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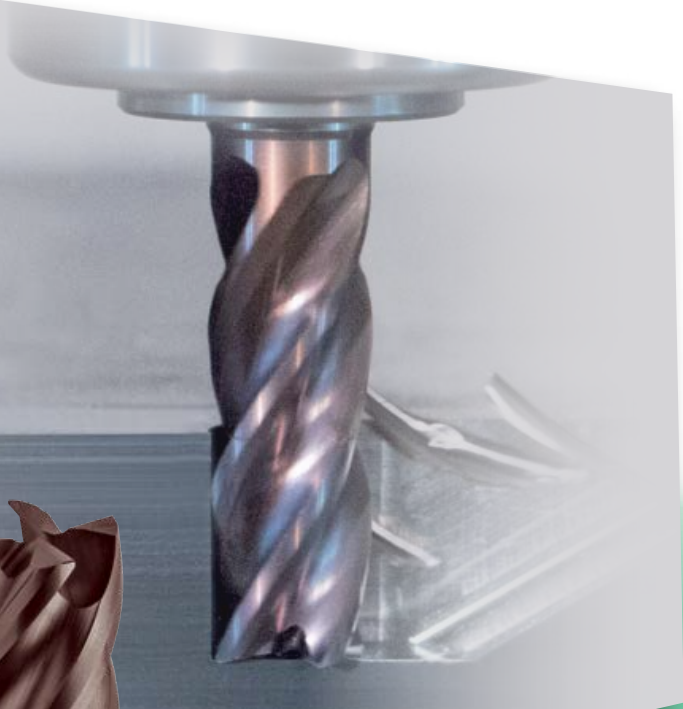
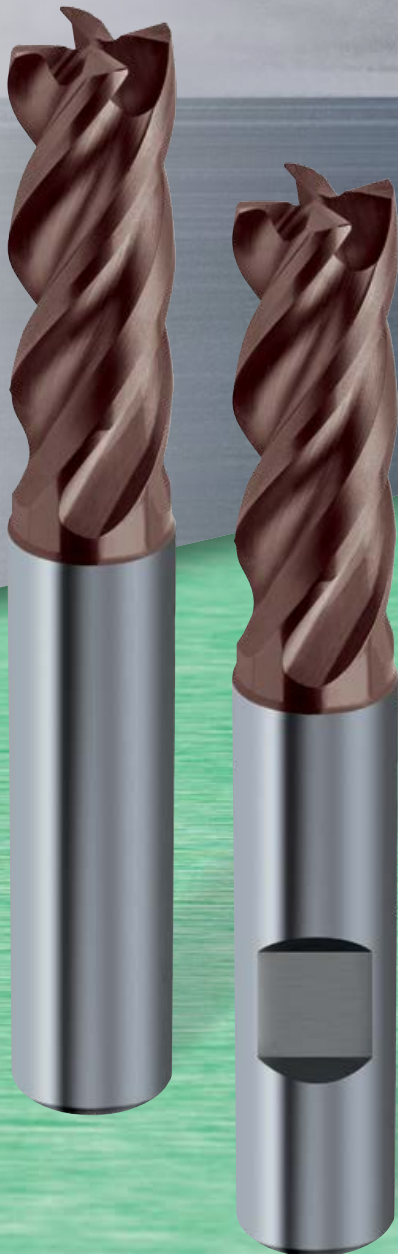
Precision Cutting Tools

NEW

TF 100 MULTI-MILL

the multifunctional end mill for ramping, drilling, slotting, roughing and finishing

2014



Ramping, drilling, slotting, roughing and finishing



Plunging with up to 45°



Milling with extreme metal removal rate



Drilling without pilot drill up to 2xD possible

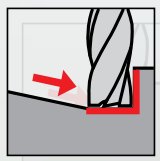


High cutting parameters

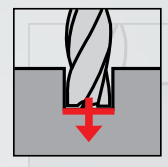


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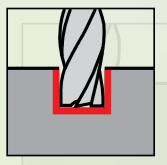
Precision Cutting Tools



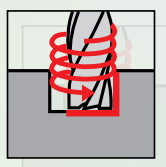
RAMPING



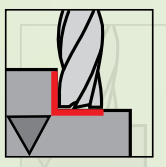
DRILLING



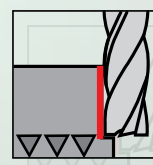
SLOTTING



HELIX



ROUGHING



FINISHING



Plunging* and ramping*

Material/ISO material	Hardness	Ramping depth* (a_p max.)	Ramping* max. angle in °	Cutting speed (v_c)	fz (mm/z) with nom. Ø						
					4	6	8	10	12	16	20
Struct./free-cutting steels, unall. heat-treat./case hard. steels	up to 850 N/mm ²	1xd	45°	270	0.015	0.020	0.030	0.040	0.045	0.050	0.060
P Free-cutting steels, unalloyed case hard. steels, nitr. steels	850 - 1200 N/mm ²	1xd	45°	240	0.012	0.015	0.020	0.035	0.040	0.045	0.050
Alloyed heat-treatable, tool and high speed steels	850 - 1400 N/mm ²	1xd	30°	200	0.008	0.010	0.015	0.025	0.030	0.035	0.040
M Stainless steel - easy to machine / sulphured	up to 750 N/mm ²	1xd	10°	60	0.008	0.010	0.015	0.025	0.030	0.035	0.040
Stainless steel - moderately difficult to machine	over 750 - 950 N/mm ²	0.5xd	5°	50	0.008	0.010	0.015	0.020	0.025	0.030	0.035
K Cast iron, grey cast iron, spher. graphite/malleable cast iron	over 240 HB 30	1xd	45°	150	0.015	0.020	0.030	0.040	0.045	0.050	0.060
N Aluminium, Al-wrought alloys, Al-alloys	up to 3% Si	1xd	30°	180	0.012	0.015	0.020	0.035	0.040	0.045	0.050
Aluminium-cast alloys	over 3% Si	1xd	45°	140	0.015	0.020	0.030	0.040	0.045	0.050	0.060
S Titanium, Titanium alloys	up to 1400 N/mm ²	0.5xd	10°	45	0.008	0.010	0.015	0.020	0.025	0.030	0.035

* tool holders with peripheral cooling are recommended for optimal chip evacuation and tool life

Slotting*

Material/ISO material	Hardness	Cutting depth* (a_p)	Cutting width (a_e)	Cutting speed (v_c)	fz (mm/z) with nom. Ø						
					4	6	8	10	12	16	20
Struct./free-cutting steels, unall. heat-treat./case hard. steels	up to 850 N/mm ²	1xd	1xd	270	0.018	0.025	0.035	0.050	0.060	0.080	0.100
P Free-cutting steels, unalloyed case hard. steels, nitr. steels	850 - 1200 N/mm ²	1xd	1xd	240	0.018	0.025	0.035	0.050	0.060	0.080	0.100
Alloyed heat-treatable, tool and high speed steels	850 - 1400 N/mm ²	1xd	1xd	200	0.018	0.025	0.030	0.045	0.050	0.070	0.085
M Stainless steel - easy to machine / sulphured	up to 750 N/mm ²	1xd	1xd	120	0.015	0.020	0.030	0.045	0.060	0.065	0.075
Stainless steel - moderately difficult to machine	over 750 - 950 N/mm ²	1xd	1xd	80	0.015	0.020	0.030	0.040	0.045	0.060	0.070
K Cast iron, grey cast iron, spher. graphite/malleable cast iron	over 240 HB 30	1xd	1xd	160	0.018	0.025	0.035	0.050	0.060	0.080	0.100
N Aluminium, Al-wrought alloys, Al-alloys	up to 3% Si	1xd	1xd	500	0.020	0.030	0.040	0.065	0.080	0.095	0.110
Aluminium-cast alloys	over 3% Si	1xd	1xd	340	0.015	0.020	0.030	0.055	0.065	0.080	0.100
S Titanium, Titanium alloys	up to 1400 N/mm ²	1xd	1xd	60	0.015	0.020	0.030	0.040	0.045	0.060	0.070

* tool holders with peripheral cooling are recommended for optimal chip evacuation and tool life

HPC-Roughing* and HSC-Finishing**

Material/ISO material	Hardness	Cutting depth* (a_p)	Cutting width (a_e)	Cutting speed (v_c)	fz (mm/z) with nom. Ø						
					4	6	8	10	12	16	20
Struct./free-cutting steels, unall. heat-treat./case hard. steels	up to 850 N/mm ²	1xd	1xd	270	0.020	0.030	0.045	0.060	0.075	0.090	0.110
P Free-cutting steels, unalloyed case hard. steels, nitr. steels	850 - 1200 N/mm ²	1xd	1xd	240	0.020	0.030	0.045	0.060	0.075	0.090	0.110
Alloyed heat-treatable, tool and high speed steels	850 - 1400 N/mm ²	1xd	1xd	200	0.018	0.025	0.030	0.055	0.070	0.085	0.100
M Stainless steel - easy to machine / sulphured	up to 750 N/mm ²	1xd	1xd	120	0.018	0.025	0.035	0.055	0.065	0.080	0.090
Stainless steel - moderately difficult to machine	over 750 - 950 N/mm ²	1xd	1xd	80	0.015	0.020	0.030	0.045	0.050	0.065	0.075
K Cast iron, grey cast iron, spher. graphite/malleable cast iron	over 240 HB 30	1xd	1xd	160	0.015	0.030	0.045	0.060	0.075	0.090	0.110
N Aluminium, Al-wrought alloys, Al-alloys	up to 3% Si	1xd	1xd	500	0.030	0.040	0.060	0.080	0.100	0.120	0.150
Aluminium-cast alloys	over 3% Si	1xd	1xd	340	0.020	0.030	0.045	0.060	0.075	0.090	0.110
S Titanium, Titanium alloys	up to 1400 N/mm ²	1xd	1xd	60	0.015	0.020	0.030	0.045	0.050	0.065	0.075

* tool holders with peripheral cooling are recommended for optimal chip evacuation and tool life

** for HSC machining the cutting speed can be increased by 50%, feed rate f_z can be reduced depending on surface requirements.

*** for trochoidal milling and machining with $a_e = 0.1-0.2xd$ the cutting speed v_c and the feed rate can be increased by 50 %.

Drilling*

Material/ISO material	Hardness	Drilling depth** (a_p max.)	Cutting speed (v_c)	fz (mm/z) with nom. Ø						
				4	6	8	10	12	16	20
Struct./free-cutting steels, unall. heat-treat./case hard. steels	up to 850 N/mm ²	2xd	270	0.015	0.020	0.030	0.040	0.045	0.050	0.060
P Free-cutting steels, unalloyed case hard. steels, nitr. steels	850 - 1200 N/mm ²	2xd	240	0.010	0.015	0.020	0.035	0.040	0.045	0.050
Alloyed heat-treatable, tool and high speed steels	850 - 1400 N/mm ²	1xd	200	0.008	0.010	0.015	0.025	0.030	0.035	0.040
K Cast iron, grey cast iron, spher. graphite/malleable cast iron	over 240 HB 30	2xd	150	0.015	0.020	0.030	0.040	0.045	0.050	0.060
N Aluminium, Al-wrought alloys, Al-alloys	up to 3% Si	1xd	180	0.010	0.015	0.020	0.035	0.040	0.045	0.050
Aluminium-cast alloys	over 3% Si	1xd	140	0.015	0.020	0.030	0.040	0.045	0.050	0.060

* pecking recommended from drilling depth 1XD

** tool holders with peripheral cooling are recommended for optimal chip evacuation and tool life

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