

Solid Carbide End Mills

SuperF-UT

2nd edition 2021

 **STOCK**

Chip – by Chip – to the Top

Super



The image shows three drill bits of different designs standing on white circular pedestals. The bit on the left is a standard double-flute design with a gold-colored coating. The middle bit has a more complex, multi-fluted design with a blue and silver coating. The bit on the right is a standard double-flute design with a blue and silver coating. The background is a light gray with faint technical drawings and the word 'FUTURE' in large, semi-transparent letters.

„Milling cutter with unequal flute spacing enable even more performance and quality“

and offer the following advantages in contrast to conventional tools:

- vibration-free running
- improved surface finish quality
- longer tool life
- larger cutting depths
- greater accuracy
- wider application range for finishing and roughing as well as slot milling
- suitable for HPC operations



THE TOP PERFORMERS

Trochoidal cutting,
high a_p and low a_e values

from page 8



High-Speed



High-Performance



Trochoidal milling



Roughing



Finishing

SPECIAL-, SUPER- AND TI-ALLOYS

for demanding applications
for materials up to 63 HRC

from page 10



Slot drilling



Ramping*



Helix*



Drilling



Roughing

UNIVERSAL APPLICATION

for individual and small batch productions
and for changing applications & materials

from page 12



Slot drilling



Roughing



Finishing

* Notes on ramping and helical milling can be found from page 120 onwards.



ALUMINIUM, NON-FERROUS METALS

Aluminium, nonferrous metals, plastics

from page 16



Trochoidal milling



Slot drilling



Ramping*



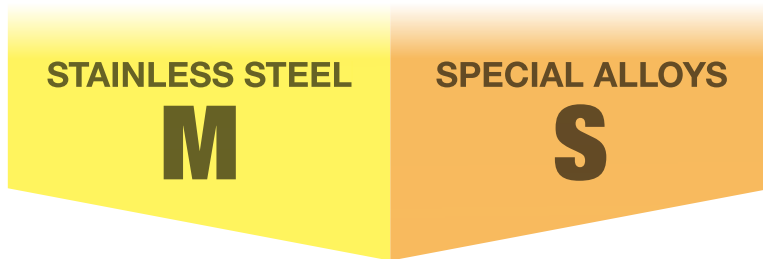
Helix*



Roughing



Finishing



THE TOP PERFORMERS

Trochoidal cutting,
high a_p and low a_e values

from page 8



High-Speed



High-Performance



Trochoidal milling



Roughing



Finishing

SPECIAL-, SUPER- AND TI-ALLOYS

for demanding applications

from page 10



Slot drilling



Ramping*



Helix*



Drilling



Roughing

STAINLESS STEEL

for individual and small batch productions
and for changing applications

from page 14



Roughing



Finishing

* Notes on ramping and helical milling can be found from page 120 onwards.



DEBURRING AND CHAMFERING TOOLS

for 60°/90°/120° chamfers
for deburring operations

from page 20



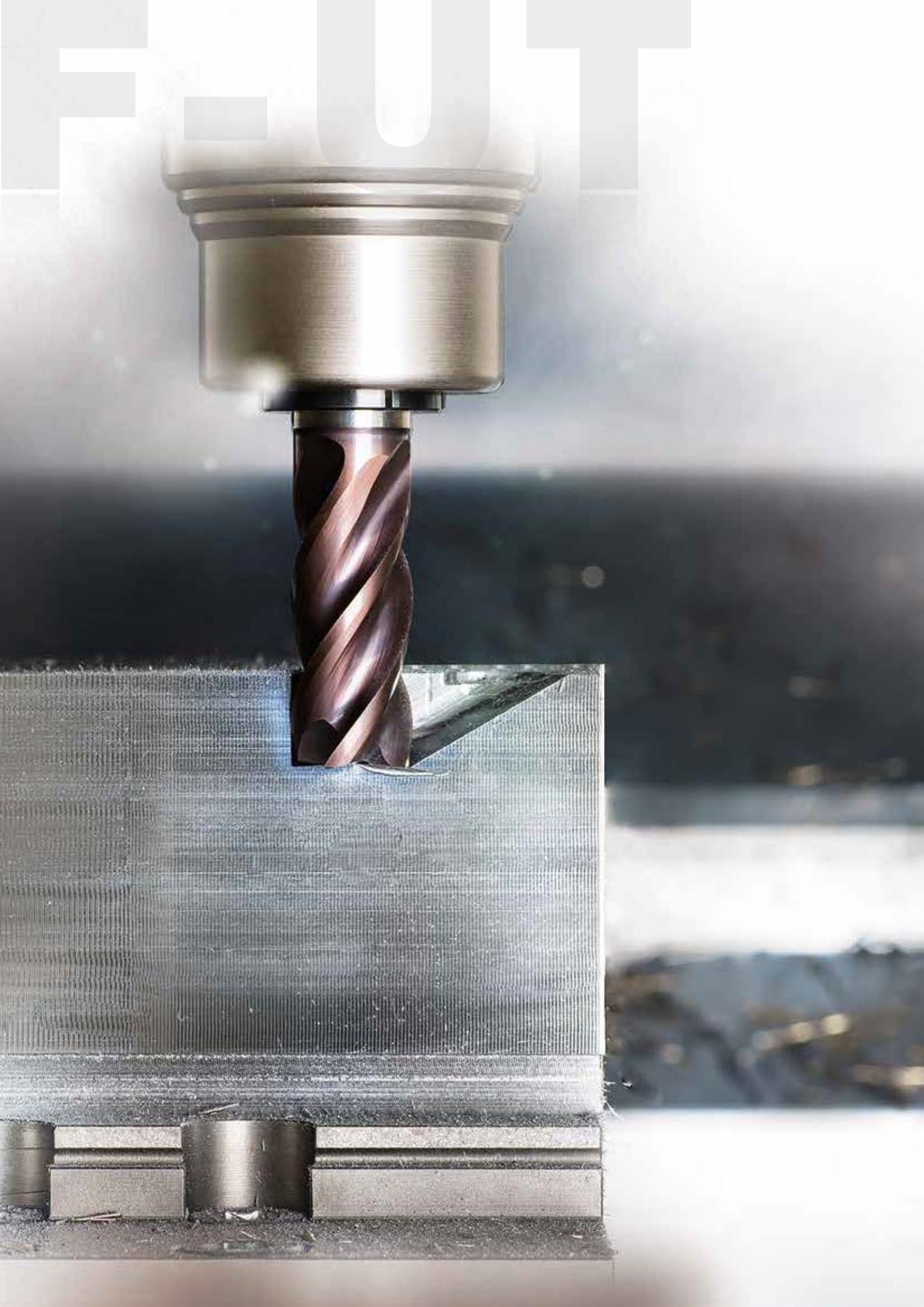
Chamfering



De-burring

Super





SuperF-UT

THE TOP PERFORMERS



- **CORNER DESIGN**

with micro-corner protection chamfer or defined corner radius

- **UNEQUAL HELIX**

45° with type N-5 | 48° with type Z/ZS with unequal pitch
44°/45°/46° with type FS | 32° with type ZS-7 | 38° with type ZS-r

- **4, 5, 6 OR 7 CUTTING EDGES**

- **CHIP BREAKERS**

SuperF-UT type ZS, ZS-7 and ZS-r possesses chip breakers and therefore produces short chips when machining tough materials. As with type Z, ZS and ZS-r there is a lower spindle load than with conventional milling cutters.

- **UP TO 3XD OVERALL LENGTH**

- **REINFORCED CORE FOR HIGHER STABILITY**

Our SuperF-UT types Z/ZS and H possess a reinforced core. This allows an effective chip evacuation with slot milling up to 1xD machining depth increased stability with contour milling to full cutting edge length under HPC/HSC conditions.

- **SHANK FORM HA OR HB**



P	M	K	N	S	H	Type	Shank form	Helix angle °	Tool material	Surface	Standard	d1/mm	Catalogue no.	Progr. page
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SuperF-UT end mills

						SuperF-UT Z	HB	48	Solid carbide	AlTiN+	Company std.	3.000 - 20.000	54577	22
						SuperF-UT ZS	HB	48	Solid carbide	AlTiN+	Company std.	3.000 - 20.000	54578	23
						SuperF-UT ZS-r	HB	38	Solid carbide	AlTiN+	Company std.	6.000 - 20.000	54555	24
						SuperF-UT ZS-7	HB	32	Solid carbide	AlTiN+	Company std.	6.000 - 20.000	54581	25
						SuperF-UT N-5	HA	45	Solid carbide	TiAlN	Company std.	4.000 - 20.000	54583	26
						SuperF-UT N-5	HB	45	Solid carbide	TiAlN	Company std.	4.000 - 20.000	54584	27
						SuperF-UT N-5	HA	45	Solid carbide	TiAlN	Company std.	4.000 - 20.000	54579	28
						SuperF-UT N-5	HB	45	Solid carbide	TiAlN	Company std.	4.000 - 20.000	54580	29
						SuperF-UT FS	HA	44/45/46	Solid carbide	TiAlN	Company std.	8.000 - 25.000	64558	30
						SuperF-UT FS ²	HB	44/45/46	Solid carbide	TiAlZrN	Company std.	8.000 - 20.000	64560	31

SuperF-UT

SPECIAL-, SUPER- AND TI-ALLOYS



- **CORNER DESIGN FOR TRUE 90° EDGE QUALITY**

Our SuperF-UT type S possesses an accurate 90° corner in order to ensure the highly demanded "sharp edged" design of the edge quality. This tool is suitable for pre-finishing and super-fine finishing.

- **UNEQUAL HELIX**

36°/37°/38° with type NX | 35°/38° with type Ti | 40°/42° with type H and type S
41°/43°/45° with type NX-3

- **FROM SHORT TO EXTRA LONG**

- **HARD MACHINING**

Our multi-fluted milling cutter type H has a 55° helix angle and is especially suitable for materials up to 63 HRC with TIAISIN coating.

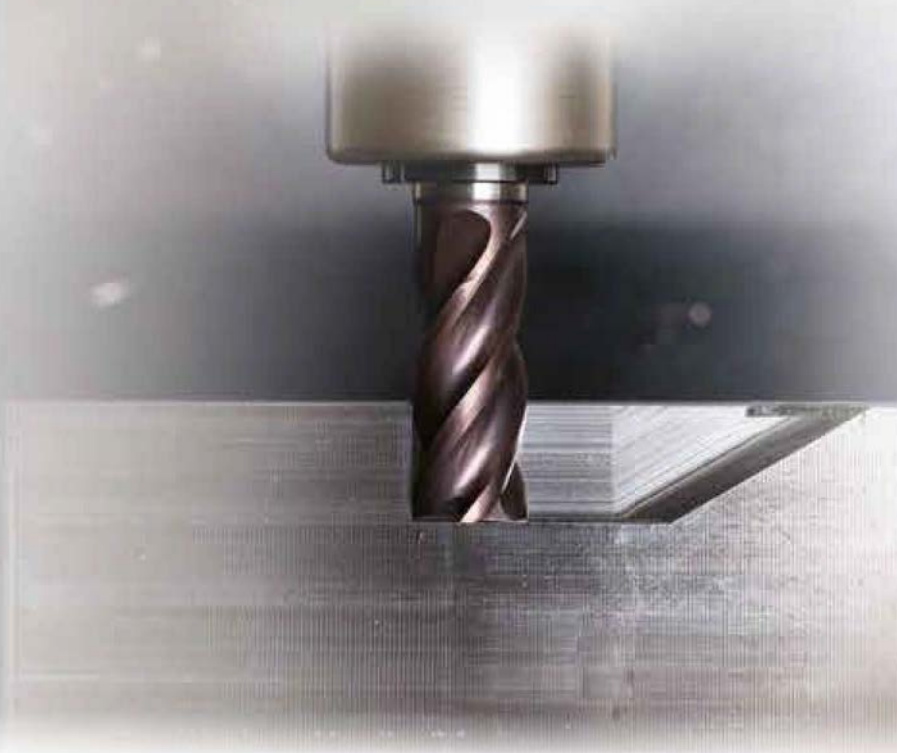
- **FACE GEOMETRY**

Our types NX as well as the pilot end mills have a special face geometry for plunging.

- **ALLROUNDER TYP NX**

Thanks to its special face geometry SuperF-UT type NX is suitable for a wide range of machining operations. This includes ramping with very steep plunging angles, drilling up to a machining depth of 2xD as well as slotting, roughing and finishing. This milling cutter type is also available as "undersize milling cutter". Notes on ramping and helical milling can be found from page 118 onwards.

- **SHANK FORM HA OR HB**



P	M	K	N	S	H	Type	Shank form	Helix angle °	Tool material	Surface	Standard	d1/mm	Catalogue no.	Progr. page
•	•	•	•	•	○	SuperF-UT NX Micro	cyl.	40	Solid carbide	TiSiN	Company std.	0.800 - 3.000	54594	32
•	•	•	•	•	○	SuperF-UT NX Micro	cyl.	40	Solid carbide	TiSiN	Company std.	1.000 - 3.000	54595	33
•	•	•	•	•	•	SuperF-UT NX-3	HA	41/43/45	Solid carbide	TiAlSiN	Company std.	3.000 - 20.000	54586	34
•	•	•	•	•	•	SuperF-UT NX-3	HB	41/43/45	Solid carbide	TiAlSiN	Company std.	3.000 - 20.000	54587	35
•	•	•	•	•	•	SuperF-UT NX	HB	36/38/37	Solid carbide	TiAlSiN	DIN 6527K	3.000 - 20.000	54589	36
•	•	•	•	•	•	SuperF-UT NX	HA	36/38/37	Solid carbide	TiAlSiN	DIN 6527L	4.000 - 20.000	54590	37
•	•	•	•	•	•	SuperF-UT NX	HB	36/38/37	Solid carbide	TiAlSiN	DIN 6527L	4.000 - 20.000	54591	38
•	•	•	•	•	•	SuperF-UT NX-1K	HB	36/38/37	Solid carbide	TiAlSiN	DIN 6527L	6.000 - 25.000	54585	39
○	○	•	•	•	•	SuperF-UT Ti	HA	35/38	Solid carbide	ZrN	DIN 6527L	6.000 - 20.000	54560	40
○	○	•	•	•	•	SuperF-UT Ti	HB	35/38	Solid carbide	ZrN	DIN 6527L	6.000 - 20.000	54561	41
○	•	•	•	•	•	SuperF-UT H	HB	40/42	Solid carbide	TiAlSiN	DIN 6527L	6.000 - 20.000	54573	42
○	•	•	•	•	•	H	HA	55	Solid carbide	TiAlSiN	Company std.	3.000 - 20.000	54207	43
○	•	•	•	•	•	H	HA	55	Solid carbide	TiAlSiN	Company std.	6.000 - 20.000	54227	44
○	○	○	○	○	○	SuperF-UT S	HA	40/42	Solid carbide	AlTiN nano	DIN 6527L	3.000 - 20.000	54556	45
•	•	•	•	•	•	NH	HA	30	Solid carbide	AlTiN+	DIN 6527L	1.400 - 12.000	54700	46

SuperF-UT

UNIVERSAL APPLICATION



- **MICRO-CORNER PROTECTION FOR REDUCED WEAR**

Most solid carbide SuperF-UT end mills possess a special geometry with micro-corner protection. This design significantly reduces corner wear and ensures longer tool life and higher feed rates.

- **UNEQUAL HELIX**

41°/43°/45° with type N-3 | 35°/38° with type N | 38° with type N-L with unequal pitch
30°/32° with type N-F | 38°/40° with types N-r, U, UL

- **FROM SHORT TO EXTRA LONG**

- **3 OR 4 CUTTING EDGES**

- **REDUCED NECK FOR LARGER CUTTING DEPTHS**

The reduced neck of solid carbide SuperF-UT end mills increases the cutting depth and improves chip evacuation. Therefore, solid carbide SuperF-UT end mills offer an extremely wide range of applications.

- **SPECIALLY DEVELOPED ROUGHING GEOMETRY**

SuperF-UT N-F-types are suitable for roughing as well as finishing and require a significantly lower machine performance than conventional milling cutters. Therefore, they are the ideal solution for unstable conditions and less powerful machines, high cutting values and achieving good surface finish quality (Ra 2-3 µm).

- **SHANK FORM HA OR HB**



P	M	K	N	S	H	Type	Shank form	Helix angle °	Tool material	Surface	Standard	d1/mm	Catalogue no.	Progr. page
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SuperF-UT end mills

						SuperF-UT N-3	HA	41/43/45	Solid carbide	TiAlN	~DIN 6527L	3.000 - 20.000	54564	48
						SuperF-UT N-3	HB	41/43/45	Solid carbide	TiAlN	~DIN 6527L	3.000 - 20.000	54565	49
						SuperF-UT N	HB	35/38	Solid carbide	TiAlN	DIN 6527K	3.000 - 20.000	64550	50
						SuperF-UT N	HA	35/38	Solid carbide	TiAlN	DIN 6527L	3.000 - 20.000	54551	51
						SuperF-UT N	HB	35/38	Solid carbide	TiAlN	DIN 6527L	3.000 - 25.000	64551	52
						SuperF-UT N ²	HB	35/38	Solid carbide	TiAlZrN	DIN 6527L	3.000 - 25.000	64552	53
						SuperF-UT N	HA	35/38	Solid carbide	TiAlN	Company std.	6.000 - 20.000	54562	54
						SuperF-UT N	HB	35/38	Solid carbide	TiAlN	Company std.	6.000 - 20.000	54563	55
						SuperF-UT NL	HB	38	Solid carbide	TiAlN	Company std.	6.000 - 25.000	54553	56
						SuperF-UT N	HA	35/38	Solid carbide	TiAlN	Company std.	10.000 - 25.000	54552	57
						SuperF-UT N-r	HB	38/40	Solid carbide	AlCrN	DIN 6527L	3.000 - 20.000	54550	58
						SuperF-UT U	HA	38/40	Solid carbide	AlCrN	Company std.	1.000 - 20.000	54500	60
						SuperF-UT U	HB	38/40	Solid carbide	AlCrN	Company std.	4.000 - 20.000	54501	61
						SuperF-UT UL	HA	38/40	Solid carbide	AlCrN	Company std.	1.000 - 20.000	54502	62
						SuperF-UT UL	HB	38/40	Solid carbide	AlCrN	Company std.	4.000 - 20.000	54503	63
						SuperF-UT N-F	HB	30/32	Solid carbide	TiAlN	DIN 6527L	6.000 - 25.000	54567	64

SuperF-UT

STAINLESS STEEL



- **SPECIALLY DEVELOPED ROUGHING GEOMETRY**

SuperF-UT VA-XF-types are suitable for roughing as well as finishing and require a significantly lower machine performance than conventional milling cutters. Therefore, they are the ideal solution for unstable conditions and less powerful machines, high cutting values and achieving good surface finish quality (Ra 2-3 μm).

- **UNEQUAL HELIX**

36°/38° with type VA-X, VA-X², VA-X IK und VA-XF | 40°/42° with type VA and type VA-IK
38°/40° with type VA-r

- **INTERNAL COOLING**

With our SuperF-UT VA-X and VA-IK types the direct positioning of the necessary cooling lubricant at the cutting edge can be ensured thanks to internal coolant ducts.

- **FROM SHORT TO LONG**

- **WEAR-RESISTANT TiAISIN OR HIGH-HARDNESS TiAlZrN COATING**

for types VA-r and VA-X²

- **SHANK FORM HA OR HB**



P	M	K	N	S	H	Type	Shank form	Helix angle °	Tool material	Surface	Standard	d1/mm	Catalogue no.	Progr. page
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SuperF-UT end mills

	○	●	○	○	○	SuperF-UT VA-X	HB	36/38	Solid carbide	AlTiN nano	DIN 6527K	4.000 - 20.000	54576	66
	○	●	○	○	○	SuperF-UT VA-X	HA	36/38	Solid carbide	AlTiN nano	DIN 6527L	3.000 - 25.000	54558	67
	○	●	○	○	○	SuperF-UT VA-X	HB	36/38	Solid carbide	AlTiN nano	DIN 6527L	3.000 - 25.000	54559	68
	○	●	○	○	○	SuperF-UT VA-X²	HB	36/38	Solid carbide	TiAlZrN	DIN 6527L	3.000 - 25.000	64553	69
	○	●	○	○	○	SuperF-UT VA-X-IK	HB	36/38	Solid carbide	AlTiN nano	DIN 6527L	6.000 - 25.000	54575	70
	○	●	○	○	○	SuperF-UT VA-r	HB	38/40	Solid carbide	TiAlSiN	DIN 6527L	3.000 - 20.000	54542	71
	○	●	○	○	○	SuperF-UT VA-XF	HA	36/38	Solid carbide	AlTiN nano	DIN 6527L	6.000 - 25.000	54568	73
	○	●	○	○	○	SuperF-UT VA-XF	HB	36/38	Solid carbide	AlTiN nano	DIN 6527L	6.000 - 25.000	54569	74
	○	○	○	○	○	SuperF-UT VA	HB	40/42	Solid carbide	TiAlN	DIN 6527L	4.000 - 20.000	64557	75
	○	○	○	○	○	SuperF-UT VA-IK	HB	40/42	Solid carbide	TiAlN	DIN 6527L	6.000 - 20.000	64567	76

SuperF-UT

ALUMINIUM, NON-FERROUS METALS, PLASTICS



- **SYMETRIC FACE GEOMETRY**

Thanks to the symetric face geometry, the load on the machine and chips are evenly distributed on all cutting edges of our 3-fluted tools.

- **UNEQUAL HELIX**

39°/40°/41° in standard, 40°/42° with type AI, 29°/30°/31° with type AI-F

- **NANO POLISHED CUTTING EDGES**

- **SPECIALLY DEVELOPED ROUGHING GEOMETRY**

Type AI-F

- **UP TO 5XD CUTTING LENGTH**

- **SHANK FORM HA OR HB**

- **BRIGHT FINISHED OR CARBO-COATED**

On request, we can supply any standard tool from this range with a carbo-coating for significantly increased tool life and cutting values.



P	M	K	N	S	H	Type	Shank form	Helix angle °	Tool material	Surface	Standard	d1/mm	Catalogue no.	Progr. page
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SuperF-UT end mills

						SuperF-UT Al-3	HA	39/40/41	Solid carbide	bright	Company std.	3.000 - 20.000	74552	78
						SuperF-UT Al-3	HB	39/40/41	Solid carbide	bright	Company std.	3.000 - 20.000	74553	79
						SuperF-UT Al-L	HB	39/40/41	Solid carbide	bright	Company std.	5.000 - 20.000	74556	80
						SuperF-UT Al-XL	HB	39/40/41	Solid carbide	bright	Company std.	6.000 - 20.000	74558	81
						SuperF-UT Al-r	HB	39/40/41	Solid carbide	bright	Company std.	6.000 - 25.000	74562	82
						SuperF-UT Al-X	HB	39/40/41	Solid carbide	DLC	Company std.	5.000 - 20.000	54592	83
						SuperF-UT Al-F	HA	29/30/31	Solid carbide	bright	Company std.	6.000 - 25.000	54570	84
						SuperF-UT Al-F	HB	29/30/31	Solid carbide	bright	Company std.	6.000 - 25.000	54571	85
						SuperF-UT Al	HA	40/42	Solid carbide	bright	DIN 6527L	4.000 - 20.000	74554	86
						SuperF-UT Al	HB	40/42	Solid carbide	bright	DIN 6527L	4.000 - 20.000	74555	87

SuperF-UT

SETS

- **OUR SuperF-UT TOOLS**
in practical tool set compositions for your cost advantage.
In round boxes or compact cases.



P	M	K	N	S	H	Type	Shank form	Helix angle °	Tool material	Surface	Surface	d1/mm	Catalogue no.	Progr. page
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Sets

	•	•	•	•	•	SuperF-UT NX	HA	36/38/37	Solid carbide	TiAlSiN	DIN 6527L	6.000-16.000	322 042 945	90
	•	•	•	•	•	SuperF-UT NX	HB	36/38/37	Solid carbide	TiAlSiN	DIN 6527L	6.000-16.000	322 042 946	91
	•	•	•	•	•	SuperF-UT NX	HA	36/38/37	Solid carbide	TiAlSiN	DIN 6527L	5.700-15.600	322 042 947	92
	•	•	•	•	•	SuperF-UT NX	HB	36/38/37	Solid carbide	TiAlSiN	DIN 6527L	5.700-15.600	322 042 948	93
	•	•	•	•	•	SuperF-UT Z	HB	48	Solid carbide	AlTiN+	Company std.	6.000-16.000	78882 1.0	94
	•	•	•	•	•	SuperF-UT Z	HB	48	Solid carbide	AlTiN+	Company std.	6.000-12.000	78882 2.0	95
	•	○	•	○	○	SuperF-UT N	HB	35/38	Solid carbide	TiAlN	DIN 6527L	6.000-16.000	78881 1.0	96
	•	○	•	○	○	SuperF-UT N ²	HB	35/38	Solid carbide	TiAlZrN	DIN 6527L	6.000-16.000	78883 1,0	97
	•	•	•	•	○	SuperAF-90	HA	0	Solid carbide	TiAlZrN	Company std.	6.000-12.000	322 052 875	98
	•	•	•	•	○	SuperAF-90	HB	0	Solid carbide	TiAlZrN	Company std.	6.000-12.000	322 044 176	98

SuperF-UT

DEBURRING AND CHAMFERING TOOLS



- **CHAMFER ANGLES**

60°/90°/120°

- **4 OR 6 CUTTING EDGES**

Multi-fluted version for faster deburring and chamfering, as well as for increased tool life.

- **WEAR-RESISTANT AITiN OR TiAlZrN COATING**

Universally applicable for general steels and high-strength materials as well as for aluminium, aluminium alloys and other non-ferrous metals.

- **RADIAL RELIEVED**

- **SHANK FORM HA OR HB**



P	M	K	N	S	H	Type	Shank form	Helix angle °	Tool material	Surface	Standard	d1/mm	Catalogue no.	Progr. page
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Deburring and chamfering tools

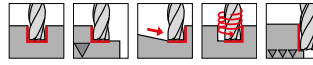
	•	•	•	•	•	SuperAF-60	HA	0	Solid carbide	AlTiN	Company std.	4.000 - 12.000	53393	100
	•	•	•	•	•	SuperAF-60	HB	0	Solid carbide	AlTiN	Company std.	6.000 - 12.000	53394	101
	•	•	•	•	•	SuperAF-90	HA	0	Solid carbide	AlTiN	Company std.	4.000 - 12.000	53395	102
	•	•	•	•	•	SuperAF-90	HB	0	Solid carbide	AlTiN	Company std.	4.000 - 12.000	53396	103
	•	•	•	•	•	SuperAF-90	HB	0	Solid carbide	TiAlZrN	Company std.	6.000 - 20.000	53399	104
	•	•	•	•	•	SuperAF-120	HA	0	Solid carbide	AlTiN	Company std.	4.000 - 12.000	53397	105
	•	•	•	•	•	SuperAF-120	HB	0	Solid carbide	AlTiN	Company std.	6.000 - 12.000	53398	106
	•	•	•	•	•	SuperAD-90	cyl.	0	Solid carbide	AlTiN nano	Company std.	3.000 - 12.000	52365	107

SuperF-UT end mills

SuperF-UT end mills Z



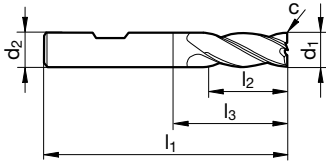
Catalogue no. 54577



P	M	K	N	S	H
●	●			●	

Application recommendations page 110-124

- particularly stable thanks to re-inforced core
- for universal application
- for materials up to 1400 N/mm²
- micro-corner protection
- centre cutting
- unequal flute spacing
- HPC machining of tough, low- and high-alloyed steels and difficult to machine special materials
- also available as kit 78882 1.000 and 78882 2.000



d1 h10 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	57.000	8.000	10.900	0.060	4	3.000
4.000	6.000	57.000	11.000	13.900	0.080	4	4.000
5.000	6.000	57.000	13.000	15.900	0.100	4	5.000
6.000	6.000	57.000	15.000	21.000	0.120	4	6.000
8.000	8.000	63.000	20.000	27.000	0.160	4	8.000
10.000	10.000	72.000	24.000	32.000	0.200	4	10.000
12.000	12.000	83.000	28.000	38.000	0.240	4	12.000
16.000	16.000	92.000	36.000	44.000	0.320	4	16.000
20.000	20.000	104.000	45.000	54.000	0.400	4	20.000

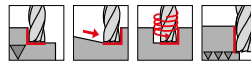
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23		270	0,015	0,030	0,040	0,055	0,07	0,09
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18		120	0,011	0,021	0,028	0,040	0,05	0,06
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21		120	0,013	0,026	0,035	0,050	0,06	0,08

SuperF-UT end mills

SuperF-UT end mills ZS

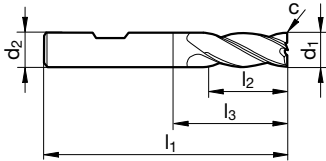


Catalogue no. 54578



P	M	K	N	S	H	Application recommendations page 110-124
●	●			●		

- particularly stable thanks to re-inforced core
- with chip breaker
- for universal application
- for materials up to 1400 N/mm²
- micro-corner protection
- centre cutting
- unequal flute spacing
- HPC machining of tough, low- and high-alloyed steels and difficult to machine special materials



d1 h10 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	57.000	12.000	14.900	0.060	4	3.000
4.000	6.000	65.000	16.000	18.900	0.080	4	4.000
5.000	6.000	65.000	20.000	22.900	0.100	4	5.000
6.000	6.000	65.000	24.000	29.000	0.120	4	6.000
8.000	8.000	75.000	32.000	39.000	0.160	4	8.000
10.000	10.000	90.000	40.000	50.000	0.200	4	10.000
12.000	12.000	100.000	46.000	55.000	0.240	4	12.000
16.000	16.000	108.000	55.000	60.000	0.320	4	16.000
20.000	20.000	126.000	65.000	76.000	0.400	4	20.000

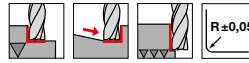
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23		270	0,015	0,030	0,040	0,055	0,07	0,09
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18		120	0,011	0,021	0,028	0,040	0,05	0,06
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21		120	0,013	0,026	0,035	0,050	0,06	0,08

SuperF-UT end mills

SuperF-UT milling cutter ZS-r

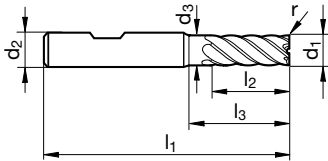


Catalogue no. 54555



P	M	K	N	S	H	Application recommendations page 110-124
●	●	●	○	●		

- with chip breaker
- for universal application
- for materials up to 1400 N/mm²
- with defined corner radii
- without centre cutting
- unequal flute spacing
- neck clearance



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	r	Z	Code no.
6.000	6.000	5.700	65.000	20.000	28.000	0.200	5	6.002
6.000	6.000	5.700	65.000	20.000	28.000	0.500	5	6.005
6.000	6.000	5.700	65.000	20.000	28.000	1.000	5	6.010
8.000	8.000	7.700	75.000	26.000	38.000	0.300	5	8.003
8.000	8.000	7.700	75.000	26.000	38.000	0.500	5	8.005
8.000	8.000	7.700	75.000	26.000	38.000	1.000	5	8.010
8.000	8.000	7.700	75.000	26.000	38.000	1.500	5	8.015
10.000	10.000	9.500	80.000	32.000	38.000	0.500	5	10.005
10.000	10.000	9.500	80.000	32.000	38.000	1.000	5	10.010
10.000	10.000	9.500	80.000	32.000	38.000	1.500	5	10.015
10.000	10.000	9.500	80.000	32.000	38.000	2.000	5	10.020
12.000	12.000	11.500	93.000	40.000	46.000	0.500	5	12.005
12.000	12.000	11.500	93.000	40.000	46.000	1.000	5	12.010
12.000	12.000	11.500	93.000	40.000	46.000	1.500	5	12.015
12.000	12.000	11.500	93.000	40.000	46.000	2.000	5	12.020
16.000	16.000	15.500	108.000	50.000	58.000	0.500	5	16.005
16.000	16.000	15.500	108.000	50.000	58.000	1.000	5	16.010
16.000	16.000	15.500	108.000	50.000	58.000	1.500	5	16.015
16.000	16.000	15.500	108.000	50.000	58.000	2.000	5	16.020
16.000	16.000	15.500	108.000	50.000	58.000	3.000	5	16.030
20.000	20.000	19.500	126.000	62.000	74.000	1.000	5	20.010
20.000	20.000	19.500	126.000	62.000	74.000	1.500	5	20.015
20.000	20.000	19.500	126.000	62.000	74.000	2.000	5	20.020
20.000	20.000	19.500	126.000	62.000	74.000	3.000	5	20.030

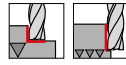
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23		270	0,015	0,030	0,040	0,055	0,07	0,09
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18		120	0,011	0,021	0,028	0,040	0,05	0,06
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21		120	0,013	0,026	0,035	0,050	0,06	0,08

SuperF-UT end mills

SuperF-UT end mills ZS-7

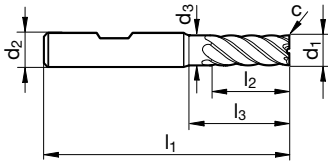


Catalogue no. 54581



P	M	K	N	S	H	Application recommendations page 110-124
●	●	●	○	●		

- neck clearance
- with chip breaker
- for universal application
- for materials up to 1400 N/mm²
- micro-corner protection
- without centre cutting
- unequal flute spacing
- HPC machining of tough, low- and high-alloyed steels and difficult to machine special materials



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	65.000	20.000	28.000	0.120	7	6.000
8.000	8.000	7.700	75.000	26.000	38.000	0.160	7	8.000
10.000	10.000	9.500	80.000	32.000	38.000	0.200	7	10.000
12.000	12.000	11.500	93.000	40.000	46.000	0.240	7	12.000
16.000	16.000	15.500	108.000	50.000	58.000	0.320	7	16.000
20.000	20.000	19.500	126.000	62.000	74.000	0.400	7	20.000

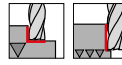
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23		270	0,015	0,030	0,040	0,055	0,07	0,09
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18		120	0,011	0,021	0,028	0,040	0,05	0,06
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21		120	0,013	0,026	0,035	0,050	0,06	0,08

SuperF-UT end mills

SuperF-UT end mills N-5

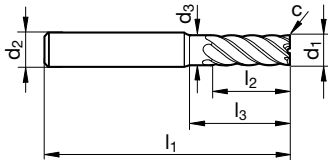


Catalogue no. 54583



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•		

- greatest possible advantages with finishing and semi-roughing operations specially under HPC conditions
- unequal flute spacing
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	57.000	11.000	18.000	0.050	5	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.050	5	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.050	5	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.100	5	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	5	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.100	5	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.150	5	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.150	5	20.000

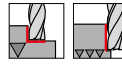
ISO	Hardness	V _c	f _z (mm/z) / Ø							V _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23		270	0,015	0,030	0,040	0,055	0,07	0,09
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18		120	0,011	0,021	0,028	0,040	0,05	0,06
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21		120	0,013	0,026	0,035	0,050	0,06	0,08
K	≤ 240 HB	300	0,038	0,076	0,101	0,150	0,18	0,24	0,30	320	0,018	0,036	0,048	0,072	0,09	0,11	0,14
	≥ 240 HB	260	0,035	0,069	0,092	0,127	0,15	0,20	0,25		280	0,017	0,033	0,044	0,061	0,07	0,10
N	≤ 7 % Si	900	0,045	0,090	0,120	0,184	0,22	0,29	0,37	1000	0,021	0,043	0,057	0,088	0,11	0,14	0,18
	≥ 7 % Si	430	0,038	0,076	0,101	0,138	0,17	0,22	0,28		460	0,018	0,036	0,048	0,066	0,08	0,11

SuperF-UT end mills

SuperF-UT end mills N-5

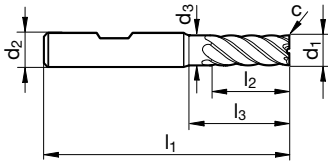


Catalogue no. 54584



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•		

- greatest possible advantages with finishing and semi-roughing operations specially under HPC conditions
- unequal flute spacing
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	57.000	11.000	18.000	0.050	5	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.050	5	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.050	5	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.100	5	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	5	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.100	5	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.150	5	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.150	5	20.000

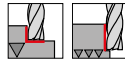
ISO	Hardness	V _c	f _z (mm/z) / Ø							V _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23		270	0,015	0,030	0,040	0,055	0,07	0,09
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18		120	0,011	0,021	0,028	0,040	0,05	0,06
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21		120	0,013	0,026	0,035	0,050	0,06	0,08
K	≤ 240 HB	300	0,038	0,076	0,101	0,150	0,18	0,24	0,30	320	0,018	0,036	0,048	0,072	0,09	0,11	0,14
	≥ 240 HB	260	0,035	0,069	0,092	0,127	0,15	0,20	0,25		280	0,017	0,033	0,044	0,061	0,07	0,10
N	≤ 7 % Si	900	0,045	0,090	0,120	0,184	0,22	0,29	0,37	1000	0,021	0,043	0,057	0,088	0,11	0,14	0,18
	≥ 7 % Si	430	0,038	0,076	0,101	0,138	0,17	0,22	0,28		460	0,018	0,036	0,048	0,066	0,08	0,11

SuperF-UT end mills

SuperF-UT end mills N-5

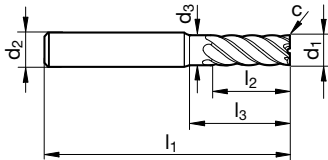


Catalogue no. 54579



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•		

- greatest possible advantages with finishing and semi-roughing operations specially under HPC conditions
- unequal flute spacing
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	65.000	12.000	26.000	0.050	5	4.000
5.000	6.000	4.800	65.000	15.000	26.000	0.050	5	5.000
6.000	6.000	5.700	65.000	18.000	28.000	0.050	5	6.000
8.000	8.000	7.700	75.000	24.000	38.000	0.100	5	8.000
10.000	10.000	9.500	80.000	30.000	38.000	0.100	5	10.000
12.000	12.000	11.500	93.000	36.000	46.000	0.100	5	12.000
16.000	16.000	15.500	108.000	48.000	58.000	0.150	5	16.000
20.000	20.000	19.500	126.000	60.000	74.000	0.150	5	20.000

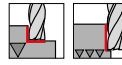
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23		270	0,015	0,030	0,040	0,055	0,07	0,09
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18		120	0,011	0,021	0,028	0,040	0,05	0,06
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21		120	0,013	0,026	0,035	0,050	0,06	0,08
K	≤ 240 HB	300	0,038	0,076	0,101	0,150	0,18	0,24	0,30	320	0,018	0,036	0,048	0,072	0,09	0,11	0,14
	≥ 240 HB	260	0,035	0,069	0,092	0,127	0,15	0,20	0,25		280	0,017	0,033	0,044	0,061	0,07	0,10
N	≤ 7 % Si	900	0,045	0,090	0,120	0,184	0,22	0,29	0,37	1000	0,021	0,043	0,057	0,088	0,11	0,14	0,18
	≥ 7 % Si	430	0,038	0,076	0,101	0,138	0,17	0,22	0,28		460	0,018	0,036	0,048	0,066	0,08	0,11

SuperF-UT end mills

SuperF-UT end mills N-5



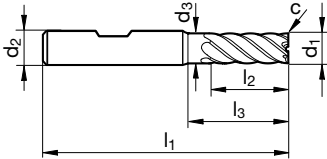
Catalogue no. 54580



P	M	K	N	S	H
•	•	•	•	•	

Application recommendations page 110-124

- greatest possible advantages with finishing and semi-roughing operations specially under HPC conditions
- unequal flute spacing
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	65.000	12.000	26.000	0.050	5	4.000
5.000	6.000	4.800	65.000	15.000	26.000	0.050	5	5.000
6.000	6.000	5.700	65.000	18.000	28.000	0.050	5	6.000
8.000	8.000	7.700	75.000	24.000	38.000	0.100	5	8.000
10.000	10.000	9.500	80.000	30.000	38.000	0.100	5	10.000
12.000	12.000	11.500	93.000	36.000	46.000	0.100	5	12.000
16.000	16.000	15.500	108.000	48.000	58.000	0.150	5	16.000
20.000	20.000	19.500	126.000	60.000	74.000	0.150	5	20.000

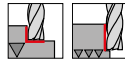
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23		270	0,015	0,030	0,040	0,055	0,07	0,09
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18		120	0,011	0,021	0,028	0,040	0,05	0,06
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21		120	0,013	0,026	0,035	0,050	0,06	0,08
K	≤ 240 HB	300	0,038	0,076	0,101	0,150	0,18	0,24	0,30	320	0,018	0,036	0,048	0,072	0,09	0,11	0,14
	≥ 240 HB	260	0,035	0,069	0,092	0,127	0,15	0,20	0,25		280	0,017	0,033	0,044	0,061	0,07	0,10
N	≤ 7 % Si	900	0,045	0,090	0,120	0,184	0,22	0,29	0,37	1000	0,021	0,043	0,057	0,088	0,11	0,14	0,18
	≥ 7 % Si	430	0,038	0,076	0,101	0,138	0,17	0,22	0,28		460	0,018	0,036	0,048	0,066	0,08	0,11

SuperF-UT end mills

SuperF-UT end mills FS

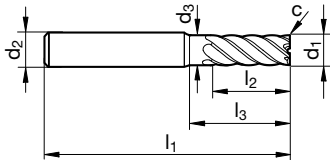


Catalogue no. 64558



P	M	K	N	S	H	Application recommendations page 110-124
●	○	●	○	○	○	

- greatest possible advantages with finishing and semi-roughing operations specially under HPC conditions
- for fine finishing in materials up to 50 HRC
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
8.000	8.000	7.700	63.000	19.000	26.000	0.100	6	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	6	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.100	6	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.150	6	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.150	6	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.200	6	25.000

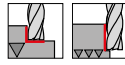
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
			a _p =l2		HPC	HSC		a _e max = 0,10xD			a _p =l2			a _e max = 0,02xD			
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23	270	0,015	0,030	0,040	0,055	0,07	0,09	0,11
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18	120	0,011	0,021	0,028	0,040	0,05	0,06	0,08
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21	120	0,013	0,026	0,035	0,050	0,06	0,08	0,10
K	≤ 240 HB	300	0,038	0,076	0,101	0,150	0,18	0,24	0,30	320	0,018	0,036	0,048	0,072	0,09	0,11	0,14
	≥ 240 HB	260	0,035	0,069	0,092	0,127	0,15	0,20	0,25	280	0,017	0,033	0,044	0,061	0,07	0,10	0,12
N	≤ 7 % Si	900	0,045	0,090	0,120	0,184	0,22	0,29	0,37	1000	0,021	0,043	0,057	0,088	0,11	0,14	0,18
	≥ 7 % Si	430	0,038	0,076	0,101	0,138	0,17	0,22	0,28	460	0,018	0,036	0,048	0,066	0,08	0,11	0,13

SuperF-UT end mills

SuperF-UT-milling cutter FS²

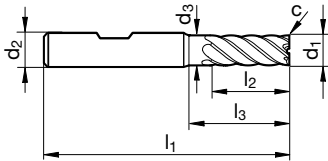


Catalogue no. 64560



P	M	K	N	S	H	Application recommendations page 110-124
○	●	○	●	●	○	

- neck clearance
- centre cutting
- greatest possible advantages with finishing and semi-roughing operations specially under HPC conditions
- suitable for fine-finishing in materials up to 50 HRC
- micro-corner protection
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
8.000	8.000	7.700	63.000	19.000	26.000	0.100	6	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	6	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.100	6	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.150	6	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.150	6	20.000

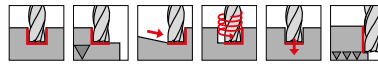
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
			a _p =l2		HPC	HSC		a _e max = 0,10xD			a _p =l2			a _e max = 0,02xD			
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23	270	0,015	0,030	0,040	0,055	0,07	0,09	0,11
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18	120	0,011	0,021	0,028	0,040	0,05	0,06	0,08
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21	120	0,013	0,026	0,035	0,050	0,06	0,08	0,10
N	≤ 7 % Si	900	0,045	0,090	0,120	0,184	0,22	0,29	0,37	1000	0,021	0,043	0,057	0,088	0,11	0,14	0,18
	≥ 7 % Si	430	0,038	0,076	0,101	0,138	0,17	0,22	0,28	460	0,018	0,036	0,048	0,066	0,08	0,11	0,13

SuperF-UT end mills

SuperF-UT end mills NX Micro



Catalogue no. 54594

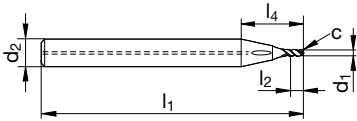


P	M	K	N	S	H
●	●	●	●	●	○

Application recommendations page 110-124

- for extreme cutting values and cutting performance
- with internal cooling: peripheral cooling with 4 or 6 exits
- centre cutting
- improved face geometry
- 2.5xD cutting edge length

Special -, super- and Ti-



d1 h8 mm	d2 h5 mm	l1 mm	l2 mm	l4 mm	c mm x 45°	Z	Code no.
0.800	4.000	38.000	2.000	9.500	0.016	3	0.800
1.000	4.000	38.000	2.500	9.300	0.020	3	1.000
1.200	4.000	38.000	3.000	9.400	0.024	3	1.200
1.500	4.000	45.000	3.750	9.700	0.030	3	1.500
1.800	4.000	45.000	4.500	10.200	0.036	3	1.800
2.000	6.000	50.000	5.000	14.600	0.040	3	2.000
2.200	6.000	50.000	5.500	14.900	0.044	3	2.200
2.500	6.000	50.000	6.250	15.300	0.050	3	2.500
2.800	6.000	50.000	7.000	15.900	0.056	3	2.800
3.000	6.000	50.000	7.500	16.200	0.060	3	3.000

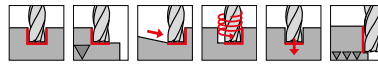
ISO	Hardness	a _p											a _e	a _p										
			Ø1,0		Ø1,5		Ø2,0		Ø2,5		Ø3,0				Ø1,0		Ø1,5		Ø2,0		Ø2,5		Ø3,0	
			v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z			v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z
P	≤ 850 N/mm ²	1,00xØ	140	0,009	168	0,014	182	0,018	182	0,023	196	0,027	0,25xØ	2,0xØ	170	0,014	204	0,021	221	0,028	221	0,035	238	0,043
	≥ 850 N/mm ²	0,75xØ	140	0,006	168	0,009	182	0,012	182	0,015	196	0,018	0,20xØ	2,0xØ	170	0,009	204	0,014	221	0,019	221	0,024	238	0,028
M	≤ 750 N/mm ²	1,00xØ	140	0,008	168	0,012	182	0,016	182	0,020	196	0,024	0,25xØ	2,0xØ	170	0,013	204	0,019	221	0,025	221	0,032	238	0,038
	≥ 750 N/mm ²	0,75xØ	90	0,006	108	0,009	117	0,012	117	0,015	126	0,018	0,20xØ	2,0xØ	105	0,010	126	0,014	137	0,019	137	0,024	147	0,029
S	Ni-based	0,50xØ	60	0,004	72	0,005	78	0,007	78	0,009	84	0,011	0,15xØ	2,0xØ	70	0,006	84	0,009	91	0,012	91	0,014	98	0,017
	Ti-based	0,75xØ	100	0,008	120	0,011	130	0,015	130	0,019	140	0,023	0,20xØ	2,0xØ	115	0,012	138	0,018	150	0,024	150	0,030	161	0,035
K	≤ 240 HB	1,00xØ	120	0,007	144	0,011	156	0,014	156	0,018	168	0,021	0,25xØ	2,0xØ	145	0,011	174	0,017	189	0,022	189	0,028	203	0,033
	≥ 240 HB	1,00xØ	100	0,006	120	0,009	130	0,012	130	0,016	140	0,019	0,25xØ	2,0xØ	120	0,010	144	0,015	156	0,020	156	0,024	168	0,029
N	Al	1,00xØ	170	0,012	204	0,018	221	0,024	221	0,030	238	0,036	0,25xØ	2,0xØ	200	0,019	240	0,028	260	0,038	260	0,047	280	0,057
	NE	1,00xØ	125	0,011	150	0,017	162,5	0,022	162,5	0,028	175	0,033	0,25xØ	2,0xØ	150	0,017	180	0,026	195	0,035	195	0,044	210	0,052

SuperF-UT end mills

SuperF-UT end mills NX Micro



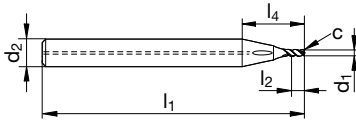
Catalogue no. 54595



P	M	K	N	S	H
●	●	●	●	●	○

Application recommendations page 110-124

- for extreme cutting values and cutting performance
- with internal cooling: peripheral cooling with 4 or 6 exits
- centre cutting
- improved face geometry
- 5xD cutting edge length



d1 h8 mm	d2 h5 mm	l1 mm	l2 mm	l4 mm	c mm x 45°	Z	Code no.
1.000	4.000	45.000	5.000	11.800	0.020	3	1.000
1.500	4.000	50.000	7.500	13.500	0.030	3	1.500
2.000	6.000	57.000	10.000	19.600	0.040	3	2.000
2.500	6.000	57.000	12.500	21.500	0.050	3	2.500
3.000	6.000	57.000	15.000	23.700	0.060	3	3.000

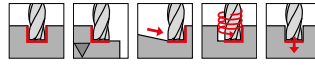
ISO	Hardness	a _p											a _e	a _p										
			Ø1,0		Ø1,5		Ø2,0		Ø2,5		Ø3,0				Ø1,0		Ø1,5		Ø2,0		Ø2,5		Ø3,0	
			v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z			v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z	v _c	f _z
P	≤ 850 N/mm ²	0,50xØ	112	0,008	134	0,012	146	0,016	146	0,020	157	0,024	0,10xØ	5,0xØ	134	0,013	161	0,019	174	0,026	174	0,032	188	0,038
	≥ 850 N/mm ²	0,25xØ	112	0,005	134	0,008	146	0,011	146	0,014	157	0,016	0,08xØ	5,0xØ	134	0,009	161	0,013	174	0,017	174	0,021	188	0,026
M	≤ 750 N/mm ²	0,25xØ	112	0,007	134	0,011	146	0,014	146	0,018	157	0,022	0,10xØ	5,0xØ	134	0,011	161	0,017	174	0,023	174	0,028	188	0,034
	≥ 750 N/mm ²	0,25xØ	71	0,006	85	0,008	92	0,011	92	0,014	99	0,017	0,05xØ	5,0xØ	86	0,009	103	0,013	112	0,017	112	0,022	120	0,026
S	Ni-based	0,25xØ	46	0,003	55	0,005	60	0,007	60	0,008	64	0,010	0,05xØ	5,0xØ	55	0,005	66	0,008	72	0,010	72	0,013	77	0,016
	Ti-based	0,25xØ	72	0,007	86	0,010	94	0,014	94	0,017	101	0,020	0,08xØ	5,0xØ	86	0,011	103	0,016	112	0,021	112	0,027	120	0,032
K	≤ 240 HB	0,50xØ	96	0,006	115	0,009	125	0,013	125	0,016	134	0,019	0,10xØ	5,0xØ	115	0,010	138	0,015	150	0,020	150	0,025	161	0,030
	≥ 240 HB	0,50xØ	80	0,006	96	0,008	104	0,011	104	0,014	112	0,017	0,10xØ	5,0xØ	96	0,009	115	0,013	125	0,018	125	0,022	134	0,026
N	Al	0,50xØ	136	0,011	163	0,016	177	0,022	177	0,027	190	0,032	0,15xØ	5,0xØ	163	0,017	196	0,026	212	0,034	212	0,043	228	0,051
	NE	0,50xØ	100	0,010	120	0,015	130	0,020	130	0,025	140	0,030	0,12xØ	5,0xØ	120	0,016	144	0,023	156	0,031	156	0,039	168	0,047

SuperF-UT end mills

SuperF-UT end mills NX-3



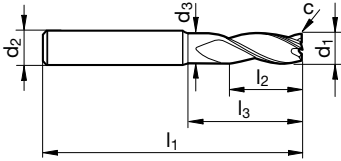
Catalogue no. 54586



P	M	K	N	S	H
●	●	●	●	●	

Application recommendations page 110-124

- adapted face and flute geometry for maximum cutting rates and optimal chip evacuation
- ramping up to 45° is possible
- long tool life thanks to extremely hard coating
- 3-fluted with increased flute space
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.050	3	3.000
3.500	6.000	3.300	57.000	10.000	15.000	0.050	3	3.500
3.700	6.000	3.500	57.000	11.000	15.000	0.060	3	3.700
4.000	6.000	3.800	57.000	11.000	18.000	0.060	3	4.000
4.500	6.000	4.300	57.000	11.000	18.000	0.070	3	4.500
4.700	6.000	4.500	57.000	13.000	18.000	0.070	3	4.700
5.000	6.000	4.800	57.000	13.000	18.000	0.080	3	5.000
5.500	6.000	5.300	57.000	13.000	19.400	0.080	3	5.500
5.700	6.000	5.500	57.000	13.000	19.600	0.090	3	5.700
6.000	6.000	5.700	57.000	13.000	20.000	0.090	3	6.000
6.500	8.000	6.200	63.000	16.000	24.400	0.100	3	6.500
7.000	8.000	6.700	63.000	16.000	24.900	0.110	3	7.000
7.500	8.000	7.200	63.000	19.000	25.300	0.110	3	7.500
8.000	8.000	7.700	63.000	19.000	26.000	0.120	3	8.000
8.500	10.000	8.200	72.000	19.000	29.400	0.130	3	8.500
9.000	10.000	8.700	72.000	19.000	29.900	0.140	3	9.000
9.500	10.000	9.200	72.000	22.000	30.300	0.140	3	9.500
10.000	10.000	9.500	72.000	22.000	30.000	0.150	3	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.180	3	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.190	3	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.240	3	20.000

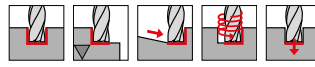
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	270	0,017	0,025	0,034	0,050	0,060	0,080	0,100	350	0,021	0,032	0,042	0,063	0,075	0,100	0,125
	≥ 850 N/mm ²	180	0,014	0,021	0,028	0,045	0,054	0,072	0,090		260	0,018	0,027	0,036	0,059	0,070	0,094
M	≤ 750 N/mm ²	120	0,014	0,021	0,028	0,045	0,054	0,072	0,090	160	0,018	0,027	0,036	0,059	0,070	0,094	0,117
	≥ 750 N/mm ²	80	0,013	0,019	0,026	0,040	0,048	0,064	0,080		120	0,019	0,029	0,038	0,060	0,072	0,096
S	Ti-based	60	0,013	0,019	0,026	0,040	0,048	0,064	0,080	110	0,017	0,025	0,033	0,052	0,062	0,083	0,104
K	≤ 240 HB	150	0,017	0,025	0,034	0,050	0,060	0,080	0,100	190	0,021	0,032	0,042	0,063	0,075	0,100	0,125
N	≥ 7 % Si	340	0,018	0,027	0,036	0,055	0,066	0,088	0,110	440	0,023	0,034	0,045	0,069	0,083	0,110	0,138

SuperF-UT end mills

SuperF-UT end mills NX-3



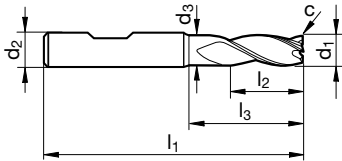
Catalogue no. 54587



P	M	K	N	S	H
●	●	●	●	●	

Application recommendations page 110-124

- adapted face and flute geometry for maximum cutting rates and optimal chip evacuation
- ramping up to 45° is possible
- long tool life thanks to extremely hard coating
- 3-fluted with increased flute space
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.050	3	3.000
3.500	6.000	3.300	57.000	10.000	15.000	0.050	3	3.500
3.700	6.000	3.500	57.000	11.000	15.000	0.060	3	3.700
4.000	6.000	3.800	57.000	11.000	18.000	0.060	3	4.000
4.500	6.000	4.300	57.000	11.000	18.000	0.070	3	4.500
4.700	6.000	4.500	57.000	13.000	18.000	0.070	3	4.700
5.000	6.000	4.800	57.000	13.000	18.000	0.080	3	5.000
5.500	6.000	5.300	57.000	13.000	19.400	0.080	3	5.500
5.700	6.000	5.500	57.000	13.000	19.600	0.090	3	5.700
6.000	6.000	5.700	57.000	13.000	20.000	0.090	3	6.000
6.500	8.000	6.200	63.000	16.000	24.400	0.100	3	6.500
7.000	8.000	6.700	63.000	16.000	24.900	0.110	3	7.000
7.500	8.000	7.200	63.000	19.000	25.300	0.110	3	7.500
8.000	8.000	7.700	63.000	19.000	26.000	0.120	3	8.000
8.500	10.000	8.200	72.000	19.000	29.400	0.130	3	8.500
9.000	10.000	8.700	72.000	19.000	29.900	0.140	3	9.000
9.500	10.000	9.200	72.000	22.000	30.300	0.140	3	9.500
10.000	10.000	9.500	72.000	22.000	30.000	0.150	3	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.180	3	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.190	3	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.240	3	20.000

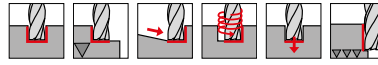
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø												
			3	6	8	10	12	16	20		3	6	8	10	12	16	20						
P	≤ 850 N/mm ²	270	a _p = 1,0xD		a _e = 1,0xD	0,017	0,025	0,034	0,050	0,060	0,080	0,100	350	a _p = 1,5xD		a _{e max} = 0,33xD	0,021	0,032	0,042	0,063	0,075	0,100	0,125
	≥ 850 N/mm ²					180	0,014	0,021	0,028	0,045	0,054	0,072					0,090	260	0,018	0,027	0,036	0,059	0,070
M	≤ 750 N/mm ²	120	a _p = 1,0xD		a _e = 1,0xD	0,014	0,021	0,028	0,045	0,054	0,072	0,090	160	a _p = 1,5xD		a _{e max} = 0,33xD	0,018	0,027	0,036	0,059	0,070	0,094	0,117
	≥ 750 N/mm ²					80	0,013	0,019	0,026	0,040	0,048	0,064					0,080	120	0,019	0,029	0,038	0,060	0,072
S	Ti-based	60	a _p = 1,0xD		a _e = 1,0xD	0,013	0,019	0,026	0,040	0,048	0,064	0,080	110	a _p = 1,5xD		a _{e max} = 0,33xD	0,017	0,025	0,033	0,052	0,062	0,083	0,104
K	≤ 240 HB	150	a _p = 1,0xD		a _e = 1,0xD	0,017	0,025	0,034	0,050	0,060	0,080	0,100	190	a _p = 1,5xD		a _{e max} = 0,33xD	0,021	0,032	0,042	0,063	0,075	0,100	0,125
N	≥ 7 % Si	340	a _p = 1,0xD		a _e = 1,0xD	0,018	0,027	0,036	0,055	0,066	0,088	0,110	440	a _p = 1,5xD		a _{e max} = 0,33xD	0,023	0,034	0,045	0,069	0,083	0,110	0,138

SuperF-UT end mills

SuperF-UT end mills NX



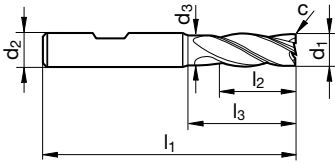
Catalogue no. 54589



P	M	K	N	S	H
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Application recommendations page 110-124

- short stable design
- adapted face and flute geometry for maximum cutting rates and optimal chip evacuation
- ramping up to 45° is possible
- long tool life thanks to extremely hard coating
- high process reliability with simultaneous reduction of machining times
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	50.000	5.000	12.000	0.030	4	3.000
3.700	6.000	3.500	54.000	8.000	12.000	0.040	4	3.700
4.000	6.000	3.800	54.000	8.000	15.000	0.040	4	4.000
4.700	6.000	4.500	54.000	9.000	15.000	0.050	4	4.700
5.000	6.000	4.800	54.000	9.000	15.000	0.050	4	5.000
5.700	6.000	5.500	54.000	10.000	16.600	0.060	4	5.700
6.000	6.000	5.700	54.000	10.000	17.000	0.060	4	6.000
7.000	8.000	6.700	58.000	11.000	19.900	0.070	4	7.000
7.700	8.000	7.400	58.000	12.000	20.500	0.080	4	7.700
8.000	8.000	7.700	58.000	12.000	21.000	0.080	4	8.000
9.000	10.000	8.700	66.000	13.000	23.900	0.090	4	9.000
9.700	10.000	9.400	66.000	14.000	24.500	0.100	4	9.700
10.000	10.000	9.500	66.000	14.000	24.000	0.100	4	10.000
11.700	12.000	11.200	73.000	16.000	25.300	0.120	4	11.700
12.000	12.000	11.500	73.000	16.000	26.000	0.120	4	12.000
15.600	16.000	15.100	82.000	22.000	31.200	0.160	4	15.600
16.000	16.000	15.500	82.000	22.000	32.000	0.160	4	16.000
19.000	20.000	18.500	92.000	26.000	38.700	0.190	4	19.000
20.000	20.000	19.500	92.000	26.000	40.000	0.200	4	20.000

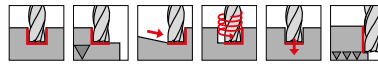
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø							
			3	6	8	10	12	16	20		3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	270	0,017	0,025	0,034	0,050	0,060	0,080	0,100		450	0,027	0,040	0,054	0,080	0,10	0,13	0,16
	≥ 850 N/mm ²	180	0,014	0,021	0,028	0,045	0,054	0,072	0,090		300	0,022	0,034	0,045	0,072	0,09	0,12	0,14
M	≤ 750 N/mm ²	120	0,014	0,021	0,028	0,045	0,054	0,072	0,090		200	0,022	0,034	0,045	0,072	0,09	0,12	0,14
	≥ 750 N/mm ²	80	0,013	0,019	0,026	0,040	0,048	0,064	0,080		140	0,020	0,031	0,041	0,064	0,08	0,10	0,13
S	Ti-based	60	0,013	0,019	0,026	0,040	0,048	0,064	0,080	110	0,020	0,031	0,041	0,064	0,08	0,10	0,13	
K	≤ 240 HB	150	0,017	0,025	0,034	0,050	0,060	0,080	0,100	250	0,027	0,040	0,054	0,080	0,10	0,13	0,16	
N	≥ 7 % Si	340	0,018	0,027	0,036	0,055	0,066	0,088	0,110	570	0,029	0,043	0,058	0,088	0,11	0,14	0,18	

SuperF-UT end mills

SuperF-UT end mills NX



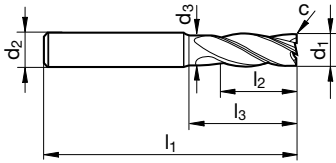
Catalogue no. 54590



P	M	K	N	S	H
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Application recommendations page 110-124

- adapted face and flute geometry for maximum cutting rates and optimal chip evacuation
- ramping up to 45° is possible
- long tool life thanks to extremely hard coating
- high process reliability with simultaneous reduction of machining times
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	57.000	11.000	18.000	0.040	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.050	4	5.000
5.700	6.000	5.500	57.000	13.000	19.600	0.060	4	5.700
6.000	6.000	5.700	57.000	13.000	20.000	0.060	4	6.000
7.700	8.000	7.400	63.000	19.000	25.500	0.080	4	7.700
8.000	8.000	7.700	63.000	19.000	26.000	0.080	4	8.000
9.700	10.000	9.400	72.000	22.000	30.500	0.100	4	9.700
10.000	10.000	9.500	72.000	22.000	30.000	0.100	4	10.000
11.700	12.000	11.200	83.000	26.000	35.300	0.120	4	11.700
12.000	12.000	11.500	83.000	26.000	36.000	0.120	4	12.000
13.700	14.000	13.200	83.000	26.000	35.300	0.140	4	13.700
14.000	14.000	13.500	83.000	26.000	36.000	0.140	4	14.000
15.600	16.000	15.100	92.000	32.000	41.200	0.160	4	15.600
16.000	16.000	15.500	92.000	32.000	42.000	0.160	4	16.000
19.500	20.000	19.000	104.000	38.000	51.100	0.200	4	19.500
20.000	20.000	19.500	104.000	38.000	52.000	0.200	4	20.000

ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø							
			3	6	8	10	12	16	20		3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	270	0,017	0,025	0,034	0,050	0,060	0,080	0,100		450	0,027	0,040	0,054	0,080	0,10	0,13	0,16
	≥ 850 N/mm ²	180	0,014	0,021	0,028	0,045	0,054	0,072	0,090			300	0,022	0,034	0,045	0,072	0,09	0,12
M	≤ 750 N/mm ²	120	0,014	0,021	0,028	0,045	0,054	0,072	0,090		200	0,022	0,034	0,045	0,072	0,09	0,12	0,14
	≥ 750 N/mm ²	80	0,013	0,019	0,026	0,040	0,048	0,064	0,080			140	0,020	0,031	0,041	0,064	0,08	0,10
S	Ti-based	60	0,013	0,019	0,026	0,040	0,048	0,064	0,080		110	0,020	0,031	0,041	0,064	0,08	0,10	0,13
K	≤ 240 HB	150	0,017	0,025	0,034	0,050	0,060	0,080	0,100			250	0,027	0,040	0,054	0,080	0,10	0,13
N	≥ 7 % Si	340	0,018	0,027	0,036	0,055	0,066	0,088	0,110		570	0,029	0,043	0,058	0,088	0,11	0,14	0,18

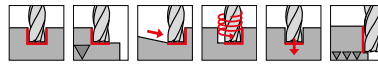
Special-, super- and Ti-alloys

SuperF-UT end mills

SuperF-UT end mills NX



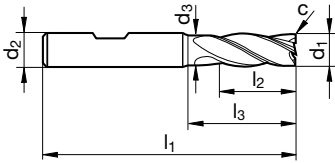
Catalogue no. 54591



P	M	K	N	S	H
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Application recommendations page 110-124

- adapted face and flute geometry for maximum cutting rates and optimal chip evacuation
- ramping up to 45° is possible
- long tool life thanks to extremely hard coating
- high process reliability with simultaneous reduction of machining times
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	57.000	11.000	18.000	0.040	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.050	4	5.000
5.700	6.000	5.500	57.000	13.000	19.600	0.060	4	5.700
6.000	6.000	5.700	57.000	13.000	20.000	0.060	4	6.000
7.700	8.000	7.400	63.000	19.000	25.500	0.080	4	7.700
8.000	8.000	7.700	63.000	19.000	26.000	0.080	4	8.000
9.700	10.000	9.400	72.000	22.000	30.500	0.100	4	9.700
10.000	10.000	9.500	72.000	22.000	30.000	0.100	4	10.000
11.700	12.000	11.200	83.000	26.000	35.300	0.120	4	11.700
12.000	12.000	11.500	83.000	26.000	36.000	0.120	4	12.000
13.700	14.000	13.200	83.000	26.000	35.300	0.140	4	13.700
14.000	14.000	13.500	83.000	26.000	36.000	0.140	4	14.000
15.600	16.000	15.100	92.000	32.000	41.200	0.160	4	15.600
16.000	16.000	15.500	92.000	32.000	42.000	0.160	4	16.000
19.500	20.000	19.000	104.000	38.000	51.100	0.200	4	19.500
20.000	20.000	19.500	104.000	38.000	52.000	0.200	4	20.000

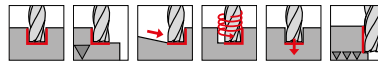
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø							
			3	6	8	10	12	16	20		3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	270	0,017	0,025	0,034	0,050	0,060	0,080	0,100		450	0,027	0,040	0,054	0,080	0,10	0,13	0,16
	≥ 850 N/mm ²	180	0,014	0,021	0,028	0,045	0,054	0,072	0,090			300	0,022	0,034	0,045	0,072	0,09	0,12
M	≤ 750 N/mm ²	120	0,014	0,021	0,028	0,045	0,054	0,072	0,090		200	0,022	0,034	0,045	0,072	0,09	0,12	0,14
	≥ 750 N/mm ²	80	0,013	0,019	0,026	0,040	0,048	0,064	0,080			140	0,020	0,031	0,041	0,064	0,08	0,10
S	Ti-based	60	0,013	0,019	0,026	0,040	0,048	0,064	0,080		110	0,020	0,031	0,041	0,064	0,08	0,10	0,13
K	≤ 240 HB	150	0,017	0,025	0,034	0,050	0,060	0,080	0,100			250	0,027	0,040	0,054	0,080	0,10	0,13
N	≥ 7 % Si	340	0,018	0,027	0,036	0,055	0,066	0,088	0,110		570	0,029	0,043	0,058	0,088	0,11	0,14	0,18

SuperF-UT end mills

SuperF-UT milling cutter NX-IK

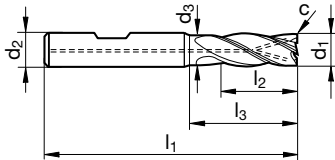


Catalogue no. 54585



P	M	K	N	S	H
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Application recommendations page 110-124



- adapted cutting edge geometry and coating
- with internal coolant: Radial and axial exits
- ramping up to 45° is possible
- long tool life thanks to extremely hard coating
- high process reliability with simultaneous reduction of machining times
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation

d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.060	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.080	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.120	4	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.160	4	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.200	4	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.250	4	25.000

ISO	Hardness	v _c	f _z (mm/z)/Ø						v _c	f _z (mm/z)/Ø							
			4	6	8	10	12	16		20	4	6	8	10	12	16	20
P	≤ 850 N/mm ²	270	0,017	0,025	0,034	0,050	0,060	0,080	0,100	270	0,014	0,021	0,028	0,040	0,048	0,064	0,080
	≥ 850 N/mm ²	180	0,014	0,021	0,028	0,045	0,054	0,072	0,090	180	0,008	0,012	0,016	0,025	0,030	0,040	0,050
M	≤ 750 N/mm ²	120	0,014	0,021	0,028	0,045	0,054	0,072	0,090	90	0,007	0,011	0,014	0,023	0,027	0,036	0,045
	≥ 750 N/mm ²	80	0,013	0,019	0,026	0,040	0,048	0,064	0,080	60	0,006	0,010	0,013	0,020	0,024	0,032	0,040
S	Ti-based	60	0,013	0,019	0,026	0,040	0,048	0,064	0,080	50	0,006	0,010	0,013	0,020	0,024	0,032	0,040
K	≤ 240 HB	150	0,017	0,025	0,034	0,050	0,060	0,080	0,100	150	0,014	0,021	0,028	0,040	0,048	0,064	0,080
N	≥ 7 % Si	340	0,018	0,027	0,036	0,055	0,066	0,088	0,110	340	0,014	0,021	0,028	0,040	0,048	0,064	0,080

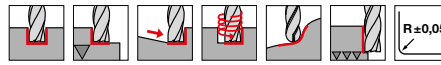
Special-, super- and Ti-alloys

SuperF-UT end mills

SuperF-UT end mills Ti



Catalogue no. 54560

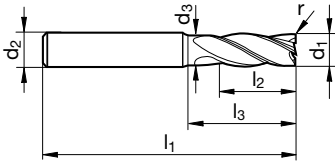


P	M	K	N	S	H
○	○	○	○	●	○

Application recommendations page 110-124

- optimised cutting edge design for high-strength titanium-alloys and special alloys
- with defined corner radii
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation

Special-, super- and Ti-alloys



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	r	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.500	4	6.005
6.000	6.000	5.700	57.000	13.000	20.000	0.800	4	6.008
6.000	6.000	5.700	57.000	13.000	20.000	1.000	4	6.010
6.000	6.000	5.700	57.000	13.000	20.000	1.500	4	6.015
6.000	6.000	5.700	57.000	13.000	20.000	2.000	4	6.020
8.000	8.000	7.700	63.000	19.000	26.000	0.500	4	8.005
8.000	8.000	7.700	63.000	19.000	26.000	0.800	4	8.008
8.000	8.000	7.700	63.000	19.000	26.000	1.000	4	8.010
8.000	8.000	7.700	63.000	19.000	26.000	1.500	4	8.015
8.000	8.000	7.700	63.000	19.000	26.000	2.000	4	8.020
10.000	10.000	9.500	72.000	22.000	30.000	0.500	4	10.005
10.000	10.000	9.500	72.000	22.000	30.000	0.800	4	10.008
10.000	10.000	9.500	72.000	22.000	30.000	1.000	4	10.010
10.000	10.000	9.500	72.000	22.000	30.000	1.500	4	10.015
10.000	10.000	9.500	72.000	22.000	30.000	2.000	4	10.020
12.000	12.000	11.500	83.000	26.000	36.000	0.500	4	12.005
12.000	12.000	11.500	83.000	26.000	36.000	0.800	4	12.008
12.000	12.000	11.500	83.000	26.000	36.000	1.000	4	12.010
12.000	12.000	11.500	83.000	26.000	36.000	1.500	4	12.015
12.000	12.000	11.500	83.000	26.000	36.000	2.000	4	12.020
12.000	12.000	11.500	83.000	26.000	36.000	2.500	4	12.025
12.000	12.000	11.500	83.000	26.000	36.000	3.000	4	12.030
12.000	12.000	11.500	83.000	26.000	36.000	4.000	4	12.040
16.000	16.000	15.500	92.000	32.000	42.000	0.500	4	16.005
16.000	16.000	15.500	92.000	32.000	42.000	0.800	4	16.008
16.000	16.000	15.500	92.000	32.000	42.000	1.000	4	16.010
16.000	16.000	15.500	92.000	32.000	42.000	1.500	4	16.015
16.000	16.000	15.500	92.000	32.000	42.000	2.000	4	16.020
16.000	16.000	15.500	92.000	32.000	42.000	2.500	4	16.025
16.000	16.000	15.500	92.000	32.000	42.000	3.000	4	16.030
16.000	16.000	15.500	92.000	32.000	42.000	4.000	4	16.040
20.000	20.000	19.500	104.000	38.000	52.000	1.000	4	20.010
20.000	20.000	19.500	104.000	38.000	52.000	2.000	4	20.020
20.000	20.000	19.500	104.000	38.000	52.000	4.000	4	20.040

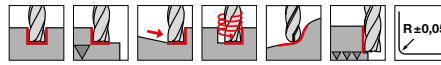
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø										
			3	6	8	10	12	16	20		3	6	8	10	12	16	20				
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28				a _e max = 0,10xD	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23					270	0,015	0,030	0,040	0,055	0,07	0,09	0,11
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23				a _e max = 0,02xD	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18					120	0,011	0,021	0,028	0,040	0,05	0,06	0,08
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15				a _e max = 0,02xD	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21					120	0,013	0,026	0,035	0,050	0,06	0,08	0,10

SuperF-UT end mills

SuperF-UT end mills Ti



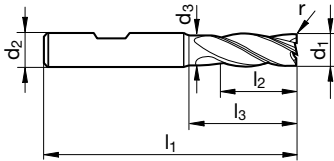
Catalogue no. 54561



P	M	K	N	S	H
○	○			●	

Application recommendations page 110-124

- optimised cutting edge design for high-strength titanium-alloys and special alloys
- with defined corner radii
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	r	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.500	4	6.005
6.000	6.000	5.700	57.000	13.000	20.000	0.800	4	6.008
6.000	6.000	5.700	57.000	13.000	20.000	1.000	4	6.010
6.000	6.000	5.700	57.000	13.000	20.000	1.500	4	6.015
6.000	6.000	5.700	57.000	13.000	20.000	2.000	4	6.020
8.000	8.000	7.700	63.000	19.000	26.000	0.500	4	8.005
8.000	8.000	7.700	63.000	19.000	26.000	0.800	4	8.008
8.000	8.000	7.700	63.000	19.000	26.000	1.000	4	8.010
8.000	8.000	7.700	63.000	19.000	26.000	1.500	4	8.015
8.000	8.000	7.700	63.000	19.000	26.000	2.000	4	8.020
10.000	10.000	9.500	72.000	22.000	30.000	0.500	4	10.005
10.000	10.000	9.500	72.000	22.000	30.000	0.800	4	10.008
10.000	10.000	9.500	72.000	22.000	30.000	1.000	4	10.010
10.000	10.000	9.500	72.000	22.000	30.000	1.500	4	10.015
10.000	10.000	9.500	72.000	22.000	30.000	2.000	4	10.020
12.000	12.000	11.500	83.000	26.000	36.000	0.500	4	12.005
12.000	12.000	11.500	83.000	26.000	36.000	0.800	4	12.008
12.000	12.000	11.500	83.000	26.000	36.000	1.000	4	12.010
12.000	12.000	11.500	83.000	26.000	36.000	1.500	4	12.015
12.000	12.000	11.500	83.000	26.000	36.000	2.000	4	12.020
12.000	12.000	11.500	83.000	26.000	36.000	2.500	4	12.025
12.000	12.000	11.500	83.000	26.000	36.000	3.000	4	12.030
12.000	12.000	11.500	83.000	26.000	36.000	4.000	4	12.040
16.000	16.000	15.500	92.000	32.000	42.000	0.500	4	16.005
16.000	16.000	15.500	92.000	32.000	42.000	0.800	4	16.008
16.000	16.000	15.500	92.000	32.000	42.000	1.000	4	16.010
16.000	16.000	15.500	92.000	32.000	42.000	1.500	4	16.015
16.000	16.000	15.500	92.000	32.000	42.000	2.000	4	16.020
16.000	16.000	15.500	92.000	32.000	42.000	2.500	4	16.025
16.000	16.000	15.500	92.000	32.000	42.000	3.000	4	16.030
16.000	16.000	15.500	92.000	32.000	42.000	4.000	4	16.040
20.000	20.000	19.500	104.000	38.000	52.000	1.000	4	20.010
20.000	20.000	19.500	104.000	38.000	52.000	2.000	4	20.020
20.000	20.000	19.500	104.000	38.000	52.000	4.000	4	20.040

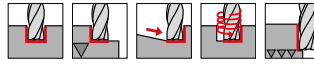
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø										
			3	6	8	10	12	16	20		3	6	8	10	12	16	20				
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28				a _e max = 0,10xD	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23					270	0,015	0,030	0,040	0,055	0,07	0,09	0,11
M	≤ 750 N/mm ²	220	0,031	0,062	0,083	0,115	0,14	0,18	0,23				a _e max = 0,02xD	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	110	0,024	0,048	0,064	0,092	0,11	0,15	0,18					120	0,011	0,021	0,028	0,040	0,05	0,06	0,08
S	Ni-based	60	0,019	0,039	0,052	0,074	0,09	0,12	0,15				a _e max = 0,02xD	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	110	0,028	0,055	0,074	0,104	0,12	0,17	0,21					120	0,013	0,026	0,035	0,050	0,06	0,08	0,10

SuperF-UT end mills

SuperF-UT end mills H



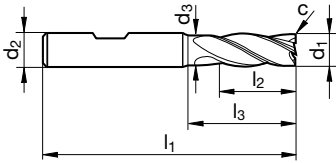
Catalogue no. 54573



P	M	K	N	S	H
○	○	●	○	○	●

Application recommendations page 110-124

- roughing up to 1xD of materials up to 54 HRC
- finishing up to 2.5xD of materials up to 63 HRC
- long tool life thanks to extremely hard coating
- particularly stable thanks to re-inforced core
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.150	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.150	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.200	4	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.350	4	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.450	4	20.000

ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≥ 1000 N/mm ²	270	0,034	0,068	0,090	0,125	0,15	0,20	0,25	270	0,015	0,030	0,040	0,055	0,07	0,09	0,11
K	≥ 300 HB	280	0,038	0,075	0,100	0,138	0,17	0,22	0,28	280	0,017	0,033	0,044	0,061	0,07	0,10	0,12
H	≤ 55 HRC	140	0,026	0,053	0,070	0,100	0,12	0,16	0,20	140	0,011	0,021	0,028	0,040	0,05	0,06	0,08
	≥ 55 HRC	80	0,021	0,042	0,056	0,075	0,09	0,12	0,15	100	0,008	0,015	0,020	0,027	0,03	0,04	0,05

Solid carbide end mills

Hard milling cutters (multi-fluted)



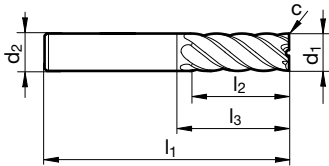
Catalogue no. 54207



P	M	K	N	S	H
○		●			●

Application recommendations page 110-124

- outstanding surface finish
- centre cutting
- suitable for hard-milling and fine-finishing in hardened materials up to 62 HRC and more



d1 h10 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	c mm	Z	Code no.
3.000	6.000	57.000	8.000	11.400	0.050	6	3.000
4.000	6.000	57.000	11.000	15.900	0.050	6	4.000
5.000	6.000	57.000	13.000	17.900	0.050	6	5.000
6.000	6.000	57.000	13.000	21.000	0.050	6	6.000
8.000	8.000	63.000	19.000	27.000	0.100	6	8.000
10.000	10.000	72.000	22.000	32.000	0.100	6	10.000
12.000	12.000	83.000	26.000	38.000	0.100	6	12.000
14.000	14.000	83.000	26.000	38.000	0.150	6	14.000
16.000	16.000	92.000	32.000	44.000	0.150	6	16.000
18.000	18.000	92.000	32.000	44.000	0.150	8	18.000
20.000	20.000	104.000	38.000	54.000	0.150	8	20.000

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≥ 1000 N/mm ²	180	0,029	0,057	0,076	0,105	0,13	0,17	0,21	180	0,013	0,025	0,033	0,046	0,06	0,07	0,09
K	≥ 300 HB	180	0,029	0,057	0,076	0,105	0,13	0,17	0,21	180	0,013	0,025	0,033	0,046	0,06	0,07	0,09
H	≤ 55 HRC	100	0,024	0,048	0,064	0,088	0,11	0,14	0,18	110	0,010	0,019	0,026	0,035	0,04	0,06	0,07
	≥ 55 HRC	70	0,019	0,038	0,050	0,070	0,08	0,11	0,14	80	0,007	0,014	0,018	0,025	0,03	0,04	0,05

Solid carbide end mills

Hard milling cutters (multi-fluted)



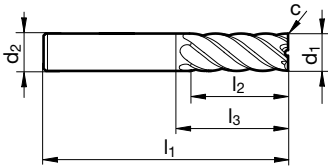
Catalogue no. 54227



P	M	K	N	S	H
○		●			●

Application recommendations page 110-124

- outstanding surface finish
- extra long
- centre cutting
- suitable for hard-milling and fine-finishing in hardened materials up to 62 HRC and more



d1 h10 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	c mm	Z	Code no.
6.000	6.000	75.000	30.000	39.000	0.050	6	6.000
8.000	8.000	100.000	40.000	64.000	0.100	6	8.000
10.000	10.000	100.000	40.000	60.000	0.100	6	10.000
12.000	12.000	150.000	45.000	105.000	0.100	6	12.000
16.000	16.000	150.000	65.000	102.000	0.150	6	16.000
20.000	20.000	150.000	65.000	100.000	0.150	8	20.000

ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≥ 1000 N/mm ²	70	0,010	0,020	0,027	0,037	0,044	0,059	0,074	80	0,006	0,013	0,017	0,023	0,028	0,037	0,046
K	≥ 300 HB	70	0,010	0,020	0,027	0,037	0,044	0,059	0,074	80	0,006	0,013	0,017	0,023	0,028	0,037	0,046
H	≤ 55 HRC	40	0,008	0,017	0,022	0,031	0,037	0,049	0,061	50	0,005	0,010	0,013	0,018	0,021	0,028	0,035
	≥ 55 HRC	20	0,007	0,013	0,018	0,025	0,029	0,039	0,049	35	0,003	0,007	0,009	0,013	0,015	0,020	0,025

SuperF-UT end mills

SuperF-UT end mills S



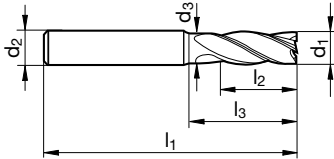
Catalogue no. 54556



P	M	K	N	S	H
○	○	○	○	○	

Application recommendations page 110-124

- without corner protection chamfer
- for fine-finishing operations
- up to 1600 N/mm²
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- HB surface clamping available on request



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	4	3.000
4.000	6.000	3.800	57.000	11.000	18.000	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	4	5.000
6.000	6.000	5.700	57.000	13.000	20.000	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	4	12.000
16.000	16.000	15.500	92.000	32.000	42.000	4	16.000
20.000	20.000	19.500	104.000	38.000	52.000	4	20.000

ISO	Hardness	V _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20
P	≤ 850 N/mm ²	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	270	0,015	0,030	0,040	0,055	0,07	0,09	0,11
M	≤ 750 N/mm ²	240	0,015	0,030	0,040	0,055	0,07	0,09	0,11
	≥ 750 N/mm ²	120	0,011	0,021	0,028	0,040	0,05	0,06	0,08
S	Ni-based	60	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	120	0,013	0,026	0,035	0,050	0,06	0,08	0,10

Solid carbide end mills

Pilot end mills



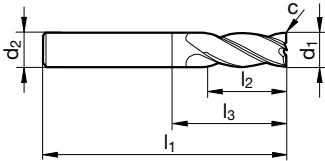
Catalogue no. 54700



P	M	K	N	S	H
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Application recommendations page 110-124

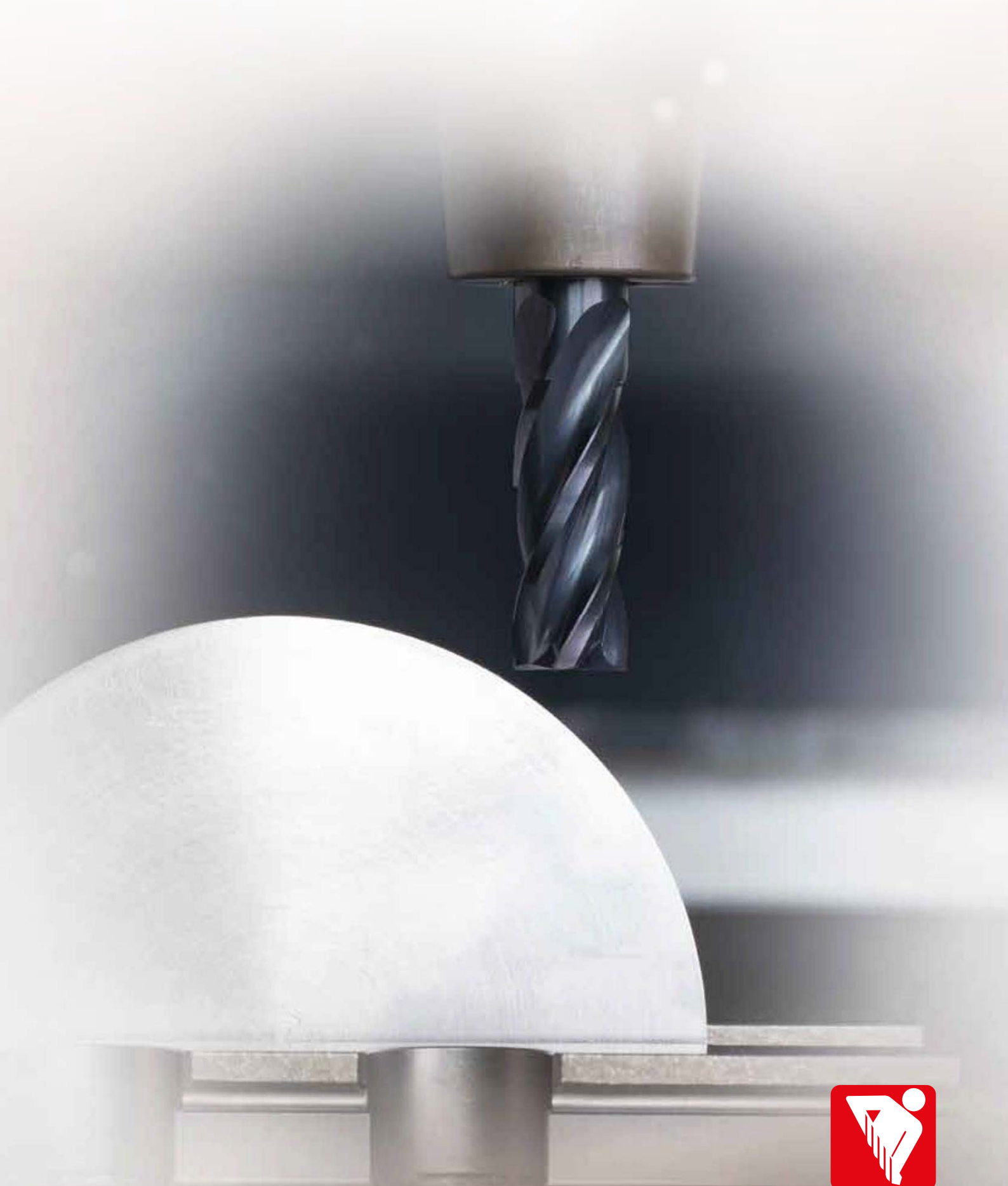
- for spot-facing and pilot drilling on an angle
- also suitable in combination with gun drills or deep hole drills, type SuperV-T or SuperV-NX
- centre cutting



d1 h10 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
1.400	3.000	38.000	3.000	5.900	0.010	4	1.400
1.500	3.000	38.000	4.000	6.900	0.020	4	1.500
1.800	3.000	38.000	6.000	8.900	0.020	4	1.800
2.000	3.000	38.000	6.500	9.400	0.020	4	2.000
2.100	3.000	38.000	6.500	9.900	0.020	4	2.100
2.300	3.000	38.000	6.500	9.900	0.020	4	2.300
2.500	3.000	38.000	6.500	9.900	0.030	4	2.500
2.800	3.000	38.000	6.500	10.000	0.030	4	2.800
3.000	6.000	57.000	8.000	12.400	0.030	4	3.000
3.500	6.000	57.000	10.000	14.900	0.040	4	3.500
4.000	6.000	57.000	11.000	15.900	0.040	4	4.000
4.500	6.000	57.000	11.000	17.400	0.050	4	4.500
5.000	6.000	57.000	13.000	19.400	0.050	4	5.000
5.500	6.000	57.000	13.000	20.400	0.060	4	5.500
6.000	8.000	63.000	13.000	20.400	0.060	4	6.000
6.500	8.000	63.000	13.000	20.900	0.070	4	6.500
7.000	8.000	63.000	16.000	23.900	0.070	4	7.000
7.500	8.000	63.000	16.000	23.900	0.080	4	7.500
8.000	10.000	72.000	19.000	26.900	0.080	4	8.000
8.500	10.000	72.000	19.000	28.400	0.090	4	8.500
9.000	10.000	72.000	19.000	28.400	0.090	4	9.000
10.000	12.000	83.000	22.000	31.400	0.100	4	10.000
11.000	12.000	83.000	26.000	36.400	0.110	4	11.000
12.000	14.000	83.000	26.000	37.400	0.120	4	12.000

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			Drilling				a _p = 1xD a _e = 1xD				Grooving				a _p = l2 a _e = 1xD		
3	6	8	10	12	16		20	3	6	8	10	12	16		20		
P	≤ 850 N/mm ²	135	0,008	0,016	0,021	0,030	0,036	0,048	0,060	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12
	≥ 850 N/mm ²	100	0,007	0,014	0,018	0,025	0,030	0,040	0,050		135	0,014	0,027	0,036	0,050	0,06	0,08
M	≤ 750 N/mm ²	90	0,007	0,014	0,018	0,025	0,030	0,040	0,050	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10
	≥ 750 N/mm ²	45	0,005	0,011	0,014	0,020	0,024	0,032	0,040		60	0,011	0,021	0,028	0,040	0,05	0,06
S	Ni-based	25	0,004	0,008	0,011	0,016	0,019	0,026	0,032	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06
	Ti-based	45	0,006	0,012	0,016	0,023	0,027	0,036	0,045		60	0,012	0,024	0,032	0,045	0,05	0,07
K	≤ 240 HB	120	0,008	0,017	0,022	0,033	0,039	0,052	0,065	160	0,017	0,033	0,044	0,065	0,08	0,10	0,13
	≥ 240 HB	105	0,008	0,015	0,020	0,028	0,033	0,044	0,055		140	0,015	0,030	0,040	0,055	0,07	0,09
N	≤ 7 % Si	375	0,010	0,020	0,026	0,040	0,048	0,064	0,080	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16
	≥ 7 % Si	175	0,008	0,017	0,022	0,030	0,036	0,048	0,060		230	0,017	0,033	0,044	0,060	0,07	0,10

SuperF-UT

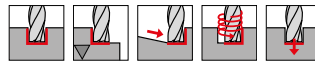


SuperF-UT end mills

SuperF-UT end mills N-3



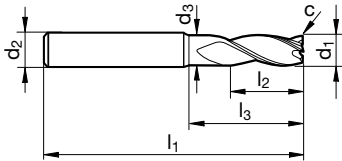
Catalogue no. 54564



P	M	K	N	S	H
●	○	●	○	○	

Application recommendations page 110-124

- 3-fluted with increased flute space
- for the production of keyways
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



Universal application

d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.050	3	3.000
3.500	6.000	3.300	57.000	10.000	15.000	0.050	3	3.500
3.700	6.000	3.500	57.000	11.000	15.000	0.050	3	3.700
4.000	6.000	3.800	57.000	11.000	18.000	0.050	3	4.000
4.500	6.000	4.300	57.000	11.000	18.000	0.050	3	4.500
4.700	6.000	4.500	57.000	13.000	18.000	0.050	3	4.700
5.000	6.000	4.800	57.000	13.000	18.000	0.050	3	5.000
5.500	6.000	5.300	57.000	13.000	19.400	0.050	3	5.500
5.700	6.000	5.500	57.000	13.000	19.600	0.050	3	5.700
6.000	6.000	5.700	57.000	13.000	20.000	0.050	3	6.000
6.500	8.000	6.200	63.000	16.000	24.400	0.100	3	6.500
7.000	8.000	6.700	63.000	16.000	24.900	0.100	3	7.000
7.500	8.000	7.200	63.000	19.000	25.300	0.100	3	7.500
8.000	8.000	7.700	63.000	19.000	26.000	0.100	3	8.000
8.500	10.000	8.200	72.000	19.000	29.400	0.100	3	8.500
9.000	10.000	8.700	72.000	19.000	29.900	0.100	3	9.000
9.500	10.000	9.200	72.000	22.000	30.300	0.100	3	9.500
10.000	10.000	9.500	72.000	22.000	30.000	0.100	3	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.100	3	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.150	3	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.150	3	20.000

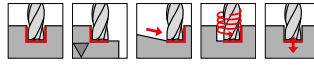
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø							
			3	6	8	10	12	16	20		3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12		210	0,018	0,036	0,048	0,069	0,08	0,11	0,14
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10			160	0,016	0,031	0,041	0,058	0,07	0,09
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10		140	0,016	0,031	0,041	0,058	0,07	0,09	0,12
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08			80	0,013	0,025	0,034	0,048	0,06	0,08
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06		40	0,010	0,020	0,027	0,038	0,05	0,06	0,08
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09			80	0,014	0,029	0,038	0,054	0,06	0,09
N	≤ 5 % Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16		600	0,022	0,045	0,060	0,092	0,11	0,15	0,18
	≥ 5 % Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12			300	0,019	0,038	0,051	0,069	0,08	0,11

SuperF-UT end mills

SuperF-UT end mills N-3



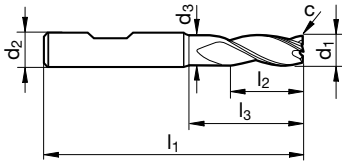
Catalogue no. 54565



P	M	K	N	S	H
●	○	●	○	○	

Application recommendations page 110-124

- 3-fluted with increased flute space
- for the production of keyways
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.050	3	3.000
3.500	6.000	3.300	57.000	10.000	15.000	0.050	3	3.500
3.700	6.000	3.500	57.000	11.000	15.000	0.060	3	3.700
4.000	6.000	3.800	57.000	11.000	18.000	0.060	3	4.000
4.500	6.000	4.300	57.000	11.000	18.000	0.070	3	4.500
4.700	6.000	4.500	57.000	13.000	18.000	0.070	3	4.700
5.000	6.000	4.800	57.000	13.000	18.000	0.080	3	5.000
5.500	6.000	5.300	57.000	13.000	19.400	0.080	3	5.500
5.700	6.000	5.500	57.000	13.000	19.600	0.090	3	5.700
6.000	6.000	5.700	57.000	13.000	20.000	0.090	3	6.000
6.500	8.000	6.200	63.000	16.000	24.400	0.100	3	6.500
7.000	8.000	6.700	63.000	16.000	24.900	0.110	3	7.000
7.500	8.000	7.200	63.000	19.000	25.300	0.110	3	7.500
8.000	8.000	7.700	63.000	19.000	26.000	0.120	3	8.000
8.500	10.000	8.200	72.000	19.000	29.400	0.130	3	8.500
9.000	10.000	8.700	72.000	19.000	29.900	0.140	3	9.000
9.500	10.000	9.200	72.000	22.000	30.300	0.140	3	9.500
10.000	10.000	9.500	72.000	22.000	30.000	0.150	3	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.180	3	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.190	3	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.240	3	20.000

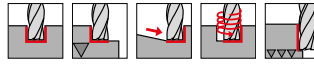
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø							
			3	6	8	10	12	16	20		3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12		210	0,018	0,036	0,048	0,069	0,08	0,11	0,14
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10			160	0,016	0,031	0,041	0,058	0,07	0,09
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10		140	0,016	0,031	0,041	0,058	0,07	0,09	0,12
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08			80	0,013	0,025	0,034	0,048	0,06	0,08
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06		40	0,010	0,020	0,027	0,038	0,05	0,06	0,08
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09			80	0,014	0,029	0,038	0,054	0,06	0,09
N	≤ 5 % Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16		600	0,022	0,045	0,060	0,092	0,11	0,15	0,18
	≥ 5 % Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12			300	0,019	0,038	0,051	0,069	0,08	0,11

SuperF-UT end mills

SuperF-UT end mills N



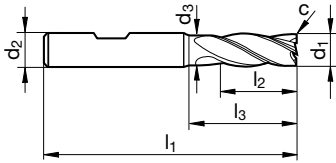
Catalogue no. 64550



P	M	K	N	S	H
●	○	●	○	○	○

Application recommendations page 110-124

- for universal application
- short stable design
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	50.000	5.000	12.000	0.100	4	3.000
4.000	6.000	3.800	54.000	8.000	15.000	0.100	4	4.000
5.000	6.000	4.800	54.000	9.000	15.000	0.100	4	5.000
6.000	6.000	5.700	54.000	10.000	17.000	0.150	4	6.000
8.000	8.000	7.700	58.000	12.000	21.000	0.150	4	8.000
10.000	10.000	9.500	66.000	14.000	24.000	0.200	4	10.000
12.000	12.000	11.500	73.000	16.000	26.000	0.200	4	12.000
14.000	14.000	13.500	75.000	18.000	28.000	0.250	4	14.000
16.000	16.000	15.500	82.000	22.000	32.000	0.350	4	16.000
18.000	18.000	17.500	84.000	24.000	34.000	0.400	4	18.000
20.000	20.000	19.500	92.000	26.000	40.000	0.450	4	20.000

Universal application

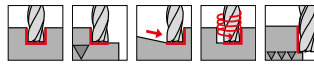
ISO	Hardness	v _c	f _z (mm/z) / Ø							f _z (mm/z) / Ø								
			3	6	8	10	12	16	20	3	6	8	10	12	16	20		
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12		305	0,025	0,050	0,067	0,096	0,12	0,15	0,19
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10		230	0,022	0,043	0,058	0,080	0,10	0,13	0,16
K	≤ 240 HB	160	0,017	0,033	0,044	0,065	0,08	0,10	0,13		270	0,026	0,053	0,070	0,104	0,12	0,17	0,21
	≥ 240 HB	140	0,015	0,030	0,040	0,055	0,07	0,09	0,11		240	0,024	0,048	0,064	0,088	0,11	0,14	0,18

SuperF-UT end mills

SuperF-UT end mills N



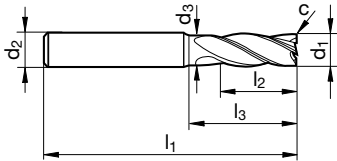
Catalogue no. 54551



P	M	K	N	S	H
●	○	●	○	○	○

Application recommendations page 110-124

- for universal application
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.100	4	3.000
4.000	6.000	3.800	57.000	11.000	18.000	0.100	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.100	4	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.150	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.150	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.200	4	12.000
14.000	14.000	13.500	83.000	26.000	36.000	0.250	4	14.000
16.000	16.000	15.500	92.000	32.000	42.000	0.350	4	16.000
18.000	18.000	17.500	92.000	32.000	42.000	0.400	4	18.000
20.000	20.000	19.500	104.000	38.000	52.000	0.450	4	20.000

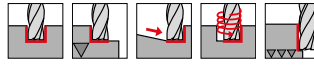
ISO	Hardness	v _c	f _z (mm/z) / Ø							f _z (mm/z) / Ø							
			3	6	8	10	12	16	20	3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12	305	0,025	0,050	0,067	0,096	0,12	0,15	0,19
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10		230	0,022	0,043	0,058	0,080	0,10	0,13
K	≤ 240 HB	160	0,017	0,033	0,044	0,065	0,08	0,10	0,13	270	0,026	0,053	0,070	0,104	0,12	0,17	0,21
	≥ 240 HB	140	0,015	0,030	0,040	0,055	0,07	0,09	0,11		240	0,024	0,048	0,064	0,088	0,11	0,14

SuperF-UT end mills

SuperF-UT end mills N



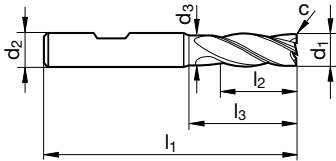
Catalogue no. 64551



P	M	K	N	S	H
●	○	●	○	○	○

Application recommendations page 110-124

- for universal application
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- also available as kit 78881 1,00



Universal application

d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.100	4	3.000
4.000	6.000	3.800	57.000	11.000	18.000	0.100	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.100	4	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.150	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.150	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.200	4	12.000
14.000	14.000	13.500	83.000	26.000	36.000	0.250	4	14.000
16.000	16.000	15.500	92.000	32.000	42.000	0.350	4	16.000
18.000	18.000	17.500	92.000	32.000	42.000	0.400	4	18.000
20.000	20.000	19.500	104.000	38.000	52.000	0.450	4	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.600	4	25.000

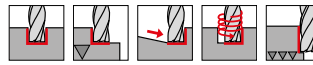
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12	305	0,025	0,050	0,067	0,096	0,12	0,15	0,19
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10		230	0,022	0,043	0,058	0,080	0,10	0,13
K	≤ 240 HB	160	0,017	0,033	0,044	0,065	0,08	0,10	0,13	270	0,026	0,053	0,070	0,104	0,12	0,17	0,21
	≥ 240 HB	140	0,015	0,030	0,040	0,055	0,07	0,09	0,11		240	0,024	0,048	0,064	0,088	0,11	0,14

SuperF-UT end mills

SuperF-UT end mills N²



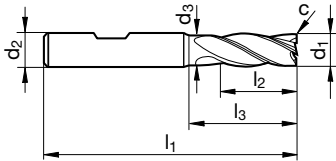
Catalogue no. 64552



P	M	K	N	S	H
●	○	●	○	○	○

Application recommendations page 110-124

- wide material spectrum = for universal application
- extremely long tool life thanks to highly hard TiAlZrN coating
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- also available as kit 78883 1.00



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.100	4	3.000
4.000	6.000	3.800	57.000	11.000	18.000	0.100	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.100	4	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.150	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.150	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.200	4	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.350	4	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.450	4	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.600	4	25.000

Universal application

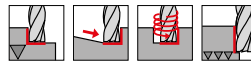
ISO	Hardness	v _c	f _z (mm/z) / Ø						f _z (mm/z) / Ø									
			3	6	8	10	12	20	3	6	8	10	12	16	20			
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12		305	0,025	0,050	0,067	0,096	0,12	0,15	0,19
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10		230	0,022	0,043	0,058	0,080	0,10	0,13	0,16
K	≤ 240 HB	160	0,017	0,033	0,044	0,065	0,08	0,10	0,13		270	0,026	0,053	0,070	0,104	0,12	0,17	0,21
	≥ 240 HB	140	0,015	0,030	0,040	0,055	0,07	0,09	0,11		240	0,024	0,048	0,064	0,088	0,11	0,14	0,18

SuperF-UT end mills

SuperF-UT end mills N



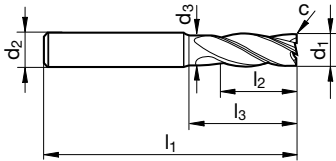
Catalogue no. 54562



P	M	K	N	S	H
●	○	●	○	○	○

Application recommendations page 110-124

- for universal application
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- 3xD cutting edge length



Universal application

d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	65.000	18.000	28.000	0.150	4	6.000
8.000	8.000	7.700	75.000	24.000	38.000	0.150	4	8.000
10.000	10.000	9.500	80.000	30.000	38.000	0.200	4	10.000
12.000	12.000	11.500	93.000	36.000	46.000	0.200	4	12.000
16.000	16.000	15.500	108.000	48.000	58.000	0.350	4	16.000
20.000	20.000	19.500	126.000	60.000	74.000	0.450	4	20.000

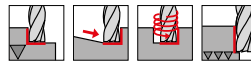
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23		270	0,015	0,030	0,040	0,055	0,07	0,09
K	≤ 240 HB	300	0,038	0,076	0,101	0,150	0,18	0,24	0,30	320	0,018	0,036	0,048	0,072	0,09	0,11	0,14
	≥ 240 HB	260	0,035	0,069	0,092	0,127	0,15	0,20	0,25		280	0,017	0,033	0,044	0,061	0,07	0,10

SuperF-UT end mills

SuperF-UT end mills N



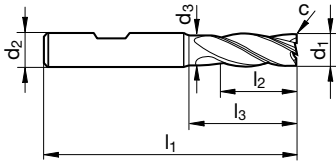
Catalogue no. 54563



P	M	K	N	S	H
●	○	●	○	○	○

Application recommendations page 110-124

- for universal application
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- 3xD cutting edge length



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	65.000	18.000	28.000	0.150	4	6.000
8.000	8.000	7.700	75.000	24.000	38.000	0.150	4	8.000
10.000	10.000	9.500	80.000	30.000	38.000	0.200	4	10.000
12.000	12.000	11.500	93.000	36.000	46.000	0.200	4	12.000
16.000	16.000	15.500	108.000	48.000	58.000	0.350	4	16.000
20.000	20.000	19.500	126.000	60.000	74.000	0.450	4	20.000

ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0,036	0,072	0,096	0,138	0,17	0,22	0,28	360	0,017	0,034	0,046	0,066	0,08	0,11	0,13
	≥ 850 N/mm ²	250	0,031	0,062	0,083	0,115	0,14	0,18	0,23		270	0,015	0,030	0,040	0,055	0,07	0,09
K	≤ 240 HB	300	0,038	0,076	0,101	0,150	0,18	0,24	0,30	320	0,018	0,036	0,048	0,072	0,09	0,11	0,14
	≥ 240 HB	260	0,035	0,069	0,092	0,127	0,15	0,20	0,25		280	0,017	0,033	0,044	0,061	0,07	0,10

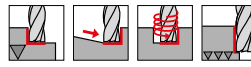
Universal application

SuperF-UT end mills

SuperF-UT end mills NL



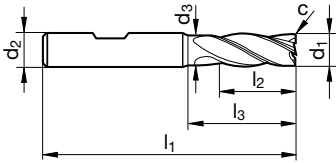
Catalogue no. 54553



P	M	K	N	S	H
●	○	●	○	○	○

Application recommendations page 110-124

- for universal application
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- HSC finishing up to 4xD cutting edge length
- unequal flute spacing, equal helix



Universal application

d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	65.000	24.000	28.000	0.120	4	6.000
8.000	8.000	7.700	75.000	32.000	38.000	0.160	4	8.000
10.000	10.000	9.500	100.000	40.000	58.000	0.200	4	10.000
12.000	12.000	11.500	100.000	48.000	53.000	0.240	4	12.000
16.000	16.000	15.500	125.000	64.000	75.000	0.320	4	16.000
20.000	20.000	19.500	150.000	80.000	98.000	0.400	4	20.000
25.000	25.000	24.000	175.000	100.000	117.000	0.500	4	25.000

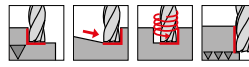
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	130	0,013	0,025	0,012	0,048	0,06	0,08	0,10	160	0,009	0,017	0,023	0,033	0,04	0,05	0,07
	≥ 850 N/mm ²	100	0,011	0,022	0,029	0,040	0,05	0,06	0,08		120	0,007	0,015	0,020	0,028	0,03	0,04
K	≤ 240 HB	120	0,013	0,027	0,035	0,052	0,06	0,08	0,10	140	0,009	0,018	0,024	0,036	0,04	0,06	0,07
	≥ 240 HB	100	0,012	0,024	0,032	0,044	0,05	0,07	0,09		120	0,008	0,017	0,022	0,030	0,04	0,05

SuperF-UT end mills

SuperF-UT end mills N



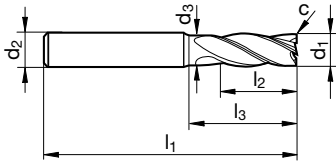
Catalogue no. 54552



P	M	K	N	S	H
●	○	●	○	○	○

Application recommendations page 110-124

- for universal application
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
10.000	10.000	9.500	100.000	40.000	48.000	0.200	4	10.000
12.000	12.000	11.500	150.000	45.000	58.000	0.200	4	12.000
14.000	14.000	13.500	150.000	45.000	58.000	0.250	4	14.000
16.000	16.000	15.500	150.000	65.000	78.000	0.350	4	16.000
18.000	18.000	17.500	150.000	65.000	78.000	0.400	4	18.000
20.000	20.000	19.500	150.000	65.000	78.000	0.450	4	20.000
25.000	25.000	24.000	150.000	75.000	92.000	0.600	4	25.000

Universal application

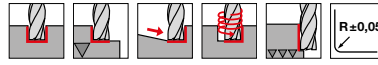
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	130	0,013	0,025	0,012	0,048	0,06	0,08	0,10	160	0,009	0,017	0,023	0,033	0,04	0,05	0,07
	≥ 850 N/mm ²	100	0,011	0,022	0,029	0,040	0,05	0,06	0,08		120	0,007	0,015	0,020	0,028	0,03	0,04
K	≤ 240 HB	120	0,013	0,027	0,035	0,052	0,06	0,08	0,10	140	0,009	0,018	0,024	0,036	0,04	0,06	0,07
	≥ 240 HB	100	0,012	0,024	0,032	0,044	0,05	0,07	0,09		120	0,008	0,017	0,022	0,030	0,04	0,05

SuperF-UT end mills

SuperF-UT end mills N-r



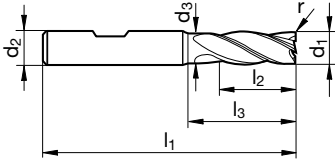
Catalogue no. 54550



P	M	K	N	S	H
●	○		●	●	


Application recommendations page 110-124

- wide material spectrum = for universal application
- optimised for milling strategies, e.g. HPC and HSC
- with defined corner radii
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



Universal application

e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	r	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.200	4	3.002
3.000	6.000	2.800	57.000	8.000	15.000	0.500	4	3.005
4.000	6.000	3.800	57.000	11.000	18.000	0.200	4	4.002
4.000	6.000	3.800	57.000	11.000	18.000	0.500	4	4.005
4.000	6.000	3.800	57.000	11.000	18.000	1.000	4	4.010
5.000	6.000	4.800	57.000	13.000	18.000	0.200	4	5.002
5.000	6.000	4.800	57.000	13.000	18.000	0.500	4	5.005
5.000	6.000	4.800	57.000	13.000	18.000	1.000	4	5.010
6.000	6.000	5.700	57.000	13.000	20.000	0.200	4	6.002
6.000	6.000	5.700	57.000	13.000	20.000	0.500	4	6.005
6.000	6.000	5.700	57.000	13.000	20.000	1.000	4	6.010
6.000	6.000	5.700	57.000	13.000	20.000	1.500	4	6.015
8.000	8.000	7.700	63.000	19.000	26.000	0.300	4	8.003
8.000	8.000	7.700	63.000	19.000	26.000	0.500	4	8.005
8.000	8.000	7.700	63.000	19.000	26.000	1.000	4	8.010
8.000	8.000	7.700	63.000	19.000	26.000	1.500	4	8.015
8.000	8.000	7.700	63.000	19.000	26.000	2.000	4	8.020
10.000	10.000	9.500	72.000	22.000	30.000	0.300	4	10.003
10.000	10.000	9.500	72.000	22.000	30.000	0.500	4	10.005
10.000	10.000	9.500	72.000	22.000	30.000	1.000	4	10.010
10.000	10.000	9.500	72.000	22.000	30.000	1.500	4	10.015
10.000	10.000	9.500	72.000	22.000	30.000	2.000	4	10.020
10.000	10.000	9.500	72.000	22.000	30.000	2.500	4	10.025
12.000	12.000	11.500	83.000	26.000	36.000	0.300	4	12.003
12.000	12.000	11.500	83.000	26.000	36.000	0.500	4	12.005
12.000	12.000	11.500	83.000	26.000	36.000	1.000	4	12.010
12.000	12.000	11.500	83.000	26.000	36.000	1.500	4	12.015
12.000	12.000	11.500	83.000	26.000	36.000	2.000	4	12.020
12.000	12.000	11.500	83.000	26.000	36.000	2.500	4	12.025
12.000	12.000	11.500	83.000	26.000	36.000	3.000	4	12.030
16.000	16.000	15.500	92.000	32.000	42.000	0.500	4	16.005
16.000	16.000	15.500	92.000	32.000	42.000	1.000	4	16.010
16.000	16.000	15.500	92.000	32.000	42.000	1.500	4	16.015
16.000	16.000	15.500	92.000	32.000	42.000	2.000	4	16.020
16.000	16.000	15.500	92.000	32.000	42.000	2.500	4	16.025
16.000	16.000	15.500	92.000	32.000	42.000	3.000	4	16.030
16.000	16.000	15.500	92.000	32.000	42.000	4.000	4	16.040
20.000	20.000	19.500	104.000	38.000	52.000	0.500	4	20.005
20.000	20.000	19.500	104.000	38.000	52.000	1.000	4	20.010
20.000	20.000	19.500	104.000	38.000	52.000	1.500	4	20.015
20.000	20.000	19.500	104.000	38.000	52.000	2.000	4	20.020
20.000	20.000	19.500	104.000	38.000	52.000	2.500	4	20.025
20.000	20.000	19.500	104.000	38.000	52.000	3.000	4	20.030
20.000	20.000	19.500	104.000	38.000	52.000	4.000	4	20.040

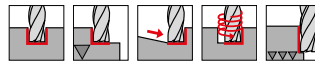
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
			a _p = 1,0xD								a _e = 1,0xD			a _p = 1,0xD			a _e max = 0,75xD
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12	210	0,018	0,036	0,048	0,069	0,08	0,11	0,14
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10	160	0,016	0,031	0,041	0,058	0,07	0,09	0,12
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10	140	0,016	0,031	0,041	0,058	0,07	0,09	0,12
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08	80	0,013	0,025	0,034	0,048	0,06	0,08	0,10
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06	40	0,010	0,020	0,027	0,038	0,05	0,06	0,08
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09	80	0,014	0,029	0,038	0,054	0,06	0,09	0,11
N	≤ 5 % Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16	600	0,022	0,045	0,060	0,092	0,11	0,15	0,18
	≥ 5 % Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12	300	0,019	0,038	0,051	0,069	0,08	0,11	0,14

SuperF-UT end mills

SuperF-UT-milling cutter U



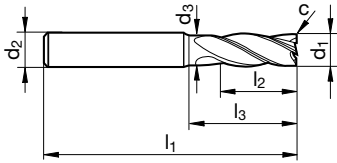
Catalogue no. 54500



P	M	K	N	S	H
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Application recommendations page 110-124

- especially for soft, tough and high-alloyed materials
- longer cutting edge than DIN 6527 L
- neck clearance
- centre cutting



Universal application

d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
1.000	4.000	0.920	50.000	3.000	4.000	0.020	4	1.000
1.500	4.000	1.400	50.000	4.500	6.000	0.030	4	1.500
2.000	6.000	1.900	50.000	6.000	8.000	0.040	4	2.000
2.500	6.000	2.400	50.000	7.500	10.000	0.050	4	2.500
3.000	6.000	2.900	57.000	10.000	15.000	0.060	4	3.000
4.000	6.000	3.800	57.000	14.000	18.000	0.080	4	4.000
5.000	6.000	4.800	57.000	15.000	20.000	0.100	4	5.000
6.000	6.000	5.700	57.000	16.000	20.000	0.120	4	6.000
8.000	8.000	7.700	63.000	21.000	26.000	0.160	4	8.000
10.000	10.000	9.500	72.000	25.000	31.000	0.200	4	10.000
12.000	12.000	11.500	83.000	28.000	37.000	0.240	4	12.000
14.000	14.000	13.500	83.000	28.000	37.000	0.280	4	14.000
16.000	16.000	15.500	92.000	36.000	43.000	0.320	4	16.000
20.000	20.000	19.500	104.000	41.000	53.000	0.400	4	20.000

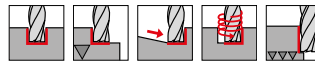
ISO	Hardness	v _c	f _z (mm/z)/Ø								v _c	f _z (mm/z)/Ø								
			a _p = 1,0xD				a _e = 1,0xD					a _p = 1,0xD				a _e max = 0,6xD				
			1	3	6	8	10	12	16	20		1	3	6	8	10	12	16	20	
P	< 500 N/mm ²	180	0,010	0,016	0,030	0,042	0,06	0,072	0,1	0,12		210	0,011	0,018	0,036	0,048	0,069	0,08	0,11	0,14
	500-900 N/mm ²	140	0,008	0,014	0,027	0,036	0,05	0,06	0,08	0,1		160	0,009	0,016	0,031	0,041	0,058	0,07	0,09	0,12
M	< 500 N/mm ²	120	0,006	0,012	0,025	0,032	0,045	0,055	0,075	0,085		140	0,007	0,016	0,031	0,041	0,058	0,07	0,09	0,12
	500-900 N/mm ²	80	0,005	0,010	0,021	0,028	0,04	0,048	0,06	0,07		100	0,006	0,013	0,025	0,034	0,048	0,06	0,08	0,1
S	< 900 N/mm ²	45	0,004	0,008	0,016	0,022	0,032	0,04	0,05	0,065		60	0,005	0,010	0,020	0,027	0,038	0,05	0,06	0,085
	> 250 N/mm ²	350	0,012	0,020	0,038	0,05	0,08	0,095	0,13	0,16		600	0,013	0,022	0,045	0,06	0,09	0,012	0,15	0,18

SuperF-UT end mills

SuperF-UT-milling cutter U



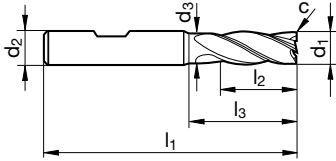
Catalogue no. 54501



P	M	K	N	S	H
•	•		•	•	

Application recommendations page 110-124

- especially for soft, tough and high-alloyed materials
- longer cutting edge than DIN 6527 L
- neck clearance
- centre cutting



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	57.000	14.000	18.000	0.080	4	4.000
5.000	6.000	4.800	57.000	15.000	20.000	0.100	4	5.000
6.000	6.000	5.700	57.000	16.000	20.000	0.120	4	6.000
8.000	8.000	7.700	63.000	21.000	26.000	0.160	4	8.000
10.000	10.000	9.500	72.000	25.000	31.000	0.200	4	10.000
12.000	12.000	11.500	83.000	28.000	37.000	0.240	4	12.000
14.000	14.000	13.500	83.000	28.000	37.000	0.280	4	14.000
16.000	16.000	15.500	92.000	36.000	43.000	0.320	4	16.000
20.000	20.000	19.500	104.000	41.000	53.000	0.400	4	20.000

Universal application

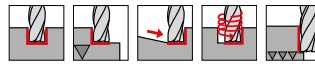
ISO	Hardness	v _c	f _z (mm/z) / Ø								v _c	f _z (mm/z) / Ø								
			1	3	6	8	10	12	16	20		1	3	6	8	10	12	16	20	
P	< 500 N/mm ²	180	0,010	0,016	0,030	0,042	0,06	0,072	0,1	0,12		210	0,011	0,018	0,036	0,048	0,069	0,08	0,11	0,14
	500-900 N/mm ²	140	0,008	0,014	0,027	0,036	0,05	0,06	0,08	0,1		160	0,009	0,016	0,031	0,041	0,058	0,07	0,09	0,12
M	< 500 N/mm ²	120	0,006	0,012	0,025	0,032	0,045	0,055	0,075	0,085		140	0,007	0,016	0,031	0,041	0,058	0,07	0,09	0,12
	500-900 N/mm ²	80	0,005	0,010	0,021	0,028	0,04	0,048	0,06	0,07		100	0,006	0,013	0,025	0,034	0,048	0,06	0,08	0,1
S	< 900 N/mm ²	45	0,004	0,008	0,016	0,022	0,032	0,04	0,05	0,065		60	0,005	0,010	0,020	0,027	0,038	0,05	0,06	0,085
N	> 250 N/mm ²	350	0,012	0,020	0,038	0,05	0,08	0,095	0,13	0,16		600	0,013	0,022	0,045	0,06	0,09	0,012	0,15	0,18

SuperF-UT end mills

SuperF-UT-milling cutter UL



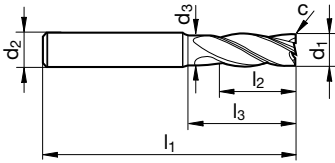
Catalogue no. 54502



P	M	K	N	S	H
•	•		•	•	

Application recommendations page 110-124

- especially for soft, tough and high-alloyed materials
- medium length version
- neck clearance
- centre cutting



Universal application

d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
1.000	4.000	0.920	50.000	3.000	5.500	0.020	4	1.000
1.500	4.000	1.400	50.000	4.500	8.500	0.030	4	1.500
2.000	6.000	1.900	57.000	6.000	11.500	0.040	4	2.000
2.500	6.000	2.400	57.000	7.500	14.500	0.050	4	2.500
3.000	6.000	2.900	65.000	10.000	20.000	0.060	4	3.000
4.000	6.000	3.800	65.000	14.000	27.000	0.080	4	4.000
5.000	6.000	4.800	65.000	15.000	28.000	0.100	4	5.000
6.000	6.000	5.700	75.000	19.000	38.000	0.120	4	6.000
8.000	8.000	7.700	80.000	21.000	43.000	0.160	4	8.000
10.000	10.000	9.500	93.000	26.000	52.000	0.200	4	10.000
12.000	12.000	11.500	100.000	28.000	54.000	0.240	4	12.000
14.000	14.000	13.500	100.000	28.000	54.000	0.280	4	14.000
16.000	16.000	15.500	123.000	38.000	74.000	0.320	4	16.000
20.000	20.000	19.500	126.000	41.000	75.000	0.400	4	20.000

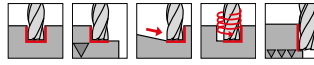
ISO	Hardness	v _c	f _z (mm/z)/Ø								f _z (mm/z)/Ø								
			a _p = 1,0xD				a _e = 0,4xD				a _p = 2,0xD				a _e max = 0,1xD				
			1	3	6	8	10	12	16	20	1	3	6	8	10	12	16	20	
P	< 500 N/mm ²	180	0,010	0,016	0,030	0,042	0,06	0,072	0,1	0,12	210	0,011	0,018	0,036	0,048	0,069	0,08	0,11	0,14
	500-900 N/mm ²	140	0,008	0,014	0,027	0,036	0,05	0,06	0,08	0,1	160	0,009	0,016	0,031	0,041	0,058	0,07	0,09	0,12
M	< 500 N/mm ²	120	0,006	0,012	0,025	0,032	0,045	0,055	0,075	0,085	140	0,007	0,016	0,031	0,041	0,058	0,07	0,09	0,12
	500-900 N/mm ²	80	0,005	0,010	0,021	0,028	0,04	0,048	0,06	0,07	100	0,006	0,013	0,025	0,034	0,048	0,06	0,08	0,1
S	< 900 N/mm ²	45	0,004	0,008	0,016	0,022	0,032	0,04	0,05	0,065	60	0,005	0,010	0,020	0,027	0,038	0,05	0,06	0,085
N	> 250 N/mm ²	350	0,012	0,020	0,038	0,05	0,08	0,095	0,13	0,16	600	0,013	0,022	0,045	0,06	0,09	0,012	0,15	0,18

SuperF-UT end mills

SuperF-UT-milling cutter UL



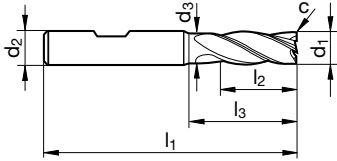
Catalogue no. 54503



P	M	K	N	S	H
●	●		●	●	

Application recommendations page 110-124

- especially for soft, tough and high-alloyed materials
- medium length version
- neck clearance
- centre cutting



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	65.000	14.000	27.000	0.080	4	4.000
5.000	6.000	4.800	65.000	15.000	28.000	0.100	4	5.000
6.000	6.000	5.700	75.000	19.000	38.000	0.120	4	6.000
8.000	8.000	7.700	80.000	21.000	43.000	0.160	4	8.000
10.000	10.000	9.500	93.000	26.000	52.000	0.200	4	10.000
12.000	12.000	11.500	100.000	28.000	54.000	0.240	4	12.000
14.000	14.000	13.500	100.000	28.000	54.000	0.280	4	14.000
16.000	16.000	15.500	123.000	38.000	74.000	0.320	4	16.000
20.000	20.000	19.500	126.000	41.000	75.000	0.400	4	20.000

Universal application

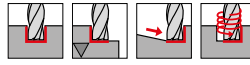
ISO	Hardness	v _c	f _z (mm/z) / Ø								v _c	f _z (mm/z) / Ø								
			1	3	6	8	10	12	16	20		1	3	6	8	10	12	16	20	
P	< 500 N/mm ²	180	0,010	0,016	0,030	0,042	0,06	0,072	0,1	0,12		210	0,011	0,018	0,036	0,048	0,069	0,08	0,11	0,14
	500-900 N/mm ²	140	0,008	0,014	0,027	0,036	0,05	0,06	0,08	0,1		160	0,009	0,016	0,031	0,041	0,058	0,07	0,09	0,12
M	< 500 N/mm ²	120	0,006	0,012	0,025	0,032	0,045	0,055	0,075	0,085		140	0,007	0,016	0,031	0,041	0,058	0,07	0,09	0,12
	500-900 N/mm ²	80	0,005	0,010	0,021	0,028	0,04	0,048	0,06	0,07		100	0,006	0,013	0,025	0,034	0,048	0,06	0,08	0,1
S	< 900 N/mm ²	45	0,004	0,008	0,016	0,022	0,032	0,04	0,05	0,065		60	0,005	0,010	0,020	0,027	0,038	0,05	0,06	0,085
N	> 250 N/mm ²	350	0,012	0,020	0,038	0,05	0,08	0,095	0,13	0,16		600	0,013	0,022	0,045	0,06	0,09	0,012	0,15	0,18

SuperF-UT end mills

SuperF-UT end mills N-F



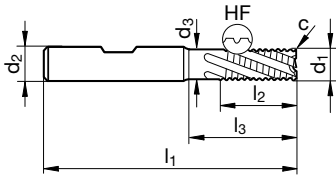
Catalogue no. 54567



P	M	K	N	S	H
●		●			

Application recommendations page 110-124

- up to 1600 N/mm²
- also suitable for unstable and difficult machining conditions
- achievable surface finish Ra = 2 to 3 μm
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



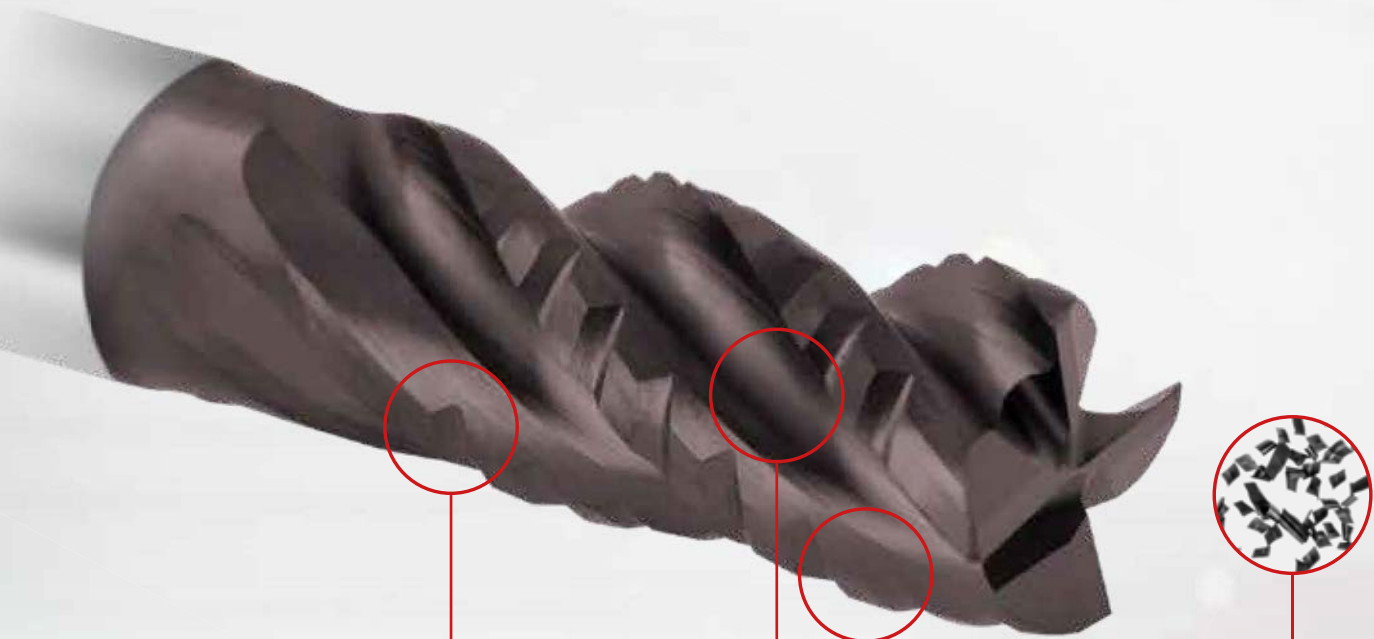
d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.120	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.160	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.240	4	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.320	4	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.400	4	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.500	4	25.000

Universal application

ISO	Hardness	v _c	f _z (mm/z) / Ø						v _c	f _z (mm/z) / Ø							
			3	6	8	10	12	16		20	3	6	8	10	12	16	20
P	≤ 850 N/mm ²	135	0,009	0,018	0,024	0,032	0,038	0,051	0,064	160	0,010	0,021	0,028	0,037	0,044	0,059	0,074
	≥ 850 N/mm ²	100	0,008	0,017	0,022	0,030	0,036	0,048	0,060	120	0,010	0,019	0,026	0,035	0,041	0,055	0,069
K	≤ 240 HB	120	0,009	0,018	0,024	0,032	0,038	0,051	0,064	140	0,010	0,021	0,028	0,037	0,044	0,059	0,074
	≥ 240 HB	105	0,008	0,017	0,022	0,030	0,036	0,048	0,060	130	0,010	0,019	0,026	0,035	0,041	0,055	0,069

FLAT KNUCKLE-TYPE TEETH

- INCREASED METAL REMOVAL RATE THROUGH USE OF THE ENTIRE CUTTING EDGE LENGTH
- UP TO 60 % LONGER TOOL LIFE WITH HIGH PROCESS RELIABILITY
- IDEAL FOR LESS POWERFUL MACHINES AND UNSTABLE CLAMPING
- GEOMETRY USED FOR TYPES N-F; VA-XF; AL-F



roughing geometry
reduces the cutting pressure in
comparison to smooth cutting
milling cutters

larger flutes for
optimal chip evacuation

more stable asymmetrical
roughing geometry produces
smooth surfaces finishes

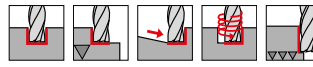
short chips thanks
to innovative
roughing geometry

SuperF-UT end mills

SuperF-UT end mills VA-X



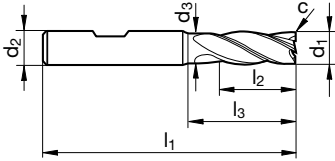
Catalogue no. 54576



P	M	K	N	S	H
○	●			●	

Application recommendations page 110-124

- adapted cutting edge geometry and coating
- for the machining of stainless and acid-resistant steels as well as nickel-based alloys
- short stable design
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	54.000	8.000	15.000	0.150	4	4.000
5.000	6.000	4.800	54.000	9.000	15.000	0.150	4	5.000
6.000	6.000	5.700	54.000	10.000	17.000	0.200	4	6.000
8.000	8.000	7.700	58.000	12.000	21.000	0.250	4	8.000
10.000	10.000	9.500	66.000	14.000	24.000	0.300	4	10.000
12.000	12.000	11.500	73.000	16.000	26.000	0.350	4	12.000
16.000	16.000	15.500	82.000	22.000	32.000	0.500	4	16.000
20.000	20.000	19.500	92.000	26.000	40.000	0.600	4	20.000

Stainless steel

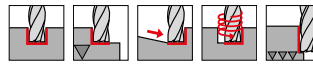
ISO	Hardness	v _c	f _z (mm/z) / Ø						f _z (mm/z) / Ø								
			3	6	8	10	12	16	20	3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12	305	0,025	0,050	0,067	0,096	0,12	0,15	0,19
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10		230	0,022	0,043	0,058	0,080	0,10	0,13
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10	205	0,022	0,043	0,058	0,080	0,10	0,13	0,16
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08		100	0,017	0,034	0,045	0,064	0,08	0,10
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06	50	0,013	0,027	0,036	0,051	0,06	0,08	0,10
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09		100	0,019	0,038	0,051	0,072	0,09	0,12

SuperF-UT end mills

SuperF-UT end mills VA-X



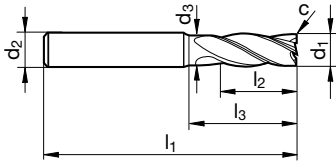
Catalogue no. 54558



P	M	K	N	S	H
○	●			●	

Application recommendations page 110-124

- adapted cutting edge geometry and coating
- for the machining of stainless and acid-resistant steels as well as nickel-based alloys
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.100	4	3.000
4.000	6.000	3.800	57.000	11.000	18.000	0.150	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.150	4	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.200	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.250	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.300	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.350	4	12.000
14.000	14.000	13.500	83.000	26.000	36.000	0.400	4	14.000
16.000	16.000	15.500	92.000	32.000	42.000	0.500	4	16.000
18.000	18.000	17.500	92.000	32.000	42.000	0.600	4	18.000
20.000	20.000	19.500	104.000	38.000	52.000	0.600	4	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.750	4	25.000

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12	305	0,025	0,050	0,067	0,096	0,12	0,15	0,19
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10		230	0,022	0,043	0,058	0,080	0,10	0,13
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10	205	0,022	0,043	0,058	0,080	0,10	0,13	0,16
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08		100	0,017	0,034	0,045	0,064	0,08	0,10
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06	50	0,013	0,027	0,036	0,051	0,06	0,08	0,10
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09		100	0,019	0,038	0,051	0,072	0,09	0,12

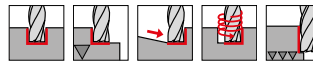
Stainless steel

SuperF-UT end mills

SuperF-UT end mills VA-X



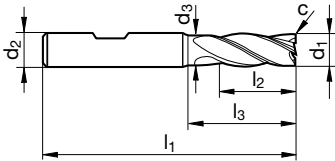
Catalogue no. 54559



P	M	K	N	S	H
○	●			●	

Application recommendations page 110-124

- adapted cutting edge geometry and coating
- for the machining of stainless and acid-resistant steels as well as nickel-based alloys
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.100	4	3.000
4.000	6.000	3.800	57.000	11.000	18.000	0.150	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.150	4	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.200	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.250	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.300	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.350	4	12.000
14.000	14.000	13.500	83.000	26.000	36.000	0.400	4	14.000
16.000	16.000	15.500	92.000	32.000	42.000	0.500	4	16.000
18.000	18.000	17.500	92.000	32.000	42.000	0.600	4	18.000
20.000	20.000	19.500	104.000	38.000	52.000	0.600	4	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.750	4	25.000

Stainless steel

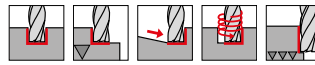
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø							
			3	6	8	10	12	16	20		3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12		305	0,025	0,050	0,067	0,096	0,12	0,15	0,19
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10		230	0,022	0,043	0,058	0,080	0,10	0,13	0,16
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10		205	0,022	0,043	0,058	0,080	0,10	0,13	0,16
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08		100	0,017	0,034	0,045	0,064	0,08	0,10	0,13
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06		50	0,013	0,027	0,036	0,051	0,06	0,08	0,10
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09		100	0,019	0,038	0,051	0,072	0,09	0,12	0,14

SuperF-UT end mills

SuperF-UT end mills VA-X²



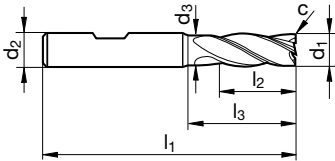
Catalogue no. 64553



P	M	K	N	S	H
○	●	○	○	●	○

Application recommendations page 110-124

- extremely long tool life thanks to highly hard TiAlZrN coating
- for the machining of stainless and acid-resistant steels as well as nickel-based alloys
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.100	4	3.000
3.500	6.000	3.300	57.000	10.000	15.000	0.100	4	3.500
4.000	6.000	3.800	57.000	11.000	18.000	0.150	4	4.000
4.500	6.000	4.300	57.000	11.000	18.000	0.150	4	4.500
5.000	6.000	4.800	57.000	13.000	18.000	0.150	4	5.000
5.500	6.000	5.300	57.000	13.000	19.400	0.200	4	5.500
6.000	6.000	5.700	57.000	13.000	20.000	0.200	4	6.000
6.500	8.000	6.200	63.000	16.000	24.400	0.250	4	6.500
7.000	8.000	6.700	63.000	16.000	24.900	0.250	4	7.000
7.500	8.000	7.200	63.000	19.000	25.300	0.250	4	7.500
8.000	8.000	7.700	63.000	19.000	26.000	0.250	4	8.000
8.500	10.000	8.200	72.000	19.000	29.400	0.300	4	8.500
9.000	10.000	8.700	72.000	19.000	29.900	0.300	4	9.000
9.500	10.000	9.200	72.000	22.000	30.300	0.300	4	9.500
10.000	10.000	9.500	72.000	22.000	30.000	0.300	4	10.000
11.000	12.000	10.500	83.000	26.000	34.700	0.350	4	11.000
12.000	12.000	11.500	83.000	26.000	36.000	0.350	4	12.000
14.000	14.000	13.500	83.000	26.000	36.000	0.400	4	14.000
16.000	16.000	15.500	92.000	32.000	42.000	0.500	4	16.000
18.000	18.000	17.500	92.000	32.000	42.000	0.600	4	18.000
20.000	20.000	19.500	104.000	38.000	52.000	0.600	4	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.750	4	25.000

Stainless steel

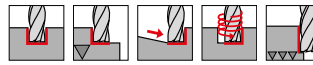
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø							
			3	6	8	10	12	16	20		3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12		305	0,025	0,050	0,067	0,096	0,12	0,15	0,19
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10		230	0,022	0,043	0,058	0,080	0,10	0,13	0,16
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10		205	0,022	0,043	0,058	0,080	0,10	0,13	0,16
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08		100	0,017	0,034	0,045	0,064	0,08	0,10	0,13
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06		50	0,013	0,027	0,036	0,051	0,06	0,08	0,10
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09		100	0,019	0,038	0,051	0,072	0,09	0,12	0,14

SuperF-UT end mills

SuperF-UT end mills VA-X IK

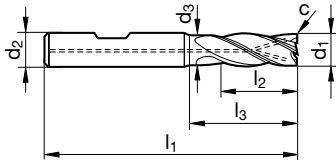


Catalogue no. 54575



P	M	K	N	S	H
○	●			●	

Application recommendations page 110-124



- adapted cutting edge geometry and coating
- for the machining of stainless and acid-resistant steels as well as nickel-based alloys
- with internal coolant for longer tool life and optimal chip evacuation
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation

d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.200	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.250	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.300	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.350	4	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.500	4	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.600	4	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.750	4	25.000

Stainless steel

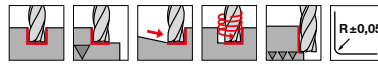
ISO	Hardness	v _c	f _z (mm/z) / Ø						v _c	f _z (mm/z) / Ø							
			3	6	8	10	12	20		3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12	305	0,025	0,050	0,067	0,096	0,12	0,15	0,19
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10		230	0,022	0,043	0,058	0,080	0,10	0,13
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10	205	0,022	0,043	0,058	0,080	0,10	0,13	0,16
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08		100	0,017	0,034	0,045	0,064	0,08	0,10
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06	50	0,013	0,027	0,036	0,051	0,06	0,08	0,10
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09		100	0,019	0,038	0,051	0,072	0,09	0,12

SuperF-UT end mills

SuperF-UT end mills VA-r



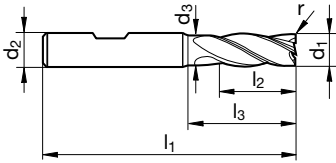
Catalogue no. 54542



P	M	K	N	S	H
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
Application recommendations page 110-124

- acid resist./stainless steels
- optimised for milling strategies, e.g. HPC and HSC
- with defined corner radii
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	r	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.200	4	3.002
3.000	6.000	2.800	57.000	8.000	15.000	0.500	4	3.005
4.000	6.000	3.800	57.000	11.000	18.000	0.200	4	4.002
4.000	6.000	3.800	57.000	11.000	18.000	0.500	4	4.005
4.000	6.000	3.800	57.000	11.000	18.000	1.000	4	4.010
5.000	6.000	4.800	57.000	13.000	18.000	0.200	4	5.002
5.000	6.000	4.800	57.000	13.000	18.000	0.500	4	5.005
5.000	6.000	4.800	57.000	13.000	18.000	1.000	4	5.010
6.000	6.000	5.700	57.000	13.000	20.000	0.200	4	6.002
6.000	6.000	5.700	57.000	13.000	20.000	0.500	4	6.005
6.000	6.000	5.700	57.000	13.000	20.000	1.000	4	6.010
6.000	6.000	5.700	57.000	13.000	20.000	1.500	4	6.015
8.000	8.000	7.700	63.000	19.000	26.000	0.300	4	8.003
8.000	8.000	7.700	63.000	19.000	26.000	0.500	4	8.005
8.000	8.000	7.700	63.000	19.000	26.000	1.000	4	8.010
8.000	8.000	7.700	63.000	19.000	26.000	1.500	4	8.015
8.000	8.000	7.700	63.000	19.000	26.000	2.000	4	8.020
10.000	10.000	9.500	72.000	22.000	30.000	0.300	4	10.003
10.000	10.000	9.500	72.000	22.000	30.000	0.500	4	10.005
10.000	10.000	9.500	72.000	22.000	30.000	1.000	4	10.010
10.000	10.000	9.500	72.000	22.000	30.000	1.500	4	10.015
10.000	10.000	9.500	72.000	22.000	30.000	2.000	4	10.020
10.000	10.000	9.500	72.000	22.000	30.000	2.500	4	10.025
12.000	12.000	11.500	83.000	26.000	36.000	0.300	4	12.003
12.000	12.000	11.500	83.000	26.000	36.000	0.500	4	12.005
12.000	12.000	11.500	83.000	26.000	36.000	1.000	4	12.010
12.000	12.000	11.500	83.000	26.000	36.000	1.500	4	12.015
12.000	12.000	11.500	83.000	26.000	36.000	2.000	4	12.020
12.000	12.000	11.500	83.000	26.000	36.000	2.500	4	12.025
12.000	12.000	11.500	83.000	26.000	36.000	3.000	4	12.030
16.000	16.000	15.500	92.000	32.000	42.000	0.500	4	16.005
16.000	16.000	15.500	92.000	32.000	42.000	1.000	4	16.010
16.000	16.000	15.500	92.000	32.000	42.000	1.500	4	16.015
16.000	16.000	15.500	92.000	32.000	42.000	2.000	4	16.020
16.000	16.000	15.500	92.000	32.000	42.000	2.500	4	16.025
16.000	16.000	15.500	92.000	32.000	42.000	3.000	4	16.030
16.000	16.000	15.500	92.000	32.000	42.000	4.000	4	16.040
20.000	20.000	19.500	104.000	38.000	52.000	0.500	4	20.005
20.000	20.000	19.500	104.000	38.000	52.000	1.000	4	20.010
20.000	20.000	19.500	104.000	38.000	52.000	1.500	4	20.015
20.000	20.000	19.500	104.000	38.000	52.000	2.000	4	20.020
20.000	20.000	19.500	104.000	38.000	52.000	2.500	4	20.025
20.000	20.000	19.500	104.000	38.000	52.000	3.000	4	20.030
20.000	20.000	19.500	104.000	38.000	52.000	4.000	4	20.040

Stainless steel

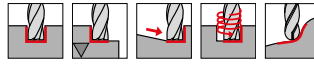
ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
			a _p = 1,0xD								a _e = 1,0xD			a _p = 1,0xD			a _e max = 0,75xD
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12	210	0,018	0,036	0,048	0,069	0,08	0,11	0,14
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10	160	0,016	0,031	0,041	0,058	0,07	0,09	0,12
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10	140	0,016	0,031	0,041	0,058	0,07	0,09	0,12
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08	80	0,013	0,025	0,034	0,048	0,06	0,08	0,10
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06	40	0,010	0,020	0,027	0,038	0,05	0,06	0,08
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09	80	0,014	0,029	0,038	0,054	0,06	0,09	0,11
N	≤ 5 % Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16	600	0,022	0,045	0,060	0,092	0,11	0,15	0,18
	≥ 5 % Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12	300	0,019	0,038	0,051	0,069	0,08	0,11	0,14

SuperF-UT end mills

SuperF-UT end mills VA-XF



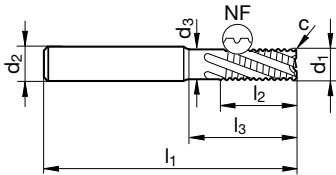
Catalogue no. 54568



P	M	K	N	S	H
○	●	●	●	●	●

Application recommendations page 110-124

- adapted cutting edge geometry and coating
- for the machining of stainless and acid-resistant steels as well as nickel-based alloys
- also suitable for unstable and difficult machining conditions
- achievable surface finish $R_a = 2$ to $3 \mu\text{m}$
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.120	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.160	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.240	4	12.000
14.000	14.000	13.500	83.000	26.000	36.000	0.280	4	14.000
16.000	16.000	15.500	92.000	32.000	42.000	0.320	4	16.000
18.000	18.000	17.500	92.000	32.000	42.000	0.360	4	18.000
20.000	20.000	19.500	104.000	38.000	52.000	0.400	4	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.500	4	25.000

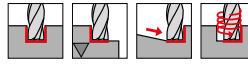
ISO	Hardness	v_c	f_z (mm/z) / \varnothing							f_z (mm/z) / \varnothing							
			3	6	8	10	12	16	20	3	6	8	10	12	16	20	
P	$\leq 850 \text{ N/mm}^2$	135	0,009	0,018	0,024	0,032	0,038	0,051	0,064	160	0,010	0,021	0,028	0,037	0,044	0,059	0,074
	$\geq 850 \text{ N/mm}^2$	100	0,008	0,017	0,022	0,030	0,036	0,048	0,060	120	0,010	0,019	0,026	0,035	0,041	0,055	0,069
M	$\leq 750 \text{ N/mm}^2$	90	0,008	0,017	0,022	0,030	0,036	0,048	0,060	110	0,010	0,019	0,026	0,035	0,041	0,055	0,069
	$\geq 750 \text{ N/mm}^2$	55	0,007	0,013	0,018	0,025	0,030	0,040	0,050	70	0,008	0,016	0,021	0,030	0,036	0,048	0,060
S	Ni-based	25	0,006	0,012	0,016	0,022	0,026	0,035	0,044	40	0,007	0,014	0,019	0,026	0,032	0,042	0,053
	Ti-based	50	0,007	0,013	0,018	0,025	0,030	0,040	0,050	70	0,008	0,016	0,021	0,030	0,036	0,048	0,060

SuperF-UT end mills

SuperF-UT end mills VA-XF



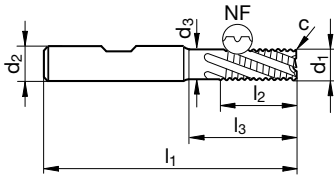
Catalogue no. 54569



P	M	K	N	S	H
○	●	●	●	●	●

Application recommendations page 110-124

- adapted cutting edge geometry and coating
- for the machining of stainless and acid-resistant steels as well as nickel-based alloys
- also suitable for unstable and difficult machining conditions
- achievable surface finish $R_a = 2$ to $3 \mu\text{m}$
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.120	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.160	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.240	4	12.000
14.000	14.000	13.500	83.000	26.000	36.000	0.280	4	14.000
16.000	16.000	15.500	92.000	32.000	42.000	0.320	4	16.000
18.000	18.000	17.500	92.000	32.000	42.000	0.360	4	18.000
20.000	20.000	19.500	104.000	38.000	52.000	0.400	4	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.500	4	25.000

Stainless steel

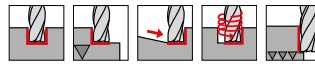
ISO	Hardness	v_c	f_z (mm/z) / \varnothing						f_z (mm/z) / \varnothing								
			3	6	8	10	12	16	20	3	6	8	10	12	16	20	
P	$\leq 850 \text{ N/mm}^2$	135	0,009	0,018	0,024	0,032	0,038	0,051	0,064	160	0,010	0,021	0,028	0,037	0,044	0,059	0,074
	$\geq 850 \text{ N/mm}^2$	100	0,008	0,017	0,022	0,030	0,036	0,048	0,060	120	0,010	0,019	0,026	0,035	0,041	0,055	0,069
M	$\leq 750 \text{ N/mm}^2$	90	0,008	0,017	0,022	0,030	0,036	0,048	0,060	110	0,010	0,019	0,026	0,035	0,041	0,055	0,069
	$\geq 750 \text{ N/mm}^2$	55	0,007	0,013	0,018	0,025	0,030	0,040	0,050	70	0,008	0,016	0,021	0,030	0,036	0,048	0,060
S	Ni-based	25	0,006	0,012	0,016	0,022	0,026	0,035	0,044	40	0,007	0,014	0,019	0,026	0,032	0,042	0,053
	Ti-based	50	0,007	0,013	0,018	0,025	0,030	0,040	0,050	70	0,008	0,016	0,021	0,030	0,036	0,048	0,060

SuperF-UT end mills

SuperF-UT end mills VA



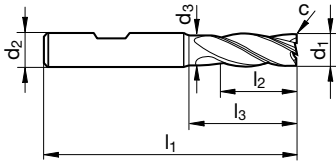
Catalogue no. 64557



P	M	K	N	S	H
○	○	○	○	○	○

Application recommendations page 110-124

- adapted cutting edge geometry and coating
- soft, long chipping materials
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	57.000	11.000	18.000	0.100	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.100	4	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.150	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.150	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.200	4	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.350	4	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.450	4	20.000

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12	305	0,025	0,050	0,067	0,096	0,12	0,15	0,19
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10		230	0,022	0,043	0,058	0,080	0,10	0,13
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10	205	0,022	0,043	0,058	0,080	0,10	0,13	0,16
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08		100	0,017	0,034	0,045	0,064	0,08	0,10
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06	50	0,013	0,027	0,036	0,051	0,06	0,08	0,10
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09		100	0,019	0,038	0,051	0,072	0,09	0,12

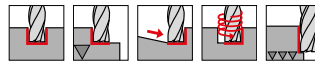
Stainless steel

SuperF-UT end mills

SuperF-UT end mills VA-IK



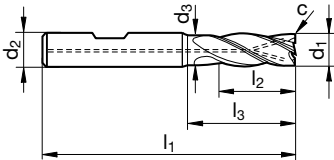
Catalogue no. 64567



P	M	K	N	S	H
○	○	○	○	○	○

Application recommendations page 110-124

- adapted cutting edge geometry and coating
- soft, long chipping materials
- with internal coolant for longer tool life and optimal chip evacuation
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.150	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.150	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.200	4	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.350	4	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.450	4	20.000

Stainless steel

ISO	Hardness	v _c	f _z (mm/z)/Ø								v _c	f _z (mm/z)/Ø							
			a _p = 1,0xD				a _e = 1,0xD					a _p = l2				a _e max = 0,2xD			
			3	6	8	10	12	16	20	3		6	8	10	12	16	20		
P	≤ 850 N/mm ²	180	0,016	0,031	0,042	0,060	0,07	0,10	0,12	305	0,025	0,050	0,067	0,096	0,12	0,15	0,19		
	≥ 850 N/mm ²	135	0,014	0,027	0,036	0,050	0,06	0,08	0,10	230	0,022	0,043	0,058	0,080	0,10	0,13	0,16		
M	≤ 750 N/mm ²	120	0,014	0,027	0,036	0,050	0,06	0,08	0,10	205	0,022	0,043	0,058	0,080	0,10	0,13	0,16		
	≥ 750 N/mm ²	60	0,011	0,021	0,028	0,040	0,05	0,06	0,08	100	0,017	0,034	0,045	0,064	0,08	0,10	0,13		
S	Ni-based	30	0,008	0,017	0,022	0,032	0,04	0,05	0,06	50	0,013	0,027	0,036	0,051	0,06	0,08	0,10		
	Ti-based	60	0,012	0,024	0,032	0,045	0,05	0,07	0,09	100	0,019	0,038	0,051	0,072	0,09	0,12	0,14		

Super F-UT

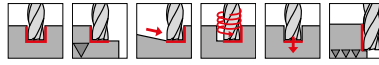


SuperF-UT end mills

SuperF-UT end mills AI-3



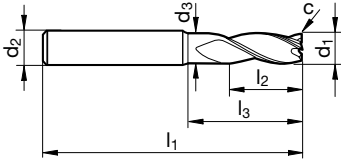
Catalogue no. 74552



P	M	K	N	S	H
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Application recommendations page 110-124

- 3-fluted with increased flute space
- mirror finish for optimal chip evacuation
- aluminium and aluminium-alloys as well as other long-chipping non-ferrous metals
- optimised micro geometry
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.030	3	3.000
4.000	6.000	3.800	57.000	11.000	18.000	0.040	3	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.050	3	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.060	3	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.080	3	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	3	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.120	3	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.160	3	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.200	3	20.000

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5 % Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16	750	0,025	0,051	0,068	0,104	0,12	0,17	0,21
	≥ 5 % Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12		345	0,021	0,043	0,057	0,078	0,09	0,12
NF	≤ 850 N/mm ²	250	0,017	0,033	0,044	0,060	0,07	0,10	0,12	375	0,021	0,043	0,057	0,078	0,09	0,12	0,16

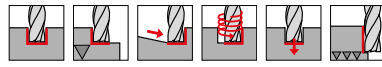
Our Carbo-coating is available as an option to improve chip flow and tool life

SuperF-UT end mills

SuperF-UT end mills AI-3

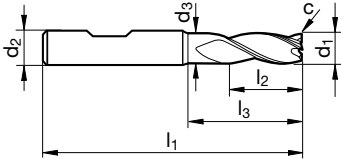


Catalogue no. 74553



Application recommendations page 110-124

- 3-fluted with increased flute space
- mirror finish for optimal chip evacuation
- aluminium and aluminium-alloys as well as other long-chipping non-ferrous metals
- optimised micro geometry
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
3.000	6.000	2.800	57.000	8.000	15.000	0.030	3	3.000
4.000	6.000	3.800	57.000	11.000	18.000	0.040	3	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.050	3	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.060	3	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.080	3	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	3	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.120	3	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.160	3	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.200	3	20.000

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5 % Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16	750	0,025	0,051	0,068	0,104	0,12	0,17	0,21
	≥ 5 % Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12		345	0,021	0,043	0,057	0,078	0,09	0,12
NF	≤ 850 N/mm ²	250	0,017	0,033	0,044	0,060	0,07	0,10	0,12	375	0,021	0,043	0,057	0,078	0,09	0,12	0,16

Our Carbo-coating is available as an option to improve chip flow and tool life

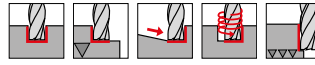
Aluminium,
non-ferrous metals

SuperF-UT end mills

SuperF-UT end mills AI-L



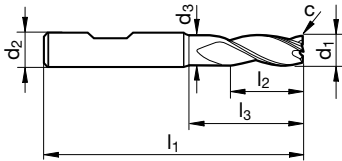
Catalogue no. 74556



P	M	K	N	S	H
			•		

Application recommendations page 110-124

- nano polished cutting edges
- particularly stable thanks to re-inforced core
- neck clearance
- centre cutting
- 3-fluted with increased flute space
- aluminium and aluminium-alloys as well as other long-chipping non-ferrous metals
- the unequal helix achieves smooth, chatter-free operation
- 3xD cutting edge length
- mirror finish for optimal chip evacuation
- optimised micro geometry



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
5.000	6.000	4.800	57.000	15.000	19.400	0.050	3	5.000
6.000	6.000	5.700	65.000	18.000	28.000	0.060	3	6.000
8.000	8.000	7.700	75.000	24.000	38.000	0.080	3	8.000
10.000	10.000	9.500	80.000	30.000	38.000	0.100	3	10.000
12.000	12.000	11.500	93.000	36.000	46.000	0.120	3	12.000
16.000	16.000	15.500	108.000	48.000	58.000	0.160	3	16.000
20.000	20.000	19.500	126.000	60.000	74.000	0.200	3	20.000

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5 % Si	900	0,045	0,090	0,120	0,184	0,221	0,294	0,368	1000	0,021	0,043	0,057	0,088	0,106	0,141	0,176
	≥ 5 % Si	400	0,038	0,076	0,101	0,138	0,166	0,221	0,276		460	0,018	0,036	0,048	0,066	0,079	0,106
NF	≤ 850 N/mm ²	470	0,038	0,076	0,101	0,138	0,166	0,221	0,276	500	0,018	0,030	0,036	0,048	0,066	0,079	0,106

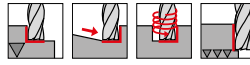
Our Carbo-coating is available as an option to improve chip flow and tool life

SuperF-UT end mills

SuperF-UT end mills AI-XL



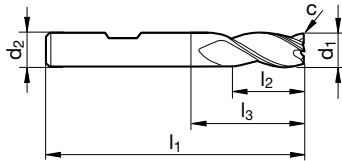
Catalogue no. 74558



P	M	K	N	S	H
			•		

Application recommendations page 110-124

- nano polished cutting edges
- particularly stable thanks to re-inforced core
- centre cutting
- 3-fluted with increased flute space
- aluminium and aluminium-alloys as well as other long-chipping non-ferrous metals
- the unequal helix achieves smooth, chatter-free operation
- 5xD cutting edge length
- mirror finish for optimal chip evacuation
- optimised micro geometry
- without neck clearance



d1 e8 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	75.000	30.000	39.000	0.060	3	6.000
8.000	8.000	86.000	40.000	50.000	0.080	3	8.000
10.000	10.000	100.000	50.000	60.000	0.100	3	10.000
12.000	12.000	120.000	60.000	75.000	0.120	3	12.000
16.000	16.000	150.000	80.000	102.000	0.160	3	16.000
20.000	20.000	175.000	100.000	125.000	0.200	3	20.000

ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5 % Si	400	0,016	0,031	0,042	0,064	0,08	0,10	0,13	450	0,010	0,020	0,026	0,040	0,048	0,064	0,080
	≥ 5 % Si	200	0,013	0,027	0,035	0,048	0,06	0,08	0,10		210	0,008	0,017	0,022	0,030	0,036	0,048
NF	≤ 850 N/mm ²	190	0,013	0,027	0,035	0,048	0,06	0,08	0,10	220	0,008	0,017	0,022	0,030	0,036	0,048	0,060

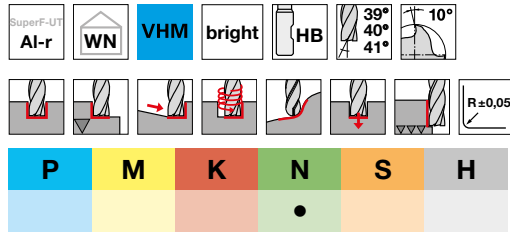
Our Carbo-coating is available as an option to improve chip flow and tool life

SuperF-UT end mills

SuperF-UT end mills Al-r

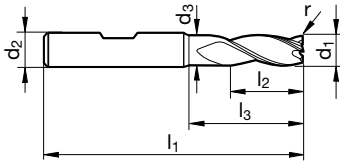


Catalogue no. 74562



Application recommendations page 110-124

- nano polished cutting edges
- neck clearance
- centre cutting
- 3-fluted with increased flute space
- aluminium and aluminium-alloys as well as other long-chipping non-ferrous metals
- the unequal helix achieves smooth, chatter-free operation
- with defined corner radii
- mirror finish for optimal chip evacuation
- optimised micro geometry



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	r	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.500	3	6.005
6.000	6.000	5.700	57.000	13.000	20.000	1.000	3	6.010
8.000	8.000	7.700	63.000	19.000	26.000	0.500	3	8.005
8.000	8.000	7.700	63.000	19.000	26.000	1.000	3	8.010
10.000	10.000	9.500	72.000	22.000	30.000	0.500	3	10.005
10.000	10.000	9.500	72.000	22.000	30.000	1.000	3	10.010
10.000	10.000	9.500	72.000	22.000	30.000	1.500	3	10.015
12.000	12.000	11.500	83.000	26.000	36.000	0.500	3	12.005
12.000	12.000	11.500	83.000	26.000	36.000	1.000	3	12.010
12.000	12.000	11.500	83.000	26.000	36.000	1.500	3	12.015
12.000	12.000	11.500	83.000	26.000	36.000	2.000	3	12.020
12.000	12.000	11.500	83.000	26.000	36.000	2.500	3	12.025
12.000	12.000	11.500	83.000	26.000	36.000	3.000	3	12.030
12.000	12.000	11.500	83.000	26.000	36.000	4.000	3	12.040
16.000	16.000	15.500	92.000	32.000	42.000	1.000	3	16.010
16.000	16.000	15.500	92.000	32.000	42.000	2.000	3	16.020
16.000	16.000	15.500	92.000	32.000	42.000	2.500	3	16.025
16.000	16.000	15.500	92.000	32.000	42.000	3.000	3	16.030
16.000	16.000	15.500	92.000	32.000	42.000	4.000	3	16.040
20.000	20.000	19.500	104.000	38.000	52.000	1.000	3	20.010
20.000	20.000	19.500	104.000	38.000	52.000	2.000	3	20.020
20.000	20.000	19.500	104.000	38.000	52.000	2.500	3	20.025
20.000	20.000	19.500	104.000	38.000	52.000	3.000	3	20.030
20.000	20.000	19.500	104.000	38.000	52.000	4.000	3	20.040
25.000	25.000	24.000	121.000	45.000	63.000	2.000	3	25.020
25.000	25.000	24.000	121.000	45.000	63.000	3.000	3	25.030
25.000	25.000	24.000	121.000	45.000	63.000	4.000	3	25.040

Aluminium,
non-ferrous metals

ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø							
			3	6	8	10	12	16	20		3	6	8	10	12	16	20	
N	≤ 5 % Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16		750	0,025	0,051	0,068	0,104	0,12	0,17	0,21
	≥ 5 % Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12		345	0,021	0,043	0,057	0,078	0,09	0,12	0,16
NF	≤ 850 N/mm ²	250	0,017	0,033	0,044	0,060	0,07	0,10	0,12		375	0,021	0,043	0,057	0,078	0,09	0,12	0,16

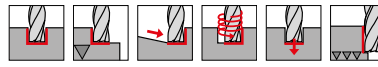
Our Carbo-coating is available as an option to improve chip flow and tool life

SuperF-UT end mills

SuperF-UT end mills AI-X

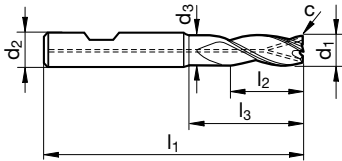


Catalogue no. 54592



Application recommendations page 110-124

- with internal cooling: Radial and axial exits
- nano polished cutting edges
- neck clearance
- centre cutting
- 3-fluted with increased flute space
- aluminium and aluminium-alloys as well as other long-chipping non-ferrous metals
- the unequal helix achieves smooth, chatter-free operation
- extremely long tool life thanks to highly hard DLC coating



d1 e8 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
5.000	6.000	4.800	57.000	13.000	18.000	0.050	3	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.060	3	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.080	3	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	3	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.120	3	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.160	3	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.200	3	20.000

ISO	Hardness	V _c	f _z (mm/z) / Ø							V _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5 % Si	500	0,020	0,039	0,052	0,080	0,10	0,13	0,16	750	0,025	0,051	0,068	0,104	0,12	0,17	0,21
	≥ 5 % Si	230	0,017	0,033	0,044	0,060	0,07	0,10	0,12		345	0,021	0,043	0,057	0,078	0,09	0,12
NF	≤ 850 N/mm ²	250	0,017	0,033	0,044	0,060	0,07	0,10	0,12	375	0,021	0,043	0,057	0,078	0,09	0,12	0,16

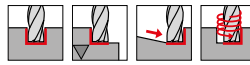
Aluminium,
non-ferrous metals

SuperF-UT end mills

SuperF-UT end mills AI-F



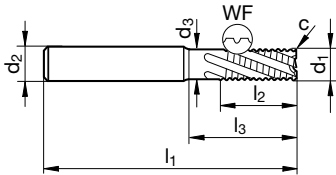
Catalogue no. 54570



P	M	K	N	S	H
			•		

Application recommendations page 110-124

- 3-fluted with increased flute space
- also suitable for unstable and difficult machining conditions
- achievable surface finish $Ra = 2$ to $3 \mu m$
- aluminium and aluminium-alloys as well as other long-chipping non-ferrous metals
- optimised micro geometry
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 js9 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.060	3	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.080	3	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	3	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.120	3	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.160	3	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.200	3	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.250	3	25.000

ISO	Hardness	v_c	f_z (mm/z) / \varnothing							v_c	f_z (mm/z) / \varnothing						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	$\leq 5\% \text{ Si}$	375	0,011	0,021	0,028	0,037	0,044	0,059	0,074	440	0,012	0,024	0,032	0,043	0,051	0,068	0,085
	$\geq 5\% \text{ Si}$	180	0,010	0,019	0,026	0,035	0,042	0,056	0,070		210	0,011	0,022	0,029	0,040	0,048	0,064
NF	$\leq 850 \text{ N/mm}^2$	200	0,010	0,019	0,026	0,035	0,042	0,056	0,070	230	0,011	0,022	0,029	0,040	0,048	0,064	0,081

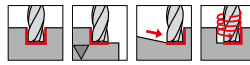
Our Carbo-coating is available as an option to improve chip flow and tool life

SuperF-UT end mills

SuperF-UT end mills AI-F



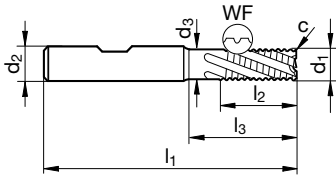
Catalogue no. 54571



P	M	K	N	S	H
			•		

Application recommendations page 110-124

- 3-fluted with increased flute space
- also suitable for unstable and difficult machining conditions
- achievable surface finish $R_a = 2$ to $3 \mu\text{m}$
- aluminium and aluminium-alloys as well as other long-chipping non-ferrous metals
- optimised micro geometry
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 js9 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
6.000	6.000	5.700	57.000	13.000	20.000	0.060	3	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.080	3	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.100	3	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.120	3	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.160	3	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.200	3	20.000
25.000	25.000	24.000	121.000	45.000	63.000	0.250	3	25.000

ISO	Hardness	v_c	f_z (mm/z) / \emptyset						v_c	f_z (mm/z) / \emptyset							
			3	6	8	10	12	16		20	3	6	8	10	12	16	20
N	$\leq 5\% \text{ Si}$	375	0,011	0,021	0,028	0,037	0,044	0,059	0,074	440	0,012	0,024	0,032	0,043	0,051	0,068	0,085
	$\geq 5\% \text{ Si}$	180	0,010	0,019	0,026	0,035	0,042	0,056	0,070		210	0,011	0,022	0,029	0,040	0,048	0,064
NF	$\leq 850 \text{ N/mm}^2$	200	0,010	0,019	0,026	0,035	0,042	0,056	0,070	230	0,011	0,022	0,029	0,040	0,048	0,064	0,081

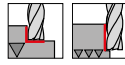
Our Carbo-coating is available as an option to improve chip flow and tool life

SuperF-UT end mills

SuperF-UT end mills Al

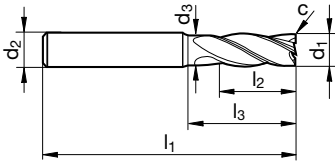


Catalogue no. 74554



Application recommendations page 110-124

- aluminium and aluminium-alloys as well as non-ferrous metals
- outstanding surface finish with fine finishing operations
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	57.000	11.000	18.000	0.100	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.100	4	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.150	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.150	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.200	4	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.350	4	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.450	4	20.000

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5 % Si	400	0,016	0,031	0,042	0,064	0,08	0,10	0,13	450	0,010	0,020	0,026	0,040	0,048	0,064	0,080
	≥ 5 % Si	200	0,013	0,027	0,035	0,048	0,06	0,08	0,10		210	0,008	0,017	0,022	0,030	0,036	0,048
NF	≤ 850 N/mm ²	190	0,013	0,027	0,035	0,048	0,06	0,08	0,10	220	0,008	0,017	0,022	0,030	0,036	0,048	0,060

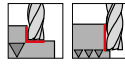
Our Carbo-coating is available as an option to improve chip flow and tool life

SuperF-UT end mills

SuperF-UT end mills Al



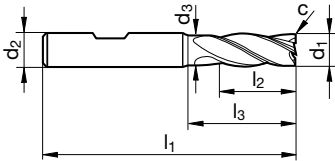
Catalogue no. 74555



P	M	K	N	S	H
			•		

Application recommendations page 110-124

- aluminium and aluminium-alloys as well as non-ferrous metals
- outstanding surface finish with fine finishing operations
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation



d1 h10 mm	d2 h6 mm	d3 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
4.000	6.000	3.800	57.000	11.000	18.000	0.100	4	4.000
5.000	6.000	4.800	57.000	13.000	18.000	0.100	4	5.000
6.000	6.000	5.700	57.000	13.000	20.000	0.150	4	6.000
8.000	8.000	7.700	63.000	19.000	26.000	0.150	4	8.000
10.000	10.000	9.500	72.000	22.000	30.000	0.200	4	10.000
12.000	12.000	11.500	83.000	26.000	36.000	0.200	4	12.000
16.000	16.000	15.500	92.000	32.000	42.000	0.350	4	16.000
20.000	20.000	19.500	104.000	38.000	52.000	0.450	4	20.000

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
N	≤ 5 % Si	400	0,016	0,031	0,042	0,064	0,08	0,10	0,13	450	0,010	0,020	0,026	0,040	0,048	0,064	0,080
	≥ 5 % Si	200	0,013	0,027	0,035	0,048	0,06	0,08	0,10		210	0,008	0,017	0,022	0,030	0,036	0,048
NF	≤ 850 N/mm ²	190	0,013	0,027	0,035	0,048	0,06	0,08	0,10	220	0,008	0,017	0,022	0,030	0,036	0,048	0,060

Our Carbo-coating is available as an option to improve chip flow and tool life

Super



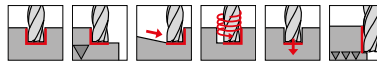
V-X

- combined optimisation of all tool parameters enables high feed rates and metal removal rates
- improved TiAlN nano-coating
- steel machining with high performance
- available in 5xD and 7xD lengths
- catalogue no. 51786 and 51791
(can be found in the web shop at www.stock.de)



SuperF-UT end mills

SuperF-UT end mills NX, sets



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•		

Catalogue no. 322 042 945

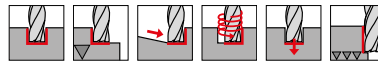
- adapted face and flute geometry for maximum cutting rates and very good chip evacuation
- ramping up to 45° is possible
- long tool life thanks to extremely hard coating
- high process reliability with simultaneous reduction of machining times
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- consisting of catalogue no. 54590

Ø-range mm	Pieces per set
6/8/10/12/16	5

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø							
			3	6	8	10	12	16	20		3	6	8	10	12	16	20	
P	≤ 850 N/mm ²	270	0.017	0.025	0.034	0.050	0.060	0.080	0.100	HPC	450	0.027	0.040	0.054	0.080	0.10	0.13	0.16
	≥ 850 N/mm ²	180	0.014	0.021	0.028	0.045	0.054	0.072	0.090		300	0.022	0.034	0.045	0.072	0.09	0.12	0.14
M	≤ 750 N/mm ²	120	0.014	0.021	0.028	0.045	0.054	0.072	0.090	HPC	200	0.022	0.034	0.045	0.072	0.09	0.12	0.14
	≥ 750 N/mm ²	80	0.013	0.019	0.026	0.040	0.048	0.064	0.080		140	0.020	0.031	0.041	0.064	0.08	0.10	0.13
S	Ti-based	60	0.013	0.019	0.026	0.040	0.048	0.064	0.080	110	0.020	0.031	0.041	0.064	0.08	0.10	0.13	
K	≤ 240 HB	150	0.017	0.025	0.034	0.050	0.060	0.080	0.100	250	0.027	0.040	0.054	0.080	0.10	0.13	0.16	
N	≥ 7 % Si	340	0.018	0.027	0.036	0.055	0.066	0.088	0.110	570	0.029	0.043	0.058	0.088	0.11	0.14	0.18	

SuperF-UT end mills

SuperF-UT end mills NX, sets



P	M	K	N	S	H
•	•	•	•	•	

Application recommendations page 110-124

Catalogue no. 322 042 946

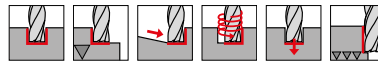
- adapted face and flute geometry for maximum cutting rates and very good chip evacuation
- ramping up to 45° is possible
- long tool life thanks to extremely hard coating
- high process reliability with simultaneous reduction of machining times
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- consisting of catalogue no. 54591

Ø-range mm	Pieces per set
6/8/10/12/16	5

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	270	0.017	0.025	0.034	0.050	0.060	0.080	0.100	450	0.027	0.040	0.054	0.080	0.10	0.13	0.16
	≥ 850 N/mm ²	180	0.014	0.021	0.028	0.045	0.054	0.072	0.090		300	0.022	0.034	0.045	0.072	0.09	0.12
M	≤ 750 N/mm ²	120	0.014	0.021	0.028	0.045	0.054	0.072	0.090	200	0.022	0.034	0.045	0.072	0.09	0.12	0.14
	≥ 750 N/mm ²	80	0.013	0.019	0.026	0.040	0.048	0.064	0.080		140	0.020	0.031	0.041	0.064	0.08	0.10
S	Ti-based	60	0.013	0.019	0.026	0.040	0.048	0.064	0.080	110	0.020	0.031	0.041	0.064	0.08	0.10	0.13
K	≤ 240 HB	150	0.017	0.025	0.034	0.050	0.060	0.080	0.100	250	0.027	0.040	0.054	0.080	0.10	0.13	0.16
N	≥ 7 % Si	340	0.018	0.027	0.036	0.055	0.066	0.088	0.110	570	0.029	0.043	0.058	0.088	0.11	0.14	0.18

SuperF-UT end mills

SuperF-UT end mills NX, sets



P	M	K	N	S	H
•	•	•	•	•	

Application recommendations page 110-124

Catalogue no. 322 042 947

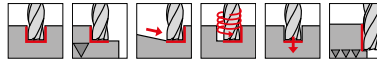
- adapted face and flute geometry for maximum cutting rates and very good chip evacuation
- ramping up to 45° is possible
- long tool life thanks to extremely hard coating
- high process reliability with simultaneous reduction of machining times
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- consisting of catalogue no. 54590

Ø-range mm	Pieces per set
5,7/7,7/9,7/11,7/15,6	5

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	270	0.017	0.025	0.034	0.050	0.060	0.080	0.100	450	0.027	0.040	0.054	0.080	0.10	0.13	0.16
	≥ 850 N/mm ²	180	0.014	0.021	0.028	0.045	0.054	0.072	0.090		300	0.022	0.034	0.045	0.072	0.09	0.12
M	≤ 750 N/mm ²	120	0.014	0.021	0.028	0.045	0.054	0.072	0.090	200	0.022	0.034	0.045	0.072	0.09	0.12	0.14
	≥ 750 N/mm ²	80	0.013	0.019	0.026	0.040	0.048	0.064	0.080		140	0.020	0.031	0.041	0.064	0.08	0.10
S	Ti-based	60	0.013	0.019	0.026	0.040	0.048	0.064	0.080	110	0.020	0.031	0.041	0.064	0.08	0.10	0.13
K	≤ 240 HB	150	0.017	0.025	0.034	0.050	0.060	0.080	0.100	250	0.027	0.040	0.054	0.080	0.10	0.13	0.16
N	≥ 7 % Si	340	0.018	0.027	0.036	0.055	0.066	0.088	0.110	570	0.029	0.043	0.058	0.088	0.11	0.14	0.18

SuperF-UT end mills

SuperF-UT end mills NX, sets



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•		

Catalogue no. 322 042 948

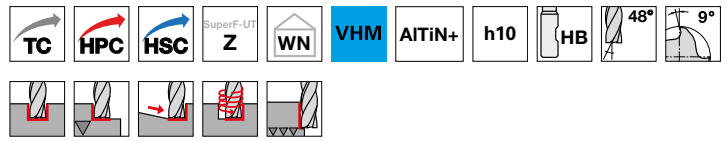
- adapted face and flute geometry for maximum cutting rates and very good chip evacuation
- ramping up to 45° is possible
- long tool life thanks to extremely hard coating
- high process reliability with simultaneous reduction of machining times
- for materials up to 1400 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- consisting of catalogue no. 54591

Ø-range mm	Pieces per set
5,7/7,7/9,7/11,7/15,6	5

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
			a _p = 1.0xD				a _e = 1.0xD				a _p = l2				a _e max = 0.20xD		
P	≤ 850 N/mm ²	270	0.017	0.025	0.034	0.050	0.060	0.080	0.100	450	0.027	0.040	0.054	0.080	0.10	0.13	0.16
	≥ 850 N/mm ²	180	0.014	0.021	0.028	0.045	0.054	0.072	0.090	300	0.022	0.034	0.045	0.072	0.09	0.12	0.14
M	≤ 750 N/mm ²	120	0.014	0.021	0.028	0.045	0.054	0.072	0.090	200	0.022	0.034	0.045	0.072	0.09	0.12	0.14
	≥ 750 N/mm ²	80	0.013	0.019	0.026	0.040	0.048	0.064	0.080	140	0.020	0.031	0.041	0.064	0.08	0.10	0.13
S	Ti-based	60	0.013	0.019	0.026	0.040	0.048	0.064	0.080	110	0.020	0.031	0.041	0.064	0.08	0.10	0.13
K	≤ 240 HB	150	0.017	0.025	0.034	0.050	0.060	0.080	0.100	250	0.027	0.040	0.054	0.080	0.10	0.13	0.16
N	≥ 7 % Si	340	0.018	0.027	0.036	0.055	0.066	0.088	0.110	570	0.029	0.043	0.058	0.088	0.11	0.14	0.18

SuperF-UT end mills

SuperF-UT end mills Z, sets



P	M	K	N	S	H
•	•			•	

Application recommendations page 110-124

Catalogue no.78882 1,0

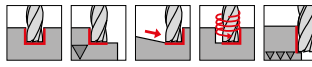
- particularly stable thanks to re-inforced core
- for universal application
- for materials up to 1400 N/mm²
- micro-corner protection
- centre cutting
- unequal flute spacing
- HPC machining of tough, low- and high-alloyed steels and difficult to machine special materials
- consisting of catalogue no. 54577

Ø-range mm	Pieces per set
6/8/10/12/16	5

ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0.036	0.072	0.096	0.138	0.17	0.22	0.28	360	0.017	0.034	0.046	0.066	0.08	0.11	0.13
	≥ 850 N/mm ²	250	0.031	0.062	0.083	0.115	0.14	0.18	0.23		270	0.015	0.030	0.040	0.055	0.07	0.09
M	≤ 750 N/mm ²	220	0.031	0.062	0.083	0.115	0.14	0.18	0.23	240	0.015	0.030	0.040	0.055	0.07	0.09	0.11
	≥ 750 N/mm ²	110	0.024	0.048	0.064	0.092	0.11	0.15	0.18		120	0.011	0.021	0.028	0.040	0.05	0.06
S	Ni-based	60	0.019	0.039	0.052	0.074	0.09	0.12	0.15	60	0.008	0.017	0.022	0.032	0.04	0.05	0.06
	Ti-based	110	0.028	0.055	0.074	0.104	0.12	0.17	0.21		120	0.013	0.026	0.035	0.050	0.06	0.08

SuperF-UT end mills

SuperF-UT end mills Z, sets



P	M	K	N	S	H
•	•			•	

Application recommendations page 110-124

Catalogue no.78882 2,0

- particularly stable thanks to re-inforced core
- for universal application
- for materials up to 1400 N/mm²
- micro-corner protection
- centre cutting
- unequal flute spacing
- HPC machining of tough, low- and high-alloyed steels and difficult to machine special materials
- consisting of catalogue no. 54577

Ø-range mm	Pieces per set
6/8/10/12	4

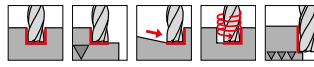
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	340	0.036	0.072	0.096	0.138	0.17	0.22	0.28	360	0.017	0.034	0.046	0.066	0.08	0.11	0.13
	≥ 850 N/mm ²	250	0.031	0.062	0.083	0.115	0.14	0.18	0.23		270	0.015	0.030	0.040	0.055	0.07	0.09
M	≤ 750 N/mm ²	220	0.031	0.062	0.083	0.115	0.14	0.18	0.23	240	0.015	0.030	0.040	0.055	0.07	0.09	0.11
	≥ 750 N/mm ²	110	0.024	0.048	0.064	0.092	0.11	0.15	0.18		120	0.011	0.021	0.028	0.040	0.05	0.06
S	Ni-based	60	0.019	0.039	0.052	0.074	0.09	0.12	0.15	60	0.008	0.017	0.022	0.032	0.04	0.05	0.06
	Ti-based	110	0.028	0.055	0.074	0.104	0.12	0.17	0.21		120	0.013	0.026	0.035	0.050	0.06	0.08

SuperF-UT end mills

SuperF-UT end mills N, sets



Catalogue no. 78881 1,0



P	M	K	N	S	H
●	○	●	○	○	○

Application recommendations page 110-124

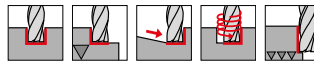
- for universal application
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- consisting of catalogue no. 64551

Ø-range mm	Pieces per set
6/8/10/12/16	5

ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	180	0.016	0.031	0.042	0.060	0.07	0.10	0.12	305	0.025	0.050	0.067	0.096	0.12	0.15	0.19
	≥ 850 N/mm ²	135	0.014	0.027	0.036	0.050	0.06	0.08	0.10	230	0.022	0.043	0.058	0.080	0.10	0.13	0.16
K	≤ 240 HB	160	0.017	0.033	0.044	0.065	0.08	0.10	0.13	270	0.026	0.053	0.070	0.104	0.12	0.17	0.21
	≥ 240 HB	140	0.015	0.030	0.040	0.055	0.07	0.09	0.11	240	0.024	0.048	0.064	0.088	0.11	0.14	0.18

SuperF-UT end mills

SuperF-UT end mills N², sets



P	M	K	N	S	H
●	○	●	○	○	○

Application recommendations page 110-124

Catalogue no. 78883 1,0

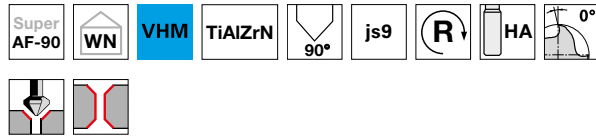
- wide material spectrum = for universal application
- extremely long tool life thanks to highly hard TiAlZrN coating
- up to 1600 N/mm²
- micro-corner protection
- neck clearance
- centre cutting
- the unequal helix achieves smooth, chatter-free operation
- consisting of catalogue no. 64552

Ø-range mm	Pieces per set
6/8/10/12/16	5

ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	180	0.016	0.031	0.042	0.060	0.07	0.10	0.12	305	0.025	0.050	0.067	0.096	0.12	0.15	0.19
	≥ 850 N/mm ²	135	0.014	0.027	0.036	0.050	0.06	0.08	0.10		230	0.022	0.043	0.058	0.080	0.10	0.13
K	≤ 240 HB	160	0.017	0.033	0.044	0.065	0.08	0.10	0.13	270	0.026	0.053	0.070	0.104	0.12	0.17	0.21
	≥ 240 HB	140	0.015	0.030	0.040	0.055	0.07	0.09	0.11		240	0.024	0.048	0.064	0.088	0.11	0.14

Deburring end mills

Deburring end mills 90°, sets



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•	○	

Catalogue no. 322 052 875

- deburring- and chamfering-mill to machine workpiece edges with a 90° angle
- highest feed rates and improved surface finish thanks to z = 6
- consisting of sim. catalogue no. 53399

Ø-range mm	Pieces per set
6/8/10/12	4

Deburring end mills

Deburring end mills 90°, sets



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•	○	

Catalogue no. 322 044 176

- deburring- and chamfering-mill to machine workpiece edges with a 90° angle
- highest feed rates and improved surface finish thanks to z = 6
- consisting of catalogue no. 53399

Ø-range mm	Pieces per set
6/8/10/12	4

ISO	Hardness	v _c	f _z (mm/z) / Ø							v _c	f _z (mm/z) / Ø						
			Chamfering				ap/ae max = 0.25xD				De-burring				ap/ae max = 0.05xD		
			3	6	8		10	12	16	20		3	6		8	10	12
P	≤ 850 N/mm ²	192	0.018	0.036	0.048	0.06	0.08	0.10	0.13	250	0.030	0.060	0.080	0.11	0.13	0.17	0.21
	≥ 850 N/mm ²	140	0.016	0.032	0.042	0.06	0.07	0.09	0.12	180	0.026	0.053	0.070	0.10	0.12	0.16	0.20
M	≤ 750 N/mm ²	120	0.013	0.025	0.034	0.05	0.05	0.07	0.09	160	0.021	0.042	0.056	0.08	0.09	0.12	0.15
	≥ 750 N/mm ²	80	0.009	0.019	0.025	0.04	0.04	0.06	0.07	100	0.016	0.032	0.042	0.06	0.07	0.10	0.12
K	≤ 240 HB	170	0.017	0.033	0.044	0.06	0.07	0.09	0.12	230	0.028	0.056	0.074	0.10	0.12	0.16	0.20
N	≥ 7 % Si	250	0.023	0.047	0.062	0.08	0.10	0.13	0.17	330	0.039	0.078	0.104	0.14	0.17	0.22	0.28



CHAMFERING AND DEBURRING

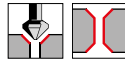
- SOLID CARBIDE TOOL FOR RAPID DEBURRING AND CHAMFERING AVAILABLE WITH CHAMFER ANGLE 60°/90°/120°
- MECHANICAL FINISHING OF HOLE ENTRY AND HOLE EXIT
- ALSO WITH 6 TEETHS AND HIGHLY HARD TiAlZrN COATING FOR MAXIMUM FEED RATES AND LONGER TOOL LIFE

Deburring and chamfering tools

Deburring end mills 60°



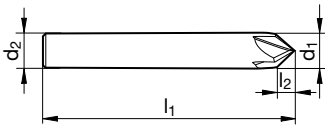
Catalogue no. 53393



P	M	K	N	S	H
•	•	•	•	•	

Application recommendations page 110-124

- deburring- and chamfering-mill to machine workpiece edges with a 60° angle



d1 js9 mm	d2 h6 mm	l1 mm	l2 mm	Z	Code no.
4.000	4.000	50.000	3.500	4	4.000
6.000	6.000	57.000	5.200	4	6.000
8.000	8.000	63.000	7.000	4	8.000
10.000	10.000	72.000	8.700	4	10.000
12.000	12.000	83.000	10.400	4	12.000

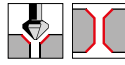
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	192	0,018	0,036	0,048	0,06	0,08	0,10	0,13	250	0,030	0,060	0,080	0,11	0,13	0,17	0,21
	≥ 850 N/mm ²	140	0,016	0,032	0,042	0,06	0,07	0,09	0,12		180	0,026	0,053	0,070	0,10	0,12	0,16
M	≤ 750 N/mm ²	120	0,013	0,025	0,034	0,05	0,05	0,07	0,09	160	0,021	0,042	0,056	0,08	0,09	0,12	0,15
	≥ 750 N/mm ²	80	0,009	0,019	0,025	0,04	0,04	0,06	0,07		100	0,016	0,032	0,042	0,06	0,07	0,10
K	≤ 240 HB	170	0,017	0,033	0,044	0,06	0,07	0,09	0,12	230	0,028	0,056	0,074	0,10	0,12	0,16	0,20
N	≥ 7 % Si	250	0,023	0,047	0,062	0,08	0,10	0,13	0,17		330	0,039	0,078	0,104	0,14	0,17	0,22

Deburring and chamfering tools

Deburring end mills 60°

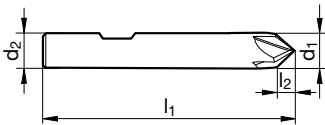


Catalogue no. 53394



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•		

- deburring- and chamfering-mill to machine workpiece edges with a 60° angle



d1 js9 mm	d2 h6 mm	l1 mm	l2 mm	Z	Code no.
6.000	6.000	57.000	5.200	4	6.000
8.000	8.000	63.000	7.000	4	8.000
10.000	10.000	72.000	8.700	4	10.000
12.000	12.000	83.000	10.400	4	12.000

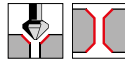
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	192	0,018	0,036	0,048	0,06	0,08	0,10	0,13	250	0,030	0,060	0,080	0,11	0,13	0,17	0,21
	≥ 850 N/mm ²	140	0,016	0,032	0,042	0,06	0,07	0,09	0,12		180	0,026	0,053	0,070	0,10	0,12	0,16
M	≤ 750 N/mm ²	120	0,013	0,025	0,034	0,05	0,05	0,07	0,09	160	0,021	0,042	0,056	0,08	0,09	0,12	0,15
	≥ 750 N/mm ²	80	0,009	0,019	0,025	0,04	0,04	0,06	0,07		100	0,016	0,032	0,042	0,06	0,07	0,10
K	≤ 240 HB	170	0,017	0,033	0,044	0,06	0,07	0,09	0,12	230	0,028	0,056	0,074	0,10	0,12	0,16	0,20
N	≥ 7 % Si	250	0,023	0,047	0,062	0,08	0,10	0,13	0,17		330	0,039	0,078	0,104	0,14	0,17	0,22

Deburring and chamfering tools

Deburring end mills 90°

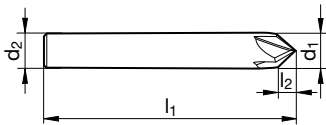


Catalogue no. 53395



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•		

- deburring- and chamfering-mill to machine workpiece edges with a 90° angle



d1 js9 mm	d2 h6 mm	l1 mm	l2 mm	Z	Code no.
4.000	4.000	50.000	2.000	4	4.000
6.000	6.000	57.000	3.000	4	6.000
8.000	8.000	63.000	4.000	4	8.000
10.000	10.000	72.000	5.000	4	10.000
12.000	12.000	83.000	6.000	4	12.000

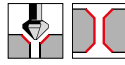
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	192	0,018	0,036	0,048	0,06	0,08	0,10	0,13	250	0,030	0,060	0,080	0,11	0,13	0,17	0,21
	≥ 850 N/mm ²	140	0,016	0,032	0,042	0,06	0,07	0,09	0,12		180	0,026	0,053	0,070	0,10	0,12	0,16
M	≤ 750 N/mm ²	120	0,013	0,025	0,034	0,05	0,05	0,07	0,09	160	0,021	0,042	0,056	0,08	0,09	0,12	0,15
	≥ 750 N/mm ²	80	0,009	0,019	0,025	0,04	0,04	0,06	0,07		100	0,016	0,032	0,042	0,06	0,07	0,10
K	≤ 240 HB	170	0,017	0,033	0,044	0,06	0,07	0,09	0,12	230	0,028	0,056	0,074	0,10	0,12	0,16	0,20
N	≥ 7 % Si	250	0,023	0,047	0,062	0,08	0,10	0,13	0,17		330	0,039	0,078	0,104	0,14	0,17	0,22

Deburring and chamfering tools

Deburring end mills 90°

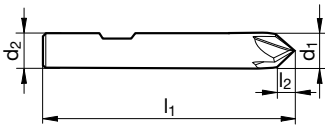


Catalogue no. 53396



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•		

- deburring- and chamfering-mill to machine workpiece edges with a 90° angle
- $\geq \varnothing 6.0$ mm with clamping surface shank form HB



d1 js9 mm	d2 h6 mm	l1 mm	l2 mm	Z	Code no.
4.000	4.000	50.000	2.000	4	4.000
6.000	6.000	57.000	3.000	4	6.000
8.000	8.000	63.000	4.000	4	8.000
10.000	10.000	72.000	5.000	4	10.000
12.000	12.000	83.000	6.000	4	12.000

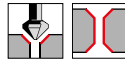
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	192	0,018	0,036	0,048	0,06	0,08	0,10	0,13	250	0,030	0,060	0,080	0,11	0,13	0,17	0,21
	≥ 850 N/mm ²	140	0,016	0,032	0,042	0,06	0,07	0,09	0,12		180	0,026	0,053	0,070	0,10	0,12	0,16
M	≤ 750 N/mm ²	120	0,013	0,025	0,034	0,05	0,05	0,07	0,09	160	0,021	0,042	0,056	0,08	0,09	0,12	0,15
	≥ 750 N/mm ²	80	0,009	0,019	0,025	0,04	0,04	0,06	0,07		100	0,016	0,032	0,042	0,06	0,07	0,10
K	≤ 240 HB	170	0,017	0,033	0,044	0,06	0,07	0,09	0,12	230	0,028	0,056	0,074	0,10	0,12	0,16	0,20
N	≥ 7 % Si	250	0,023	0,047	0,062	0,08	0,10	0,13	0,17		330	0,039	0,078	0,104	0,14	0,17	0,22

Deburring and chamfering tools

Deburring end mills 90°

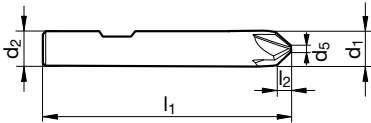


Catalogue no. 53399



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•	○	

- deburring- and chamfering-mill to machine workpiece edges with a 90° angle
- highest feed rates and improved surface finish thanks to $z = 6$
- also available as kit 322 044 176
- HA shank on request



d1 js9 mm	d2 h6 mm	d5 mm	l1 mm	l2 mm	Z	Code no.
6.000	6.000	1.500	57.000	2.300	6	6.000
8.000	8.000	2.000	63.000	3.000	6	8.000
10.000	10.000	3.000	72.000	3.500	6	10.000
12.000	12.000	3.000	83.000	4.500	6	12.000
16.000	16.000	4.000	92.000	6.000	6	16.000
20.000	20.000	6.000	92.000	6.900	6	20.000

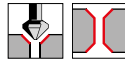
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	192	0,018	0,036	0,048	0,06	0,08	0,10	0,13	250	0,030	0,060	0,080	0,11	0,13	0,17	0,21
	≥ 850 N/mm ²	140	0,016	0,032	0,042	0,06	0,07	0,09	0,12	180	0,026	0,053	0,070	0,10	0,12	0,16	0,20
M	≤ 750 N/mm ²	120	0,013	0,025	0,034	0,05	0,05	0,07	0,09	160	0,021	0,042	0,056	0,08	0,09	0,12	0,15
	≥ 750 N/mm ²	80	0,009	0,019	0,025	0,04	0,04	0,06	0,07	100	0,016	0,032	0,042	0,06	0,07	0,10	0,12
K	≤ 240 HB	170	0,017	0,033	0,044	0,06	0,07	0,09	0,12	230	0,028	0,056	0,074	0,10	0,12	0,16	0,20
N	≥ 7 % Si	250	0,023	0,047	0,062	0,08	0,10	0,13	0,17	330	0,039	0,078	0,104	0,14	0,17	0,22	0,28

Deburring and chamfering tools

Deburring end mills 120°



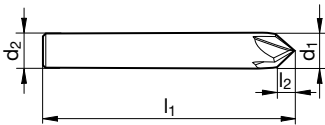
Catalogue no. 53397



P	M	K	N	S	H
•	•	•	•	•	

Application recommendations page 110-124

- deburring- and chamfering-mill to machine workpiece edges with a 120° angle



d1 js9 mm	d2 h6 mm	l1 mm	l2 mm	Z	Code no.
4.000	4.000	50.000	1.200	4	4.000
6.000	6.000	57.000	1.800	4	6.000
8.000	8.000	63.000	2.400	4	8.000
10.000	10.000	72.000	2.900	4	10.000
12.000	12.000	83.000	3.500	4	12.000

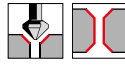
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	192	0,018	0,036	0,048	0,06	0,08	0,10	0,13	250	0,030	0,060	0,080	0,11	0,13	0,17	0,21
	≥ 850 N/mm ²	140	0,016	0,032	0,042	0,06	0,07	0,09	0,12		180	0,026	0,053	0,070	0,10	0,12	0,16
M	≤ 750 N/mm ²	120	0,013	0,025	0,034	0,05	0,05	0,07	0,09	160	0,021	0,042	0,056	0,08	0,09	0,12	0,15
	≥ 750 N/mm ²	80	0,009	0,019	0,025	0,04	0,04	0,06	0,07		100	0,016	0,032	0,042	0,06	0,07	0,10
K	≤ 240 HB	170	0,017	0,033	0,044	0,06	0,07	0,09	0,12	230	0,028	0,056	0,074	0,10	0,12	0,16	0,20
N	≥ 7 % Si	250	0,023	0,047	0,062	0,08	0,10	0,13	0,17		330	0,039	0,078	0,104	0,14	0,17	0,22

Deburring and chamfering tools

Deburring end mills 120°

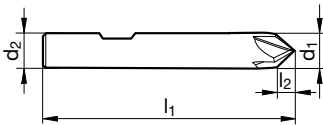


Catalogue no. 53398



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•		

- deburring- and chamfering-mill to machine workpiece edges with a 120° angle



d1 js9 mm	d2 h6 mm	l1 mm	l2 mm	Z	Code no.
6.000	6.000	57.000	1.800	4	6.000
8.000	8.000	63.000	2.400	4	8.000
10.000	10.000	72.000	2.900	4	10.000
12.000	12.000	83.000	3.500	4	12.000

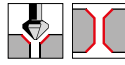
ISO	Hardness	v _c	f _z (mm/z)/Ø							v _c	f _z (mm/z)/Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	192	0,018	0,036	0,048	0,06	0,08	0,10	0,13	250	0,030	0,060	0,080	0,11	0,13	0,17	0,21
	≥ 850 N/mm ²	140	0,016	0,032	0,042	0,06	0,07	0,09	0,12		180	0,026	0,053	0,070	0,10	0,12	0,16
M	≤ 750 N/mm ²	120	0,013	0,025	0,034	0,05	0,05	0,07	0,09	160	0,021	0,042	0,056	0,08	0,09	0,12	0,15
	≥ 750 N/mm ²	80	0,009	0,019	0,025	0,04	0,04	0,06	0,07		100	0,016	0,032	0,042	0,06	0,07	0,10
K	≤ 240 HB	170	0,017	0,033	0,044	0,06	0,07	0,09	0,12	230	0,028	0,056	0,074	0,10	0,12	0,16	0,20
N	≥ 7 % Si	250	0,023	0,047	0,062	0,08	0,10	0,13	0,17		330	0,039	0,078	0,104	0,14	0,17	0,22

Deburring and chamfering tools

Front/back deburrer 90°

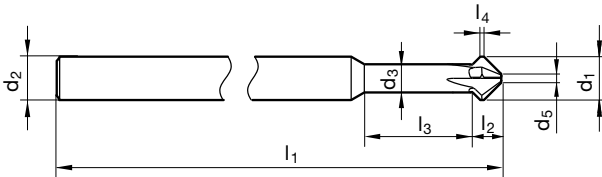


Catalogue no. 52365



P	M	K	N	S	H	Application recommendations page 110-124
•	•	•	•	•		

- de-burring and chamfer tool for the machining of workpiece edges with a 90° chamfer angle
- for clamping in hydraulic and shrink fit chucks
- with shank to DIN 6535



d1 mm	d2 h6 mm	d3 mm	d5 mm	l1 mm	l2 mm	l3 mm	l4 mm	Z	Code no.
3.000	4.000	2.200	0.600	75.000	2.10	11.400	0.500	4	3.000
4.000	4.000	2.900	0.800	75.000	2.70	15.000	0.500	4	4.000
5.000	5.000	3.900	1.000	75.000	3.00	18.000	0.500	4	5.000
6.000	6.000	3.900	1.200	100.000	3.90	18.200	0.500	4	6.000
8.000	6.000	6.000	1.600	100.000	4.70		0.500	4	8.000
10.000	6.000	6.000	2.000	100.000	6.50		0.500	4	10.000
12.000	6.000	6.000	2.400	100.000	8.30		0.500	4	12.000

ISO	Hardness	V _c	f _z (mm/z) / Ø							V _c	f _z (mm/z) / Ø						
			3	6	8	10	12	16	20		3	6	8	10	12	16	20
P	≤ 850 N/mm ²	192	0,018	0,036	0,048	0,06	0,08	0,10	0,13	250	0,030	0,060	0,080	0,11	0,13	0,17	0,21
	≥ 850 N/mm ²	140	0,016	0,032	0,042	0,06	0,07	0,09	0,12	180	0,026	0,053	0,070	0,10	0,12	0,16	0,20
M	≤ 750 N/mm ²	120	0,013	0,025	0,034	0,05	0,05	0,07	0,09	160	0,021	0,042	0,056	0,08	0,09	0,12	0,15
	≥ 750 N/mm ²	80	0,009	0,019	0,025	0,04	0,04	0,06	0,07	100	0,016	0,032	0,042	0,06	0,07	0,10	0,12
K	≤ 240 HB	170	0,017	0,033	0,044	0,06	0,07	0,09	0,12	230	0,028	0,056	0,074	0,10	0,12	0,16	0,20
N	≥ 7 % Si	250	0,023	0,047	0,062	0,08	0,10	0,13	0,17	330	0,039	0,078	0,104	0,14	0,17	0,22	0,28

TECHNICAL SECTION





SuperF-UT stable conditions

Recommendation for smooth-edged milling tools.



Correction factors			
a_p roughing > 1,5xD	! v_c -25 %	! f_z -25 %	
medium length tools	! v_c -40 %	! f_z -40 %	
extra length tools	! v_c -60 %	! f_z -55 %	

Material	Hardness	Application	a_e max.	v_c	f_z (mm/z) with nom. Ø									
					3	4	6	8	10	12	16	20	25	
P Struct. + free-cutting steels, unalloyed heat-treat. + case hard. steels 1.0035 S185, 1.0486 P275N, 1.0345 P235GH, 1.0050, 1.0070, 1.8937 1.0718 11SMnPb30, 1.0736 11SMn37 1.0402 C22, 1.1178 C30E, 1.0503 C45, 1.1191 C30E 1.0301 C10, 1.1121 C10E, 1.1750 C75W, 1.2076 102Cr6, 1.2307 29CrMoV9	≤ 850 N/mm ²	Slot drilling	1xD	180	0.016	0.021	0.031	0.042	0.060	0.072	0.100	0.120	0.150	
		Roughing	0.75xD	210	0.018	0.024	0.036	0.048	0.069	0.083	0.110	0.140	0.170	
		Finishing	0.02xD	360	0.017	0.023	0.034	0.046	0.066	0.079	0.110	0.130	0.170	
P Free-cutting steels, unalloyed case hardened steels, nitriding steels 1.0727 46 S20, 1.0728 60 S20, 1.0757 46SPb20, 1.0601 C60, 1.1221 C60E 1.7043 38Cr4, 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5 1.8504 34CrAl6, 1.8519 31CrMoV9, 1.8550 34CrAlNi7	850-1200 N/mm ²	Slot drilling	1xD	160	0.014	0.019	0.029	0.038	0.055	0.066	0.090	0.110	0.140	
		Roughing	0.75xD	190	0.017	0.022	0.033	0.044	0.063	0.076	0.100	0.130	0.160	
		Finishing	0.02xD	320	0.016	0.021	0.032	0.042	0.061	0.073	0.100	0.120	0.150	
P Alloyed heat-treatable, tool and high speed steels 1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4, 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4, 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2379 X155CrVMo12-1 1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3, Spring steel = 1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4	850-1400 N/mm ²	Slot drilling	1xD	135	0.014	0.018	0.027	0.036	0.050	0.060	0.080	0.100	0.130	
		Roughing	0.75xD	160	0.016	0.021	0.031	0.041	0.058	0.069	0.090	0.120	0.140	
		Finishing	0.02xD	270	0.015	0.020	0.030	0.040	0.055	0.066	0.090	0.110	0.140	
H Hardened steel Tool steel, heat-treatable steel, spring steel, high-speed steel, case hardened steel, etc. e.g.: 1.2344 X40CrMoV5-1; 1.2767 X45NiCrMo4; 1.2379 X155CrVMo12-1; 1.2080 X210Cr12; 1.3343 S 6-5-2	≤ 55 HRC	Slot drilling	1xD	70	0.011	0.014	0.021	0.028	0.040	0.048	0.060	0.080	0.100	
		Roughing	0.33xD	100	0.014	0.018	0.027	0.036	0.052	0.062	0.080	0.100	0.130	
		Finishing	0.01xD	140	0.011	0.014	0.021	0.028	0.040	0.048	0.060	0.080	0.100	
M Stainless steel 1.4404 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X10CrNiS18-9 USA = 303, 410, 420F, 430, 430F	≤ 750 N/mm ²	Slot drilling	1xD	120	0.014	0.018	0.027	0.036	0.050	0.060	0.080	0.100	0.130	
		Roughing	0.75xD	140	0.016	0.021	0.031	0.041	0.058	0.069	0.090	0.120	0.140	
M Stainless steel 1.4301 X5CrNi18-10, 1.4303 X5CrNi18-12 1.4310 XCrNi18-8 USA = 304, 304L, 420	750-850 N/mm ²	Slot drilling	1xD	80	0.012	0.016	0.024	0.032	0.045	0.054	0.070	0.090	0.110	
		Roughing	0.75xD	100	0.014	0.018	0.028	0.037	0.052	0.062	0.080	0.100	0.130	
		Finishing	0.02xD	160	0.013	0.018	0.026	0.035	0.050	0.059	0.080	0.100	0.120	
M Stainless steel 1.4438 X2CrNiMo18-15-4, 1.4404 X2CrNiMo17-12-2, 1.4571 X6CrNiTi18-10 USA = 310, 316, 316B, 316L, 317	≤ 850 N/mm ²	Slot drilling	1xD	60	0.011	0.014	0.021	0.028	0.040	0.048	0.060	0.080	0.100	
		Roughing	0.60xD	80	0.013	0.017	0.025	0.034	0.048	0.058	0.080	0.100	0.120	
		Finishing	0.01xD	120	0.011	0.014	0.021	0.028	0.040	0.048	0.060	0.080	0.100	
S Special alloys (nickel based "Ni") Nimonic, Inconel, Monel, Hastelloy	≤ 1.300 N/mm ²	Slot drilling	1xD	30	0.008	0.011	0.017	0.022	0.032	0.038	0.050	0.060	0.080	
		Roughing	0.60xD	40	0.010	0.013	0.020	0.027	0.038	0.046	0.060	0.080	0.100	
		Finishing	0.01xD	60	0.008	0.011	0.017	0.022	0.032	0.038	0.050	0.060	0.080	
Ti Titanium alloys ("Ti") 3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7164 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5	≤ 1.300 N/mm ²	Slot drilling	1xD	60	0.012	0.016	0.024	0.032	0.045	0.054	0.070	0.090	0.110	
		Roughing	0.60xD	80	0.014	0.019	0.029	0.038	0.054	0.065	0.090	0.110	0.140	
		Finishing	0.02xD	120	0.013	0.018	0.026	0.035	0.050	0.059	0.080	0.100	0.120	
K Cast iron, grey cast iron, spheroidal graphite and malleable cast iron 0.6010 EN-GL100 (GG10), 0.6020 EN-GJL-200 (GG20), 0.7050 EN-GJS-500-7 (GGG50), 0.8535 EN-GJMW-350-4 (GTW35)	≤ 240 HB	Slot drilling	1xD	160	0.017	0.022	0.033	0.044	0.065	0.078	0.100	0.130	0.160	
		Roughing	0.75xD	190	0.019	0.025	0.038	0.051	0.075	0.090	0.120	0.150	0.190	
		Finishing	0.02xD	320	0.018	0.024	0.036	0.048	0.072	0.086	0.110	0.140	0.180	
K Cast iron, grey cast iron, spheroidal graphite and malleable cast iron 0.6025 EN-GL250 (GG25), 0.6035 EN-GJL-350 (GG35), 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)	≥ 240 HB	Slot drilling	1xD	140	0.015	0.020	0.030	0.040	0.055	0.066	0.090	0.110	0.140	
		Roughing	0.75xD	170	0.017	0.023	0.035	0.046	0.063	0.076	0.100	0.130	0.160	
		Finishing	0.02xD	280	0.017	0.022	0.033	0.044	0.061	0.073	0.100	0.120	0.150	
N Aluminium, Al-wrought alloys, Al-alloys 3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1 3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1,5	bis 3 % Si	Slot drilling	1xD	500	0.020	0.026	0.039	0.052	0.080	0.096	0.130	0.160	0.200	
		Roughing	0.75xD	600	0.022	0.030	0.045	0.060	0.092	0.110	0.150	0.180	0.230	
		Finishing	0.02xD	1000	0.021	0.029	0.043	0.057	0.088	0.106	0.140	0.180	0.220	
N Aluminium-cast alloys 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, -G-AlSi12CuNiMg	≥ 7 % Si	Slot drilling	1xD	230	0.017	0.022	0.033	0.044	0.060	0.072	0.100	0.120	0.150	
		Roughing	0.75xD	300	0.019	0.025	0.038	0.051	0.069	0.083	0.110	0.140	0.170	
		Finishing	0.02xD	460	0.018	0.024	0.036	0.048	0.066	0.079	0.110	0.130	0.170	
N Magnesium-alloys MgMn2, G-MgAl8Zn1, G-MgAl6Zn3		Slot drilling	1xD	180	0.015	0.020	0.030	0.040	0.055	0.066	0.090	0.110	0.140	
		Roughing	0.75xD	210	0.017	0.023	0.035	0.046	0.063	0.076	0.100	0.130	0.160	
		Finishing	0.02xD	360	0.017	0.022	0.033	0.044	0.061	0.073	0.100	0.120	0.150	
N Non-ferrous metals (copper, short- or long-chipping brass) 2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb, 2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 ... 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5, 2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 ... 2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	≤ 850 N/mm ²	Slot drilling	1xD	250	0.017	0.022	0.033	0.044	0.060	0.072	0.100	0.120	0.150	
		Roughing	0.75xD	290	0.019	0.025	0.038	0.051	0.069	0.083	0.110	0.140	0.170	
		Finishing	0.02xD	500	0.018	0.024	0.036	0.048	0.066	0.079	0.110	0.130	0.170	

SuperF-UT unstable conditions

Recommendation for milling tools with flat nucle-type teeth.



Correction factors				
a_p roughing > 1,5xD	!	v_c -25 %	!	f_z -25 %
medium length tools		v_c -40 %	!	f_z -40 %
extra length tools		v_c -60 %	!	f_z -55 %

Material	Hardness	Application	a_e max.	v_c	f_z (mm/z) with nom. Ø								
					3	4	6	8	10	12	16	20	25
P Struct. + free-cutting steels, unalloyed heat-treat. + case hard. steels 1.0035 S185, 1.0486 P275N, 1.0345 P235GH, 1.0050, 1.0070, 1.8937 1.0718 11SMnPb30, 1.0736 11SMn37 1.0402 C22, 1.1178 C30E, 1.0503 C45, 1.1191 C30E 1.0301 C10, 1.1121 C10E, 1.1750 C75W, 1.2076 102Cr6, 1.2307 29CrMoV9	≤ 850 N/mm ²	Slot drilling	1xD	135	0.010	0.013	0.020	0.026	0.035	0.042	0.055	0.066	0.088
		Roughing	0.75xD	160	0.011	0.015	0.023	0.031	0.041	0.048	0.066	0.077	0.099
P Free-cutting steels, unalloyed case hardened steels, nitriding steels 1.0727 46 S20, 1.0728 60 S20, 1.0757 46SPb20, 1.0601 C60, 1.1221 C60E 1.7043 38Cr4, 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5 1.8504 34CrAl6, 1.8519 31CrMoV9, 1.8550 34CrAlNi7	850-1200 N/mm ²	Slot drilling	1xD	120	0.010	0.013	0.020	0.026	0.035	0.042	0.055	0.066	0.088
		Roughing	0.75xD	140	0.011	0.015	0.023	0.031	0.041	0.048	0.066	0.077	0.099
P Alloyed heat-treatable, tool and high speed steels 1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4, 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4, 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2379 X155CrVMo12-1 1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3, Spring steel = 1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4	850-1400 N/mm ²	Slot drilling	1xD	100	0.009	0.012	0.019	0.024	0.033	0.040	0.055	0.066	0.088
		Roughing	0.75xD	120	0.011	0.014	0.021	0.029	0.039	0.045	0.066	0.077	0.099
H Hardened steel Tool steel, heat-treatable steel, spring steel, high-speed steel, case hardened steel, etc. e.g.: 1.2344 X40CrMoV5-1; 1.2767 X45NiCrMo4; 1.2379 X155CrVMo12-1; 1.2080 X210Cr12; 1.3343 S 6-5-2	≤ 55 HRC	Slot drilling	1xD	55	0.007	0.009	0.013	0.018	0.024	0.029	0.044	0.044	0.066
	55-63 HRC	Roughing	0.33xD	80	0.009	0.011	0.018	0.023	0.032	0.037	0.055	0.066	0.077
M Stainless steel 1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X10CrNiS18-9 USA = 303, 410, 420F, 430, 430F	≤ 750 N/mm ²	Slot drilling	1xD	90	0.009	0.012	0.019	0.024	0.033	0.040	0.055	0.066	0.088
		Roughing	0.75xD	100	0.011	0.014	0.021	0.029	0.039	0.045	0.066	0.077	0.099
M Stainless steel 1.4301X5CrNi18-10, 1.4303 X5CrNi18-12 1.4310 XCrNi18-8 USA = 304, 304L, 420	750-850 N/mm ²	Slot drilling	1xD	65	0.009	0.011	0.017	0.022	0.031	0.037	0.044	0.066	0.077
		Roughing	0.75xD	80	0.010	0.013	0.019	0.025	0.035	0.043	0.055	0.066	0.088
M Stainless steel 1.4438 X2CrNiMo18-15-4, 1.4404 X2CrNiMo17-12-2, 1.4571 X6CrNiTi18-10 USA = 310, 316, 316B, 316L, 317	≤ 850 N/mm ²	Slot drilling	1xD	55	0.008	0.010	0.014	0.020	0.028	0.033	0.044	0.055	0.066
		Roughing	0.60xD	70	0.009	0.012	0.018	0.023	0.033	0.040	0.055	0.066	0.088
S Special alloys (nickel based "Ni") Nimonic, Inconel, Monel, Hastelloy	≤ 1.300 N/mm ²	Slot drilling	1xD	25	0.007	0.009	0.013	0.018	0.024	0.029	0.044	0.044	0.066
		Roughing	0.60xD	40	0.008	0.011	0.015	0.021	0.029	0.035	0.044	0.055	0.077
Ti Titanium alloys ("Ti") 3.7024 Ti99.5, 3.7114 TiAl5Sn2.5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7164 TiAl6V4, 3.7184 TiAl4Mo4Sn2.5	≤ 1.300 N/mm ²	Slot drilling	1xD	50	0.008	0.010	0.014	0.020	0.028	0.033	0.044	0.055	0.066
		Roughing	0.60xD	70	0.009	0.012	0.018	0.023	0.033	0.040	0.055	0.066	0.088
K Cast iron, grey cast iron, spheroidal graphite and malleable cast iron 0.6010 EN-GL100 (GG10), 0.6020 EN-GJL-200 (GG20), 0.7050 EN-GJS-500-7 (GGG50), 0.8535 EN-GJMW-350-4 (GTW35)	≤ 240 HB	Slot drilling	1xD	120	0.010	0.013	0.020	0.026	0.035	0.042	0.055	0.066	0.088
		Roughing	0.75xD	140	0.011	0.015	0.023	0.031	0.041	0.048	0.066	0.077	0.099
K Cast iron, grey cast iron, spheroidal graphite and malleable cast iron 0.6025 EN-GL250 (GG25), 0.6035 EN-GJL-350 (GG35), 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)	≥ 240 HB	Slot drilling	1xD	105	0.009	0.012	0.019	0.024	0.033	0.040	0.055	0.066	0.088
		Roughing	0.75xD	130	0.011	0.014	0.021	0.029	0.039	0.045	0.066	0.077	0.099
N Aluminium, Al-wrought alloys, Al-alloys 3.0255 Al99.5, 3.2315 AlMgSi1, 3.3515 AlMg1 3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1.5	≤ 7 % Si	Slot drilling	1xD	375	0.012	0.015	0.023	0.031	0.041	0.048	0.066	0.077	0.099
		Roughing	0.75xD	440	0.013	0.018	0.026	0.035	0.047	0.056	0.077	0.099	0.121
N Aluminium-cast alloys 3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9 3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, -G-AlSi12CuNiMg	≥ 7 % Si	Slot drilling	1xD	180	0.011	0.014	0.021	0.029	0.039	0.046	0.066	0.077	0.099
		Roughing	0.75xD	210	0.012	0.017	0.024	0.032	0.044	0.053	0.066	0.088	0.110
N Magnesium-alloys MgMn2, G-MgAl8Zn1, G-MgAl6Zn3		Slot drilling	1xD	140	0.011	0.014	0.021	0.029	0.039	0.046	0.066	0.077	0.099
		Roughing	0.75xD	170	0.012	0.017	0.024	0.032	0.044	0.053	0.066	0.088	0.110
N Non-ferrous metals (copper, short- or long-chipping brass) 2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb, 2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 ... 2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0.5, 2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 ... 2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	≤ 850 N/mm ²	Slot drilling	1xD	200	0.011	0.014	0.021	0.029	0.039	0.046	0.066	0.077	0.099
		Roughing	0.75xD	230	0.012	0.017	0.024	0.032	0.044	0.053	0.066	0.088	0.110

SuperF-UT Z



Slot drilling

Material	Machinability	a _p max.	a _e max.	max. pressure angle	v _c	f _z with nom. Ø								
						3	4	5	6	8	10	12	16	20
P1/P2	light/medial	0.80xD	1.00xD	180°	160	0.014	0.018	0.023	0.027	0.044	0.055	0.066	0.088	0.110
P3	difficult	0.80xD	1.00xD	180°	125	0.014	0.018	0.023	0.027	0.040	0.050	0.060	0.080	0.100
M1	light/medial	0.80xD	1.00xD	180°	85	0.011	0.014	0.018	0.021	0.028	0.035	0.042	0.056	0.070
M2	difficult	0.80xD	1.00xD	180°	55	0.011	0.014	0.018	0.021	0.028	0.035	0.042	0.056	0.070
S	medial/difficult	0.80xD	1.00xD	180°	45	0.011	0.014	0.018	0.021	0.028	0.035	0.042	0.056	0.070
	very difficult	0.80xD	1.00xD	180°	30	0.009	0.012	0.015	0.018	0.024	0.030	0.036	0.048	0.060

HPC Roughing

Material	Machinability	a _p max.	a _e max.	max. pressure angle	v _c	f _z with nom. Ø								
						3	4	5	6	8	10	12	16	20
P1/P2	light/medial	L2	0.20xD	53°	270	0.022	0.029	0.036	0.043	0.070	0.088	0.106	0.141	0.176
P3	difficult	L2	0.20xD	53°	210	0.022	0.029	0.036	0.043	0.064	0.080	0.096	0.128	0.160
M1	light/medial	L2	0.15xD	46°	150	0.020	0.027	0.033	0.040	0.053	0.067	0.080	0.106	0.133
M2	difficult	L2	0.10xD	37°	100	0.024	0.032	0.040	0.048	0.064	0.081	0.097	0.129	0.161
S	medial/difficult	L2	0.08xD	31°	90	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175
	very difficult	L2	0.08xD	31°	60	0.023	0.030	0.038	0.045	0.060	0.075	0.090	0.120	0.150

HSC Roughing

Material	Machinability	a _p max.	a _e max.	max. pressure angle	v _c	f _z with nom. Ø								
						3	4	5	6	8	10	12	16	20
P1/P2	light/medial	L2	0.15xD	46°	290	0.026	0.034	0.043	0.051	0.084	0.105	0.125	0.167	0.209
P3	difficult	L2	0.15xD	46°	230	0.026	0.034	0.043	0.051	0.076	0.095	0.114	0.152	0.190
M1	light/medial	L2	0.10xD	37°	170	0.024	0.032	0.040	0.048	0.064	0.081	0.097	0.129	0.161
M2	difficult	L2	0.08xD	31°	110	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175
S	medial/difficult	L2	0.05xD	26°	100	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175
	very difficult	L2	0.05xD	26°	70	0.023	0.030	0.038	0.045	0.060	0.075	0.090	0.120	0.150

Finishing

Material	Machinability	a _p max.	a _e max.	max. pressure angle	v _c	f _z with nom. Ø								
						3	4	5	6	8	10	12	16	20
P1/P2	light/medial	L2	0.02xD	18°	320	0.019	0.025	0.032	0.038	0.062	0.077	0.092	0.123	0.154
P3	difficult	L2	0.02xD	18°	250	0.019	0.025	0.032	0.038	0.056	0.070	0.084	0.112	0.140
M1	light/medial	L2	0.02xD	18°	170	0.015	0.020	0.025	0.029	0.039	0.049	0.059	0.078	0.098
M2	difficult	L2	0.01xD	11°	120	0.019	0.025	0.032	0.038	0.050	0.063	0.076	0.101	0.126
S	medial/difficult	L2	0.01xD	11°	100	0.019	0.025	0.032	0.038	0.050	0.063	0.076	0.101	0.126
	very difficult	L2	0.01xD	11°	70	0.016	0.022	0.027	0.032	0.043	0.054	0.065	0.086	0.108

P1	P Struct. + free-cutting steels, unalloyed heat-treat. + case hard. steels	1.0345 P235GH, 1.0050, 1.0503 C45, 1.2076 102Cr6
P2	P Free-cutting steels, unalloyed case hardened steels, nitriding steels	1.1221 C60E, 1.7043 38Cr4, 1.7131 16MnCr5, 1.8550 34CrAlNi7
P3	P Alloyed heat-treatable, tool and high speed steels	1.7003 38Cr2, 1.5710 36NiCr6, 1.7225 42CrMo4, 1.2419 105WCr6
M1	M Stainless steel (easy to machine/sulphured)	1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X10CrNiS18-9
M2	M Stainless steel (moderately difficult to machine)	1.4301X5CrNi18-10, 1.4571 X6CrNiTi18-10, 1.4404 X2CrNiMo17-12-2
Ti	T Titanium alloys	3.7114 TiAl5Sn2.5, 3.7124 TiCu2, 3.7154 TiAl6Zr5, 3.7164 TiAl6V4



SUPERF-UT Z

SUPERF-UT ZS

- HIGH-PERFORMANCE ROUGHING INCLUDING LARGE CUTTING DEPTHS
- HIGH RUNNING SMOOTHNESS AND METAL REMOVAL RATE
- HPC-MILLING IN TOUGH, LOW- AND HIGHALLOYED STEELS AND DIFFCULT-TO-MACHINE SPECIAL MATERIALS

SuperF-UT ZS



HPC Roughing

Material	Machinability	a _p max.	a _e max.	max. pressure angle	v _c	f _z with nom. Ø								
						3	4	5	6	8	10	12	16	20
P1/P2	light/medial	L2	0.15xD	46°	280	0.026	0.034	0.043	0.051	0.084	0.105	0.125	0.167	0.209
P3	difficult	L2	0.15xD	46°	220	0.026	0.034	0.043	0.051	0.076	0.095	0.114	0.152	0.190
M1	light/medial	L2	0.10xD	37°	160	0.024	0.032	0.040	0.048	0.064	0.081	0.097	0.129	0.161
M2	difficult	L2	0.10xD	37°	100	0.024	0.032	0.040	0.048	0.064	0.081	0.097	0.129	0.161
S	medial/difficult	L2	0.08xD	31°	90	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175
	very difficult	L2	0.08xD	31°	60	0.023	0.030	0.038	0.045	0.060	0.075	0.090	0.120	0.150

HSC Roughing

Material	Machinability	a _p max.	a _e max.	max. pressure angle	v _c	f _z with nom. Ø								
						3	4	5	6	8	10	12	16	20
P1/P2	light/medial	L2	0.10xD	37°	310	0.031	0.041	0.052	0.062	0.101	0.127	0.152	0.202	0.253
P3	difficult	L2	0.10xD	37°	240	0.031	0.041	0.052	0.062	0.092	0.115	0.138	0.184	0.230
M1	light/medial	L2	0.08xD	31°	170	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175
M2	difficult	L2	0.08xD	31°	110	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175
S	medial/difficult	L2	0.05xD	26°	100	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175
	very difficult	L2	0.05xD	26°	70	0.023	0.030	0.038	0.045	0.060	0.075	0.090	0.120	0.150

Finishing

Material	Machinability	a _p max.	a _e max.	max. pressure angle	v _c	f _z with nom. Ø								
						3	4	5	6	8	10	12	16	20
P1/P2	light/medial	L2	0.01xD	11°	340	0.024	0.032	0.041	0.049	0.079	0.099	0.119	0.158	0.198
P3	difficult	L2	0.01xD	11°	270	0.024	0.032	0.041	0.049	0.072	0.090	0.108	0.144	0.180
M1	light/medial	L2	0.01xD	11°	180	0.019	0.025	0.032	0.038	0.050	0.063	0.076	0.101	0.126
M2	difficult	L2	0.01xD	11°	120	0.019	0.025	0.032	0.038	0.050	0.063	0.076	0.101	0.126
S	medial/difficult	L2	0.01xD	11°	100	0.019	0.025	0.032	0.038	0.050	0.063	0.076	0.101	0.126
	very difficult	L2	0.01xD	11°	70	0.016	0.022	0.027	0.032	0.043	0.054	0.065	0.086	0.108

P1	P Struct. + free-cutting steels, unalloyed heat-treat. + case hard. steels	1.0345 P235GH, 1.0050, 1.0503 C45, 1.2076 102Cr6
P2	P Free-cutting steels, unalloyed case hardened steels, nitriding steels	1.1221 C60E, 1.7043 38Cr4, 1.7131 16MnCr5, 1.8550 34CrAINi7
P3	P Alloyed heat-treatable, tool and high speed steels	1.7003 38Cr2, 1.5710 36NiCr6, 1.7225 42CrMo4, 1.2419 105WCr6
M1	M Stainless steel (easy to machine/sulphured)	1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X10CrNiS18-9
M2	M Stainless steel (moderately difficult to machine)	1.4301X5CrNi18-10, 1.4571 X6CrNiTi18-10, 1.4404 X2CrNiMo17-12-2
Ti	T Titanium alloys	3.7114 TiAl5Sn2,5, 3.7124 TiCu2, 3.7154 TiAl6Zr5, 3.7164 TiAl6V4



SUPERF-UT ZS-R

SUPERF-UT ZS-7

- HIGHEST METAL REMOVAL RATE FOR TROCHOIDAL MILLING APPLICATIONS (TC)
- 5 OR 7 CUTTING EDGES WITH LOW HELIX ANGLE FOR REDUCED CONTACT POINTS
- HIGH FEED RATES AT LIMITED CUTTING SPEEDS FOR OUTSTANDING METAL REMOVAL RATES

SuperF-UT NX Micro



Catalogue no. 54594

Open grooves and helix

	Material/ISO material	a _e max.	a _p max.	v _c	f _z / Ø			v _c	f _z / Ø			v _c	f _z / Ø				
					0.8	1.0	1.2		1.5	1.8	2.0		2.2	2.5	2.8	3.0	
P	Unalloyed steel	1.00xD	1.00xD	140	0.0072	0.0090	0.0108	168	0.0135	0.0162	182	0.0180	0.0198	0.0225	196	0.0252	0.0270
	Low-alloyed steel	1.00xD	1.00xD	140	0.0064	0.0080	0.0096	168	0.0120	0.0144	182	0.0160	0.0176	0.0200	196	0.0224	0.0240
	High-alloyed steel and tool steel	1.00xD	0.75xD	140	0.0048	0.0060	0.0072	168	0.0090	0.0108	182	0.0120	0.0132	0.0150	196	0.0168	0.0180
M	Stainless steel, ferritic, martensitic	1.00xD	1.00xD	140	0.0064	0.0080	0.0096	168	0.0120	0.0144	182	0.0160	0.0176	0.0200	196	0.0224	0.0240
	Stainless steel, austenitic	1.00xD	1.00xD	120	0.0056	0.0070	0.0084	144	0.0105	0.0126	156	0.0140	0.0154	0.0175	168	0.0196	0.0210
	Duplex steel, high strength stainless steels	1.00xD	0.75xD	90	0.0049	0.0061	0.0073	108	0.0092	0.0110	117	0.0122	0.0135	0.0153	126	0.0171	0.0184
K	Grey cast iron	1.00xD	1.00xD	120	0.0056	0.0070	0.0084	144	0.0105	0.0126	156	0.0140	0.0154	0.0175	168	0.0196	0.0210
	Cast iron with spheroidal graphite iron	1.00xD	1.00xD	120	0.0056	0.0070	0.0084	144	0.0105	0.0126	156	0.0140	0.0154	0.0175	168	0.0196	0.0210
	Malleable cast iron GJV & ADI	1.00xD	1.00xD	100	0.0050	0.0062	0.0075	120	0.0093	0.0112	130	0.0124	0.0137	0.0156	140	0.0174	0.0187
N	Aluminium-wrought alloys	1.00xD	1.00xD	170	0.0096	0.0120	0.0144	204	0.0180	0.0216	221	0.0240	0.0264	0.0300	238	0.0336	0.0360
	Aluminium-cast alloys	1.00xD	1.00xD	170	0.0096	0.0120	0.0144	204	0.0180	0.0216	221	0.0240	0.0264	0.0300	238	0.0336	0.0360
	Copper and copper alloys	1.00xD	1.00xD	125	0.0088	0.0110	0.0133	150	0.0166	0.0199	162.5	0.0221	0.0243	0.0276	175	0.0309	0.0331
S	Heat-resistant alloys, Fe-based	1.00xD	0.50xD	100	0.0036	0.0045	0.0054	120	0.0068	0.0081	130	0.0090	0.0099	0.0113	140	0.0126	0.0135
	Heat-resistant alloys, Ni-based, CO-based	1.00xD	0.50xD	60	0.0029	0.0037	0.0044	72	0.0055	0.0066	78	0.0073	0.0080	0.0091	84	0.0102	0.0110
	Titanium alloys & pure titanium	1.00xD	0.75xD	100	0.0060	0.0075	0.0090	120	0.0113	0.0135	130	0.0150	0.0165	0.0188	140	0.0210	0.0225
H	Hardened steel, hardened and tempered, < 55 HRC	1.00xD	0.25xD	35	0.0032	0.0040	0.0048	42	0.0060	0.0072	46	0.0080	0.0088	0.0100	49	0.0112	0.0120

Ramping and closed grooves

	Material/ISO material	a _e max.	a _p max.	v _c	f _z / Ø			v _c	f _z / Ø			v _c	f _z / Ø				
					0.8	1.0	1.2		1.5	1.8	2.0		2.2	2.5	2.8	3.0	
P	Unalloyed steel	1.00xD	1.00xD	100	0.0043	0.0054	0.0065	120	0.0081	0.0097	130	0.0108	0.0119	0.0135	140	0.0151	0.0162
	Low-alloyed steel	1.00xD	1.00xD	100	0.0038	0.0048	0.0058	120	0.0072	0.0086	130	0.0096	0.0106	0.0120	140	0.0134	0.0144
	High-alloyed steel and tool steel	1.00xD	0.75xD	100	0.0029	0.0036	0.0043	120	0.0054	0.0065	130	0.0072	0.0079	0.0090	140	0.0101	0.0108
M	Stainless steel, ferritic, martensitic	1.00xD	1.00xD	100	0.0038	0.0048	0.0058	120	0.0072	0.0086	130	0.0096	0.0106	0.0120	140	0.0134	0.0144
	Stainless steel, austenitic	1.00xD	1.00xD	90	0.0034	0.0042	0.0050	108	0.0063	0.0076	117	0.0084	0.0092	0.0105	126	0.0118	0.0126
	Duplex steel, high strength stainless steels	1.00xD	0.75xD	65	0.0029	0.0037	0.0044	78	0.0055	0.0066	85	0.0073	0.0081	0.0092	91	0.0103	0.0110
K	Grey cast iron	1.00xD	1.00xD	90	0.0034	0.0042	0.0050	108	0.0063	0.0076	117	0.0084	0.0092	0.0105	126	0.0118	0.0126
	Cast iron with spheroidal graphite iron	1.00xD	1.00xD	90	0.0034	0.0042	0.0050	108	0.0063	0.0076	117	0.0084	0.0092	0.0105	126	0.0118	0.0126
	Malleable cast iron GJV & ADI	1.00xD	1.00xD	75	0.0030	0.0037	0.0045	90	0.0056	0.0067	98	0.0075	0.0082	0.0093	105	0.0105	0.0112
N	Aluminium-wrought alloys	1.00xD	1.00xD	120	0.0058	0.0072	0.0086	144	0.0108	0.0130	156	0.0144	0.0158	0.0180	168	0.0202	0.0216
	Aluminium-cast alloys	1.00xD	1.00xD	120	0.0058	0.0072	0.0086	144	0.0108	0.0130	156	0.0144	0.0158	0.0180	168	0.0202	0.0216
	Copper and copper alloys	1.00xD	1.00xD	90	0.0053	0.0066	0.0080	108	0.0099	0.0119	117	0.0133	0.0146	0.0166	126	0.0186	0.0199
S	Heat-resistant alloys, Fe-based	1.00xD	0.50xD	75	0.0022	0.0027	0.0032	90	0.0041	0.0049	98	0.0054	0.0059	0.0068	105	0.0076	0.0081
	Heat-resistant alloys, Ni-based, CO-based	1.00xD	0.50xD	45	0.0018	0.0022	0.0026	54	0.0033	0.0039	59	0.0044	0.0048	0.0055	63	0.0061	0.0066
	Titanium alloys & pure titanium	1.00xD	0.75xD	70	0.0036	0.0045	0.0054	84	0.0068	0.0081	91	0.0090	0.0099	0.0113	98	0.0126	0.0135
H	Hardened steel, hardened and tempered, < 55 HRC	1.00xD	0.25xD	25	0.0019	0.0024	0.0029	30	0.0036	0.0043	33	0.0048	0.0053	0.0060	35	0.0067	0.0072

Roughing

	Material/ISO material	a _e max.	a _p max.	v _c	f _z / Ø			v _c	f _z / Ø			v _c	f _z / Ø				
					0.8	1.0	1.2		1.5	1.8	2.0		2.2	2.5	2.8	3.0	
P	Unalloyed steel	0.25xD	2.00xD	170	0.0113	0.0142	0.0170	204	0.0213	0.0255	221	0.0284	0.0312	0.0354	238	0.0397	0.0425
	Low-alloyed steel	0.25xD	2.00xD	170	0.0101	0.0126	0.0151	204	0.0189	0.0227	221	0.0252	0.0277	0.0315	238	0.0353	0.0378
	High-alloyed steel and tool steel	0.20xD	2.00xD	170	0.0076	0.0095	0.0113	204	0.0142	0.0170	221	0.0189	0.0208	0.0236	238	0.0265	0.0284
M	Stainless steel, ferritic, martensitic	0.25xD	2.00xD	170	0.0101	0.0126	0.0151	204	0.0189	0.0227	221	0.0252	0.0277	0.0315	238	0.0353	0.0378
	Stainless steel, austenitic	0.20xD	2.00xD	145	0.0088	0.0110	0.0132	174	0.0165	0.0198	189	0.0221	0.0243	0.0276	203	0.0309	0.0331
	Duplex steel, high strength stainless steels	0.20xD	2.00xD	105	0.0077	0.0096	0.0116	126	0.0145	0.0174	137	0.0193	0.0212	0.0241	147	0.0270	0.0289
K	Grey cast iron	0.25xD	2.00xD	145	0.0088	0.0110	0.0132	174	0.0165	0.0198	189	0.0221	0.0243	0.0276	203	0.0309	0.0331
	Cast iron with spheroidal graphite iron	0.25xD	2.00xD	145	0.0088	0.0110	0.0132	174	0.0165	0.0198	189	0.0221	0.0243	0.0276	203	0.0309	0.0331
	Malleable cast iron GJV & ADI	0.25xD	2.00xD	120	0.0078	0.0098	0.0118	144	0.0147	0.0176	156	0.0196	0.0216	0.0245	168	0.0274	0.0294
N	Aluminium-wrought alloys	0.25xD	2.00xD	200	0.0151	0.0189	0.0227	240	0.0284	0.0340	260	0.0378	0.0416	0.0473	280	0.0529	0.0567
	Aluminium-cast alloys	0.25xD	2.00xD	200	0.0151	0.0189	0.0227	240	0.0284	0.0340	260	0.0378	0.0416	0.0473	280	0.0529	0.0567
	Copper and copper alloys	0.25xD	2.00xD	150	0.0139	0.0174	0.0209	180	0.0261	0.0313	195	0.0348	0.0383	0.0435	210	0.0487	0.0522
S	Heat-resistant alloys, Fe-based	0.15xD	2.00xD	120	0.0057	0.0071	0.0085	144	0.0106	0.0128	156	0.0142	0.0156	0.0177	168	0.0198	0.0213
	Heat-resistant alloys, Ni-based, CO-based	0.15xD	2.00xD	70	0.0046	0.0058	0.0069	84	0.0086	0.0104	91	0.0115	0.0127	0.0144	98	0.0161	0.0173
	Titanium alloys & pure titanium	0.20xD	2.00xD	115	0.0095	0.0118	0.0142	138	0.0177	0.0213	150	0.0236	0.0260	0.0295	161	0.0331	0.0354
H	Hardened steel, hardened and tempered, < 55 HRC	0.05xD	2.00xD	45	0.0050	0.0063	0.0076	54	0.0095	0.0113	59	0.0126	0.0139	0.0158	63	0.0176	0.0189

Finishing

	Material/ISO material	a _e max.	a _p max.	v _c	f _z / Ø			f _z / Ø			f _z / Ø			f _z / Ø			
					0.8	1.0	1.2	v _c	1.5	1.8	v _c	2.0	2.2	2.5	v _c	2.8	3.0
P	Unalloyed steel	0.03xD	2.00xD	180	0.0086	0.0108	0.0130	216	0.0162	0.0194	234	0.0216	0.0238	0.0270	252	0.0302	0.0324
	Low-alloyed steel	0.03xD	2.00xD	180	0.0077	0.0096	0.0115	216	0.0144	0.0173	234	0.0192	0.0211	0.0240	252	0.0269	0.0288
	High-alloyed steel and tool steel	0.03xD	2.00xD	180	0.0058	0.0072	0.0086	216	0.0108	0.0130	234	0.0144	0.0158	0.0180	252	0.0202	0.0216
M	Stainless steel, ferritic, martensitic	0.03xD	2.00xD	180	0.0077	0.0096	0.0115	216	0.0144	0.0173	234	0.0192	0.0211	0.0240	252	0.0269	0.0288
	Stainless steel, austenitic	0.03xD	2.00xD	155	0.0067	0.0084	0.0101	186	0.0126	0.0151	202	0.0168	0.0185	0.0210	217	0.0235	0.0252
	Duplex steel, high strength stainless steels	0.03xD	2.00xD	115	0.0059	0.0073	0.0088	138	0.0110	0.0132	150	0.0147	0.0162	0.0184	161	0.0206	0.0220
K	Grey cast iron	0.03xD	2.00xD	155	0.0067	0.0084	0.0101	186	0.0126	0.0151	202	0.0168	0.0185	0.0210	217	0.0235	0.0252
	Cast iron with spheroidal graphite iron																
	Malleable cast iron	0.03xD	2.00xD	130	0.0060	0.0075	0.0090	156	0.0112	0.0134	169	0.0149	0.0164	0.0187	182	0.0209	0.0224
	GJV & ADI																
N	Aluminium-wrought alloys	0.03xD	2.00xD	220	0.0115	0.0144	0.0173	264	0.0216	0.0259	286	0.0288	0.0317	0.0360	308	0.0403	0.0432
	Aluminium-cast alloys																
	Copper and copper alloys																
S	Heat-resistant alloys, Fe-based	0.03xD	2.00xD	130	0.0043	0.0054	0.0065	156	0.0081	0.0097	169	0.0108	0.0119	0.0135	182	0.0151	0.0162
	Heat-resistant alloys, Ni-based, CO-based																
	Titanium alloys & pure titanium																
H	Hardened steel, hardened and tempered, < 55 HRC	0.02xD	2.00xD	45	0.0038	0.0048	0.0058	54	0.0072	0.0086	59	0.0096	0.0106	0.0120	63	0.0134	0.0144

Drilling

	Material/ISO material	a _p max.	v _c	f _z / Ø			f _z / Ø			f _z / Ø			f _z / Ø			
				0.8	1.0	1.2	v _c	1.5	1.8	v _c	2.0	2.2	2.5	v _c	2.8	3.0
P	Unalloyed steel	1.00xD	100	0.0014	0.0018	0.0022	120	0.0027	0.0032	130	0.0036	0.0040	0.0045	140	0.0050	0.0054
	Low-alloyed steel	1.00xD	100	0.0013	0.0016	0.0019	120	0.0024	0.0029	130	0.0032	0.0035	0.0040	140	0.0045	0.0048
	High-alloyed steel and tool steel	0.50xD	90	0.0010	0.0012	0.0014	108	0.0018	0.0022	117	0.0024	0.0026	0.0030	126	0.0034	0.0036
M	Stainless steel, ferritic, martensitic	0.75xD	90	0.0012	0.0015	0.0018	108	0.0023	0.0027	117	0.0030	0.0033	0.0038	126	0.0042	0.0045
	Stainless steel, austenitic	0.50xD	85	0.0011	0.0014	0.0017	102	0.0021	0.0025	111	0.0028	0.0031	0.0035	119	0.0039	0.0042
	Duplex steel, high strength stainless steels	0.25xD	65	0.0010	0.0012	0.0014	78	0.0018	0.0022	85	0.0024	0.0026	0.0030	91	0.0034	0.0036
K	Grey cast iron	1.00xD	90	0.0011	0.0014	0.0017	108	0.0021	0.0025	117	0.0028	0.0031	0.0035	126	0.0039	0.0042
	Cast iron with spheroidal graphite iron															
	Malleable cast iron	1.00xD	75	0.0010	0.0012	0.0014	90	0.0018	0.0022	98	0.0024	0.0026	0.0030	105	0.0034	0.0036
	GJV & ADI															
N	Aluminium-wrought alloys	0.50xD	125	0.0019	0.0024	0.0029	150	0.0036	0.0043	163	0.0048	0.0053	0.0060	175	0.0067	0.0072
	Aluminium-cast alloys															
	Copper and copper alloys															
S	Heat-resistant alloys, Fe-based	0.25xD	75	0.0007	0.0009	0.0011	90	0.0014	0.0016	98	0.0018	0.0020	0.0023	105	0.0025	0.0027
	Heat-resistant alloys, Ni-based, CO-based	0.25xD	45	0.0006	0.0008	0.0009	54	0.0011	0.0014	59	0.0015	0.0017	0.0019	63	0.0021	0.0023
	Titanium alloys & pure titanium	0.25xD	70	0.0012	0.0015	0.0018	84	0.0023	0.0027	91	0.0030	0.0033	0.0038	98	0.0042	0.0045

Struct. + free-cutting steels, unalloyed heat-treat. + case hard. steels	1.0345 P235GH, 1.0050, 1.0503 C45, 1.2076 102Cr6
P Free-cutting steels, unalloyed case hardened steels, nitriding steels	1.1221 C60E, 1.7043 38Cr4, 1.7131 16MnCr5, 1.8550 34CrAlNi7
Alloyed heat-treatable, tool and high speed steels	1.7003 38Cr2, 1.5710 36NiCr6, 1.7225 42CrMo4, 1.2419 105WCr6
M Stainless steel (easy to machine/sulphured)	1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X10CrNiS18-9
Stainless steel (moderately difficult to machine)	1.4301 X5CrNi18-10, 1.4571 X6CrNiTi18-10, 1.4404 X2CrNiMo17-12-2
K Cast iron, grey cast iron, spheroidal graphite and malleable cast iron	0.6025 EN-GL250 (GG25), 0.7070 EN-GJS-700-2 (GGG70)
N Aluminium, Al-wrought alloys, Al-alloys	3.0255 Al99,5, 3.2315 AlMgSi1, 3.1325 AlCuMg1, 3.3245 AlMg3Si
Aluminium-cast alloys	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9
Ti Titanium alloys	3.7114 TiAl5Sn2,5, 3.7124 TiCu2, 3.7154 TiAl6Zr5, 3.7164 TiAl6V4

SuperF-UT NX Micro



Catalogue no. 54595

Open grooves and helix

	Material/ISO material	a _e max.	a _p max.	v _c	f _z /Ø		v _c	f _z /Ø		v _c	f _z /Ø		v _c	f _z /Ø	
					1.0	1.2		1.5	2.0		2.5	2.8		3.0	
P	Unalloyed steel	1.00xD	0.50xD	112	0.0081	0.0097	134	0.0122	146	0.0162	0.0203	157	0.0227	0.0243	
	Low-alloyed steel	1.00xD	0.50xD	112	0.0072	0.0086	134	0.0108	146	0.0144	0.0180	157	0.0202	0.0216	
	High-alloyed steel and tool steel	1.00xD	0.25xD	112	0.0054	0.0065	134	0.0081	146	0.0108	0.0135	157	0.0151	0.0162	
M	Stainless steel, ferritic, martensitic	1.00xD	0.25xD	112	0.0072	0.0086	134	0.0108	146	0.0144	0.0180	157	0.0202	0.0216	
	Stainless steel, austenitic	1.00xD	0.25xD	96	0.0063	0.0076	115	0.0095	125	0.0126	0.0158	134	0.0176	0.0189	
	Duplex steel, high strength stainless steels	1.00xD	0.25xD	71	0.0055	0.0066	85	0.0083	92	0.0110	0.0138	99	0.0154	0.0165	
K	Grey cast iron	1.00xD	0.50xD	96	0.0063	0.0076	115	0.0095	125	0.0126	0.0158	134	0.0176	0.0189	
	Cast iron with spheroidal graphite iron	1.00xD	0.50xD	96	0.0063	0.0076	115	0.0095	125	0.0126	0.0158	134	0.0176	0.0189	
	Malleable cast iron GJV & ADI	1.00xD	0.50xD	80	0.0056	0.0067	96	0.0084	104	0.0112	0.0140	112	0.0157	0.0168	
N	Aluminium-wrought alloys	1.00xD	0.50xD	136	0.0108	0.0130	163	0.0162	177	0.0216	0.0270	190	0.0302	0.0324	
	Aluminium-cast alloys	1.00xD	0.50xD	136	0.0108	0.0130	163	0.0162	177	0.0216	0.0270	190	0.0302	0.0324	
	Copper and copper alloys	1.00xD	0.50xD	100	0.0099	0.0119	120	0.0149	130	0.0199	0.0249	140	0.0278	0.0298	
S	Heat-resistant alloys, Fe-based	1.00xD	0.25xD	80	0.0041	0.0049	96	0.0061	104	0.0081	0.0101	112	0.0113	0.0122	
	Heat-resistant alloys, Ni-based, CO-based	1.00xD	0.25xD	46	0.0033	0.0039	55	0.0049	60	0.0066	0.0082	64	0.0092	0.0099	
	Titanium alloys & pure titanium	1.00xD	0.25xD	72	0.0068	0.0081	86	0.0101	94	0.0135	0.0169	101	0.0189	0.0203	
H	Hardened steel, hardened and tempered, < 55 HRC	1.00xD	0.10xD	26	0.0036	0.0043	31	0.0054	34	0.0072	0.0090	36	0.0101	0.0108	

Ramping and closed grooves

	Material/ISO material	a _e max.	a _p max.	v _c	f _z /Ø		v _c	f _z /Ø		v _c	f _z /Ø		v _c	f _z /Ø	
					1.0	1.2		1.5	2.0		2.5	2.8		3.0	
P	Unalloyed steel	1.00xD	0.50xD	78	0.0049	0.0058	94	0.0073	102	0.0097	0.0122	110	0.0136	0.0146	
	Low-alloyed steel	1.00xD	0.50xD	78	0.0043	0.0052	94	0.0065	102	0.0086	0.0108	110	0.0121	0.0130	
	High-alloyed steel and tool steel	1.00xD	0.25xD	78	0.0032	0.0039	94	0.0049	102	0.0065	0.0081	110	0.0091	0.0097	
M	Stainless steel, ferritic, martensitic	1.00xD	0.25xD	78	0.0043	0.0052	94	0.0065	102	0.0086	0.0108	110	0.0121	0.0130	
	Stainless steel, austenitic	1.00xD	0.25xD	67	0.0038	0.0045	81	0.0057	87	0.0076	0.0095	94	0.0106	0.0113	
	Duplex steel, high strength stainless steels	1.00xD	0.25xD	50	0.0033	0.0040	60	0.0050	65	0.0066	0.0083	70	0.0093	0.0099	
K	Grey cast iron	1.00xD	0.50xD	67	0.0038	0.0045	81	0.0057	87	0.0076	0.0095	94	0.0106	0.0113	
	Cast iron with spheroidal graphite iron	1.00xD	0.50xD	67	0.0038	0.0045	81	0.0057	87	0.0076	0.0095	94	0.0106	0.0113	
	Malleable cast iron GJV & ADI	1.00xD	0.50xD	56	0.0034	0.0040	67	0.0050	73	0.0067	0.0084	78	0.0094	0.0101	
N	Aluminium-wrought alloys	1.00xD	0.50xD	95	0.0065	0.0078	114	0.0097	124	0.0130	0.0162	133	0.0181	0.0194	
	Aluminium-cast alloys	1.00xD	0.50xD	95	0.0065	0.0078	114	0.0097	124	0.0130	0.0162	133	0.0181	0.0194	
	Copper and copper alloys	1.00xD	0.50xD	70	0.0060	0.0072	84	0.0089	91	0.0119	0.0149	98	0.0167	0.0179	
S	Heat-resistant alloys, Fe-based	1.00xD	0.25xD	56	0.0024	0.0029	67	0.0036	73	0.0049	0.0061	78	0.0068	0.0073	
	Heat-resistant alloys, Ni-based, CO-based	1.00xD	0.25xD	32	0.0020	0.0024	39	0.0030	42	0.0039	0.0049	45	0.0055	0.0059	
	Titanium alloys & pure titanium	1.00xD	0.25xD	50	0.0041	0.0049	60	0.0061	66	0.0081	0.0101	71	0.0113	0.0122	
H	Hardened steel, hardened and tempered, < 55 HRC	1.00xD	0.10xD	18	0.0022	0.0026	22	0.0032	24	0.0043	0.0054	25	0.0060	0.0065	

Roughing

	Material/ISO material	a _e max.	a _p max.	v _c	f _z /Ø		v _c	f _z /Ø		v _c	f _z /Ø		v _c	f _z /Ø	
					1.0	1.2		1.5	2.0		2.5	2.8		3.0	
P	Unalloyed steel	0.10xD	5.00xD	134	0.0128	0.0153	161	0.0191	174	0.0255	0.0319	188	0.0357	0.0383	
	Low-alloyed steel	0.10xD	5.00xD	134	0.0113	0.0136	161	0.0170	174	0.0227	0.0284	188	0.0318	0.0340	
	High-alloyed steel and tool steel	0.08xD	5.00xD	134	0.0085	0.0102	161	0.0128	174	0.0170	0.0213	188	0.0238	0.0255	
M	Stainless steel, ferritic, martensitic	0.10xD	5.00xD	134	0.0113	0.0136	161	0.0170	174	0.0227	0.0284	188	0.0318	0.0340	
	Stainless steel, austenitic	0.08xD	5.00xD	115	0.0099	0.0119	138	0.0149	150	0.0198	0.0248	161	0.0278	0.0298	
	Duplex steel, high strength stainless steels	0.05xD	5.00xD	86	0.0087	0.0104	103	0.0130	112	0.0174	0.0217	120	0.0243	0.0260	
K	Grey cast iron	0.10xD	5.00xD	115	0.0099	0.0119	138	0.0149	150	0.0198	0.0248	161	0.0278	0.0298	
	Cast iron with spheroidal graphite iron	0.10xD	5.00xD	115	0.0099	0.0119	138	0.0149	150	0.0198	0.0248	161	0.0278	0.0298	
	Malleable cast iron GJV & ADI	0.10xD	5.00xD	96	0.0088	0.0106	115	0.0132	125	0.0176	0.0220	134	0.0247	0.0265	
N	Aluminium-wrought alloys	0.15xD	5.00xD	163	0.0170	0.0204	196	0.0255	212	0.0340	0.0425	228	0.0476	0.0510	
	Aluminium-cast alloys	0.15xD	5.00xD	163	0.0170	0.0204	196	0.0255	212	0.0340	0.0425	228	0.0476	0.0510	
	Copper and copper alloys	0.12xD	5.00xD	120	0.0157	0.0188	144	0.0235	156	0.0313	0.0392	168	0.0438	0.0470	
S	Heat-resistant alloys, Fe-based	0.08xD	5.00xD	96	0.0064	0.0077	115	0.0096	125	0.0128	0.0159	134	0.0179	0.0191	
	Heat-resistant alloys, Ni-based, CO-based	0.05xD	5.00xD	55	0.0052	0.0062	66	0.0078	72	0.0104	0.0130	77	0.0145	0.0155	
	Titanium alloys & pure titanium	0.08xD	5.00xD	86	0.0106	0.0128	103	0.0159	112	0.0213	0.0266	120	0.0298	0.0319	
H	Hardened steel, hardened and tempered, < 55 HRC	0.03xD	5.00xD	31	0.0057	0.0068	37	0.0085	40	0.0113	0.0142	43	0.0159	0.0170	

Finishing

	Material/ISO material	a _e max.	a _p max.	v _c	f _z / Ø		f _z / Ø		f _z / Ø		f _z / Ø			
					1.0	1.2	v _c	1.5	v _c	2.0	2.5	v _c	2.8	3.0
	Unalloyed steel	0.02xD	5.00xD	146	0.0097	0.0117	175	0.0146	190	0.0194	0.0243	204	0.0272	0.0292
P	Low-alloyed steel	0.02xD	5.00xD	146	0.0086	0.0104	175	0.0130	190	0.0173	0.0216	204	0.0242	0.0259
	High-alloyed steel and tool steel	0.02xD	5.00xD	146	0.0065	0.0078	175	0.0097	190	0.0130	0.0162	204	0.0181	0.0194
M	Stainless steel, ferritic, martensitic	0.02xD	5.00xD	146	0.0086	0.0104	175	0.0130	190	0.0173	0.0216	204	0.0242	0.0259
	Stainless steel, austenitic	0.02xD	5.00xD	125	0.0076	0.0091	150	0.0113	163	0.0151	0.0189	175	0.0212	0.0227
	Duplex steel, high strength stainless steels	0.02xD	5.00xD	93	0.0066	0.0079	112	0.0099	121	0.0132	0.0165	130	0.0185	0.0198
K	Grey cast iron	0.02xD	5.00xD	125	0.0076	0.0091	150	0.0113	163	0.0151	0.0189	175	0.0212	0.0227
	Cast iron with spheroidal graphite iron													
	Malleable cast iron	0.02xD	5.00xD	104	0.0067	0.0081	125	0.0101	135	0.0134	0.0168	146	0.0188	0.0202
	GJV & ADI													
N	Aluminium-wrought alloys	0.02xD	5.00xD	177	0.0130	0.0156	212	0.0194	230	0.0259	0.0324	248	0.0363	0.0389
	Aluminium-cast alloys													
	Copper and copper alloys													
S	Heat-resistant alloys, Fe-based	0.02xD	5.00xD	104	0.0049	0.0058	125	0.0073	135	0.0097	0.0122	146	0.0136	0.0146
	Heat-resistant alloys, Ni-based, CO-based	0.02xD	5.00xD	60	0.0039	0.0047	72	0.0059	78	0.0079	0.0099	84	0.0111	0.0118
	Titanium alloys & pure titanium	0.02xD	5.00xD	94	0.0081	0.0097	113	0.0122	122	0.0162	0.0203	132	0.0227	0.0243
	Hardened steel, hardened and tempered, < 55 HRC	0.01xD	5.00xD	34	0.0043	0.0052	41	0.0065	44	0.0086	0.0108	48	0.0121	0.0130

Drilling

	Material/ISO material	a _e max.	v _c	f _z / Ø		f _z / Ø		f _z / Ø		f _z / Ø			
				1.0	1.2	v _c	1.5	v _c	2.0	2.5	v _c	2.8	3.0
	Unalloyed steel	0.50xD	84	0.0097	0.0117	175	0.0146	190	0.0194	0.0243	204	0.0272	0.0292
P	Low-alloyed steel	0.50xD	84	0.0013	0.0015	101	0.0019	109	0.0026	0.0032	118	0.0036	0.0038
	High-alloyed steel and tool steel	0.25xD	84	0.0010	0.0012	101	0.0014	109	0.0019	0.0024	118	0.0027	0.0029
M	Stainless steel, ferritic, martensitic	0.25xD	84	0.0013	0.0015	101	0.0019	109	0.0026	0.0032	118	0.0036	0.0038
	Stainless steel, austenitic	0.25xD	72	0.0011	0.0013	86	0.0017	94	0.0022	0.0028	101	0.0031	0.0034
	Duplex steel, high strength stainless steels	0.25xD	54	0.0010	0.0012	65	0.0015	70	0.0020	0.0024	76	0.0027	0.0029
K	Grey cast iron	0.50xD	72	0.0011	0.0013	86	0.0017	94	0.0022	0.0028	101	0.0031	0.0034
	Cast iron with spheroidal graphite iron												
	Malleable cast iron	0.50xD	60	0.0010	0.0012	72	0.0015	78	0.0020	0.0025	84	0.0028	0.0030
	GJV & ADI												
N	Aluminium-wrought alloys	0.50xD	102	0.0019	0.0023	122	0.0029	133	0.0038	0.0048	143	0.0054	0.0058
	Aluminium-cast alloys												
	Copper and copper alloys												
S	Heat-resistant alloys, Fe-based	0.25xD	60	0.0007	0.0009	72	0.0011	78	0.0014	0.0018	84	0.0020	0.0022
	Heat-resistant alloys, Ni-based, CO-based	0.25xD	34	0.0006	0.0007	41	0.0009	44	0.0012	0.0015	48	0.0016	0.0018
	Titanium alloys & pure titanium	0.25xD	54	0.0012	0.0014	65	0.0018	70	0.0024	0.0030	76	0.0034	0.0036

Struct. + free-cutting steels, unalloyed heat-treat. + case hard. steels	1.0345 P235GH, 1.0050, 1.0503 C45, 1.2076 102Cr6
P Free-cutting steels, unalloyed case hardened steels, nitriding steels	1.1221 C60E, 1.7043 38Cr4, 1.7131 16MnCr5, 1.8550 34CrAlNi7
Alloyed heat-treatable, tool and high speed steels	1.7003 38Cr2, 1.5710 36NiCr6, 1.7225 42CrMo4, 1.2419 105WCr6
M Stainless steel (easy to machine/sulphured)	1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X10CrNiS18-9
	1.4301X5CrNi18-10, 1.4571 X6CrNiTi18-10, 1.4404 X2CrNiMo17-12-2
K Cast iron, grey cast iron, spheroidal graphite and malleable cast iron	0.6025 EN-GL250 (GG25), 0.7070 EN-GJS-700-2 (GGG70)
N Aluminium, Al-wrought alloys, Al-alloys	3.0255 Al99,5, 3.2315 AlMgSi1, 3.1325 AlCuMg1, 3.3245 AlMg3Si
	3.2131 G-AISI5Cu1, 3.2153 G-AISI7Cu3, 3.2573 G-AISI9
Ti Titanium alloys	3.7114 TiAl5Sn2,5, 3.7124 TiCu2, 3.7154 TiAl6Zr5, 3.7164 TiAl6V4

Super F-UT



SuperF-UT NX



Slot drilling

Material	Hardness	a _p max.	a _e max.	v _c	f _z with nom. Ø							
					4	5	6	8	10	12	16	20
P1	≤850 N/mm ²	1xD	1xD	270	0.017	0.021	0.025	0.034	0.050	0.060	0.080	0.100
P2	850-1200 N/mm ²	1xD	1xD	230	0.017	0.021	0.025	0.034	0.050	0.060	0.080	0.100
P3	850-1400 N/mm ²	1xD	1xD	180	0.014	0.018	0.021	0.028	0.045	0.054	0.072	0.090
M1	≤750 N/mm ²	1xD	1xD	120	0.014	0.018	0.021	0.028	0.045	0.054	0.072	0.090
M2	750-950 N/mm ²	1xD	1xD	80	0.013	0.016	0.019	0.026	0.040	0.048	0.064	0.080
K2	≥240 HB	1xD	1xD	150	0.017	0.021	0.025	0.034	0.050	0.060	0.080	0.100
N1	≤7% Si	1xD	1xD	500	0.022	0.028	0.033	0.044	0.065	0.078	0.104	0.130
N2	≥7% Si	1xD	1xD	340	0.018	0.023	0.027	0.036	0.055	0.066	0.088	0.110
Ti	≤1300 N/mm ²	1xD	1xD	60	0.013	0.016	0.019	0.026	0.040	0.048	0.064	0.080

HPC Roughing

Material	Hardness	a _p max.	a _e max.	v _c	f _z with nom. Ø							
					4	5	6	8	10	12	16	20
P1	≤850 N/mm ²	1.5xD	0.40xD	350	0.021	0.026	0.032	0.042	0.063	0.075	0.100	0.125
P2	850-1200 N/mm ²	1.5xD	0.40xD	290	0.021	0.026	0.032	0.042	0.063	0.075	0.100	0.125
P3	850-1400 N/mm ²	1.5xD	0.33xD	260	0.018	0.023	0.027	0.036	0.059	0.070	0.094	0.117
M1	≤750 N/mm ²	1.5xD	0.33xD	160	0.018	0.023	0.027	0.036	0.059	0.070	0.094	0.117
M2	750-950 N/mm ²	1.5xD	0.25xD	120	0.019	0.024	0.029	0.038	0.060	0.072	0.096	0.120
K2	≥240 HB	1.5xD	0.40xD	190	0.021	0.026	0.032	0.042	0.063	0.075	0.100	0.125
N1	≤7% Si	1.5xD	0.40xD	600	0.028	0.034	0.041	0.055	0.081	0.098	0.130	0.163
N2	≥7% Si	1.5xD	0.40xD	440	0.023	0.028	0.034	0.045	0.069	0.083	0.110	0.138
Ti	≤1300 N/mm ²	1.5xD	0.33xD	110	0.017	0.021	0.025	0.033	0.052	0.062	0.083	0.104

HSC Finishing

Material	Hardness	a _p max.	a _e max.	v _c	f _z with nom. Ø							
					4	5	6	8	10	12	16	20
P1	≤850 N/mm ²	2xD	0.02xD	540	0.018	0.023	0.028	0.037	0.055	0.066	0.088	0.110
P2	850-1200 N/mm ²	2xD	0.02xD	460	0.018	0.023	0.028	0.037	0.055	0.066	0.088	0.110
P3	850-1400 N/mm ²	2xD	0.02xD	350	0.015	0.019	0.023	0.031	0.050	0.059	0.079	0.099
M1	≤750 N/mm ²	2xD	0.02xD	220	0.015	0.019	0.023	0.031	0.050	0.059	0.079	0.099
M2	750-950 N/mm ²	2xD	0.02xD	160	0.014	0.018	0.021	0.028	0.044	0.053	0.070	0.088
K2	≥240 HB	2xD	0.02xD	300	0.018	0.023	0.028	0.037	0.055	0.066	0.088	0.110
N1	≤7% Si	2xD	0.02xD	1000	0.024	0.030	0.036	0.048	0.072	0.086	0.114	0.143
N2	≥7% Si	2xD	0.02xD	680	0.020	0.025	0.030	0.040	0.061	0.073	0.097	0.121
Ti	≤1300 N/mm ²	2xD	0.02xD	130	0.014	0.018	0.021	0.028	0.044	0.053	0.070	0.088

Ramping, Helix, Grooving

Material	Hardness	Ramping depth (a _p)	Ramping max. angle	v _c	f _z with nom. Ø							
					4	5	6	8	10	12	16	20
P1	≤850 N/mm ²	1xD	45°	270	0.015	0.019	0.023	0.030	0.045	0.054	0.072	0.090
P2	850-1200 N/mm ²	1xD	45°	230	0.013	0.017	0.020	0.026	0.040	0.048	0.064	0.080
P3	850-1400 N/mm ²	1xD	30°	180	0.011	0.014	0.017	0.022	0.030	0.036	0.048	0.060
M1	≤750 N/mm ²	1xD	10°	120	0.009	0.012	0.014	0.018	0.030	0.036	0.048	0.060
M2	750-950 N/mm ²	1xD	5°	80	0.007	0.009	0.011	0.014	0.025	0.030	0.040	0.050
K2	≥240 HB	1xD	45°	150	0.015	0.019	0.023	0.030	0.045	0.054	0.072	0.090
N1	≤7% Si	1xD	30°	500	0.013	0.017	0.020	0.026	0.040	0.048	0.064	0.080
N2	≥7% Si	1xD	45°	340	0.015	0.019	0.023	0.030	0.045	0.054	0.072	0.090
Ti	≤1300 N/mm ²	1xD	10°	60	0.007	0.009	0.011	0.014	0.025	0.030	0.040	0.050

Drilling

Material	Hardness	max. drilling depth without pecking	v _c	f _z with nom. Ø							
				4	5	6	8	10	12	16	20
P1	≤850 N/mm ²	1.5xD	270	0.014	0.018	0.021	0.028	0.040	0.048	0.064	0.080
P2	850-1200 N/mm ²	1.5xD	230	0.012	0.015	0.018	0.024	0.035	0.042	0.056	0.070
P3	850-1400 N/mm ²	1.0xD	180	0.008	0.010	0.012	0.016	0.025	0.030	0.040	0.050
K2	≥240 HB	1.5xD	150	0.014	0.018	0.021	0.028	0.040	0.048	0.064	0.080
N1	≤7% Si	1.0xD	500	0.012	0.015	0.018	0.024	0.035	0.042	0.056	0.070
N2	≥7% Si	1.0xD	340	0.014	0.018	0.021	0.028	0.040	0.048	0.064	0.080

P1	P Struct. + free-cutting steels, unalloyed heat-treat. + case hard. steels	1.0345 P235GH, 1.0050, 1.0503 C45, 1.2076 102Cr6
P2	P Free-cutting steels, unalloyed case hardened steels, nitriding steels	1.1221 C60E, 1.7043 38Cr4, 1.7131 16MnCr5, 1.8550 34CrAINi7
P3	P Alloyed heat-treatable, tool and high speed steels	1.7003 38Cr2, 1.5710 36NiCr6, 1.7225 42CrMo4, 1.2419 105WCr6
M1	M Stainless steel (easy to machine/sulphured)	1.4104 X14CrMoS17, 1.4105 X6CrMoS17, 1.4305 X10CrNiS18-9
M2	M Stainless steel (moderately difficult to machine)	1.4301X5CrNi18-10, 1.4571 X6CrNiTi18-10, 1.4404 X2CrNiMo17-12-2
K2	K Cast iron, grey cast iron, spheroidal graphite and malleable cast iron	0.6025 EN-GL250 (GG25), 0.7070 EN-GJS-700-2 (GGG70)
N1	N Aluminium, Al-wrought alloys, Al-alloys	3.0255 Al99.5, 3.2315 AlMgSi1, 3.1325 AlCuMg1, 3.3245 AlMg3Si
N2	N Aluminium-cast alloys	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9
Ti	T Titanium alloys	3.7114 TiAl5Sn2.5, 3.7124 TiCu2, 3.7154 TiAl6Zr5, 3.7164 TiAl6V4

Milling strategies

Special plunging – tools with special plunging geometry

SuperF-UT NX

- h10 cutting edge tolerance
- 36°/37°/38° helix
- reduced and nominal diameter
- good drilling characteristics
- very good milling characteristics

First choice: Milling and plunging

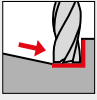


Pilot milling cutter #54700

- m8 cutting edge tolerance
- 30° helix
- a multitude of individual dimensions
- very good drilling characteristics
- sufficient milling characteristics

First choice: Drilling and pilot drilling





Ramping

- ramping angle = 15° - 45° to max. a_p $1 \times D$
- f_z **100 %**



Helix

- feed = 0.10 - $0.30 \times D$ per revolution
- smallest diameter to be produced = $1.7 \times D$
- f_z **100 %**



Grooving

- altern. when problems through excessive radial forces
- a_e $0.25 \times D$ - a_p cutting edge length/clearance grind
- f_z **100 %**



Drilling/pilot drilling

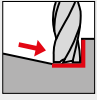
- max. depth feed $1.0 \times D$ then pecking
- f_z **100 %**



Base $f_z = f_z$ slotting

Milling strategies

General plunging with standard face geometries



Ramping

- ramping angle = 2° - 5° to max. a_p $1 \times D$
- even load increase
- f_z **75 %**



Helix

- feed = 0.05 - $0.15 \times D$ per revolution
- smallest diameter to be produced = $1.7 \times D$
- f_z **100 %**



Grooving

- alternative when problems through excess. radial forces
- a_e $0.25 \times D$ - a_p cutting edge length/clearance ground length
- f_z **100 %**



Drilling/pilot drilling

- max. depth feed $0.5 \times D$ then pecking
- f_z **50 %**



Base $f_z = f_z$ slotting

Chamfering milling cutters / front/back deburrer



Chamfering max. a_p/a_e 0,25xD

Material	Hardness	a_p max.	a_e max.	v_c	f_z with nom. \emptyset						
					3	6	8	10	12	16	20
P	$\leq 850 \text{ N/mm}^2$	0.25xD	0.25xD	192	0.018	0.036	0.048	0.060	0.080	0.100	0.130
	$\geq 850 \text{ N/mm}^2$	0.25xD	0.25xD	140	0.016	0.032	0.042	0.060	0.070	0.090	0.120
M	$\leq 750 \text{ N/mm}^2$	0.25xD	0.25xD	120	0.013	0.025	0.034	0.050	0.050	0.070	0.090
	$\geq 750 \text{ N/mm}^2$	0.25xD	0.25xD	80	0.009	0.019	0.025	0.040	0.040	0.060	0.070
K	$\leq 240 \text{ HB}$	0.25xD	0.25xD	170	0.017	0.033	0.044	0.060	0.070	0.090	0.120
	$\geq 240 \text{ HB}$	0.25xD	0.25xD	150	0.014	0.028	0.037	0.050	0.060	0.080	0.100
N	$\geq 7\% \text{ Si}$	0.25xD	0.25xD	250	0.023	0.047	0.062	0.080	0.100	0.130	0.170
H	$\leq 55 \text{ HRC}$	0.25xD	0.25xD	50	0.010	0.020	0.026	0.040	0.050	0.060	0.070
S	Ti-based	0.25xD	0.25xD	50	0.010	0.020	0.027	0.036	0.043	0.060	0.070
	Ni-based	0.25xD	0.25xD	40	0.005	0.011	0.014	0.022	0.026	0.030	0.040



Deburring max. a_p/a_e 0,05xD

Material	Hardness	a_p max.	a_e max.	v_c	f_z with nom. \emptyset						
					3	6	8	10	12	16	20
P	$\leq 850 \text{ N/mm}^2$	0.05xD	0.05xD	250	0.030	0.060	0.080	0.110	0.130	0.170	0.210
	$\geq 850 \text{ N/mm}^2$	0.05xD	0.05xD	180	0.026	0.053	0.070	0.100	0.120	0.160	0.200
M	$\leq 750 \text{ N/mm}^2$	0.05xD	0.05xD	160	0.021	0.042	0.056	0.080	0.090	0.120	0.150
	$\geq 750 \text{ N/mm}^2$	0.05xD	0.05xD	100	0.016	0.032	0.042	0.060	0.070	0.100	0.120
K	$\leq 240 \text{ HB}$	0.05xD	0.05xD	230	0.028	0.056	0.074	0.100	0.120	0.160	0.200
	$\geq 240 \text{ HB}$	0.05xD	0.05xD	190	0.023	0.047	0.062	0.080	0.100	0.130	0.170
N	$\geq 7\% \text{ Si}$	0.05xD	0.05xD	330	0.039	0.078	0.104	0.140	0.170	0.220	0.280
H	$\leq 55 \text{ HRC}$	0.05xD	0.05xD	70	0.017	0.033	0.044	0.060	0.070	0.100	0.120
S	Ti-based	0.05xD	0.05xD	80	0.009	0.018	0.025	0.033	0.040	0.050	0.070
	Ni-based	0.05xD	0.05xD	50	0.004	0.008	0.011	0.017	0.021	0.029	0.039

Chamfering milling cutters with radial relieved geometry for chamfering and deburring:

- especially smooth cutting operation
- regrindable
- universal application in most materials
- long tool life thanks to wear-resistant coating and ultra-tough carbide
- calculate cutting speed from effective diameter

HPC and HSC milling strategies

Guide values for increasing the cutting values with cutting edge lengths up to 3xD

Roughing and finishing

Material	Application	radial feed in % of Ø	v _c factor *	f _z factor *	Angle of engagement
	Slotting	100 %	1	1	180°
	HPC Roughing	33 %	1.5	1.3	70°
	HPC Roughing	25 %	1.6	1.5	60°
	HPC Roughing	20 %	1.7	1.6	53°
	HPC Roughing	15 %	1.8	1.9	46°
	HSC Roughing	10 %	1.9	2.3	37°
	HSC Roughing	8 %	2.0	2.5	31°
	HSC Roughing	5 %	2.1	2.5	26°
	HSC Finishing	3 %	2.0	1.2	20°
	HSC Finishing	2 %	2.0	1.1	18°
	HSC Finishing	1 %	2.0	1.0	11°
	HSC Fine finishing	0.5 %	2.2	0.9	8°

* base value for the calculation with v_c and f_z factors are indicated in the next chart:

Base cutting values slotting – SuperF-UT tools – smooth cutting

Material	Hardness	Application	v _c	f _z with nom. Ø									
				3	4	5	6	8	10	12	16	20	25
P1	≤850 N/mm ²	Slotting	180	0.015	0.020	0.025	0.030	0.040	0.060	0.072	0.096	0.120	0.150
P2	850-1200 N/mm ²	Slotting	160	0.014	0.019	0.024	0.029	0.038	0.055	0.066	0.088	0.110	0.138
P3	850-1400 N/mm ²	Slotting	135	0.014	0.018	0.023	0.027	0.036	0.050	0.060	0.080	0.100	0.125
M1	< 750 N/mm ²	Slotting	120	0.014	0.018	0.023	0.027	0.036	0.050	0.060	0.080	0.100	0.125
M2	750-850 N/mm ²	Slotting	80	0.012	0.016	0.020	0.024	0.032	0.045	0.054	0.072	0.090	0.113
M3	>850 N/mm ²	Slotting	70	0.011	0.014	0.018	0.021	0.028	0.040	0.048	0.064	0.080	0.100
S-Ni	≤1300 N/mm ²	Slotting	30	0.008	0.011	0.014	0.017	0.022	0.032	0.038	0.051	0.064	0.080
S-Ti	≤1300 N/mm ²	Slotting	60	0.012	0.016	0.020	0.024	0.032	0.045	0.054	0.072	0.090	0.113
K1	≤240 HB	Slotting	160	0.017	0.022	0.028	0.033	0.044	0.065	0.078	0.104	0.130	0.163
K2	>240 HB	Slotting	140	0.015	0.020	0.025	0.030	0.040	0.055	0.066	0.088	0.110	0.138
Wr. al. alloy	≤5 % Si	Slotting	500	0.020	0.026	0.033	0.039	0.052	0.075	0.090	0.120	0.150	0.188
Cast al. alloy	>5 % Si	Slotting	230	0.017	0.022	0.028	0.033	0.044	0.060	0.072	0.096	0.120	0.150
Non-fer.metals	≤850 N/mm ²	Slotting	250	0.017	0.022	0.028	0.033	0.044	0.060	0.072	0.096	0.120	0.150

Metal removal rate $a_p \text{ (mm)} \times a_e \text{ (mm)} \times v_f \text{ (m/min)} = Q \text{ (cm}^3\text{/min)}$

Example	HPC Roughing: 15 % a _e ; 2xD a _p ; C45
Tool	SuperF-UT type N Ø 12 mm-4 flutes
Feed	radial feed a _e 1.8mm = 15 % of D
Base value slotting	v _c slotting = 180 m/min, f _z slotting = 0.072 mm
Conversion	v _c factor = 1.8 → v _c : 180 m/min x 1.8 = v _c 324 m/min f _z factor = 1.9 → f _z : 0.072 mm x 1.9 = f _z 0.137
Increased values	v _c : 324 m/min / f _z : 0.137 mm n: 8594 rev./min / v _f : 4710 mm/min
Metal removal rate	Q = 203 cm ³ /min

HPC and HSC milling strategies

Correct milling with the most efficient strategies

HPC & HSC milling strategies

These milling strategies belong to the state-of-the-art and most effective application methods for current solid carbide milling tools. When applied, an enormously high metal removal rate ensures a considerable increase in productivity. Very high cutting parameters can be achieved even with less powerful machines or unstable machining conditions. With difficult-to-machine materials or unfavourable diameter-length-ratios of the tools a massive increase of process reliability can be achieved.



HIGH PERFORMANCE CUTTING

max. metal removal rate/time → stable conditions; short de-clamping; high performance; good cooling



TROCHOIDAL CUTTING

maximum metal removal rate with maximum process reliability → for state-of-the-art programming systems



HIGH SPEED CUTTING

at high speed/high feed rate → high dynamics; low cutting depth; low drive power

Principles and objectives

Maximum tool utilisation

- utilisation of entire cutting edge length
- full power delivery
- increased tool life
- balanced wear

Modification of cutting distribution

- low cutting widths a_e
- high cutting depths a_p

High process reliability

- low tool wrapping
- improved thermal conditions at tool cutting edge
- low mechanical stress

Maximum metal removal rate

- saving time/machine costs



Metal removal rate

The metal removal rate specifies how high the actual chip removal is per minute. It is especially suitable for comparing different machining strategies.

$$a_p \text{ (mm)} \times a_e \text{ (mm)} \times v_f \text{ (m/min)} = Q \text{ (cm}^3\text{/min)}$$

SuperF-UT

HPC - STRATEGY MEANS ...

- **A HIGH PROCESS RELIABILITY**
 - the point of tool changing can be reliable estimated
 - low risk for breakages
 - longer tool life
 - consistant workpiece quality
- **EFFECTIVE USE OF PRODUCTION RESOURCES (F.EX. MACHINE LOAD <90%)**
- **A HIGH METAL REMOVAL RATE**
- **BEST SUITABILITY FOR MACHINING IN UNSTABLE CONDITIONS, F.EX. THIN-WALLED WORKPIECES**
- **REDUCTION OF CYCLE TIMES**



HPC and HSC milling strategies

HPC and HSC milling – fully optimised application examples

Application example – material 16MnCr5

SuperF-UT type ZS, Ø 16 mm,
HPC clamping chuck + PINLock-safety
 v_c 410 m/min f_z 0.450 mm hm 0.123 mm
 a_e 1.2 mm a_p 45 mm v_f 14690 mm/min
Q = 793 cm³/min



Application example – material Hardox 400®

SuperF-UT type N, Ø 20 mm,
Weldon clamping chuck
 v_c 200 m/min f_z 0.180 mm hm 0.049 mm
 a_e 1.5 mm a_p 55 mm v_f 2290 mm/min
Q = 189 cm³/min



HPC and HSC milling – Strategy comparison

Application comparison – material 42CrMo4

Stock

SuperF-UT type NX, Ø 12 – Z4,
Weldon clamping chuck
 v_c 300 m/min f_z 0.120 mm
 n 7960 U/min v_f 3820 mm/min
 a_e 1.5 mm a_p 24 mm
Q = 138 cm³/min

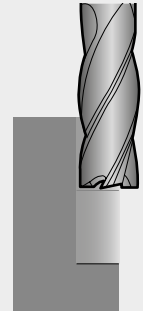


5 radial cuts per 1200 mm path
Machining time = **1.34 min**

Application comparison – material 42CrMo4

Competition

HPC milling cutter, Ø 16 – Z4
Weldon clamping chuck
 v_c 140 m/min f_z 0.070 mm
 n 2790 U/min v_f 780 mm/min
 a_e 7.5 mm a_p 12 mm
Q = 70 cm³/min



2 axial cuts per 1200 mm path
Machining time = 3.05 min

Application comparison – material 1.4301

Stock HSC milling strategy

SuperF-UT type FS², Ø 12 – Z6,
Weldon clamping chuck
 v_c 180 m/min f_z 0,18 mm
 n 4777 U/min v_f 5160 mm/min
 a_e 1,2 mm a_p 25 mm
Q = 155 cm³/min

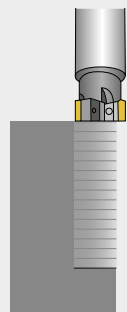


10 radial cuts per 900 mm path
Machining time = **4.43 min**

Application comparison – material 1.4301

Competition

Indexable inserted milling cutter Ø 25 – Z3
 v_c 200 m/min f_z 0.120 mm
 n 2550 U/min v_f 920 mm/min
 a_e 12 mm a_p 2 mm
Q = 22 cm³/min



15 axial cuts per 900 mm path
Machining time = 14.40 min

HPC and HSC milling strategies

Angle of engagement

Angle of engagement:

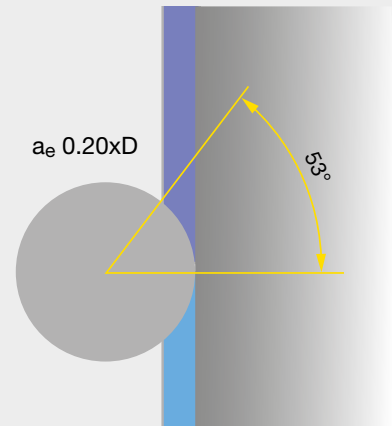
The angle of engagement inscribes the cutting range of the tool from start of chip formation to exit from the material. With these parameters the stress impacting on the tool can be assessed.

With straight milling paths the angle is constant, with concave milling paths it increases and with convex milling paths it decreases.

Straight milling path

- constant angle of engagement
- constant tool stress

Example: $a_e 0.20xD = 53^\circ$ engagement
Engagement remains a constant 53°

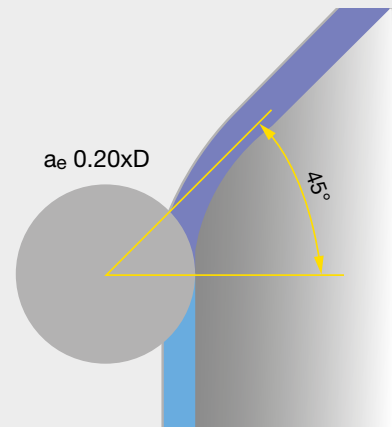


Convex milling path

- decreasing angle of engagement
- reduced tool stress

Example: $a_e 0.20xD = 53^\circ$ engagement
Engagement reduces to 45°

Measures: a_e may be increased
 f_z can be increased

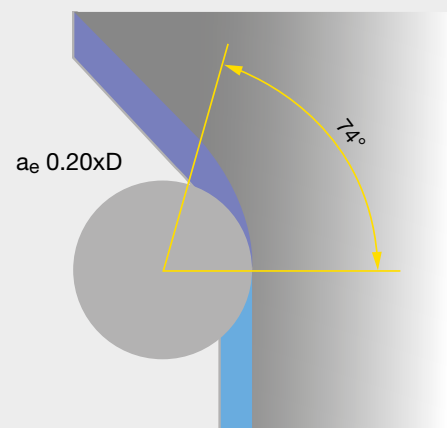


Concave milling path

- increasing angle of engagement
- increased tool stress

Example: $a_e 0.20xD = 53^\circ$ engagement
Engagement increases to 74°

Measures: a_e must be reduced
 f_z must be reduced in radius



HPC and HSC milling strategies

Angle of engagement

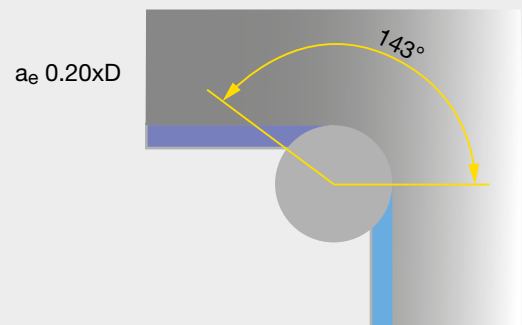
90° corner radii

Tool radius = Corner radius

- very unfavourable for tool dynamics
- change of stress direction
- abrupt increase in tool stress

Example: Increase of engagement angle from 53° to 143° (170%)

Measures: v_c and f_z must be heavily reduced

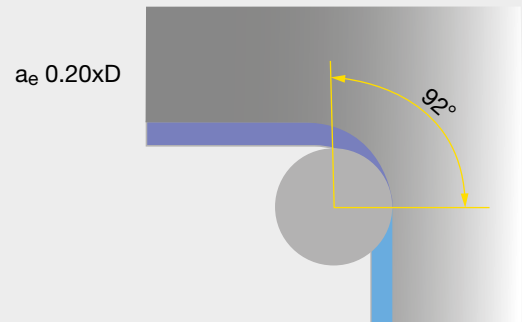


Tool radius < Corner radius

- machine can interpolate the path
- no "impact" on tool
- lower increase of tool stress

Example: Increase of engagement angle from 53° to 92° (74%)

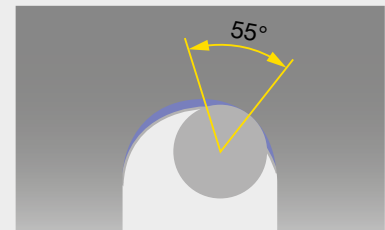
Measures: a_e must be reduced
 f_z must be heavily reduced in radius



Ratio of flute width to tool diameter with trochoidal milling

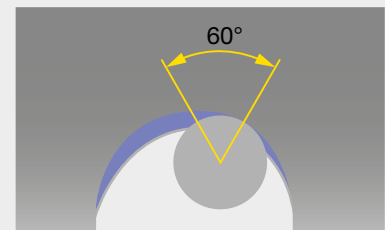
Flute width 1.7-2.0xD

- cut in C-arc
- a_e max. 0.10xD (theor. 37°)
- increase of angles of engagement by up to 50%



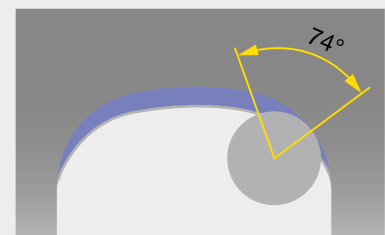
Flute width 2.1-3.0xD

- cut in C-arc
- a_e max. 0.15xD (theor. 46°)
- increase of angles of engagement by up to 50%



Flute width from 3.1xD

- cut in D-arc
- a_e max. 0.20xD (theor. 53°)
- increase of angles of engagement by up to 40%



HPC and HSC milling strategies

General recommendation for tool cooling

Steel			<ul style="list-style-type: none"> • Avoid thermal shock
Cast iron		Dry machining, compressed air, MQL:	<ul style="list-style-type: none"> • Dissipate machining temperature via chip
Hardened			<ul style="list-style-type: none"> • Supporting chip evacuation
Stainless		Soluble oil, neat oil:	<ul style="list-style-type: none"> • Cooling of tool cutting edge • Preventing built-up edge • Supporting chip evacuation
Special alloy			
Non-ferrous metals		Soluble oil, MQL:	<ul style="list-style-type: none"> • Preventing built-up edge • Supporting chip evacuation

Exceptions for material ranges



When **coolant** is not available the cutting speed (v_c) and/or the radial feed (a_e) should be reduced. The resulting reduced temperature reduces the risk of thermal shock.

If there are **chip evacuation problems** the application of coolant should be taken into consideration, poor evacuation of chips can lead to massive tool wear and even tool breakage.

When **heat is being generated due to poor chip evacuation**, it should be checked if through coolant is available. By using a specifically directed “coolant jet”, coolant can be supplied where congested without hitting the cutting area. Alternatively, the application of coolant for the entire machining operation is recommended.

Other notes

Finishing

The application of coolant is principally an advantage as a better surface finish can be achieved.

Very long tools

Coolant can result in a smoother process, as the lubricant has a vibration-reducing effect.

Alignment of coolant

- as accurate as possible in the cutting area from at least three directions
- no flushing back of small chips to the cutting area



Solid carbide milling cutters with internal cooling

- optimal chip evacuation, very good cutting edge cooling, very effective against built-up edges
- to be recommended especially for larger tool diameters and tough materials

Peripheral cooling

Best external option: Optimal tool cooling and chip evacuation thanks to the direct route from coolant exit to cutting area



Application/Troubleshooting

General notes

All the cutting value recommendations specified in this catalogue are standard values valid exclusively for new tools or tools re-ground to Stock specifications. Pre-requisites are stable machines, optimal cooling, optimal tool clamping and maximum concentricity of the tool and the machine spindle.

Our recommended cutting values must be reduced if the conditions deviate. The values may also be adjusted to influence surface quality, machining rate or tool life.

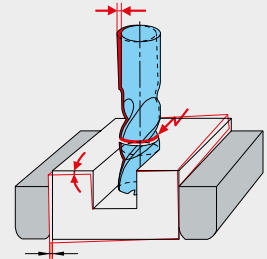
1. Workpiece clamping

Loss of tool life or tool breakage through unstable clamping

- improve workpiece clamping

Alternative:

- reduce feed
- reduce cutting width or depth
- modify milling strategy



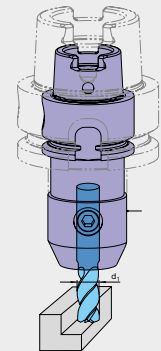
2. Tool clamping

Loss of tool life or tool breakage through unstable, worn or too small/long/thin tool holder

- apply new or larger tool holder or holder with increased clamping force and increased concentricity

Alternative:

- reduce cutting rates
- reduce clamping length
- apply tool with smaller diameter
- check clamping screws for wear



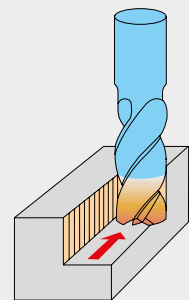
3. Surface quality

Excessive peak-to-valley height R_a/R_z at the tool surface through excessive feed and feed rates or vibrations

- improve workpiece clamping and tool clamping (see points 1 and 2)

Alternative:

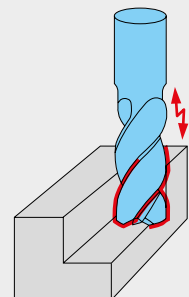
- reduce feed and feed rate
- increase cutting speed
- use/optimize cooling



4. Vibrations

High tool wear, insufficient workpiece surface quality and insufficient dimensional accuracy through vibration

- improve workpiece and tool clamping (see points 1 and 2)
- increase tooth feed, because the chip centre thickness is too small
- modify speed
- modify milling strategy, i.e. select alternative cutting distribution
- change tool selection, i.e. reduce no. of teeth or spiral



Application/Troubleshooting

General notes

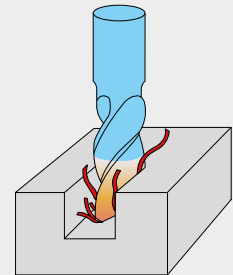
5. Chip congestion/cooling

Significant reduction in tool life, cutting-edge breakouts, built-up edges or material adhesions due to poor chip evacuation

- select milling cutters with internal cooling

Alternative:

- peripheral cooling via chuck
- increase volume flow
- adjust coolant flow
- apply compressed air cooling (according to tool and material)
- reduce feed rate
- modify cutting distribution



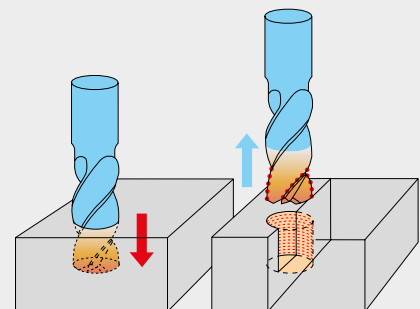
6. Pecking when drilling

Significant reduction in tool life as well as cutting-edge outbreaks due to poor chip evacuation and thermal stress

- select milling cutter with internal cooling
- with drilling depths $> 0.5xD$ pecking in stages

Alternative:

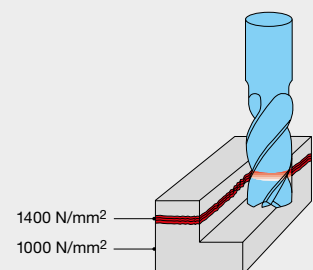
- peripheral cooling via chuck
- increase volume flow
- adjust coolant flow
- reduce feed rate



7. Thermal influence on materials

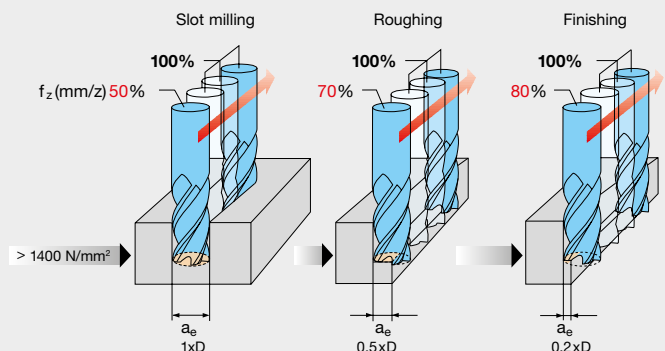
Through welding or torch cutting, the material characteristics at the parting line do not correspond with the specified material class

- reduce cutting values
- select tool for materials with a higher tensile strength
- using solid carbide milling cutters down-milling is preferred



8. Entry in hardened materials

For entering materials over 1400 N/mm^2 (44HRC), reduce the feed rate v_f (mm/min) in accordance with the illustration on the right



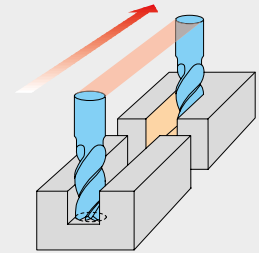
Application/Troubleshooting

General notes

9. Loss in tool life with interrupted cutting

Significant loss in tool life through interrupted cutting (especially with milling angles of 90°)

- modify cutting distribution
- reduce feed rate for entry and exit
- reduce entrance angle



10. Feed rate adjustment: Modifying the cutting width

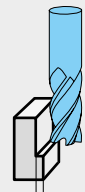
- when modifying the cutting width a_e , the feed rate must be reduced in accordance with the illustration on the right
- cutting speed or revolutions remain unchanged
- for slotting and roughing with a feed of $a_p > 1.5xD$, v_c and f_z should be reduced by 25 %



$a_e = 1xD$
 $f_z = 100\%$



$a_e = 0.66xD$
 $f_z = 115\%$



$a_e = 0.25xD$
 $f_z = 150\%$

11. Feed rate adjustment: Modifying the cutting depth

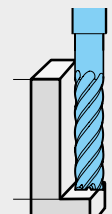
- when modifying the cutting depth a_p , the feed rate must be reduced in accordance with the illustration on the right
- cutting speed or revolutions remain unchanged up to cutting depths of $2xD$, must only be adapted over $2xD$
- for longer tools revolutions and feed must be reduced in accordance with vibration



$a_p = 1xD$
 $f_z = 100\%$



$a_p = 2xD$
 $f_z = 50\%$



$a_p = 3xD$
 $f_z = 25\%$

12. Plunging strategies

For drilling:

- reduce feed rate v_f (mm/min.)
- additional pecking for drilling depths $> 0.5xD$ or transition to radial machining
- Attention: Danger of breakage through abrupt load increase!

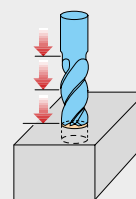
Oblique plunging up to 5°:

- reduce feed rate v_f (mm/min.) in accordance with the illustration on the right

Helical plunging:

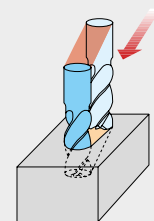
- for helical plunging on a milling cycle, we recommend a feed of 0.1 to 0.2 per cycle
- reduce feed rate v_f (mm/min.) in accordance with the illustration on the right
- select preferred hole diameter $1.7xD$

Drilling



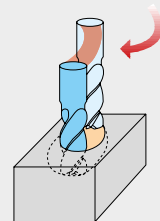
90°
 $f_z = 50\%$

Oblique plunging



5°
 $f_z = 75\%$

Helical plunging



$f_z = 100\%$

Catalogue no.	Page	Standard	Surface	Description	Tool material	Type
322 042 945	86	DIN 6527L	TiAlSiN	SuperF-UT end mills NX, sets	Solid carbide	SuperF-UT NX
322 042 946	87	DIN 6527L	TiAlSiN	SuperF-UT end mills NX, sets	Solid carbide	SuperF-UT NX
322 042 947	88	DIN 6527L	TiAlSiN	SuperF-UT end mills NX, sets	Solid carbide	SuperF-UT NX
322 042 948	89	DIN 6527L	TiAlSiN	SuperF-UT end mills NX, sets	Solid carbide	SuperF-UT NX
322 044 176	94	Company std.	TiAl ZrN	Deburring end mills 90°, sets	Solid carbide	SuperAF-90
322 052 875	94	Company std.	TiAl ZrN	Deburring end mills 90°, sets	Solid carbide	SuperAF-90
52365	107	Company std.	AlTiN nano	Front/back deburrer 90°	Solid carbide	SuperAD-90
53393	100	Company std.	AlTiN	Deburring end mills 60°	Solid carbide	SuperAF-60
53394	101	Company std.	AlTiN	Deburring end mills 60°	Solid carbide	SuperAF-60
53395	102	Company std.	AlTiN	Deburring end mills 90°	Solid carbide	SuperAF-90
53396	103	Company std.	AlTiN	Deburring end mills 90°	Solid carbide	SuperAF-90
53397	105	Company std.	AlTiN	Deburring end mills 120°	Solid carbide	SuperAF-120
53398	106	Company std.	AlTiN	Deburring end mills 120°	Solid carbide	SuperAF-120
53399	104	Company std.	TiAlZrN	Deburring end mills 90°	Solid carbide	SuperAF-90
54207	43	Company std.	TiAlSiN	Hard milling cutters (multi-fluted)	Solid carbide	H
54227	44	Company std.	TiAlSiN	Hard milling cutters (multi-fluted)	Solid carbide	H
54500	60	Company std.	AlCrN	SuperF-UT end mills U	Solid carbide	F-UT U
54501	61	Company std.	AlCrN	SuperF-UT end mills U	Solid carbide	F-UT U
54502	62	Company std.	AlCrN	SuperF-UT end mills UL	Solid carbide	F-UT UL
54503	63	Company std.	AlCrN	SuperF-UT end mills UL	Solid carbide	F-UT UL
54542	71	DIN 6527L	TiAlSiN	SuperF-UT end mills VA-r	Solid carbide	SuperF-UT VA-r
54550	58	DIN 6527L	AlCrN	SuperF-UT end mills N-r	Solid carbide	SuperF-UT N-r
54551	51	DIN 6527L	TiAlN	SuperF-UT end mills N	Solid carbide	SuperF-UT N
54552	57	Company std.	TiAlN	SuperF-UT end mills N	Solid carbide	SuperF-UT N
54553	56	Company std.	TiAlN	SuperF-UT end mills NL	Solid carbide	SuperF-UT NL
54555	24	Company std.	AlTiN+	SuperF-UT milling cutter ZS-r	Solid carbide	SuperF-UT ZS-r
54556	45	DIN 6527L	AlTiN nano	SuperF-UT end mills S	Solid carbide	SuperF-UT S
54558	67	DIN 6527L	AlTiN nano	SuperF-UT end mills VA-X	Solid carbide	SuperF-UT VA-X
54559	68	DIN 6527L	AlTiN nano	SuperF-UT end mills VA-X	Solid carbide	SuperF-UT VA-X
54560	40	DIN 6527L	ZrN	SuperF-UT end mills Ti	Solid carbide	SuperF-UT Ti
54561	41	DIN 6527L	ZrN	SuperF-UT end mills Ti	Solid carbide	SuperF-UT Ti
54562	54	Company std.	TiAlN	SuperF-UT end mills N	Solid carbide	SuperF-UT N
54563	55	Company std.	TiAlN	SuperF-UT end mills N	Solid carbide	SuperF-UT N
54564	48	-DIN 6527L	TiAlN	SuperF-UT end mills N-3	Solid carbide	SuperF-UT N-3
54565	49	-DIN 6527L	TiAlN	SuperF-UT end mills N-3	Solid carbide	SuperF-UT N-3
54567	64	DIN 6527L	TiAlN	SuperF-UT end mills N-F	Solid carbide	SuperF-UT N-F
54568	73	DIN 6527L	AlTiN nano	SuperF-UT end mills VA-XF	Solid carbide	SuperF-UT VA-XF
54569	74	DIN 6527L	AlTiN nano	SuperF-UT end mills VA-XF	Solid carbide	SuperF-UT VA-XF
54570	84	Company std.	bright	SuperF-UT end mills Al-F	Solid carbide	SuperF-UT Al-F
54571	85	Company std.	bright	SuperF-UT end mills Al-F	Solid carbide	SuperF-UT Al-F
54573	42	DIN 6527L	TiAlSiN	SuperF-UT end mills H	Solid carbide	SuperF-UT H
54575	70	DIN 6527L	AlTiN nano	SuperF-UT end mills VA-X IK	Solid carbide	SuperF-UT VA-X-IK
54576	66	DIN 6527K	AlTiN nano	SuperF-UT end mills VA-X	Solid carbide	SuperF-UT VA-X
54577	22	Company std.	AlTiN+	SuperF-UT end mills Z	Solid carbide	SuperF-UT Z
54578	23	Company std.	AlTiN+	SuperF-UT end mills ZS	Solid carbide	SuperF-UT ZS
54579	28	Company std.	TiAlN	SuperF-UT end mills N-5	Solid carbide	SuperF-UT N-5
54580	29	Company std.	TiAlN	SuperF-UT end mills N-5	Solid carbide	SuperF-UT N-5
54581	25	Company std.	AlTiN+	SuperF-UT end mills ZS-7	Solid carbide	SuperF-UT ZS-7
54583	26	Company std.	TiAlN	SuperF-UT end mills N-5	Solid carbide	SuperF-UT N-5
54584	27	Company std.	TiAlN	SuperF-UT end mills N-5	Solid carbide	SuperF-UT N-5
54585	39	DIN 6527L	TiAlSiN	SuperF-UT milling cutter NX-1K	Solid carbide	SuperF-UT NX-1K
54586	34	Company std.	TiAlSiN	SuperF-UT end mills NX-3	Solid carbide	SuperF-UT NX-3
54587	35	Company std.	TiAlSiN	SuperF-UT end mills NX-3	Solid carbide	SuperF-UT NX-3
54589	36	DIN 6527K	TiAlSiN	SuperF-UT end mills NX	Solid carbide	SuperF-UT NX
54590	37	DIN 6527L	TiAlSiN	SuperF-UT end mills NX	Solid carbide	SuperF-UT NX
54591	38	DIN 6527L	TiAlSiN	SuperF-UT end mills NX	Solid carbide	SuperF-UT NX
54592	83	Company std.	DLC	SuperF-UT end mills Al-X	Solid carbide	SuperF-UT Al-X
54594	32	Company std.	TiSiN	SuperF-UT end mills NX Micro	Solid carbide	SuperF-UT NX Micro
54595	33	Company std.	TiSiN	SuperF-UT end mills NX Micro	Solid carbide	SuperF-UT NX Micro
54700	46	DIN 6527L	AlTiN+	Pilot end mills	Solid carbide	NH
64550	50	DIN 6527K	TiAlN	SuperF-UT end mills N	Solid carbide	SuperF-UT N
64551	52	DIN 6527L	TiAlN	SuperF-UT end mills N	Solid carbide	SuperF-UT N
64552	53	DIN 6527L	TiAlZrN	SuperF-UT end mills N ²	Solid carbide	SuperF-UT N ²
64553	69	DIN 6527L	TiAlZrN	SuperF-UT end mills VA-X ²	Solid carbide	SuperF-UT VA-X ²
64557	75	DIN 6527L	TiAlN	SuperF-UT end mills VA	Solid carbide	SuperF-UT VA
64558	30	Company std.	TiAlN	SuperF-UT end mills FS	Solid carbide	SuperF-UT FS
64560	31	Company std.	TiAlZrN	SuperF-UT-milling cutter FS ²	Solid carbide	SuperF-UT FS ²
64567	76	DIN 6527L	TiAlN	SuperF-UT end mills VA-1K	Solid carbide	SuperF-UT VA-1K
74552	78	Company std.	bright	SuperF-UT end mills Al-3	Solid carbide	SuperF-UT Al-3
74553	79	Company std.	bright	SuperF-UT end mills Al-3	Solid carbide	SuperF-UT Al-3
74554	86	DIN 6527L	bright	SuperF-UT end mills Al	Solid carbide	SuperF-UT Al
74555	87	DIN 6527L	bright	SuperF-UT end mills Al	Solid carbide	SuperF-UT Al

Catalogue no.	Page	Standard	Surface	Description	Tool material	Type
74556	80	Company std.	bright	SuperF-UT end mills Al-L	Solid carbide	SuperF-UT Al-L
74558	81	Company std.	bright	SuperF-UT end mills Al-XL	Solid carbide	SuperF-UT Al-XL
74562	82	Company std.	bright	SuperF-UT end mills Al-r	Solid carbide	SuperF-UT Al-r
78881 1,0	92	DIN 6527L	TiAlN	SuperF-UT end mills N, sets	Solid carbide	SuperF-UT N
78882 1,0	90	Company std.	AlTiN+	SuperF-UT end mills Z, sets	Solid carbide	SuperF-UT Z
78882 2,0	91	Company std.	AlTiN+	SuperF-UT end mills Z, sets	Solid carbide	SuperF-UT Z
78883 1,0	93	DIN 6527L	TiAlZrN	SuperF-UT end mills N2, sets	Solid carbide	SuperF-UT N ²

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