

CUTTING DATA

Description	Tensile str. RM (MPa)*	B*	Cutting speed	Working feed rate mm/rev					
				Series and bore diameter					
				A 6.50– 7.00	B 7.50– 8.50	C 9.00– 11.50	D 10.50– 11.50	E/F/G 12.00– 21.00	
P0	Low-carbon steel, long-chipping, C <0.25%	<530	A	40–70	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
P1	Low-carbon steel, short-chipping, C <0.25%	<530	A	40–70	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
P2	Steel with carbon content C >0.25%	>530	A	40–70	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
P3	Alloy steel and tool steel, C >0.25%	600–850	A	30–50	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
P4	Alloy steel and tool steel, C >0.25%	850–1400	A	30–50	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
P5	Ferritic, martensitic and stainless PH steel	600–900	A	15–30	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
P6	High-strength ferritic, martensitic and PH stainless steel	900–1350	A	15–30	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
M1	Austenitic stainless steel	<600	A	10–20	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
M2	High-strength austenitic stainless steel	600–800	A	10–20	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
M3	Duplex stainless steel	<800	A	40–70	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
K1	Cast iron	125–500	A	50–90	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
K2	Ductile cast iron with up to medium strength	<600	A	40–70	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
K3	High-strength cast iron and bainitic cast iron	>600	A	40–70	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
N1	Wrought aluminium alloys	–	D	60–120	0.02–0.03	0.02–0.04	0.02–0.05	0.02–0.08	0.05–0.10
N2	Aluminium alloys with low Si content	–	D	60–120	0.02–0.03	0.02–0.04	0.02–0.05	0.02–0.08	0.05–0.10
N3	Aluminium alloys with high Si content	–	D	60–120	0.02–0.03	0.02–0.04	0.02–0.05	0.02–0.08	0.05–0.10
N4	Copper, brass and zinc base	–	D	50–90	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
S1	Iron-based heat-resistant alloys	500–1200	A	10–20	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
S2	Cobalt-based heat-resistant alloys	1000–1450	A	10–20	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
S3	Nickel-based heat-resistant alloys	600–1700	A	10–20	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08
S4	Titanium and titanium alloys	900–1600	A	10–20	0.01–0.02	0.01–0.03	0.02–0.04	0.03–0.06	0.03–0.08

* coating for blades

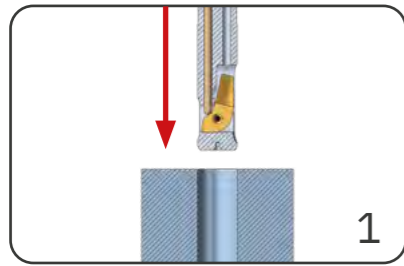


The cutting data listed are guide values! They depend on the amount of slope of the uneven surface. (e.g. high slope > low cutting value).
For materials that are difficult to machine, we recommend applying cutting speeds that are at the lower end of the range.

ACTIVATION SPEED

Counterbore ratio*	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3
* C-bore Ø : Bore Ø										
Bore diameter d										
Series A										
6.5	4500	4500	4500	3500	3500	3500	3000	3000	2500	2500
7.0	2500	2500	2500	2500	2500	2000	2000	2000	2000	2000
Series B										
7.5	4500	4500	4500	3500	3500	3000	3000	2500	2500	2500
8.0	2500	2500	2500	2500	2500	2000	2000	2000	2000	2000
8.5	2000	2000	2000	2000	2000	2000	2000	2000	1500	1500
Series C										
9.0	3500	3500	3500	3000	3000	2500	2500	2500	2500	2500
9.5	2500	2500	2500	2500	2000	2000	2000	2000	2000	2000
10.0	2000	2000	2000	2000	2000	2000	2000	2000	2000	1500
Series D										
10.5	5000	5000	5000	3500	3500	3500	3000	3000	2500	2500
11.0	3000	3000	3000	2500	2500	2500	2500	2500	2000	2000
11.5	2500	2500	2500	2000	2000	2000	2000	2000	2000	2000
Series E										
12.0	3500	3500	3500	2500	2500	2500	2500	2500	2000	2000
12.5 - 13.0	2500	2500	2500	2000	2000	2000	2000	1500	1500	1500
13.5 - 14.0	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Series F										
14.5	3500	3500	3500	2500	2500	2500	2500	2500	2500	2000
15.0 - 15.5	3000	3000	3000	2500	2500	2500	2000	2000	2000	2000
16.0 - 17.0	2000	2000	2000	1500	1500	1500	1500	1500	1500	1500
Series G										
17.5 - 18.0	3500	3500	3500	2500	2500	2500	2000	2000	2000	1500
18.5 - 19.5	2000	2000	2000	1500	1500	1500	1500	1500	1500	1500
20.0 - 21.0	1500	1500	1500	1000	1000	1000	1000	1000	1000	1000

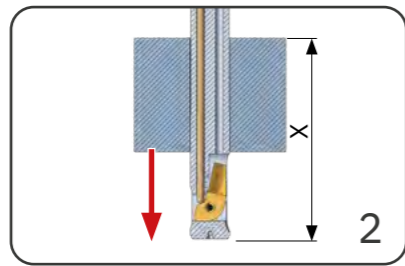
BSF PROCESS STEPS



- Rapid feed to 1.0 mm in front of the bore
- Spindle stop!
- Internal coolant on (20–50 bar)
- Dwell time 2–5 sec.

Example
G0 Z+1 M5
M88 (internal coolant on¹⁾)
G4X3

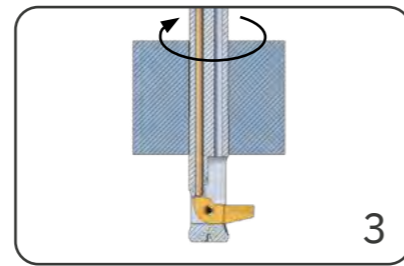
¹⁾ Machine command for internal coolant ON (M88), OFF (M89). Your machine may have different M commands for internal coolant (see manufacturer's specifications for the control unit)



- Rapid feed to position X

G0 Z-54.5²⁾

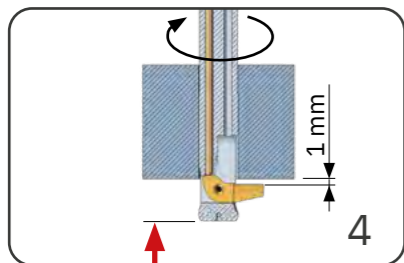
²⁾ 54.5 = 30.0 mm + swing length AL (see page 144) 22.5 mm + safety clearance 2.0 mm



- Switch off internal coolant
- Activation speed on
- Dwell time 1–2 sec³⁾

M89 (internal coolant off)
S2000 M3
G4X2

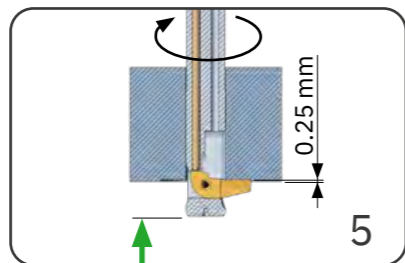
³⁾ Take into account the pressure reduction time of the internal coolant system for the machine in question



- Rapid feed up to the bore edge, observe safety clearance of 1.0 mm
- Cutting speed set
- External coolant on

G0 Z-40.6⁴⁾
S400 M3
M8

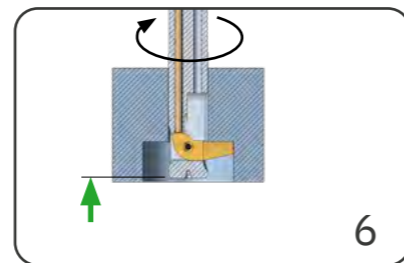
⁴⁾ 40.6 = 30.0 + 9.6 + 1.0



- Working feed until blade is fully in the cut

G1 Z-39.35⁵⁾ F20

⁵⁾ 39.35 = 30.0 + 9.6 - 0.25



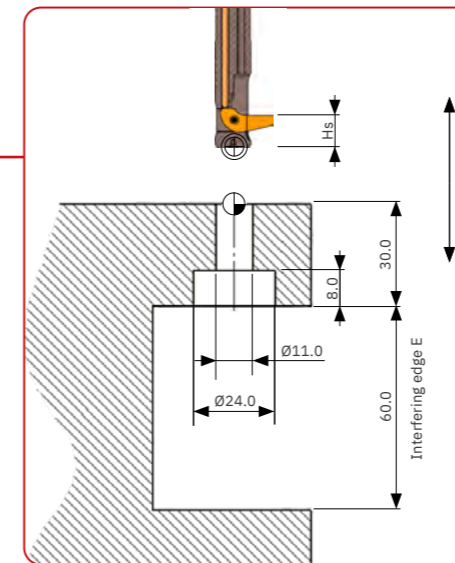
- Internal coolant on
- Working feed to counterbore depth
- Free cutting without internal coolant recommended⁷⁾

M88
G1 Z-31.6⁶⁾

⁶⁾ 31.6 = 30.0 + 9.6 - 8.0

⁷⁾ For soft materials, machine approx. 1.0 mm before counterbore depth without internal coolant

APPLICATION AND PROGRAMMING EXAMPLE



Counterbore M10 for socket head cap screw with inner hexagonal recess in accordance with DIN 974-1

Application data

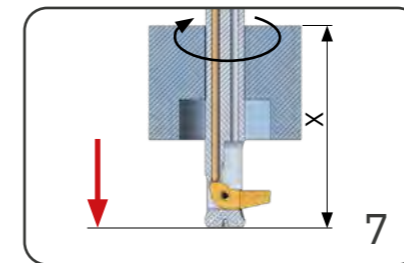
Bore Ø: Ø11.0 mm
Material: C45
Counterbore Ø: Ø24.0 mm
Counterbore depth: 8.0 mm

Tool and blade selection

Tool: BSF-D-1100/050-12.0
Blade: BSF-M-D-1A-12.0
Swing length AL: 22.5 mm
Blade height Hs: 9.6 mm

Cutting data

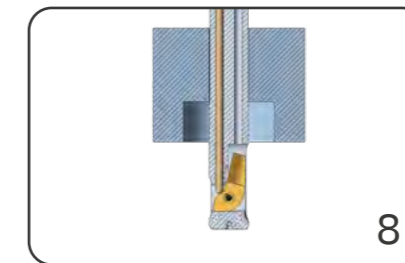
Cutting speed V_c : 30 m/min.
Tool working feed: 0.05 mm/rev
Activation speed: Counterbore ratio 24.0: 11.0 = 2.18 > 2000 rpm



- Internal coolant off
- External coolant off
- Rapid feed to position X

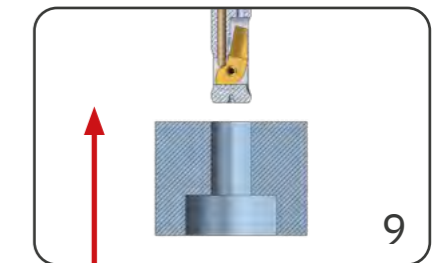
M89
M9
G0 Z-54.5⁸⁾

⁸⁾ 54.5 = 30.0 + 22.5 + 2.0



- Spindle stop!
- Internal coolant on 20–50 bar
- Dwell time 2–5 sec.

M5
M88
G4X3



- Rapid feed out of the workpiece

G0 Z1
M89