 | .566 | | AF56-14.50M | |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-27.50M |
| 15.5 | .610 | 15.4 | .605 | AF59-15.50M | | | | |



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 | |
| | | | | | | | | |
| 29.0 | 1.142 | 13.5 | .531 | 13.4 | .526 | 20 | AF53-13.50M | CB53-29.00M |
| | | 14.0 | .551 | 13.9 | .546 | | AF53-14.00M | |
| | | 14.5 | .571 | 14.4 | .566 | | 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 | |
| 29.5 | 1.161 | 14.5 | .571 | 14.4 | .566 | 20 | AF56-14.50M | CB56-29.50M |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-29.50M |
| | | 15.5 | .610 | 15.4 | .605 | | AF59-15.50M | |
| 30.0 | 1.181 | 14.5 | .571 | 14.4 | .566 | 20 | AF56-14.50M | CB56-30.00M |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-30.00M |
| | | 15.5 | .610 | 15.4 | .605 | | AF59-15.50M | |
| 30.5 | 1.201 | 14.5 | .571 | 14.4 | .566 | 20 | AF56-14.50M | CB56-30.50M |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-30.50M |
| | | 15.5 | .610 | 15.4 | .605 | | AF59-15.50M | |
| 31.0 | 1.220 | 14.5 | .571 | 14.4 | .566 | 20 | AF56-14.50M | CB56-31.00M |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-31.00M |
| | | 15.5 | .610 | 15.4 | .605 | | AF59-15.50M | |
| 31.5 | 1.240 | 14.5 | .571 | 14.4 | .566 | 20 | AF56-14.50M | CB56-31.50M |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-31.50M |
| | | 15.5 | .610 | 15.4 | .605 | | AF59-15.50M | |
| 32.0 | 1.260 | 14.5 | .571 | 14.4 | .566 | 20 | AF56-14.50M | CB56-32.00M |
| | | 15.0 | .591 | 14.9 | .585 | | AF59-15.00M | CB59-32.00M |
| | | 15.5 | .610 | 15.4 | .605 | | AF59-15.50M | |
| 32.5 | 1.280 | 15.0 | .591 | 14.9 | .585 | 20 | AF59-15.00M | CB59-32.50M |
| | | 15.5 | .610 | 15.4 | .605 | | AF59-15.50M | |
| 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 | |



Spare parts kits

Include:

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

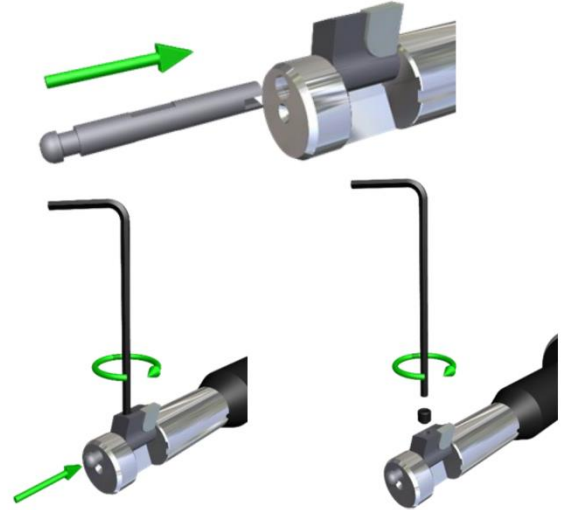
| Kit code | Tool size | Safety pin code |
|-------------|-----------|-----------------|
| SPK-AF25 | 25 | 203020-02 |
| SPK-AF28 | 28 | 203020-02 |
| SPK-AF31-34 | 31, 34 | 203020-02 |
| SPK-AF38-40 | 38, 40 | 204020-02 |
| SPK-AF44-47 | 44, 47 | 204020-02 |
| SPK-AF50-53 | 50, 53 | 205020-02 |
| SPK-AF56-59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



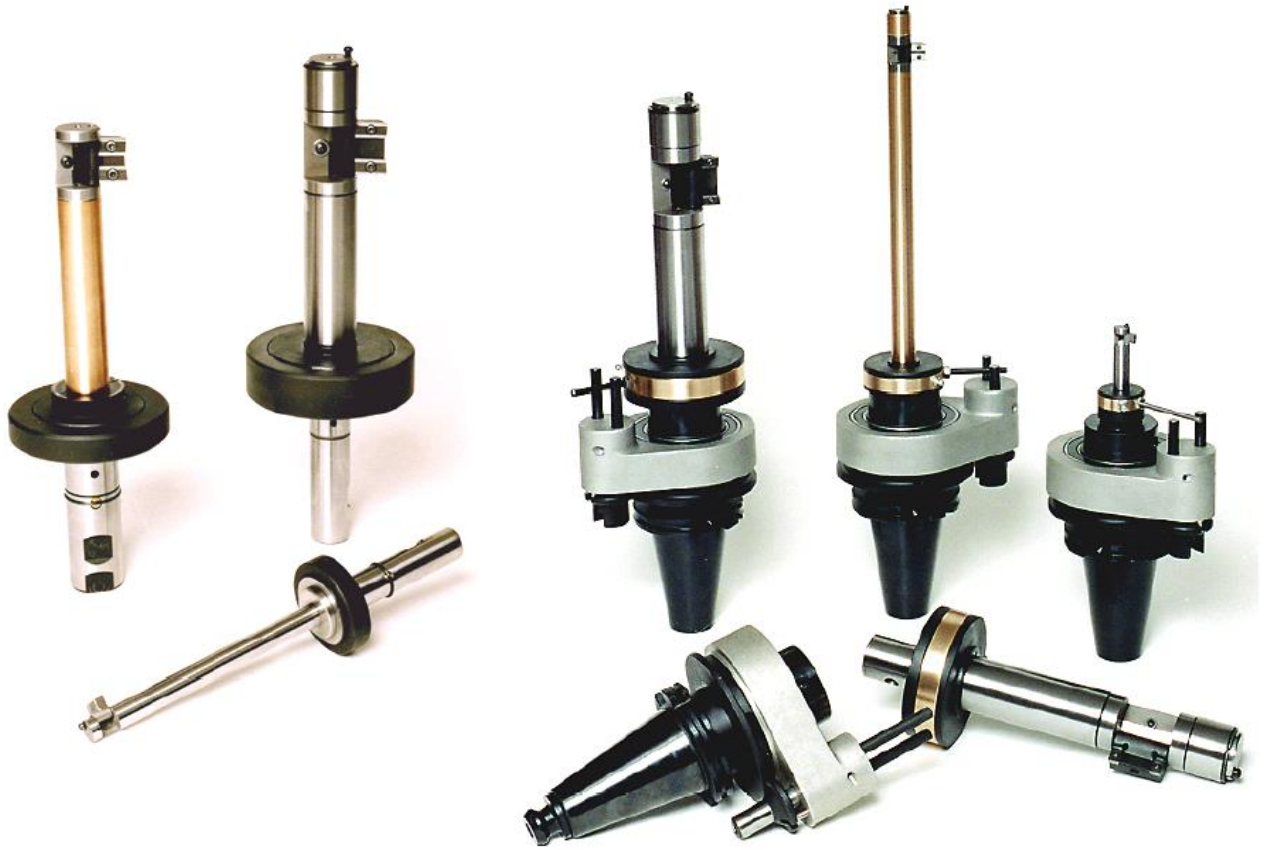
Verification: To check that the set screw is positioned on the flat reference, slightly loosen the set screw and try to pull out the pin. If positioned correctly, the pin should not come out but should slide slightly and then lock in place.

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.

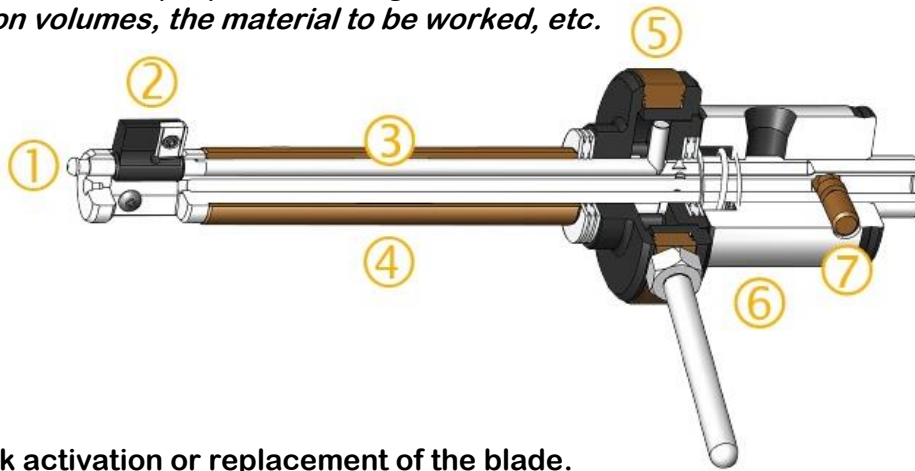
*We can provide special tools
for your specific application*

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.



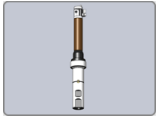
1. Blade pin: Quick activation or replacement of the blade.
2. Blade: With insert or brazed, different grades and coatings depending on the application (including PCD)
3. Coolant through spindle: available for tools with shaft diameter $\geq 16\text{mm}$
4. Shaft: Guides and supports the tool during 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



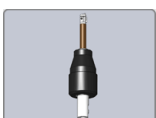
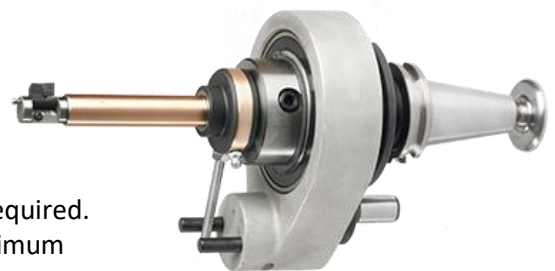
PAD ACTIVATION

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

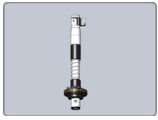
For the opening/closing, an anti-rotation system for the actuation rod is required.
A highly reliable system used for high-volume productions where the maximum level of reliability is required.
Equipped with a safety pin in the shank to safeguard the tool



AIR/COOLANT ACTIVATION

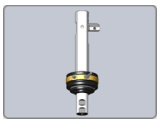
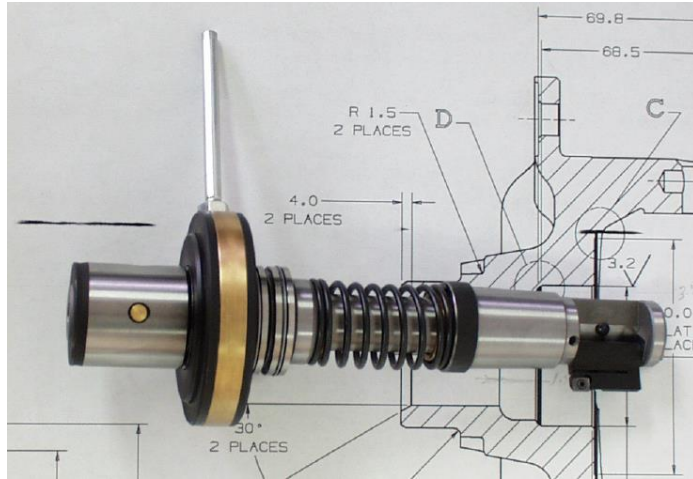
The pressure of the coolant or air opens the blade.
The blade closure is entrusted to a spring system.
Very easy to program.
Requires filtration of at least 10 microns.
Note: It does not have a safety pin.





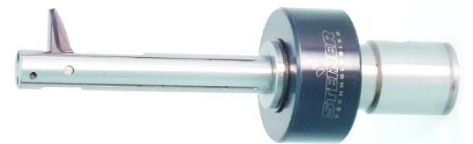
GUIDE BEARING

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

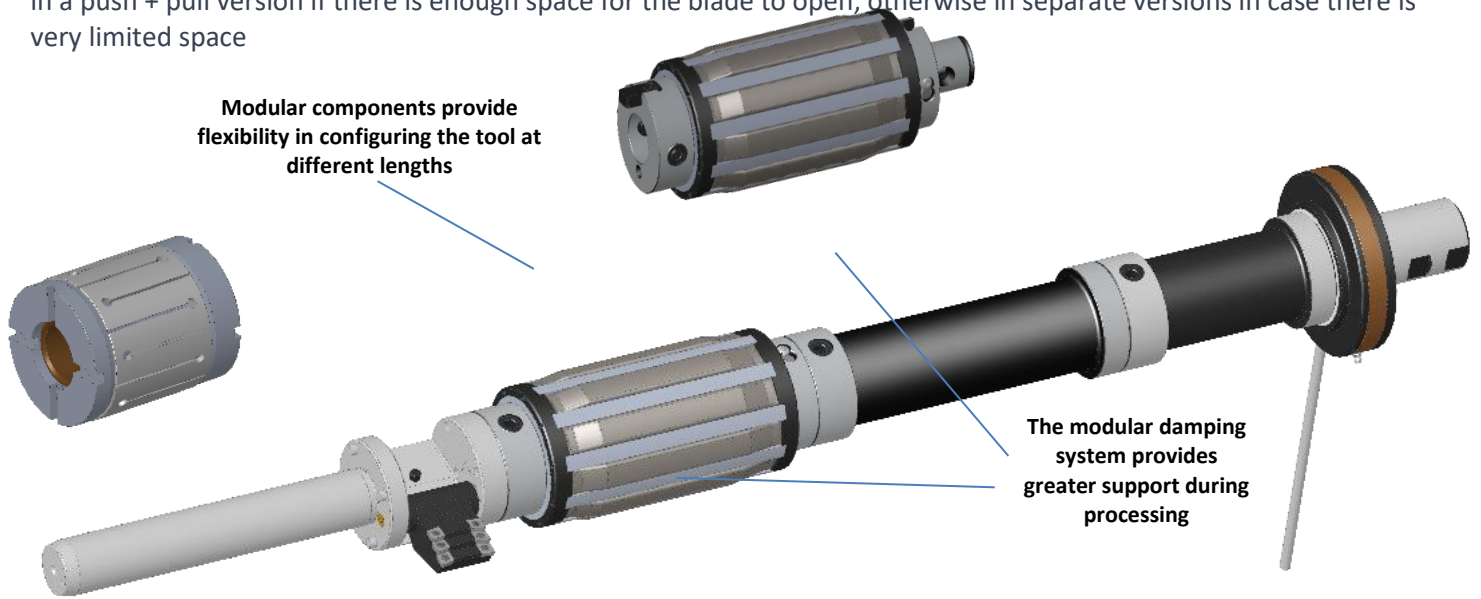
Gearboxes
Submarine components
Engine blocks, Ballasts, Manifolds
PUMPS AND VALVES
Pump housings
Valve seats, Valve bodies
Impellers and rotors

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.

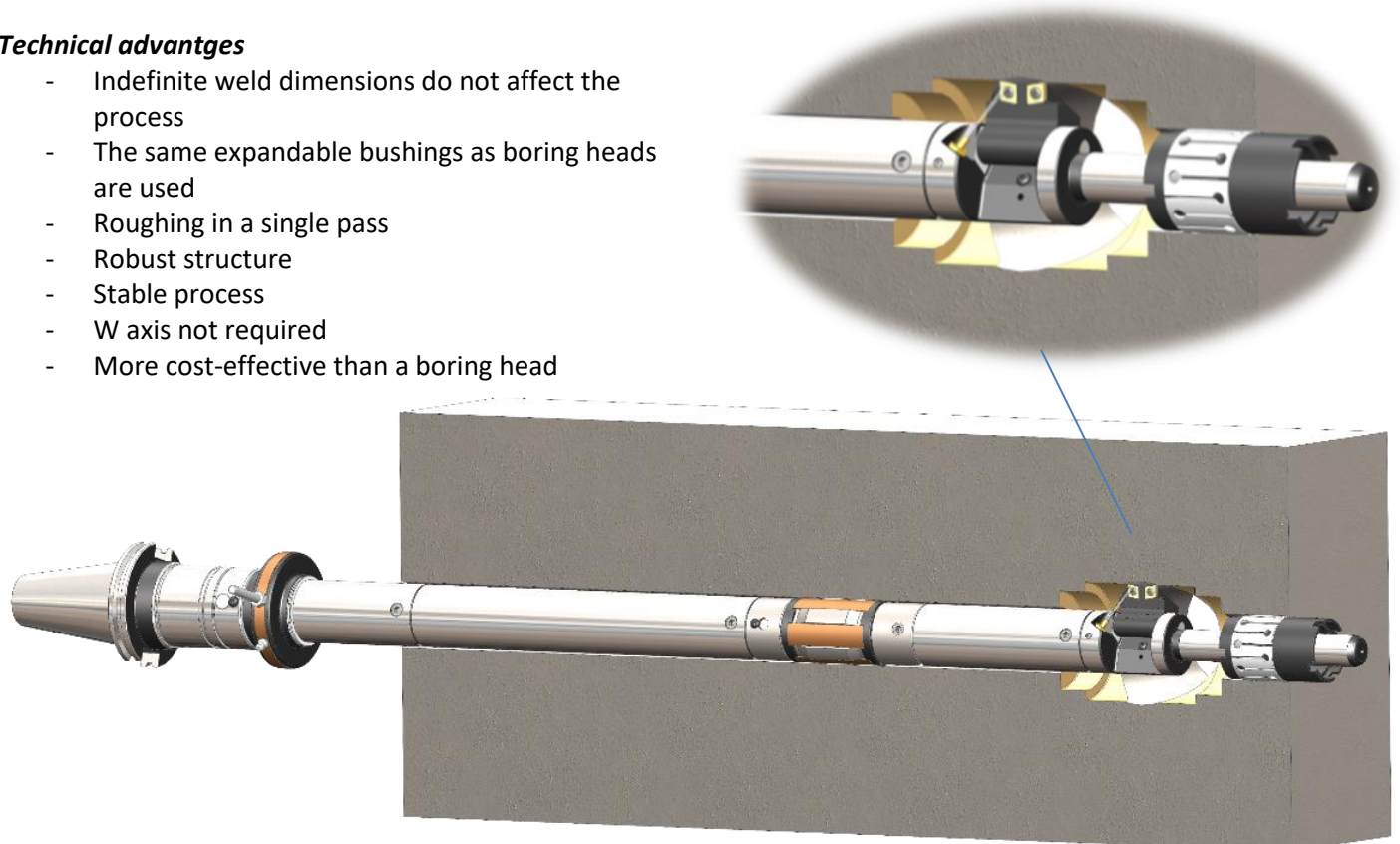
Modular components are standard.

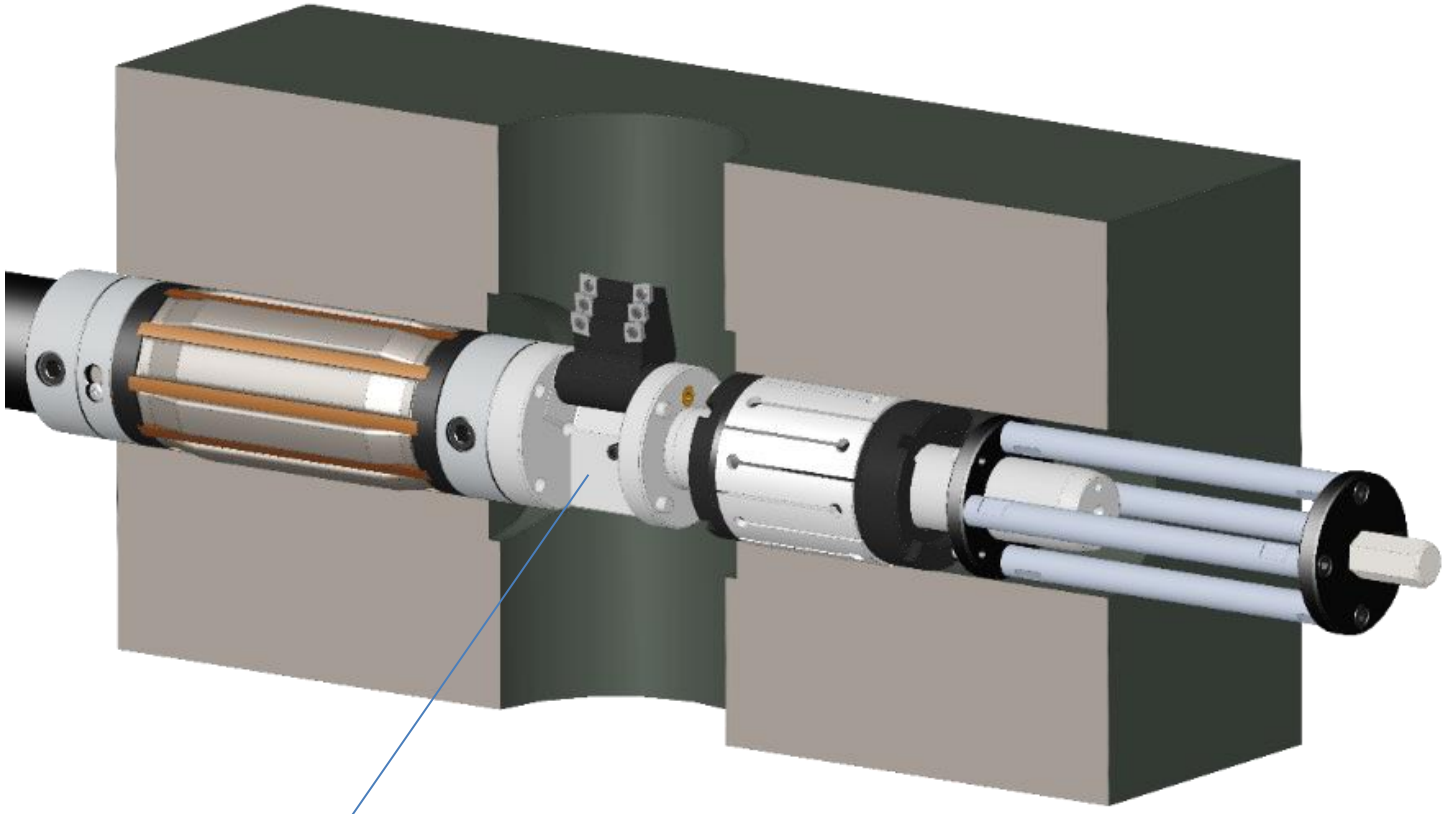
There are semi-standard models for valves from 2" to 7" (50-178mm).

Dampers reduce vibrations during cutting action

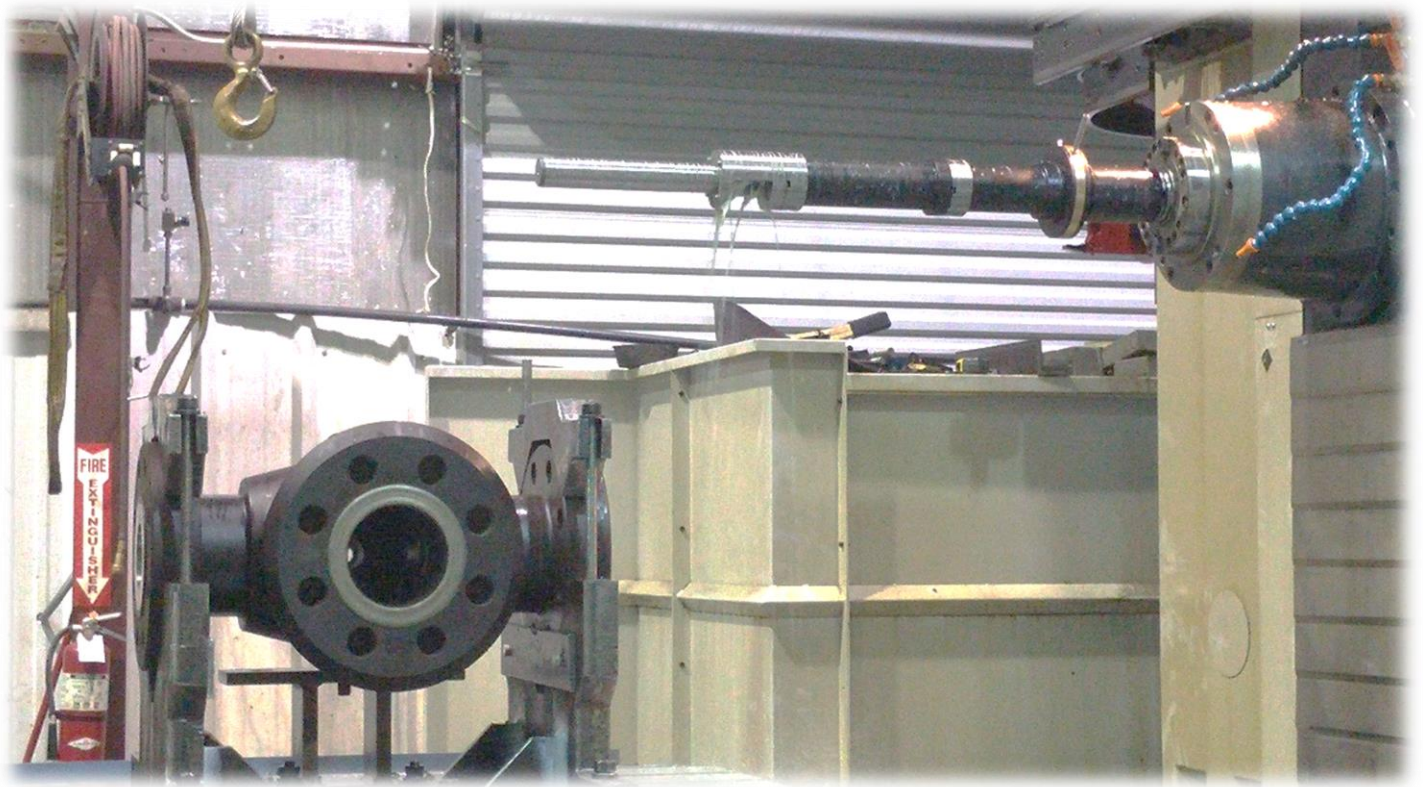
Technical advantages

- 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

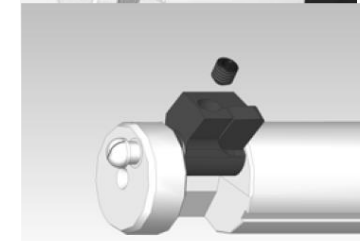
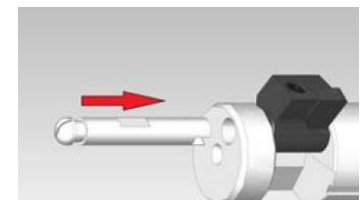
- Check the recommended speeds and feeds
- Check the work cycle for your specific tool
- Check that the blade is installed correctly (see “Instructions for the blade installation” below)
- Read the troubleshooting and blade re-sharpening instructions
- DO NOT activate the through spindle coolant before 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.

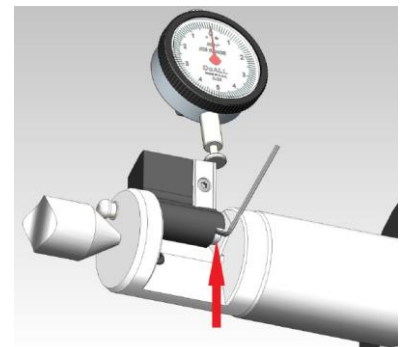
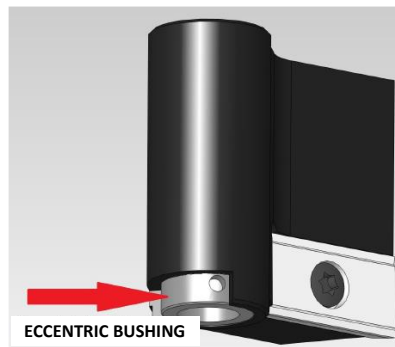
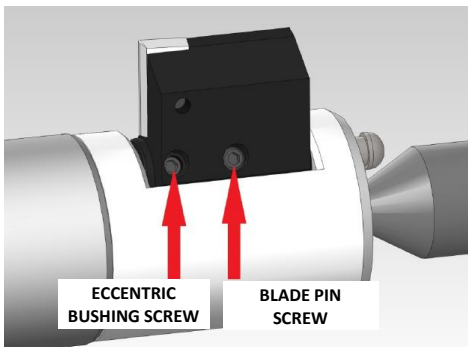
To adjust it, mount the AUTOFACER between centers, ensure that the blade is correctly installed and locked against the pin's flat (see "Instructions for the blade installation" above).

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

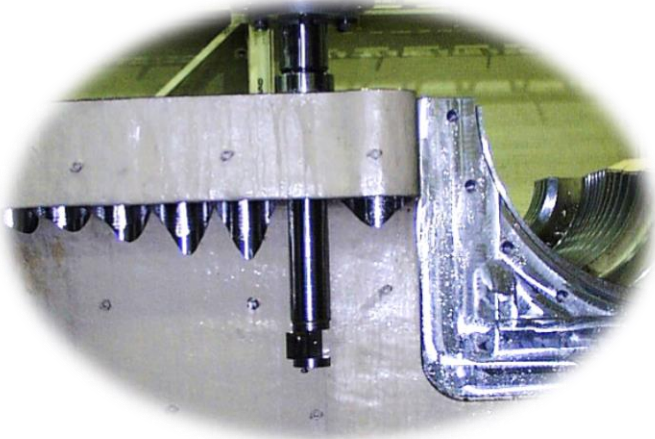
Check the condition and play of the outer bushing on the stem with guide bushing.

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

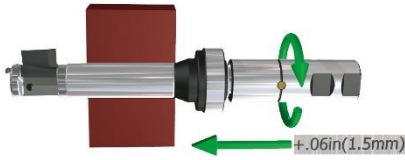
If the clutch moves freely and, consequently, the blade opens freely, inspect the condition of the clutch assembly by disassembling it.



THRUST ACTIVATION



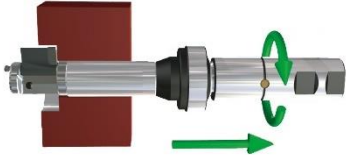
External coolant ON, coolant through the spindle OFF. Feed into the right-hand rotating hole (100 rpm) until the thrust cone contacts the surface.



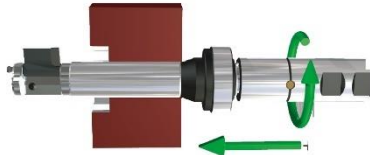
Compress the cone by 1.5mm. Reverse the rotation to open the blade. Note: Ensure clearance from obstacles. After 1-3 turns, bring it up to working speed. Activate the coolant through the spindle.



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).

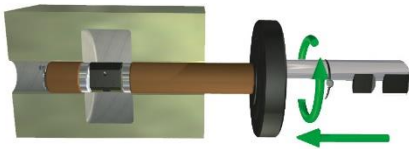


Lower the speed to 100 rpm, fast feed until the cone makes contact with the surface.

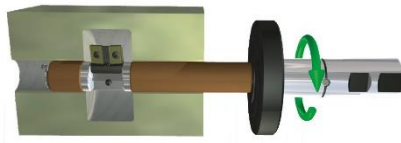


External coolant ON, coolant through the spindle OFF. Compress the cone by 1.5mm. Reverse the rotation to close the blade. Quickly retract from the hole to complete the work cycle.

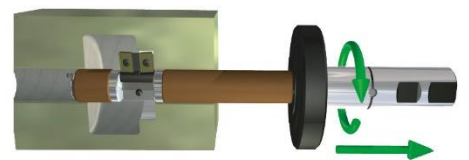
INERTIAL ACTIVATION



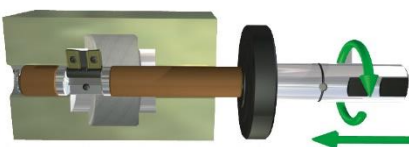
External coolant ON, coolant through the spindle OFF. Enter the hole in a clockwise rotation (rotational speed 300-800 rpm) until it passes through and position in an obstacle-free area for blade opening.



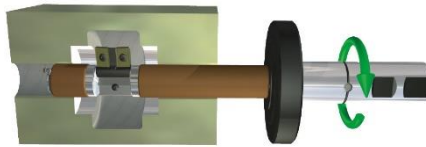
Reverse the rotation quickly at 300-800 rpm (do not program spindle stop between directions). The blade opens in the cutting position. After 1-3 turns, bring it up to working speed. Activate the coolant through the spindle.



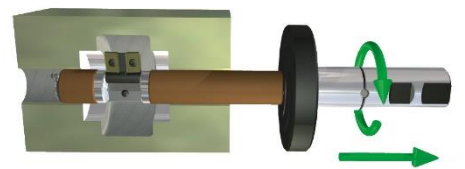
Approach the work surface rapidly. Perform the machining at the recommended cutting speed. A brief pause in the final position is advisable to clean the cut (1-3 turns).



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).

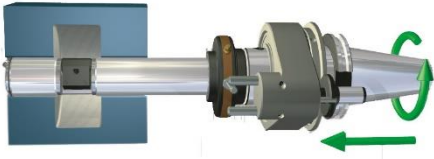


Position the blade in an obstacle-free area. External coolant ON, coolant through the spindle OFF.

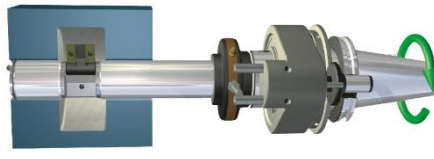


Reverse the rotation quickly to close the blade at 300-800 rpm (do not program spindle stop between directions). Rapid exit to disengage from the hole.

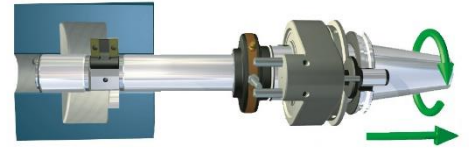
TORQUE BAR ACTIVATION



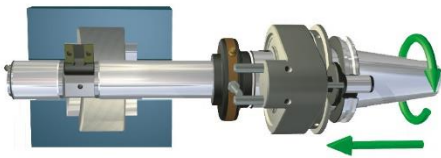
External coolant ON, coolant through the spindle OFF. Enter the hole with right-hand rotation (100 rpm).



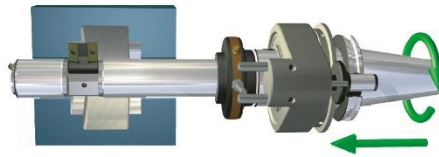
Reverse the rotation at 100 rpm. The blade opens in the cutting position. After 1-3 turns, bring it up to working speed. Activate the coolant through the spindle.



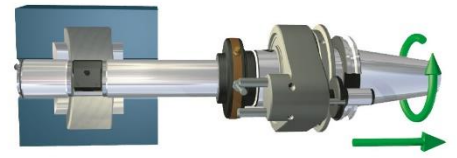
Approach the work surface rapidly. Perform the machining at the recommended cutting speed. A brief pause in the final position is advisable to clean the cut (1-3 turns).



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.

