



SINCE 1977

2020.03 LAUNCH



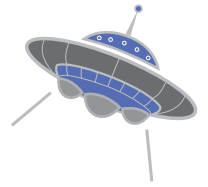
UFO MILL[®]

Simple - Speed - Smart

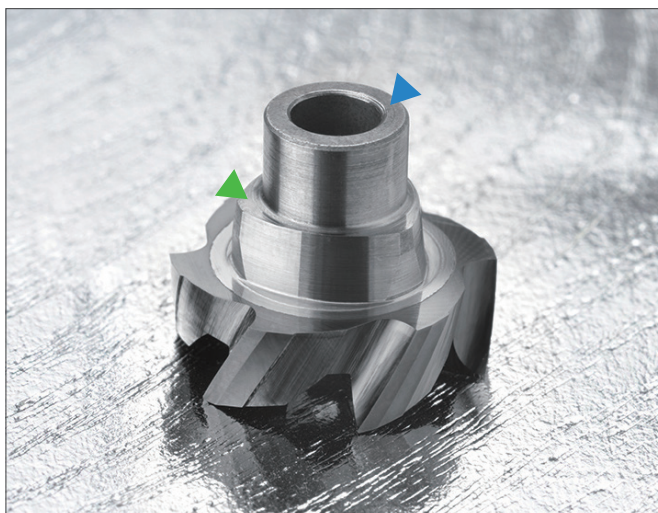


Design of UFO Mill

Taper polygon + Centralize cylinder



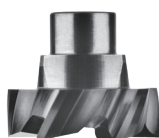
Taper Polygon



▶ Centralize cylinder concentricity:
 $\pm 0.005\text{mm}$

▶ Taper polygon

• All grinded milling head



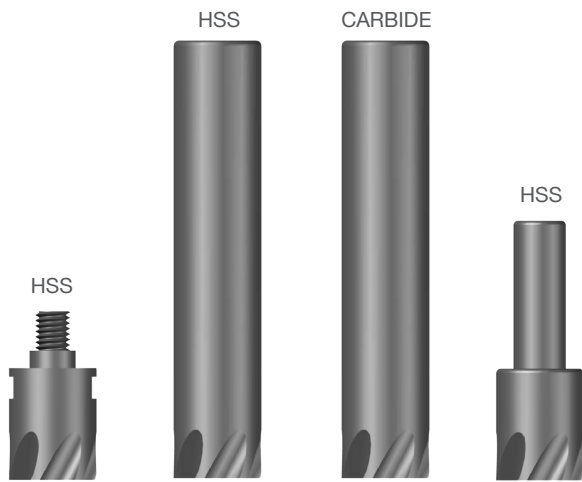
UFO Mill

80% off



excess carbide material

End Mill



Simple - Speed - Smart

1. Simple:

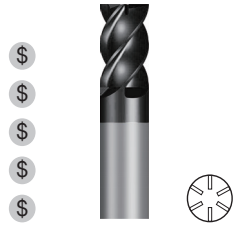
Only one front-fitted screw achieves excellent accuracy. Easy change and reduces the tool set-up time.

2. Speed:

Patented geometry leads to high metal removal rate, increasing the productivity obviously.

3. Smart:

5 different insert corner radius options and 4 types of shank with maximum 240 mm length.

Tools comparison				
Productivity (Ø16)	6 teeth+patented geometry achieves high metal removal 😊	2-6 teeth	2-3 teeth 😞	2-6 teeth
Accuracy	Concentricity ± 0.005mm 😊		😞	
Accuracy on the corner radius	😊		😞	
Regrinding	Not necessary, less tool inventory and management cost	could be regrind but quality might not be equal	not necessary	not necessary
Tool length resetting	not necessary, can be changed directly from M/C	necessary, shrink fit arbor takes longer time to reset	re-setup is necessary in finishing process	not necessary
Price	😊	high quality end mill is very expensive	😊	😞
Flexibility	😊	😞		
Disadvantage	not economical for the user who only make side milling	1.long shank and big dia. end mill is expensive 2.poor flexibility, one size-one tool	less no. of teeth	1. expensive 2. thread breaks sometimes inside the shank

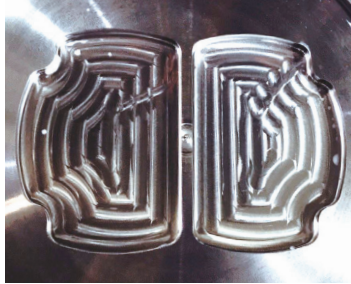
Applications of UFO Mill

Applicable industries

1 Difficult material : hardened steel/stainless steel/inconel/titanium



Aerospace parts

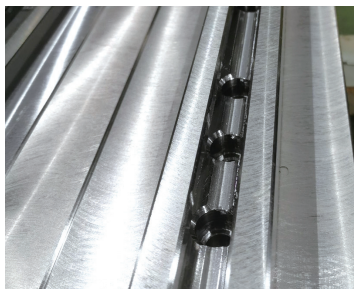


Mould & Die



Medical parts

2 General machining



Milling



Flat surface

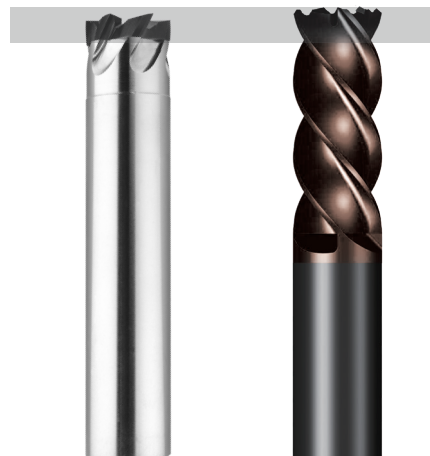


Screw hole plane

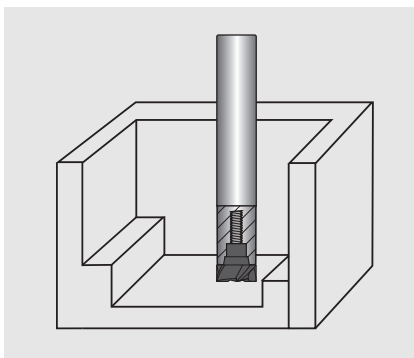
3 Casting / forging parts by mass production



Particularly suitable for small cutting depth (A_p) applications.



4 Deep Cavity Milling



Best cost-saving solution, only the wore part need to be changed. You only need to pay what you need.

Common Holders



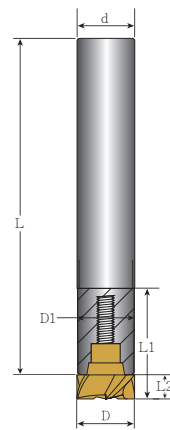
Taper Polygon
Concentricity: $\pm 0.005\text{mm}$

BB3

• HSS



$D : +0.0$
 $-0.01 \sim -0.02$ $d : h6$
 $L2 : \pm 0.03$



Part No.	Dimensions (mm)							Insert	Screw	Key
	D	D1	d	L	L1	L2				
BB3-1010-60	10	9.7	10	60	23	5	0.11	Ø10	C03016	T09P
BB3-1010-90				90			0.13			
BB3-1212-70	12	11.5	12	70	23		0.13	Ø12	C03517	T10P
BB3-1212-100				100			0.15			
BB3-1616-80	16	15.5	16	80	29		0.15	Ø16	C04020	T15P
BB3-1616-110				110			0.18			
BB3-1616-160				160			0.2			
BB3-2020-90	20	19.5	20	90	35		0.17	Ø20	C05021	T20P
BB3-2020-120				120			0.2			
BB3-2020-180				180			0.23			
BB3-2525-100	25	24.5	25	100	43		0.4	Ø25	C05021	T20P
BB3-2525-130				130			0.5			
BB3-2525-180				180			0.7			

• Not available in shrink fit holder



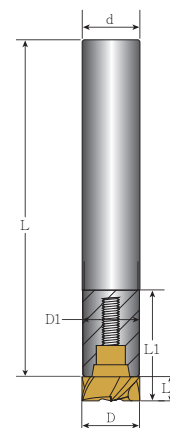
Taper Polygon
Concentricity: $\pm 0.005\text{mm}$

BB3W

• Carbide



$D : +0.0$
 $-0.01 \sim -0.02$ $d : h6$
 $L2 : \pm 0.03$



Part No.	Dimensions (mm)						 KG	Insert	Screw	Key
	D	D1	d	L	L1	L2				
BB3W-1010-60	10	9.7	10	60	25	5	0.20	Ø10	C03016	T09P
BB3W-1010-90				90			0.25			
BB3W-1010-120				120			0.35			
BB3W-1212-70	12	11.5	12	70	27		0.26	Ø12	C03517	T10P
BB3W-1212-100				100			0.30			
BB3W-1212-140				140			0.40			
BB3W-1616-80	16	15.5	16	80	31		0.40	Ø16	C04020	T15P
BB3W-1616-110				110			0.50			
BB3W-1616-170				170			0.70			

Common Holders



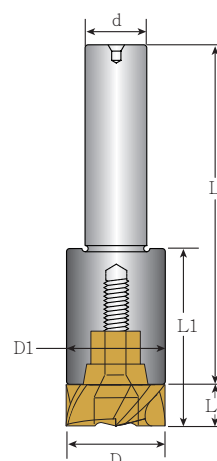
Taper Polygon
Concentricity: $\pm 0.005\text{mm}$

BB3

• HSS



$D : \begin{matrix} +0.0 \\ -0.01 \sim -0.02 \end{matrix}$ $d : h6$
 $L2 : \pm 0.03$



Part No.	Dimensions (mm)						KG	Insert	Screw	Key
	D	D1	d	L	L1	L2				
BB3-1012	12	11.5	10	55	25	5	0.09	$\phi 12$	C03517	T10P
BB3-1016	16	15.5	10		27		0.10	$\phi 16$	C04020	T15P
BB3-1220	20	19.5	12		31		0.11	$\phi 20$	C05021	T20P
BB3-1225	25	24.5	12		31		0.12	$\phi 25$	C05021	T20P

• Not available in shrink fit holder



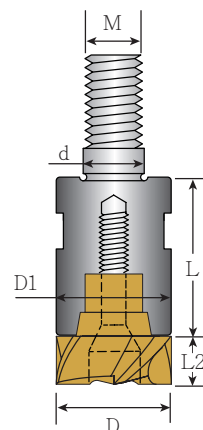
Taper Polygon
Concentricity: $\pm 0.005\text{mm}$

BB3

• HSS



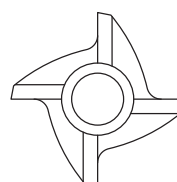
$D : \begin{matrix} +0.0 \\ -0.01 \sim -0.02 \end{matrix}$ $L2 : \pm 0.03$



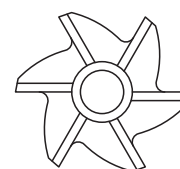
Part No.	Dimensions (mm)						KG	Insert	Screw	Key
	D	D1	d	L	M	L2				
BB3-10	10	9.7	6.5	22	6	5	0.05	$\phi 10$	C03016	T09P
BB3-12	12	11.5	6.5	24	6		0.06	$\phi 12$	C03517	T10P
BB3-16	16	15.5	8.5	26	8		0.08	$\phi 16$	C04020	T15P
BB3-20	20	19.5	10.5	26	10		0.09	$\phi 20$	C05021	T20P
BB3-25	25	24.5	12.5	26	12		0.10	$\phi 25$	C05021	T20P

Exchangable Milling Heads

Standard milling



4 flutes
D:10-12mm



6 flutes
D:16-25mm

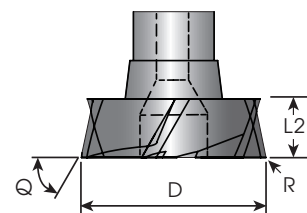
Dimensions (mm)			
D	L2	R	Q
10	5	0	30°
		0.5	
		1	
12	5	0	
		0.5	
		1	
16	5	0	
		0.5	
		1	
20	5	0	
		0.5	
		1	
25	5	0	
		0.5	
		1	



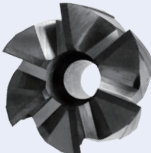
Taper Polygon
Concentricity: $\pm 0.005\text{mm}$



D : $+0.0$
 $-0.01 \sim -0.02$ L2 : ± 0.03



3B

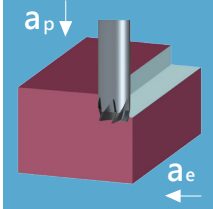
Milling Heads	Part No.	Grades								
		Carbide					Metal cermet		Uncoated	
		B100	C200	C250	F20	F30	CE25	CE60	K10	
	3B1005-E	★								
	3B1005R0.5-E	★								
	3B1005R1.0-E	★								
	3B1205-E	★								
	3B1205R0.5-E	★								
	3B1205R1.0-E	★								
	3B1605-E	★								
	3B1605R0.5-E	★								
	3B1605R1.0-E	★								
	3B2005-E	★								
	3B2005R0.5-E	★								
	3B2005R1.0-E	★								
	3B2505-E	★								
	3B2505R0.5-E	★								
	3B2505R1.0-E	★								

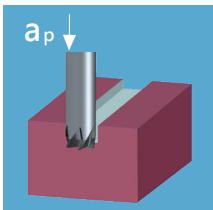
	
	
	

Inserts 6 PCS / Bo

- ★ Applicable to all Materials
- Correct price and stock are based on current situation
- Please specify model number and grade of insert, ie.: 3B1205-E , B100

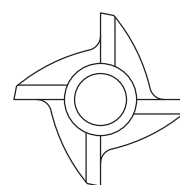
Cutting Parameter - Standard Milling

3B	Materials	D (mm)	Z	Vc (m/min)	f_z (mm/tooth)	a_p (mm)	a_e (mm)	S (rev/min)	F (mm/min)
	Steel 24-32 HRC	10	4	180	0.045	2	7	5800	1040
		12	4	180	0.045	2	8	4850	860
		16	6	180	0.050	2	11	3600	900
		20	6	180	0.050	2	14	2900	870
		25	6	180	0.055	2	17	2300	760
	Steel 32-42 HRC	10	4	150	0.050	2	7	4800	860
		12	4	150	0.045	2	8	4000	720
		16	6	150	0.050	2	11	3000	750
		20	6	150	0.050	2	14	2400	720
		25	6	150	0.055	2	17	1900	620
	Hardened steel 50-58 HRC	10	4	70	0.06	0.1	7	2250	540
		12	4	70	0.06	0.1	8	1840	440
		16	6	70	0.06	0.1	11	1370	490
		20	6	70	0.06	0.1	14	1130	400
		25	6	70	0.06	0.1	17	890	320
	Stainless steel	10	4	60	0.06	1	7	1950	468
		12	4	60	0.06	1	8	1880	430
		16	6	60	0.06	1	11	1170	420
		20	6	60	0.06	1	14	950	340
		25	6	60	0.06	1	17	750	270

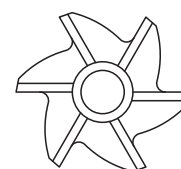
3B	Materials	D (mm)	Z	Vc (m/min)	f_z (mm/tooth)	a_p (mm)	a_e (mm)	S (rev/min)	F (mm/min)
	Steel 24-32 HRC	10	4	145	0.030	2	10	4600	550
		12	4	145	0.030	2	12	4000	480
		16	6	145	0.035	2	16	3000	630
		20	6	145	0.035	2	20	2300	480
		25	6	145	0.040	2	25	1900	460
	Steel 32-42 HRC	10	4	120	0.030	2	10	3850	460
		12	4	120	0.030	2	12	3600	430
		16	6	120	0.035	2	16	2500	520
		20	6	120	0.035	2	20	1950	400
		25	6	120	0.040	2	25	1600	380
	Hardened steel 50-58 HRC	10	4	60	0.06	0.1	10	1930	460
		12	4	60	0.06	0.1	12	1580	380
		16	6	60	0.06	0.1	16	1200	430
		20	6	60	0.06	0.1	20	960	350
		25	6	60	0.06	0.1	25	760	279

Exchangable Milling Heads

Roughing with high productivity



4 flutes
D:10-12mm



6 flutes
D:16-25mm

Dimensions (mm)			
D	L2	R	Q
10	5	1.5	30°
		2.0	
12	5	1.5	
		2.0	
16	5	1.5	
		2.0	
20	5	1.5	
		2.0	
25	5	1.5	
		2.0	

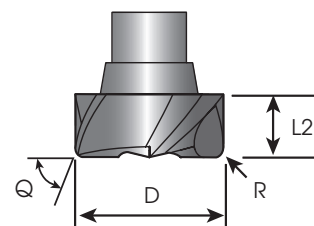


Taper Polygon
Concentricity: $\pm 0.005\text{mm}$

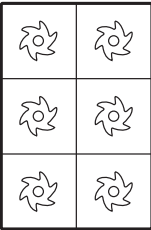
3B



D : $+0.0$
 $-0.01 \sim -0.02$ L2 : ± 0.03



Milling Heads	Part No.	Grades									
		Carbide					Metal cermet	Uncoated			
		B100	C200	C250	F20	F30	CE25	CE60	K10	CE	
	3B1005R1.5-ME										
	3B1205R1.5-ME										
	3B1605R1.5-ME										
	3B2005R1.5-ME										
	3B2505R1.5-ME										
	3B1005R2.0-ME										
	3B1205R2.0-ME										
	3B1605R2.0-ME										
	3B2005R2.0-ME										
	3B2505R2.0-ME										

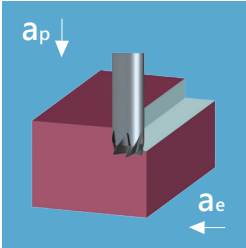


Inserts 6 PCS / Box

Inserts 6 PCS / Box

-  Steel/Stainless Steel/Cast Iron/Hardened Steel     (except slot milling in )
- Correct price and stock are based on current situation
- Please specify model number and grade of insert, ie.: 3B1205R1.5-ME , B100

Cutting Parameter-Roughing

3B		Materials	D (mm)	Z	V _c (m/min)	f _z (mm/tooth)	a _p (mm)	a _e (mm)	S (rev/min)	F (mm/min)
	Steel 24-32 HRC		10	4	210	0.10	1	7	6700	2700
			12	4	210	0.10	1	8	5600	2200
			16	6	210	0.10	1	11	4300	2600
			20	6	210	0.10	1	14	3400	2000
			25	6	210	0.10	1	17	2700	1600
	Steel 32-42 HRC		10	4	170	0.10	1	7	5500	2200
			12	4	170	0.10	1	8	4700	1900
			16	6	170	0.10	1	11	3500	2100
			20	6	170	0.10	1	14	2700	1600
			25	6	170	0.10	1	17	2300	1380
	Hardened steel 42-48 HRC		10	4	120	0.10	0.3	7	3900	1600
			12	4	120	0.10	0.3	8	3300	1300
			16	6	120	0.10	0.3	11	2600	1600
			20	6	120	0.10	0.3	14	1900	1100
			25	6	120	0.10	0.3	17	1600	960
	Hardened steel 50-58 HRC		10	4	80	0.15	0.1	7	2580	1550
			12	4	80	0.15	0.1	8	2160	1300
			16	6	80	0.15	0.1	11	1600	1140
			20	6	80	0.15	0.1	14	1290	1160
			25	6	80	0.15	0.1	17	1050	945
	Stainless steel		10	4	70	0.06	1	10	2260	540
			12	4	70	0.06	1	12	1850	440
			16	6	70	0.06	1	16	1400	500
			20	6	70	0.06	1	20	1100	400
			25	6	70	0.06	1	25	880	320

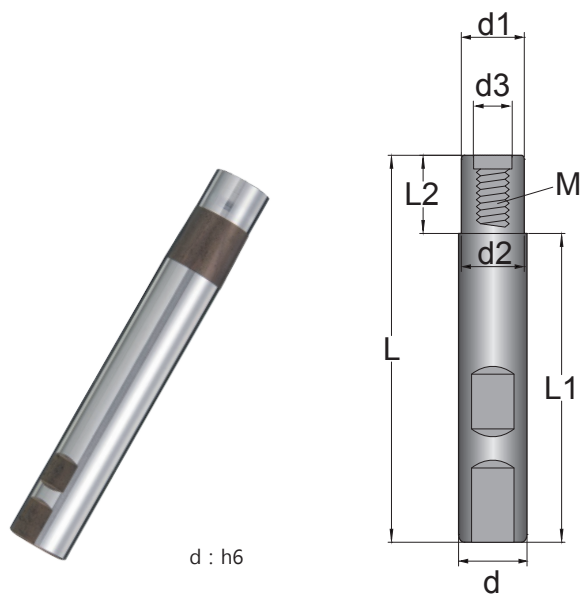
Screw & Key & Torque Values

Code	Category	Code	Category	Torque Value(Nm)
C03016	Screw	T9P	key	2.0
C03517	Screw	T10P	key	3.0
C04020	Screw	T15P	key	4.0
C05021	Screw	T20P	key	6.0

Combimaster Toolholders

CBH

• HSS



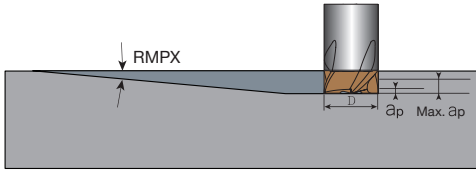
d : h6

Order code	Dimensions (mm)							
	d	d1	d2	d3	L1	L2	L	M
CBH-1010-80	10	10	10	6.5	-	-	60	M6
CBH-1009-100		9	9		60	20	80	
CBH-1212-80	12	12	12		-	-	60	
CBH-1211-100		11	11		60	20	80	
CBH-1211-120					80		100	
CBH-1211-140					100		120	
CBH-1616-100	16	16	16	8.5	-	-	70	M8
CBH-1615-120		15	15		70	20	90	
CBH-1615-150					95	25	120	
CBH-2020-100	20	20	20	10.5	-	-	70	M10
CBH-2019-120		19	19		70	20	90	
CBH-2019-160					95	25	120	
CBH-2523I-130	25	23	23	12.5	70	20	90	M12
CBH-2523I-170					100	30	130	
CBH-2523I-210					140		170	
CBH-2523I-240					170		200	
CBH-2523I-110		25	25		-	-	70	

• Not available in shrink fit holder

Technical Data

• Ramping

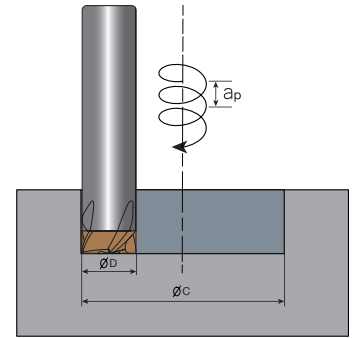


Unit:mm

ϕD	RMPX	Max. a_p
10	1.5°	1
12	1.5°	1
16	1.5°	1
20	1.5°	1
25	1.5°	1

- It's calculated with exchangeable milling head R0.

• Helical milling



Unit:mm

ϕD	C min / a_p max			
	C min ϕ	a_p max mm	C max ϕ	a_p max mm
10	15	0.4	19	0.7
12	17	0.4	23	0.7
16	25	0.7	31	1.2
20	33	1.0	39	1.5
25	43	1.4	49	1.9

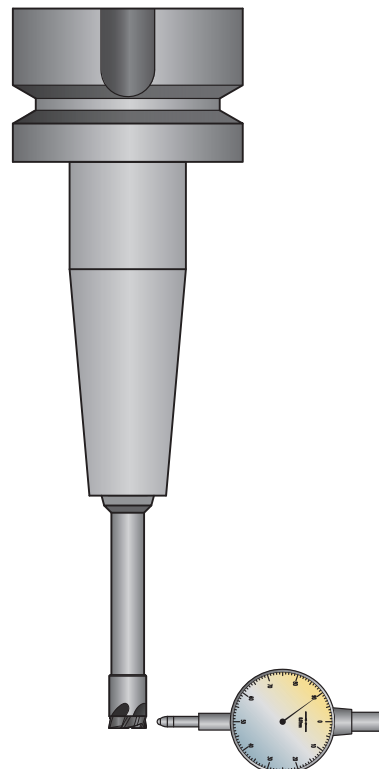
- It's calculated with exchangeable milling head R0.

Arbor and chuck

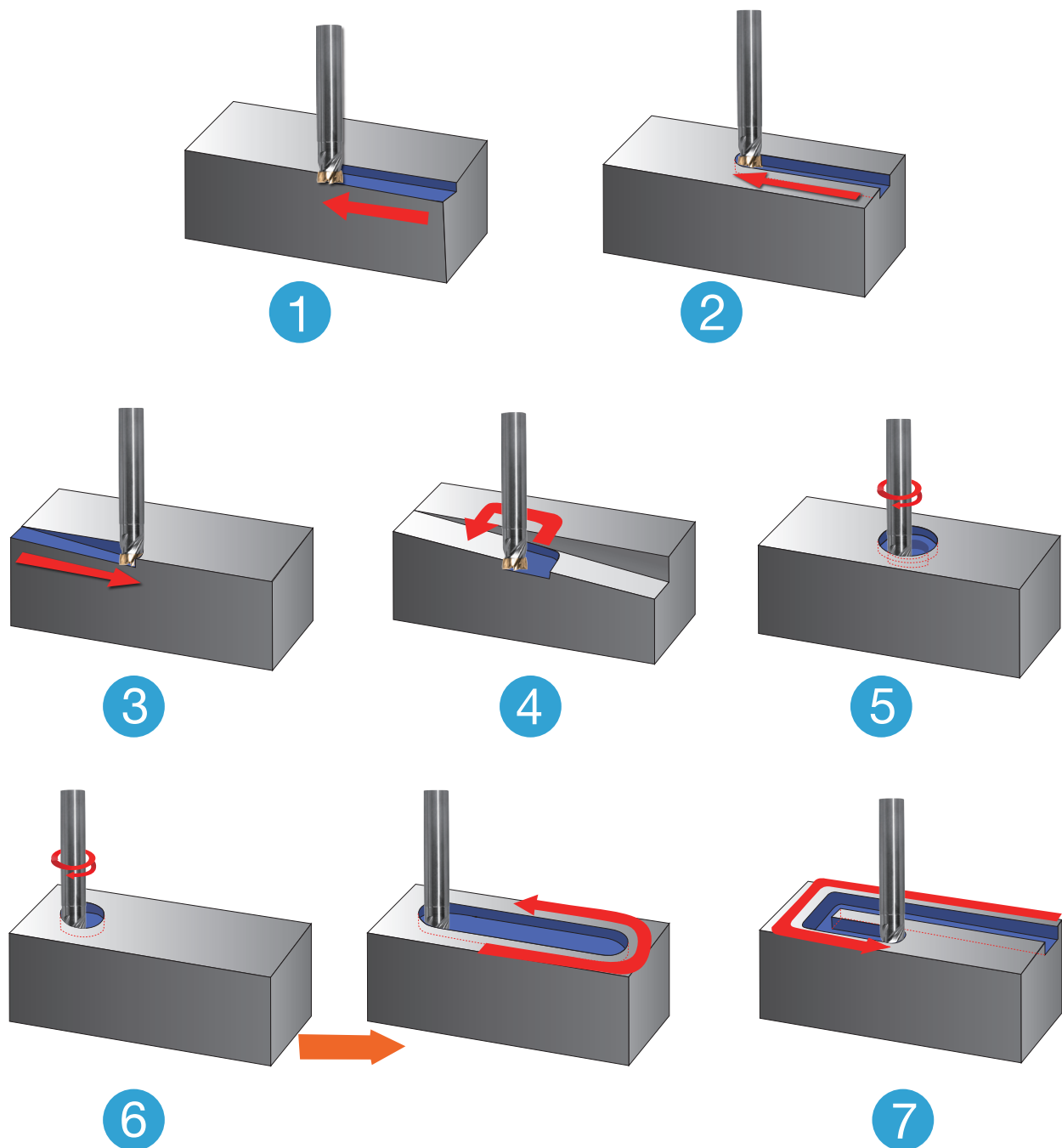
Precise arbor and chuck will improve the tool toolife in high speed machining.

Arbor recommendation:

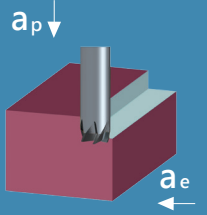
Hydraulic chuck, shrink fit chuck or highly precision chuck.



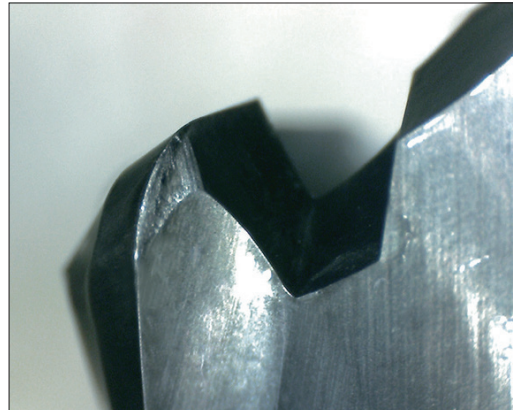
Different Applications

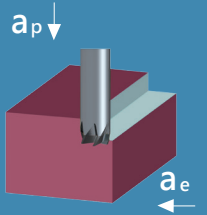


Test Report

3B	Material	D (mm)	Z	Vc (m/min)	f _z (mm/tooth)	a _p (mm)	a _e (mm)	S (rev/min)	F (mm/min)
	Stainless steel 	10	4	70	0.06	1	7	2250	540

- Life time: 180 minutes
- 200 x magnification
- Tested tool:
Milling head (3B1005R1.5-ME,B100)
HSS shank (BB3-1010-60)



3B	Material	D (mm)	Z	Vc (m/min)	f _z (mm/tooth)	a _p (mm)	a _e (mm)	S (rev/min)	F (mm/min)
	Steel 24-32 HRC 	10	4	210	0.10	1	7	6700	2700

- Life time: 80 minutes
- 200 x magnification
- Tested tool:
Milling head (3B1005R1.5-ME,B100)
HSS shank (BB3-1010-60)





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