



SOLID CARBIDE END MILLS



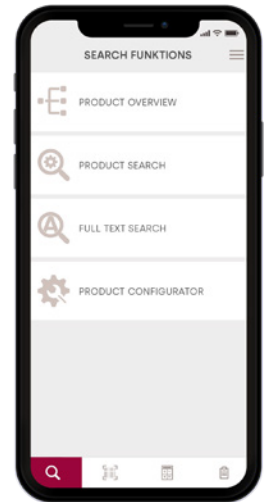
Thinking in solutions

Tooling systems and application consulting for
the cutting of complex 2.5 and 3D geometries

Experience the Pokolm guide

Pokolm offers a wide range of useful functions for milling technology users, streamlined into a single app. Each one of these is a helpful tool facilitating everyday work.

Once the app is installed, all key functions are available even without an internet connection. The Pokolm app is available in both IOS and Android versions.



The Pokolm guide offers the following functions for you:

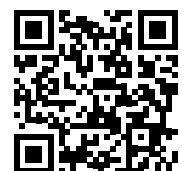
- **Search function**

- Product tree: Targeted selection by milling cutter bodies, solid carbide end mills, and arbors and adapters.
- Search function: The product selection can be limited using easy to understand parameter settings for material, processing type, tool, and available machine equipment.
- Full text search: Free text search throughout the entire product range; other products that can be combined with the selected item are also displayed.
- Product configurator: Convenient parameter selection based on the machine, processing type, tool, and even geometric data for the processed workpiece delivers all usable combinations of milling cutters, cutting inserts, and mounts that can be used to achieve the desired milling result.

- **Scanner** The scanner can be used to scan bar codes and QR codes. For instance, scanning the bar code on the packaging of Pokolm cutting inserts will direct you to the relevant cutting material in the product database, which is the fastest way to find detailed cutting data for all material and machining options. Selections will be adopted directly into the cutting data calculator.


- **Memo** All products can be marked with an asterisk to add a memo to them.


If the user has an internet connection, images and drawings of all tools can be enlarged, and CAM data is available for download in different formats, or to send as an e-mail attachment.




Pokolm app

Order and info hotline

 Pokolm Frästechnik GmbH & Co. KG

 +49 5247 9361-0

 info@pokolm.com

 7:30 AM - 6:00 PM (weekdays)


 Order before 5:00 PM
for same-day shipping!













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Product overview

Page	Cutters	Tool properties					
		d ₁	l ₂	r	ef	z	
23	P/K – Steel/cast iron						
24	End mills						
24	PX01		1 - 20	2 - 65	-	-	2
28	PX02		2 - 20	8 - 47	-	0.05 - 0.3	3
30	PX03		1 - 20	3 - 32	-	-	3
33	PX04		3 - 25	8 - 62	-	0.05 - 0.2	5 - 6
35	Torus milling cutters						
35	PR01		0.4 - 12	0.5 - 13.8	0.1 - 2	-	2
41	PR02		0.2 - 12	0.2 - 13.8	0.05 - 2	-	2
49	PR03		2 - 12	3 - 18	0.6 - 5	-	2
51	PR04		2 - 12	2.3 - 13.8	0.2 - 2	-	4
55	PR05		3 - 12	3.5 - 13.8	0.3 - 2	-	4
60	PR06		0.3 - 12	0.45 - 24	0.05 - 1	-	2

Feature	Material group ISO 513					
	P	M	K	N	S	H
-	●	○	●	Ⓐ ⓀⓊ	-	-
-	●	○	●	Ⓐ ⓀⓊ	-	-
-	●	○	●	Ⓐ ⓀⓊ	-	-
-	●	●	●	-	○	-
-	●	○	●	-	-	55 60
conical 0.5° - 1.5°	●	○	●	-	-	55 60
-	●	○	●	-	-	55
-	●	○	●	-	-	55 60
conical 0.5° - 1.5°	●	○	●	-	-	55 60
-	●	-	●	-	-	55 60 65

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels








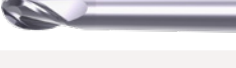








M – Stainless steels


S – Special alloys & titanium

N – Non-ferrous metals & plastics

Technical information

Index

Page	Cutters	Tool properties					
		d ₁	l ₂	r	ef	z	
23	P/K – Steel/cast iron						
63	Ball nose end mill cutters						
63	PV01		0.4 - 20	0.5 - 25	0.2 - 10	-	2
67	PV02		0.2 - 6	0.25 - 5	0.1 - 3	-	2
72	PV03		0.25 - 20	0.5 - 24	0.13 - 10	-	2
74	PV04		0.2 - 2	0.5 - 5	0.1 - 1	-	2
76	PV05		0.8 - 12	0.9 - 13.8	0.4 - 6	-	2
81	PV06		6 - 12	6.9 - 13.8	3 - 6	-	4
83	PV07		3 - 12	3.5 - 13.8	1.5 - 6	-	4
85	PV08		3 - 12	3.5 - 13.8	1.5 - 6	-	4
88	HPC milling cutters						
88	PH01		4 - 20	8 - 38	-	0.13 - 0.5	4
90	PH02		3.8 - 20	10 - 41	0.19 - 1	-	3
92	PH03		2 - 20	4 - 62	-	-	3 - 4
95	PH04		3 - 20	6 - 62	0.3 - 1	-	4
98	PH05		3 - 20	6 - 41	0.4 - 4	0.06 - 0.4	4
101	HSC Ball nose end mill cutters						
101	PH06		3 - 20	8 - 38	1.5 - 10	-	4
103	PH07		0.4 - 20	1.5 - 26	0.2 - 10	-	2
106	PH08		2.5 - 20	5 - 26	1.25 - 10	-	2

		Material group ISO 513					
Feature		P	M	K	N	S	H
-		●	○	●	-	-	55 60
-		●	-	●	-	-	55 60 65
-		●	○	●	-	○	-
-		●	○	●	Ⓐ	-	-
conical 0.5° - 1.5°		●	○	●	-	-	55 60
-		●	○	●	-	-	55 60
-		●	○	●	-	-	55 60
conical 0.5° - 1.5°		●	○	●	-	-	55 60
		●	○	○	-	-	-
-		●	●	●	-	-	-
-		●	-	○	-	-	○
-		●	-	○	-	-	○
-		●	●	●	-	-	-
-		●	-	●	-	-	55
-		●	-	●	-	-	55 60 65
-		●	-	●	-	-	55 60 65

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels










S – Special alloys & titanium



N – Non-ferrous metals & plastics

Technical information








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
● = Primary application | ○ = Secondary application | A = Aluminium | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

Page	Cutters	Tool properties				
		d ₁	l ₂	r	ef	z
23	P/K – Steel/cast iron					
108	High-feed milling cutters					
108	PF01 	2 - 16	2 - 16	0.15 - 1.4	-	3
110	PF02 	3 - 16	3 - 16	0.2 - 1.4	-	4
112	PF03 	2 - 16	2 - 16	0.18 - 1.47	-	4
114	PF04 	4 - 16	4 - 16	0.3 - 1.4	-	4
116	PF05 	6 - 16	6 - 16	0.55 - 1.47	-	6
118	PF06 	6 - 12	6 - 12	1.5 - 3	-	4
119	Trochoidal milling cutters					
119	PT01 	4 - 20	16 - 100	-	0.08 - 0.4	5
121	Circle segment milling cutters					
121	PB01 	6 - 12	9.58 - 13.5	-	-	3
122	PB02 	2 - 12	3.19 - 26.66	-	-	3 - 4

		Material group ISO 513						
Feature		P	M	K	N	S	H	
	-	●	-	○	-	-	55 60 65	P/K – Steel/cast iron
	-	●	○	○	-	○	55 60 65	
	-	●	-	○	-	-	55 60 65	
	-	●	○	○	-	○	55 60 65	
	-	●	-	○	-	-	55 60 65	
	-	●	○	○	-	○	55 60 65	
		●	●	●	-	-	-	H – Hardened materials
-	-	●	○	●	A KU	-	55 60	M – Stainless steels
	-	●	○	●	A KU	-	55 60	

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

Page	Cutters	Tool properties				
		d ₁	l ₂	r	ef	z
125	H – Hard materials					
126	End mills					
126	HX01 	3 - 20	8 - 65	-	-	6 - 8
128	Torus milling cutters					
128	HR01 	0.4 - 12	0.4 - 12	0.1 - 2	-	2
134	HR02 	4 - 12	4.2 - 12.5	0.5 - 2	-	5
136	HR03 	3 - 12	3.5 - 13.8	0.2 - 2	-	4
139	HR04 	6 - 16	4.5 - 10.5	2 - 5	-	5
141	Ball nose end mill cutters					
141	HV01 	0.2 - 12	0.2 - 12	0.1 - 6	-	2
146	Trochoidal milling cutters					
146	HT01 	6 - 20	18 - 60	0.1 - 0.3	-	5

Material group ISO 513						
Feature	P	M	K	N	S	H
-	○	-	○	-	-	55 60 65
-	○	-	-	-	-	55 60 65
-	○	-	○	-	-	55 60 65
-	○	-	-	-	-	55 60
-	○	-	-	-	-	55 60 65
	-	-	-	-	-	55 60 65

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

P/K – Steel/cast iron

H – Hardened materials








M – Stainless steels









S – Special alloys & titanium

N – Non-ferrous metals & plastics

Technical information

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Page	Cutters	Tool properties				
		d ₁	l ₂	r	ef	z
149	M – Stainless steels					
150	End mills					
150	MX01 	4 - 25	11 - 45	-	0.15 - 0.3	3 - 6
152	Torus milling cutters					
152	MR01 	8 - 20	19 - 38	0.5 - 4	-	4
155	HPC milling cutters					
155	MH01 	3 - 20	8 - 38	-	0.06 - 0.4	3
157	MH02 	6 - 20	13 - 38	-	-	4
159	MH03 	3 - 20	6 - 68	-	0.06 - 0.4	4
162	Trochoidal milling cutters					
162	MT01 	8 - 20	19 - 100	-	0.16 - 0.4	6
164	MT02 	6 - 20	13 - 38	-	0.2 - 0.5	4 - 5

		Material group ISO 513					
Feature		P	M	K	N	S	H
-				-		-	
-	-	-		-	-	-	
-	-	-		-	-	-	
-	-	-		-	-	-	
	-	-		-	-	-	
-		-		-	-		

 ● = Primary application | ○ = Secondary application | 55 = HRC 45-55

P/K – Steel/cast iron

H – Hardened materials





M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

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Page	Cutters	Tool properties				
		d ₁	l ₂	r	ef	z
167	S – Special alloys & titanium					
168	End mills					
168	SX01 	3 - 20	8 - 38	0.1 - 0.3	-	4
170	HPC milling cutters					
170	SH01 	6 - 25	13 - 50	0.5 - 2	-	4
172	Trochoidal milling cutters					
172	ST01 	6 - 20	18 - 60	0.1 - 0.3	-	5
174	ST02 	6 - 20	18 - 60	-	0.1 - 0.4	5

Material group ISO 513						
Feature	P	M	K	N	S	H
-	-	-	-	-	●	-
-	-	-	-	-	● T HWF	-
-	-	-	-	-	●	-
-	-	○	-	-	●	-

① ● = Primary application | ○ = Secondary application | T = Titanium | HWF = Heat-resistant alloys

P/K – Steel/cast iron

H – Hardened materials

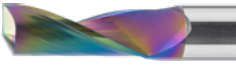










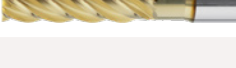
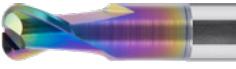

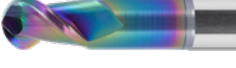

M – Stainless steels



S – Special alloys & titanium

N – Non-ferrous metals & plastics

Technical information

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Page	Cutters	Tool properties					
		d ₁	l ₂	r	ef	z	
177	N – Non-ferrous metals & plastics						
178	End mills						
178	NE01		1 - 12	4 - 30	-	-	1
180	NE02		2 - 5.5	6 - 35	-	-	1
182	NE03		1.5 - 12	6 - 40	-	-	1
184	NE04		1.5 - 20	6 - 40	-	-	1
186	NX05		1.5 - 20	3 - 32	-	-	2
188	NX06		0.6 - 20	2 - 38	-	0.05 - 0.2	2
190	NX09		6 - 20	14 - 41	-	0.2 - 0.4	3
192	NX11		6 - 20	14 - 41	-	0.2 - 0.4	3
194	NX12		6 - 25	10 - 41	-	0.3 - 1.25	3
196	NX13		6 - 25	16 - 50	0.4 - 1.5	-	3
198	NX14		3 - 20	8 - 41	-	-	3 - 4
200	NX15		6 - 20	15 - 50	-	-	6
202	Torus milling cutters						
202	NR01		3 - 16	4 - 17	0.3 - 5	-	2
206	NR02		0.4 - 6	0.5 - 6	0.05 - 0.3	-	2
210	Ball nose end mill cutters						
210	NV01		3 - 16	2 - 30	0.5 - 8	-	2
212	NV02		0.4 - 6	0.5 - 6	0.2 - 3	-	2

		Material group ISO 513					
Feature		P	M	K	N	S	H
	-	-	-	-	● A ● KU ○ GFK	-	-
	-	-	-	-	● A ● KU	-	-
	-	-	-	-	● A ● KU	-	-
	-	-	-	-	● A ● KU	-	-
	-	-	-	-	● A ● KU	-	-
	-	-	-	-	● A ● KU ○ GFK	-	-
	-	-	-	-	● A	-	-
		-	-	-	● A	-	-
		-	-	-	● A	-	-
	-	-	-	-	● A	-	-
	-	-	-	-	● A ○ KU	-	-
	-	-	-	-	● A ○ KU	-	-
	-	-	-	-	● A ● KU ○ GFK	-	-
	-	○	○	○	● A ○ KU	-	-
	-	-	-	-	● A ● KU ○ GFK	-	-
	-	○	○	○	● A ○ KU	-	-

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

P/K – Steel/cast iron

H – Hardened materials




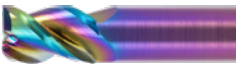
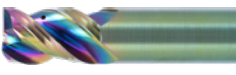









M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics













Technical information

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Page	Cutters	Tool properties					
		d ₁	l ₂	r	ef	z	
177	N – Non-ferrous metals & plastics						
216	HPC milling cutters						
216	NH01		3 - 25	8 - 50	-	0.1 - 0.3	3
219	NH02		3 - 20	12 - 41	-	0.1 - 0.2	3
221	NH03		3 - 25	8 - 50	-	0.06 - 0.3	3
224	NH04		1 - 20	3 - 32	-	0.05 - 0.2	3
226	NH05		6 - 20	10 - 32	-	0.1 - 0.2	3
228	NH06		3 - 20	12 - 41	-	0.1 - 0.2	3
230	NH07		5 - 20	15 - 41	0.5 - 2	-	3
232	NH08		3 - 25	8 - 50	-	0.1 - 0.3	4
235	NH09		3 - 20	6 - 40	-	0.1 - 0.2	4
237	Trochoidal milling cutters						
237	NT01		3 - 25	11 - 43	-	-	2 - 4
239	NT02		6 - 20	21 - 70	-	0.2	3
241	NT03		6 - 20	25 - 82	0.5 - 3	-	3
243	CVD-D milling cutter – End mills						
243	NR03		2 - 12	2.5 - 9	0.2 - 1	-	2
245	CVD-D milling cutter – Ball nose end mill cutters						
245	NV03		2 - 12	2.5 - 9	1 - 6	-	2

Feature	Material group ISO 513					
	P	M	K	N	S	H
-	-	-	-	● A ○ KU	-	-
-	-	-	-	● A ● KU ○ GFK	-	-
	-	-	-	● A ○ KU	-	-
-	-	-	-	● A ● KU ○ GFK	-	-
	-	-	-	● A ● KU ○ GFK	-	-
	-	-	-	● A ● KU ○ CFK	-	-
-	-	-	-	● A ● KU ○ CFK	-	-
-	-	-	-	● A	-	-
-	-	-	-	● A ○ KU	-	-
-	-	-	-	● A ● KU ○ GFK	-	-
	-	-	-	● A ○ KU ○ GFK	-	-
	-	-	-	● A ○ KU ○ GFK	-	-
-	-	-	-	●	-	-
-	-	-	-	●	-	-

① ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic | CFK = Fiber reinforced plastic

Page	Cutters	Tool properties				
		d_1	l_2	r	ef	z
177	N – Non-ferrous metals & plastics					
247	Graphite – End mills					
247	GX01 	3 - 12	10 - 30	-	-	2
248	GX02 	4 - 12	16 - 30	-	-	8 - 16
250	Graphite – Torus milling cutters					
250	GR03 	0.4 - 6	0.4 - 6	0.05 - 0.5	-	2
252	GR04 	0.2 - 12	0.2 - 12	0.02 - 1	-	2
259	GR05 	3 - 16	6 - 32	0.3 - 2	-	4
262	Graphite – Ball nose end mill cutters					
262	GV01 	0.2 - 12	0.2 - 12	0.1 - 6	-	2
268	GV02 	0.4 - 6	0.4 - 6	0.2 - 3	-	2
270	GV03 	4 - 16	12 - 36	2 - 8	-	9 - 20
272	CFK/GFK – End mills					
272	CX01 	4 - 16	11 - 32	-	0.08 - 0.32	8
274	CX02 	4 - 16	11 - 32	-	0.08 - 0.32	8
276	CX03 	4 - 16	11 - 32	-	0.08 - 0.32	8
278	CX04 	4 - 16	11 - 32	-	0.08 - 0.32	8

Material group ISO 513							
Feature	P	M	K	N	S	H	
-	-	-	-	G	-	-	H – Hardened materials
-	-	-	-	G	-	-	
-	-	-	-	G	-	-	M – Stainless steels
-	-	-	-	G	-	-	
-	-	-	-	G	-	-	
-	-	-	-	G	-	-	S – Special alloys & titanium
-	-	-	-	G	-	-	
-	-	-	-	G	-	-	
-	-	-	-	CFK GFK	-	-	N – Non-ferrous metals & plastics
-	-	-	-	CFK GFK	-	-	
-	-	-	-	CFK GFK	-	-	
-	-	-	-	CFK GFK	-	-	

① ● = Primary application | ○ = Secondary application | G = Graphit | GFK = Glass fiber reinforced plastic | CFK = Fiber reinforced Plastic

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

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P/K – Steel/cast iron

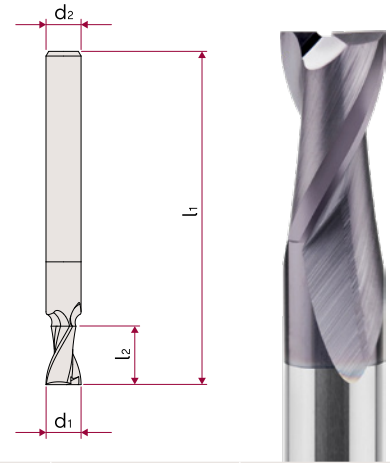
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End mills

PX01

d_1 1 - 20	z 2	λ° 30°	TiAlN Blank
			



Order no.	d_1	l_2	l_1	d_2	z	Cylinder shank	Coating
162434	1	2	38	3	2	HA	TiAlN
162435	1	2	38	3	2	HA	Blank
162436	1.5	3	38	3	2	HA	TiAlN
162437	1.5	3	38	3	2	HA	Blank
162438	2	6	38	3	2	HA	TiAlN
162439	2	6	38	3	2	HA	Blank
162440	2.5	6	38	3	2	HA	TiAlN
162441	2.5	6	38	3	2	HA	Blank
162442	3	7	38	3	2	HA	TiAlN
162443	3	7	38	3	2	HA	Blank
162494	3	20	75	3	2	HA	TiAlN
162444	3.5	8	57	6	2	HB	TiAlN
162445	3.5	8	57	6	2	HB	Blank
162446	4	8	57	6	2	HB	TiAlN
162447	4	8	57	6	2	HB	Blank
162495	4	25	75	4	2	HA	TiAlN
162448	4.5	10	57	6	2	HB	TiAlN
162449	4.5	10	57	6	2	HB	Blank
162450	4.8	10	57	6	2	HB	TiAlN
162451	4.8	10	57	6	2	HB	Blank
162452	5	10	57	6	2	HB	TiAlN
162453	5	10	57	6	2	HB	Blank
162496	5	30	75	5	2	HA	TiAlN
162454	5.5	10	57	6	2	HB	TiAlN

Order no.	d ₁	l ₂	l ₁	d ₂	z	Cylinder shank	Coating
162455	5.5	10	57	6	2	HB	Blank
162456	5.75	10	57	6	2	HB	TiAlN
162457	5.75	10	57	6	2	HB	Blank
162458	6	10	57	6	2	HB	TiAlN
162459	6	10	57	6	2	HB	Blank
162497	6	30	75	6	2	HB	TiAlN
162460	6.75	13	63	8	2	HB	TiAlN
162461	6.75	13	63	8	2	HB	Blank
162462	7	16	63	8	2	HB	TiAlN
162463	7	16	63	8	2	HB	Blank
162464	7.5	16	63	8	2	HB	TiAlN
162465	7.5	16	63	8	2	HB	Blank
162466	7.75	16	63	8	2	HB	TiAlN
162467	7.75	16	63	8	2	HB	Blank
162468	8	16	63	8	2	HB	TiAlN
162469	8	16	63	8	2	HB	Blank
162498	8	40	100	8	2	HB	TiAlN
162470	8.7	16	72	10	2	HB	TiAlN
162471	8.7	16	72	10	2	HB	Blank
162472	9	16	72	10	2	HB	TiAlN
162473	9	16	72	10	2	HB	Blank
162474	9.7	19	72	10	2	HB	TiAlN
162475	9.7	19	72	10	2	HB	Blank
162476	10	19	72	10	2	HB	TiAlN
162477	10	19	72	10	2	HB	Blank
162499	10	40	100	10	2	HB	TiAlN
162478	11.7	22	83	12	2	HB	TiAlN
162479	11.7	22	83	12	2	HB	Blank
162480	12	22	83	12	2	HB	TiAlN
162481	12	22	83	12	2	HB	Blank

Order no.	d ₁	l ₂	l ₁	d ₂	z	Cylinder shank	Coating
162500	12	45	150	12	2	HB	TiAlN
162482	13.7	22	83	14	2	HB	TiAlN
162483	13.7	22	83	14	2	HB	Blank
162484	14	22	83	14	2	HB	TiAlN
162485	14	22	83	14	2	HB	Blank
162486	15.7	26	92	16	2	HB	TiAlN
162487	15.7	26	92	16	2	HB	Blank
162488	16	26	92	16	2	HB	TiAlN
162489	16	26	92	16	2	HB	Blank
162501	16	65	150	16	2	HB	TiAlN
162490	18	26	92	18	2	HB	TiAlN
162491	18	26	92	18	2	HB	Blank
162492	20	32	104	20	2	HB	TiAlN
162493	20	32	104	20	2	HB	Blank
162502	20	65	150	20	2	HB	TiAlN

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
1 - 2.5	f_z (mm)	0.0014 - 0.03	0.0047 - 0.03	0.0047 - 0.03	0.0047 - 0.03	-	-
	a_p (mm)	1.0 - 2.5	1.0 - 2.5	1.0 - 2.5	1.0 - 2.5	-	-
3 - 4	f_z (mm)	0.008 - 0.05	0.014 - 0.05	0.014 - 0.05	0.014 - 0.05	-	-
	a_p (mm)	3.0 - 4.0	3.0 - 4.0	3.0 - 4.0	3.0 - 4.0	-	-
5 - 6	f_z (mm)	0.0122 - 0.064	0.0234 - 0.064	0.0234 - 0.064	0.0234 - 0.05	-	-
	a_p (mm)	5.0 - 6.0	5.0 - 6.0	5.0 - 6.0	5.0 - 6.0	-	-
7 - 8	f_z (mm)	0.015 - 0.075	0.03 - 0.075	0.03 - 0.075	0.03 - 0.075	-	-
	a_p (mm)	7.0 - 8.0	7.0 - 8.0	7.0 - 8.0	7.0 - 8.0	-	-
9 - 10	f_z (mm)	0.0206 - 0.09	0.0351 - 0.09	0.0351 - 0.09	0.0351 - 0.09	-	-
	a_p (mm)	9.0 - 10.0	9.0 - 10.0	9.0 - 10.0	9.0 - 10.0	-	-
12	f_z (mm)	0.0281 - 0.12	0.0421 - 0.12	0.0421 - 0.12	0.0421 - 0.12	-	-
	a_p (mm)	12	12	12	12	-	-
14	f_z (mm)	0.0374 - 0.16	0.0749 - 0.16	0.0749 - 0.16	0.0749 - 0.16	-	-
	a_p (mm)	14	14	14	14	-	-
16	f_z (mm)	0.0374 - 0.16	0.0749 - 0.16	0.0749 - 0.16	0.0749 - 0.16	-	-
	a_p (mm)	16	16	16	16	-	-
18	f_z (mm)	0.0468 - 0.2	0.0936 - 0.2	0.0936 - 0.2	0.0936 - 0.2	-	-
	a_p (mm)	18	18	18	18	-	-
20	f_z (mm)	0.0468 - 0.2	0.0936 - 0.2	0.0936 - 0.2	0.0936 - 0.2	-	-
	a_p (mm)	20	20	20	20	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	○	●	⊙ (A) ⊙ (KU)	-	-
ROUGH	49 63 98	38 54	44 56 80	63 89 112	-	-
FINE	109 175 220	84 120	98 140 180	140 220 300	-	-

① ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic

N – Non-ferrous metals & plastics

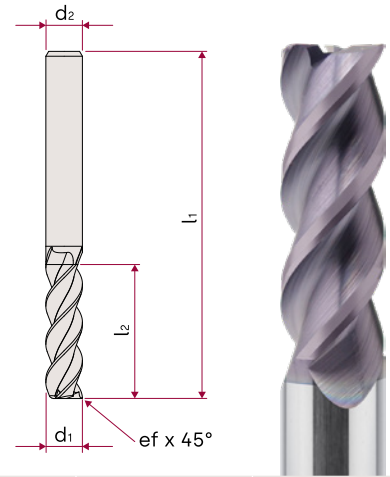
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End mills

PX02

d_1 2 - 20	z 3	ef 0.05 - 0.3	λ° 45°	TiAlN
				



Order no.	d_1	l_2	l_1	ef	d_2	z
162521	2	8	57	0.05	6	3
162522	3	14	57	0.05	6	3
162523	4	18	57	0.1	6	3
162524	5	20	57	0.1	6	3
162525	6	22	57	0.1	6	3
162526	8	30	63	0.15	8	3
162527	10	33	72	0.15	10	3
162528	12	34	83	0.2	12	3
162529	16	38	92	0.2	16	3
162530	20	47	104	0.3	20	3

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
2	f_z (mm) a_p (mm)	0.02 - 0.025 2.0	0.018 - 0.025 2.0	0.02 - 0.025 2.0	0.02 - 0.03 2.0	-	-
3 - 4	f_z (mm) a_p (mm)	0.017 - 0.05 3.0 - 4.0	0.02 - 0.05 3.0 - 4.0	0.017 - 0.05 3.0 - 4.0	0.03 - 0.05 3.0 - 4.0	-	-
5 - 6	f_z (mm) a_p (mm)	0.021 - 0.064 5.0 - 6.0	0.03 - 0.06 5.0 - 6.0	0.043 - 0.064 5.0 - 6.0	0.043 - 0.064 5.0 - 6.0	-	-
8	f_z (mm) a_p (mm)	0.029 - 0.075 8.0	0.05 - 0.075 8.0	0.05 - 0.075 8.0	0.05 - 0.075 8.0	-	-
10	f_z (mm) a_p (mm)	0.04 - 0.09 10.0	0.06 - 0.09 10.0	0.06 - 0.09 10.0	0.06 - 0.09 10.0	-	-
12	f_z (mm) a_p (mm)	0.047 - 0.12 12	0.08 - 0.12 12	0.08 - 0.12 12	0.08 - 0.12 12	-	-
16	f_z (mm) a_p (mm)	0.054 - 0.16 16	0.11 - 0.16 16	0.11 - 0.16 16	0.11 - 0.16 16	-	-
20	f_z (mm) a_p (mm)	0.061 - 0.18 20	0.13 - 0.2 20	0.13 - 0.2 20	0.13 - 0.2 20	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	○	●	⊙ ⊙	-	-
ROUGH FINE	69 85 98 155 190 220	45 54 90 120	63 67 80 140 150 180	89 112 134 200 250 300	-	-

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic

S – Special alloys & titanium

N – Non-ferrous metals & plastics

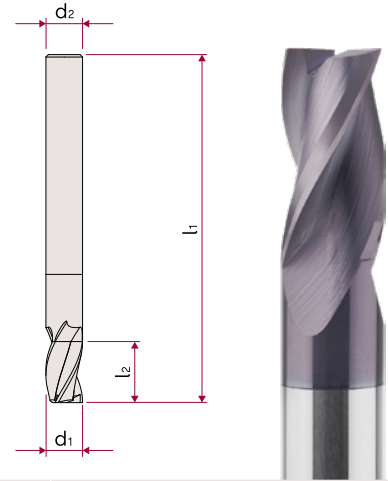
Technical information

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End mills

PX03

d_1 1 - 20	z 3	λ° 30°	TiAlN



Order no.	d_1	l_2	l_1	d_2	z	Cylinder shank
162800	1	3	38	3	3	HA
162801	1.5	5	38	3	3	HA
162802	1.8	3	50	6	3	HA
162803	2	7	38	3	3	HA
162804	2.5	7	38	3	3	HA
162805	2.8	4	50	6	3	HA
162806	3	8	38	3	3	HA
162807	3.5	11	50	4	3	HA
162808	3.8	5	50	6	3	HA
162809	4	11	50	4	3	HA
162810	4.5	11	50	5	3	HA
162811	4.8	6	50	6	3	HA
162812	5	10	50	5	3	HA
162813	5.5	10	50	6	3	HA
162814	5.8	7	50	6	3	HA
162815	6	10	57	6	3	HA
162816	6	10	57	6	3	HB
162817	6.75	13	63	8	3	HA
162818	7	13	63	8	3	HA
162819	7.75	16	63	8	3	HA
162820	8	16	63	8	3	HA
162821	8	16	63	8	3	HB
162822	9	16	72	10	3	HA
162823	9.7	19	72	10	3	HA

Order no.	d ₁	l ₂	l ₁	d ₂	z	Cylinder shank
162824	10	22	72	10	3	HA
162825	10	22	72	10	3	HB
162826	11	22	72	12	3	HA
162827	11.7	22	83	12	3	HA
162828	12	22	83	12	3	HA
162829	12	22	83	12	3	HB
162830	14	22	83	14	3	HA
162831	14	22	83	14	3	HB
162832	16	26	83	16	3	HA
162833	16	26	83	16	3	HB
162834	18	26	92	18	3	HA
162835	18	26	92	18	3	HB
162836	20	32	104	20	3	HA
162837	20	32	104	20	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
1 - 2.5	f_z (mm)	0.002 - 0.03	0.007 - 0.03	0.007 - 0.03	0.007 - 0.03	-	-
	a_p (mm)	1.0 - 2.5	1.0 - 2.5	1.0 - 2.5	1.0 - 2.5	-	-
3 - 4	f_z (mm)	0.011 - 0.05	0.021 - 0.05	0.021 - 0.05	0.021 - 0.05	-	-
	a_p (mm)	3.0 - 4.0	3.0 - 4.0	3.0 - 4.0	3.0 - 4.0	-	-
5 - 6	f_z (mm)	0.017 - 0.064	0.034 - 0.064	0.034 - 0.064	0.034 - 0.064	-	-
	a_p (mm)	5.0 - 6.0	5.0 - 6.0	5.0 - 6.0	5.0 - 6.0	-	-
7 - 8	f_z (mm)	0.021 - 0.075	0.043 - 0.075	0.043 - 0.075	0.043 - 0.075	-	-
	a_p (mm)	7.0 - 8.0	7.0 - 8.0	7.0 - 8.0	7.0 - 8.0	-	-
9 - 10	f_z (mm)	0.029 - 0.09	0.05 - 0.09	0.05 - 0.09	0.05 - 0.09	-	-
	a_p (mm)	9.0 - 10.0	9.0 - 10.0	9.0 - 10.0	9.0 - 10.0	-	-
12	f_z (mm)	0.04 - 0.12	0.06 - 0.12	0.06 - 0.12	0.06 - 0.12	-	-
	a_p (mm)	12	12	12	12	-	-
14	f_z (mm)	0.054 - 0.16	0.11 - 0.16	0.11 - 0.16	0.11 - 0.16	-	-
	a_p (mm)	14	14	14	14	-	-
16	f_z (mm)	0.054 - 0.16	0.11 - 0.16	0.11 - 0.16	0.11 - 0.16	-	-
	a_p (mm)	16	16	16	16	-	-
18	f_z (mm)	0.067 - 0.2	0.13 - 0.2	0.13 - 0.2	0.13 - 0.2	-	-
	a_p (mm)	18	18	18	18	-	-
20	f_z (mm)	0.067 - 0.2	0.13 - 0.2	0.13 - 0.2	0.13 - 0.2	-	-
	a_p (mm)	20	20	20	20	-	-

Speed (V_c in m/min)

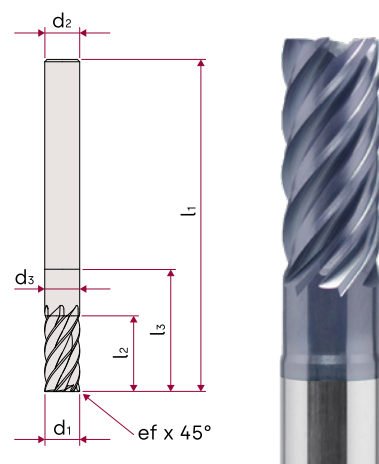
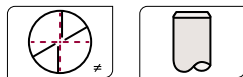
Application	P	M	K	N	S	H
	●	○	●	⊙ (A) ⊙ (KU)	-	-
ROUGH	69 85 98	45 54	63 67 80	89 112 134	-	-
FINE	155 190 220	90 120	140 150 180	200 250 300	-	-

① ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic

End mills

PX04

d_1 3 - 25	z 5 - 6	ef 0.05 - 0.2	λ° 40°/42°	AlTiN
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Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z
163803	3	8	-	-	57	0.05	6	5
163804	3	8	11	2.8	57	0.05	6	5
163805	4	8	-	-	57	0.1	6	6
163806	4	8	16	3.7	57	0.1	6	6
163807	5	10	-	-	57	0.1	6	6
163808	5	10	18	4.7	57	0.1	6	6
163809	6	13	-	-	57	0.1	6	6
163810	6	22	29	5.5	65	0.1	6	6
163811	8	19	-	-	63	0.1	8	6
163812	8	28	44	7.5	80	0.1	8	6
163813	10	22	-	-	72	0.1	10	6
163814	10	32	60	9.5	100	0.1	10	6
163815	12	26	-	-	83	0.1	12	6
163816	12	40	55	11.5	100	0.1	12	6
163817	16	32	-	-	92	0.2	16	6
163818	16	50	67	15.5	115	0.2	16	6
163819	20	42	-	-	104	0.2	20	6
163820	20	62	75	19.5	125	0.2	20	6
163821	25	42	-	-	110	0.2	25	6

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3 - 4	f_z (mm)	0.007 - 0.02	0.006 - 0.015	0.01 - 0.02	-	0.006 - 0.01	-
	a_p (mm)	4.5 - 6.0	4.5 - 6.0	4.5 - 6.0	-	4.5 - 6.0	-
5 - 6	f_z (mm)	0.016 - 0.035	0.012 - 0.028	0.024 - 0.035	-	0.012 - 0.025	-
	a_p (mm)	7.5 - 9.0	7.5 - 9.0	7.5 - 9.0	-	7.5 - 9.0	-
7 - 8	f_z (mm)	0.028 - 0.045	0.02 - 0.035	0.036 - 0.045	-	0.02 - 0.025	-
	a_p (mm)	10.5 - 12.0	10.5 - 12.0	10.5 - 12.0	-	10.5 - 12.0	-
9 - 10	f_z (mm)	0.034 - 0.060	0.026 - 0.042	0.048 - 0.06	-	0.026 - 0.032	-
	a_p (mm)	13.0 - 15.0	13.0 - 15.0	13.0 - 15.0	-	13.0 - 15.0	-
12	f_z (mm)	0.042 - 0.072	0.03 - 0.052	0.058 - 0.072	-	0.03 - 0.038	-
	a_p (mm)	18.0	18.0	18.0	-	18.0	-
16	f_z (mm)	0.056 - 0.090	0.042 - 0.07	0.072 - 0.09	-	0.042 - 0.052	-
	a_p (mm)	24.0	24.0	24.0	-	24.0	-
20	f_z (mm)	0.072 - 0.11	0.056 - 0.09	0.088 - 0.11	-	0.056 - 0.07	-
	a_p (mm)	30.0	30.0	30.0	-	30.0	-
25	f_z (mm)	0.09 - 0.11	0.07 - 0.09	0.09 - 0.11	-	0.059 - 0.07	-
	a_p (mm)	37.5	37.5	37.5	-	37.5	-

Speed (V_c in m/min)


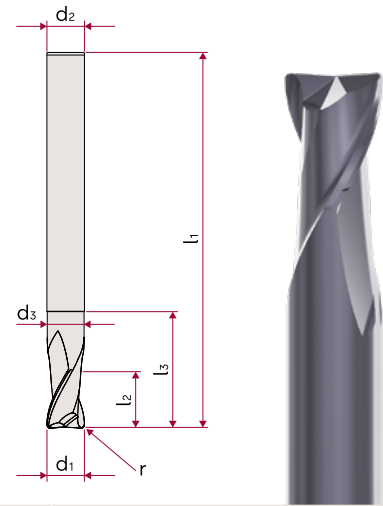
Application	P	M	K	N	S	H
	●	●	●	-	○	-
ROUGH	-	-	-	-	-	-
FINE	72 160 220	72 96 120	136 170 200	-	40 64 80	-

● = Primary application | ○ = Secondary application

Torus milling cutters

PR01

d_1 0.4 - 12	z 2	r 0.1 - 2	λ° 30°	TiAlN
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
161777	0.4	0.5	0.75	0.37	50	0.1	4	2	1.05	1.11	1.16	1.3
161778	0.4	0.5	1	0.37	50	0.1	4	2	1.32	1.39	1.45	1.61
161779	0.4	0.5	1.5	0.37	50	0.1	4	2	1.85	1.93	2.01	2.2
161780	0.4	0.5	2	0.37	50	0.1	4	2	2.37	2.47	2.56	2.77
161781	0.4	0.5	2	0.37	60	0.1	6	2	2.37	2.47	2.56	2.77
161782	0.4	0.5	3	0.37	60	0.1	6	2	3.42	3.54	3.65	4.04
161783	0.5	0.6	1.5	0.46	50	0.1	4	2	1.88	1.95	2.03	2.21
161784	0.5	0.6	2	0.46	50	0.1	4	2	2.4	2.49	2.58	2.79
161785	0.5	0.6	3	0.46	50	0.1	4	2	3.44	3.56	3.66	4.07
161786	0.5	0.6	4	0.46	50	0.1	4	2	4.48	4.62	4.74	5.4
161787	0.5	0.6	4	0.46	60	0.1	6	2	4.48	4.62	4.74	5.4
161788	0.5	0.6	5	0.46	50	0.1	4	2	5.51	5.67	5.81	6.73
161789	0.5	0.6	6	0.46	50	0.1	4	2	6.55	6.72	6.94	8.06
161790	0.5	0.6	6	0.46	60	0.1	6	2	6.55	6.72	6.94	8.06
161791	0.6	0.7	2	0.56	50	0.1	4	2	2.4	2.49	2.58	2.79
161792	0.6	0.7	3	0.56	50	0.1	4	2	3.44	3.56	3.66	4.07
161793	0.6	0.7	4	0.56	50	0.1	4	2	4.48	4.62	4.74	5.4
161794	0.6	0.7	4	0.56	60	0.1	6	2	4.48	4.62	4.74	5.4
161795	0.6	0.7	5	0.56	50	0.1	4	2	5.51	5.67	5.81	6.73
161796	0.6	0.7	6	0.56	50	0.1	4	2	6.55	6.72	6.94	8.06
161797	0.6	0.7	6	0.56	60	0.1	6	2	6.55	6.72	6.94	8.06
161798	0.6	0.7	8	0.56	60	0.1	6	2	8.61	8.81	9.22	10.71
161799	0.8	0.9	3	0.76	50	0.1	4	2	3.44	3.56	3.66	4.07
161800	0.8	0.9	4	0.76	50	0.1	4	2	4.48	4.62	4.74	5.4

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
161801	0.8	0.9	6	0.76	50	0.1	4	2	6.55	6.72	6.94	8.06
161802	0.8	0.9	6	0.76	60	0.1	6	2	6.55	6.72	6.94	8.06
161803	0.8	0.9	8	0.76	50	0.1	4	2	8.61	8.81	9.22	10.71
161804	0.8	0.9	8	0.76	60	0.1	6	2	8.61	8.81	9.22	10.71
161805	0.8	0.9	10	0.76	60	0.1	6	2	10.66	10.99	11.5	13.37
161806	1	1.2	3	0.94	50	0.2	4	2	3.48	3.59	3.69	4.11
161807	1	1.2	4	0.94	50	0.2	4	2	4.52	4.65	4.76	5.43
161808	1	1.2	5	0.94	50	0.2	4	2	5.55	5.7	5.84	6.76
161809	1	1.2	6	0.94	50	0.2	4	2	6.58	6.75	6.98	8.09
161810	1	1.2	8	0.94	50	0.2	4	2	8.64	8.85	9.26	10.74
161811	1	1.2	10	0.94	50	0.2	4	2	10.69	11.03	11.54	13.4
161812	1	1.2	10	0.94	60	0.2	6	2	10.69	11.03	11.54	13.4
161813	1	1.2	12	0.94	60	0.2	6	2	12.73	13.21	13.82	16.05
161814	1	1.2	15	0.94	60	0.2	6	2	15.8	16.48	17.24	20.03
161815	1.5	1.7	5	1.44	50	0.2	4	2	5.55	5.7	5.84	6.76
161816	1.5	1.7	6	1.44	50	0.2	4	2	6.58	6.75	6.98	8.09
161817	1.5	1.7	8	1.44	50	0.2	4	2	8.64	8.85	9.26	10.74
161818	1.5	1.7	10	1.44	50	0.2	4	2	10.69	11.03	11.54	13.4
161819	1.5	1.7	10	1.44	60	0.2	6	2	10.69	11.03	11.54	13.4
161820	1.5	1.7	12	1.44	50	0.2	4	2	12.73	13.21	13.82	16.05
161821	1.5	1.7	12	1.44	60	0.2	6	2	12.73	13.21	13.82	16.05
161822	1.5	1.7	15	1.44	50	0.2	4	2	15.8	16.48	17.24	20.03
161823	1.5	1.7	15	1.44	60	0.2	6	2	15.8	16.48	17.24	20.03
161824	2	2.3	6	1.94	50	0.2	4	2	7.03	7.35	7.63	8.29
161825	2	2.3	8	1.94	50	0.2	4	2	9.13	9.51	9.82	10.74
161826	2	2.3	10	1.94	50	0.2	4	2	11.22	11.64	11.99	13.4
161827	2	2.3	12	1.94	50	0.2	4	2	13.31	13.77	14.14	16.05
161828	2	2.3	15	1.94	50	0.2	4	2	16.42	16.94	17.35	19.85
161829	2	2.3	15	1.94	60	0.2	6	2	16.42	16.94	17.35	20.03
161830	2	2.3	18	1.94	50	0.2	4	2	19.53	20.09	20.66	22.85

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
161831	2	2.3	20	1.94	50	0.2	4	2	21.6	22.19	22.94	24.85
161832	2	2.3	20	1.94	75	0.2	6	2	21.6	22.19	22.94	26.67
161833	2	2.3	25	1.94	75	0.2	6	2	26.75	27.41	28.65	33.3
161834	2	2.3	6	1.94	50	0.5	4	2	7.02	7.33	7.6	8.25
161835	2	2.3	8	1.94	50	0.5	4	2	9.12	9.49	9.79	10.65
161836	2	2.3	10	1.94	50	0.5	4	2	11.21	11.63	11.96	13.3
161837	2	2.3	12	1.94	50	0.5	4	2	13.3	13.75	14.12	15.95
161838	2	2.3	15	1.94	50	0.5	4	2	16.41	16.92	17.33	19.85
161839	2	2.3	15	1.94	60	0.5	6	2	16.41	16.92	17.33	19.94
161840	2	2.3	18	1.94	50	0.5	4	2	19.52	20.08	20.62	22.85
161841	2	2.3	20	1.94	50	0.5	4	2	21.59	22.18	22.9	24.85
161842	2	2.3	20	1.94	75	0.5	6	2	21.59	22.18	22.9	26.57
161843	2	2.3	25	1.94	75	0.5	6	2	26.74	27.4	28.6	33.21
161844	2.5	2.9	8	2.44	50	0.5	4	2	9.12	9.49	9.79	10.65
161845	2.5	2.9	10	2.44	50	0.5	4	2	11.21	11.63	11.96	13.3
161846	2.5	2.9	15	2.44	50	0.5	4	2	16.41	16.92	17.33	18.67
161847	2.5	2.9	15	2.44	60	0.5	6	2	16.41	16.92	17.33	19.94
161848	2.5	2.9	20	2.44	50	0.5	4	2	21.59	22.18	22.9	23.67
161849	2.5	2.9	20	2.44	75	0.5	6	2	21.59	22.18	22.9	26.57
161850	2.5	2.9	25	2.44	75	0.5	6	2	26.74	27.4	28.6	33.21
161851	3	3.5	10	2.94	60	0.2	6	2	11.22	11.64	11.99	13.4
161852	3	3.5	15	2.94	60	0.2	6	2	16.42	16.94	17.35	20.03
161853	3	3.5	20	2.94	60	0.2	6	2	21.6	22.19	22.94	26.67
161854	3	3.5	25	2.94	75	0.2	6	2	26.75	27.41	28.65	32.2
161855	3	3.5	10	2.94	60	0.5	6	2	11.21	11.63	11.96	13.3
161856	3	3.5	15	2.94	60	0.5	6	2	16.41	16.92	17.33	19.94
161857	3	3.5	20	2.94	60	0.5	6	2	21.59	22.18	22.9	26.57
161858	3	3.5	25	2.94	75	0.5	6	2	26.74	27.4	28.6	32.2
161859	4	4.6	10	3.94	60	0.2	6	2	11.22	11.64	11.99	13.4
161860	4	4.6	15	3.94	60	0.2	6	2	16.42	16.94	17.35	19.85

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

Technical information

Index

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
161861	4	4.6	20	3.94	60	0.2	6	2	21.6	22.19	22.94	24.85
161862	4	4.6	25	3.94	75	0.2	6	2	26.75	27.41	28.65	29.85
161863	4	4.6	30	3.94	75	0.2	6	2	31.89	32.82	34.35	34.85
161864	4	4.6	35	3.94	75	0.2	6	2	37.02	38.27	39.85	-
161865	4	4.6	10	3.94	60	0.5	6	2	11.21	11.63	11.96	13.3
161866	4	4.6	15	3.94	60	0.5	6	2	16.41	16.92	17.33	19.85
161867	4	4.6	20	3.94	60	0.5	6	2	21.59	22.18	22.9	24.85
161868	4	4.6	25	3.94	75	0.5	6	2	26.74	27.4	28.6	29.85
161869	4	4.6	30	3.94	75	0.5	6	2	31.89	32.79	34.31	34.85
161870	4	4.6	35	3.94	75	0.5	6	2	37.02	38.24	39.85	-
161871	5	5.8	15	4.9	60	0.2	6	2	15.88	16.58	17.35	17.59
161872	5	5.8	20	4.9	60	0.2	6	2	21.09	22.03	22.59	-
161873	5	5.8	25	4.9	60	0.2	6	2	26.31	27.48	27.59	-
161874	5	5.8	30	4.9	75	0.2	6	2	31.52	32.59	-	-
161875	5	5.8	15	4.9	60	0.5	6	2	15.87	16.55	17.31	17.59
161876	5	5.8	20	4.9	60	0.5	6	2	21.08	22	22.59	-
161877	5	5.8	25	4.9	60	0.5	6	2	26.29	27.45	27.59	-
161878	5	5.8	30	4.9	75	0.5	6	2	31.51	32.59	-	-
161879	6	6.9	15	5.9	60	0.2	6	2	-	-	-	-
161880	6	6.9	20	5.9	60	0.2	6	2	-	-	-	-
161881	6	6.9	25	5.9	60	0.2	6	2	-	-	-	-
161882	6	6.9	30	5.9	75	0.2	6	2	-	-	-	-
161883	6	6.9	35	5.9	75	0.2	6	2	-	-	-	-
161884	6	6.9	15	5.9	60	0.3	6	2	-	-	-	-
161885	6	6.9	20	5.9	60	0.3	6	2	-	-	-	-
161886	6	6.9	25	5.9	60	0.3	6	2	-	-	-	-
161887	6	6.9	30	5.9	75	0.3	6	2	-	-	-	-
161888	6	6.9	35	5.9	75	0.3	6	2	-	-	-	-
161889	6	6.9	15	5.9	60	0.5	6	2	-	-	-	-
161890	6	6.9	20	5.9	60	0.5	6	2	-	-	-	-

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
161891	6	6.9	25	5.9	60	0.5	6	2	-	-	-	-
161892	6	6.9	30	5.9	75	0.5	6	2	-	-	-	-
161893	6	6.9	35	5.9	75	0.5	6	2	-	-	-	-
161894	6	6.9	15	5.9	60	1	6	2	-	-	-	-
161895	6	6.9	20	5.9	60	1	6	2	-	-	-	-
161896	6	6.9	25	5.9	60	1	6	2	-	-	-	-
161897	6	6.9	30	5.9	75	1	6	2	-	-	-	-
161898	6	6.9	35	5.9	75	1	6	2	-	-	-	-
161899	8	9.2	25	7.8	64	0.5	8	2	-	-	-	-
161900	8	9.2	50	7.8	100	0.5	8	2	-	-	-	-
161901	8	9.2	25	7.8	64	1	8	2	-	-	-	-
161902	8	9.2	50	7.8	100	1	8	2	-	-	-	-
161903	8	9.2	25	7.8	64	2	8	2	-	-	-	-
161904	8	9.2	50	7.8	100	2	8	2	-	-	-	-
161905	10	11.5	30	9.8	75	0.5	10	2	-	-	-	-
161906	10	11.5	50	9.8	100	0.5	10	2	-	-	-	-
161907	10	11.5	30	9.8	75	1	10	2	-	-	-	-
161908	10	11.5	50	9.8	100	1	10	2	-	-	-	-
161909	10	11.5	30	9.8	75	2	10	2	-	-	-	-
161910	10	11.5	50	9.8	100	2	10	2	-	-	-	-
161911	12	13.8	35	11.8	75	0.5	12	2	-	-	-	-
161912	12	13.8	60	11.8	100	0.5	12	2	-	-	-	-
161913	12	13.8	35	11.8	75	1	12	2	-	-	-	-
161914	12	13.8	60	11.8	100	1	12	2	-	-	-	-
161915	12	13.8	35	11.8	75	2	12	2	-	-	-	-
161916	12	13.8	60	11.8	100	2	12	2	-	-	-	-

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.4 - 0.8	f_z (mm)	0.006 - 0.016	0.006 - 0.014	0.005 - 0.019	-	-	0.004 - 0.012
	a_p (mm)	0.005 - 0.12	0.005 - 0.08	0.005 - 0.12	-	-	0.004 - 0.048
1 - 2.5	f_z (mm)	0.014 - 0.05	0.014 - 0.044	0.012 - 0.06	-	-	0.01 - 0.037
	a_p (mm)	0.012 - 0.375	0.012 - 0.25	0.012 - 0.375	-	-	0.01 - 0.15
3 - 4	f_z (mm)	0.042 - 0.084	0.042 - 0.074	0.036 - 0.101	-	-	0.029 - 0.061
	a_p (mm)	0.036 - 0.6	0.036 - 0.4	0.036 - 0.6	-	-	0.03 - 0.24
5 - 6	f_z (mm)	0.074 - 0.125	0.074 - 0.110	0.063 - 0.150	-	-	0.051 - 0.091
	a_p (mm)	0.06 - 0.9	0.06 - 0.6	0.06 - 0.9	-	-	0.05 - 0.36
8	f_z (mm)	0.114 - 0.165	0.114 - 0.145	0.097 - 0.198	-	-	0.079 - 0.120
	a_p (mm)	0.096 - 1.2	0.096 - 0.8	0.096 - 1.2	-	-	0.08 - 0.48
10	f_z (mm)	0.139 - 0.2	0.139 - 0.176	0.118 - 0.240	-	-	0.096 - 0.146
	a_p (mm)	0.12 - 1.5	0.12 - 1	0.12 - 1.5	-	-	0.1 - 0.6
12	f_z (mm)	0.163 - 0.235	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.144 - 1.8	0.144 - 1.2	0.144 - 1.8	-	-	0.12 - 0.72



Speed (V_c in m/min)

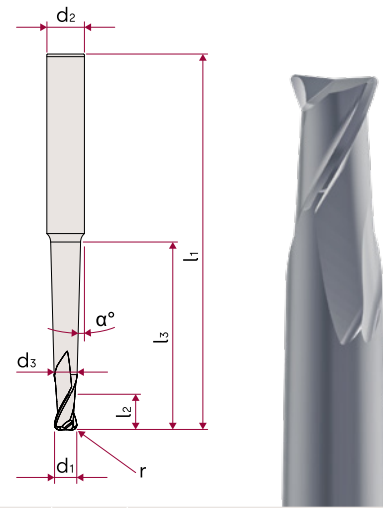
Application	P	M	K	N	S	H
	●	○	●	-	-	● ₅₅ ○ ₆₀
ROUGH	180 220 250	60 85 110	190 250	-	-	60 120 200
FINE	220 270 320	70 90 120	260 320	-	-	120 170 250

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60

Torus milling cutters

PR02

d_1 0.2 - 12	z 2	r 0.05 - 2	λ° 30°	TiAlN
		conical 0.5° - 1.5°		



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
161917	0.2	0.2	1	0.17	60	0.05	6	2	1	1.24	1.33	1.4	1.58
161918	0.2	0.2	1.5	0.17	60	0.05	6	2	1	1.7	1.83	1.92	2.14
161919	0.2	0.2	2	0.17	60	0.05	6	2	1	2.15	2.33	2.44	2.7
161920	0.3	0.3	1.5	0.27	60	0.05	6	2	1	3.3	3.46	3.58	3.93
161921	0.3	0.3	2.25	0.27	60	0.05	6	2	1	1.74	1.85	1.94	2.15
161922	0.3	0.3	3	0.27	60	0.05	6	2	0.5	2.42	2.6	2.72	2.99
161923	0.3	0.3	3	0.27	60	0.05	6	2	1	2.87	3.35	3.5	3.81
161924	0.4	0.5	2	0.37	60	0.1	6	2	1	4.31	4.5	4.64	5.2
161925	0.4	0.5	3	0.37	60	0.1	6	2	1	2.22	2.37	2.47	2.71
161926	0.4	0.5	4	0.37	60	0.1	6	2	0.5	3.11	3.37	3.51	3.81
161927	0.4	0.5	4	0.37	60	0.1	6	2	1	3.22	4.37	4.54	5.02
161928	0.5	0.6	2.5	0.46	60	0.1	6	2	1	5.35	5.56	5.71	6.51
161929	0.5	0.6	4	0.46	60	0.1	6	2	1	2.76	2.91	3.03	3.29
161930	0.5	0.6	5	0.46	60	0.1	6	2	0.5	4.1	4.41	4.58	5.08
161931	0.5	0.6	5	0.46	60	0.1	6	2	1	4.19	5.41	5.61	6.29
161932	0.5	0.6	7.5	0.46	60	0.1	6	2	1	4.19	7.91	8.18	9.34
161933	0.5	0.6	10	0.46	60	0.1	6	2	1	4.19	10.41	10.74	12.38
161934	0.6	0.7	3	0.56	60	0.1	6	2	1	6.36	6.6	6.77	7.79
161935	0.6	0.7	4.5	0.56	60	0.1	6	2	1	3.25	3.43	3.56	3.88
161936	0.6	0.7	6	0.56	60	0.1	6	2	0.5	4.58	4.93	5.1	5.71
161937	0.6	0.7	6	0.56	60	0.1	6	2	1	4.59	6.43	6.65	7.53
161938	0.6	0.7	9	0.56	60	0.1	6	2	1	4.59	9.43	9.72	11.19
161939	0.6	0.7	12	0.56	60	0.1	6	2	1	4.59	12.43	12.79	14.84
161940	0.8	0.9	4	0.76	60	0.1	6	2	1	6.38	6.61	6.78	7.82

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
161941	0.8	0.9	6	0.76	60	0.1	6	2	0.5	8.38	8.66	8.92	10.36
161942	0.8	0.9	6	0.76	60	0.1	6	2	1	4.24	4.46	4.61	5.14
161943	0.8	0.9	8	0.76	60	0.1	6	2	0.5	5.39	6.46	6.67	7.58
161944	0.8	0.9	8	0.76	60	0.1	6	2	1	5.39	8.46	8.72	10.01
161945	0.8	0.9	12	0.76	60	0.1	6	2	1	5.39	12.46	12.81	14.89
161946	0.8	0.9	16	0.76	60	0.1	6	2	1	5.39	16.46	16.99	19.76
161947	1	1.2	5	0.94	60	0.2	6	2	1	10.44	10.75	11.16	12.96
161948	1	1.2	5	0.94	60	0.2	6	2	1.5	15.44	15.9	16.63	19.32
161949	1	1.2	10	0.94	60	0.2	6	2	0.5	20.44	21.12	22.1	25.69
161950	1	1.2	10	0.94	60	0.2	6	2	1	25.44	26.34	27.57	32.05
161951	1	1.2	10	0.94	60	0.2	6	2	1.5	30.44	31.57	33.04	38.42
161952	1	1.2	15	0.94	60	0.2	6	2	0.5	35.44	36.79	38.51	44.78
161953	1	1.2	15	0.94	60	0.2	6	2	1	5.3	5.53	5.69	6.43
161954	1	1.2	15	0.94	60	0.2	6	2	1.5	7.24	10.53	10.8	12.52
161955	1	1.2	20	0.94	75	0.2	6	2	0.5	7.24	15.53	16.02	18.62
161956	1	1.2	20	0.94	75	0.2	6	2	1	7.24	20.53	21.26	24.71
161957	1	1.2	20	0.94	75	0.2	6	2	1.5	7.24	25.53	26.49	30.8
161958	1	1.2	25	0.94	75	0.2	6	2	0.5	7.24	30.53	31.73	36.89
161959	1	1.2	25	0.94	75	0.2	6	2	1	7.24	35.53	36.96	42.98
161960	1	1.2	25	0.94	75	0.2	6	2	1.5	4.62	5.41	5.6	6.27
161961	1	1.2	30	0.94	75	0.2	6	2	0.5	4.62	9.04	10.6	12.09
161962	1	1.2	30	0.94	75	0.2	6	2	1	4.62	9.04	15.6	17.91
161963	1	1.2	30	0.94	75	0.2	6	2	1.5	4.62	9.04	20.6	23.73
161964	1	1.2	35	0.94	100	0.2	6	2	0.5	4.62	9.04	25.6	29.54
161965	1	1.2	35	0.94	100	0.2	6	2	1	4.62	9.04	30.6	35.36
161966	1	1.2	35	0.94	75	0.2	6	2	1.5	4.62	9.04	35.6	41.18
161967	2	2.3	10	1.94	60	0.3	6	2	1	15.92	16.61	17.08	19.4
161968	2	2.3	10	1.94	60	0.3	6	2	1.5	20.92	21.76	22.32	25.76
161969	2	2.3	15	1.94	60	0.3	6	2	0.5	25.92	26.91	27.65	32.13
161970	2	2.3	15	1.94	60	0.3	6	2	1	30.92	32.04	33.12	38.48

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
161971	2	2.3	15	1.94	60	0.3	6	2	1.5	35.92	37.16	38.59	43.28
161972	2	2.3	20	1.94	60	0.3	6	2	0.5	10.4	11.17	11.62	12.71
161973	2	2.3	20	1.94	60	0.3	6	2	1	11.14	16.17	16.78	18.8
161974	2	2.3	20	1.94	60	0.3	6	2	1.5	11.14	21.17	21.92	24.89
161975	2	2.3	25	1.94	75	0.3	6	2	0.5	11.14	26.17	27.06	30.98
161976	2	2.3	25	1.94	75	0.3	6	2	1	11.14	31.17	32.18	37.08
161977	2	2.3	25	1.94	75	0.3	6	2	1.5	11.14	36.17	37.3	42
161978	2	2.3	30	1.94	75	0.3	6	2	0.5	7.57	10.82	11.39	12.42
161979	2	2.3	30	1.94	75	0.3	6	2	1	7.57	14.84	16.39	18.2
161980	2	2.3	30	1.94	75	0.3	6	2	1.5	7.57	14.84	21.39	24.02
161981	2	2.3	35	1.94	75	0.3	6	2	0.5	7.57	14.84	26.39	29.84
161982	2	2.3	35	1.94	75	0.3	6	2	1	7.57	14.84	31.39	35.66
161983	2	2.3	35	1.94	75	0.3	6	2	1.5	7.57	14.84	36.39	40.73
161984	2	2.3	10	1.94	60	0.5	6	2	0.5	10.9	11.41	11.79	12.97
161985	2	2.3	10	1.94	60	0.5	6	2	1	15.9	16.59	17.07	19.34
161986	2	2.3	10	1.94	60	0.5	6	2	1.5	20.9	21.75	22.31	25.7
161987	2	2.3	15	1.94	60	0.5	6	2	0.5	25.9	26.9	27.62	32.06
161988	2	2.3	15	1.94	60	0.5	6	2	1	30.9	32.03	33.09	38.43
161989	2	2.3	15	1.94	60	0.5	6	2	1.5	35.9	37.15	38.56	43.28
161990	2	2.3	20	1.94	60	0.5	6	2	0.5	10.37	11.15	11.6	12.65
161991	2	2.3	20	1.94	60	0.5	6	2	1	10.94	16.15	16.76	18.74
161992	2	2.3	20	1.94	60	0.5	6	2	1.5	10.94	21.15	21.91	24.83
161993	2	2.3	25	1.94	75	0.5	6	2	0.5	10.94	26.15	27.04	30.92
161994	2	2.3	25	1.94	75	0.5	6	2	1	10.94	31.15	32.17	37.01
161995	2	2.3	25	1.94	75	0.5	6	2	1.5	10.94	36.15	37.29	42
161996	2	2.3	30	1.94	75	0.5	6	2	0.5	7.47	10.79	11.37	12.39
161997	2	2.3	30	1.94	75	0.5	6	2	1	7.47	14.44	16.37	18.14
161998	2	2.3	30	1.94	75	0.5	6	2	1.5	7.47	14.44	21.37	23.96
161999	2	2.3	35	1.94	75	0.5	6	2	0.5	7.47	14.44	26.37	29.78
162000	2	2.3	35	1.94	75	0.5	6	2	1	7.47	14.44	31.37	35.59

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
162001	2	2.3	35	1.94	75	0.5	6	2	1.5	7.47	14.44	36.37	40.73
162002	3	3.5	15	2.94	60	0.3	6	2	1	21.03	21.82	22.36	25.87
162003	3	3.5	15	2.94	60	0.3	6	2	1.5	26.03	26.96	27.74	31.42
162004	3	3.5	20	2.94	60	0.3	6	2	0.5	31.03	32.09	33.21	36.21
162005	3	3.5	20	2.94	60	0.3	6	2	1	36.03	37.21	38.68	41.01
162006	3	3.5	20	2.94	60	0.3	6	2	1.5	41.03	42.32	44.15	45.8
162007	3	3.5	25	2.94	75	0.3	6	2	0.5	15.18	16.35	16.9	19.02
162008	3	3.5	25	2.94	75	0.3	6	2	1	15.14	21.35	22.03	25.11
162009	3	3.5	25	2.94	75	0.3	6	2	1.5	15.14	26.35	27.16	30.64
162010	3	3.5	30	2.94	75	0.3	6	2	0.5	15.14	31.35	32.28	35.23
162011	3	3.5	30	2.94	75	0.3	6	2	1	15.14	36.35	37.39	39.82
162012	3	3.5	30	2.94	75	0.3	6	2	1.5	15.14	41.35	42.56	44.41
162013	3	3.5	35	2.94	75	0.3	6	2	0.5	10.57	15.89	16.62	18.53
162014	3	3.5	35	2.94	75	0.3	6	2	1	10.57	20.42	21.62	24.35
162015	3	3.5	35	2.94	75	0.3	6	2	1.5	10.57	20.84	26.62	29.86
162016	3	3.5	40	2.94	100	0.3	6	2	0.5	10.57	20.84	31.62	34.24
162017	3	3.5	40	2.94	100	0.3	6	2	1	10.57	20.84	36.62	37.94
162018	3	3.5	40	2.94	75	0.3	6	2	1.5	10.57	20.84	40.96	43.01
162019	3	3.5	15	2.94	60	0.5	6	2	0.5	16.02	16.66	17.12	19.45
162020	3	3.5	15	2.94	60	0.5	6	2	1	21.02	21.81	22.35	25.81
162021	3	3.5	15	2.94	60	0.5	6	2	1.5	26.02	26.95	27.71	31.42
162022	3	3.5	20	2.94	60	0.5	6	2	0.5	31.02	32.08	33.18	36.21
162023	3	3.5	20	2.94	60	0.5	6	2	1	36.02	37.2	38.65	41.01
162024	3	3.5	20	2.94	60	0.5	6	2	1.5	41.02	42.31	44.12	45.8
162025	3	3.5	25	2.94	75	0.5	6	2	0.5	14.94	16.33	16.88	18.96
162026	3	3.5	25	2.94	75	0.5	6	2	1	14.94	21.33	22.02	25.05
162027	3	3.5	25	2.94	75	0.5	6	2	1.5	14.94	26.33	27.14	30.64
162028	3	3.5	30	2.94	75	0.5	6	2	0.5	14.94	31.33	32.26	35.23
162029	3	3.5	30	2.94	75	0.5	6	2	1	14.94	36.33	37.37	39.82
162030	3	3.5	30	2.94	75	0.5	6	2	1.5	14.94	41.33	42.53	44.41

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
162031	3	3.5	35	2.94	75	0.5	6	2	0.5	10.47	15.86	16.6	18.47
162032	3	3.5	35	2.94	75	0.5	6	2	1	10.47	20.34	21.6	24.28
162033	3	3.5	35	2.94	75	0.5	6	2	1.5	10.47	20.44	26.6	29.86
162034	3	3.5	40	2.94	100	0.5	6	2	0.5	10.47	20.44	31.6	34.24
162035	3	3.5	40	2.94	100	0.5	6	2	1	10.47	20.44	36.6	37.94
162036	3	3.5	40	2.94	75	0.5	6	2	1.5	10.47	20.44	40.93	43.01
162037	4	4.6	20	3.94	60	0.3	6	2	0.5	21.13	21.88	22.41	24.35
162038	4	4.6	20	3.94	60	0.3	6	2	1	26.13	27.01	27.84	29.15
162039	4	4.6	20	3.94	60	0.3	6	2	1.5	31.13	32.14	33.3	33.94
162040	4	4.6	25	3.94	75	0.3	6	2	0.5	36.13	37.25	37.96	37.98
162041	4	4.6	25	3.94	60	0.3	6	2	1	41.13	42.36	42.91	-
162042	4	4.6	25	3.94	60	0.3	6	2	1.5	46.13	47.47	47.83	-
162043	4	4.6	30	3.94	75	0.3	6	2	0.5	50.48	52.72	53.12	-
162044	4	4.6	30	3.94	75	0.3	6	2	1	19.14	21.5	22.13	23.86
162045	4	4.6	30	3.94	75	0.3	8	2	1.5	19.14	26.5	27.25	27.87
162046	4	4.6	35	3.94	75	0.3	6	2	0.5	19.14	30.84	32.27	33.04
162047	4	4.6	35	3.94	75	0.3	6	2	1	19.14	35.84	37.51	37.63
162048	4	4.6	35	3.94	75	0.3	8	2	1.5	19.14	40.84	42.22	-
162049	4	4.6	40	3.94	75	0.3	6	2	0.5	19.14	46.5	47.98	51.51
162050	4	4.6	40	3.94	75	0.3	6	2	1	19.14	51.5	53.21	56.1
162051	4	4.6	40	3.94	100	0.3	8	2	1.5	13.57	20.95	21.81	22.84
162052	4	4.6	45	3.94	100	0.3	6	2	0.5	13.57	25.08	26.24	27.75
162053	4	4.6	45	3.94	100	0.3	8	2	1	13.57	26.84	31.81	36.31
162054	4	4.6	45	3.94	100	0.3	8	2	1.5	13.57	26.84	36.81	41.22
162055	4	4.6	50	3.94	100	0.3	6	2	0.5	13.57	26.84	41.81	45.61
162056	4	4.6	50	3.94	100	0.3	8	2	1	13.57	26.84	46.81	49.99
162057	4	4.6	50	3.94	100	0.3	8	2	1.5	13.57	26.84	51.81	54.38
162058	4	4.6	20	3.94	60	0.5	6	2	0.5	21.12	21.87	22.4	24.35
162059	4	4.6	20	3.94	60	0.5	6	2	1	26.12	27	27.81	29.15
162060	4	4.6	20	3.94	60	0.5	6	2	1.5	31.12	32.13	33.28	33.94

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
162061	4	4.6	25	3.94	75	0.5	6	2	0.5	36.12	37.25	37.95	37.98
162062	4	4.6	25	3.94	60	0.5	6	2	1	41.12	42.35	42.91	-
162063	4	4.6	25	3.94	60	0.5	6	2	1.5	46.12	47.46	47.83	-
162064	4	4.6	30	3.94	75	0.5	6	2	0.5	50.47	52.7	53.12	-
162065	4	4.6	30	3.94	75	0.5	6	2	1	18.94	21.49	22.12	23.86
162066	4	4.6	30	3.94	75	0.5	8	2	1.5	18.94	26.49	27.24	27.87
162067	4	4.6	35	3.94	75	0.5	6	2	0.5	18.94	30.83	32.25	33.04
162068	4	4.6	35	3.94	75	0.5	6	2	1	18.94	35.83	37.48	37.63
162069	4	4.6	35	3.94	75	0.5	8	2	1.5	18.94	41.49	42.71	46.92
162070	4	4.6	40	3.94	75	0.5	6	2	0.5	18.94	46.49	47.95	51.51
162071	4	4.6	40	3.94	100	0.5	8	2	1	18.94	51.49	53.18	56.1
162072	4	4.6	40	3.94	100	0.5	8	2	1.5	13.47	20.93	21.79	22.84
162073	4	4.6	45	3.94	100	0.5	6	2	0.5	13.47	25.06	26.22	27.75
162074	4	4.6	45	3.94	100	0.5	8	2	1	13.47	26.44	31.79	36.25
162075	4	4.6	45	3.94	100	0.5	8	2	1.5	13.47	26.44	36.79	41.22
162076	4	4.6	50	3.94	100	0.5	6	2	0.5	13.47	26.44	41.79	45.61
162077	4	4.6	50	3.94	100	0.5	8	2	1	13.47	26.44	46.79	49.99
162078	4	4.6	50	3.94	100	0.5	8	2	1.5	13.47	26.44	51.79	54.38
162079	5	5.8	30	4.9	75	0.5	8	2	1	25.23	31.7	32.54	35.65
162080	5	5.8	30	4.9	75	0.5	8	2	1.5	25.23	51.7	52.86	53.08
162081	5	5.8	50	4.9	100	0.5	8	2	1	17.61	30.81	32.02	34.83
162082	6	6.9	35	5.9	75	0.5	8	2	1	29.23	36.29	37.96	38.05
162083	6	6.9	35	5.9	100	0.5	10	2	1.5	29.23	41.29	42.64	-
162084	6	6.9	40	5.9	75	0.5	8	2	1	29.23	51.82	53.67	56.52
162085	6	6.9	40	5.9	100	0.5	10	2	1.5	29.23	61.82	64.13	65.7
162086	6	6.9	50	5.9	100	0.5	10	2	1	20.61	35.88	37.18	41.81
162087	6	6.9	60	5.9	110	0.5	10	2	1	20.61	40.4	42.18	46.2
162088	6	6.9	35	5.9	75	1	8	2	1	28.73	36.24	37.89	38.05
162089	6	6.9	35	5.9	100	1	10	2	1.5	28.73	41.24	42.64	-
162090	6	6.9	40	5.9	75	1	8	2	1	28.73	51.79	53.6	56.52

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
162091	6	6.9	40	5.9	100	1	10	2	1.5	28.73	61.79	64.06	65.7
162092	6	6.9	50	5.9	100	1	10	2	1	20.36	35.81	37.14	41.81
162093	6	6.9	60	5.9	110	1	10	2	1	20.36	39.74	42.14	46.2
162094	8	9.2	50	7.8	100	0.5	12	2	1	42.96	52.18	54.31	57.09
162095	8	9.2	70	7.8	120	0.5	12	2	1	42.96	72.18	75.25	75.45
162096	8	9.2	90	7.8	140	0.5	12	2	1	42.96	91.9	93.8	-
162097	8	9.2	50	7.8	100	1	12	2	1	42.46	52.15	54.24	57.09
162098	8	9.2	70	7.8	120	1	12	2	1	42.46	72.15	75.18	75.45
162099	8	9.2	90	7.8	140	1	12	2	1	42.46	91.86	93.8	-
162100	10	11.5	50	9.8	115	1	16	2	1	50.28	52.33	54.61	62.12
162101	10	11.5	70	9.8	130	1	16	2	1	50.46	72.33	75.55	80.48
162102	10	11.5	90	9.8	150	1	16	2	1	50.46	92.33	96.49	98.84
162103	10	11.5	50	9.8	115	2	16	2	1	49.46	52.29	54.47	62.12
162104	10	11.5	70	9.8	130	2	16	2	1	49.46	72.29	75.41	80.48
162105	10	11.5	90	9.8	150	2	16	2	1	49.46	92.29	96.35	98.84
162106	12	13.8	50	11.8	110	1	16	2	1	50.99	52.57	54.99	57.74
162107	12	13.8	70	11.8	125	1	16	2	1	58.46	72.5	73.6	73.73
162108	12	13.8	90	11.8	145	1	16	2	1	58.46	92.5	93.24	-
162109	12	13.8	50	11.8	110	2	16	2	1	50.94	52.48	54.85	57.74
162110	12	13.8	70	11.8	125	2	16	2	1	57.46	72.46	73.56	73.73
162111	12	13.8	90	11.8	145	2	16	2	1	57.46	92.46	93.24	-

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.2 - 0.3	f_z (mm)	0.002 - 0.006	0.002 - 0.005	0.002 - 0.007	-	-	0.001 - 0.004
	a_p (mm)	0.0012 - 0.045	0.001 - 0.03	0.001 - 0.045	-	-	0.001 - 0.018
0.4 - 0.8	f_z (mm)	0.006 - 0.016	0.006 - 0.014	0.005 - 0.019	-	-	0.004 - 0.012
	a_p (mm)	0.005 - 0.12	0.005 - 0.08	0.005 - 0.12	-	-	0.004 - 0.048
1 - 2.5	f_z (mm)	0.014 - 0.05	0.014 - 0.044	0.012 - 0.06	-	-	0.01 - 0.037
	a_p (mm)	0.012 - 0.375	0.012 - 0.25	0.012 - 0.375	-	-	0.01 - 0.15
3 - 4	f_z (mm)	0.042 - 0.084	0.042 - 0.074	0.036 - 0.101	-	-	0.029 - 0.061
	a_p (mm)	0.036 - 0.6	0.036 - 0.4	0.036 - 0.6	-	-	0.03 - 0.24
5 - 6	f_z (mm)	0.074 - 0.125	0.074 - 0.110	0.063 - 0.150	-	-	0.051 - 0.091
	a_p (mm)	0.06 - 0.9	0.06 - 0.6	0.06 - 0.9	-	-	0.05 - 0.36
8	f_z (mm)	0.114 - 0.165	0.114 - 0.145	0.097 - 0.198	-	-	0.079 - 0.120
	a_p (mm)	0.096 - 1.2	0.096 - 0.8	0.096 - 1.2	-	-	0.08 - 0.48
10	f_z (mm)	0.139 - 0.2	0.139 - 0.176	0.118 - 0.240	-	-	0.096 - 0.146
	a_p (mm)	0.12 - 1.5	0.12 - 1	0.12 - 1.5	-	-	0.1 - 0.6
12	f_z (mm)	0.163 - 0.235	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.144 - 1.8	0.144 - 1.2	0.144 - 1.8	-	-	0.12 - 0.72

Speed (V_c in m/min)

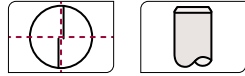
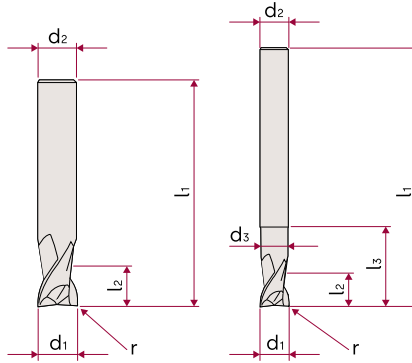
Application	P	M	K	N	S	H
	●	○	●	-	-	55 60
ROUGH	180 220 250	60 85 110	190 250	-	-	60 120 200
FINE	220 270 320	70 90 120	260 320	-	-	120 170 250

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60

Torus milling cutters

PR03

d_1 2 - 12	z 2	r 0.6 - 5	λ° 30°	TiAlN
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle				
									0.5°	1°	1.5°	2°	3°
164267	2	3	-	-	57	0.6	6	2	3.50	3.74	3.93	4.10	4.41
164268	4	6	-	-	57	1.5	6	2	6.67	6.97	7.22	7.44	7.92
164269	6	9	-	-	57	2	6	2	-	-	-	-	-
164279	6	9	20	5.8	75	2	6	2	-	-	-	-	-
164270	6	9	-	-	57	2.5	6	2	-	-	-	-	-
164280	6	9	20	5.8	75	2.5	6	2	-	-	-	-	-
164271	8	12	-	-	63	2.5	8	2	-	-	-	-	-
164281	8	12	26	7.8	90	2.5	8	2	-	-	-	-	-
164272	8	12	-	-	63	3	8	2	-	-	-	-	-
164282	8	12	26	7.8	90	3	8	2	-	-	-	-	-
164273	10	15	-	-	72	2.5	10	2	-	-	-	-	-
164283	10	15	31	9.8	100	2.5	10	2	-	-	-	-	-
164274	10	15	-	-	72	3	10	2	-	-	-	-	-
164284	10	15	31	9.8	100	3	10	2	-	-	-	-	-
164275	10	15	-	-	72	4	10	2	-	-	-	-	-
164285	10	15	31	9.8	100	4	10	2	-	-	-	-	-
164276	12	18	-	-	83	3	12	2	-	-	-	-	-
164277	12	18	-	-	83	4	12	2	-	-	-	-	-
164286	12	18	37	11.8	110	4	12	2	-	-	-	-	-
164278	12	18	-	-	83	5	12	2	-	-	-	-	-
164287	12	18	37	11.8	110	5	12	2	-	-	-	-	-

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
2	f_z (mm)	0.01 - 0.04	0.01 - 0.04	0.01 - 0.04	-	-	0.01 - 0.03
	a_p (mm)	0.05 - 0.2	0.05 - 0.15	0.06 - 0.2	-	-	0.04 - 0.1
3 - 4	f_z (mm)	0.04 - 0.07	0.04 - 0.07	0.04 - 0.07	-	-	0.04 - 0.07
	a_p (mm)	0.08 - 0.4	0.08 - 0.3	0.06 - 0.4	-	-	0.08 - 0.2
5 - 6	f_z (mm)	0.08 - 0.12	0.08 - 0.12	0.08 - 0.12	-	-	0.08 - 0.15
	a_p (mm)	0.1 - 0.6	0.1 - 0.4	0.12 - 0.6	-	-	0.1 - 0.3
8	f_z (mm)	0.08 - 0.115	0.08	0.08 - 0.15	-	-	0.08 - 0.15
	a_p (mm)	0.15 - 0.525	0.15	0.15 - 0.8	-	-	0.15 - 0.4
10	f_z (mm)	0.08 - 0.115	0.08	0.08 - 0.15	-	-	0.08 - 0.2
	a_p (mm)	0.2 - 0.65	0.2	0.3 - 1	-	-	0.2 - 0.5
12	f_z (mm)	0.08 - 0.115	0.08	0.08 - 0.15	-	-	0.08 - 0.25
	a_p (mm)	0.2 - 0.75	0.2	0.3 - 1.2	-	-	0.2 - 0.6

Speed (V_c in m/min)


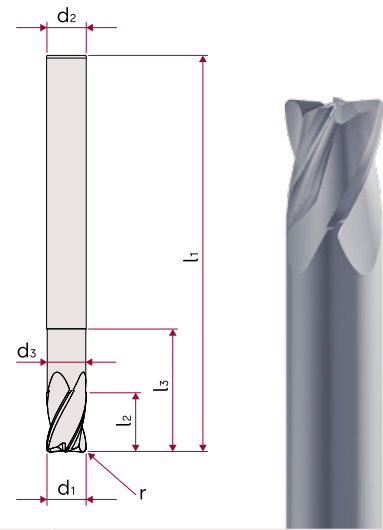
Application	P	M	K	N	S	H
	●	○	●	-	-	55
ROUGH	120 210 300	-	100 225 350	-	-	80 140 200
FINE	200 250 300	70 110 150	180 290 400	-	-	100 175 250

● = Primary application | ○ = Secondary application | 55 = HRC 45-55

Torus milling cutters

PR04

d_1 2 - 12	z 4	r 0.2 - 2	λ° 30°	AlTiN
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at α° draft angle			
									0.5°	1°	1.5°	3°
164579	2	2.3	10	1.9	60	0.5	6	4	11.21	11.63	11.96	13.3
162112	3	3.5	10	2.94	60	0.2	6	4	11.22	11.64	11.99	13.40
162113	3	3.5	15	2.94	60	0.2	6	4	16.42	16.94	17.35	20.03
162114	3	3.5	20	2.94	60	0.2	6	4	21.60	22.19	22.94	26.67
162115	3	3.5	25	2.94	75	0.2	6	4	26.75	27.41	28.65	32.20
162116	3	3.5	10	2.94	60	0.5	6	4	11.21	11.63	11.96	13.30
162117	3	3.5	15	2.94	60	0.5	6	4	16.41	16.92	17.33	19.94
162118	3	3.5	20	2.94	60	0.5	6	4	21.59	22.18	22.90	26.57
162119	3	3.5	25	2.94	75	0.5	6	4	26.74	27.40	28.60	32.20
162120	4	4.6	10	3.94	60	0.2	6	4	11.22	11.64	11.99	13.40
162121	4	4.6	15	3.94	60	0.2	6	4	16.42	16.94	17.35	19.85
162122	4	4.6	20	3.94	60	0.2	6	4	21.60	22.19	22.94	24.85
162123	4	4.6	25	3.94	75	0.2	6	4	26.75	27.41	28.65	29.85
162124	4	4.6	30	3.94	75	0.2	6	4	31.89	32.82	34.35	34.85
162125	4	4.6	10	3.94	60	0.5	6	4	11.21	11.63	11.96	13.30
162126	4	4.6	15	3.94	60	0.5	6	4	16.41	16.92	17.33	19.85
162127	4	4.6	20	3.94	60	0.5	6	4	21.59	22.18	22.90	24.85
162128	4	4.6	25	3.94	75	0.5	6	4	26.74	27.40	28.60	29.85
162129	4	4.6	30	3.94	75	0.5	6	4	31.89	32.79	34.31	34.85
162130	5	5.8	15	4.9	60	0.2	6	4	15.88	16.58	17.35	17.59
162131	5	5.8	20	4.9	60	0.2	6	4	21.09	22.03	22.59	-
162132	5	5.8	25	4.9	60	0.2	6	4	26.31	27.48	27.59	-
162133	5	5.8	30	4.9	75	0.2	6	4	31.52	32.59	-	-
162134	5	5.8	15	4.9	60	0.5	6	4	15.87	16.55	17.31	17.59

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
162135	5	5.8	20	4.9	60	0.5	6	4	21.08	22.00	22.59	-
162136	5	5.8	25	4.9	60	0.5	6	4	26.29	27.45	27.59	-
162137	5	5.8	30	4.9	75	0.5	6	4	31.51	32.59	-	-
162138	6	6.9	15	5.9	60	0.2	6	4	-	-	-	-
162139	6	6.9	20	5.9	60	0.2	6	4	-	-	-	-
162140	6	6.9	25	5.9	60	0.2	6	4	-	-	-	-
162141	6	6.9	30	5.9	75	0.2	6	4	-	-	-	-
162142	6	6.9	35	5.9	75	0.2	6	4	-	-	-	-
162143	6	6.9	15	5.9	60	0.3	6	4	-	-	-	-
162144	6	6.9	20	5.9	60	0.3	6	4	-	-	-	-
162145	6	6.9	25	5.9	60	0.3	6	4	-	-	-	-
162146	6	6.9	30	5.9	75	0.3	6	4	-	-	-	-
162147	6	6.9	35	5.9	75	0.3	6	4	-	-	-	-
162148	6	6.9	15	5.9	60	0.5	6	4	-	-	-	-
162149	6	6.9	20	5.9	60	0.5	6	4	-	-	-	-
162150	6	6.9	25	5.9	60	0.5	6	4	-	-	-	-
162151	6	6.9	30	5.9	75	0.5	6	4	-	-	-	-
162152	6	6.9	35	5.9	75	0.5	6	4	-	-	-	-
162153	6	6.9	15	5.9	60	1	6	4	-	-	-	-
162154	6	6.9	20	5.9	60	1	6	4	-	-	-	-
162155	6	6.9	25	5.9	60	1	6	4	-	-	-	-
162156	6	6.9	30	5.9	75	1	6	4	-	-	-	-
162157	6	6.9	35	5.9	75	1	6	4	-	-	-	-
162158	8	9.2	25	7.8	64	0.5	8	4	-	-	-	-
162159	8	9.2	50	7.8	100	0.5	8	4	-	-	-	-
162160	8	9.2	25	7.8	64	1	8	4	-	-	-	-
162161	8	9.2	50	7.8	100	1	8	4	-	-	-	-
162162	8	9.2	25	7.8	64	2	8	4	-	-	-	-
162163	8	9.2	50	7.8	100	2	8	4	-	-	-	-
162164	10	11.5	30	9.8	75	0.5	10	4	-	-	-	-

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
162165	10	11.5	50	9.8	100	0.5	10	4	-	-	-	-
162166	10	11.5	30	9.8	75	1	10	4	-	-	-	-
162167	10	11.5	50	9.8	100	1	10	4	-	-	-	-
162168	10	11.5	30	9.8	75	2	10	4	-	-	-	-
162169	10	11.5	50	9.8	100	2	10	4	-	-	-	-
162170	12	13.8	35	11.8	75	0.5	12	4	-	-	-	-
162171	12	13.8	60	11.8	100	0.5	12	4	-	-	-	-
162172	12	13.8	35	11.8	75	1	12	4	-	-	-	-
162173	12	13.8	60	11.8	100	1	12	4	-	-	-	-
162174	12	13.8	35	11.8	75	2	12	4	-	-	-	-
162175	12	13.8	60	11.8	100	2	12	4	-	-	-	-

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
2	f_z (mm)	0.028 - 0.04	0.028 - 0.035	0.024 - 0.048	-	-	0.019 - 0.029
	a_p (mm)	0.024 - 0.3	0.024 - 0.2	0.024 - 0.3	-	-	0.02 - 0.05
3 - 4	f_z (mm)	0.042 - 0.084	0.042 - 0.074	0.036 - 0.101	-	-	0.029 - 0.061
	a_p (mm)	0.036 - 0.6	0.036 - 0.4	0.036 - 0.6	-	-	0.03 - 0.24
5 - 6	f_z (mm)	0.074 - 0.125	0.074 - 0.110	0.063 - 0.150	-	-	0.051 - 0.091
	a_p (mm)	0.06 - 0.9	0.06 - 0.6	0.06 - 0.9	-	-	0.05 - 0.36
8	f_z (mm)	0.114 - 0.165	0.114 - 0.145	0.097 - 0.198	-	-	0.079 - 0.120
	a_p (mm)	0.096 - 1.2	0.096 - 0.8	0.096 - 1.2	-	-	0.08 - 0.48
10	f_z (mm)	0.139 - 0.2	0.139 - 0.176	0.118 - 0.240	-	-	0.096 - 0.146
	a_p (mm)	0.12 - 1.5	0.12 - 1	0.12 - 1.5	-	-	0.1 - 0.6
12	f_z (mm)	0.163 - 0.235	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.144 - 1.8	0.144 - 1.2	0.144 - 1.8	-	-	0.12 - 0.72


Speed (V_c in m/min)

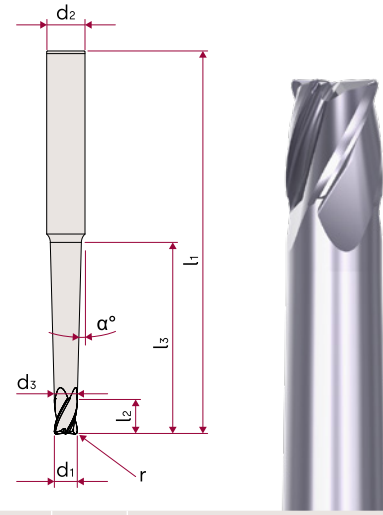
Application	P	M	K	N	S	H
	●	○	●	-	-	55 ○ 60
ROUGH	180 220 250	60 85 110	190 250	-	-	60 120 200
FINE	220 270 320	70 90 120	260 320	-	-	120 170 250

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60

Torus milling cutters

PR05

d_1 3 - 12	z 4	r 0.3 - 2	λ° 30°	AlTiN
	conical 0.5° - 1.5°			



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
162176	3	3.5	15	2.94	60	0.3	6	4	1	21.03	21.82	22.36	25.87
162177	3	3.5	15	2.94	60	0.3	6	4	1.5	26.03	26.96	27.74	31.42
162178	3	3.5	20	2.94	60	0.3	6	4	0.5	31.03	32.09	33.21	36.21
162179	3	3.5	20	2.94	60	0.3	6	4	1	36.03	37.21	38.68	41.01
162180	3	3.5	20	2.94	60	0.3	6	4	1.5	41.03	42.32	44.15	45.8
162181	3	3.5	25	2.94	75	0.3	6	4	0.5	15.18	16.35	16.9	19.02
162182	3	3.5	25	2.94	75	0.3	6	4	1	15.14	21.35	22.03	25.11
162183	3	3.5	25	2.94	75	0.3	6	4	1.5	15.14	26.35	27.16	30.64
162184	3	3.5	30	2.94	75	0.3	6	4	0.5	15.14	31.35	32.28	35.23
162185	3	3.5	30	2.94	75	0.3	6	4	1	15.14	36.35	37.39	39.82
162186	3	3.5	30	2.94	75	0.3	6	4	1.5	15.14	41.35	42.56	44.41
162187	3	3.5	35	2.94	75	0.3	6	4	0.5	10.57	15.89	16.62	18.53
162188	3	3.5	35	2.94	75	0.3	6	4	1	10.57	20.42	21.62	24.35
162189	3	3.5	35	2.94	75	0.3	6	4	1.5	10.57	20.84	26.62	29.86
162190	3	3.5	40	2.94	100	0.3	6	4	0.5	10.57	20.84	31.62	34.24
162191	3	3.5	40	2.94	100	0.3	6	4	1	10.57	20.84	36.62	37.94
162192	3	3.5	40	2.94	75	0.3	6	4	1.5	10.57	20.84	40.96	43.01
162193	3	3.5	15	2.94	60	0.5	6	4	0.5	16.02	16.66	17.12	19.45
162194	3	3.5	15	2.94	60	0.5	6	4	1	21.02	21.81	22.35	25.81
162195	3	3.5	15	2.94	60	0.5	6	4	1.5	26.02	26.95	27.71	31.42
162196	3	3.5	20	2.94	60	0.5	6	4	0.5	31.02	32.08	33.18	36.21
162197	3	3.5	20	2.94	60	0.5	6	4	1	36.02	37.2	38.65	41.01
162198	3	3.5	20	2.94	60	0.5	6	4	1.5	41.02	42.31	44.12	45.8
162199	3	3.5	25	2.94	75	0.5	6	4	0.5	14.94	16.33	16.88	18.96

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
162200	3	3.5	25	2.94	75	0.5	6	4	1	14.94	21.33	22.02	25.05
162201	3	3.5	25	2.94	75	0.5	6	4	1.5	14.94	26.33	27.14	30.64
162202	3	3.5	30	2.94	75	0.5	6	4	0.5	14.94	31.33	32.26	35.23
162203	3	3.5	30	2.94	75	0.5	6	4	1	14.94	36.33	37.37	39.82
162204	3	3.5	30	2.94	75	0.5	6	4	1.5	14.94	41.33	42.53	44.41
162205	3	3.5	35	2.94	75	0.5	6	4	0.5	10.47	15.86	16.6	18.47
162206	3	3.5	35	2.94	75	0.5	6	4	1	10.47	20.34	21.6	24.28
162207	3	3.5	35	2.94	75	0.5	6	4	1.5	10.47	20.44	26.6	29.86
162208	3	3.5	40	2.94	100	0.5	6	4	0.5	10.47	20.44	31.6	34.24
162209	3	3.5	40	2.94	100	0.5	6	4	1	10.47	20.44	36.6	37.94
162210	3	3.5	40	2.94	75	0.5	6	4	1.5	10.47	20.44	40.93	43.01
162211	4	4.6	20	3.94	60	0.3	6	4	0.5	21.13	21.88	22.41	24.35
162212	4	4.6	20	3.94	60	0.3	6	4	1	26.13	27.01	27.84	29.15
162213	4	4.6	20	3.94	60	0.3	6	4	1.5	31.13	32.14	33.3	33.94
162214	4	4.6	25	3.94	75	0.3	6	4	0.5	36.13	37.25	37.96	37.98
162215	4	4.6	25	3.94	60	0.3	6	4	1	41.13	42.36	42.91	-
162216	4	4.6	25	3.94	60	0.3	6	4	1.5	46.13	47.47	47.83	-
162217	4	4.6	30	3.94	75	0.3	6	4	0.5	50.48	52.72	53.12	-
162218	4	4.6	30	3.94	75	0.3	6	4	1	19.14	21.5	22.13	23.86
162219	4	4.6	30	3.94	75	0.3	8	4	1.5	19.14	26.5	27.25	27.87
162220	4	4.6	35	3.94	75	0.3	6	4	0.5	19.14	30.84	32.27	33.04
162221	4	4.6	35	3.94	75	0.3	6	4	1	19.14	35.84	37.51	37.63
162222	4	4.6	35	3.94	75	0.3	8	4	1.5	19.14	41.5	42.74	46.92
162223	4	4.6	40	3.94	75	0.3	6	4	0.5	19.14	46.5	47.98	51.51
162224	4	4.6	40	3.94	100	0.3	8	4	1	19.14	51.5	53.21	56.1
162225	4	4.6	40	3.94	100	0.3	8	4	1.5	13.57	20.95	21.81	22.84
162226	4	4.6	45	3.94	100	0.3	6	4	0.5	13.57	25.08	26.24	27.75
162227	4	4.6	45	3.94	100	0.3	8	4	1	13.57	26.84	31.81	36.31
162228	4	4.6	45	3.94	100	0.3	8	4	1.5	13.57	26.84	36.81	41.22
162229	4	4.6	50	3.94	100	0.3	6	4	0.5	13.57	26.84	41.81	45.61

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
162230	4	4.6	50	3.94	100	0.3	8	4	1	13.57	26.84	46.81	49.99
162231	4	4.6	50	3.94	100	0.3	8	4	1.5	13.57	26.84	51.81	54.38
162232	4	4.6	20	3.94	60	0.5	6	4	0.5	21.12	21.87	22.4	24.35
162233	4	4.6	20	3.94	60	0.5	6	4	1	26.12	27	27.81	29.15
162234	4	4.6	20	3.94	60	0.5	6	4	1.5	31.12	32.13	33.28	33.94
162235	4	4.6	25	3.94	75	0.5	6	4	0.5	36.12	37.25	37.95	37.98
162236	4	4.6	25	3.94	60	0.5	6	4	1	41.12	42.35	42.91	-
162237	4	4.6	25	3.94	60	0.5	6	4	1.5	46.12	47.46	47.83	-
162238	4	4.6	30	3.94	75	0.5	6	4	0.5	50.47	52.7	53.12	-
162239	4	4.6	30	3.94	75	0.5	6	4	1	18.94	21.49	22.12	23.86
162240	4	4.6	30	3.94	75	0.5	8	4	1.5	18.94	26.49	27.24	27.87
162241	4	4.6	35	3.94	75	0.5	6	4	0.5	18.94	30.83	32.25	33.04
162242	4	4.6	35	3.94	75	0.5	6	4	1	18.94	35.83	37.48	37.63
162243	4	4.6	35	3.94	75	0.5	8	4	1.5	18.94	41.49	42.71	46.92
162244	4	4.6	40	3.94	75	0.5	6	4	0.5	18.94	46.49	47.95	51.51
162245	4	4.6	40	3.94	100	0.5	8	4	1	18.94	51.49	53.18	56.1
162246	4	4.6	40	3.94	100	0.5	8	4	1.5	13.47	20.93	21.79	22.84
162247	4	4.6	45	3.94	100	0.5	6	4	0.5	13.47	25.06	26.22	27.75
162248	4	4.6	45	3.94	100	0.5	8	4	1	13.47	26.44	31.79	36.25
162249	4	4.6	45	3.94	100	0.5	8	4	1.5	13.47	26.44	36.79	41.22
162250	4	4.6	50	3.94	100	0.5	6	4	0.5	13.47	26.44	41.79	45.61
162251	4	4.6	50	3.94	100	0.5	8	4	1	13.47	26.44	46.79	49.99
162252	4	4.6	50	3.94	100	0.5	8	4	1.5	13.47	26.44	51.79	54.38
162253	5	5.8	30	4.9	75	0.5	8	4	1	25.23	31.7	32.54	35.65
162254	5	5.8	30	4.9	75	0.5	8	4	1.5	25.23	51.7	52.86	53.08
162255	5	5.8	50	4.9	100	0.5	8	4	1	17.61	30.81	32.02	34.83
162256	6	6.9	35	5.9	75	0.5	8	4	1	29.23	36.29	37.96	38.05
162257	6	6.9	35	5.9	100	0.5	10	4	1.5	29.23	41.29	42.64	-
162258	6	6.9	40	5.9	75	0.5	8	4	1	29.23	51.82	53.67	56.52
162259	6	6.9	40	5.9	100	0.5	10	4	1.5	29.23	61.82	64.13	65.7

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
162260	6	6.9	50	5.9	100	0.5	10	4	1	20.61	35.88	37.18	41.81
162261	6	6.9	60	5.9	110	0.5	10	4	1	20.61	40.4	42.18	46.2
162262	6	6.9	35	5.9	75	1	8	4	1	28.73	36.24	37.89	38.05
162263	6	6.9	35	5.9	100	1	10	4	1.5	28.73	41.24	42.64	-
162264	6	6.9	40	5.9	75	1	8	4	1	28.73	51.79	53.6	56.52
162265	6	6.9	40	5.9	100	1	10	4	1.5	28.73	61.79	64.06	65.7
162266	6	6.9	50	5.9	100	1	10	4	1	20.36	35.81	37.14	41.81
162267	6	6.9	60	5.9	110	1	10	4	1	20.36	39.74	42.14	46.2
162268	8	9.2	50	7.8	100	0.5	12	4	1	42.96	52.18	54.31	57.09
162269	8	9.2	70	7.8	120	0.5	12	4	1	42.96	72.18	75.25	75.45
162270	8	9.2	90	7.8	140	0.5	12	4	1	42.96	91.9	93.8	-
162271	8	9.2	50	7.8	100	1	12	4	1	42.46	52.15	54.24	57.09
162272	8	9.2	70	7.8	120	1	12	4	1	42.46	72.15	75.18	75.45
162273	8	9.2	90	7.8	140	1	12	4	1	42.46	91.86	93.8	-
162274	10	11.5	50	9.8	115	1	16	4	1	50.28	52.33	54.61	62.12
162275	10	11.5	70	9.8	130	1	16	4	1	50.46	72.33	75.55	80.48
162276	10	11.5	90	9.8	150	1	16	4	1	50.46	92.33	96.49	98.84
162277	10	11.5	50	9.8	115	2	16	4	1	49.46	52.29	54.47	62.12
162278	10	11.5	70	9.8	130	2	16	4	1	49.46	72.29	75.41	80.48
162279	10	11.5	90	9.8	150	2	16	4	1	49.46	92.29	96.35	98.84
162280	12	13.8	50	11.8	110	1	16	4	1	50.99	52.57	54.99	57.74
162281	12	13.8	70	11.8	125	1	16	4	1	58.46	72.5	73.6	73.73
162282	12	13.8	90	11.8	145	1	16	4	1	58.46	92.5	93.24	-
162283	12	13.8	50	11.8	110	2	16	4	1	50.94	52.48	54.85	57.74
162284	12	13.8	70	11.8	125	2	16	4	1	57.46	72.46	73.56	73.73
162285	12	13.8	90	11.8	145	2	16	4	1	57.46	92.46	93.24	-

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3 - 4	f_z (mm)	0.042 - 0.084	0.042 - 0.074	0.036 - 0.101	-	-	0.029 - 0.061
	a_p (mm)	0.036 - 0.6	0.036 - 0.4	0.036 - 0.6	-	-	0.03 - 0.24
5 - 6	f_z (mm)	0.074 - 0.125	0.074 - 0.110	0.063 - 0.150	-	-	0.051 - 0.091
	a_p (mm)	0.06 - 0.9	0.06 - 0.6	0.06 - 0.9	-	-	0.05 - 0.36
8	f_z (mm)	0.114 - 0.165	0.114 - 0.145	0.097 - 0.198	-	-	0.079 - 0.120
	a_p (mm)	0.096 - 1.2	0.096 - 0.8	0.096 - 1.2	-	-	0.08 - 0.48
10	f_z (mm)	0.139 - 0.2	0.139 - 0.176	0.118 - 0.240	-	-	0.096 - 0.146
	a_p (mm)	0.12 - 1.5	0.12 - 1	0.12 - 1.5	-	-	0.1 - 0.6
12	f_z (mm)	0.163 - 0.235	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.144 - 1.8	0.144 - 1.2	0.144 - 1.8	-	-	0.12 - 0.72

Speed (V_c in m/min)


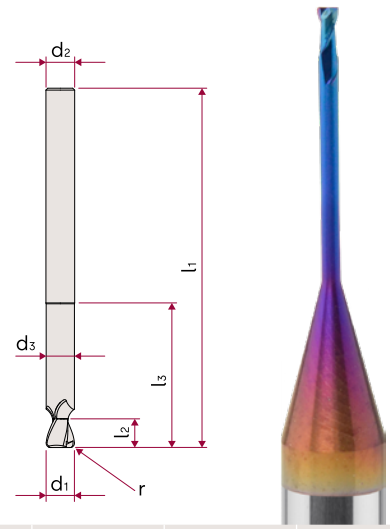
Application	P	M	K	N	S	H
	●	○	●	-	-	55 60
ROUGH FINE	180 220 250 220 270 320	60 85 110 70 90 120	190 250 260 320	-	-	60 120 200 120 170 250

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60

Torus milling cutters

PR06

d_1 0.3 - 12	z 2	r 0.05 - 1	λ° 30°	AlTiSi
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
163203	0.3	0.45	3	0.28	55	0.05	6	2
163204	0.4	0.6	2	0.38	55	0.05	6	2
163205	0.5	0.7	2	0.48	55	0.05	6	2
163206	0.5	0.7	4	0.48	55	0.05	6	2
163207	0.6	0.9	6	0.58	55	0.06	6	2
163208	0.8	1.2	4	0.77	55	0.08	6	2
163209	0.8	1.2	6	0.77	55	0.08	6	2
163210	0.8	1.2	8	0.77	55	0.08	6	2
163211	1	1.6	3	0.95	54	0.1	4	2
163212	1	1.6	4	0.95	54	0.1	4	2
163213	1	1.6	6	0.95	54	0.1	4	2
163214	1	1.6	8	0.95	54	0.1	4	2
163215	1	1.6	3	0.95	55	0.1	6	2
163216	1	1.6	4	0.95	55	0.1	6	2
163217	1	1.6	5	0.95	55	0.1	6	2
163218	1	1.6	6	0.95	55	0.1	6	2
163219	1	1.6	8	0.95	55	0.1	6	2
163220	1	1.6	10	0.95	55	0.1	6	2
163221	1.2	1.9	6	1.15	55	0.12	6	2
163222	1.2	1.9	8	1.15	55	0.12	6	2
163223	1.2	1.9	15	1.15	65	0.12	6	2
163224	1.5	2.4	6	1.44	55	0.15	6	2
163225	1.5	2.4	8	1.44	55	0.15	6	2
163226	1.5	2.4	12	1.44	65	0.15	6	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163227	2	2.8	6	1.92	54	0.2	4	2
163228	2	2.8	8	1.92	54	0.2	4	2
163229	2	2.8	10	1.92	54	0.2	4	2
163230	2	2.8	6	1.92	55	0.2	6	2
163231	2	2.8	8	1.92	55	0.2	6	2
163232	2	2.8	10	1.92	65	0.2	6	2
163233	2	2.8	12	1.92	65	0.2	6	2
163234	2	2.8	20	1.92	65	0.2	6	2
163235	3	3	8	2.9	55	0.5	6	2
163236	3	3	10	2.9	65	0.5	6	2
163237	3	3	15	2.9	65	1	6	2
163238	3	3	20	2.9	65	0.5	6	2
163239	4	4	10	3.9	65	0.5	6	2
163240	4	4	15	3.9	65	0.5	6	2
163241	4	4	20	3.9	65	0.5	6	2
163242	4	4	25	3.9	70	0.5	6	2
163243	4	4	30	3.9	75	0.5	6	2
163244	6	6	20	5.9	65	0.5	6	2
163245	6	6	30	5.9	75	1	6	2
163246	6	6	40	5.9	90	0.5	6	2
163247	6	6	50	5.9	90	1	6	2
164580	8	8	25	7.8	70	0.5	8	2
164581	8	16	25	7.8	70	0.5	8	2
164582	8	8	60	7.8	104	0.5	8	2
164583	8	16	60	7.8	104	0.5	8	2
164584	10	10	25	9.8	72	1	10	2
164585	10	20	25	9.8	72	1	10	2
164586	10	10	60	9.8	104	1	10	2
164587	10	20	60	9.8	104	1	10	2
164588	12	12	35	11.8	83	1	12	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
164589	12	24	35	11.8	83	1	12	2
164590	12	12	70	11.8	115	1	12	2
164591	12	24	70	11.8	115	1	12	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.3	f _z (mm)	0.0028	-	0.003	-	-	0.0021 - 0.0028
	a _p (mm)	0.015 - 0.3	-	0.015 - 0.3	-	-	0.015 - 0.3
0.4 - 0.8	f _z (mm)	0.0035 - 0.0079	-	0.0044 - 0.0079	-	-	0.0035 - 0.007
	a _p (mm)	0.02 - 0.8	-	0.02 - 0.8	-	-	0.02 - 0.8
1 - 2.5	f _z (mm)	0.0052 - 0.019	-	0.058 - 0.019	-	-	0.0046 - 0.016
	a _p (mm)	0.05 - 2.5	-	0.05 - 2.5	-	-	0.05 - 2.5
3 - 4	f _z (mm)	0.016 - 0.027	-	0.019 - 0.027	-	-	0.013 - 0.023
	a _p (mm)	0.15 - 4.0	-	0.15 - 4.0	-	-	0.15 - 4.0
6	f _z (mm)	0.018 - 0.041	-	0.032 - 0.041	-	-	0.023 - 0.034
	a _p (mm)	0.25 - 6.0	-	0.25 - 6.0	-	-	0.25 - 6.0
8	f _z (mm)	0.034 - 0.052	-	0.042 - 0.062	-	-	0.034 - 0.05
	a _p (mm)	0.4 - 8.0	-	0.4 - 8.0	-	-	0.4 - 8.0
10	f _z (mm)	0.042 - 0.082	-	0.053 - 0.082	-	-	0.049 - 0.068
	a _p (mm)	0.5 - 10.0	-	0.5 - 10.0	-	-	0.5 - 10.0
12	f _z (mm)	0.045 - 0.082	-	0.055 - 0.082	-	-	0.045 - 0.066
	a _p (mm)	0.6 - 12.0	-	0.6 - 12.0	-	-	0.6 - 12.0

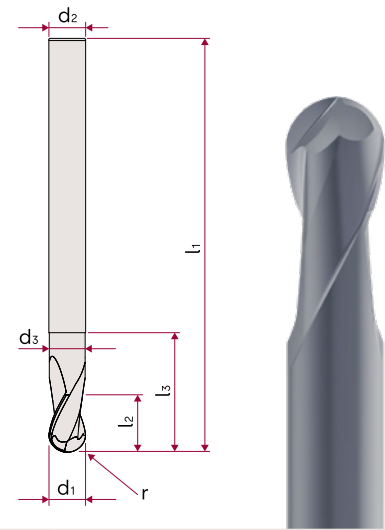
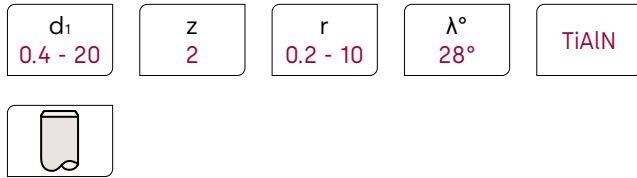
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	-	●	-	-	● 55 ● 60 ● 65
ROUGH	110 170 216	-	110 175 216	-	-	38 67 116
FINE	131 176 217	-	110 169 219	-	-	38 69 118

● = Primary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

Ball nose end mill cutters

PV01



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
161318	0.4	0.5	0.75	0.37	50	0.2	4	2	1.05	1.1	1.15	1.28
161319	0.5	0.6	1.5	0.46	50	0.25	4	2	1.87	1.94	2.01	2.19
161320	0.5	0.6	2	0.46	50	0.25	4	2	2.39	2.48	2.56	2.77
161321	0.5	0.6	3	0.46	50	0.25	4	2	3.43	3.55	3.65	4.03
161322	0.5	0.6	4	0.46	50	0.25	4	2	4.47	4.61	4.73	5.35
161323	0.5	0.6	4	0.46	60	0.25	6	2	4.47	4.61	4.73	5.35
161324	0.6	0.7	2	0.56	50	0.3	4	2	2.39	2.48	2.56	2.76
161325	0.6	0.7	3	0.56	50	0.3	4	2	3.43	3.55	3.65	4.01
161326	0.6	0.7	4	0.56	50	0.3	4	2	4.47	4.61	4.72	5.34
161327	0.6	0.7	4	0.56	60	0.3	6	2	4.47	4.61	4.72	5.34
161328	0.6	0.7	5	0.56	50	0.3	4	2	5.51	5.66	5.79	6.67
161329	0.8	0.9	3	0.76	50	0.4	4	2	3.43	3.54	3.64	3.98
161330	0.8	0.9	4	0.76	50	0.4	4	2	4.47	4.6	4.72	5.31
161331	0.8	0.9	6	0.76	50	0.4	4	2	6.54	6.71	6.89	7.96
161332	0.8	0.9	6	0.76	60	0.4	6	2	6.54	6.71	6.89	7.96
161333	1	1.2	3	0.94	50	0.5	4	2	3.47	3.57	3.66	4.01
161334	1	1.2	4	0.94	50	0.5	4	2	4.51	4.63	4.74	5.34
161335	1	1.2	5	0.94	50	0.5	4	2	5.54	5.68	5.8	6.66
161336	1	1.2	6	0.94	50	0.5	4	2	6.57	6.73	6.93	7.99
161337	1	1.2	8	0.94	50	0.5	4	2	8.63	8.83	9.22	10.65
161338	1	1.2	10	0.94	50	0.5	4	2	10.68	11	11.5	13.3
161339	1	1.2	10	0.94	60	0.5	6	2	10.68	11	11.5	13.3
161340	1.5	1.7	5	1.44	50	0.75	4	2	5.53	5.67	5.79	6.58
161341	1.5	1.7	6	1.44	50	0.75	4	2	6.56	6.72	6.9	7.91

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
161342	1.5	1.7	8	1.44	50	0.75	4	2	8.62	8.81	9.18	10.57
161343	1.5	1.7	10	1.44	50	0.75	4	2	10.67	10.98	11.46	13.22
161344	1.5	1.7	10	1.44	60	0.75	6	2	10.67	10.98	11.46	13.22
161345	1.5	1.7	12	1.44	50	0.75	4	2	12.72	13.16	13.74	15.88
161346	1.5	1.7	12	1.44	60	0.75	6	2	12.72	13.16	13.74	15.88
161347	1.5	1.7	15	1.44	50	0.75	4	2	15.79	16.43	17.16	19.86
161348	1.5	1.7	15	1.44	60	0.75	6	2	15.79	16.43	17.16	19.86
161349	1.8	2.1	6	1.74	50	0.9	4	2	6.56	6.71	6.88	7.86
161350	1.8	2.1	8	1.74	50	0.9	4	2	8.62	8.8	9.16	10.52
161351	1.8	2.1	10	1.74	50	0.9	4	2	10.67	10.97	11.44	13.17
161352	1.8	2.1	15	1.74	50	0.9	4	2	15.78	16.42	17.14	19.81
161353	2	2.3	6	1.94	50	1	4	2	6.99	7.29	7.54	8.17
161354	2	2.3	8	1.94	50	1	4	2	9.09	9.45	9.74	10.49
161355	2	2.3	10	1.94	50	1	4	2	11.19	11.59	11.92	13.14
161356	2	2.3	12	1.94	50	1	4	2	13.28	13.72	14.08	15.8
161357	2	2.3	15	1.94	50	1	4	2	16.39	16.9	17.3	19.78
161358	2	2.3	15	1.94	60	1	6	2	16.39	16.9	17.3	19.78
161359	2	2.3	18	1.94	50	1	4	2	19.5	20.05	20.55	22.85
161360	2	2.3	20	1.94	50	1	4	2	21.57	22.15	22.83	24.85
161361	2	2.3	20	1.94	75	1	6	2	21.57	22.15	22.83	26.41
161362	2.5	2.9	8	2.44	50	1.25	4	2	9.08	9.43	9.72	10.43
161363	2.5	2.9	10	2.44	50	1.25	4	2	11.18	11.58	11.9	13.06
161364	2.5	2.9	15	2.44	50	1.25	4	2	16.39	16.88	17.28	18.67
161365	2.5	2.9	15	2.44	60	1.25	6	2	16.39	16.88	17.28	19.7
161366	2.5	2.9	20	2.44	50	1.25	4	2	21.56	22.14	22.8	23.67
161367	2.5	2.9	20	2.44	60	1.25	6	2	21.56	22.14	22.8	26.33
161368	2.5	2.9	25	2.44	75	1.25	6	2	26.72	27.37	28.5	32.97
161369	3	3.5	10	2.94	60	1.5	6	2	11.17	11.56	11.88	12.98
161370	3	3.5	15	2.94	60	1.5	6	2	16.38	16.87	17.26	19.62
161371	3	3.5	20	2.94	60	1.5	6	2	21.56	22.13	22.76	26.25

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
161372	3	3.5	25	2.94	75	1.5	6	2	26.71	27.36	28.47	32.2
161373	4	4.6	10	3.94	60	2	6	2	11.14	11.52	11.84	12.82
161374	4	4.6	15	3.94	60	2	6	2	16.36	16.84	17.23	19.46
161375	4	4.6	20	3.94	60	2	6	2	21.54	22.1	22.69	24.85
161376	4	4.6	25	3.94	75	2	6	2	26.7	27.33	28.4	29.85
161377	4	4.6	30	3.94	75	2	6	2	31.84	32.66	34.1	34.85
161378	4	4.6	35	3.94	75	2	6	2	36.98	38.11	39.8	39.85
161379	5	5.8	15	4.9	60	2.5	6	2	15.78	16.38	17.03	17.59
161380	5	5.8	20	4.9	60	2.5	6	2	21	21.82	22.59	-
161381	5	5.8	25	4.9	60	2.5	6	2	26.21	27.27	27.59	-
161382	5	5.8	30	4.9	75	2.5	6	2	31.42	32.59	-	-
161383	6	6.9	15	5.9	60	3	6	2	-	-	-	-
161384	6	6.9	20	5.9	60	3	6	2	-	-	-	-
161385	6	6.9	25	5.9	60	3	6	2	-	-	-	-
161386	6	6.9	30	5.9	75	3	6	2	-	-	-	-
161387	6	6.9	35	5.9	75	3	6	2	-	-	-	-
161388	8	9.2	25	7.8	64	4	8	2	-	-	-	-
161389	8	9.2	50	7.8	100	4	8	2	-	-	-	-
161390	10	11.5	30	9.8	75	5	10	2	-	-	-	-
161391	10	11.5	50	9.8	100	5	10	2	-	-	-	-
161392	12	13.8	35	11.8	75	6	12	2	-	-	-	-
161393	12	13.8	60	11.8	100	6	12	2	-	-	-	-
164573	14	16	40	13.8	85	7	14	2	-	-	-	-
164574	14	16	65	13.8	110	7	14	2	-	-	-	-
164575	16	18	45	15.8	93	8	16	2	-	-	-	-
164576	16	18	70	15.8	118	8	16	2	-	-	-	-
164577	20	25	55	19.8	105	10	20	2	-	-	-	-
164578	20	25	90	19.8	140	10	20	2	-	-	-	-

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.4 - 0.8	f_z (mm)	0.006 - 0.016	0.006 - 0.014	0.005 - 0.019	-	-	0.004 - 0.012
	a_p (mm)	0.005 - 0.04	0.005 - 0.04	0.0048 - 0.048	-	-	0.0032 - 0.032
1 - 2.5	f_z (mm)	0.015 - 0.05	0.014 - 0.044	0.012 - 0.06	-	-	0.01 - 0.037
	a_p (mm)	0.012 - 0.125	0.012 - 0.125	0.012 - 0.15	-	-	0.008 - 0.1
3 - 4	f_z (mm)	0.042 - 0.084	0.042 - 0.074	0.036 - 0.101	-	-	0.029 - 0.061
	a_p (mm)	0.036 - 0.2	0.036 - 0.2	0.036 - 0.24	-	-	0.024 - 0.16
5 - 6	f_z (mm)	0.074 - 0.125	0.074 - 0.110	0.063 - 0.150	-	-	0.051 - 0.091
	a_p (mm)	0.06 - 0.3	0.06 - 0.3	0.06 - 0.36	-	-	0.04 - 0.24
8	f_z (mm)	0.114 - 0.165	0.114 - 0.145	0.097 - 0.198	-	-	0.079 - 0.120
	a_p (mm)	0.1 - 0.4	0.096 - 0.4	0.096 - 0.48	-	-	0.064 - 0.32
10	f_z (mm)	0.139 - 0.2	0.139 - 0.176	0.118 - 0.240	-	-	0.096 - 0.146
	a_p (mm)	0.12 - 0.5	0.12 - 0.5	0.12 - 0.6	-	-	0.08 - 0.4
12	f_z (mm)	0.163 - 0.235	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.14 - 0.6	0.144 - 0.6	0.144 - 0.72	-	-	0.096 - 0.48
14	f_z (mm)	0.184 - 0.266	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.17 - 0.7	0.17 - 0.7	0.17 - 0.84	-	-	0.11 - 0.56
16	f_z (mm)	0.21 - 0.29	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.19 - 0.8	0.19 - 0.8	0.19 - 0.96	-	-	0.13 - 0.64
20	f_z (mm)	0.21 - 0.29	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.24 - 1	0.24 - 1	0.24 - 1.2	-	-	0.16 - 0.8

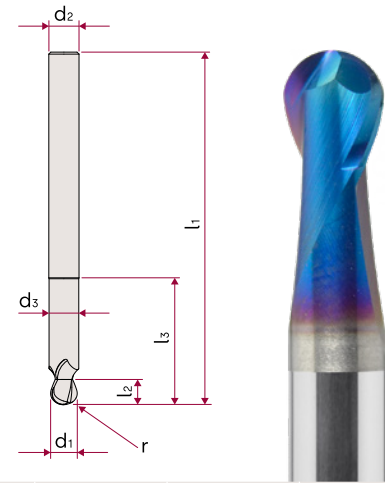
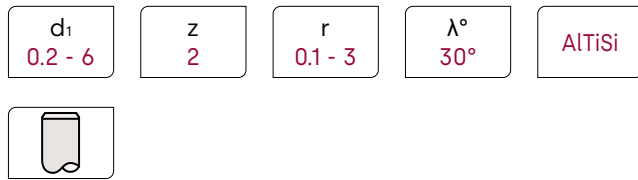
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	○	●	-	-	● ₅₅ ○ ₆₀
ROUGH	200 250 300	60 85 110	240 300	-	-	100 160 280
FINE	220 270 320	70 90 120	260 320	-	-	120 160 280

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60

Ball nose end mill cutters

PV02



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163248	0.2	0.25	0.6	0.18	55	0.1	6	2
163249	0.2	0.25	1	0.18	55	0.1	6	2
163250	0.2	0.25	1.5	0.18	55	0.1	6	2
163251	0.2	0.25	2	0.18	55	0.1	6	2
163252	0.3	0.25	1	0.28	55	0.15	6	2
163253	0.3	0.25	2	0.28	55	0.15	6	2
163254	0.3	0.25	4	0.28	55	0.15	6	2
163255	0.4	0.3	1	0.38	55	0.2	6	2
163256	0.4	0.3	2	0.38	55	0.2	6	2
163257	0.4	0.3	3	0.38	55	0.2	6	2
163258	0.4	0.3	5	0.38	55	0.2	6	2
163259	0.4	0.3	7	0.38	55	0.2	6	2
163260	0.5	0.4	2	0.48	55	0.25	6	2
163266	0.5	0.4	2.5	0.48	55	0.25	6	2
163267	0.5	0.4	3.5	0.48	55	0.25	6	2
163261	0.5	0.4	4	0.48	55	0.25	6	2
163262	0.5	0.4	4.5	0.48	55	0.25	6	2
163268	0.5	0.4	6	0.48	55	0.25	6	2
163263	0.5	0.4	6.5	0.48	55	0.25	6	2
163264	0.5	0.4	8.5	0.48	55	0.25	6	2
163265	0.5	0.4	10	0.48	55	0.25	6	2
163269	0.6	0.5	2	0.58	55	0.3	6	2
163274	0.6	0.5	2.5	0.58	55	0.3	6	2
163275	0.6	0.5	3.5	0.58	55	0.3	6	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163270	0.6	0.5	4	0.58	55	0.3	6	2
163276	0.6	0.5	4.5	0.58	55	0.3	6	2
163277	0.6	0.5	6.5	0.58	55	0.3	6	2
163271	0.6	0.5	8.5	0.58	65	0.3	6	2
163272	0.6	0.5	10	0.58	55	0.3	6	2
163273	0.6	0.5	11.5	0.58	65	0.3	6	2
163278	0.8	0.6	4	0.77	55	0.4	6	2
163284	0.8	0.6	5	0.77	55	0.4	6	2
163279	0.8	0.6	6	0.77	55	0.4	6	2
163280	0.8	0.6	10	0.77	55	0.4	6	2
163281	0.8	0.6	12	0.77	65	0.4	6	2
163282	0.8	0.6	14	0.77	65	0.4	6	2
163283	0.8	0.6	16	0.77	65	0.4	6	2
163285	1	0.8	4	0.95	54	0.5	4	2
163288	1	0.8	4	0.95	55	0.5	6	2
163295	1	0.8	5	0.95	65	0.5	6	2
163286	1	0.8	6	0.95	54	0.5	4	2
163289	1	0.8	6	0.95	55	0.5	6	2
163287	1	0.8	8	0.95	54	0.5	4	2
163290	1	0.8	8	0.95	55	0.5	6	2
163291	1	0.8	10	0.95	65	0.5	6	2
163292	1	0.8	12	0.95	65	0.5	6	2
163296	1	0.8	14	0.95	65	0.5	6	2
163293	1	0.8	15	0.95	65	0.5	6	2
163297	1	0.8	16	0.95	65	0.5	6	2
163294	1.2	1	3	1.15	55	0.6	6	2
163298	1.2	1	18	1.15	65	0.6	6	2
163299	1.4	1.2	4	1.35	55	0.7	6	2
163300	1.4	1.2	6	1.35	55	0.7	6	2
163301	1.4	1.2	8	1.35	55	0.7	6	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163302	1.4	1.2	10	1.35	55	0.7	6	2
163303	1.4	1.2	12	1.35	65	0.7	6	2
163304	1.4	1.2	15	1.35	65	0.7	6	2
163305	1.4	1.2	20	1.35	65	0.7	6	2
163306	1.5	1.2	6	1.44	55	0.75	6	2
163307	1.5	1.2	8	1.44	55	0.75	6	2
163308	1.5	1.2	10	1.44	65	0.75	6	2
163309	1.5	1.2	15	1.44	65	0.75	6	2
163310	1.5	1.2	20	1.44	65	0.75	6	2
163311	1.6	1.5	6	1.55	55	0.8	6	2
163312	1.6	1.5	8	1.55	55	0.8	6	2
163313	1.6	1.5	10	1.55	65	0.8	6	2
163314	1.6	1.5	12	1.55	65	0.8	6	2
163315	1.6	1.5	16	1.55	65	0.8	6	2
163316	1.6	1.5	20	1.55	65	0.8	6	2
163317	1.8	1.5	6	1.72	55	0.9	6	2
163318	1.8	1.5	8	1.72	55	0.9	6	2
163319	1.8	1.5	12	1.72	65	0.9	6	2
163320	1.8	1.5	16	1.72	65	0.9	6	2
163321	1.8	1.5	20	1.72	65	0.9	6	2
163323	2	1.5	6	1.92	55	1	6	2
163324	2	1.5	8	1.92	55	1	6	2
163325	2	1.5	10	1.92	65	1	6	2
163322	2	1.5	12	1.92	54	1	4	2
163326	2	1.5	12	1.92	65	1	6	2
163327	2	1.5	15	1.92	65	1	6	2
163328	2	1.5	20	1.92	65	1	6	2
163329	2.5	2	8	2.4	55	1.25	6	2
163330	2.5	2	12	2.4	65	1.25	6	2
163331	2.5	2	16	2.4	65	1.25	6	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163332	2.5	2	20	2.4	65	1.25	6	2
163333	2.5	2	23	2.4	70	1.25	6	2
163334	2.5	2	25	2.4	70	1.25	6	2
163335	3	2.5	5	2.9	55	1.5	6	2
163340	3	2.5	6	2.9	55	1.5	6	2
163341	3	2.5	8	2.9	55	1.5	6	2
163336	3	2.5	10	2.9	65	1.5	6	2
163342	3	2.5	12	2.9	55	1.5	6	2
163337	3	2.5	15	2.9	65	1.5	6	2
163343	3	2.5	16	2.9	55	1.5	6	2
163338	3	2.5	20	2.9	65	1.5	6	2
163339	3	2.5	30	2.9	75	1.5	6	2
163344	4	3.2	10	3.9	65	2	6	2
163345	4	3.2	15	3.9	65	2	6	2
163346	4	3.2	20	3.9	65	2	6	2
163347	4	3.2	25	3.9	70	2	6	2
163348	4	3.2	35	3.9	75	2	6	2
163349	5	4	15	4.9	65	2.5	6	2
163351	5	4	18	4.9	75	2.5	6	2
163350	5	4	20	4.9	65	2.5	6	2
163352	6	5	10	5.9	65	3	6	2
163353	6	5	15	5.9	65	3	6	2
163358	6	5	18	5.9	65	3	6	2
163354	6	5	20	5.9	65	3	6	2
163355	6	5	25	5.9	70	3	6	2
163356	6	5	30	5.9	75	3	6	2
163357	6	5	40	5.9	90	3	6	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.2 - 0.3	f_z (mm)	0.001 - 0.003	-	0.001 - 0.003	-	-	0.001 - 0.002
	a_p (mm)	0.006 - 0.009	-	0.006 - 0.009	-	-	0.006 - 0.009
0.4 - 0.8	f_z (mm)	0.002 - 0.006	-	0.004 - 0.006	-	-	0.002 - 0.004
	a_p (mm)	0.012 - 0.024	-	0.012 - 0.024	-	-	0.012 - 0.024
1 - 2.5	f_z (mm)	0.004 - 0.011	-	0.005 - 0.011	-	-	0.004 - 0.007
	a_p (mm)	0.03 - 0.075	-	0.03 - 0.075	-	-	0.03 - 0.075
3 - 4	f_z (mm)	0.004 - 0.035	-	0.006 - 0.035	-	-	0.004 - 0.009
	a_p (mm)	0.09 - 0.12	-	0.09 - 0.12	-	-	0.09 - 0.12
5 - 6	f_z (mm)	0.008 - 0.045	-	0.032 - 0.045	-	-	0.008 - 0.011
	a_p (mm)	0.15 - 0.18	-	0.15 - 0.18	-	-	0.15 - 0.18

Speed (V_c in m/min)

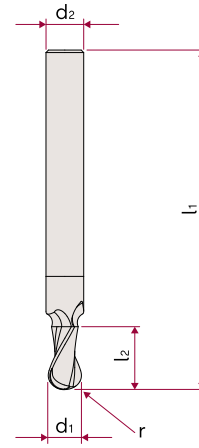
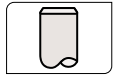
Application	P	M	K	N	S	H
	●	-	●	-	-	55 60 65
ROUGH FINE	- 108 180 260	-	- 144 192 260	-	-	- 54 90 130

● = Primary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

Ball nose end mill cutters

PV03

d_1 0.25 - 20	z 2	r 0.13 - 10	λ° 30°	AlTiSi
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Order no.	d_1	l_2	l_1	r	d_2	z
162964	0.25	0.5	50	0.13	4	2
162965	0.3	1	50	0.15	4	2
162966	0.4	1	50	0.2	4	2
162967	0.5	1.5	50	0.25	4	2
162968	0.6	1.5	50	0.3	4	2
162969	0.7	2	50	0.35	4	2
162970	0.8	2	50	0.4	4	2
162971	0.9	2.5	50	0.45	4	2
162972	1	3	50	0.5	4	2
162973	1.1	3	50	0.55	4	2
162974	1.2	3	50	0.6	4	2
162975	1.4	4	50	0.7	4	2
162976	1.5	4	50	0.75	4	2
162977	1.6	5	50	0.8	4	2
162978	1.8	5	50	0.9	4	2
162979	2	5	50	1	4	2
162980	2.5	5	50	1.25	4	2
162981	3	6	50	1.5	6	2
162982	4	8	54	2	6	2
162983	5	9	54	2.5	6	2
162984	6	10	54	3	6	2
162985	8	12	58	4	8	2
162986	10	14	66	5	10	2
162987	12	16	73	6	12	2

Order no.	d ₁	l ₂	l ₁	r	d ₂	z
162988	14	18	75	7	14	2
162989	16	20	82	8	16	2
162990	20	24	92	10	20	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.25 - 0.3	f _z (mm)	0.001	0.001	0.001	-	0.001	-
	a _p (mm)	0.005 - 0.015	0.005 - 0.015	0.005 - 0.015	-	0.005 - 0.015	-
0.4 - 0.8	f _z (mm)	0.001 - 0.003	0.001 - 0.002	0.001 - 0.003	-	0.001 - 0.002	-
	a _p (mm)	0.02 - 0.04	0.02 - 0.04	0.02 - 0.04	-	0.02 - 0.04	-
1 - 2.5	f _z (mm)	0.002 - 0.011	0.002 - 0.007	0.003 - 0.011	-	0.002 - 0.007	-
	a _p (mm)	0.045 - 0.125	0.045 - 0.125	0.045 - 0.125	-	0.045 - 0.125	-
3 - 4	f _z (mm)	0.007 - 0.035	0.007 - 0.025	0.011 - 0.035	-	0.007 - 0.025	-
	a _p (mm)	0.15 - 0.20	0.15 - 0.20	0.15 - 0.20	-	0.15 - 0.20	-
5 - 6	f _z (mm)	0.025 - 0.045	0.025 - 0.03	0.035 - 0.045	-	0.025 - 0.03	-
	a _p (mm)	0.25 - 0.30	0.25 - 0.30	0.25 - 0.30	-	0.25 - 0.30	-
8	f _z (mm)	0.04 - 0.055	0.032 - 0.04	0.04 - 0.055	-	0.032 - 0.04	-
	a _p (mm)	0.4	0.4	0.4	-	0.4	-
10	f _z (mm)	0.045 - 0.065	0.038 - 0.045	0.045 - 0.065	-	0.038 - 0.045	-
	a _p (mm)	0.5	0.5	0.5	-	0.5	-
12	f _z (mm)	0.045 - 0.065	0.038 - 0.045	0.045 - 0.065	-	0.038 - 0.045	-
	a _p (mm)	0.6	0.6	0.6	-	0.6	-
14	f _z (mm)	0.06 - 0.09	0.049 - 0.06	0.06 - 0.09	-	0.049 - 0.06	-
	a _p (mm)	0.7	0.7	0.7	-	0.7	-
16	f _z (mm)	0.06 - 0.09	0.049 - 0.06	0.06 - 0.09	-	0.049 - 0.06	-
	a _p (mm)	0.8	0.8	0.8	-	0.8	-
20	f _z (mm)	0.08 - 0.12	0.07 - 0.08	0.08 - 0.12	-	0.07 - 0.08	-
	a _p (mm)	1	1	1	-	1	-

Speed (V_c in m/min)

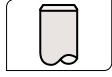
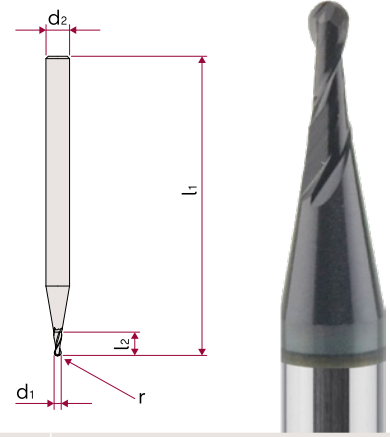
Application	P	M	K	N	S	H
	●	○	●	-	○	-
ROUGH	-	-	-	-	-	-
FINE	150 270 400	130 220	350 400	-	120 150	-

● = Primary application | ○ = Secondary application

Ball nose end mill cutters

PV04

d_1 0.2 - 2	z 2	r 0.1 - 1	λ° 30°	TiAlN Blank
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Order no.	d_1	l_2	l_1	r	d_2	z	Coating
162991	0.2	0.5	38	0.1	3	2	TiAlN
162992	0.3	1	38	0.15	3	2	TiAlN
162993	0.3	1	38	0.15	3	2	Blank
162994	0.4	1	38	0.2	3	2	TiAlN
162995	0.4	1	38	0.2	3	2	Blank
162996	0.5	1.5	38	0.25	3	2	TiAlN
162997	0.5	1.5	38	0.25	3	2	Blank
162998	0.6	1.5	38	0.3	3	2	TiAlN
162999	0.6	1.5	38	0.3	3	2	Blank
163000	0.7	2	38	0.35	3	2	TiAlN
163001	0.7	2	38	0.35	3	2	Blank
163002	0.8	2	38	0.4	3	2	TiAlN
163003	0.8	2	38	0.4	3	2	Blank
163004	0.9	2.5	38	0.45	3	2	TiAlN
163005	1	3	38	0.5	3	2	TiAlN
163006	1	3	38	0.5	3	2	Blank
163007	1.1	3	38	0.55	3	2	TiAlN
163008	1.2	3	38	0.6	3	2	TiAlN
163009	1.2	3	38	0.6	3	2	Blank
163010	1.4	4	38	0.7	3	2	TiAlN
163011	1.5	4	38	0.75	3	2	TiAlN
163012	1.5	4	38	0.75	3	2	Blank
163013	1.6	5	38	0.8	3	2	TiAlN
163014	1.6	5	38	0.8	3	2	Blank

Order no.	d ₁	l ₂	l ₁	r	d ₂	z	Coating
163015	1.8	5	38	0.9	3	2	TiAlN
163016	1.8	5	38	0.9	3	2	Blank
163017	2	5	38	1	3	2	TiAlN
163018	2	5	38	1	3	2	Blank

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.2 - 0.3	f _z (mm)	0.0007 - 0.001	0.0007 - 0.001	0.0007 - 0.001	0.0007 - 0.001	-	-
	a _p (mm)	0.01 - 0.015	0.01 - 0.015	0.01 - 0.015	0.01 - 0.015	-	-
0.4 - 0.8	f _z (mm)	0.0007 - 0.003	0.0007 - 0.003	0.0007 - 0.003	0.0007 - 0.003	-	-
	a _p (mm)	0.02 - 0.04	0.02 - 0.04	0.02 - 0.04	0.02 - 0.04	-	-
0.9 - 1.2	f _z (mm)	0.002 - 0.005	0.002 - 0.005	0.003 - 0.005	0.003 - 0.005	-	-
	a _p (mm)	0.045 - 0.06	0.045 - 0.06	0.045 - 0.06	0.045 - 0.06	-	-
1.3 - 1.6	f _z (mm)	0.003 - 0.011	0.003 - 0.007	0.005 - 0.011	0.005 - 0.011	-	-
	a _p (mm)	0.065 - 0.08	0.065 - 0.08	0.065 - 0.08	0.065 - 0.08	-	-
1.7 - 2	f _z (mm)	0.005 - 0.011	0.005 - 0.007	0.008 - 0.011	0.008 - 0.011	-	-
	a _p (mm)	0.085 - 0.1	0.085 - 0.1	0.085 - 0.1	0.085 - 0.1	-	-


Speed (V_c in m/min)

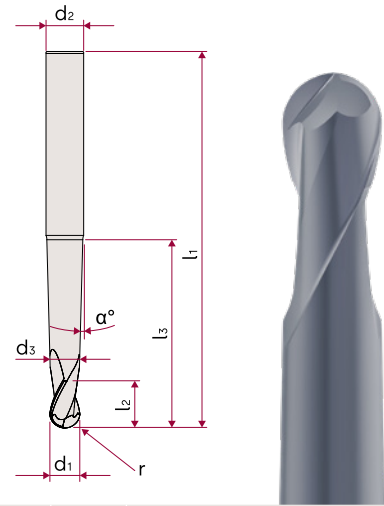
Application	P	M	K	N	S	H
	●	○	●	⊙ ^A	-	-
ROUGH	-	-	-	-	-	-
FINE	98 182 390	147 210	238 340 390	203 308 440	-	-

● = Primary application | ○ = Secondary application | A = Aluminium

Ball nose end mill cutters

PV05

d_1 0.8 - 12	z 2	r 0.4 - 6	λ° 28°	TiAlN
	conical 0.5° - 1.5°			



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
161397	0.8	0.9	4	0.76	60	0.4	6	2	1	4.21	4.44	4.59	5.04
161394	0.8	0.9	6	0.76	60	0.4	6	2	0.5	6.37	6.59	6.76	7.72
161398	0.8	0.9	6	0.76	60	0.4	6	2	1	5.09	6.44	6.65	7.48
161395	0.8	0.9	8	0.76	60	0.4	6	2	0.5	8.37	8.65	8.88	10.27
161399	0.8	0.9	8	0.76	60	0.4	6	2	1	5.09	8.44	8.7	9.92
161396	0.8	0.9	10	0.76	60	0.4	6	2	0.5	10.37	10.7	11.06	12.81
161400	0.8	0.9	10	0.76	60	0.4	6	2	1	5.09	10.44	10.75	12.35
161401	1	1.2	5	0.94	60	0.5	6	2	1	10.43	10.73	11.12	12.86
161410	1	1.2	5	0.94	60	0.5	6	2	1.5	6.94	20.51	21.22	24.61
161402	1	1.2	10	0.94	60	0.5	6	2	0.5	15.43	15.87	16.59	19.23
161404	1	1.2	10	0.94	60	0.5	6	2	1	25.43	26.32	27.53	31.96
161412	1	1.2	10	0.94	60	0.5	6	2	1.5	6.94	30.51	31.68	36.79
161403	1	1.2	15	0.94	60	0.5	6	2	0.5	20.43	21.09	22.06	25.59
161405	1	1.2	15	0.94	60	0.5	6	2	1	30.43	31.54	33	38.32
161413	1	1.2	15	0.94	60	0.5	6	2	1.5	6.94	35.51	36.92	42.88
161411	1	1.2	20	0.94	75	0.5	6	2	0.5	6.94	25.51	26.45	30.7
161406	1	1.2	20	0.94	75	0.5	6	2	1	35.43	36.76	38.46	44.68
161414	1	1.2	20	0.94	75	0.5	6	2	1.5	4.47	5.38	5.58	6.17
161416	1	1.2	25	0.94	75	0.5	6	2	0.5	4.47	8.44	15.58	17.81
161407	1	1.2	25	0.94	75	0.5	6	2	1	5.28	5.51	5.66	6.34
161415	1	1.2	25	0.94	75	0.5	6	2	1.5	4.47	8.44	10.58	11.99
161419	1	1.2	30	0.94	75	0.5	6	2	0.5	4.47	8.44	30.58	35.27
161408	1	1.2	30	0.94	75	0.5	6	2	1	6.94	10.51	10.78	12.43
161417	1	1.2	30	0.94	75	0.5	6	2	1.5	4.47	8.44	20.58	23.63

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
161420	1	1.2	35	0.94	100	0.5	6	2	0.5	4.47	8.44	35.58	41.09
161409	1	1.2	35	0.94	100	0.5	6	2	1	6.94	15.51	15.98	18.52
161418	1	1.2	35	0.94	75	0.5	6	2	1.5	4.47	8.44	25.58	29.45
161421	2	2.3	10	1.94	60	1	6	2	1	15.87	16.56	17.03	19.18
161429	2	2.3	10	1.94	60	1	6	2	1.5	10.44	26.1	27	30.76
161422	2	2.3	15	1.94	60	1	6	2	0.5	20.87	21.72	22.27	25.54
161424	2	2.3	15	1.94	60	1	6	2	1	30.87	32	33.02	38.27
161430	2	2.3	15	1.94	60	1	6	2	1.5	10.44	31.1	32.13	36.85
161423	2	2.3	20	1.94	60	1	6	2	0.5	25.87	26.87	27.55	31.91
161425	2	2.3	20	1.94	60	1	6	2	1	35.87	37.13	38.49	43.28
161432	2	2.3	20	1.94	60	1	6	2	1.5	7.22	10.71	11.3	12.32
161431	2	2.3	25	1.94	75	1	6	2	0.5	10.44	36.1	37.25	42
161426	2	2.3	25	1.94	75	1	6	2	1	10.27	11.1	11.54	12.49
161433	2	2.3	25	1.94	75	1	6	2	1.5	7.22	13.45	16.3	17.98
161436	2	2.3	30	1.94	75	1	6	2	0.5	7.22	13.45	31.3	35.43
161427	2	2.3	30	1.94	75	1	6	2	1	10.44	16.1	16.71	18.58
161434	2	2.3	30	1.94	75	1	6	2	1.5	7.22	13.45	21.3	23.8
161438	2	2.3	35	1.94	75	1	6	2	0.5	5.29	6.36	8.15	36.82
161428	2	2.3	35	1.94	75	1	6	2	1	10.44	21.1	21.87	24.67
161435	2	2.3	35	1.94	75	1	6	2	1.5	7.22	13.45	26.3	29.62
161437	2	2.3	35	1.94	75	1	8	2	3	7.22	13.45	36.3	40.73
161439	3	3.5	15	2.94	60	1.5	6	2	0.5	15.96	16.59	17.04	19.13
161440	3	3.5	15	2.94	60	1.5	6	2	1	20.96	21.75	22.29	25.49
161441	3	3.5	15	2.94	60	1.5	6	2	1.5	25.96	26.9	27.58	31.42
161442	3	3.5	20	2.94	60	1.5	6	2	0.5	30.96	32.03	33.04	36.21
161443	3	3.5	20	2.94	60	1.5	6	2	1	35.96	37.15	38.51	41.01
161444	3	3.5	20	2.94	60	1.5	6	2	1.5	40.96	42.27	43.98	45.8
161445	3	3.5	25	2.94	75	1.5	6	2	0.5	13.94	16.24	16.79	18.64
161446	3	3.5	25	2.94	75	1.5	6	2	1	13.94	21.24	21.94	24.73
161447	3	3.5	25	2.94	75	1.5	6	2	1.5	13.94	26.24	27.07	30.64

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
161448	3	3.5	30	2.94	75	1.5	6	2	0.5	13.94	31.24	32.19	35.23
161449	3	3.5	30	2.94	75	1.5	6	2	1	13.94	36.24	37.31	39.82
161450	3	3.5	30	2.94	75	1.5	6	2	1.5	13.94	41.24	42.42	44.41
161451	3	3.5	35	2.94	75	1.5	6	2	0.5	9.97	15.71	16.49	18.15
161452	3	3.5	35	2.94	75	1.5	6	2	1	9.97	18.46	21.49	23.97
161453	3	3.5	35	2.94	75	1.5	6	2	1.5	9.97	18.46	26.49	29.78
161454	3	3.5	40	2.94	100	1.5	6	2	0.5	9.97	18.46	31.49	34.24
161455	3	3.5	40	2.94	100	1.5	6	2	1	9.97	18.46	36.49	37.94
161456	3	3.5	40	2.94	75	1.5	6	2	1.5	9.97	18.46	40.8	43.01
161458	4	4.6	20	3.94	60	2	6	2	0.5	21.04	21.78	22.3	24.35
161460	4	4.6	20	3.94	60	2	6	2	1	30.4	31.68	33.07	33.94
161468	4	4.6	20	3.94	60	2	6	2	1.5	17.44	35.69	37.27	37.63
161459	4	4.6	25	3.94	75	2	6	2	0.5	26.04	26.92	27.6	29.15
161461	4	4.6	25	3.94	60	2	6	2	1	36.04	37.18	37.88	37.98
161469	4	4.6	25	3.94	60	2	6	2	1.5	17.44	40.69	42.22	-
161466	4	4.6	30	3.94	75	2	6	2	0.5	17.44	26.37	27.13	27.87
161462	4	4.6	30	3.94	75	2	6	2	1	41.04	42.29	42.91	-
161470	4	4.6	30	3.94	75	2	8	2	1.5	17.44	46.37	47.74	51.51
161471	4	4.6	35	3.94	75	2	6	2	0.5	17.44	51.37	52.98	56.1
161463	4	4.6	35	3.94	75	2	6	2	1	46.04	47.4	47.83	-
161472	4	4.6	35	3.94	75	2	8	2	1.5	12.72	20.71	21.65	22.84
161476	4	4.6	40	3.94	75	2	6	2	0.5	12.72	23.47	41.65	45.61
161464	4	4.6	40	3.94	75	2	6	2	1	50.4	52.57	53.12	-
161473	4	4.6	40	3.94	100	2	8	2	1.5	12.72	23.47	26.01	27.75
161477	4	4.6	45	3.94	100	2	6	2	0.5	12.72	23.47	46.65	49.99
161465	4	4.6	45	3.94	100	2	8	2	1	17.44	21.37	22.01	23.86
161474	4	4.6	45	3.94	100	2	8	2	1.5	12.72	23.47	31.65	35.77
161479	4	4.6	50	3.94	100	2	6	2	0.5	9.89	11.86	15.16	52.33
161467	4	4.6	50	3.94	100	2	8	2	1	17.44	30.69	32.04	33.04
161475	4	4.6	50	3.94	100	2	8	2	1.5	12.72	23.47	36.65	41.22

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
161478	4	4.6	50	3.94	100	2	10	2	3	12.72	23.47	51.65	54.38
161480	5	5.8	30	4.9	75	2.5	8	2	1	23.24	31.57	32.36	35.65
161482	5	5.8	30	4.9	75	2.5	8	2	1.5	16.62	30.41	31.86	34.83
161481	5	5.8	50	4.9	100	2.5	8	2	1	23.24	51.57	52.75	53.08
161483	6	6.9	35	5.9	75	3	8	2	1	26.74	36.06	37.62	38.05
161486	6	6.9	35	5.9	100	3	10	2	1.5	26.74	61.67	63.79	65.7
161484	6	6.9	40	5.9	75	3	8	2	1	26.74	41.06	42.64	-
161487	6	6.9	40	5.9	100	3	10	2	1.5	19.37	35.41	36.99	41.81
161485	6	6.9	50	5.9	100	3	10	2	1	26.74	51.67	53.32	56.52
161488	6	6.9	60	5.9	110	3	10	2	1	19.37	35.77	41.99	46.2
161489	8	9.2	50	7.8	100	4	12	2	1	39.47	51.59	53.82	57.09
161491	8	9.2	50	7.8	100	4	12	2	3	39.47	91.59	93.8	-
161492	8	9.2	70	7.8	120	4	12	2	1	20.69	24.87	31.85	51.5
161490	8	9.2	90	7.8	140	4	12	2	1	39.47	72.01	74.76	75.45
161493	10	11.5	50	9.8	110	5	16	2	1	38.48	51.95	53.68	61.69
161494	10	11.5	70	9.8	130	5	16	2	1	38.48	71.95	74.62	80.15
161495	10	11.5	90	9.8	150	5	16	2	1	38.48	91.95	95.56	98.51
161496	12	13.8	50	11.8	105	6	16	2	1	37.48	51.9	53.55	57.09
161497	12	13.8	70	11.8	125	6	16	2	1	37.48	71.9	73.19	73.54
161498	12	13.8	90	11.8	145	6	16	2	1	37.48	91.41	93.8	-

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.8	f_z (mm)	0.006 - 0.016	0.006 - 0.014	0.005 - 0.019	-	-	0.004 - 0.012
	a_p (mm)	0.005 - 0.04	0.005 - 0.04	0.0048 - 0.048	-	-	0.0032 - 0.032
1 - 2.5	f_z (mm)	0.015 - 0.05	0.014 - 0.044	0.012 - 0.06	-	-	0.01 - 0.037
	a_p (mm)	0.012 - 0.125	0.012 - 0.125	0.012 - 0.15	-	-	0.008 - 0.1
3 - 4	f_z (mm)	0.042 - 0.084	0.042 - 0.074	0.036 - 0.101	-	-	0.029 - 0.061
	a_p (mm)	0.036 - 0.2	0.036 - 0.2	0.036 - 0.24	-	-	0.024 - 0.16
5 - 6	f_z (mm)	0.074 - 0.125	0.074 - 0.110	0.063 - 0.150	-	-	0.051 - 0.091
	a_p (mm)	0.06 - 0.3	0.06 - 0.3	0.06 - 0.36	-	-	0.04 - 0.24
7 - 8	f_z (mm)	0.114 - 0.165	0.114 - 0.145	0.097 - 0.198	-	-	0.079 - 0.120
	a_p (mm)	0.1 - 0.4	0.096 - 0.4	0.096 - 0.48	-	-	0.064 - 0.32
9 - 10	f_z (mm)	0.139 - 0.2	0.139 - 0.176	0.118 - 0.240	-	-	0.096 - 0.146
	a_p (mm)	0.12 - 0.5	0.12 - 0.5	0.12 - 0.6	-	-	0.08 - 0.4
12	f_z (mm)	0.163 - 0.235	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.14 - 0.6	0.144 - 0.6	0.144 - 0.72	-	-	0.096 - 0.48

Speed (V_c in m/min)


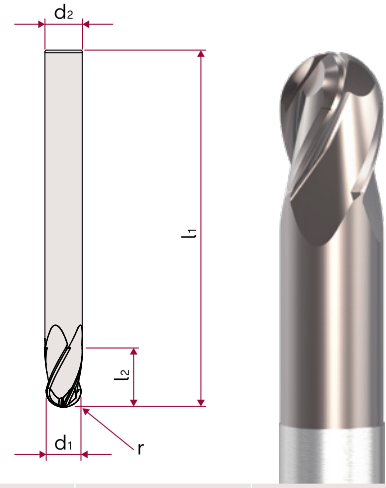
Application	P	M	K	N	S	H
	●	○	●	-	-	● ₅₅ ○ ₆₀
ROUGH	200 250 300	60 85 110	240 300	-	-	100 160 280
FINE	220 270 320	70 90 120	260 320	-	-	120 160 280

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60

Ball nose end mill cutters

PV06

d_1 6 - 12	z 4	r 3 - 6	λ° 30°	AlCrN
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Order no.	d_1	l_2	l_1	r	d_2	z
161499	6	6.9	60	3	6	4
161500	6	6.9	100	3	6	4
161501	8	9.2	64	4	8	4
161502	8	9.2	100	4	8	4
161503	10	11.5	75	5	10	4
161504	10	11.5	120	5	10	4
161505	12	13.8	75	6	12	4
161506	12	13.8	120	6	12	4

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	0.074 - 0.125	0.074 - 0.110	0.063 - 0.150	-	-	0.051 - 0.091
	a_p (mm)	0.06 - 0.3	0.06 - 0.3	0.06 - 0.36	-	-	0.04 - 0.24
8	f_z (mm)	0.114 - 0.165	0.114 - 0.145	0.097 - 0.198	-	-	0.079 - 0.120
	a_p (mm)	0.1 - 0.4	0.096 - 0.4	0.096 - 0.48	-	-	0.064 - 0.32
10	f_z (mm)	0.139 - 0.2	0.139 - 0.176	0.118 - 0.240	-	-	0.096 - 0.146
	a_p (mm)	0.12 - 0.5	0.12 - 0.5	0.12 - 0.6	-	-	0.08 - 0.4
12	f_z (mm)	0.163 - 0.235	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.14 - 0.6	0.144 - 0.6	0.144 - 0.72	-	-	0.096 - 0.48

Speed (V_c in m/min)


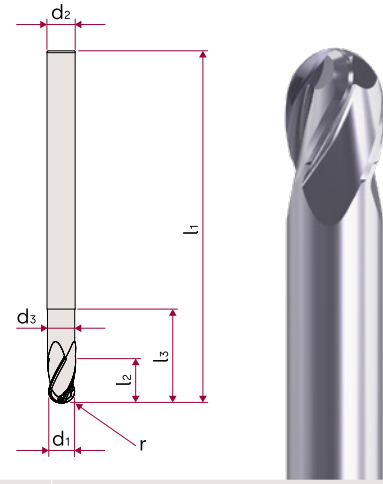
Application	P	M	K	N	S	H
	●	○	●	-	-	● ₅₅ ○ ₆₀
ROUGH	200 250 300	60 85 110	240 300	-	-	100 160 280
FINE	220 270 320	70 90 120	260 320	-	-	120 160 280

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60

Ball nose end mill cutters

PV07

d_1 3 - 12	z 4	r 1.5 - 6	λ° 30°	AlCrN
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Effective usable length at x° draft angle			
									0.5°	1°	1.5°	3°
161507	3	3.5	10	2.94	60	1.5	6	4	11.17	11.56	11.88	12.98
161508	3	3.5	15	2.94	60	1.5	6	4	16.38	16.87	17.26	19.62
161509	3	3.5	20	2.94	60	1.5	6	4	21.56	22.13	22.76	26.25
161510	3	3.5	25	2.94	75	1.5	6	4	26.71	27.36	28.47	32.2
161511	4	4.6	10	3.94	60	2	6	4	11.14	11.52	11.84	12.82
161512	4	4.6	15	3.94	60	2	6	4	16.36	16.84	17.23	19.46
161513	4	4.6	20	3.94	60	2	6	4	21.54	22.1	22.69	24.85
161514	4	4.6	25	3.94	75	2	6	4	26.7	27.33	28.4	29.85
161515	4	4.6	30	3.94	75	2	6	4	31.84	32.66	34.1	34.85
161516	5	5.8	20	4.9	60	2.5	6	4	21	21.82	22.59	-
161517	5	5.8	30	4.9	75	2.5	6	4	31.42	32.59	-	-
161518	6	6.9	15	5.9	60	3	6	4	-	-	-	-
161519	6	6.9	20	5.9	60	3	6	4	-	-	-	-
161520	6	6.9	25	5.9	60	3	6	4	-	-	-	-
161521	6	6.9	30	5.9	75	3	6	4	-	-	-	-
161522	6	6.9	35	5.9	75	3	6	4	-	-	-	-
161523	8	9.2	25	7.8	64	4	8	4	-	-	-	-
161524	8	9.2	50	7.8	100	4	8	4	-	-	-	-
161525	10	11.5	30	9.8	75	5	10	4	-	-	-	-
161526	10	11.5	50	9.8	100	5	10	4	-	-	-	-
161527	12	13.8	35	11.8	75	6	12	4	-	-	-	-
161528	12	13.8	60	11.8	100	6	12	4	-	-	-	-

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3 - 4	f_z (mm)	0.042 - 0.084	0.042 - 0.074	0.036 - 0.101	-	-	0.029 - 0.061
	a_p (mm)	0.036 - 0.2	0.036 - 0.2	0.036 - 0.24	-	-	0.024 - 0.16
5 - 6	f_z (mm)	0.074 - 0.125	0.074 - 0.110	0.063 - 0.150	-	-	0.051 - 0.091
	a_p (mm)	0.06 - 0.3	0.06 - 0.3	0.06 - 0.36	-	-	0.04 - 0.24
8	f_z (mm)	0.114 - 0.165	0.114 - 0.145	0.097 - 0.198	-	-	0.079 - 0.120
	a_p (mm)	0.1 - 0.4	0.096 - 0.4	0.096 - 0.48	-	-	0.064 - 0.32
10	f_z (mm)	0.139 - 0.2	0.139 - 0.176	0.118 - 0.240	-	-	0.096 - 0.146
	a_p (mm)	0.12 - 0.5	0.12 - 0.5	0.12 - 0.6	-	-	0.08 - 0.4
12	f_z (mm)	0.163 - 0.235	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a_p (mm)	0.14 - 0.6	0.144 - 0.6	0.144 - 0.72	-	-	0.096 - 0.48


Speed (V_c in m/min)

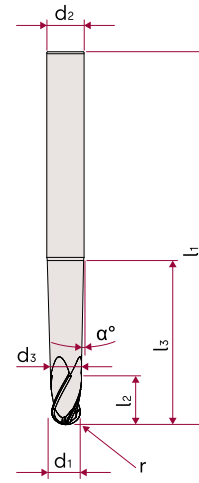
Application	P	M	K	N	S	H
	●	○	●	-	-	● ₅₅ ○ ₆₀
ROUGH	200 250 300	60 85 110	240 300	-	-	100 160 280
FINE	220 270 320	70 90 120	260 320	-	-	120 160 280

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60

Ball nose end mill cutters

PV08

d_1 3 - 12	z 4	r 1.5 - 6	λ° 30°	AlCrN
	conical 0.5° - 1.5°			



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
161529	3	3.5	15	2.94	60	1.5	6	4	0.5	15.96	16.59	17.04	19.13
161530	3	3.5	15	2.94	60	1.5	6	4	1	20.96	21.75	22.29	25.49
161531	3	3.5	15	2.94	60	1.5	6	4	1.5	25.96	26.9	27.58	31.42
161532	3	3.5	20	2.94	60	1.5	6	4	0.5	30.96	32.03	33.04	36.21
161533	3	3.5	20	2.94	60	1.5	6	4	1	13.94	16.24	16.79	18.64
161534	3	3.5	20	2.94	60	1.5	6	4	1.5	13.94	21.24	21.94	24.73
161535	3	3.5	25	2.94	75	1.5	6	4	0.5	13.94	26.24	27.07	30.64
161536	3	3.5	25	2.94	75	1.5	6	4	1	13.94	31.24	32.19	35.23
161537	3	3.5	25	2.94	75	1.5	6	4	1.5	13.94	36.24	37.31	39.82
161538	3	3.5	30	2.94	75	1.5	6	4	0.5	13.94	41.24	42.42	44.41
161539	3	3.5	30	2.94	75	1.5	6	4	1	9.97	15.71	16.49	18.15
161540	3	3.5	30	2.94	75	1.5	6	4	1.5	9.97	18.46	21.49	23.97
161541	3	3.5	35	2.94	75	1.5	6	4	1	9.97	18.46	26.49	29.78
161542	3	3.5	35	2.94	75	1.5	6	4	1.5	9.97	18.46	31.49	34.24
161544	3	3.5	40	2.94	100	1.5	6	4	1	9.97	18.46	40.8	43.01
161543	3	3.5	40	2.94	75	1.5	6	4	1.5	9.97	18.46	36.49	37.94
161545	4	4.6	20	3.94	60	2	6	4	0.5	21.04	21.78	22.3	24.35
161546	4	4.6	20	3.94	60	2	6	4	1	26.04	26.92	27.6	29.15
161547	4	4.6	20	3.94	60	2	6	4	1.5	31.04	32.06	33.07	33.94
161550	4	4.6	25	3.94	75	2	6	4	0.5	46.04	47.4	47.83	-
161548	4	4.6	25	3.94	60	2	6	4	1	36.04	37.18	37.88	37.98
161549	4	4.6	25	3.94	60	2	6	4	1.5	41.04	42.29	42.91	-
161551	4	4.6	30	3.94	75	2	6	4	0.5	17.44	21.37	22.01	23.86
161552	4	4.6	30	3.94	75	2	6	4	1	17.44	26.37	27.13	27.87

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
161553	4	4.6	30	3.94	75	2	8	4	1.5	17.44	30.69	32.04	33.04
161554	4	4.6	35	3.94	75	2	6	4	0.5	17.44	35.69	37.27	37.63
161555	4	4.6	35	3.94	75	2	6	4	1	17.44	41.37	42.51	46.92
161556	4	4.6	35	3.94	75	2	8	4	1.5	17.44	46.37	47.74	51.51
161557	4	4.6	40	3.94	75	2	6	4	0.5	17.44	51.37	52.98	56.1
161558	4	4.6	40	3.94	100	2	8	4	1	12.72	20.71	21.65	22.84
161559	4	4.6	40	3.94	100	2	8	4	1.5	12.72	23.47	26.01	27.75
161560	4	4.6	45	3.94	100	2	6	4	0.5	12.72	23.47	31.65	35.77
161561	4	4.6	45	3.94	100	2	8	4	1	12.72	23.47	36.65	41.22
161562	4	4.6	45	3.94	100	2	8	4	1.5	12.72	23.47	41.65	45.61
161563	4	4.6	50	3.94	100	2	8	4	1	12.72	23.47	46.65	49.99
161564	5	5.8	30	4.9	75	2.5	8	4	1	23.24	31.57	32.36	35.65
161565	5	5.8	30	4.9	75	2.5	8	4	1.5	23.24	51.57	52.75	53.08
161566	5	5.8	50	4.9	100	2.5	8	4	1	16.62	30.41	31.86	34.83
161567	6	6.9	35	5.9	75	3	8	4	1	26.74	36.06	37.62	38.05
161568	6	6.9	35	5.9	100	3	10	4	1.5	26.74	41.06	42.64	-
161569	6	6.9	40	5.9	75	3	8	4	1	26.74	51.67	53.32	56.52
161570	6	6.9	40	5.9	100	3	10	4	1.5	26.74	61.67	63.79	65.7
161571	6	6.9	50	5.9	100	3	10	4	1	19.37	35.41	36.99	41.81
161572	6	6.9	60	5.9	110	3	10	4	1	19.37	35.77	41.99	46.2
161573	8	9.2	50	7.8	100	4	12	4	1	39.47	52.01	53.82	57.09
161574	8	9.2	70	7.8	120	4	12	4	1	39.47	72.01	74.76	75.45
161575	8	9.2	90	7.8	140	4	12	4	1	39.47	91.59	93.8	-
161576	10	11.5	50	9.8	100	5	12	4	1	38.48	51.5	52.38	-
161577	10	11.5	70	9.8	120	5	12	4	1	38.48	70.74	-	-
161578	10	11.5	90	9.8	150	5	16	4	1	38.48	91.95	95.56	98.51
161580	12	13.8	50	11.8	110	6	16	4	0.5	71.54	73.83	77.01	77.66
161579	12	13.8	50	11.8	105	6	16	4	1.5	51.54	52.93	55.14	58.48
161582	12	13.8	70	11.8	130	6	16	4	0.5	26.74	47.55	52.21	53.61
161581	12	13.8	70	11.8	125	6	16	4	1.5	91.54	94.72	96.84	-

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	α°	Effective usable length at x° draft angle			
										0.5°	1°	1.5°	3°
161584	12	13.8	90	11.8	145	6	16	4	0.5	26.74	47.55	90.76	-
161583	12	13.8	90	11.8	140	6	16	4	1.5	26.74	47.55	71.95	73.23

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3 - 4	f _z (mm)	0.042 - 0.084	0.042 - 0.074	0.036 - 0.101	-	-	0.029 - 0.061
	a _p (mm)	0.036 - 0.2	0.036 - 0.2	0.036 - 0.24	-	-	0.024 - 0.16
5 - 6	f _z (mm)	0.074 - 0.125	0.074 - 0.110	0.063 - 0.150	-	-	0.051 - 0.091
	a _p (mm)	0.06 - 0.3	0.06 - 0.3	0.06 - 0.36	-	-	0.04 - 0.24
8	f _z (mm)	0.114 - 0.165	0.114 - 0.145	0.097 - 0.198	-	-	0.079 - 0.120
	a _p (mm)	0.1 - 0.4	0.096 - 0.4	0.096 - 0.48	-	-	0.064 - 0.32
10	f _z (mm)	0.139 - 0.2	0.139 - 0.176	0.118 - 0.240	-	-	0.096 - 0.146
	a _p (mm)	0.12 - 0.5	0.12 - 0.5	0.12 - 0.6	-	-	0.08 - 0.4
12	f _z (mm)	0.163 - 0.235	0.163 - 0.207	0.139 - 0.282	-	-	0.113 - 0.172
	a _p (mm)	0.14 - 0.6	0.144 - 0.6	0.144 - 0.72	-	-	0.096 - 0.48

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	○	●	-	-	55 60
ROUGH	200 250 300	60 85 110	240 300	-	-	100 160 280
FINE	220 270 320	70 90 120	260 320	-	-	120 160 280

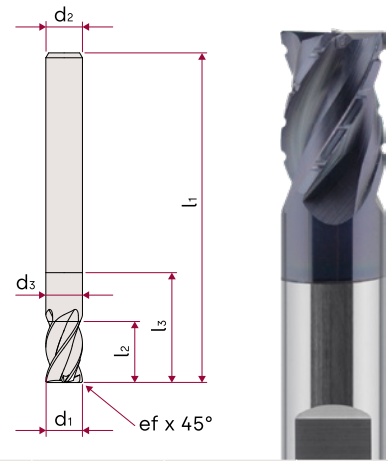
● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60

HPC milling cutters

PH01

d_1 4 - 20	z 4	ef 0.13 - 0.5	λ° 35°/38°	AlTiN
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Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z
163785	4	8	-	-	54	0.13	6	4
163794	4	11	16	3.7	57	0.13	6	4
163786	5	6	-	-	54	0.18	6	4
163795	5	13	18	4.7	57	0.18	6	4
163787	6	10	-	-	54	0.2	6	4
163796	6	13	18	5.6	57	0.2	6	4
163788	8	12	-	-	58	0.2	8	4
163797	8	19	24	7.5	63	0.2	8	4
163789	10	14	-	-	66	0.3	10	4
163798	10	22	32	9.5	72	0.3	10	4
163790	12	16	-	-	73	0.3	12	4
163799	12	26	36	11	83	0.3	12	4
163791	14	18	-	-	75	0.3	14	4
163800	14	26	38	13	83	0.3	14	4
163792	16	22	-	-	82	0.4	16	4
163801	16	32	42	15	92	0.4	16	4
163793	20	26	-	-	92	0.5	20	4
163802	20	38	48	19	104	0.5	20	4

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm)	0.013 - 0.02	0.013 - 0.015	0.017 - 0.02	-	-	-
	a_p (mm)	4.0	4.0	4.0	-	-	-
5	f_z (mm)	0.021 - 0.035	0.015 - 0.025	0.029 - 0.035	-	-	-
	a_p (mm)	5.0	5.0	5.0	-	-	-
6	f_z (mm)	0.021 - 0.035	0.025	0.029 - 0.035	-	-	-
	a_p (mm)	6.0	6.0	6.0	-	-	-
8	f_z (mm)	0.027 - 0.045	0.027 - 0.032	0.038 - 0.045	-	-	-
	a_p (mm)	8.0	8.0	8.0	-	-	-
10	f_z (mm)	0.044 - 0.075	0.044 - 0.052	0.063 - 0.08	-	-	-
	a_p (mm)	10.0	10.0	10.0	-	-	-
12	f_z (mm)	0.044 - 0.075	0.044 - 0.052	0.063 - 0.08	-	-	-
	a_p (mm)	12.0	12.0	12.0	-	-	-
14	f_z (mm)	0.059 - 0.1	0.059 - 0.07	0.084 - 0.1	-	-	-
	a_p (mm)	14.0	14.0	14.0	-	-	-
16	f_z (mm)	0.059 - 0.1	0.059 - 0.07	0.084 - 0.1	-	-	-
	a_p (mm)	16.0	16.0	16.0	-	-	-
20	f_z (mm)	0.071 - 0.12	0.071 - 0.084	0.1 - 0.12	-	-	-
	a_p (mm)	20.0	20.0	20.0	-	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	○	○	-	-	-
ROUGH	64 113 159	53 67	71 120	-	-	-
FINE	90 160 225	77 95	100 170	-	-	-

● = Primary application | ○ = Secondary application

S – Special alloys & titanium

N – Non-ferrous metals & plastics

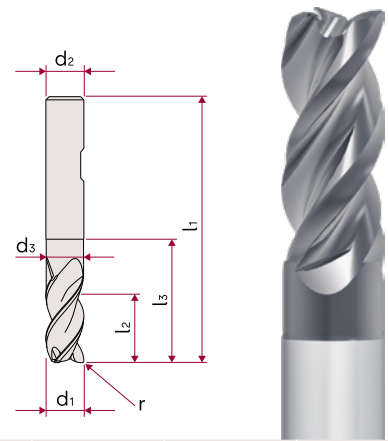
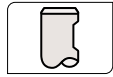
Technical information

Index

HPC milling cutters

PH02

d_1 3.8 - 20	z 3	r 0.19 - 1	λ° 42°	AlCrN
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
161717	3.8	10	13	3.6	57	0.19	6	3
161718	4	11	13	3.8	57	0.2	6	3
161719	4.8	11	15.5	4.6	57	0.24	6	3
161720	5	13	15.5	4.8	57	0.25	6	3
161721	5.7	13	19	5.5	57	0.29	6	3
161722	6	13	19	5.8	57	0.3	6	3
161723	6.7	16	25	6.5	63	0.34	8	3
161724	7	16	25	6.8	63	0.35	8	3
161725	7.7	19	25	7.5	63	0.39	8	3
161726	8	19	25	7.8	63	0.4	8	3
161727	8.7	22	30	8.5	72	0.44	10	3
161728	9	22	30	8.8	72	0.45	10	3
161729	9.7	22	30	9.5	72	0.49	10	3
161730	10	22	30	9.8	72	0.5	10	3
161731	11.7	26	36	11.5	83	0.59	12	3
161732	12	26	36	11.8	83	0.6	12	3
161733	13.7	26	36	13.5	83	0.69	14	3
161734	14	26	36	13.8	83	0.7	14	3
161735	15.5	31	42	15.3	92	0.78	16	3
161736	16	31	42	15.8	92	0.8	16	3
161737	17.5	31	42	17.3	92	0.88	18	3
161738	18	31	42	17.8	92	0.9	18	3
161739	19.5	41	52	19.3	104	0.98	20	3
161740	20	41	52	19.8	104	1	20	3

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3.8	f_z (mm)	0.015 - 0.053	0.015 - 0.033	0.021 - 0.088	-	-	-
	a_p (mm)	3.8 - 5.7	3.8 - 5.7	3.8 - 5.7	-	-	-
6	f_z (mm)	0.022 - 0.079	0.023 - 0.05	0.031 - 0.132	-	-	-
	a_p (mm)	6 - 9	6 - 9	6 - 9	-	-	-
8	f_z (mm)	0.028 - 0.101	0.029 - 0.064	0.04 - 0.169	-	-	-
	a_p (mm)	8 - 12	8 - 12	8 - 12	-	-	-
10	f_z (mm)	0.033 - 0.122	0.035 - 0.077	0.048 - 0.203	-	-	-
	a_p (mm)	10 - 15	10 - 15	10 - 15	-	-	-
12	f_z (mm)	0.038 - 0.140	0.04 - 0.088	0.055 - 0.233	-	-	-
	a_p (mm)	12 - 18	12 - 18	12 - 18	-	-	-
16	f_z (mm)	0.047 - 0.171	0.049 - 0.108	0.067 - 0.284	-	-	-
	a_p (mm)	16 - 24	16 - 24	16 - 24	-	-	-
20	f_z (mm)	0.054 - 0.195	0.056 - 0.124	0.077 - 0.325	-	-	-
	a_p (mm)	20 - 30	20 - 30	20 - 30	-	-	-

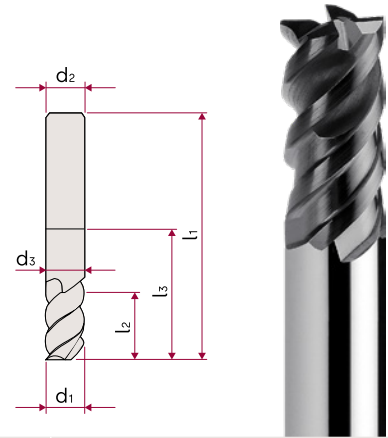
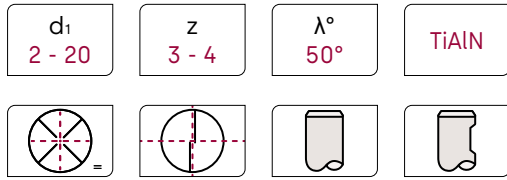
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	●	●	-	-	-
ROUGH	95 280 465	60 100 140	105 308 510	-	-	-
FINE	-	-	-	-	-	-

① ● = Primary application

HPC milling cutters

PH03



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	d ₂	z	Cylinder shank
164305	2	4	-	-	57	6	3	HA
164306	2.5	5	-	-	57	6	3	HA
164307	3	6	-	-	57	6	4	HA
164308	3.5	7	-	-	57	6	4	HA
164309	4	8	-	-	57	6	4	HA
164310	4.5	9	-	-	57	6	4	HA
164311	5	10	-	-	57	6	4	HA
164300	6	8	21	5.7	57	6	4	HA
164312	6	14	21	5.7	57	6	4	HA
164288	6	18	-	-	75	6	4	HA
164289	6	20	25	5.7	65	6	4	HA
164313	7	14	-	-	63	8	4	HA
164301	8	10	27	7.6	63	8	4	HA
164314	8	18	27	7.6	63	8	4	HA
164290	8	24	-	-	90	8	4	HA
164291	8	26	30	7.6	70	8	4	HA
164315	9	18	-	-	72	10	4	HA
164302	10	12	32	9.5	72	10	4	HA
164316	10	22	32	9.5	72	10	4	HA
164292	10	30	-	-	100	10	4	HA
164293	10	32	40	9.5	82	10	4	HA
164303	12	14	38	11.5	83	12	4	HB
164317	12	26	38	11.5	83	12	4	HB
164294	12	36	-	-	110	12	4	HB

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	d ₂	z	Cylinder shank
164295	12	38	50	11.5	95	12	4	HB
164304	16	18	44	15.5	92	16	4	HB
164318	16	34	44	15.5	92	16	4	HB
164296	16	48	-	-	140	16	4	HB
164297	16	50	62	15.5	110	16	4	HB
164319	20	42	54	19.5	104	20	4	HB
164298	20	60	-	-	150	20	4	HB
164299	20	62	74	19.5	125	20	4	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
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Contour milling

2 - 2.5	f _z (mm) a _p (mm)	0.05 - 0.09 4	-	0.05 - 0.09 4	-	-	0.03 - 0.045 4
3 - 4.5	f _z (mm) a _p (mm)	0.09 - 0.12 6	-	0.05 - 0.12 6	-	-	0.07 - 0.085 6
5 - 6	f _z (mm) a _p (mm)	0.12 - 0.18 8	-	0.09 - 0.18 8	-	-	0.1 - 0.125 8
7 - 8	f _z (mm) a _p (mm)	0.12 - 0.18 10	-	0.12 - 0.18 10	-	-	0.1 - 0.125 10
9 - 10	f _z (mm) a _p (mm)	0.15 - 0.2 12	-	0.12 - 0.2 12	-	-	0.12 - 0.145 12
12	f _z (mm) a _p (mm)	0.15 - 0.2 14	-	0.15 - 0.2 14	-	-	0.12 - 0.145 14
16	f _z (mm) a _p (mm)	0.2 - 0.25 18	-	0.15 - 0.25 18	-	-	0.17 - 0.195 18
20	f _z (mm) a _p (mm)	0.25 - 0.3 42	-	0.2 - 0.3 42	-	-	0.2 - 0.225 42

Diameter	Feed depth of cut	P	M	K	N	S	H
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Pocket and slot milling

2 - 2.5	f _z (mm) a _p (mm)	0.02 - 0.04 1 - 1.5	-	0.02 - 0.04 1 - 1.5	-	-	0.02 - 0.03 0.04 - 0.07
3 - 4.5	f _z (mm) a _p (mm)	0.03 - 0.06 1.5 - 2	-	0.03 - 0.06 1.5 - 2	-	-	0.03 - 0.045 0.08 - 0.14
5 - 6	f _z (mm) a _p (mm)	0.05 - 0.08 2.5 - 3	-	0.05 - 0.08 2.5 - 3	-	-	0.05 - 0.065 0.1 - 0.2
7 - 8	f _z (mm) a _p (mm)	0.05 - 0.08 3.5 - 4	-	0.05 - 0.08 3.5 - 4	-	-	0.05 - 0.065 0.15 - 0.275
9 - 10	f _z (mm) a _p (mm)	0.06 - 0.1 4.5 - 5	-	0.06 - 0.1 4.5 - 5	-	-	0.06 - 0.08 0.2 - 0.35
12	f _z (mm) a _p (mm)	0.07 - 0.12 5 - 6	-	0.07 - 0.12 5 - 6	-	-	0.07 - 0.095 0.2 - 0.4
16	f _z (mm) a _p (mm)	0.08 - 0.12 6 - 8	-	0.08 - 0.12 6 - 8	-	-	0.08 - 0.1 0.2 - 0.5
20	f _z (mm) a _p (mm)	0.08 - 0.12 6 - 8	-	0.08 - 0.12 6 - 8	-	-	0.08 - 0.1 0.2 - 0.6

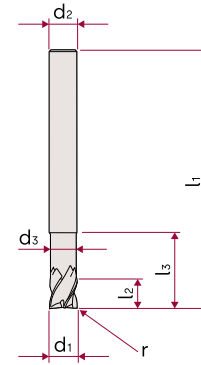
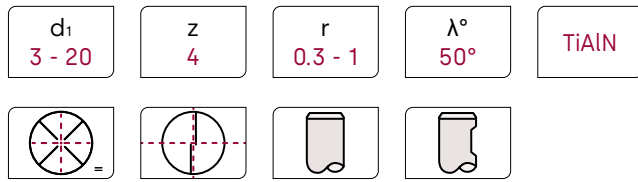
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	-	○	-	-	○
ROUGH	120 210 300	-	100 225 350	-	-	120 160 200
FINE	200 250 300	-	180 290 400	-	-	100 175 250

● = Primary application | ○ = Secondary application

HPC milling cutters

PH04



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Cylinder shank
164320	3	6	-	-	57	0.3	6	4	HA
164321	4	8	-	-	57	0.3	6	4	HA
164322	5	10	-	-	57	0.3	6	4	HA
164323	6	14	21	5.7	57	0.3	6	4	HA
164329	6	18	-	-	75	0.3	6	4	HA
164324	8	18	27	7.6	63	0.5	8	4	HA
164331	8	24	-	-	90	0.5	8	4	HA
164325	10	22	32	9.5	72	0.5	10	4	HA
164333	10	30	-	-	100	0.5	10	4	HA
164326	12	26	38	11.5	83	1	12	4	HB
164335	12	36	-	-	110	1	12	4	HB
164327	16	34	44	15.5	92	1	16	4	HB
164337	16	48	-	-	140	1	16	4	HB
164328	20	44	54	19.5	104	1	20	4	HB
164339	20	60	-	-	150	1	20	4	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
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Contour milling

3 - 4	f_z (mm) a_p (mm)	0.09 - 0.12 4.5 - 6	0.01 - 0.02 4.5 - 6	0.09 - 0.12 4.5 - 6	0.1 - 0.18 3 - 4	0.01 - 0.025 2 - 2.5	0.07 - 0.1 4.5 - 6
5 - 6	f_z (mm) a_p (mm)	0.12 - 0.18 7.5 - 9	0.03 - 0.04 7.5 - 9	0.12 - 0.18 7.5 - 9	0.12 - 0.2 5 - 6	0.02 - 0.03 2.5 - 3	0.1 - 0.15 7.5 - 9
8	f_z (mm) a_p (mm)	0.12 - 0.18 12	0.04 - 0.05 12	0.12 - 0.18 12	0.14 - 0.2 4 - 8	0.03 - 0.035 4 - 7.2	0.1 - 0.15 12
10	f_z (mm) a_p (mm)	0.15 - 0.2 15	0.06 - 0.08 15	0.15 - 0.2 15	0.17 - 0.22 5 - 10	0.035 - 0.04 5 - 9	0.12 - 0.17 15
12	f_z (mm) a_p (mm)	0.15 - 0.2 18	0.08 - 0.09 18	0.15 - 0.2 18	0.2 - 0.3 6 - 12	0.04 - 0.045 6 - 10.8	0.15 - 0.18 18
16	f_z (mm) a_p (mm)	0.2 - 0.25 24	0.1 - 0.13 24	0.2 - 0.25 24	0.25 - 0.3 8 - 16	0.05 - 0.06 8 - 14.4	0.17 - 0.22 24
20	f_z (mm) a_p (mm)	0.25 - 0.3 30	0.13 - 0.15 30	0.25 - 0.3 30	0.3 - 0.4 8 - 16	0.06 - 0.07 8 - 14.4	0.2 - 0.25 30

Pocket and slot milling

3 - 4	f_z (mm) a_p (mm)	0.03 - 0.06 1.5 - 3.6	0.01 - 0.02 1.5 - 3.6	0.03 - 0.12 1.5 - 3.6	0.06 - 0.14 2 - 2.5	0.01 - 0.015 2 - 2.5	0.03 - 0.06 0.08 - 3.6
5 - 6	f_z (mm) a_p (mm)	0.05 - 0.18 2.5 - 5.4	0.02 - 0.04 2.5 - 5.4	0.05 - 0.18 2.5 - 5.4	0.08 - 0.16 2.5 - 3	0.01 - 0.02 2.5 - 3	0.05 - 0.15 0.13 - 5.4
8	f_z (mm) a_p (mm)	0.05 - 0.18 4 - 7.2	0.04 - 0.05 4 - 7.2	0.05 - 0.18 4 - 7.2	0.1 - 0.2 4	0.02 - 0.03 4	0.05 - 0.15 0.2 - 7.2
10	f_z (mm) a_p (mm)	0.06 - 0.2 5 - 9	0.05 - 0.06 5 - 9	0.06 - 0.2 5 - 9	0.12 - 0.2 5	0.03 - 0.035 5	0.06 - 0.17 0.25 - 9
12	f_z (mm) a_p (mm)	0.07 - 0.2 6 - 10.8	0.06 - 0.08 6 - 10.8	0.07 - 0.2 6 - 10.8	0.14 - 0.22 6	0.04 - 0.045 6	0.07 - 0.18 0.3 - 10.8
16	f_z (mm) a_p (mm)	0.08 - 0.25 8 - 14.4	0.08 - 0.1 8 - 14.4	0.08 - 0.25 8 - 14.4	0.15 - 0.25 8	0.05 - 0.055 8	0.08 - 0.22 0.4 - 14.4
20	f_z (mm) a_p (mm)	0.08 - 0.3 10 - 18	0.01 - 0.14 10 - 18	0.08 - 0.3 10 - 18	0.18 - 0.3 10	0.06 - 0.065 10	0.08 - 0.25 0.5 - 18

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	-	○	-	-	○
ROUGH	120 210 300	-	100 225 350	-	-	120 160 200
FINE	200 275 350	-	180 290 400	-	-	100 175 250

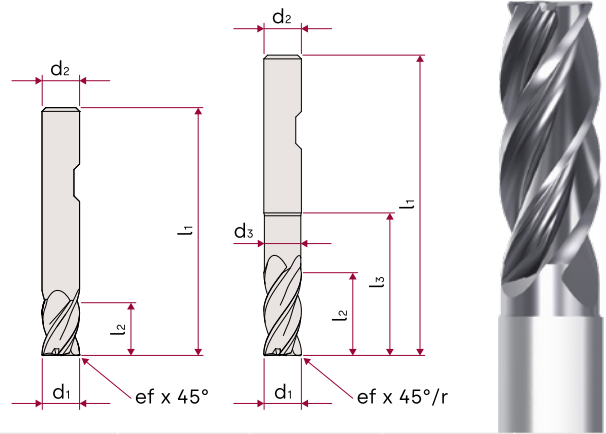
● = Primary application | ○ = Secondary application

HPC milling cutters

PH05

d_1 3 - 20	z 4	$ef (*r)$ 0.06 - 4	λ° 36°/38°	AlCrN
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Order no.	d_1	l_2	l_3	d_3	l_1	$ef (*r)$	d_2	z
161599	3	6	-	-	50	0.06	6	4
161600	4	8	-	-	54	0.08	6	4
161610	4	11	-	-	57	0.4*	6	4
161611	4	11	-	-	57	0.5*	6	4
161612	4	11	-	-	57	1*	6	4
161601	5	9	-	-	54	0.1	6	4
161613	5	13	-	-	57	0.5*	6	4
161614	5	13	-	-	57	1*	6	4
161669	5	13	42	4.8	80	0.1	6	4
161602	6	10	-	-	54	0.12	6	4
161615	6	13	20	5.8	57	0.5*	6	4
161616	6	13	20	5.8	57	1*	6	4
161617	6	13	20	5.8	57	1.5*	6	4
161618	6	13	20	5.8	57	2*	6	4
161670	6	13	42	5.8	80	0.12	6	4
161603	8	12	-	-	58	0.16	8	4
161619	8	21	25	7.8	63	0.5*	8	4
161620	8	21	25	7.8	63	1*	8	4
161621	8	21	25	7.8	63	1.5*	8	4
161622	8	21	25	7.8	63	2*	8	4
161623	8	21	25	7.8	63	2.5*	8	4
161624	8	21	25	7.8	63	3*	8	4
161671	8	21	62	7.7	100	0.16	8	4
161604	10	14	-	-	66	0.2	10	4

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef (*r)	d ₂	z
161625	10	22	30	9.8	72	0.5*	10	4
161626	10	22	30	9.8	72	1*	10	4
161627	10	22	30	9.8	72	1.5*	10	4
161628	10	22	30	9.8	72	2*	10	4
161629	10	22	30	9.8	72	2.5*	10	4
161630	10	22	30	9.8	72	3*	10	4
161672	10	22	58	9.7	100	0.2	10	4
161605	12	16	-	-	73	0.24	12	4
161631	12	26	36	11.8	83	0.5*	12	4
161632	12	26	36	11.8	83	1*	12	4
161633	12	26	36	11.8	83	1.5*	12	4
161634	12	26	36	11.8	83	2*	12	4
161635	12	26	36	11.8	83	2.5*	12	4
161636	12	26	36	11.8	83	3*	12	4
161637	12	26	36	11.8	83	4*	12	4
161673	12	26	73	11.6	120	0.24	12	4
161606	14	16	-	-	73	0.28	14	4
161674	14	26	73	13.6	120	0.28	14	4
161607	16	22	-	-	82	0.32	16	4
161638	16	36	42	15.8	92	0.5*	16	4
161639	16	36	42	15.8	92	1*	16	4
161640	16	36	42	15.8	92	2*	16	4
161641	16	36	42	15.8	92	2.5*	16	4
161642	16	36	42	15.8	92	3*	16	4
161643	16	36	42	15.8	92	4*	16	4
161675	16	36	100	15.5	150	0.32	16	4
161608	18	22	-	-	82	0.36	18	4
161609	20	26	-	-	92	0.4	20	4
161644	20	41	52	19.8	104	1*	20	4
161645	20	41	52	19.8	104	2*	20	4

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef (*r)	d ₂	z
161646	20	41	52	19.8	104	3*	20	4
161647	20	41	52	19.8	104	4*	20	4
161676	20	41	98	19.5	150	0.4	20	4

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f _z (mm)	0.006 - 0.034	0.006 - 0.021	0.008 - 0.056	-	-	-
	a _p (mm)	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	-	-	-
4	f _z (mm)	0.011 - 0.065	0.012 - 0.041	0.016 - 0.108	-	-	-
	a _p (mm)	4.0 - 6.0	4.0 - 6.0	4.0 - 6.0	-	-	-
6	f _z (mm)	0.016 - 0.102	0.017 - 0.059	0.023 - 0.155	-	-	-
	a _p (mm)	6.0 - 9.0	6.0 - 9.0	6.0 - 9.0	-	-	-
8	f _z (mm)	0.021 - 0.119	0.022 - 0.075	0.030 - 0.198	-	-	-
	a _p (mm)	8.0 - 12.0	8.0 - 12.0	8.0 - 12.0	-	-	-
10	f _z (mm)	0.025 - 0.142	0.027 - 0.09	0.035 - 0.237	-	-	-
	a _p (mm)	10.0 - 15.0	10.0 - 15.0	10.0 - 15.0	-	-	-
12	f _z (mm)	0.028 - 0.164	0.031 - 0.104	0.041 - 0.273	-	-	-
	a _p (mm)	12.0 - 18.0	12.0 - 18.0	12.0 - 18.0	-	-	-
16	f _z (mm)	0.035 - 0.2	0.037 - 0.127	0.050 - 0.333	-	-	-
	a _p (mm)	16.0 - 24.0	16.0 - 24.0	16.0 - 24.0	-	-	-
20	f _z (mm)	0.040 - 0.228	0.043 - 0.145	0.057 - 0.381	-	-	-
	a _p (mm)	20.0 - 30.0	20.0 - 30.0	20.0 - 30.0	-	-	-

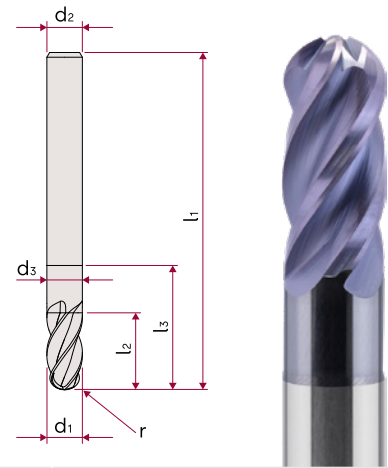
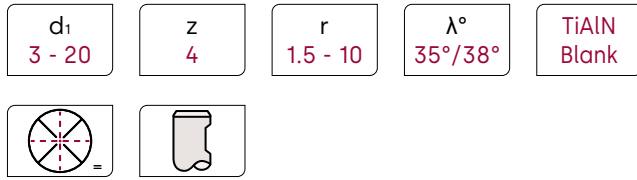
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	●	●	-	-	-
ROUGH	70 213 355	50 78 105	80 235 390	-	-	-
FINE	240 405 570	135 145 155	240 395 570	-	-	-

● = Primary application

HSC Ball nose end mill cutters

PH06



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Coating
163822	3	8	18	2.8	57	1.5	6	4	Blank
163823	3	8	18	2.8	57	1.5	6	4	TiAlN
163824	4	10	21	3.7	57	2	6	4	Blank
163825	4	10	21	3.7	57	2	6	4	TiAlN
163826	5	13	21	4.7	57	2.5	6	4	TiAlN
163827	6	13	21	5.5	57	3	6	4	Blank
163828	6	13	21	5.5	57	3	6	4	TiAlN
163829	8	16	27	7.5	63	4	8	4	Blank
163830	8	16	27	7.5	63	4	8	4	TiAlN
163831	10	22	32	9.5	72	5	10	4	TiAlN
163832	12	26	38	11	83	6	12	4	TiAlN
163833	14	26	38	13	83	7	14	4	TiAlN
163834	16	32	44	15	92	8	16	4	TiAlN
163835	20	38	54	19	104	10	20	4	TiAlN

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3 - 4	f_z (mm)	0.012 - 0.035	-	0.022 - 0.035	-	-	0.022 - 0.035
	a_p (mm)	0.09 - 0.12	-	0.09 - 0.12	-	-	0.09 - 0.12
5 - 6	f_z (mm)	0.025 - 0.045	-	0.035 - 0.045	-	-	0.035 - 0.045
	a_p (mm)	0.15 - 0.18	-	0.15 - 0.18	-	-	0.15 - 0.18
8	f_z (mm)	0.04 - 0.055	-	0.048 - 0.055	-	-	0.048 - 0.055
	a_p (mm)	0.26	-	0.26	-	-	0.26
10	f_z (mm)	0.045 - 0.065	-	0.058 - 0.065	-	-	0.058 - 0.065
	a_p (mm)	0.3	-	0.3	-	-	0.3
12	f_z (mm)	0.05 - 0.072	-	0.064 - 0.073	-	-	0.064 - 0.073
	a_p (mm)	0.36	-	0.36	-	-	0.36
14	f_z (mm)	0.05 - 0.072	-	0.064 - 0.073	-	-	0.064 - 0.073
	a_p (mm)	0.42	-	0.42	-	-	0.42
16	f_z (mm)	0.06 - 0.09	-	0.081 - 0.09	-	-	0.081 - 0.09
	a_p (mm)	0.48	-	0.48	-	-	0.48
20	f_z (mm)	0.08 - 0.12	-	0.11 - 0.12	-	-	0.11 - 0.12
	a_p (mm)	0.6	-	0.6	-	-	0.6

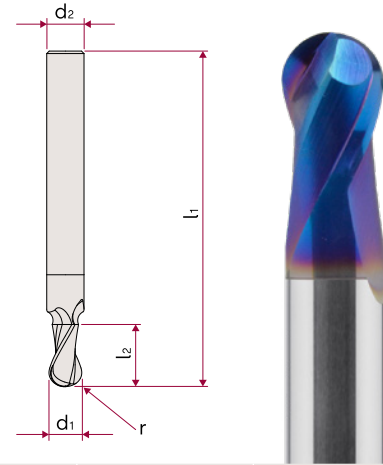
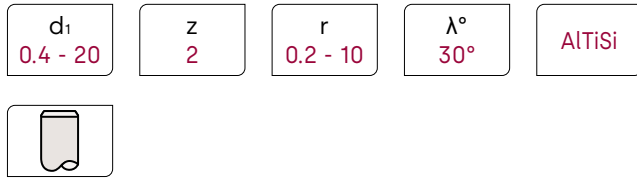
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	-	●	-	-	○55
ROUGH	-	-	-	-	-	-
FINE	200 300 627	-	500 550 607	-	-	130 143

● = Primary application | ○ = Secondary application | 55 = HRC 45-55

HSC Ball nose end mill cutters

PH07



Order no.	d ₁	l ₂	l ₁	r	d ₂	z
162918	0.4	1.5	38	0.2	3	2
162919	0.5	1.5	38	0.25	3	2
162920	0.6	1.5	38	0.3	3	2
162921	0.7	2	38	0.35	3	2
162922	0.8	2	38	0.4	3	2
162923	0.9	2.5	38	0.45	3	2
162924	1	2	50	0.5	3	2
162927	1	2	54	0.5	6	2
162925	1.1	3	50	0.55	3	2
162926	1.2	3	50	0.6	3	2
162928	1.4	3	50	0.7	3	2
162929	1.5	3	50	0.75	3	2
162931	1.5	3	54	0.75	6	2
162930	1.6	4	50	0.8	3	2
162932	1.8	4	50	0.9	3	2
162933	2	4	50	1	3	2
162934	2	4	54	1	6	2
162935	2.5	5	50	1.25	3	2
162936	2.5	5	54	1.25	6	2
162937	3	5	50	1.5	3	2
162938	3	5	54	1.5	6	2
162939	4	8	54	2	4	2
162940	4	8	54	2	6	2
162941	5	9	54	2.5	5	2

Order no.	d ₁	l ₂	l ₁	r	d ₂	z
162942	5	9	54	2.5	6	2
162943	6	10	54	3	6	2
162944	8	12	58	4	8	2
162945	10	14	66	5	10	2
162946	12	16	73	6	12	2
162947	14	18	75	7	14	2
162948	16	22	82	8	16	2
162949	20	26	92	10	20	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.4 - 0.8	f_z (mm)	0.003 - 0.005	-	0.005	-	-	0.003
	a_p (mm)	0.02 - 0.04	-	0.02 - 0.04	-	-	0.02 - 0.04
1 - 2.5	f_z (mm)	0.003 - 0.011	-	0.005 - 0.011	-	-	0.003 - 0.007
	a_p (mm)	0.05 - 0.125	-	0.05 - 0.125	-	-	0.05 - 0.125
3 - 4	f_z (mm)	0.007 - 0.035	-	0.011 - 0.035	-	-	0.007 - 0.025
	a_p (mm)	0.15 - 0.2	-	0.15 - 0.2	-	-	0.15 - 0.2
5 - 6	f_z (mm)	0.025 - 0.045	-	0.035 - 0.045	-	-	0.025 - 0.032
	a_p (mm)	0.25 - 0.3	-	0.25 - 0.3	-	-	0.25 - 0.3
8	f_z (mm)	0.04 - 0.055	-	0.04 - 0.055	-	-	0.032 - 0.04
	a_p (mm)	0.4	-	0.4	-	-	0.4
10	f_z (mm)	0.045 - 0.065	-	0.045 - 0.065	-	-	0.035 - 0.045
	a_p (mm)	0.5	-	0.5	-	-	0.5
12	f_z (mm)	0.045 - 0.065	-	0.045 - 0.065	-	-	0.035 - 0.045
	a_p (mm)	0.6	-	0.6	-	-	0.6
14	f_z (mm)	0.06 - 0.09	-	0.06 - 0.09	-	-	0.045 - 0.06
	a_p (mm)	0.7	-	0.7	-	-	0.7
16	f_z (mm)	0.06 - 0.09	-	0.06 - 0.09	-	-	0.045 - 0.06
	a_p (mm)	0.8	-	0.8	-	-	0.8
20	f_z (mm)	0.08 - 0.12	-	0.08 - 0.12	-	-	0.063 - 0.08
	a_p (mm)	1.0	-	1.0	-	-	1.0

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	-	●	-	-	● 55 ● 60 ● 65
ROUGH FINE	- 240 350 570	-	- 380 400	-	-	- 150 160 180

① ● = Primary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

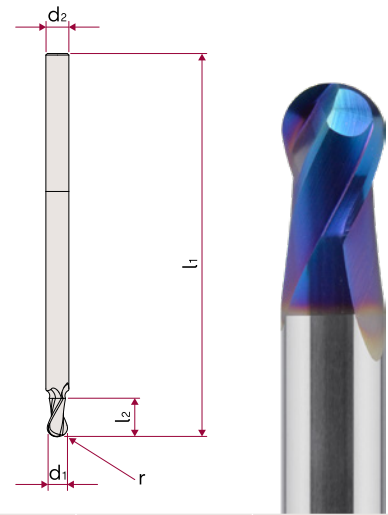
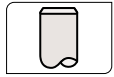
Technical information

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HSC Ball nose end mill cutters

PH08

d_1 2.5 - 20	z 2	r 1.25 - 10	λ° 30°	AlTiSi
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Order no.	d_1	l_2	l_1	r	d_2	z
162950	2.5	5	80	1.25	6	2
162951	3	5	75	1.5	3	2
162952	3	5	80	1.5	6	2
162953	4	8	75	2	4	2
162954	4	8	80	2	6	2
162955	5	9	75	2.5	5	2
162956	5	9	80	2.5	6	2
162957	6	10	100	3	6	2
162958	8	12	100	4	8	2
162959	10	14	100	5	10	2
162960	12	16	100	6	12	2
162961	14	18	100	7	14	2
162962	16	22	150	8	16	2
162963	20	26	150	10	20	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
2.5	f_z (mm) a_p (mm)	0.007 - 0.011 0.13	-	0.007 - 0.011 0.13	-	-	0.004 - 0.007 0.13
3 - 4	f_z (mm) a_p (mm)	0.007 - 0.035 0.15 - 0.2	-	0.011 - 0.035 0.15 - 0.2	-	-	0.007 - 0.025 0.15 - 0.2
5 - 6	f_z (mm) a_p (mm)	0.025 - 0.045 0.25 - 0.3	-	0.035 - 0.045 0.25 - 0.3	-	-	0.025 - 0.032 0.25 - 0.3
8	f_z (mm) a_p (mm)	0.04 - 0.055 0.4	-	0.04 - 0.055 0.4	-	-	0.032 - 0.04 0.4
10	f_z (mm) a_p (mm)	0.045 - 0.065 0.5	-	0.045 - 0.065 0.5	-	-	0.035 - 0.045 0.5
12	f_z (mm) a_p (mm)	0.045 - 0.065 0.6	-	0.045 - 0.065 0.6	-	-	0.035 - 0.045 0.6
14	f_z (mm) a_p (mm)	0.06 - 0.09 0.7	-	0.06 - 0.09 0.7	-	-	0.045 - 0.06 0.7
16	f_z (mm) a_p (mm)	0.06 - 0.09 0.8	-	0.06 - 0.09 0.8	-	-	0.045 - 0.06 0.8
20	f_z (mm) a_p (mm)	0.08 - 0.12 1.0	-	0.08 - 0.12 1.0	-	-	0.063 - 0.08 1.0

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	-	●	-	-	●●● 55 60 65
ROUGH FINE	- 300 450 570	-	- 380 400	-	-	- 150 160 180

● = Primary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

S – Special alloys & titanium

N – Non-ferrous metals & plastics

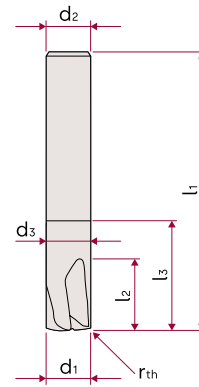
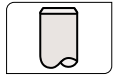
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High-feed milling cutters

PF01

d_1 2 - 16	z 3	r_{th} 0.15 - 1.4	λ° 5°	TiAlN
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Order no.	d_1	l_2	l_3	d_3	l_1	r_{th}	d_2	z
164341	2	2	10	1.9	57	0.15	6	3
164342	3	3	16	2.9	57	0.2	6	3
164343	4	4	18	3.8	57	0.3	6	3
164344	5	5	21	4.8	57	0.4	6	3
164345	6	6	21	5.8	57	0.5	6	3
164346	8	8	27	7.8	63	0.7	8	3
164347	10	10	32	9.8	72	0.85	10	3
164348	12	12	38	11.8	83	1	12	3
164349	16	16	50	15.8	92	1.4	16	3

i r_{th} is theoretical radius

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
2	f_z (mm)	0.06 - 0.15	-	0.06 - 0.15	-	-	0.06 - 0.15
	a_p (mm)	0.1 - 0.15	-	0.1 - 0.15	-	-	0.1 - 0.15
3 - 4	f_z (mm)	0.08 - 0.25	-	0.08 - 0.25	-	-	0.08 - 0.25
	a_p (mm)	0.1 - 0.2	-	0.1 - 0.2	-	-	0.1 - 0.2
5 - 6	f_z (mm)	0.1 - 0.35	-	0.1 - 0.35	-	-	0.1 - 0.35
	a_p (mm)	0.1 - 0.3	-	0.1 - 0.3	-	-	0.1 - 0.3
8	f_z (mm)	0.1 - 0.5	-	0.1 - 0.5	-	-	0.1 - 0.5
	a_p (mm)	0.1 - 0.3	-	0.1 - 0.3	-	-	0.1 - 0.3
10	f_z (mm)	0.1 - 0.7	-	0.1 - 0.7	-	-	0.1 - 0.7
	a_p (mm)	0.1 - 0.3	-	0.1 - 0.3	-	-	0.1 - 0.3
12	f_z (mm)	0.1 - 0.8	-	0.1 - 0.8	-	-	0.1 - 0.8
	a_p (mm)	0.1 - 0.3	-	0.1 - 0.3	-	-	0.1 - 0.3
16	f_z (mm)	0.1 - 0.8	-	0.1 - 0.8	-	-	0.1 - 0.8
	a_p (mm)	0.1 - 0.4	-	0.1 - 0.4	-	-	0.1 - 0.4

Speed (V_c in m/min)

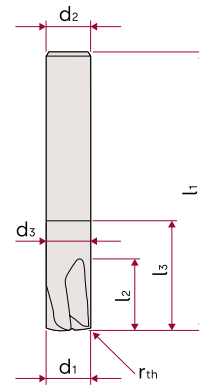
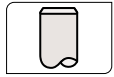
Application	P	M	K	N	S	H
	●	-	○	-	-	55 60 65
ROUGH FINE	120 210 300 -	-	100 225 350 -	-	-	80 140 200 -

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

High-feed milling cutters

PF02

d_1 3 - 16	z 4	r_{th} 0.2 - 1.4	λ° 5°	TiAlN
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Order no.	d_1	l_2	l_3	d_3	l_1	r_{th}	d_2	z
164350	3	3	16	2.9	57	0.2	6	4
164351	4	4	18	3.8	57	0.3	6	4
164352	5	5	21	4.8	57	0.4	6	4
164353	6	6	21	5.8	57	0.5	6	4
164354	6	6	64	5.8	100	0.5	6	4
164355	8	8	27	7.8	63	0.7	8	4
164356	8	8	64	7.8	100	0.7	8	4
164357	10	10	32	9.8	72	0.85	10	4
164358	10	10	60	9.8	100	0.85	10	4
164359	12	12	38	11.8	83	1	12	4
164360	12	12	65	11.8	110	1	12	4
164361	16	16	50	15.8	92	1.4	16	4
164362	16	16	65	15.8	150	1.4	16	4

r_{th} is theoretical radius

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3 - 4	f_z (mm)	0.08 - 0.25	0.08 - 0.25	0.08 - 0.25	-	0.08 - 0.25	0.08 - 0.25
	a_p (mm)	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	-	0.1 - 0.2	0.1 - 0.2
5 - 6	f_z (mm)	0.1 - 0.35	0.1 - 0.35	0.1 - 0.35	-	0.1 - 0.35	0.1 - 0.35
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
8	f_z (mm)	0.1 - 0.5	0.1 - 0.4	0.1 - 0.5	-	0.1 - 0.5	0.1 - 0.5
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
10	f_z (mm)	0.1 - 0.7	0.1 - 0.4	0.1 - 0.7	-	0.1 - 0.7	0.1 - 0.7
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
12	f_z (mm)	0.1 - 0.8	0.1 - 0.6	0.1 - 0.8	-	0.1 - 0.8	0.1 - 0.8
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
16	f_z (mm)	0.1 - 0.8	0.1 - 0.6	0.1 - 0.8	-	0.1 - 0.8	0.1 - 0.8
	a_p (mm)	0.1 - 0.4	0.1 - 0.3	0.1 - 0.4	-	0.1 - 0.4	0.1 - 0.4

Speed (V_c in m/min)

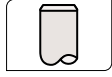
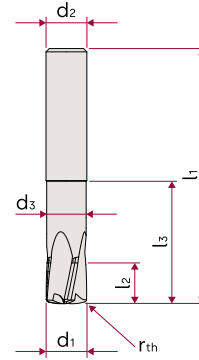
Application	P	M	K	N	S	H
	●	○	○	-	○	55 ● 60 ● 65 ●
ROUGH	120 210 310	70 95 120	100 225 350	-	30 50 70	80 140 200
FINE	-	-	-	-	-	-

① ● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

High-feed milling cutters

PF03

d_1 2 - 16	z 4	r_{th} 0.18 - 1.47	λ° 12°	TiSiN
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Order no.	d_1	l_2	l_3	d_3	l_1	r_{th}	d_2	z
162386	2	2	6	1.9	50	0.18	4	4
162387	2	2	6	1.9	60	0.18	6	4
162388	2	2	10	1.9	50	0.18	4	4
162389	2	2	10	1.9	60	0.18	6	4
162390	3	3	9	2.85	60	0.275	6	4
162391	3	3	15	2.85	50	0.275	4	4
162392	3	3	15	2.85	60	0.275	6	4
162393	3	3	9	2.85	50	0.275	4	4
162394	4	4	12	3.8	60	0.368	6	4
162395	4	4	20	3.8	60	0.368	6	4
162396	5	5	15	4.75	60	0.46	6	4
162397	5	5	20	4.75	60	0.46	6	4
162398	6	6	18	5.7	60	0.55	6	4
162399	6	6	24	5.7	60	0.55	6	4
162400	8	8	24	7.7	64	0.74	8	4
162401	8	8	32	7.7	64	0.74	8	4
162402	8	8	40	7.7	75	0.74	8	4
162403	10	10	30	9.65	75	0.92	10	4
162404	10	10	40	9.65	75	0.92	10	4
162405	10	10	50	9.65	100	0.92	10	4
162406	12	12	36	11.6	75	1.11	12	4
162407	12	12	48	11.6	100	1.11	12	4

ⁱ r_{th} is theoretical radius

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r _{th}	d ₂	z
162408	12	12	60	11.6	100	1.11	12	4
162409	16	16	48	15.5	100	1.47	16	4

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
2	f _z (mm)	0.1	-	0.1	-	-	0.018 - 0.071
	a _p (mm)	0.084	-	0.084	-	-	0.004 - 0.084
3	f _z (mm)	0.13	-	0.13	-	-	0.028 - 0.103
	a _p (mm)	0.126	-	0.126	-	-	0.006 - 0.126
4	f _z (mm)	0.18	-	0.18	-	-	0.038 - 0.135
	a _p (mm)	0.168	-	0.168	-	-	0.008 - 0.168
5	f _z (mm)	0.21	-	0.21	-	-	0.055 - 0.170
	a _p (mm)	0.21	-	0.21	-	-	0.01 - 0.21
6	f _z (mm)	0.25	-	0.25	-	-	0.07 - 0.21
	a _p (mm)	0.252	-	0.252	-	-	0.012 - 0.252
8	f _z (mm)	0.35	-	0.35	-	-	0.082 - 0.28
	a _p (mm)	0.336	-	0.336	-	-	0.016 - 0.336
10	f _z (mm)	0.46	-	0.46	-	-	0.118 - 0.35
	a _p (mm)	0.42	-	0.42	-	-	0.02 - 0.42
12	f _z (mm)	0.58	-	0.58	-	-	0.140 - 0.42
	a _p (mm)	0.504	-	0.504	-	-	0.024 - 0.504
16	f _z (mm)	0.7	-	0.7	-	-	0.162 - 0.56
	a _p (mm)	0.672	-	0.672	-	-	0.032 - 0.672

Speed (V_c in m/min)

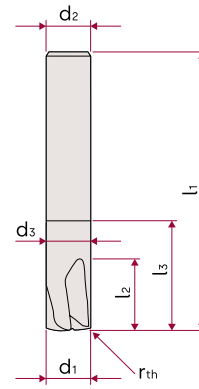
Application	P	M	K	N	S	H
	●	-	○	-	-	55 ● 60 ● 65 ●
ROUGH	160 260 340	-	200 250 300	-	-	60 150 250
FINE	-	-	-	-	-	110 148 185

① ● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

High-feed milling cutters

PF04

d_1 4 - 16	z 4	r_{th} 0.3 - 1.4	λ° 5°	TiAlN
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Order no.	d_1	l_2	l_3	d_3	l_1	r_{th}	d_2	z
164363	4	4	12	3.8	57	0.3	6	4
164364	6	6	21	5.8	57	0.5	6	4
164365	6	6	64	5.8	100	0.5	6	4
164366	8	8	27	7.8	63	0.7	8	4
164367	8	8	64	7.8	100	0.7	8	4
164368	10	10	32	9.8	72	0.85	10	4
164369	10	10	60	9.8	100	0.85	10	4
164370	12	12	38	11.8	83	1	12	4
164371	12	12	65	11.8	110	1	12	4
164372	16	16	50	15.8	92	1.4	16	4
164373	16	16	65	15.8	150	1.4	16	4

① r_{th} is theoretical radius

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm)	0.08 - 0.25	0.08 - 0.25	0.08 - 0.25	-	0.08 - 0.25	0.08 - 0.25
	a_p (mm)	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	-	0.1 - 0.2	0.1 - 0.2
5 - 6	f_z (mm)	0.1 - 0.35	0.1 - 0.35	0.1 - 0.35	-	0.1 - 0.35	0.1 - 0.35
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
8	f_z (mm)	0.1 - 0.5	0.1 - 0.4	0.1 - 0.5	-	0.1 - 0.5	0.1 - 0.5
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
10	f_z (mm)	0.1 - 0.7	0.1 - 0.4	0.1 - 0.7	-	0.1 - 0.7	0.1 - 0.7
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
12	f_z (mm)	0.1 - 0.8	0.1 - 0.6	0.1 - 0.8	-	0.1 - 0.8	0.1 - 0.8
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
16	f_z (mm)	0.1 - 0.8	0.1 - 0.6	0.1 - 0.8	-	0.1 - 0.8	0.1 - 0.8
	a_p (mm)	0.1 - 0.4	0.1 - 0.3	0.1 - 0.4	-	0.1 - 0.4	0.1 - 0.4

Speed (V_c in m/min)

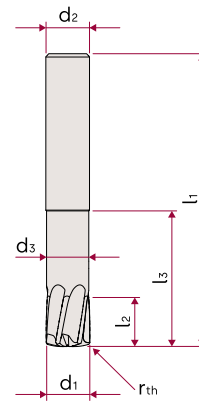
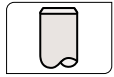
Application	P	M	K	N	S	H
	●	○	○	-	○	55 ● 60 ● 65 ●
ROUGH	120 210 310	70 95 120	100 225 350	-	30 50 70	80 140 200
FINE	-	-	-	-	-	-

① ● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

High-feed milling cutters

PF05

d_1 6 - 16	z 6	r_{th} 0.55 - 1.47	λ° 12°	TiSiN
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Order no.	d_1	l_2	l_3	d_3	l_1	r_{th}	d_2	z
162410	6	6	18	5.7	60	0.55	6	6
162411	6	6	24	5.7	60	0.55	6	6
162412	8	8	24	7.7	64	0.74	8	6
162413	8	8	32	7.7	64	0.74	8	6
162414	8	8	40	7.7	75	0.74	8	6
162415	10	10	30	9.65	75	0.92	10	6
162416	10	10	40	9.65	75	0.92	10	6
162417	10	10	50	9.65	100	0.92	10	6
162418	12	12	36	11.6	75	1.11	12	6
162419	12	12	48	11.6	100	1.11	12	6
162420	12	12	60	11.6	100	1.11	12	6
162421	16	16	48	15.5	100	1.47	16	6

^① r_{th} is theoretical radius

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	0.25	-	0.25	-	-	0.07 - 0.21
	a_p (mm)	0.252	-	0.252	-	-	0.012 - 0.252
8	f_z (mm)	0.35	-	0.35	-	-	0.082 - 0.28
	a_p (mm)	0.336	-	0.336	-	-	0.016 - 0.336
10	f_z (mm)	0.46	-	0.46	-	-	0.118 - 0.35
	a_p (mm)	0.42	-	0.42	-	-	0.02 - 0.42
12	f_z (mm)	0.58	-	0.58	-	-	0.140 - 0.42
	a_p (mm)	0.504	-	0.504	-	-	0.024 - 0.504
16	f_z (mm)	0.7	-	0.7	-	-	0.162 - 0.56
	a_p (mm)	0.672	-	0.672	-	-	0.032 - 0.672

Speed (V_c in m/min)

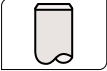
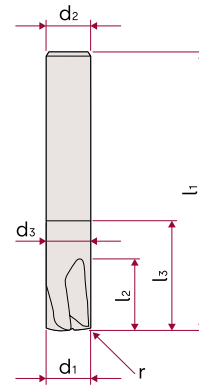
Application	P	M	K	N	S	H
	●	-	○	-	-	55 60 65
ROUGH FINE	160 260 340 -	-	200 250 300 -	-	-	60 150 250 110 148 185

① ● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

High-feed milling cutters

PF06

d_1 6 - 12	z 4	r 1.5 - 3	λ° 5°	TiAlN
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
164374	6	6	21	5.8	57	1.5	6	4
164375	8	8	27	7.8	63	2	8	4
164376	10	10	32	9.8	72	2	10	4
164377	12	12	38	11.8	83	3	12	4

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
		f_z (mm)	0.1 - 0.35	0.1 - 0.35	0.1 - 0.35	-	0.1 - 0.35
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
6	f_z (mm)	0.1 - 0.5	0.1 - 0.4	0.1 - 0.5	-	0.1 - 0.5	0.1 - 0.5
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
8	f_z (mm)	0.1 - 0.7	0.1 - 0.4	0.1 - 0.7	-	0.1 - 0.7	0.1 - 0.7
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3
10	f_z (mm)	0.1 - 0.8	0.1 - 0.6	0.1 - 0.8	-	0.1 - 0.8	0.1 - 0.8
	a_p (mm)	0.1 - 0.3	0.1 - 0.3	0.1 - 0.3	-	0.1 - 0.3	0.1 - 0.3

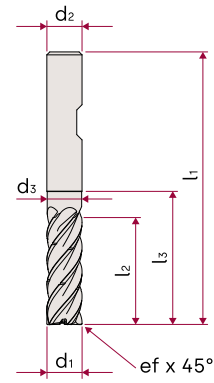
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	○	○	-	○	55 ● 60 ● 65 ●
ROUGH	120 210 310	70 95 120	100 225 350	-	30 50 70	80 140 200
FINE	-	-	-	-	-	-

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

Trochoidal milling cutters

PT01



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef	d ₂	z
161648	4	16	23	3.9	62	0.08	6	5
161649	5	17	24	4.8	62	0.1	6	5
161657	5	20	-	-	66	0.1	6	5
161650	6	18	25	5.8	62	0.12	6	5
161658	6	24	-	-	66	0.12	6	5
161651	8	24	30	7.8	68	0.16	8	5
161659	8	32	-	-	74	0.16	8	5
161664	8	40	-	-	81	0.16	8	5
161652	10	30	35	9.8	80	0.2	10	5
161660	10	40	-	-	89	0.2	10	5
161665	10	50	-	-	96	0.2	10	5
161653	12	36	45	11.8	93	0.24	12	5
161661	12	48	-	-	100	0.24	12	5
161666	12	60	-	-	112	0.24	12	5
161654	14	42	50	13.8	99	0.28	14	5
161655	16	48	55	15.8	108	0.32	16	5
161662	16	64	-	-	123	0.32	16	5
161667	16	80	-	-	136	0.32	16	5
161656	20	60	70	19.8	126	0.4	20	5
161663	20	80	-	-	140	0.4	20	5
161668	20	100	-	-	160	0.4	20	5

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm)	0.032 - 0.08	0.024 - 0.048	0.056 - 0.104	-	-	-
	a_e (mm)	0.24 - 0.72	0.2 - 0.48	0.32 - 0.8	-	-	-
	hm max (mm)	0.02 - 0.0264	0.0184 - 0.024	0.0224 - 0.0312	-	-	-
5	f_z (mm)	0.04 - 0.1	0.03 - 0.06	0.07 - 0.13	-	-	-
	a_e (mm)	0.3 - 0.9	0.25 - 0.6	0.4 - 1	-	-	-
	hm max (mm)	0.025 - 0.033	0.023 - 0.03	0.028 - 0.039	-	-	-
6	f_z (mm)	0.048 - 0.12	0.036 - 0.072	0.084 - 0.156	-	-	-
	a_e (mm)	0.36 - 1.08	0.3 - 0.72	0.48 - 1.2	-	-	-
	hm max (mm)	0.03 - 0.0396	0.0276 - 0.036	0.0336 - 0.0468	-	-	-
8	f_z (mm)	0.064 - 0.16	0.048 - 0.096	0.112 - 0.208	-	-	-
	a_e (mm)	0.48 - 1.44	0.4 - 0.96	0.64 - 1.6	-	-	-
	hm max (mm)	0.04 - 0.0528	0.0368 - 0.048	0.0448 - 0.0624	-	-	-
10	f_z (mm)	0.08 - 0.2	0.06 - 0.12	0.14 - 0.26	-	-	-
	a_e (mm)	0.6 - 1.8	0.5 - 1.2	0.8 - 2	-	-	-
	hm max (mm)	0.05 - 0.066	0.046 - 0.06	0.056 - 0.078	-	-	-
12	f_z (mm)	0.096 - 0.24	0.072 - 0.144	0.168 - 0.312	-	-	-
	a_e (mm)	0.72 - 2.16	0.6 - 1.44	0.96 - 2.4	-	-	-
	hm max (mm)	0.06 - 0.0792	0.0552 - 0.072	0.0672 - 0.0936	-	-	-
14	f_z (mm)	0.112 - 0.28	0.084 - 0.168	0.196 - 0.364	-	-	-
	a_e (mm)	0.84 - 2.52	0.7 - 1.68	1.12 - 2.8	-	-	-
	hm max (mm)	0.07 - 0.0924	0.0644 - 0.084	0.0784 - 0.1092	-	-	-
16	f_z (mm)	0.128 - 0.32	0.096 - 0.192	0.224 - 0.416	-	-	-
	a_e (mm)	0.96 - 2.88	0.8 - 1.92	1.28 - 3.2	-	-	-
	hm max (mm)	0.08 - 0.1056	0.0736 - 0.096	0.0896 - 0.1248	-	-	-
20	f_z (mm)	0.16 - 0.4	0.12 - 0.24	0.28 - 0.52	-	-	-
	a_e (mm)	1.2 - 3.6	1 - 2.4	1.6 - 4	-	-	-
	hm max (mm)	0.1 - 0.132	0.092 - 0.12	0.112 - 0.156	-	-	-

① a_p is maximum cutting edge length (l_z)

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	●	●	-	-	-
ROUGH	160 280 520	110 180 220	210 300 500	-	-	-
FINE	-	-	-	-	-	-

① ● = Primary application

Circle segment milling cutters

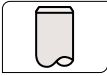
PB01

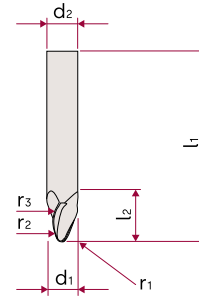
Type-K – tapered

d_1
6 - 12

z
3

ALTiN





Order no.	d_1	l_2	l_1	r_1	r_2	r_3	d_2	z
162382	6	9.58	57	1	250	-	6	3
162383	8	10.5	64	1.5	250	4	8	3
162384	10	10.73	73	2	250	5	10	3
162385	12	13.5	84	3	250	6	12	3

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
		f_z (mm)	a_p (mm)	f_z (mm)	a_p (mm)	f_z (mm)	a_p (mm)
6	f_z (mm)	0.025 - 0.45	0.025 - 0.03	0.05	0.03 - 0.05	-	0.025 - 0.03
	a_p (mm)	0.05 - 0.2	0.05 - 0.2	0.05 - 0.2	0.05 - 0.2	-	0.05 - 0.2
8	f_z (mm)	0.035 - 0.06	0.035 - 0.04	0.065	0.05 - 0.06	-	0.03 - 0.04
	a_p (mm)	0.05 - 0.2	0.05 - 0.2	0.05 - 0.2	0.05 - 0.2	-	0.05 - 0.2
10	f_z (mm)	0.045 - 0.07	0.045 - 0.05	0.08	0.055 - 0.07	-	0.04 - 0.05
	a_p (mm)	0.05 - 0.2	0.05 - 0.2	0.05 - 0.2	0.05 - 0.2	-	0.05 - 0.2
12	f_z (mm)	0.055 - 0.085	0.055 - 0.06	0.1	0.085 - 0.1	-	0.05 - 0.06
	a_p (mm)	0.05 - 0.2	0.05 - 0.2	0.05 - 0.2	0.05 - 0.2	-	0.05 - 0.2

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	○	●	● A KU	-	● 55 ○ 60
ROUGH	-	-	-	-	-	-
FINE	85 210 280	60 85 110	160 220 280	180 300 600	-	80 120 200

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | 55 = HRC 45-55 | 60 = HRC 55-60

Circle segment milling cutters

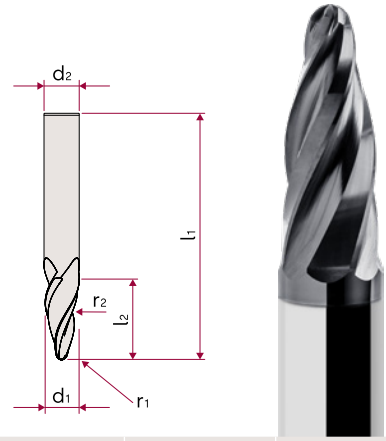
PB02

Type-T – drop shape

d_1
2 - 12

z
3 - 4

ALTiN



Order no.	d_1	l_2	l_1	r_1	r_2	d_2	z
162374	2	3.19	50	0.5	8	4	3
162375	3	4.75	57	0.75	12	6	3
162376	4	6.39	57	1	16	6	3
162377	6	20.29	75	1	95	6	3
162378	8	17.62	75	2	64	8	3
162379	8	23.92	75	1	90	8	3
162380	10	24.12	73	2	85	10	4
162381	12	26.66	84	2	80	12	4

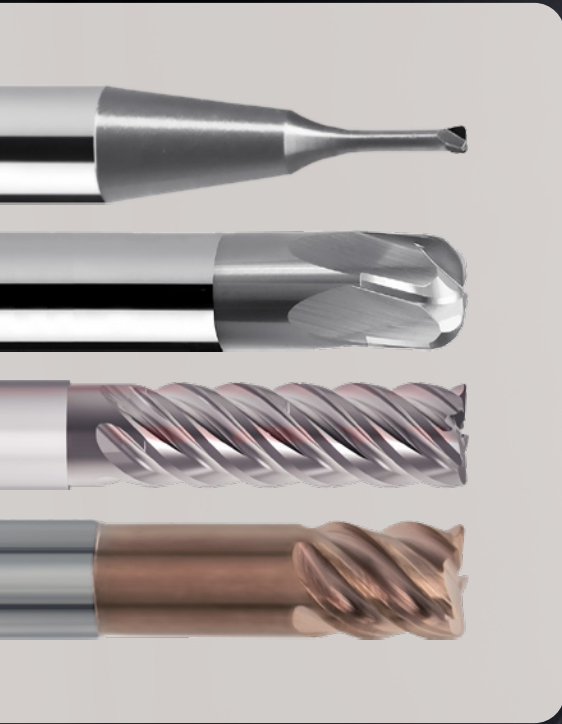
Application data (f_z / a_p)

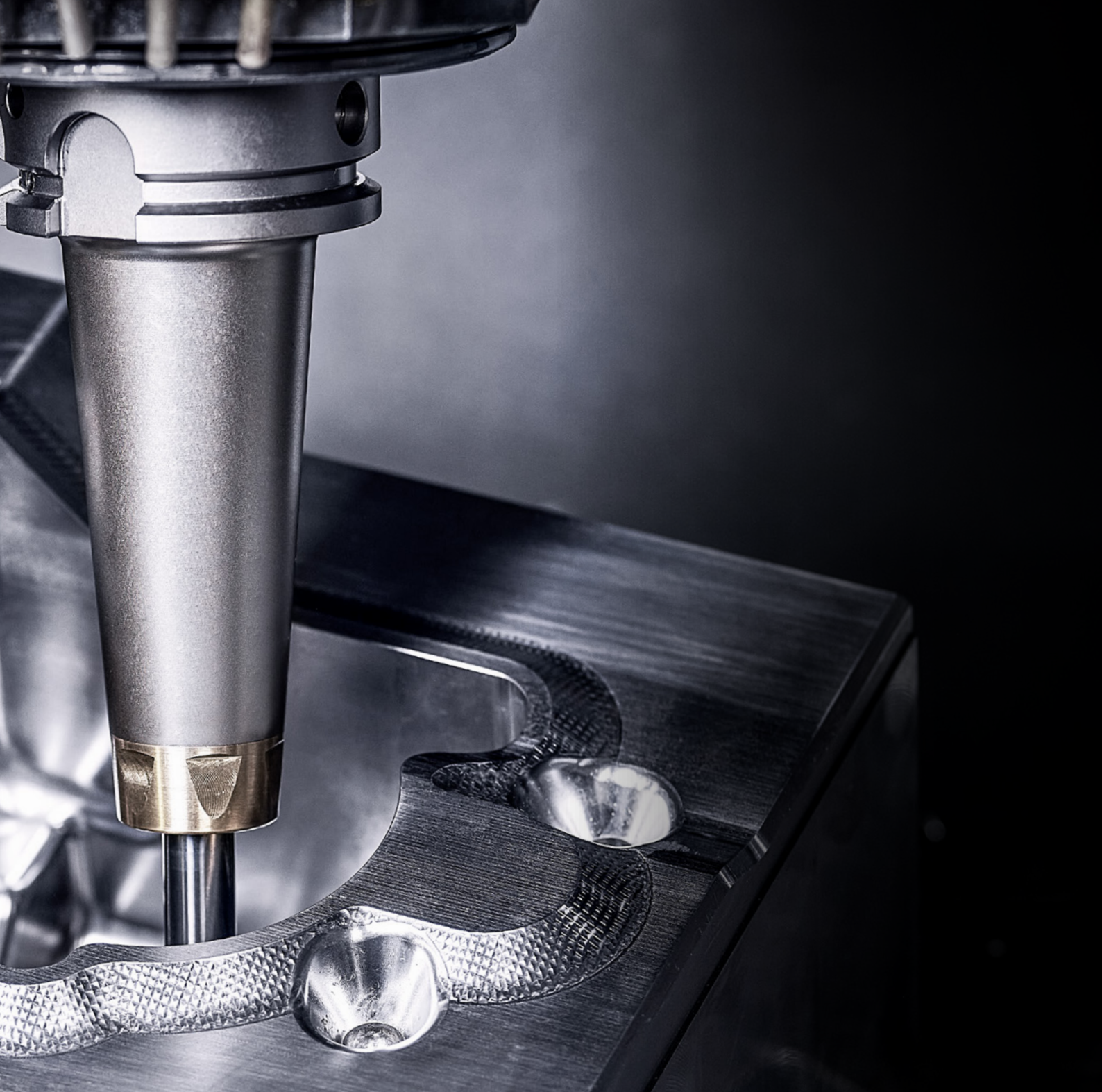
Diameter	Feed depth of cut	P	M	K	N	S	H
2	f_z (mm)	0.02	0.02	0.02	0.02	-	0.02
	a_p (mm)	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	-	0.05 - 0.3
3	f_z (mm)	0.03	0.025	0.03	0.03	-	0.03
	a_p (mm)	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	-	0.05 - 0.3
4	f_z (mm)	0.04	0.025	0.04	0.04	-	0.04
	a_p (mm)	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	-	0.05 - 0.3
6	f_z (mm)	0.045	0.03	0.05	0.05	-	0.025 - 0.03
	a_p (mm)	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	-	0.05 - 0.3
8	f_z (mm)	0.06	0.04	0.065	0.055	-	0.03 - 0.04
	a_p (mm)	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	-	0.05 - 0.3
10	f_z (mm)	0.07	0.045	0.08	0.055 - 0.07	-	0.04 - 0.05
	a_p (mm)	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	-	0.05 - 0.3
12	f_z (mm)	0.085	0.055	0.1	0.085 - 0.1	-	0.05 - 0.06
	a_p (mm)	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	0.05 - 0.3	-	0.05 - 0.3

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	●	○	●	● A ● KU	-	● 55 ● 60
ROUGH	-	-	-	-	-	-
FINE	85 210 280	60 85 110	160 220 280	180 300 600	-	80 120 200

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | 55 = HRC 45-55 | 60 = HRC 55-60





H – Hard materials

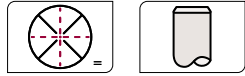
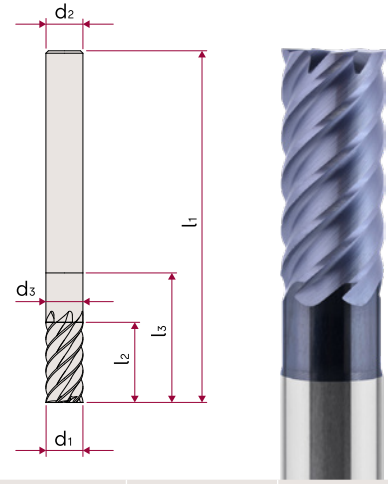
	z	Page
End mills		126
HX01	6 - 8	126
Torus milling cutters		128
HR01	2	128
HR02	5	134
HR03	4	136
HR04	5	139

	z	Page
Ball nose end mill cutters		141
HV01	2	141
Trochoidal milling cutters		146
HT01	5	146

End mills

HX01

d_1 3 - 20	z 6 - 8	λ° 50°	AlTiN
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Order no.	d_1	l_2	l_3	d_3	l_1	d_2	z
162503	3	8	11	2.8	57	6	6
162504	4	11	16	3.7	57	6	6
162505	5	13	18	4.7	57	6	6
162506	6	13	18	5.6	57	6	6
162512	6	18	-	-	57	6	6
162507	8	19	27	7.5	63	8	6
162513	8	24	-	-	63	8	6
162508	10	22	32	9.5	72	10	6
162514	10	30	-	-	75	10	6
162509	12	26	36	11	83	12	6
162515	12	36	-	-	83	12	6
162516	12	36	-	-	150	12	6
162510	16	32	42	15	92	16	8
162517	16	48	-	-	104	16	8
162518	16	65	-	-	150	16	8
162511	20	38	48	19	104	20	8
162519	20	55	-	-	110	20	8
162520	20	65	-	-	150	20	8

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3 - 4	f_z (mm)	0.035 - 0.047	-	0.037 - 0.04	-	-	0.03 - 0.045
	a_p (mm)	4.5 - 6.0	-	4.5 - 6.0	-	-	4.5 - 6.0
5 - 6	f_z (mm)	0.045 - 0.057	-	0.04 - 0.057	-	-	0.04 - 0.055
	a_p (mm)	7.5 - 9.0	-	7.5 - 9.0	-	-	7.5 - 9.0
7 - 8	f_z (mm)	0.071 - 0.074	-	0.074	-	-	0.066 - 0.071
	a_p (mm)	10.0 - 12.0	-	10.0 - 12.0	-	-	10.0 - 12.0
9 - 10	f_z (mm)	0.078 - 0.081	-	0.081	-	-	0.073 - 0.078
	a_p (mm)	13.0 - 15.0	-	13.0 - 15.0	-	-	13.0 - 15.0
12	f_z (mm)	0.073 - 0.081	-	0.073 - 0.081	-	-	0.073 - 0.081
	a_p (mm)	18	-	18	-	-	18
16	f_z (mm)	0.087 - 0.1	-	0.087 - 0.1	-	-	0.087 - 0.1
	a_p (mm)	24	-	24	-	-	24
20	f_z (mm)	0.1 - 0.12	-	0.1 - 0.12	-	-	0.11 - 0.12
	a_p (mm)	30	-	30	-	-	30

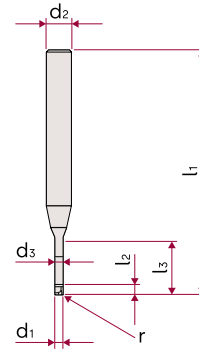
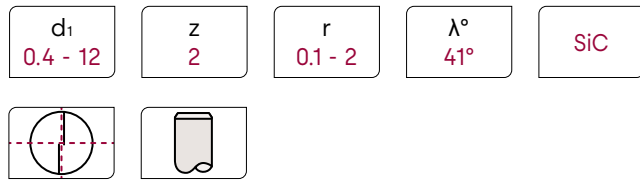
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	○	-	○	-	-	● ₅₅ ● ₆₀ ● ₆₅
ROUGH	-	-	-	-	-	-
FINE	117 170 180	-	144 160	-	-	45 65 110

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

Torus milling cutters

HR01



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
164378	0.4	0.4	1.5	0.385	50	0.1	4	2
164379	0.4	0.4	3	0.385	50	0.1	4	2
164380	0.4	0.4	5	0.385	50	0.1	4	2
164434	0.4	0.4	-	-	50	0.1	4	2
164381	0.5	0.5	1.5	0.48	50	0.1	4	2
164382	0.5	0.5	3	0.48	50	0.1	4	2
164383	0.5	0.5	5	0.48	50	0.1	4	2
164384	0.5	0.5	10	0.48	50	0.1	4	2
164435	0.5	0.5	-	-	50	0.1	4	2
164385	0.6	0.6	3	0.58	50	0.1	4	2
164386	0.6	0.6	5	0.58	50	0.1	4	2
164387	0.6	0.6	10	0.58	50	0.1	4	2
164436	0.6	0.6	-	-	50	0.1	4	2
164388	0.8	0.8	3	0.78	50	0.1	4	2
164389	0.8	0.8	5	0.78	50	0.1	4	2
164390	0.8	0.8	10	0.78	50	0.1	4	2
164391	0.8	0.8	15	0.78	50	0.1	4	2
164437	0.8	0.8	-	-	50	0.1	4	2
164392	1	1	5	0.98	50	0.2	4	2
164393	1	1	10	0.98	50	0.2	4	2
164394	1	1	15	0.98	50	0.2	4	2
164395	1	1	20	0.98	75	0.2	4	2
164438	1	1	-	-	50	0.2	4	2
164439	1	1	-	-	75	0.2	4	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
164396	1.5	1.5	5	1.45	50	0.2	4	2
164397	1.5	1.5	10	1.45	50	0.2	4	2
164398	1.5	1.5	15	1.45	50	0.2	4	2
164399	1.5	1.5	20	1.45	75	0.2	4	2
164440	1.5	1.5	-	-	50	0.2	4	2
164441	1.5	1.5	-	-	75	0.2	4	2
164400	2	2	5	1.95	50	0.2	4	2
164401	2	2	10	1.95	50	0.2	4	2
164402	2	2	15	1.95	50	0.2	4	2
164403	2	2	20	1.95	75	0.2	4	2
164404	2	2	25	1.95	75	0.2	4	2
164442	2	2	-	-	50	0.2	4	2
164443	2	2	-	-	75	0.2	4	2
164405	2	2	5	1.95	50	0.5	4	2
164406	2	2	10	1.95	50	0.5	4	2
164407	2	2	15	1.95	50	0.5	4	2
164408	2	2	20	1.95	75	0.5	4	2
164409	2	2	25	1.95	75	0.5	4	2
164444	2	2	-	-	50	0.5	4	2
164445	2	2	-	-	75	0.5	4	2
164410	3	3	10	2.95	58	0.2	6	2
164411	3	3	15	2.95	58	0.2	6	2
164412	3	3	20	2.95	75	0.2	6	2
164413	3	3	25	2.95	75	0.2	6	2
164446	3	3	-	-	58	0.2	6	2
164447	3	3	-	-	75	0.2	6	2
164414	3	3	10	2.95	58	0.5	6	2
164415	3	3	15	2.95	58	0.5	6	2
164416	3	3	20	2.95	75	0.5	6	2
164417	3	3	25	2.95	75	0.5	6	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
164448	3	3	-	-	58	0.5	6	2
164449	3	3	-	-	75	0.5	6	2
164418	4	4	10	3.9	58	0.2	6	2
164419	4	4	15	3.9	58	0.2	6	2
164420	4	4	20	3.9	75	0.2	6	2
164421	4	4	25	3.9	75	0.2	6	2
164450	4	4	-	-	58	0.2	6	2
164451	4	4	-	-	75	0.2	6	2
164422	4	4	10	3.9	58	0.5	6	2
164423	4	4	15	3.9	58	0.5	6	2
164424	4	4	20	3.9	75	0.5	6	2
164425	4	4	25	3.9	75	0.5	6	2
164452	4	4	-	-	58	0.5	6	2
164453	4	4	-	-	75	0.5	6	2
164426	5	5	10	4.9	58	0.2	6	2
164427	5	5	20	4.9	75	0.2	6	2
164454	5	5	-	-	58	0.2	6	2
164455	5	5	-	-	75	0.2	6	2
164428	5	5	10	4.9	58	0.5	6	2
164429	5	5	20	4.9	75	0.5	6	2
164456	5	5	-	-	58	0.5	6	2
164457	5	5	-	-	75	0.5	6	2
164430	6	6	10	5.85	58	0.2	6	2
164431	6	6	20	5.85	75	0.2	6	2
164458	6	6	-	-	58	0.2	6	2
164459	6	6	-	-	75	0.2	6	2
164432	6	6	10	5.85	58	0.5	6	2
164433	6	6	20	5.85	75	0.5	6	2
164460	6	6	-	-	58	0.5	6	2
164461	6	6	-	-	75	0.5	6	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
164462	6	6	-	-	58	1	6	2
164463	6	6	-	-	75	1	6	2
164464	8	8	-	-	63	0.5	8	2
164465	8	8	-	-	90	0.5	8	2
164466	8	8	-	-	63	1	8	2
164467	8	8	-	-	90	1	8	2
164468	10	10	-	-	72	1	10	2
164469	10	10	-	-	100	1	10	2
164470	10	10	-	-	72	1.5	10	2
164471	10	10	-	-	100	1.5	10	2
164472	12	12	-	-	83	1	12	2
164473	12	12	-	-	110	1	12	2
164474	12	12	-	-	83	2	12	2
164475	12	12	-	-	110	2	12	2

Application data (f_z / a_p) and speed (V_c)

Ball nose end mills – Copy milling 3D


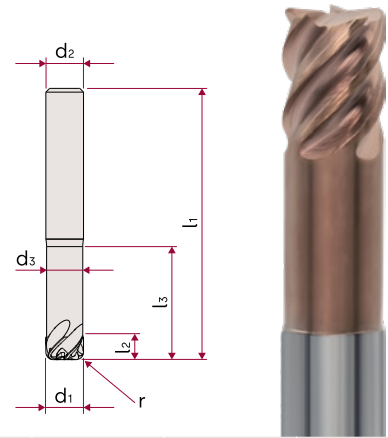
H – Hardened materials									
Machining	up to 48 HRC			up to 55 HRC			up to 65 HRC		
	V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]
	d_1 [mm]								
	0.4 - 0.5 mm								
Rough	-	-	-	-	-	-	-	-	-
Medium	-	-	-	-	-	-	-	-	-
Fine	170 - 250	0.015 - 0.02	0.01 - 0.02	160 - 200	0.016 - 0.018	0.01 - 0.02	90 - 160	0.005 - 0.01	0.01 - 0.02
	0.6 - 0.8 mm								
Rough	-	-	-	-	-	-	-	-	-
Medium	-	-	-	-	-	-	-	-	-
Fine	170 - 250	0.015 - 0.025	0.02 - 0.03	160 - 200	0.01 - 0.02	0.02 - 0.03	90 - 160	0.005 - 0.01	0.01 - 0.02
	1.0 - 1.5 mm								
Rough	150 - 190	0.02 - 0.025	0.2 - 0.5	120 - 160	0.015 - 0.02	0.2 - 0.5	70 - 120	0.005 - 0.01	0.15 - 0.25
Medium	160 - 220	0.025 - 0.045	0.08 - 0.1	140 - 180	0.02 - 0.04	0.05 - 0.1	80 - 140	0.01 - 0.015	0.035 - 0.045
Fine	170 - 250	0.02 - 0.025	0.03 - 0.04	160 - 200	0.015 - 0.02	0.03 - 0.04	90 - 160	0.005 - 0.01	0.03 - 0.04
	2.0 mm								
Rough	150 - 190	0.025 - 0.03	0.3 - 0.6	120 - 160	0.02 - 0.025	0.3 - 0.6	70 - 120	0.005 - 0.01	0.2 - 0.3
Medium	160 - 220	0.025 - 0.045	0.1 - 0.12	140 - 180	0.025 - 0.045	0.1 - 0.12	80 - 140	0.01 - 0.015	0.04 - 0.05
Fine	170 - 250	0.02 - 0.025	0.035 - 0.05	160 - 200	0.015 - 0.02	0.035 - 0.05	90 - 160	0.005 - 0.01	0.035 - 0.05
	3.0 mm								
Rough	150 - 190	0.03 - 0.04	0.3 - 0.6	120 - 160	0.03 - 0.035	0.3 - 0.6	70 - 120	0.01 - 0.015	0.2 - 0.3
Medium	160 - 220	0.04 - 0.065	0.12 - 0.15	140 - 180	0.035 - 0.06	0.12 - 0.15	80 - 140	0.015 - 0.02	0.045 - 0.055
Fine	170 - 250	0.02 - 0.025	0.04 - 0.05	160 - 200	0.015 - 0.02	0.04 - 0.05	90 - 160	0.01 - 0.015	0.04 - 0.05
	4.0 mm								
Rough	150 - 190	0.04 - 0.05	0.3 - 0.6	120 - 160	0.035 - 0.045	0.3 - 0.6	70 - 120	0.01 - 0.02	0.2 - 0.3
Medium	160 - 220	0.045 - 0.08	0.13 - 0.18	140 - 180	0.04 - 0.075	0.12 - 0.18	80 - 140	0.02 - 0.025	0.05 - 0.06
Fine	170 - 250	0.025 - 0.03	0.05 - 0.075	160 - 200	0.02 - 0.025	0.05 - 0.075	90 - 160	0.01 - 0.015	0.05 - 0.075
	5.0 mm								
Rough	150 - 190	0.04 - 0.055	0.3 - 0.6	120 - 160	0.035 - 0.05	0.3 - 0.6	70 - 120	0.015 - 0.02	0.2 - 0.3
Medium	160 - 220	0.06 - 0.095	0.14 - 0.19	140 - 180	0.045 - 0.085	0.16 - 0.24	80 - 140	0.025 - 0.03	0.06 - 0.08
Fine	170 - 250	0.03 - 0.035	0.055 - 0.08	160 - 200	0.025 - 0.03	0.055 - 0.08	90 - 160	0.015 - 0.02	0.055 - 0.08

H – Hardened materials									
Machining	up to 48 HRC			up to 55 HRC			up to 65 HRC		
	V _c [m/min]	f _z [mm/tooth]	a _p [mm]	V _c [m/min]	f _z [mm/tooth]	a _p [mm]	V _c [m/min]	f _z [mm/tooth]	a _p [mm]
	d ₁ [mm]								
	6.0 mm								
Rough	150 - 190	0.045 - 0.06	0.3 - 0.6	120 - 160	0.04 - 0.055	0.3 - 0.6	70 - 120	0.015 - 0.02	0.2 - 0.3
Medium	160 - 220	0.08 - 0.13	0.16 - 0.32	140 - 180	0.075 - 0.12	0.18 - 0.26	80 - 140	0.03 - 0.04	0.07 - 0.09
Fine	170 - 250	0.03 - 0.04	0.07 - 0.1	160 - 200	0.025 - 0.035	0.07 - 0.1	90 - 160	0.015 - 0.02	0.07 - 0.1
	8.0 mm								
Rough	150 - 190	0.055 - 0.07	0.3 - 0.6	120 - 160	0.05 - 0.065	0.3 - 0.6	70 - 120	0.02 - 0.025	0.2 - 0.3
Medium	160 - 220	0.12 - 0.145	0.18 - 0.3	140 - 180	0.11 - 0.135	0.2 - 0.3	80 - 140	0.035 - 0.045	0.08 - 0.15
Fine	170 - 250	0.035 - 0.045	0.075 - 0.11	160 - 200	0.03 - 0.04	0.075 - 0.11	90 - 160	0.02 - 0.025	0.075 - 0.11
	10.0 mm								
Rough	150 - 190	0.065 - 0.095	0.3 - 0.6	120 - 160	0.065 - 0.085	0.3 - 0.6	70 - 120	0.025 - 0.030	0.2 - 0.3
Medium	160 - 220	0.13 - 0.18	0.2 - 0.36	140 - 180	0.125 - 0.17	0.24 - 0.36	80 - 140	0.04 - 0.055	0.12 - 0.18
Fine	170 - 250	0.04 - 0.05	0.09 - 0.14	160 - 200	0.035 - 0.045	0.09 - 0.14	90 - 160	0.02 - 0.025	0.09 - 0.14
	12.0 mm								
Rough	150 - 190	0.085 - 0.115	0.3 - 0.6	120 - 160	0.08 - 0.105	0.3 - 0.6	70 - 120	0.03 - 0.004	0.2 - 0.3
Medium	160 - 220	0.14 - 0.19	0.26 - 0.39	140 - 180	0.135 - 0.18	0.26 - 0.39	80 - 140	0.045 - 0.06	0.14 - 0.2
Fine	170 - 250	0.045 - 0.045	0.1 - 0.17	160 - 200	0.04 - 0.045	0.1 - 0.17	90 - 160	0.025 - 0.03	0.1 - 0.17

Torus milling cutters

HR02

d_1 4 - 12	z 5	r 0.5 - 2	λ° 47°	ALTiSiN
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
162350	4	4.2	12	3.94	60	0.5	6	5
162351	4	4.2	20	3.94	60	0.5	6	5
162352	4	4.2	12	3.94	60	1	6	5
162353	4	4.2	20	3.94	60	1	6	5
162354	5	5.2	15	4.9	60	0.5	6	5
162355	5	5.2	25	4.9	60	0.5	6	5
162356	5	5.2	15	4.9	60	1	6	5
162357	5	5.2	25	4.9	60	1	6	5
162358	6	6.3	18	5.9	60	0.5	6	5
162359	6	6.3	30	5.9	75	0.5	6	5
162360	6	6.3	18	5.9	60	1	6	5
162361	6	6.3	30	5.9	75	1	6	5
162362	8	8.4	24	7.8	64	0.5	8	5
162363	8	8.4	40	7.8	75	0.5	8	5
162364	8	8.4	24	7.8	64	1	8	5
162365	8	8.4	40	7.8	75	1	8	5
162366	10	10.5	30	9.8	75	1	10	5
162367	10	10.5	50	9.8	100	1	10	5
162368	10	10.5	30	9.8	75	2	10	5
162369	10	10.5	50	9.8	100	2	10	5
162370	12	12.5	36	11.8	100	1	12	5
162371	12	12.5	60	11.8	100	1	12	5
162372	12	12.5	36	11.8	100	2	12	5
162373	12	12.5	60	11.8	100	2	12	5

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm)	0.05 - 0.08	-	0.05 - 0.08	-	-	0.05 - 0.06
	a_p (mm)	0.048 - 0.6	-	0.048 - 0.6	-	-	0.024 - 0.24
5	f_z (mm)	0.06 - 0.09	-	0.06 - 0.09	-	-	0.06 - 0.08
	a_p (mm)	0.06 - 0.75	-	0.06 - 0.75	-	-	0.03 - 0.3
6	f_z (mm)	0.08 - 0.1	-	0.08 - 0.1	-	-	0.08 - 0.09
	a_p (mm)	0.072 - 0.9	-	0.072 - 0.9	-	-	0.06 - 0.36
7	f_z (mm)	0.09 - 0.12	-	0.09 - 0.12	-	-	0.09 - 0.11
	a_p (mm)	0.096 - 1.2	-	0.096 - 1.2	-	-	0.048 - 0.48
10	f_z (mm)	0.11 - 0.15	-	0.11 - 0.15	-	-	0.11 - 0.13
	a_p (mm)	0.12 - 1.5	-	0.12 - 1.5	-	-	0.06 - 0.6
12	f_z (mm)	0.13 - 0.18	-	0.13 - 0.18	-	-	0.13 - 0.16
	a_p (mm)	0.144 - 1.8	-	0.144 - 1.8	-	-	0.072 - 0.72

Speed (V_c in m/min)


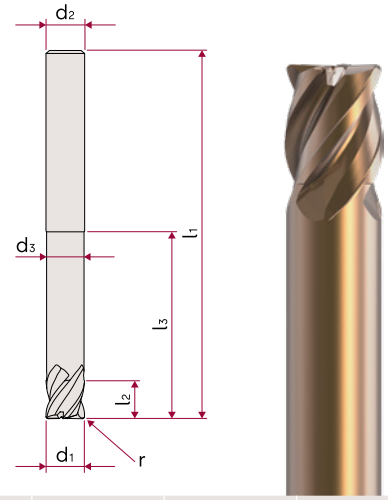
Application	P	M	K	N	S	H
	○	-	○	-	-	● 55 ● 60 ● 65
ROUGH	180 250 270	-	190 230 270	-	-	50 140 230
FINE	240 260 320	-	240 260 320	-	-	140 200 250

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

Torus milling cutters

HR03

d_1 3 - 12	z 4	r 0.2 - 2	λ° 42°	AlTiSiN
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
162286	3	3.5	10	2.94	60	0.2	6	4
162287	3	3.5	15	2.94	60	0.2	6	4
162288	3	3.5	20	2.94	60	0.2	6	4
162289	3	3.5	25	2.94	75	0.2	6	4
162290	3	3.5	10	2.94	60	0.5	6	4
162291	3	3.5	15	2.94	60	0.5	6	4
162292	3	3.5	20	2.94	60	0.5	6	4
162293	3	3.5	25	2.94	75	0.5	6	4
162294	4	4.6	10	3.94	60	0.2	6	4
162295	4	4.6	15	3.94	60	0.2	6	4
162296	4	4.6	20	3.94	60	0.2	6	4
162297	4	4.6	25	3.94	75	0.2	6	4
162298	4	4.6	30	3.94	75	0.2	6	4
162299	4	4.6	10	3.94	60	0.5	6	4
162300	4	4.6	15	3.94	60	0.5	6	4
162301	4	4.6	20	3.94	60	0.5	6	4
162302	4	4.6	25	3.94	75	0.5	6	4
162303	4	4.6	30	3.94	75	0.5	6	4
162304	5	5.8	15	4.9	60	0.2	6	4
162305	5	5.8	20	4.9	60	0.2	6	4
162306	5	5.8	25	4.9	60	0.2	6	4
162307	5	5.8	30	4.9	75	0.2	6	4
162308	5	5.8	15	4.9	60	0.5	6	4
162309	5	5.8	20	4.9	60	0.5	6	4

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
162310	5	5.8	25	4.9	60	0.5	6	4
162311	5	5.8	30	4.9	75	0.5	6	4
162312	6	6.9	15	5.9	60	0.2	6	4
162313	6	6.9	20	5.9	60	0.2	6	4
162314	6	6.9	25	5.9	60	0.2	6	4
162315	6	6.9	30	5.9	75	0.2	6	4
162316	6	6.9	35	5.9	75	0.2	6	4
162317	6	6.9	15	5.9	60	0.3	6	4
162318	6	6.9	20	5.9	60	0.3	6	4
162319	6	6.9	25	5.9	60	0.3	6	4
162320	6	6.9	30	5.9	75	0.3	6	4
162321	6	6.9	35	5.9	75	0.3	6	4
162322	6	6.9	15	5.9	60	0.5	6	4
162323	6	6.9	20	5.9	60	0.5	6	4
162324	6	6.9	25	5.9	60	0.5	6	4
162325	6	6.9	30	5.9	75	0.5	6	4
162326	6	6.9	35	5.9	75	0.5	6	4
162327	6	6.9	15	5.9	60	1	6	4
162328	6	6.9	20	5.9	60	1	6	4
162329	6	6.9	25	5.9	60	1	6	4
162330	6	6.9	30	5.9	75	1	6	4
162331	6	6.9	35	5.9	75	1	6	4
162332	8	9.2	25	7.8	64	0.5	8	4
162333	8	9.2	50	7.8	100	0.5	8	4
162334	8	9.2	25	7.8	64	1	8	4
162335	8	9.2	50	7.8	100	1	8	4
162336	8	9.2	25	7.8	64	2	8	4
162337	8	9.2	50	7.8	100	2	8	4
162338	10	11.5	30	9.8	75	0.5	10	4
162339	10	11.5	50	9.8	100	0.5	10	4

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
162340	10	11.5	30	9.8	75	1	10	4
162341	10	11.5	50	9.8	100	1	10	4
162342	10	11.5	30	9.8	75	2	10	4
162343	10	11.5	50	9.8	100	2	10	4
162344	12	13.8	35	11.8	75	0.5	12	4
162345	12	13.8	60	11.8	100	0.5	12	4
162346	12	13.8	35	11.8	75	1	12	4
162347	12	13.8	60	11.8	100	1	12	4
162348	12	13.8	35	11.8	75	2	12	4
162349	12	13.8	60	11.8	100	2	12	4

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3 - 4	f _z (mm)	0.042 - 0.084	-	0.036 - 0.101	-	-	0.024 - 0.061
	a _p (mm)	0.036 - 0.6	-	0.036 - 0.6	-	-	0.015 - 0.24
5 - 6	f _z (mm)	0.074 - 0.125	-	0.063 - 0.150	-	-	0.042 - 0.091
	a _p (mm)	0.06 - 0.9	-	0.06 - 0.9	-	-	0.025 - 0.36
7 - 8	f _z (mm)	0.114 - 0.165	-	0.097 - 0.198	-	-	0.065 - 0.120
	a _p (mm)	0.096 - 1.2	-	0.096 - 1.2	-	-	0.04 - 0.48
9 - 10	f _z (mm)	0.39 - 0.2	-	0.118 - 0.240	-	-	0.079 - 0.146
	a _p (mm)	0.12 - 1.5	-	0.12 - 1.5	-	-	0.05 - 0.6
12	f _z (mm)	0.163 - 0.235	-	0.139 - 0.282	-	-	0.093 - 0.172
	a _p (mm)	0.144 - 1.8	-	0.144 - 1.8	-	-	0.06 - 0.72

Speed (V_c in m/min)

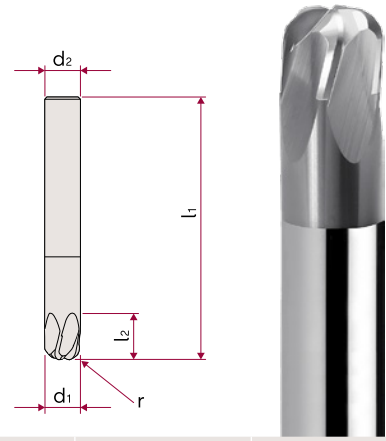
Application	P	M	K	N	S	H
	○	-	○	-	-	● 55 ● 60 ● 65
ROUGH FINE	1800 220 250 220 270 340	-	190 250 260 340	-	-	35 80 180 120 200 250

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65

Torus milling cutters

HR04

d_1 6 - 16	z 5	r 2 - 5	λ° 30°	CrN
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Order no.	d_1	l_2	l_1	r	d_2	z
164476	6	4.5	57	2	6	5
164477	8	5.5	63	2.5	8	5
164478	10	7.5	72	3	10	5
164479	10	7.5	72	3.5	10	5
164480	12	9	83	3.5	12	5
164481	16	10.5	92	5	16	5

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	0.08 - 0.12	-	-	-	-	0.08 - 0.1
	a_p (mm)	0.1 - 0.6	-	-	-	-	0.1 - 0.2
8	f_z (mm)	0.08 - 0.15	-	-	-	-	0.08 - 0.1
	a_p (mm)	0.15 - 0.8	-	-	-	-	0.15 - 0.275
10	f_z (mm)	0.08 - 0.15	-	-	-	-	0.08 - 0.1
	a_p (mm)	0.2 - 1	-	-	-	-	0.2 - 0.35
12	f_z (mm)	0.08 - 0.15	-	-	-	-	0.08 - 0.115
	a_p (mm)	0.2 - 1.2	-	-	-	-	0.2 - 0.4
16	f_z (mm)	0.1 - 0.175	-	-	-	-	0.08 - 0.115
	a_p (mm)	0.2 - 0.95	-	-	-	-	0.2 - 0.5

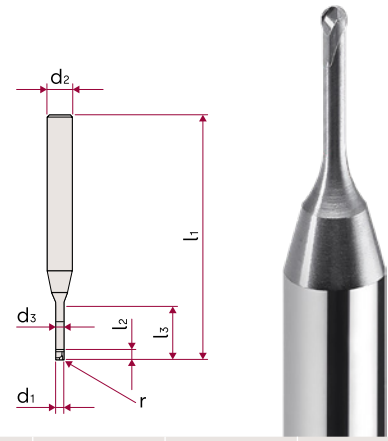
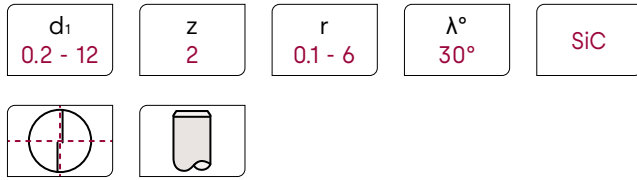
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	○	-	-	-	-	● 55 ● 60
ROUGH FINE	- 120 235 350	-	-	-	-	80 150 220 100 175 250

● = Primary application | ○ = Secondary application | 55 = HRC 45-55 | 60 = HRC 55-60

Ball nose end mill cutters

HV01



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
164522	0.2	0.2	-	-	50	0.1	4	2
164482	0.3	0.3	1.5	0.27	50	0.15	4	2
164523	0.3	0.3	-	-	50	0.15	4	2
164483	0.4	0.4	1.5	0.385	50	0.2	4	2
164484	0.4	0.4	3	0.385	50	0.2	4	2
164485	0.4	0.4	5	0.385	50	0.2	4	2
164524	0.4	0.4	-	-	50	0.2	4	2
164486	0.5	0.5	3	0.48	50	0.25	4	2
164487	0.5	0.5	5	0.48	50	0.25	4	2
164488	0.5	0.5	10	0.48	50	0.25	4	2
164525	0.5	0.5	-	-	50	0.25	4	2
164489	0.6	0.6	3	0.58	50	0.3	4	2
164490	0.6	0.6	5	0.58	50	0.3	4	2
164491	0.6	0.6	10	0.58	50	0.3	4	2
164526	0.6	0.6	-	-	50	0.3	4	2
164492	0.8	0.8	3	0.78	50	0.4	4	2
164493	0.8	0.8	5	0.78	50	0.4	4	2
164494	0.8	0.8	10	0.78	50	0.4	4	2
164527	0.8	0.8	-	-	50	0.4	4	2
164495	1	1	5	0.98	50	0.5	4	2
164496	1	1	10	0.98	50	0.5	4	2
164497	1	1	15	0.98	50	0.5	4	2
164528	1	1	-	-	50	0.5	4	2
164529	1	1	-	-	75	0.5	4	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
164498	1.5	1.5	5	1.45	50	0.75	4	2
164499	1.5	1.5	10	1.45	50	0.75	4	2
164500	1.5	1.5	15	1.45	50	0.75	4	2
164501	1.5	1.5	20	1.45	75	0.75	4	2
164530	1.5	1.5	-	-	50	0.75	4	2
164531	1.5	1.5	-	-	75	0.75	4	2
164502	2	2	5	1.95	50	1	4	2
164503	2	2	10	1.95	50	1	4	2
164504	2	2	15	1.95	50	1	4	2
164505	2	2	20	1.95	75	1	4	2
164532	2	2	-	-	50	1	4	2
164533	2	2	-	-	75	1	4	2
164506	3	3	10	2.95	58	1.5	6	2
164507	3	3	15	2.95	58	1.5	6	2
164508	3	3	20	2.95	75	1.5	6	2
164509	3	3	25	2.95	75	1.5	6	2
164534	3	3	-	-	58	1.5	6	2
164535	3	3	-	-	75	1.5	6	2
164510	4	4	10	3.9	58	2	6	2
164511	4	4	15	3.9	58	2	6	2
164512	4	4	20	3.9	75	2	6	2
164513	4	4	25	3.9	75	2	6	2
164536	4	4	-	-	58	2	6	2
164537	4	4	-	-	75	2	6	2
164514	5	5	10	4.9	58	2.5	6	2
164515	5	5	15	4.9	58	2.5	6	2
164516	5	5	20	4.9	75	2.5	6	2
164517	5	5	25	4.9	75	2.5	6	2
164538	5	5	-	-	58	2.5	6	2
164539	5	5	-	-	75	2.5	6	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
164518	6	6	10	5.85	58	3	6	2
164519	6	6	15	5.85	58	3	6	2
164520	6	6	20	5.85	75	3	6	2
164521	6	6	25	5.85	75	3	6	2
164540	6	6	-	-	58	3	6	2
164541	6	6	-	-	75	3	6	2
164542	8	8	-	-	63	4	8	2
164543	8	8	-	-	90	4	8	2
164544	10	10	-	-	72	5	10	2
164545	10	10	-	-	100	5	10	2
164546	12	12	-	-	83	6	12	2
164547	12	12	-	-	110	6	12	2

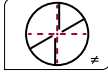
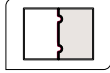

Application data (f_z / a_p) and speed (V_c) Ball nose end mills – Copy milling 3D

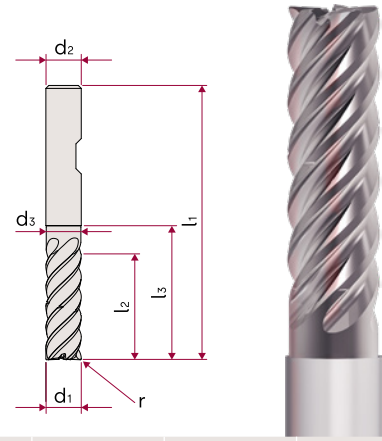
H – Hardened materials									
Machining	up to 48 HRC			up to 55 HRC			up to 65 HRC		
	V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]	V_c [m/min]	f_z [mm/tooth]	a_p [mm]
	d_1 [mm]								
	0.2 - 0.5 mm								
Rough	-	-	-	-	-	-	-	-	-
Medium	-	-	-	-	-	-	-	-	-
Fine	180 - 250	0.005 - 0.02	0.01 - 0.02	140 - 200	0.005 - 0.015	0.005 - 0.02	40 - 60	0.005 - 0.01	0.01 - 0.02
	0.6 - 0.8 mm								
Rough	-	-	-	-	-	-	-	-	-
Medium	-	-	-	-	-	-	-	-	-
Fine	180 - 250	0.015 - 0.025	0.02 - 0.04	140 - 200	0.01 - 0.02	0.02 - 0.035	40 - 60	0.01 - 0.015	0.015 - 0.03
	1.0 - 1.5 mm								
Rough	110 - 130	0.025 - 0.035	0.1 - 0.2	90 - 110	0.025 - 0.03	0.1 - 0.15	15 - 20	0.005 - 0.01	0.4 - 0.075
Medium	120 - 160	0.04 - 0.05	0.05 - 0.15	100 - 120	0.025 - 0.045	0.05 - 0.1	25 - 35	0.02 - 0.025	0.025 - 0.05
Fine	180 - 250	0.025 - 0.03	0.04 - 0.05	140 - 200	0.02 - 0.025	0.035 - 0.05	40 - 60	0.01 - 0.015	0.02 - 0.03
	2.0 mm								
Rough	110 - 130	0.035 - 0.06	0.2 - 0.35	90 - 110	0.03 - 0.055	0.15 - 0.35	15 - 20	0.01 - 0.015	0.05 - 0.15
Medium	120 - 160	0.05 - 0.085	0.1 - 0.25	100 - 120	0.045 - 0.08	0.1 - 0.2	25 - 35	0.03 - 0.04	0.035 - 0.075
Fine	180 - 250	0.03 - 0.035	0.05 - 0.07	140 - 200	0.025 - 0.03	0.05 - 0.07	40 - 60	0.015 - 0.025	0.025 - 0.04
	3.0 mm								
Rough	110 - 130	0.05 - 0.07	0.35 - 0.55	90 - 110	0.05 - 0.065	0.3 - 0.55	15 - 20	0.01 - 0.02	0.1 - 0.2
Medium	120 - 160	0.085 - 0.095	0.25 - 0.35	100 - 120	0.07 - 0.09	0.2 - 0.35	25 - 35	0.035 - 0.05	0.05 - 0.1
Fine	180 - 250	0.035 - 0.04	0.07 - 0.1	140 - 200	0.03 - 0.035	0.05 - 0.1	40 - 60	0.01 - 0.015	0.03 - 0.05
	4.0 mm								
Rough	110 - 130	0.07 - 0.85	0.45 - 0.7	90 - 110	0.065 - 0.075	0.4 - 0.7	15 - 20	0.015 - 0.02	0.1 - 0.2
Medium	120 - 160	0.095 - 0.115	0.35 - 0.5	100 - 120	0.08 - 0.105	0.3 - 0.5	25 - 35	0.04 - 0.05	0.05 - 0.15
Fine	180 - 250	0.04 - 0.065	0.1 - 0.12	140 - 200	0.035 - 0.065	0.1 - 0.12	40 - 60	0.025 - 0.035	0.04 - 0.06
	5.0 mm								
Rough	110 - 130	0.08 - 0.09	0.55 - 0.9	90 - 110	0.075 - 0.085	0.5 - 0.9	15 - 20	0.015 - 0.025	0.15 - 0.3
Medium	120 - 160	0.11 - 0.13	0.45 - 0.6	100 - 120	0.09 - 0.12	0.4 - 0.6	25 - 35	0.045 - 0.06	0.1 - 0.2
Fine	180 - 250	0.06 - 0.075	0.12 - 0.15	140 - 200	0.04 - 0.07	0.11 - 0.14	40 - 60	0.03 - 0.04	0.05 - 0.08

H – Hardened materials									
Machining	up to 48 HRC			up to 55 HRC			up to 65 HRC		
	V _c [m/min]	f _z [mm/tooth]	a _p [mm]	V _c [m/min]	f _z [mm/tooth]	a _p [mm]	V _c [m/min]	f _z [mm/tooth]	a _p [mm]
	d ₁ [mm]								
	6.0 mm								
Rough	110 - 130	0.085 - 0.1	0.85 - 1.25	90 - 110	0.08 - 0.095	0.8 - 1.25	15 - 20	0.02 - 0.025	0.25 - 0.4
Medium	120 - 160	0.12 - 0.145	0.5 - 0.7	100 - 120	0.105 - 0.13	0.45 - 0.7	25 - 35	0.05 - 0.07	0.15 - 0.25
Fine	180 - 250	0.065 - 0.08	0.13 - 0.16	140 - 200	0.06 - 0.075	0.13 - 0.15	40 - 60	0.03 - 0.04	0.065 - 0.08
	8,0 mm								
Rough	110 - 130	0.095 - 0.115	1.1 - 1.7	90 - 110	0.09 - 0.105	1.1 - 1.7	15 - 20	0.02 - 0.03	0.35 - 0.5
Medium	120 - 160	0.14 - 0.155	0.65 - 0.95	100 - 120	0.115 - 0.145	0.6 - 0.95	25 - 35	0.065 - 0.08	0.2 - 0.3
Fine	180 - 250	0.075 - 0.09	0.145 - 0.17	140 - 200	0.07 - 0.085	0.14 - 0.17	40 - 60	0.035 - 0.045	0.07 - 0.09
	10.0 mm								
Rough	110 - 130	0.11 - 0.135	1.4 - 2.1	90 - 110	0.105 - 0.125	1.4 - 2.1	15 - 20	0.03 - 0.035	0.4 - 0.65
Medium	120 - 160	0.15 - 0.185	0.8 - 1.2	100 - 120	0.13 - 0.17	0.8 - 1.2	25 - 35	0.07 - 0.085	0.2 - 0.35
Fine	180 - 250	0.08 - 0.095	0.15 - 0.2	140 - 200	0.075 - 0.09	0.17 - 0.2	40 - 60	0.035 - 0.05	0.08 - 0.1
	12.0 mm								
Rough	110 - 130	0.13 - 0.14	1.65 - 2.5	90 - 110	0.115 - 0.13	1.6 - 2.5	15 - 20	0.03 - 0.035	0.5 - 0.8
Medium	120 - 160	0.16 - 0.195	0.95 - 1.45	100 - 120	0.15 - 0.18	0.9 - 1.45	25 - 35	0.075 - 0.09	0.25 - 0.45
Fine	180 - 250	0.085 - 0.1	0.16 - 0.25	140 - 200	0.08 - 0.095	0.2 - 0.25	40 - 60	0.035 - 0.055	0.09 - 0.15

Trochoidal milling cutters

HT01

d_1 6 - 20	z 5	r 0.1 - 0.3	λ° 41°/42°	AlTiSiN
				



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
161592	6	18	25	5.8	62	0.1	6	5
161593	8	24	30	7.8	68	0.2	8	5
161594	10	30	35	9.8	80	0.2	10	5
161595	12	36	45	11.8	93	0.3	12	5
161596	14	42	50	13.8	99	0.3	14	5
161597	16	48	55	15.8	108	0.3	16	5
161598	20	60	70	19.8	126	0.3	20	5

Application data (f_z / a_p)

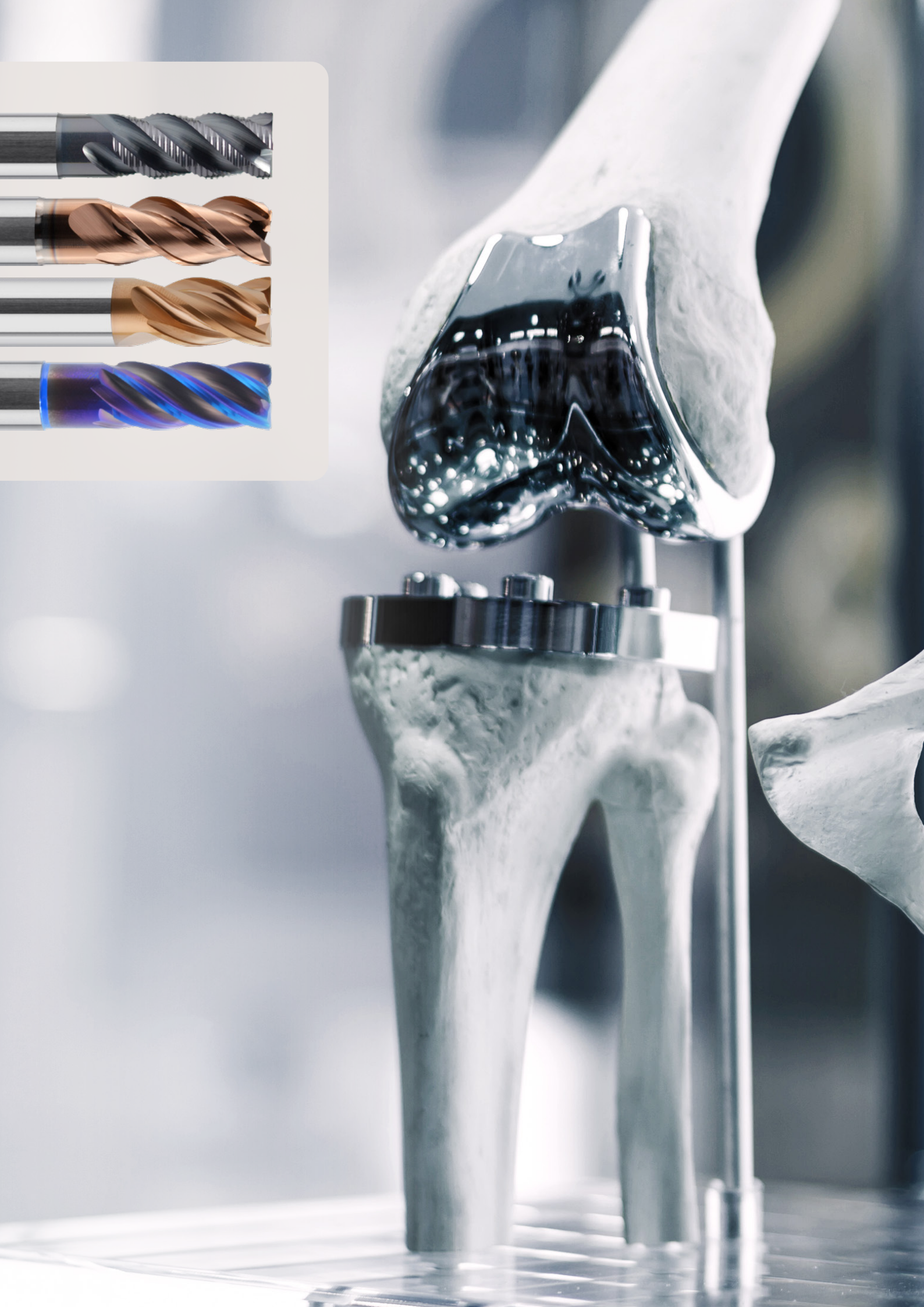
Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	-	-	-	-	-	0.018 - 0.0288
	a_e (mm)	-	-	-	-	-	0.12 - 0.6
	hm max (mm)	-	-	-	-	-	0.015 - 0.03
8	f_z (mm)	-	-	-	-	-	0.024 - 0.0384
	a_e (mm)	-	-	-	-	-	0.16 - 0.8
	hm max (mm)	-	-	-	-	-	0.02 - 0.04
10	f_z (mm)	-	-	-	-	-	0.03 - 0.048
	a_e (mm)	-	-	-	-	-	0.2 - 1
	hm max (mm)	-	-	-	-	-	0.025 - 0.05
12	f_z (mm)	-	-	-	-	-	0.036 - 0.0576
	a_e (mm)	-	-	-	-	-	0.24 - 1.2
	hm max (mm)	-	-	-	-	-	0.03 - 0.06
16	f_z (mm)	-	-	-	-	-	0.048 - 0.0768
	a_e (mm)	-	-	-	-	-	0.32 - 1.6
	hm max (mm)	-	-	-	-	-	0.04 - 0.08
20	f_z (mm)	-	-	-	-	-	0.06 - 0.096
	a_e (mm)	-	-	-	-	-	0.4 - 2
	hm max (mm)	-	-	-	-	-	0.05 - 0.1

① a_p is maximum cutting edge length (l_2)

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	-	-	55 60 65
ROUGH FINE	-	-	-	-	-	50 110 160 -

① ● = Primary application | 55 = HRC 45-55 | 60 = HRC 55-60 | 65 = HRC 60-65





M – Stainless steels

	z	Page
End mills		150
MX01	3 - 6	150
Torus milling cutters		152
MR01	4	152

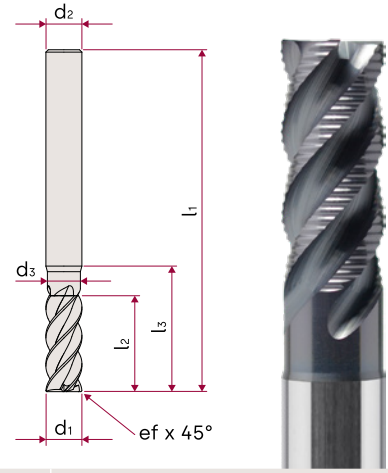
	z	Page
HPC milling cutters		155
MH01	3	155
MH02	4	157
MH03	4	159
Trochoidal milling cutters		162
MT01	6	162
MT02	4 - 5	164

End mills

MX01

d_1 4 - 25	z 3 - 6	ef 0.15 - 0.3	λ° 45°	AlTiN
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Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
162838	4	11	18	3.8	57	0.15	6	3	HA
162839	4	11	18	3.8	57	0.15	6	3	HB
162840	5	13	20	4.7	57	0.15	6	4	HA
162841	5	13	20	4.7	57	0.15	6	4	HB
162842	6	16	20	5.5	57	0.15	6	4	HA
162843	6	16	20	5.5	57	0.15	6	4	HB
162844	7	16	25	6.5	63	0.15	8	4	HA
162845	7	16	25	6.5	63	0.15	8	4	HB
162846	8	16	26	7.5	63	0.15	8	4	HA
162847	8	16	26	7.5	63	0.15	8	4	HB
162848	9	19	30	8.5	72	0.2	10	4	HA
162849	9	19	30	8.5	72	0.2	10	4	HB
162850	10	22	31	9.5	72	0.2	10	4	HA
162851	10	22	31	9.5	72	0.2	10	4	HB
162852	12	26	37	11.5	83	0.2	12	4	HA
162853	12	26	37	11.5	83	0.2	12	4	HB
162854	14	26	42	13.5	83	0.2	14	5	HA
162855	14	26	42	13.5	83	0.2	14	5	HB
162856	16	32	51	15.5	100	0.25	16	5	HA
162857	16	32	51	15.5	100	0.25	16	5	HB
162858	20	38	59	19.2	110	0.25	20	6	HA
162859	20	38	59	19.2	110	0.25	20	6	HB
162860	25	45	65	24	121	0.3	25	6	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm) a_p (mm)	0.013 - 0.02 4.0	0.013 - 0.02 4.0	0.013 - 0.02 4.0	-	0.013 - 0.015 4.0	-
5 - 6	f_z (mm) a_p (mm)	0.013 - 0.034 5.0 - 6.0	0.013 - 0.034 5.0 - 6.0	0.013 - 0.034 5.0 - 6.0	-	0.013 - 0.025 5.0 - 6.0	-
7 - 8	f_z (mm) a_p (mm)	0.021 - 0.049 7.0 - 8.0	0.021 - 0.049 7.0 - 8.0	0.021 - 0.049 7.0 - 8.0	-	0.021 - 0.031 7.0 - 8.0	-
9 - 10	f_z (mm) a_p (mm)	0.026 - 0.059 9.0 - 10.0	0.026 - 0.059 9.0 - 10.0	0.026 - 0.059 9.0 - 10.0	-	0.026 - 0.044 9.0 - 10.0	-
12	f_z (mm) a_p (mm)	0.043 - 0.074 12.0	0.043 - 0.074 12.0	0.043 - 0.074 12.0	-	0.043 - 0.051 12.0	-
14	f_z (mm) a_p (mm)	0.043 - 0.074 14.0	0.043 - 0.074 14.0	0.043 - 0.074 14.0	-	0.043 - 0.051 14.0	-
16	f_z (mm) a_p (mm)	0.054 - 0.098 16.0	0.054 - 0.098 16.0	0.054 - 0.098 16.0	-	0.054 - 0.064 16.0	-
20	f_z (mm) a_p (mm)	0.069 - 0.118 20.0	0.069 - 0.118 20.0	0.069 - 0.118 20.0	-	0.069 - 0.082 20.0	-
25	f_z (mm) a_p (mm)	0.069 - 0.118 25.0	0.069 - 0.118 25.0	0.069 - 0.118 25.0	-	0.069 - 0.082 25.0	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	○	●	○	-	○	-
ROUGH FINE	76 104 132 108 147 186	55 69 78 98	83 118 118 167	-	33 42 47 59	-

① ● = Primary application | ○ = Secondary application

S – Special alloys & titanium

N – Non-ferrous metals & plastics

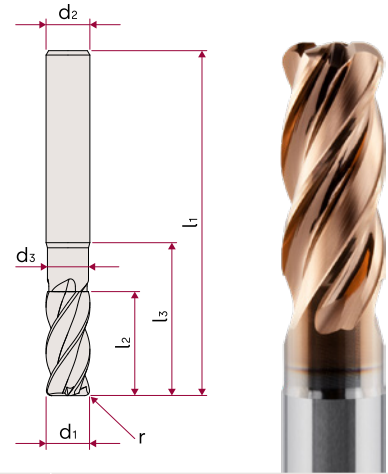
Technical information

Index

Torus milling cutters

MR01

d_1 8 - 20	z 4	r 0.5 - 4	λ° 35°/38°	AlTiSiN



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Cylinder shank
162742	8	19	27	7.5	63	0.5	8	4	HA
162743	8	19	27	7.5	63	0.5	8	4	HB
162744	8	19	27	7.5	63	1	8	4	HA
162745	8	19	27	7.5	63	1	8	4	HB
162746	8	19	27	7.5	63	1.5	8	4	HA
162747	8	19	27	7.5	63	1.5	8	4	HB
162748	8	19	27	7.5	63	2	8	4	HA
162749	8	19	27	7.5	63	2	8	4	HB
162750	10	22	32	9.5	72	0.5	10	4	HA
162751	10	22	32	9.5	72	0.5	10	4	HB
162752	10	22	32	9.5	72	1	10	4	HA
162753	10	22	32	9.5	72	1	10	4	HB
162754	10	22	32	9.5	72	1.5	10	4	HA
162755	10	22	32	9.5	72	1.5	10	4	HB
162756	10	22	32	9.5	72	2	10	4	HA
162757	10	22	32	9.5	72	2	10	4	HB
162758	12	26	38	11.5	83	0.5	12	4	HA
162759	12	26	38	11.5	83	0.5	12	4	HB
162760	12	26	38	11.5	83	1	12	4	HA
162761	12	26	38	11.5	83	1	12	4	HB
162762	12	26	38	11.5	83	1.5	12	4	HA
162763	12	26	38	11.5	83	1.5	12	4	HB
162764	12	26	38	11.5	83	2	12	4	HA
162765	12	26	38	11.5	83	2	12	4	HB

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Cylinder shank
162766	12	26	38	11.5	83	3	12	4	HA
162767	12	26	38	11.5	83	3	12	4	HB
162768	16	32	44	15.5	92	0.5	16	4	HA
162769	16	32	44	15.5	92	0.5	16	4	HB
162770	16	32	44	15.5	92	1	16	4	HA
162771	16	32	44	15.5	92	1	16	4	HB
162772	16	32	44	15.5	92	2	16	4	HA
162773	16	32	44	15.5	92	2	16	4	HB
162774	16	32	44	15.5	92	2.5	16	4	HA
162775	16	32	44	15.5	92	2.5	16	4	HB
162776	16	32	44	15.5	92	3	16	4	HA
162777	16	32	44	15.5	92	3	16	4	HB
162778	16	32	44	15.5	92	4	16	4	HA
162779	16	32	44	15.5	92	4	16	4	HB
162780	20	38	54	19.5	104	0.5	20	4	HA
162781	20	38	54	19.5	104	0.5	20	4	HB
162782	20	38	54	19.5	104	1	20	4	HA
162783	20	38	54	19.5	104	1	20	4	HB
162784	20	38	54	19.5	104	2	20	4	HA
162785	20	38	54	19.5	104	2	20	4	HB
162786	20	38	54	19.5	104	4	20	4	HA
162787	20	38	54	19.5	104	4	20	4	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
8	f_z (mm) a_p (mm)	-	0.024 - 0.036 8.0	-	-	-	-
10	f_z (mm) a_p (mm)	-	0.031 - 0.047 10.0	-	-	-	-
12	f_z (mm) a_p (mm)	-	0.04 - 0.059 12.0	-	-	-	-
16	f_z (mm) a_p (mm)	-	0.045 - 0.068 16.0	-	-	-	-
20	f_z (mm) a_p (mm)	-	0.061 - 0.09 20.0	-	-	-	-

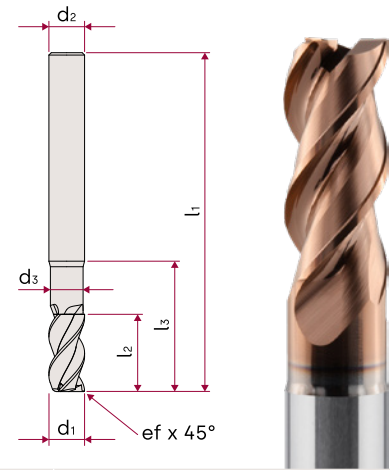
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	●	-	-	-	-
ROUGH FINE	-	64 85 90 120	-	-	-	-

● = Primary application

HPC milling cutters

MH01



Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
162670	3	8	-	-	57	0.06	6	3	HA
162671	3	8	-	-	57	0.06	6	3	HB
162672	4	11	-	-	57	0.08	6	3	HA
162673	4	11	-	-	57	0.08	6	3	HB
162674	5	13	-	-	57	0.1	6	3	HA
162675	5	13	-	-	57	0.1	6	3	HB
162676	6	13	21	5.5	57	0.13	6	3	HA
162677	6	13	21	5.5	57	0.13	6	3	HB
162678	8	19	27	7.5	63	0.15	8	3	HA
162679	8	19	27	7.5	63	0.15	8	3	HB
162680	10	22	32	9.5	72	0.2	10	3	HA
162681	10	22	32	9.5	72	0.2	10	3	HB
162682	12	26	38	11.5	83	0.25	12	3	HA
162683	12	26	38	11.5	83	0.25	12	3	HB
162684	16	32	44	15.5	92	0.35	16	3	HA
162685	16	32	44	15.5	92	0.35	16	3	HB
162686	20	38	54	19.5	104	0.4	20	3	HA
162687	20	38	54	19.5	104	0.4	20	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm) a_p (mm)	-	0.01 - 0.014 3.0	-	-	-	-
4	f_z (mm) a_p (mm)	-	0.012 - 0.018 4.0	-	-	-	-
5	f_z (mm) a_p (mm)	-	0.015 - 0.022 5.0	-	-	-	-
6	f_z (mm) a_p (mm)	-	0.017 - 0.026 6.0	-	-	-	-
8	f_z (mm) a_p (mm)	-	0.022 - 0.032 8.0	-	-	-	-
10	f_z (mm) a_p (mm)	-	0.028 - 0.042 10.0	-	-	-	-
12	f_z (mm) a_p (mm)	-	0.036 - 0.053 12.0	-	-	-	-
16	f_z (mm) a_p (mm)	-	0.041 - 0.061 16.0	-	-	-	-
20	f_z (mm) a_p (mm)	-	0.055 - 0.081 20.0	-	-	-	-

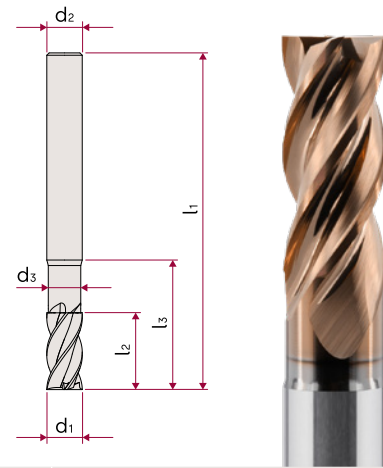
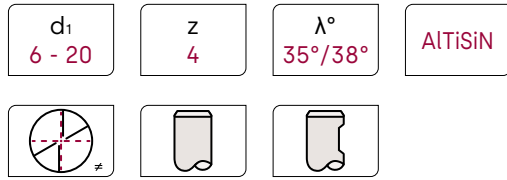
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	●	-	-	-	-
ROUGH FINE	-	48 64 68 90	-	-	-	-

● = Primary application

HPC milling cutters

MH02



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	d ₂	z	Cylinder shank
162730	6	13	21	5.5	57	6	4	HA
162731	6	13	21	5.5	57	6	4	HB
162732	8	19	27	7.5	63	8	4	HA
162733	8	19	27	7.5	63	8	4	HB
162734	10	22	32	9.5	72	10	4	HA
162735	10	22	32	9.5	72	10	4	HB
162736	12	26	38	11.5	83	12	4	HA
162737	12	26	38	11.5	83	12	4	HB
162738	16	32	44	15.5	92	16	4	HA
162739	16	32	44	15.5	92	16	4	HB
162740	20	38	54	19.5	104	20	4	HA
162741	20	38	54	19.5	104	20	4	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm) a_p (mm)	-	0.017 - 0.026 6.0 - 9.0	-	-	-	-
8	f_z (mm) a_p (mm)	-	0.022 - 0.032 8.0 - 12.0	-	-	-	-
10	f_z (mm) a_p (mm)	-	0.028 - 0.042 10.0 - 15.0	-	-	-	-
12	f_z (mm) a_p (mm)	-	0.036 - 0.053 12.0 - 18.0	-	-	-	-
16	f_z (mm) a_p (mm)	-	0.041 - 0.061 16.0 - 24.0	-	-	-	-
20	f_z (mm) a_p (mm)	-	0.055 - 0.081 20.0 - 30.0	-	-	-	-

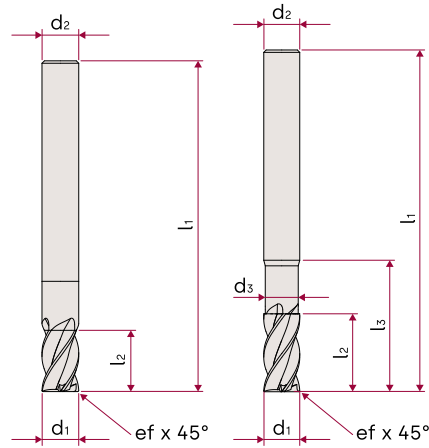
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	●	-	-	-	-
ROUGH FINE	-	95 127 135 180	-	-	-	-

● = Primary application

HPC milling cutters

MH03



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef	d ₂	z	Cylinder shank
162688	3	6	-	-	54	0.06	6	4	HA
162689	3	6	-	-	54	0.06	6	4	HB
162706	3	8	18	2.8	57	0.06	6	4	HA
162707	3	8	18	2.8	57	0.06	6	4	HB
162708	3	8	-	-	57	0.06	6	4	HA
162709	3	8	-	-	57	0.06	6	4	HB
162690	4	8	-	-	54	0.08	6	4	HA
162691	4	8	-	-	54	0.08	6	4	HB
162710	4	11	21	3.6	57	0.08	6	4	HA
162711	4	11	21	3.6	57	0.08	6	4	HB
162712	4	11	-	-	57	0.08	6	4	HA
162713	4	11	-	-	57	0.08	6	4	HB
162692	5	9	-	-	54	0.1	6	4	HA
162693	5	9	-	-	54	0.1	6	4	HB
162714	5	13	21	4.6	57	0.1	6	4	HA
162715	5	13	21	4.6	57	0.1	6	4	HB
162716	5	13	-	-	57	0.1	6	4	HA
162717	5	13	-	-	57	0.1	6	4	HB
162694	6	10	-	-	54	0.13	6	4	HA
162695	6	10	-	-	54	0.13	6	4	HB
162718	6	13	21	5.5	57	0.13	6	4	HA
162719	6	13	21	5.5	57	0.13	6	4	HB
162788	6	22	-	-	62	0.13	6	4	HA
162789	6	22	-	-	62	0.13	6	4	HB

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef	d ₂	z	Cylinder shank
162696	8	12	-	-	58	0.15	8	4	HA
162697	8	12	-	-	58	0.15	8	4	HB
162720	8	19	27	7.5	63	0.15	8	4	HA
162721	8	19	27	7.5	63	0.15	8	4	HB
162790	8	28	-	-	68	0.15	8	4	HA
162791	8	28	-	-	68	0.15	8	4	HB
162698	10	14	-	-	66	0.2	10	4	HA
162699	10	14	-	-	66	0.2	10	4	HB
162722	10	22	32	9.5	72	0.2	10	4	HA
162723	10	22	32	9.5	72	0.2	10	4	HB
162792	10	33	-	-	80	0.2	10	4	HA
162793	10	33	-	-	80	0.2	10	4	HB
162700	12	16	-	-	73	0.25	12	4	HA
162701	12	16	-	-	73	0.25	12	4	HB
162724	12	26	38	11.5	83	0.25	12	4	HA
162725	12	26	38	11.5	83	0.25	12	4	HB
162794	12	42	-	-	93	0.25	12	4	HA
162795	12	42	-	-	93	0.25	12	4	HB
162702	16	22	-	-	82	0.35	16	4	HA
162703	16	22	-	-	82	0.35	16	4	HB
162726	16	32	44	15.5	92	0.35	16	4	HA
162727	16	32	44	15.5	92	0.35	16	4	HB
162796	16	53	-	-	108	0.35	16	4	HA
162797	16	53	-	-	108	0.35	16	4	HB
162704	20	26	-	-	92	0.4	20	4	HA
162705	20	26	-	-	92	0.4	20	4	HB
162728	20	38	54	19.5	104	0.4	20	4	HA
162729	20	38	54	19.5	104	0.4	20	4	HB
162798	20	68	-	-	126	0.4	20	4	HA
162799	20	68	-	-	126	0.4	20	4	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm) a_p (mm)	-	0.011 - 0.018 3.0	-	-	-	-
4	f_z (mm) a_p (mm)	-	0.014 - 0.022 4.0	-	-	-	-
5	f_z (mm) a_p (mm)	-	0.017 - 0.026 5.0	-	-	-	-
6	f_z (mm) a_p (mm)	-	0.014 - 0.032 6.0 - 18.0	-	-	-	-
8	f_z (mm) a_p (mm)	-	0.018 - 0.04 8.0 - 24.0	-	-	-	-
10	f_z (mm) a_p (mm)	-	0.023 - 0.052 10.0 - 30.0	-	-	-	-
12	f_z (mm) a_p (mm)	-	0.029 - 0.065 12.0 - 36.0	-	-	-	-
16	f_z (mm) a_p (mm)	-	0.033 - 0.075 16.0 - 48.0	-	-	-	-
20	f_z (mm) a_p (mm)	-	0.044 - 0.1 20.0 - 60.0	-	-	-	-

Speed (V_c in m/min)

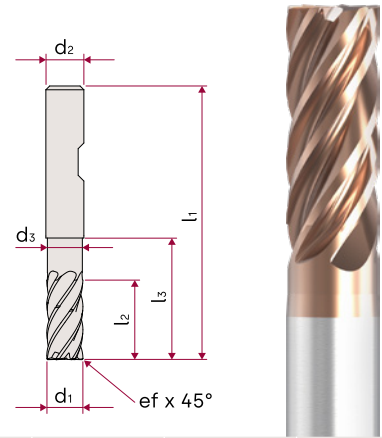
Application	P	M	K	N	S	H
	-	●	-	-	-	-
ROUGH FINE	-	57 64 85 90 120 132	-	-	-	-

● = Primary application

Trochoidal milling cutters

MT01

d_1 8 - 20	z 6	ef 0.16 - 0.4	λ° 36°	TiSiXN



Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z
161677	8	19	25	7.8	63	0.16	8	6
161682	8	24	30	7.8	68	0.16	8	6
161688	8	32	-	-	74	0.16	8	6
161693	8	40	-	-	81	0.16	8	6
161678	10	22	30	9.8	72	0.2	10	6
161683	10	30	35	9.8	80	0.2	10	6
161689	10	40	-	-	89	0.2	10	6
161694	10	50	-	-	96	0.2	10	6
161679	12	26	36	11.8	83	0.24	12	6
161684	12	36	45	11.8	93	0.24	12	6
161690	12	48	-	-	100	0.24	12	6
161695	12	60	-	-	112	0.24	12	6
161685	14	42	50	13.8	99	0.28	14	6
161680	16	32	42	15.8	92	0.32	16	6
161686	16	48	55	15.8	108	0.32	16	6
161691	16	64	-	-	123	0.32	16	6
161696	16	80	-	-	136	0.32	16	6
161681	20	41	52	19.8	104	0.4	20	6
161687	20	60	70	19.8	126	0.4	20	6
161692	20	80	-	-	140	0.4	20	6
161697	20	100	-	-	160	0.4	20	6

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
8	f_z (mm)	-	0.048 - 0.088	-	-	-	-
	a_e (mm)	-	0.4 - 0.8	-	-	-	-
	hm max (mm)	-	0.0368 - 0.048	-	-	-	-
10	f_z (mm)	-	0.06 - 0.11	-	-	-	-
	a_e (mm)	-	0.5 - 1	-	-	-	-
	hm max (mm)	-	0.046 - 0.06	-	-	-	-
12	f_z (mm)	-	0.072 - 0.132	-	-	-	-
	a_e (mm)	-	0.6 - 1.2	-	-	-	-
	hm max (mm)	-	0.0552 - 0.072	-	-	-	-
14	f_z (mm)	-	0.084 - 0.154	-	-	-	-
	a_e (mm)	-	0.7 - 1.4	-	-	-	-
	hm max (mm)	-	0.0644 - 0.084	-	-	-	-
16	f_z (mm)	-	0.096 - 0.176	-	-	-	-
	a_e (mm)	-	0.8 - 1.6	-	-	-	-
	hm max (mm)	-	0.0736 - 0.096	-	-	-	-
20	f_z (mm)	-	0.12 - 0.22	-	-	-	-
	a_e (mm)	-	1 - 2	-	-	-	-
	hm max (mm)	-	0.092 - 0.12	-	-	-	-

① a_p is maximum cutting edge length (l_2)

Speed (V_c in m/min)

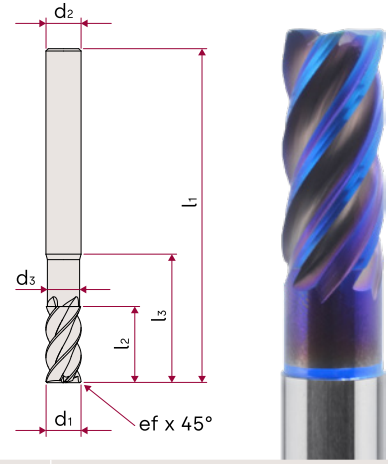
Application	P	M	K	N	S	H
	-	●	-	-	-	-
ROUGH FINE	-	120 160 220 -	-	-	-	-

① ● = Primary application

Trochoidal milling cutters

MT02

d_1 6 - 20	z 4 - 5	ef 0.2 - 0.5	λ° 35°/38°	AlTiSi



Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
163836	6	13	21	5.5	57	0.2	6	4	HA
163837	6	13	21	5.5	57	0.2	6	4	HB
163838	8	19	27	7.5	63	0.2	8	5	HA
163839	8	19	27	7.5	63	0.2	8	5	HB
163840	10	22	32	9.5	72	0.3	10	5	HA
163841	10	22	32	9.5	72	0.3	10	5	HB
163842	12	26	38	11.5	83	0.3	12	5	HA
163843	12	26	38	11.5	83	0.3	12	5	HB
163844	16	32	44	15.5	92	0.4	16	5	HA
163845	16	32	44	15.5	92	0.4	16	5	HB
163846	20	38	54	19.5	104	0.5	20	5	HA
163847	20	38	54	19.5	104	0.5	20	5	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	0.055 - 0.065	0.052 - 0.06	-	-	-	0.04 - 0.045
	a_p (mm)	12.0	12.0	-	-	-	12.0
8	f_z (mm)	0.065 - 0.075	0.06 - 0.07	-	-	-	0.045 - 0.05
	a_p (mm)	16.0	16.0	-	-	-	16.0
10	f_z (mm)	0.08 - 0.1	0.073 - 0.085	-	-	-	0.06 - 0.07
	a_p (mm)	20.0	20.0	-	-	-	20.0
12	f_z (mm)	0.1 - 0.12	0.088 - 0.1	-	-	-	0.072 - 0.085
	a_p (mm)	24.0	24.0	-	-	-	24.0
16	f_z (mm)	0.13 - 0.15	0.11 - 0.13	-	-	-	0.086 - 0.1
	a_p (mm)	32.0	32.0	-	-	-	32.0
20	f_z (mm)	0.17 - 0.2	0.14 - 0.17	-	-	-	0.1 - 0.12
	a_p (mm)	40.0	40.0	-	-	-	40.0

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	○	●	-	-	-	55
ROUGH	-	-	-	-	-	-
FINE	100 185 380	130 200	-	-	-	52 60

● = Primary application | ○ = Secondary application | 55 = HRC 45-55





S – Special alloys & titanium

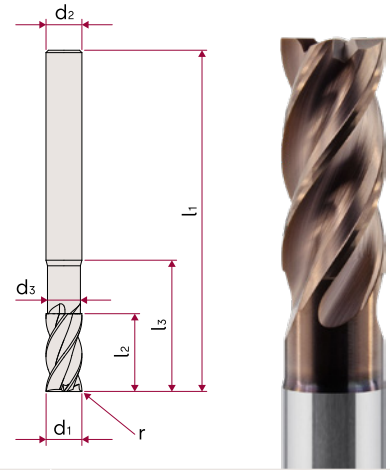
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	z	Page
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End mills

SX01

d_1 3 - 20	z 4	r 0.1 - 0.3	λ° 35°/38°	TiAlSiN



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Cylinder shank
162652	3	8	-	-	57	0.1	6	4	HA
162653	3	8	-	-	57	0.1	6	4	HB
162654	4	11	-	-	57	0.1	6	4	HA
162655	4	11	-	-	57	0.1	6	4	HB
162656	5	13	-	-	57	0.1	6	4	HA
162657	5	13	-	-	57	0.1	6	4	HB
162658	6	13	21	5.5	57	0.1	6	4	HA
162659	6	13	21	5.5	57	0.1	6	4	HB
162660	8	19	27	7.5	63	0.2	8	4	HA
162661	8	19	27	7.5	63	0.2	8	4	HB
162662	10	22	32	9.5	72	0.2	10	4	HA
162663	10	22	32	9.5	72	0.2	10	4	HB
162664	12	26	38	11.5	83	0.2	12	4	HA
162665	12	26	38	11.5	83	0.2	12	4	HB
162666	16	32	44	15.5	92	0.3	16	4	HA
162667	16	32	44	15.5	92	0.3	16	4	HB
162668	20	38	54	19.5	104	0.3	20	4	HA
162669	20	38	54	19.5	104	0.3	20	4	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm)	-	-	-	-	0.015 - 0.017	-
	a_p (mm)	-	-	-	-	3.0	-
4	f_z (mm)	-	-	-	-	0.018 - 0.02	-
	a_p (mm)	-	-	-	-	4.0	-
5	f_z (mm)	-	-	-	-	0.022 - 0.025	-
	a_p (mm)	-	-	-	-	5.0	-
6	f_z (mm)	-	-	-	-	0.026 - 0.03	-
	a_p (mm)	-	-	-	-	6.0	-
8	f_z (mm)	-	-	-	-	0.035 - 0.04	-
	a_p (mm)	-	-	-	-	8.0	-
10	f_z (mm)	-	-	-	-	0.042 - 0.048	-
	a_p (mm)	-	-	-	-	10.0	-
12	f_z (mm)	-	-	-	-	0.053 - 0.06	-
	a_p (mm)	-	-	-	-	12.0	-
16	f_z (mm)	-	-	-	-	0.068 - 0.077	-
	a_p (mm)	-	-	-	-	16.0	-
20	f_z (mm)	-	-	-	-	0.079 - 0.09	-
	a_p (mm)	-	-	-	-	20.0	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	-	●	-
ROUGH	-	-	-	-	53 62	-
FINE	-	-	-	-	65 80	-

● = Primary application

S – Special alloys & titanium

N – Non-ferrous metals & plastics

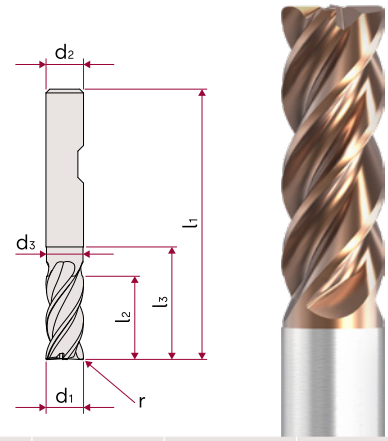
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HPC milling cutters

SH01

d_1 6 - 25	z 4	r 0.5 - 2	λ° 43°	TiSiXN



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
161698	6	13	20	5.8	57	0.5	6	4
161699	6	13	20	5.8	57	1	6	4
161700	8	21	25	7.8	63	0.5	8	4
161701	8	21	25	7.8	63	1	8	4
161702	10	22	30	9.8	72	0.5	10	4
161703	10	22	30	9.8	72	1	10	4
161704	12	26	36	11.8	83	0.5	12	4
161705	12	26	36	11.8	83	1	12	4
161706	16	36	42	15.8	92	1	16	4
161707	16	36	42	15.8	92	2	16	4
161708	20	41	55	19.7	104	1	20	4
161709	20	41	55	19.7	104	2	20	4
161710	25	50	65	24.7	136	2	25	4

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	-	-	-	-	0.025 - 0.035	-
	a_p (mm)	-	-	-	-	6	-
8	f_z (mm)	-	-	-	-	0.033 - 0.045	-
	a_p (mm)	-	-	-	-	8	-
10	f_z (mm)	-	-	-	-	0.039 - 0.054	-
	a_p (mm)	-	-	-	-	10	-
12	f_z (mm)	-	-	-	-	0.045 - 0.062	-
	a_p (mm)	-	-	-	-	12	-
16	f_z (mm)	-	-	-	-	0.055 - 0.075	-
	a_p (mm)	-	-	-	-	16	-
20	f_z (mm)	-	-	-	-	0.062 - 0.086	-
	a_p (mm)	-	-	-	-	20	-
25	f_z (mm)	-	-	-	-	0.07 - 0.096	-
	a_p (mm)	-	-	-	-	25	-

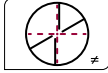

Speed (V_c in m/min)

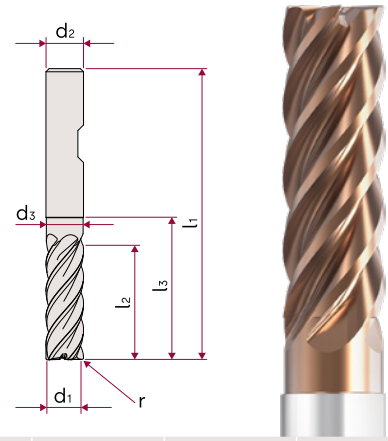
Application	P	M	K	N	S	H
	-	-	-	-	● (T) ○ (HWF)	-
ROUGH FINE	-	-	-	-	50 120 160 -	-

● = Primary application | ○ = Secondary application | T = Titanium | HWF = Heat-resistant alloys

Trochoidal milling cutters

ST01

d_1 6 - 20	z 5	r 0.1 - 0.3	λ° 41°/42°	TiSiXN
				



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
161711	6	18	25	5.8	62	0.1	6	5
161712	8	24	30	7.8	68	0.2	8	5
161713	10	30	35	9.8	80	0.2	10	5
161714	12	36	45	11.8	93	0.3	12	5
161715	16	48	55	15.8	108	0.3	16	5
161716	20	60	70	19.8	126	0.3	20	5

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	-	-	-	-	0.018 - 0.078	-
	a_e (mm)	-	-	-	-	0.24 - 0.72	-
	hm max (mm)	-	-	-	-	0.0228 - 0.036	-
8	f_z (mm)	-	-	-	-	0.024 - 0.104	-
	a_e (mm)	-	-	-	-	0.32 - 0.96	-
	hm max (mm)	-	-	-	-	0.0304 - 0.048	-
10	f_z (mm)	-	-	-	-	0.03 - 0.13	-
	a_e (mm)	-	-	-	-	0.4 - 1.2	-
	hm max (mm)	-	-	-	-	0.038 - 0.06	-
12	f_z (mm)	-	-	-	-	0.036 - 0.156	-
	a_e (mm)	-	-	-	-	0.48 - 1.44	-
	hm max (mm)	-	-	-	-	0.0456 - 0.072	-
16	f_z (mm)	-	-	-	-	0.048 - 0.208	-
	a_e (mm)	-	-	-	-	0.64 - 1.92	-
	hm max (mm)	-	-	-	-	0.0608 - 0.096	-
20	f_z (mm)	-	-	-	-	0.06 - 0.26	-
	a_e (mm)	-	-	-	-	0.8 - 2.4	-
	hm max (mm)	-	-	-	-	0.076 - 0.12	-

① a_p is maximum cutting edge length (l_2)

Speed (V_c in m/min)

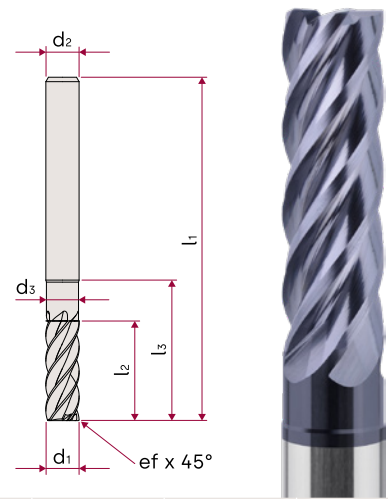
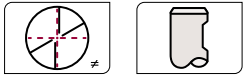
Application	P	M	K	N	S	H
	-	-	-	-	●	-
ROUGH FINE	-	-	-	-	35 70 170 -	-

① ● = Primary application

Trochoidal milling cutters

ST02

d_1 6 - 20	z 5	ef 0.1 - 0.4	λ° 40°	AlTiN
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Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z
163779	6	18	25	5.8	62	0.1	6	5
163780	8	24	30	7.8	68	0.15	8	5
163781	10	30	35	9.8	80	0.2	10	5
163782	12	36	45	11.8	93	0.2	12	5
163783	16	48	55	15.8	108	0.3	16	5
163784	20	60	70	19.8	126	0.4	20	5

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	-	0.055 - 0.06	-	-	0.055 - 0.06	-
	a_p (mm)	-	15.0	-	-	15.0	-
8	f_z (mm)	-	0.06 - 0.07	-	-	0.06 - 0.07	-
	a_p (mm)	-	20.0	-	-	20.0	-
10	f_z (mm)	-	0.07 - 0.085	-	-	0.07 - 0.085	-
	a_p (mm)	-	25.0	-	-	25.0	-
12	f_z (mm)	-	0.085 - 0.1	-	-	0.085 - 0.1	-
	a_p (mm)	-	30.0	-	-	30.0	-
16	f_z (mm)	-	0.1 - 0.13	-	-	0.1 - 0.13	-
	a_p (mm)	-	40.0	-	-	40.0	-
20	f_z (mm)	-	0.13 - 0.17	-	-	0.13 - 0.17	-
	a_p (mm)	-	50.0	-	-	50.0	-

P/K – Steel/cast iron

H – Hardened materials

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	○	-	-	●	-
ROUGH FINE	-	- 120 180	-	-	- 90 130	-

● = Primary application | ○ = Secondary application

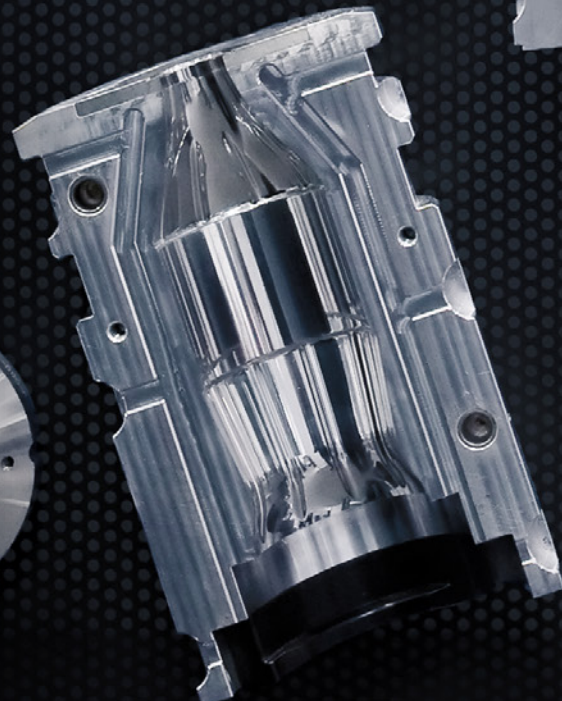
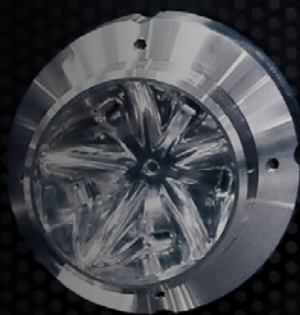
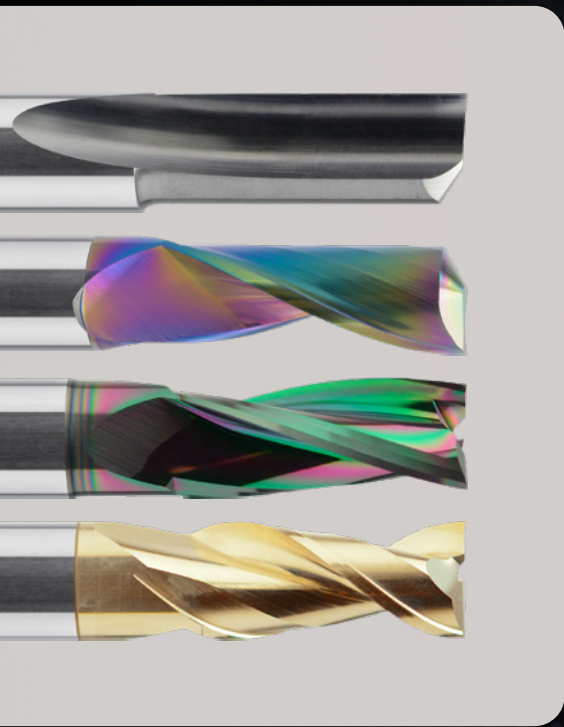
M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

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N – Non-ferrous metals & plastics

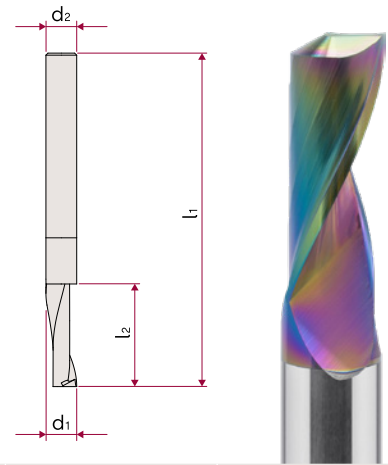
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End mills

NE01

d_1 1 - 12	z 1	λ° 26°	$\tau\alpha$ -C
			



Order no.	d_1	l_2	l_1	d_2	z
163912	1	4	50	3	1
163913	1.5	6	50	3	1
163914	2	8	50	3	1
163915	3	12	50	3	1
163916	4	15	60	4	1
163917	5	17	60	5	1
163918	6	20	65	6	1
163919	8	22	65	8	1
163920	10	25	75	10	1
163921	12	30	80	12	1

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
1	f_z (mm) a_p (mm)	-	-	-	0.004 - 0.005 1.0	-	-
1.5	f_z (mm) a_p (mm)	-	-	-	0.004 - 0.005 1.5	-	-
2	f_z (mm) a_p (mm)	-	-	-	0.007 - 0.008 2.0	-	-
3	f_z (mm) a_p (mm)	-	-	-	0.007 - 0.008 3.0	-	-
4	f_z (mm) a_p (mm)	-	-	-	0.015 - 0.018 4.0	-	-
5	f_z (mm) a_p (mm)	-	-	-	0.015 - 0.018 5.0	-	-
6	f_z (mm) a_p (mm)	-	-	-	0.025 - 0.03 6.0	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.034 - 0.04 8.0	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.042 - 0.05 10.0	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.06 - 0.071 12.0	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A KU GFK	-	-
ROUGH FINE	-	-	-	99 156 445 140 560 630	-	-

① ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

N – Non-ferrous metals & plastics

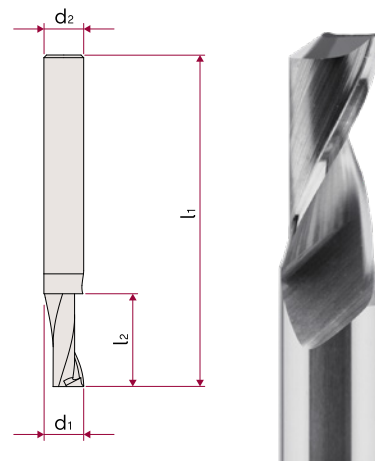
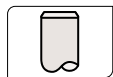
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End mills

NE02

d_1 2 - 5.5	z 1	λ° 30°
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Order no.	d_1	l_2	l_1	d_2	z
164226	2	6	50	6	1
164227	2	8	40	3	1
164228	2	10	40	2	1
164229	3	10	40	3	1
164230	3	10	50	6	1
164231	4	12	50	4	1
164232	4	12	50	6	1
164233	5	14	50	5	1
164234	5	14	50	6	1
164235	6	14	50	6	1
164236	6	20	60	6	1
164237	6	35	75	6	1
164238	8	25	63	8	1
164239	10	25	72	10	1
164240	12	25	83	12	1
164241	1.5	6	40	3	1
164242	2.5	8	50	6	1
164243	3.5	10	50	6	1
164244	4.5	12	50	6	1
164245	5.5	14	50	6	1

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
2 - 2.5	f_z (mm) a_p (mm)	-	-	-	0.003 - 0.008 2.0 - 2.5	-	-
3 - 3.5	f_z (mm) a_p (mm)	-	-	-	0.003 - 0.02 3.0 - 3.5	-	-
4 - 4.5	f_z (mm) a_p (mm)	-	-	-	0.007 - 0.02 4.0 - 4.5	-	-
5 - 5.5	f_z (mm) a_p (mm)	-	-	-	0.007 - 0.03 5.0 - 5.5	-	-

P/K – Steel/cast iron

H – Hardened materials

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A KU	-	-
ROUGH FINE	-	-	-	85 141 120 200	-	-

● = Primary application | A = Aluminium | KU = Plastic

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

Technical information

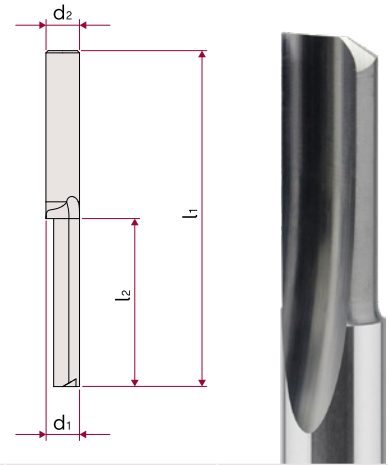
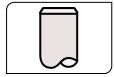
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End mills

NE03

d_1
1.5 - 12

z
1



Order no.	d_1	l_2	l_1	d_2	z
164225	1.5	6	40	3	1
164212	2	6	40	3	1
164213	2	10	60	6	1
164214	3	12	40	3	1
164215	3	15	60	6	1
164216	4	15	60	6	1
164217	5	16	60	6	1
164218	6	20	60	6	1
164219	6	30	60	6	1
164220	6	35	75	6	1
164221	8	22	63	8	1
164222	8	40	100	8	1
164223	10	25	72	10	1
164224	12	30	83	12	1

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
1.5	f_z (mm)	-	-	-	0.002 - 0.004	-	-
	a_p (mm)	-	-	-	1.5	-	-
2	f_z (mm)	-	-	-	0.003 - 0.008	-	-
	a_p (mm)	-	-	-	2.0	-	-
3	f_z (mm)	-	-	-	0.003 - 0.008	-	-
	a_p (mm)	-	-	-	3.0	-	-
4	f_z (mm)	-	-	-	0.007 - 0.02	-	-
	a_p (mm)	-	-	-	4.0	-	-
5	f_z (mm)	-	-	-	0.007 - 0.02	-	-
	a_p (mm)	-	-	-	5.0	-	-
6	f_z (mm)	-	-	-	0.009 - 0.03	-	-
	a_p (mm)	-	-	-	6.0	-	-
8	f_z (mm)	-	-	-	0.011 - 0.04	-	-
	a_p (mm)	-	-	-	8.0	-	-
10	f_z (mm)	-	-	-	0.014 - 0.06	-	-
	a_p (mm)	-	-	-	10.0	-	-
12	f_z (mm)	-	-	-	0.014 - 0.06	-	-
	a_p (mm)	-	-	-	12.0	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	● A ● KU	-	-
ROUGH	-	-	-	85 141	-	-
FINE	-	-	-	120 200	-	-

● = Primary application | A = Aluminium | KU = Plastic

S – Special alloys & titanium

N – Non-ferrous metals & plastics

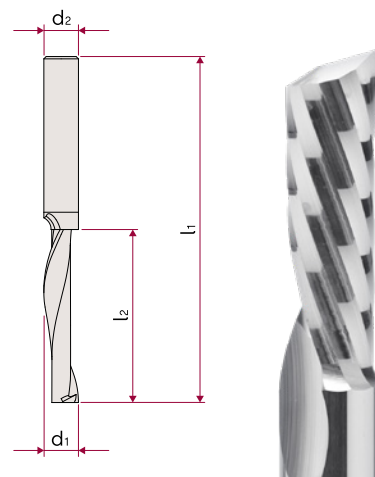
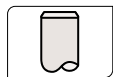
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End mills

NE04

d_1 1.5 - 20	z 1	λ° 25°
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Order no.	d_1	l_2	l_1	d_2	z
164263	1.5	6	40	3	1
164246	2	6	40	3	1
164247	2	10	40	2	1
164248	2	10	60	6	1
164266	2.5	6	40	2.5	1
164249	3	10	60	6	1
164250	3	12	40	3	1
164251	3	12	60	6	1
164252	3	15	60	6	1
164253	4	15	40	4	1
164254	4	15	60	6	1
164255	5	16	60	6	1
164256	6	20	60	6	1
164257	6	30	60	6	1
164258	6	35	75	6	1
164259	8	22	63	8	1
164260	10	25	72	10	1
164261	12	30	83	12	1
164262	14	30	83	14	1
164264	16	35	92	16	1
164265	20	40	104	20	1

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
1.5 - 2.5	f_z (mm) a_p (mm)	-	-	-	0.002 - 0.008 1.5 - 2.5	-	-
3 - 4	f_z (mm) a_p (mm)	-	-	-	0.003 - 0.02 3.0 - 4.0	-	-
5 - 6	f_z (mm) a_p (mm)	-	-	-	0.007 - 0.03 5.0 - 6.0	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.011 - 0.04 8.0	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.014 - 0.06 10.0	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.014 - 0.06 12	-	-
14	f_z (mm) a_p (mm)	-	-	-	0.017 - 0.08 14	-	-
16	f_z (mm) a_p (mm)	-	-	-	0.017 - 0.08 16	-	-
20	f_z (mm) a_p (mm)	-	-	-	0.021 - 0.1 20	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	● A ● KU	-	-
ROUGH FINE	-	-	-	85 ● 99 141 100 ● 140 200	-	-

● = Primary application | A = Aluminium | KU = Plastic

S – Special alloys & titanium

N – Non-ferrous metals & plastics

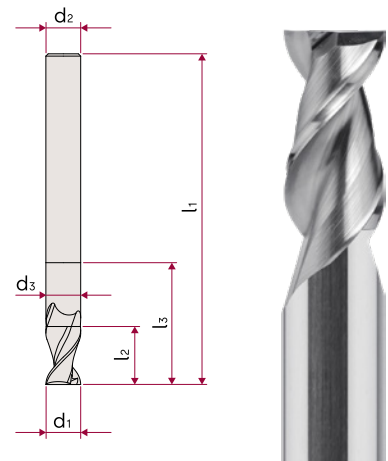
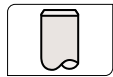
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End mills

NX05

d_1 1.5 - 20	z 2	λ° 45°
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Order no.	d_1	l_2	l_3	d_3	l_1	d_2	z
162640	1.5	3	6	1.4	57	6	2
162641	2	6	9.5	1.92	57	6	2
162642	2.5	7	10	2.4	57	6	2
162643	3	7	10	2.9	57	6	2
162644	4	8	15	3.8	57	6	2
162645	5	10	16	4.75	57	6	2
162646	6	10	-	-	57	6	2
162647	8	16	-	-	63	8	2
162648	10	19	-	-	72	10	2
162649	12	22	-	-	83	12	2
162650	16	26	-	-	92	16	2
162651	20	32	-	-	104	20	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
1.5	f_z (mm) a_p (mm)	-	-	-	0.006 - 0.007 1.5	-	-
2 - 2.5	f_z (mm) a_p (mm)	-	-	-	0.009 - 0.01 2.0 - 2.5	-	-
3	f_z (mm) a_p (mm)	-	-	-	0.009 - 0.01 3.0	-	-
4	f_z (mm) a_p (mm)	-	-	-	0.018 - 0.02 4.0	-	-
5	f_z (mm) a_p (mm)	-	-	-	0.018 - 0.02 5.0	-	-
6	f_z (mm) a_p (mm)	-	-	-	0.026 - 0.03 6.0	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.04 - 0.045 8.0	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.053 - 0.06 10.0	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.053 - 0.06 12.0	-	-
16	f_z (mm) a_p (mm)	-	-	-	0.062 - 0.07 16.0	-	-
20	f_z (mm) a_p (mm)	-	-	-	0.079 - 0.09 20.0	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A KU	-	-
ROUGH FINE	-	-	-	116 155 232 150 250 300	-	-

① ● = Primary application | A = Aluminium | KU = Plastic

N – Non-ferrous metals & plastics



Technical information

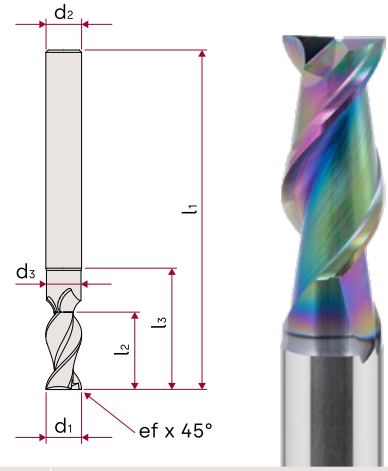
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End mills

NX06

d_1 0.6 - 20	z 2	ef 0.05 - 0.2	λ° 45°	ta-C
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Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
163922	0.6	2	5	0.55	50	0.05	6	2	HA
163923	1	3	8	0.9	50	0.05	6	2	HA
163924	1.5	4	10	1.4	50	0.05	6	2	HA
163925	2	6	12	1.9	50	0.05	6	2	HA
163926	3	8	18	2.9	57	0.1	6	2	HA
163927	3	8	18	2.9	57	0.1	6	2	HB
163928	4	11	18	3.9	57	0.1	6	2	HA
163929	4	11	18	3.9	57	0.1	6	2	HB
163930	5	13	20	4.9	57	0.1	6	2	HA
163931	5	13	20	4.9	57	0.1	6	2	HB
163932	6	13	20	5.8	57	0.1	6	2	HA
163933	6	13	20	5.8	57	0.1	6	2	HB
163934	8	19	26	7.8	63	0.1	8	2	HA
163935	8	19	26	7.8	63	0.1	8	2	HB
163936	10	22	29	9.7	72	0.2	10	2	HA
163937	10	22	29	9.7	72	0.2	10	2	HB
163938	12	26	36	11.7	83	0.2	12	2	HA
163939	12	26	36	11.7	83	0.2	12	2	HB
163940	14	26	36	13.7	83	0.2	14	2	HA
163941	14	26	36	13.7	83	0.2	14	2	HB
163942	16	32	42	15.7	92	0.2	16	2	HA
163943	16	32	42	15.7	92	0.2	16	2	HB
163944	18	32	45	17.7	92	0.2	18	2	HA
163945	18	32	45	17.7	92	0.2	18	2	HB

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef	d ₂	z	Cylinder shank
163946	20	38	52	19.5	104	0.2	20	2	HA
163947	20	38	52	19.5	104	0.2	20	2	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.6 - 1	f _z (mm) a _p (mm)	-	-	-	0.004 - 0.008 0.6 - 1.0	-	-
1.5 - 2	f _z (mm) a _p (mm)	-	-	-	0.006 - 0.01 1.5 - 2.0	-	-
3	f _z (mm) a _p (mm)	-	-	-	0.007 - 0.01 3.0	-	-
4	f _z (mm) a _p (mm)	-	-	-	0.015 - 0.02 4.0	-	-
5	f _z (mm) a _p (mm)	-	-	-	0.019 - 0.025 5.0	-	-
6	f _z (mm) a _p (mm)	-	-	-	0.022 - 0.03 6.0	-	-
8	f _z (mm) a _p (mm)	-	-	-	0.031 - 0.042 8.0	-	-
10	f _z (mm) a _p (mm)	-	-	-	0.041 - 0.055 10.0	-	-
12	f _z (mm) a _p (mm)	-	-	-	0.056 - 0.075 12.0	-	-
14	f _z (mm) a _p (mm)	-	-	-	0.056 - 0.075 14.0	-	-
16	f _z (mm) a _p (mm)	-	-	-	0.074 - 0.1 16.0	-	-
18	f _z (mm) a _p (mm)	-	-	-	0.074 - 0.1 18.0	-	-
20	f _z (mm) a _p (mm)	-	-	-	0.089 - 0.12 20.0	-	-

Speed (V_c in m/min)

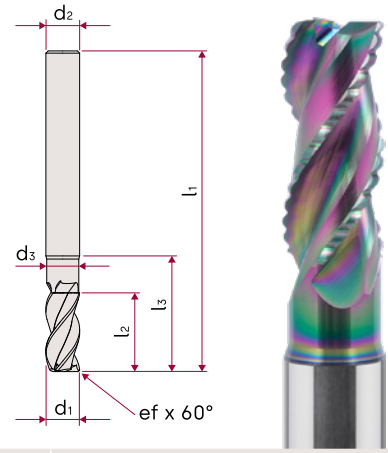
Application	P	M	K	N	S	H
	-	-	-		-	-
ROUGH FINE	-	-	-	137 314 438 250 450 800	-	-

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

End mills

NX09

d_1 6 - 20	z 3	ef 0.2 - 0.4	λ° 38°/ 40°/42°	ta-C



Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
164143	6	14	20	5.7	57	0.2	6	3	HA
164144	6	14	20	5.7	57	0.2	6	3	HB
164145	8	21	26	7.4	63	0.25	8	3	HA
164146	8	21	26	7.4	63	0.25	8	3	HB
164147	10	23	31	9.5	72	0.3	10	3	HA
164148	10	23	31	9.5	72	0.3	10	3	HB
164149	12	27	37	11	83	0.35	12	3	HA
164150	12	27	37	11	83	0.35	12	3	HB
164151	16	36	43	15	92	0.4	16	3	HA
164152	16	36	43	15	92	0.4	16	3	HB
164153	20	41	52	19	104	0.4	20	3	HA
164154	20	41	52	19	104	0.4	20	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	-	-	-	0.03 - 0.088	-	-
	a_p (mm)	-	-	-	6.0	-	-
8	f_z (mm)	-	-	-	0.034 - 0.11	-	-
	a_p (mm)	-	-	-	8.0	-	-
10	f_z (mm)	-	-	-	0.037 - 0.14	-	-
	a_p (mm)	-	-	-	10.0	-	-
12	f_z (mm)	-	-	-	0.04 - 0.18	-	-
	a_p (mm)	-	-	-	12.0	-	-
16	f_z (mm)	-	-	-	0.051 - 0.22	-	-
	a_p (mm)	-	-	-	16.0	-	-
20	f_z (mm)	-	-	-	0.061 - 0.28	-	-
	a_p (mm)	-	-	-	20.0	-	-

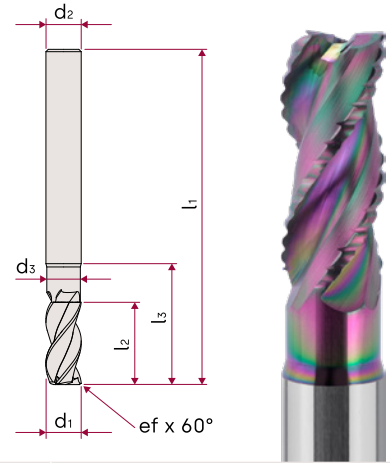
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	● A	-	-
ROUGH FINE	-	-	-	141 396 424 200 320 600	-	-

● = Primary application | A = Aluminium

End mills

NX11



Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
162615	6	14	20	5.7	57	0.2	6	3	HA
162616	6	14	20	5.7	57	0.2	6	3	HB
162617	8	21	26	7.4	63	0.25	8	3	HA
162618	8	21	26	7.4	63	0.25	8	3	HB
162619	10	23	31	9.5	72	0.3	10	3	HA
162620	10	23	31	9.5	72	0.3	10	3	HB
162621	12	27	37	11	83	0.35	12	3	HA
162622	12	27	37	11	83	0.35	12	3	HB
162623	16	36	43	15	92	0.4	16	3	HA
162624	16	36	43	15	92	0.4	16	3	HB
162625	20	41	52	19	104	0.4	20	3	HA
162626	20	41	52	19	104	0.4	20	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	-	-	-	0.038 - 0.11	-	-
	a_p (mm)	-	-	-	6.0	-	-
8	f_z (mm)	-	-	-	0.042 - 0.14	-	-
	a_p (mm)	-	-	-	8.0	-	-
10	f_z (mm)	-	-	-	0.046 - 0.18	-	-
	a_p (mm)	-	-	-	10.0	-	-
12	f_z (mm)	-	-	-	0.051 - 0.22	-	-
	a_p (mm)	-	-	-	12.0	-	-
16	f_z (mm)	-	-	-	0.063 - 0.28	-	-
	a_p (mm)	-	-	-	16.0	-	-
20	f_z (mm)	-	-	-	0.076 - 0.35	-	-
	a_p (mm)	-	-	-	20.0	-	-

P/K – Steel/cast iron

H – Hardened materials

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	● A	-	-
ROUGH FINE	-	-	-	177 247 530 205 400 750	-	-

● = Primary application | A = Aluminium

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

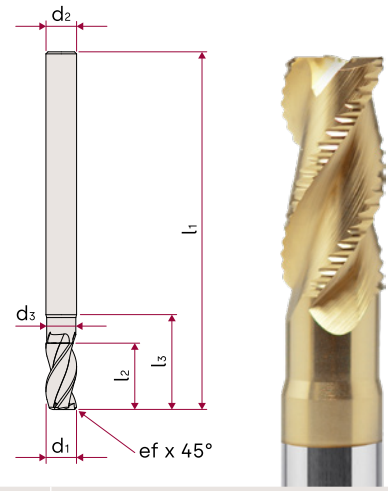
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End mills

NX12

d_1 6 - 25	z 3	ef 0.3 - 1.25	λ° 35°/38°	ZrN



Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
162633	6	10	24	5.5	63	0.3	6	3	HA
162627	6	13	18	5.7	70	0.4	6	3	HA
162634	8	12	29	7.5	72	0.4	8	3	HA
162628	8	21	25	7.4	80	0.4	8	3	HA
162635	10	14	35	9.5	83	0.5	10	3	HA
162629	10	22	30	9.2	80	0.4	10	3	HA
162636	12	16	50	11.4	100	0.6	12	3	HA
162630	12	26	36	11	90	0.4	12	3	HA
162637	16	20	63	15.2	115	0.8	16	3	HA
162631	16	36	42	15	100	0.4	16	3	HB
162638	20	20	70	19	125	1	20	3	HA
162632	20	41	52	19	120	0.4	20	3	HB
162639	25	25	75	23.75	135	1.25	25	3	HA

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	-	-	-	0.038 - 0.065	-	-
	a_p (mm)	-	-	-	6.0	-	-
8	f_z (mm)	-	-	-	0.042 - 0.085	-	-
	a_p (mm)	-	-	-	8.0	-	-
10	f_z (mm)	-	-	-	0.046 - 0.1	-	-
	a_p (mm)	-	-	-	10.0	-	-
12	f_z (mm)	-	-	-	0.051 - 0.12	-	-
	a_p (mm)	-	-	-	12.0	-	-
16	f_z (mm)	-	-	-	0.063 - 0.15	-	-
	a_p (mm)	-	-	-	16.0	-	-
20	f_z (mm)	-	-	-	0.076 - 0.2	-	-
	a_p (mm)	-	-	-	20.0	-	-
25	f_z (mm)	-	-	-	0.093 - 0.22	-	-
	a_p (mm)	-	-	-	25.0	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A	-	-
ROUGH FINE	-	-	-	177 283 445 250 400 630	-	-

 ● = Primary application | A = Aluminium

S – Special alloys & titanium

N – Non-ferrous metals & plastics

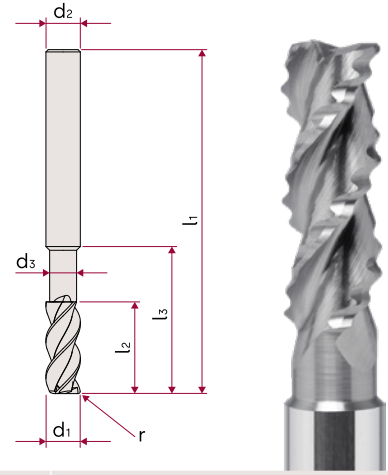
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End mills

NX13

d_1 6 - 25	z 3	r 0.4 - 1.5	λ° 45°	Blank



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Cylinder shank
162861	6	16	25	4.7	60	0.4	6	3	HA
162862	6	16	25	4.7	60	0.4	6	3	HB
162863	8	25	33	6.3	78	0.5	8	3	HA
162864	8	25	33	6.3	78	0.5	8	3	HB
162865	10	28	35	8.2	78	0.6	10	3	HA
162866	10	28	35	8.2	78	0.6	10	3	HB
162867	12	32	40	10.2	89	0.8	12	3	HA
162868	12	32	40	10.2	89	0.8	12	3	HB
162869	14	32	40	12	89	1	14	3	HA
162870	14	32	40	12	89	1	14	3	HB
162871	16	36	45	14	96	1	16	3	HA
162872	16	36	45	14	96	1	16	3	HB
162873	20	45	60	17.5	111	1.2	20	3	HA
162874	20	45	60	17.5	111	1.2	20	3	HB
162875	25	50	65	21.8	121	1.5	25	3	HA
162876	25	50	65	21.8	121	1.5	25	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	-	-	-	0.035 - 0.041	-	-
	a_p (mm)	-	-	-	6.0	-	-
8	f_z (mm)	-	-	-	0.035 - 0.041	-	-
	a_p (mm)	-	-	-	8.0	-	-
10	f_z (mm)	-	-	-	0.044 - 0.075	-	-
	a_p (mm)	-	-	-	10.0	-	-
12	f_z (mm)	-	-	-	0.044 - 0.075	-	-
	a_p (mm)	-	-	-	12.0	-	-
14	f_z (mm)	-	-	-	0.054 - 0.064	-	-
	a_p (mm)	-	-	-	14.0	-	-
16	f_z (mm)	-	-	-	0.054 - 0.064	-	-
	a_p (mm)	-	-	-	16.0	-	-
20	f_z (mm)	-	-	-	0.067 - 0.08	-	-
	a_p (mm)	-	-	-	20.0	-	-
25	f_z (mm)	-	-	-	0.084 - 0.01	-	-
	a_p (mm)	-	-	-	25.0	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	● A	-	-
ROUGH FINE	-	-	-	127 212 318 180 300 450	-	-

● = Primary application | A = Aluminium

S – Special alloys & titanium

N – Non-ferrous metals & plastics

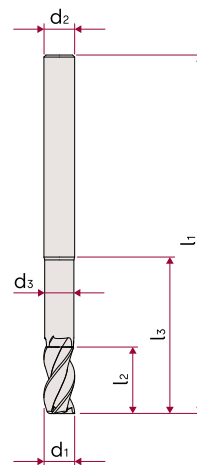
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End mills

NX14

d_1 3 - 20	z 3 - 4	λ° 40°	ZrN
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Order no.	d_1	l_2	l_3	d_3	l_1	d_2	z
162877	3	8	20	2.7	70	6	3
162878	4	11	25	3.7	70	6	3
162879	5	13	30	4.7	70	6	3
162880	6	13	30	5.7	70	6	3
162881	8	20	35	7.4	80	8	3
162882	10	22	45	9.2	90	10	3
162883	12	26	55	11	100	12	4
162884	16	36	65	15	115	16	4
162885	20	41	75	19	125	20	4

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm)	-	-	-	0.01 - 0.015	-	-
	a_p (mm)	-	-	-	3.0	-	-
4	f_z (mm)	-	-	-	0.017 - 0.025	-	-
	a_p (mm)	-	-	-	4.0	-	-
5	f_z (mm)	-	-	-	0.017 - 0.025	-	-
	a_p (mm)	-	-	-	5.0	-	-
6	f_z (mm)	-	-	-	0.023 - 0.035	-	-
	a_p (mm)	-	-	-	6.0	-	-
8	f_z (mm)	-	-	-	0.03 - 0.045	-	-
	a_p (mm)	-	-	-	8.0	-	-
10	f_z (mm)	-	-	-	0.037 - 0.055	-	-
	a_p (mm)	-	-	-	10.0	-	-
12	f_z (mm)	-	-	-	0.044 - 0.065	-	-
	a_p (mm)	-	-	-	12.0	-	-
16	f_z (mm)	-	-	-	0.054 - 0.08	-	-
	a_p (mm)	-	-	-	16.0	-	-
20	f_z (mm)	-	-	-	0.074 - 0.11	-	-
	a_p (mm)	-	-	-	20.0	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A KU	-	-
ROUGH	-	-	-	157 246 313	-	-
FINE	-	-	-	350 500 700	-	-

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic

S – Special alloys & titanium

N – Non-ferrous metals & plastics

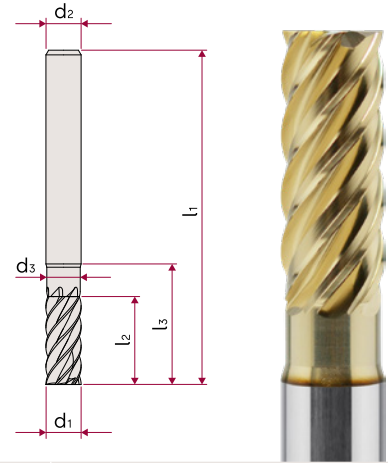
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End mills

NX15

d_1 6 - 20	z 6	λ° 45°	ZrN



Order no.	d_1	l_2	l_3	d_3	l_1	d_2	z	Cylinder shank
162567	6	15	20	5.7	57	6	6	HA
162568	6	15	20	5.7	57	6	6	HB
162569	6	15	43	5.7	80	6	6	HA
162570	8	20	26	7.4	63	8	6	HA
162571	8	20	62	7.4	100	8	6	HA
162572	10	25	32	9.2	73	10	6	HA
162573	10	25	32	9.2	73	10	6	HB
162574	10	25	58	9.2	100	10	6	HA
162575	12	30	37	11	83	12	6	HA
162576	12	30	73	11	120	12	6	HA
162577	16	40	45	15	93	16	6	HA
162578	16	40	45	15	93	16	6	HB
162579	16	40	100	15	150	16	6	HA
162580	20	50	53	19	104	20	6	HA
162581	20	50	53	19	104	20	6	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	-	-	-	0.014 - 0.04	-	-
	a_p (mm)	-	-	-	9.0	-	-
8	f_z (mm)	-	-	-	0.014 - 0.04	-	-
	a_p (mm)	-	-	-	12.0	-	-
10	f_z (mm)	-	-	-	0.021 - 0.05	-	-
	a_p (mm)	-	-	-	15.0	-	-
12	f_z (mm)	-	-	-	0.021 - 0.05	-	-
	a_p (mm)	-	-	-	18.0	-	-
16	f_z (mm)	-	-	-	0.028 - 0.06	-	-
	a_p (mm)	-	-	-	24.0	-	-
20	f_z (mm)	-	-	-	0.05 - 0.07	-	-
	a_p (mm)	-	-	-	30.0	-	-

P/K – Steel/cast iron

H – Hardened materials

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	● (A) ○ (KU)	-	-
ROUGH FINE	-	-	-	- 126 280 450	-	-

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

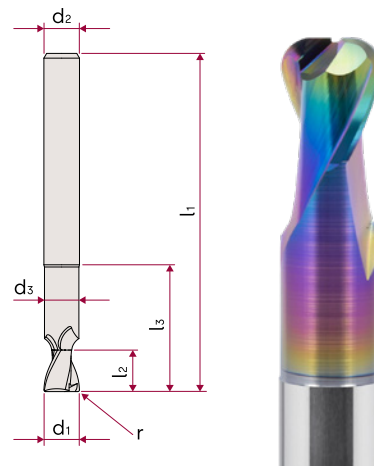
Technical information

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Torus milling cutters

NR01

d_1 3 - 16	z 2	r 0.3 - 5	λ° 30°	ta-C
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Cylinder shank
164053	3	4	14	2.9	50	0.3	6	2	HA
164054	3	4	14	2.9	50	0.3	6	2	HB
164021	3	4	32	2.9	75	0.3	6	2	HA
164022	3	4	32	2.9	75	0.3	6	2	HB
164055	4	5	16	3.9	50	0.3	6	2	HA
164056	4	5	16	3.9	50	0.3	6	2	HB
164023	4	5	36	3.9	75	0.3	6	2	HA
164024	4	5	36	3.9	75	0.3	6	2	HB
164057	5	6	18	4.9	54	0.3	6	2	HA
164058	5	6	18	4.9	54	0.3	6	2	HB
164025	5	6	40	4.9	75	0.3	6	2	HA
164026	5	6	40	4.9	75	0.3	6	2	HB
164059	6	7	21	5.8	57	0.3	6	2	HA
164060	6	7	21	5.8	57	0.3	6	2	HB
164061	6	7	21	5.8	57	1	6	2	HA
164062	6	7	21	5.8	57	1	6	2	HB
164063	6	7	21	5.8	57	2	6	2	HA
164064	6	7	21	5.8	57	2	6	2	HB
164027	6	7	44	5.8	80	0.3	6	2	HA
164028	6	7	44	5.8	80	0.3	6	2	HB
164029	6	7	44	5.8	80	1	6	2	HA
164030	6	7	44	5.8	80	1	6	2	HB
164031	6	7	44	5.8	80	2	6	2	HA
164032	6	7	44	5.8	80	2	6	2	HB

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Cylinder shank
164065	8	9	27	7.8	63	0.3	8	2	HA
164066	8	9	27	7.8	63	0.3	8	2	HB
164067	8	9	27	7.8	63	1	8	2	HA
164068	8	9	27	7.8	63	1	8	2	HB
164069	8	9	27	7.8	63	2	8	2	HA
164070	8	9	27	7.8	63	2	8	2	HB
164033	8	9	54	7.8	100	0.3	8	2	HA
164034	8	9	54	7.8	100	0.3	8	2	HB
164035	8	9	54	7.8	100	1	8	2	HA
164036	8	9	54	7.8	100	1	8	2	HB
164037	8	9	54	7.8	100	2	8	2	HA
164038	8	9	54	7.8	100	2	8	2	HB
164071	10	11	32	9.7	72	0.3	10	2	HA
164072	10	11	32	9.7	72	0.3	10	2	HB
164073	10	11	32	9.7	72	1.5	10	2	HA
164074	10	11	32	9.7	72	1.5	10	2	HB
164075	10	11	32	9.7	72	3	10	2	HA
164076	10	11	32	9.7	72	3	10	2	HB
164039	10	11	60	9.7	100	0.3	10	2	HA
164040	10	11	60	9.7	100	0.3	10	2	HB
164041	10	11	60	9.7	100	1.5	10	2	HA
164042	10	11	60	9.7	100	1.5	10	2	HB
164043	10	11	60	9.7	100	3	10	2	HA
164044	10	11	60	9.7	100	3	10	2	HB
164077	12	13	38	11.7	83	1.5	12	2	HA
164078	12	13	38	11.7	83	1.5	12	2	HB
164079	12	13	38	11.7	83	4	12	2	HA
164080	12	13	38	11.7	83	4	12	2	HB
164045	12	13	75	11.7	120	1.5	12	2	HA
164046	12	13	75	11.7	120	1.5	12	2	HB

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Cylinder shank
164047	12	13	75	11.7	120	4	12	2	HA
164048	12	13	75	11.7	120	4	12	2	HB
164081	16	17	44	15.7	92	2	16	2	HA
164082	16	17	44	15.7	92	2	16	2	HB
164083	16	17	44	15.7	92	5	16	2	HA
164084	16	17	44	15.7	92	5	16	2	HB
164049	16	17	92	15.7	150	2	16	2	HA
164050	16	17	92	15.7	150	2	16	2	HB
164051	16	17	92	15.7	150	5	16	2	HA
164052	16	17	92	15.7	150	5	16	2	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm)	-	-	-	0.008 - 0.01	-	-
	a_p (mm)	-	-	-	0.15	-	-
4	f_z (mm)	-	-	-	0.013 - 0.017	-	-
	a_p (mm)	-	-	-	0.2	-	-
5	f_z (mm)	-	-	-	0.015 - 0.02	-	-
	a_p (mm)	-	-	-	0.25	-	-
6	f_z (mm)	-	-	-	0.026 - 0.03	-	-
	a_p (mm)	-	-	-	0.3	-	-
8	f_z (mm)	-	-	-	0.034 - 0.04	-	-
	a_p (mm)	-	-	-	0.4	-	-
10	f_z (mm)	-	-	-	0.046 - 0.05	-	-
	a_p (mm)	-	-	-	0.5	-	-
12	f_z (mm)	-	-	-	0.066 - 0.07	-	-
	a_p (mm)	-	-	-	0.6	-	-
16	f_z (mm)	-	-	-	0.085 - 0.09	-	-
	a_p (mm)	-	-	-	0.8	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A KU GFK	-	-
ROUGH FINE	-	-	-	- 120 240 320	-	-

i ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

S – Special alloys & titanium

N – Non-ferrous metals & plastics

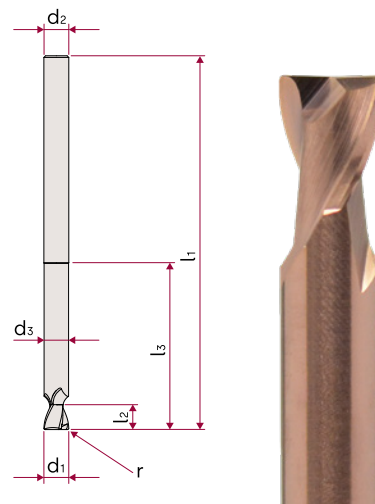
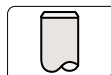
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Torus milling cutters

NR02

d_1 0.4 - 6	z 2	r 0.05 - 0.3	λ° 30°	TiAlCN / Blank
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Coating
163112	0.4	0.5	2	0.38	55	0.05	3	2	Blank
163113	0.4	0.5	2	0.38	55	0.05	3	2	TIALCN
163114	0.4	0.5	4	0.38	55	0.05	3	2	Blank
163115	0.4	0.5	4	0.38	55	0.05	3	2	TIALCN
163116	0.5	0.6	3	0.48	55	0.05	3	2	Blank
163117	0.5	0.6	3	0.48	55	0.05	3	2	TIALCN
163118	0.5	0.6	5	0.48	55	0.05	3	2	Blank
163119	0.5	0.6	5	0.48	55	0.05	3	2	TIALCN
163120	0.6	0.8	4	0.58	55	0.06	4	2	Blank
163121	0.6	0.8	4	0.58	55	0.06	4	2	TIALCN
163122	0.6	0.8	6	0.58	55	0.06	4	2	Blank
163123	0.6	0.8	6	0.58	55	0.06	4	2	TIALCN
163124	0.8	1	4	0.77	55	0.08	4	2	Blank
163125	0.8	1	4	0.77	55	0.08	4	2	TIALCN
163126	0.8	1	6	0.77	55	0.08	4	2	Blank
163127	0.8	1	6	0.77	55	0.08	4	2	TIALCN
163128	0.8	1	8	0.77	55	0.08	4	2	TIALCN
163129	0.8	1	10	0.77	55	0.08	4	2	Blank
163130	0.8	1	10	0.77	55	0.08	4	2	TIALCN
163131	1	1.2	5	0.95	55	0.1	4	2	Blank
163132	1	1.2	5	0.95	55	0.1	4	2	TIALCN
163133	1	1.2	10	0.95	55	0.1	4	2	Blank
163134	1	1.2	10	0.95	55	0.1	4	2	TIALCN
163135	1	1.2	15	0.95	55	0.1	4	2	Blank

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Coating
163136	1	1.2	15	0.95	55	0.1	4	2	TIALCN
163137	1	1.2	20	0.95	55	0.1	4	2	Blank
163138	1	1.2	20	0.95	55	0.1	4	2	TIALCN
163139	1	1.2	25	0.95	60	0.1	4	2	Blank
163140	1	1.2	25	0.95	60	0.1	4	2	TIALCN
163141	1.2	1.4	6	1.15	55	0.12	4	2	Blank
163142	1.2	1.4	6	1.15	55	0.12	4	2	TIALCN
163143	1.2	1.4	12	1.15	55	0.12	4	2	TIALCN
163144	1.5	1.8	4	1.44	55	0.15	4	2	Blank
163145	1.5	1.8	4	1.44	55	0.15	4	2	TIALCN
163146	1.5	1.8	8	1.44	55	0.15	4	2	Blank
163147	1.5	1.8	8	1.44	55	0.15	4	2	TIALCN
163148	1.5	1.8	12	1.44	55	0.15	4	2	Blank
163149	1.5	1.8	12	1.44	55	0.15	4	2	TIALCN
163150	1.5	1.8	16	1.44	55	0.15	4	2	Blank
163151	1.5	1.8	16	1.44	55	0.15	4	2	TIALCN
163152	1.5	1.8	20	1.44	55	0.15	4	2	Blank
163153	1.5	1.8	20	1.44	55	0.15	4	2	TIALCN
163154	1.5	1.8	25	1.44	60	0.15	4	2	Blank
163155	1.5	1.8	25	1.44	60	0.15	4	2	TIALCN
163156	2	2	5	1.92	65	0.2	4	2	Blank
163157	2	2	5	1.92	65	0.2	4	2	TIALCN
163158	2	2	10	1.92	65	0.2	4	2	Blank
163159	2	2	10	1.92	65	0.2	4	2	TIALCN
163160	2	2	15	1.92	65	0.2	4	2	Blank
163161	2	2	15	1.92	65	0.2	4	2	TIALCN
163162	2	2	20	1.92	75	0.2	4	2	Blank
163163	2	2	20	1.92	75	0.2	4	2	TIALCN
163164	2	2	25	1.92	75	0.2	4	2	Blank
163165	2	2	25	1.92	75	0.2	4	2	TIALCN

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Coating
163166	2	2	30	1.92	75	0.2	4	2	Blank
163167	2	2	30	1.92	75	0.2	4	2	TIALCN
163168	3	3	5	2.9	65	0.3	4	2	Blank
163169	3	3	5	2.9	65	0.3	4	2	TIALCN
163170	3	3	10	2.9	65	0.3	4	2	Blank
163171	3	3	10	2.9	65	0.3	4	2	TIALCN
163172	3	3	15	2.9	65	0.3	4	2	Blank
163173	3	3	15	2.9	65	0.3	4	2	TIALCN
163174	3	3	20	2.9	65	0.3	4	2	Blank
163175	3	3	20	2.9	65	0.3	4	2	TIALCN
163176	3	3	25	2.9	75	0.3	4	2	Blank
163177	3	3	25	2.9	75	0.3	4	2	TIALCN
163178	3	3	30	2.9	75	0.3	4	2	Blank
163179	3	3	30	2.9	75	0.3	4	2	TIALCN
163180	4	4	10	3.9	65	0.3	6	2	TIALCN
163181	4	4	15	3.9	65	0.3	6	2	Blank
163182	4	4	15	3.9	65	0.3	6	2	TIALCN
163183	4	4	20	3.9	65	0.3	6	2	Blank
163184	4	4	20	3.9	65	0.3	6	2	TIALCN
163185	4	4	25	3.9	75	0.3	6	2	TIALCN
163186	4	4	30	3.9	75	0.3	6	2	Blank
163187	4	4	30	3.9	75	0.3	6	2	TIALCN
163188	5	5	10	4.9	65	0.3	6	2	TIALCN
163189	5	5	20	4.9	65	0.3	6	2	Blank
163190	5	5	20	4.9	65	0.3	6	2	TIALCN
163191	5	5	30	4.9	75	0.3	6	2	Blank
163192	5	5	30	4.9	75	0.3	6	2	TIALCN
163193	5	5	40	4.9	90	0.3	6	2	Blank
163194	5	5	40	4.9	90	0.3	6	2	TIALCN
163195	6	6	20	5.9	65	0.3	6	2	Blank

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Coating
163196	6	6	20	5.9	65	0.3	6	2	TIALCN
163197	6	6	30	5.9	75	0.3	6	2	Blank
163198	6	6	30	5.9	75	0.3	6	2	TIALCN
163199	6	6	40	5.9	90	0.3	6	2	Blank
163200	6	6	40	5.9	90	0.3	6	2	TIALCN
163201	6	6	50	5.9	90	0.3	6	2	Blank
163202	6	6	50	5.9	90	0.3	6	2	TIALCN

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.4 - 0.8	f _z (mm) a _p (mm)	0.001 - 0.002 0.4 - 0.8	0.001 0.4 - 0.8	0.001 - 0.002 0.4 - 0.8	0.001 - 0.002 0.4 - 0.8	-	-
1 - 2	f _z (mm) a _p (mm)	0.002 - 0.01 1.0 - 2.0	0.002 - 0.007 1.0 - 2.0	0.004 - 0.01 1.0 - 2.0	0.004 - 0.01 1.0 - 2.0	-	-
3	f _z (mm) a _p (mm)	0.005 - 0.01 3.0	0.005 - 0.007 3.0	0.007 - 0.01 3.0	0.007 - 0.01 3.0	-	-
4	f _z (mm) a _p (mm)	0.013 - 0.018 4.0	0.009 - 0.013 4.0	0.013 - 0.018 4.0	0.013 - 0.018 4.0	-	-
5	f _z (mm) a _p (mm)	0.013 - 0.018 5.0	0.009 - 0.013 5.0	0.013 - 0.018 5.0	0.013 - 0.018 5.0	-	-
6	f _z (mm) a _p (mm)	0.021 - 0.03 6.0	0.016 - 0.021 6.0	0.021 - 0.03 6.0	0.021 - 0.03 6.0	-	-



Speed (V_c in m/min)

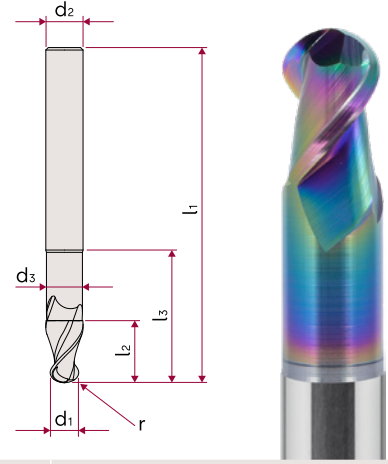
Application	P	M	K	N	S	H
	○	○	○	● (A) (KU)	-	-
ROUGH FINE	- 88 245 350	- 88 126 200	- 88 250 330	- 88 350 780	-	-

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic

Ball nose end mill cutters

NV01

d_1 3 - 16	z 2	r 0.5 - 8	λ° 45°	ta-C
				




Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Cylinder shank
164115	3	6	16	2.9	50	1.5	3	2	HA
164116	4	7	17	3.9	54	2	4	2	HA
164117	5	8	18	4.9	54	2.5	5	2	HA
164118	6	10	21	5.8	54	3	6	2	HA
164119	6	10	21	5.8	54	3	6	2	HA
164120	8	12	27	7.8	59	4	8	2	HA
164121	8	12	27	7.8	59	4	8	2	HA
164122	10	13	32	9.8	67	5	10	2	HA
164123	10	13	32	9.8	67	5	10	2	HA
164124	12	16	38	11.7	73	6	12	2	HA
164125	12	16	38	11.7	73	6	12	2	HA
164126	16	20	44	15.7	83	8	16	2	HA
164127	16	20	44	15.7	83	8	16	2	HA
164128	1	2	15	0.9	60	0.5	3	2	HA
164129	2	4	20	1.9	60	1	3	2	HA
164130	3	10	32	2.9	75	1.5	3	2	HA
164131	4	13	36	3.9	75	2	4	2	HA
164132	5	15	40	4.9	75	2.5	5	2	HA
164133	6	16	44	5.8	100	3	6	2	HA
164134	6	16	44	5.8	100	3	6	2	HB
164135	8	22	54	7.8	100	4	8	2	HA
164136	8	22	54	7.8	100	4	8	2	HB
164137	10	25	60	9.8	100	5	10	2	HA
164138	10	25	60	9.8	100	5	10	2	HB

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Cylinder shank
164139	12	26	60	11.7	100	6	12	2	HA
164140	12	26	60	11.7	100	6	12	2	HB
164141	16	30	92	15.7	150	8	16	2	HA
164142	16	30	92	15.7	150	8	16	2	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f _z (mm) a _p (mm)	-	-	-	0.02 - 0.025 0.09	-	-
4	f _z (mm) a _p (mm)	-	-	-	0.025 - 0.03 0.12	-	-
5	f _z (mm) a _p (mm)	-	-	-	0.038 - 0.05 0.15	-	-
6	f _z (mm) a _p (mm)	-	-	-	0.053 - 0.06 0.18	-	-
8	f _z (mm) a _p (mm)	-	-	-	0.06 - 0.07 0.24	-	-
10	f _z (mm) a _p (mm)	-	-	-	0.07 - 0.085 0.30	-	-
12	f _z (mm) a _p (mm)	-	-	-	0.088 - 0.1 0.36	-	-
16	f _z (mm) a _p (mm)	-	-	-	0.12 - 0.15 0.48	-	-

Speed (V_c in m/min)

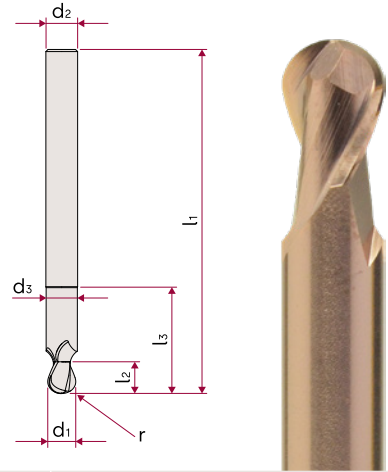
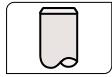
Application	P	M	K	N	S	H
	-	-	-		-	-
ROUGH FINE	-	-	-	400 600 800	-	-

① ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

Ball nose end mill cutters

NV02

d_1 0.4 - 6	z 2	r 0.2 - 3	λ° 30°	TiAlCN / Blank
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Coating
163019	0.4	0.5	2	0.38	55	0.2	3	2	Blank
163020	0.4	0.5	2	0.38	55	0.2	3	2	TiAlCN
163021	0.4	0.5	4	0.38	55	0.2	3	2	Blank
163022	0.4	0.5	4	0.38	55	0.2	3	2	TiAlCN
163023	0.5	0.6	3	0.48	55	0.25	3	2	Blank
163024	0.5	0.6	3	0.48	55	0.25	3	2	TiAlCN
163025	0.5	0.6	5	0.48	55	0.25	3	2	Blank
163026	0.5	0.6	5	0.48	55	0.25	3	2	TiAlCN
163027	0.6	0.8	2	0.58	55	0.3	4	2	Blank
163028	0.6	0.8	2	0.58	55	0.3	4	2	TiAlCN
163029	0.6	0.8	4	0.58	55	0.3	4	2	Blank
163030	0.6	0.8	4	0.58	55	0.3	4	2	TiAlCN
163031	0.6	0.8	6	0.58	55	0.3	4	2	Blank
163032	0.6	0.8	6	0.58	55	0.3	4	2	TiAlCN
163033	0.8	1	4	0.77	55	0.4	4	2	Blank
163034	0.8	1	4	0.77	55	0.4	4	2	TiAlCN
163035	0.8	1	6	0.77	55	0.4	4	2	Blank
163036	0.8	1	8	0.77	55	0.4	4	2	TiAlCN
163037	0.8	1	10	0.77	55	0.4	4	2	Blank
163038	0.8	1	10	0.77	55	0.4	4	2	TiAlCN
163039	1	1.2	5	0.95	55	0.5	4	2	Blank
163040	1	1.2	5	0.95	55	0.5	4	2	TiAlCN
163041	1	1.2	10	0.95	55	0.5	4	2	Blank
163042	1	1.2	10	0.95	55	0.5	4	2	TiAlCN

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Coating
163043	1	1.2	15	0.95	55	0.5	4	2	Blank
163044	1	1.2	15	0.95	55	0.5	4	2	TiAlCN
163045	1	1.2	20	0.95	55	0.5	4	2	Blank
163046	1	1.2	20	0.95	55	0.5	4	2	TiAlCN
163047	1	1.2	25	0.95	60	0.5	4	2	Blank
163048	1	1.2	25	0.95	60	0.5	4	2	TiAlCN
163049	1.2	1.4	6	1.15	55	0.6	4	2	TiAlCN
163050	1.2	1.4	12	1.15	55	0.6	4	2	TiAlCN
163051	1.2	1.4	18	1.15	55	0.6	4	2	TiAlCN
163052	1.5	1.8	4	1.44	55	0.75	4	2	Blank
163053	1.5	1.8	4	1.44	55	0.75	4	2	TiAlCN
163054	1.5	1.8	8	1.44	55	0.75	4	2	Blank
163055	1.5	1.8	8	1.44	55	0.75	4	2	TiAlCN
163056	1.5	1.8	12	1.44	55	0.75	4	2	Blank
163057	1.5	1.8	12	1.44	55	0.75	4	2	TiAlCN
163058	1.5	1.8	16	1.44	55	0.75	4	2	Blank
163059	1.5	1.8	16	1.44	55	0.75	4	2	TiAlCN
163060	1.5	1.8	20	1.44	55	0.75	4	2	Blank
163061	1.5	1.8	20	1.44	55	0.75	4	2	TiAlCN
163062	1.5	1.8	25	1.44	60	0.75	4	2	Blank
163063	1.5	1.8	25	1.44	60	0.75	4	2	TiAlCN
163064	2	2	5	1.92	65	1	4	2	Blank
163065	2	2	5	1.92	65	1	4	2	TiAlCN
163066	2	2	10	1.92	65	1	4	2	Blank
163067	2	2	10	1.92	65	1	4	2	TiAlCN
163068	2	2	15	1.92	65	1	4	2	Blank
163069	2	2	15	1.92	65	1	4	2	TiAlCN
163070	2	2	20	1.92	65	1	4	2	Blank
163071	2	2	20	1.92	65	1	4	2	TiAlCN
163072	2	2	25	1.92	75	1	4	2	Blank

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Coating
163073	2	2	25	1.92	75	1	4	2	TiAlCN
163074	2	2	30	1.92	75	1	4	2	Blank
163075	2	2	30	1.92	75	1	4	2	TiAlCN
163076	3	3	5	2.9	65	1.5	4	2	TiAlCN
163077	3	3	10	2.9	65	1.5	4	2	Blank
163078	3	3	10	2.9	65	1.5	4	2	TiAlCN
163079	3	3	15	2.9	65	1.5	4	2	Blank
163080	3	3	15	2.9	65	1.5	4	2	TiAlCN
163081	3	3	20	2.9	65	1.5	4	2	Blank
163082	3	3	20	2.9	65	1.5	4	2	TiAlCN
163083	3	3	25	2.9	75	1.5	4	2	Blank
163084	3	3	25	2.9	75	1.5	4	2	TiAlCN
163085	3	3	30	2.9	75	1.5	4	2	Blank
163086	3	3	30	2.9	75	1.5	4	2	TiAlCN
163087	4	4	10	3.9	65	2	6	2	TiAlCN
163088	4	4	15	3.9	65	2	6	2	Blank
163089	4	4	15	3.9	65	2	6	2	TiAlCN
163090	4	4	20	3.9	65	2	6	2	Blank
163091	4	4	20	3.9	65	2	6	2	TiAlCN
163092	4	4	25	3.9	75	2	6	2	Blank
163093	4	4	25	3.9	75	2	6	2	TiAlCN
163094	4	4	30	3.9	75	2	6	2	Blank
163095	4	4	30	3.9	75	2	6	2	TiAlCN
163096	5	5	10	4.9	65	2.5	6	2	Blank
163097	5	5	10	4.9	65	2.5	6	2	TiAlCN
163098	5	5	20	4.9	65	2.5	6	2	Blank
163099	5	5	20	4.9	65	2.5	6	2	TiAlCN
163100	5	5	30	4.9	75	2.5	6	2	Blank
163101	5	5	30	4.9	75	2.5	6	2	TiAlCN
163102	6	6	10	5.9	65	3	6	2	Blank

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Coating
163103	6	6	10	5.9	65	3	6	2	TiAlCN
163104	6	6	20	5.9	65	3	6	2	Blank
163105	6	6	20	5.9	65	3	6	2	TiAlCN
163106	6	6	30	5.9	75	3	6	2	Blank
163107	6	6	30	5.9	75	3	6	2	TiAlCN
163108	6	6	40	5.9	90	3	6	2	Blank
163109	6	6	40	5.9	90	3	6	2	TiAlCN
163110	6	6	50	5.9	90	3	6	2	Blank
163111	6	6	50	5.9	90	3	6	2	TiAlCN

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.4 - 0.8	f _z (mm)	0.002 - 0.005	0.001 - 0.003	0.002 - 0.005	0.002 - 0.005	-	-
	a _p (mm)	0.012 - 0.024	0.012 - 0.024	0.012 - 0.024	0.012 - 0.024	-	-
1 - 2	f _z (mm)	0.005 - 0.011	0.004 - 0.007	0.005 - 0.011	0.005 - 0.011	-	-
	a _p (mm)	0.03 - 0.06	0.03 - 0.06	0.03 - 0.06	0.03 - 0.06	-	-
3	f _z (mm)	0.008 - 0.011	0.005 - 0.007	0.008 - 0.011	0.008 - 0.011	-	-
	a _p (mm)	0.09	0.09	0.09	0.09	-	-
4	f _z (mm)	0.024 - 0.035	0.006 - 0.009	0.024 - 0.035	0.024 - 0.035	-	-
	a _p (mm)	0.12	0.12	0.12	0.12	-	-
5	f _z (mm)	0.024 - 0.035	0.006 - 0.009	0.024 - 0.035	0.024 - 0.035	-	-
	a _p (mm)	0.15	0.15	0.15	0.15	-	-
6	f _z (mm)	0.032 - 0.045	0.008 - 0.011	0.032 - 0.045	0.032 - 0.045	-	-
	a _p (mm)	0.18	0.18	0.18	0.18	-	-

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	○	○	○	● (A) (KU)	-	-
ROUGH	-	-	-	-	-	-
FINE	123 205 335	88 125	207 295 325	207 312 445	-	-

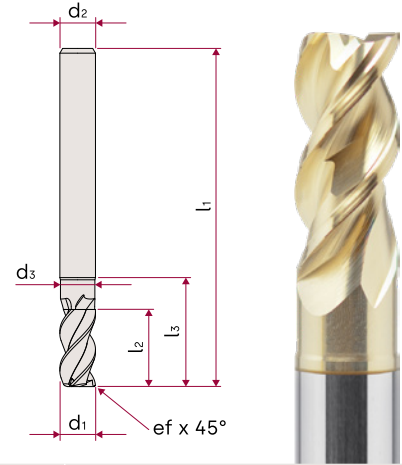
● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic

HPC milling cutters

NH01

d_1 3 - 25	z 3	ef 0.1 - 0.3	λ° 43°/47°	ZrN
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Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
162531	3	8	12	2.8	57	0.1	6	3	HA
162532	3	8	12	2.8	57	0.1	6	3	HB
162533	4	11	18	3.8	57	0.1	6	3	HA
162534	4	11	18	3.8	57	0.1	6	3	HB
162535	5	13	18	4.8	57	0.1	6	3	HA
162536	5	13	18	4.8	57	0.1	6	3	HB
162537	6	13	18	5.8	57	0.2	6	3	HA
162538	6	13	18	5.8	57	0.2	6	3	HB
162539	6	13	42	5.8	80	0.2	6	3	HA
162540	6	13	42	5.8	80	0.2	6	3	HB
162541	8	21	25	7.8	63	0.2	8	3	HA
162542	8	21	25	7.8	63	0.2	8	3	HB
162543	8	21	62	7.8	100	0.2	8	3	HA
162544	8	21	62	7.8	100	0.2	8	3	HB
162545	10	22	30	9.7	72	0.2	10	3	HA
162546	10	22	30	9.7	72	0.2	10	3	HB
162547	10	22	58	9.7	100	0.2	10	3	HA
162548	10	22	58	9.7	100	0.2	10	3	HB
162549	12	26	36	11.7	83	0.2	12	3	HA
162550	12	26	36	11.7	83	0.2	12	3	HB
162551	12	26	73	11.7	120	0.2	12	3	HA
162552	12	26	73	11.7	120	0.2	12	3	HB
162553	16	36	42	15.7	92	0.2	16	3	HA
162554	16	36	42	15.7	92	0.2	16	3	HB

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef	d ₂	z	Cylinder shank
162555	16	36	100	15.7	150	0.2	16	3	HA
162556	16	36	100	15.7	150	0.2	16	3	HB
162557	18	36	42	17.6	92	0.2	18	3	HA
162558	18	36	42	17.6	92	0.2	18	3	HB
162559	18	36	100	17.6	150	0.2	18	3	HA
162560	18	36	100	17.6	150	0.2	18	3	HB
162561	20	41	52	19.5	104	0.2	20	3	HA
162562	20	41	52	19.5	104	0.2	20	3	HB
162563	20	41	98	19.5	150	0.2	20	3	HA
162564	20	41	98	19.5	150	0.2	20	3	HB
162565	25	50	65	24.5	121	0.3	25	3	HA
162566	25	50	65	24.5	121	0.3	25	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm) a_p (mm)	-	-	-	0.021 - 0.032 3.0	-	-
4	f_z (mm) a_p (mm)	-	-	-	0.03 - 0.045 4.0	-	-
5	f_z (mm) a_p (mm)	-	-	-	0.034 - 0.05 5.0	-	-
6	f_z (mm) a_p (mm)	-	-	-	0.029 - 0.06 6.0	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.038 - 0.08 8.0	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.042 - 0.09 10.0	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.047 - 0.1 12.0	-	-
16	f_z (mm) a_p (mm)	-	-	-	0.059 - 0.13 16.0	-	-
18	f_z (mm) a_p (mm)	-	-	-	0.093 - 0.14 18.0	-	-
20	f_z (mm) a_p (mm)	-	-	-	0.077 - 0.16 20.0	-	-
25	f_z (mm) a_p (mm)	-	-	-	0.13 - 0.2 25.0	-	-

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	<div style="display: flex; align-items: center; gap: 5px;"> ● A ○ KU </div>	-	-
ROUGH FINE	-	-	-	109 257 389 210 364 550	-	-

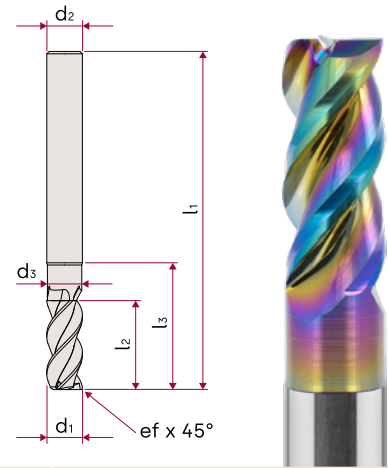
● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic

HPC milling cutters

NH02

d_1 3 - 20	z 3	ef 0.1 - 0.2	λ° 45°	ta-C
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Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
163981	3	12	16	2.9	57	0.1	6	3	HA
163982	3	12	16	2.9	57	0.1	6	3	HB
163983	4	12	18	3.9	57	0.1	6	3	HA
163984	4	12	18	3.9	57	0.1	6	3	HB
163985	5	15	18	4.9	57	0.1	6	3	HA
163986	5	15	18	4.9	57	0.1	6	3	HB
163987	6	15	21	5.8	57	0.1	6	3	HA
163988	6	15	21	5.8	57	0.1	6	3	HB
163989	8	22	28	7.8	64	0.1	8	3	HA
163990	8	22	28	7.8	64	0.1	8	3	HB
163991	10	25	33	9.7	73	0.2	10	3	HA
163992	10	25	33	9.7	73	0.2	10	3	HB
163993	12	28	39	11.7	84	0.2	12	3	HA
163994	12	28	39	11.7	84	0.2	12	3	HB
163995	14	32	42	13.7	89	0.2	14	3	HA
163996	14	32	42	13.7	89	0.2	14	3	HB
163997	16	35	45	15.7	93	0.2	16	3	HA
163998	16	35	45	15.7	93	0.2	16	3	HB
163999	20	41	52	19.5	104	0.2	20	3	HA
164000	20	41	52	19.5	104	0.2	20	3	HB

Product overview

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

Technical information

Index

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm) a_p (mm)	-	-	-	0.021 - 0.032 3.0	-	-
4	f_z (mm) a_p (mm)	-	-	-	0.03 - 0.045 4.0	-	-
5	f_z (mm) a_p (mm)	-	-	-	0.033 - 0.05 5.0	-	-
6	f_z (mm) a_p (mm)	-	-	-	0.042 - 0.06 6.0	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.054 - 0.08 8.0	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.061 - 0.09 10.0	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.067 - 0.1 12.0	-	-
14	f_z (mm) a_p (mm)	-	-	-	0.76 - 0.11 14.0	-	-
16	f_z (mm) a_p (mm)	-	-	-	0.084 - 0.13 16.0	-	-
20	f_z (mm) a_p (mm)	-	-	-	0.11 - 0.16 20.0	-	-

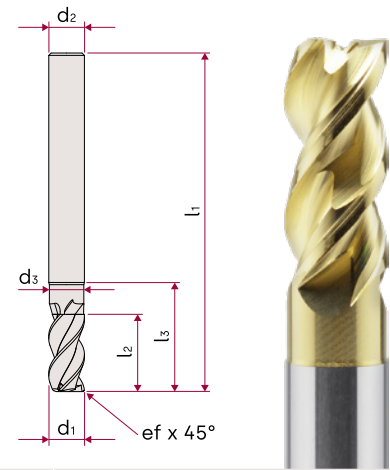
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A KU GFK	-	-
ROUGH FINE	-	-	-	184 247 389 260 350 550	-	-

① ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

HPC milling cutters

NH03



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef	d ₂	z	Cylinder shank
162582	3	8	10	2.8	57	0.06	6	3	HA
162583	4	11	14	3.8	57	0.08	6	3	HA
162584	5	13	16	4.8	57	0.1	6	3	HA
162585	6	13	18	5.8	57	0.2	6	3	HA
162586	6	13	18	5.8	57	0.2	6	3	HB
162587	6	13	42	5.8	80	0.2	6	3	HA
162588	6	13	42	5.8	80	0.2	6	3	HB
162589	8	21	25	7.8	63	0.2	8	3	HA
162590	8	21	25	7.8	63	0.2	8	3	HB
162591	8	21	62	7.8	100	0.2	8	3	HA
162592	8	21	62	7.8	100	0.2	8	3	HB
162593	10	22	30	9.7	72	0.2	10	3	HA
162594	10	22	30	9.7	72	0.2	10	3	HB
162595	10	22	58	9.7	100	0.2	10	3	HA
162596	10	22	58	9.7	100	0.2	10	3	HB
162597	12	26	36	11.7	83	0.2	12	3	HA
162598	12	26	36	11.7	83	0.2	12	3	HB
162599	12	26	73	11.7	120	0.2	12	3	HA
162600	12	26	73	11.7	120	0.2	12	3	HB
162601	16	36	42	15.7	92	0.2	16	3	HA
162602	16	36	42	15.7	92	0.2	16	3	HB
162603	16	36	100	15.7	150	0.2	16	3	HA
162604	16	36	100	15.7	150	0.2	16	3	HB
162605	18	36	42	17.6	92	0.2	18	3	HA

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef	d ₂	z	Cylinder shank
162606	18	36	42	17.6	92	0.2	18	3	HB
162607	18	36	100	17.6	150	0.2	18	3	HA
162608	18	36	100	17.6	150	0.2	18	3	HB
162609	20	41	52	19.5	104	0.2	20	3	HA
162610	20	41	52	19.5	104	0.2	20	3	HB
162611	20	41	98	19.5	150	0.2	20	3	HA
162612	20	41	98	19.5	150	0.2	20	3	HB
162613	25	50	65	24.5	121	0.3	25	3	HA
162614	25	50	65	24.5	121	0.3	25	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm)	-	-	-	0.021 - 0.032	-	-
	a_p (mm)	-	-	-	3.0	-	-
4	f_z (mm)	-	-	-	0.03 - 0.045	-	-
	a_p (mm)	-	-	-	4.0	-	-
5	f_z (mm)	-	-	-	0.034 - 0.05	-	-
	a_p (mm)	-	-	-	5.0	-	-
6	f_z (mm)	-	-	-	0.029 - 0.06	-	-
	a_p (mm)	-	-	-	6.0	-	-
8	f_z (mm)	-	-	-	0.038 - 0.08	-	-
	a_p (mm)	-	-	-	8.0	-	-
10	f_z (mm)	-	-	-	0.042 - 0.09	-	-
	a_p (mm)	-	-	-	10.0	-	-
12	f_z (mm)	-	-	-	0.047 - 0.1	-	-
	a_p (mm)	-	-	-	12.0	-	-
16	f_z (mm)	-	-	-	0.059 - 0.13	-	-
	a_p (mm)	-	-	-	16.0	-	-
18	f_z (mm)	-	-	-	0.065 - 0.14	-	-
	a_p (mm)	-	-	-	18.0	-	-
20	f_z (mm)	-	-	-	0.077 - 0.16	-	-
	a_p (mm)	-	-	-	20.0	-	-
25	f_z (mm)	-	-	-	0.13 - 0.2	-	-
	a_p (mm)	-	-	-	25.0	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	● (A) ○ (KU)	-	-
ROUGH FINE	-	-	-	109 212 389 154 300 550	-	-

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic

N – Non-ferrous metals & plastics

Technical information

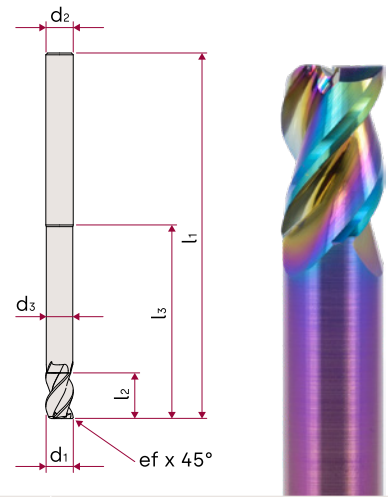
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HPC milling cutters

NH04

d_1 1 - 20	z 3	ef 0.05 - 0.2	λ° 45°	ta-C
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Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
163948	1	3	8	0.9	50	0.05	4	3	HA
163949	1.5	5	13	1.4	50	0.05	4	3	HA
163950	1.8	5	13	1.7	50	0.05	4	3	HA
163951	2	6	15	1.9	50	0.05	4	3	HA
163952	3	6.5	20	2.9	80	0.05	6	3	HA
163953	4	6.5	24	3.9	80	0.1	6	3	HA
163954	4	6.5	24	3.9	80	0.1	6	3	HB
163955	5	8	30	4.9	80	0.1	6	3	HA
163956	5	8	30	4.9	80	0.1	6	3	HB
163957	6	10	42	5.8	80	0.2	6	3	HA
163958	6	10	42	5.8	80	0.2	6	3	HB
163959	8	13	62	7.8	100	0.2	8	3	HA
163960	8	13	62	7.8	100	0.2	8	3	HB
163961	10	16	58	9.7	100	0.2	10	3	HA
163962	10	16	58	9.7	100	0.2	10	3	HB
163963	12	19	73	11.7	120	0.2	12	3	HA
163964	12	19	73	11.7	120	0.2	12	3	HB
163965	16	25	92	15.7	150	0.2	16	3	HA
163966	16	25	92	15.7	150	0.2	16	3	HB
163967	20	32	100	19.5	150	0.2	20	3	HA
163968	20	32	100	19.5	150	0.2	20	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
1 - 2	f_z (mm)	-	-	-	0.007 - 0.022	-	-
	a_p (mm)	-	-	-	1.0 - 2.0	-	-
3	f_z (mm)	-	-	-	0.021 - 0.032	-	-
	a_p (mm)	-	-	-	3.0	-	-
4	f_z (mm)	-	-	-	0.027 - 0.041	-	-
	a_p (mm)	-	-	-	4.0	-	-
5	f_z (mm)	-	-	-	0.03 - 0.045	-	-
	a_p (mm)	-	-	-	5.0	-	-
6	f_z (mm)	-	-	-	0.038 - 0.045	-	-
	a_p (mm)	-	-	-	6.0	-	-
8	f_z (mm)	-	-	-	0.048 - 0.072	-	-
	a_p (mm)	-	-	-	8.0	-	-
10	f_z (mm)	-	-	-	0.055 - 0.081	-	-
	a_p (mm)	-	-	-	10.0	-	-
12	f_z (mm)	-	-	-	0.061 - 0.09	-	-
	a_p (mm)	-	-	-	12.0	-	-
16	f_z (mm)	-	-	-	0.076 - 0.12	-	-
	a_p (mm)	-	-	-	16.0	-	-
20	f_z (mm)	-	-	-	0.098 - 0.14	-	-
	a_p (mm)	-	-	-	20.0	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A KU GFK	-	-
ROUGH FINE	-	-	-	147 198 311 208 280 440	-	-

① ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

N – Non-ferrous metals & plastics

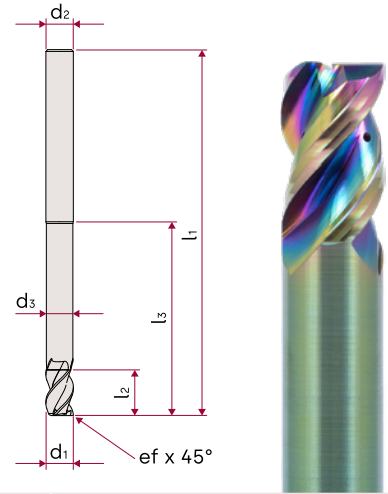
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HPC milling cutters

NH05

d_1 6 - 20	z 3	ef 0.1 - 0.2	λ° 45°	ta-C



Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
163969	6	10	42	5.8	80	0.1	6	3	HA
163970	6	10	42	5.8	80	0.1	6	3	HB
163971	8	13	62	7.8	100	0.1	8	3	HA
163972	8	13	62	7.8	100	0.1	8	3	HB
163973	10	16	58	9.7	100	0.2	10	3	HA
163974	10	16	58	9.7	100	0.2	10	3	HB
163975	12	19	73	11.7	120	0.2	12	3	HA
163976	12	19	73	11.7	120	0.2	12	3	HB
163977	16	25	92	15.7	150	0.2	16	3	HA
163978	16	25	92	15.7	150	0.2	16	3	HB
163979	20	32	100	19.5	150	0.2	20	3	HA
163980	20	32	100	19.5	150	0.2	20	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm)	-	-	-	0.038 - 0.054	-	-
	a_p (mm)	-	-	-	6.0	-	-
8	f_z (mm)	-	-	-	0.048 - 0.072	-	-
	a_p (mm)	-	-	-	8.0	-	-
10	f_z (mm)	-	-	-	0.055 - 0.081	-	-
	a_p (mm)	-	-	-	10.0	-	-
12	f_z (mm)	-	-	-	0.061 - 0.09	-	-
	a_p (mm)	-	-	-	12.0	-	-
16	f_z (mm)	-	-	-	0.076 - 0.12	-	-
	a_p (mm)	-	-	-	16.0	-	-
20	f_z (mm)	-	-	-	0.098 - 0.014	-	-
	a_p (mm)	-	-	-	20.0	-	-

P/K – Steel/cast iron

H – Hardened materials

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A KU GFK	-	-
ROUGH FINE	-	-	-	147 198 311 208 280 440	-	-

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

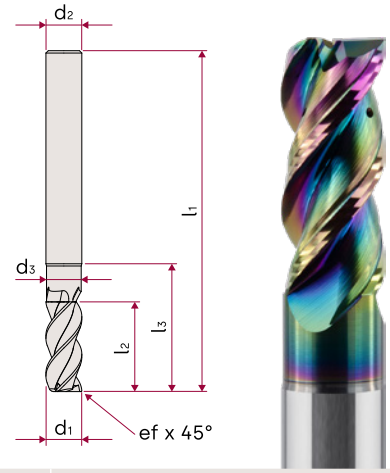
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HPC milling cutters

NH06

d_1 3 - 20	z 3	ef 0.1 - 0.2	λ° 45°	ta-C



Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
164167	3	12	14	2.9	57	0.1	6	3	HA
164168	4	12	15	3.9	57	0.1	6	3	HA
164169	5	15	18	4.9	57	0.1	6	3	HA
164170	6	15	21	5.8	57	0.1	6	3	HA
164171	6	15	21	5.8	57	0.1	6	3	HB
164172	8	22	28	7.8	64	0.1	8	3	HA
164173	8	22	28	7.8	64	0.1	8	3	HB
164174	10	25	33	9.7	73	0.2	10	3	HA
164175	10	25	33	9.7	73	0.2	10	3	HB
164176	12	28	39	11.7	84	0.2	12	3	HA
164177	12	28	39	11.7	84	0.2	12	3	HB
164178	16	35	45	15.7	93	0.2	16	3	HA
164179	16	35	45	15.7	93	0.2	16	3	HB
164180	20	41	52	19.5	104	0.2	20	3	HA
164181	20	41	52	19.5	104	0.2	20	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm)	-	-	-	0.021 - 0.032	-	-
	a_p (mm)	-	-	-	3.0	-	-
4	f_z (mm)	-	-	-	0.03 - 0.045	-	-
	a_p (mm)	-	-	-	4.0	-	-
5	f_z (mm)	-	-	-	0.034 - 0.05	-	-
	a_p (mm)	-	-	-	5.0	-	-
6	f_z (mm)	-	-	-	0.042 - 0.06	-	-
	a_p (mm)	-	-	-	6.0	-	-
8	f_z (mm)	-	-	-	0.054 - 0.08	-	-
	a_p (mm)	-	-	-	8.0	-	-
10	f_z (mm)	-	-	-	0.061 - 0.09	-	-
	a_p (mm)	-	-	-	10.0	-	-
12	f_z (mm)	-	-	-	0.067 - 0.1	-	-
	a_p (mm)	-	-	-	12.0	-	-
16	f_z (mm)	-	-	-	0.084 - 0.13	-	-
	a_p (mm)	-	-	-	16.0	-	-
20	f_z (mm)	-	-	-	0.11 - 0.16	-	-
	a_p (mm)	-	-	-	20.0	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A KU CFK	-	-
ROUGH	-	-	-	184 247 389	-	-
FINE	-	-	-	260 350 550	-	-

① ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | CFK = Faserverstärkter Plastic

S – Special alloys & titanium

N – Non-ferrous metals & plastics

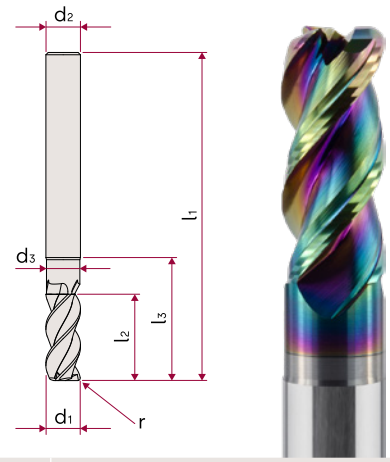
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HPC milling cutters

NH07

d_1 5 - 20	z 3	r 0.5 - 2	λ° 45°	ta-C




Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z	Cylinder shank
164182	5	15	18	4.9	57	0.5	6	3	HA
164183	5	15	18	4.9	57	0.5	6	3	HB
164184	5	15	18	4.9	57	1	6	3	HA
164185	5	15	18	4.9	57	1	6	3	HB
164186	6	15	21	5.8	57	0.5	6	3	HA
164187	6	15	21	5.8	57	0.5	6	3	HB
164188	6	15	21	5.8	57	1	6	3	HA
164189	6	15	21	5.8	57	1	6	3	HB
164190	8	22	28	7.8	64	0.5	8	3	HA
164191	8	22	28	7.8	64	0.5	8	3	HB
164192	8	22	28	7.8	64	1	8	3	HA
164193	8	22	28	7.8	64	1	8	3	HB
164194	10	25	33	9.7	73	0.5	10	3	HA
164195	10	25	33	9.7	73	0.5	10	3	HB
164196	10	25	33	9.7	73	1	10	3	HA
164197	10	25	33	9.7	73	1	10	3	HB
164198	12	28	39	11.7	84	0.5	12	3	HA
164199	12	28	39	11.7	84	0.5	12	3	HB
164200	12	28	39	11.7	84	1	12	3	HA
164201	12	28	39	11.7	84	1	12	3	HB
164202	12	28	39	11.7	84	2	12	3	HA
164203	12	28	39	11.7	84	2	12	3	HB
164204	16	35	45	15.7	93	1	16	3	HA
164205	16	35	45	15.7	93	1	16	3	HB

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Cylinder shank
164206	16	35	45	15.7	93	2	16	3	HA
164207	16	35	45	15.7	93	2	16	3	HB
164208	20	41	52	19.5	104	1	20	3	HA
164209	20	41	52	19.5	104	1	20	3	HB
164210	20	41	52	19.5	104	2	20	3	HA
164211	20	41	52	19.5	104	2	20	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
5	f _z (mm) a _p (mm)	-	-	-	0.034 - 0.05 5.0	-	-
6	f _z (mm) a _p (mm)	-	-	-	0.042 - 0.06 6.0	-	-
8	f _z (mm) a _p (mm)	-	-	-	0.054 - 0.08 8.0	-	-
10	f _z (mm) a _p (mm)	-	-	-	0.061 - 0.09 10.0	-	-
12	f _z (mm) a _p (mm)	-	-	-	0.067 - 0.1 12.0	-	-
16	f _z (mm) a _p (mm)	-	-	-	0.084 - 0.13 16.0	-	-
20	f _z (mm) a _p (mm)	-	-	-	0.011- 0.16 20.0	-	-

Speed (V_c in m/min)

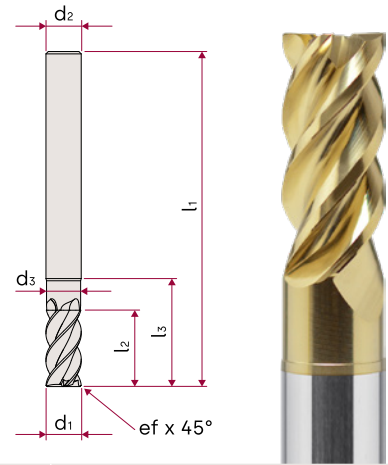
Application	P	M	K	N	S	H
	-	-	-		-	-
ROUGH FINE	-	-	-	184 247 389 260 350 550	-	-

● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | CFK = Faserverstärkter Plastic

HPC milling cutters

NH08

d_1 3 - 25	z 4	ef 0.1 - 0.3	λ° 43°/47°	ZrN



Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z	Cylinder shank
162886	3	8	12	2.8	57	0.1	6	4	HA
162887	3	8	12	2.8	57	0.1	6	4	HB
162888	4	11	18	3.8	57	0.1	6	4	HA
162889	4	11	18	3.8	57	0.1	6	4	HB
162890	5	13	18	4.8	57	0.1	6	4	HA
162891	5	13	18	4.8	57	0.1	6	4	HB
162892	6	13	18	5.8	57	0.2	6	4	HA
162893	6	13	18	5.8	57	0.2	6	4	HB
162894	6	13	42	5.8	80	0.2	6	4	HA
162895	6	13	42	5.8	80	0.2	6	4	HB
162896	8	21	25	7.8	63	0.2	8	4	HA
162897	8	21	25	7.8	63	0.2	8	4	HB
162898	8	21	62	7.8	100	0.2	8	4	HA
162899	8	21	62	7.8	100	0.2	8	4	HB
162900	10	22	30	9.7	72	0.2	10	4	HA
162901	10	22	30	9.7	72	0.2	10	4	HB
162902	10	22	58	9.7	100	0.2	10	4	HA
162903	10	22	58	9.7	100	0.2	10	4	HB
162904	12	26	36	11.7	83	0.2	12	4	HA
162905	12	26	36	11.7	83	0.2	12	4	HB
162906	12	26	73	11.7	120	0.2	12	4	HA
162907	12	26	73	11.7	120	0.2	12	4	HB
162908	16	36	42	15.7	92	0.2	16	4	HA
162909	16	36	42	15.7	92	0.2	16	4	HB

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef	d ₂	z	Cylinder shank
162910	16	36	100	15.7	150	0.2	16	4	HA
162911	16	36	100	15.7	150	0.2	16	4	HB
162912	20	41	52	19.5	104	0.2	20	4	HA
162913	20	41	52	19.5	104	0.2	20	4	HB
162914	20	41	98	19.5	150	0.2	20	4	HA
162915	20	41	98	19.5	150	0.2	20	4	HB
162916	25	50	65	24.5	121	0.3	25	4	HA
162917	25	50	65	24.5	121	0.3	25	4	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm) a_p (mm)	-	-	-	0.021 - 0.032 3.0	-	-
4	f_z (mm) a_p (mm)	-	-	-	0.03 - 0.045 4.0	-	-
5	f_z (mm) a_p (mm)	-	-	-	0.034 - 0.05 5.0	-	-
6	f_z (mm) a_p (mm)	-	-	-	0.029 - 0.06 6.0	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.038 - 0.08 8.0	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.042 - 0.09 10.0	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.047 - 0.1 12.0	-	-
16	f_z (mm) a_p (mm)	-	-	-	0.059 - 0.13 16.0	-	-
20	f_z (mm) a_p (mm)	-	-	-	0.077 - 0.16 20.0	-	-
25	f_z (mm) a_p (mm)	-	-	-	0.13 - 0.2 25.0	-	-

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	● A	-	-
ROUGH FINE	-	-	-	109 257 389 154 300 550	-	-

● = Primary application | A = Aluminium

HPC milling cutters

NH09



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	ef	d ₂	z	Cylinder shank
164001	3	6	10	2.9	57	0.1	6	4	HA
164002	3	6	10	2.9	57	0.1	6	4	HB
164003	4	8	14	3.9	57	0.1	6	4	HA
164004	4	8	14	3.9	57	0.1	6	4	HB
164005	5	10	16	4.9	57	0.1	6	4	HA
164006	5	10	16	4.9	57	0.1	6	4	HB
164007	6	12	19	5.8	57	0.2	6	4	HA
164008	6	12	19	5.8	57	0.2	6	4	HB
164009	8	16	25	7.8	63	0.2	8	4	HA
164010	8	16	25	7.8	63	0.2	8	4	HB
164011	10	20	30	9.7	72	0.2	10	4	HA
164012	10	20	30	9.7	72	0.2	10	4	HB
164013	12	24	36	11.7	83	0.2	12	4	HA
164014	12	24	36	11.7	83	0.2	12	4	HB
164015	14	30	38	13.7	83	0.2	14	4	HA
164016	14	30	38	13.7	83	0.2	14	4	HB
164017	16	32	42	15.7	92	0.2	16	4	HA
164018	16	32	42	15.7	92	0.2	16	4	HB
164019	20	40	52	19.5	104	0.2	20	4	HA
164020	20	40	52	19.5	104	0.2	20	4	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm) a_p (mm)	-	-	-	0.021 - 0.032 3.0	-	-
4	f_z (mm) a_p (mm)	-	-	-	0.03 - 0.045 4.0	-	-
5	f_z (mm) a_p (mm)	-	-	-	0.034 - 0.05 5.0	-	-
6	f_z (mm) a_p (mm)	-	-	-	0.042 - 0.06 6.0	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.054 - 0.08 8.0	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.061 - 0.09 10.0	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.067 - 0.1 12.0	-	-
14	f_z (mm) a_p (mm)	-	-	-	0.076 - 0.11 14.0	-	-
16	f_z (mm) a_p (mm)	-	-	-	0.084 - 0.13 16.0	-	-
20	f_z (mm) a_p (mm)	-	-	-	0.11 - 0.16 20.0	-	-

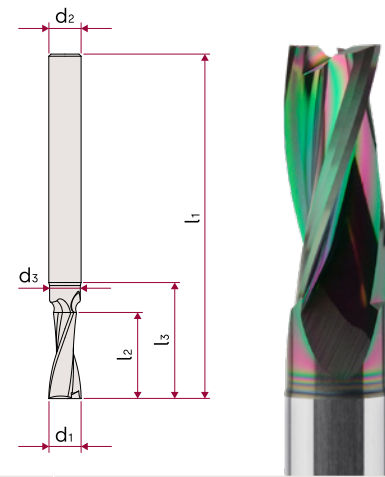
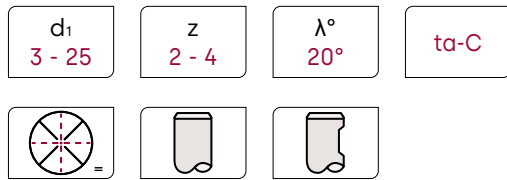
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	A KU	-	-
ROUGH FINE	-	-	-	184 247 389 260 350 550	-	-

i ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic

Trochoidal milling cutters

NT01



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	d ₂	z	Cylinder shank
163758	3	11	14	2.9	50	3	2	HA
163759	4	13	16	3.7	54	4	2	HA
163760	5	15	18	4.7	54	5	2	HA
163761	6	16	21	5.7	64	6	2	HA
163762	6	16	21	5.7	64	6	2	HB
163763	8	22	27	7.5	70	8	2	HA
163764	8	22	27	7.5	70	8	2	HB
163765	10	25	32	9.5	72	10	2	HA
163766	10	25	32	9.5	72	10	2	HB
163767	12	28	38	11.5	83	12	3	HA
163768	12	28	38	11.5	83	12	3	HB
163769	14	30	42	13.5	83	14	3	HA
163770	14	30	42	13.5	83	14	3	HB
163771	16	36	44	15.5	92	16	3	HA
163772	16	36	44	15.5	92	16	3	HB
163773	18	36	50	17.5	92	18	3	HA
163774	18	36	50	17.5	92	18	3	HB
163775	20	41	54	19.5	104	20	4	HA
163776	20	41	54	19.5	104	20	4	HB
163777	25	43	63	24.5	110	25	4	HA
163778	25	43	63	24.5	110	25	4	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm) a_p (mm)	-	-	-	0.007 - 0.01 3.0	-	-
4	f_z (mm) a_p (mm)	-	-	-	0.015 - 0.02 4.0	-	-
5	f_z (mm) a_p (mm)	-	-	-	0.019 - 0.025 5.0	-	-
6	f_z (mm) a_p (mm)	-	-	-	0.022 - 0.03 6.0	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.031 - 0.042 8.0	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.041 - 0.055 10.0	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.056 - 0.075 12.0	-	-
14	f_z (mm) a_p (mm)	-	-	-	0.063 - 0.085 14.0	-	-
16	f_z (mm) a_p (mm)	-	-	-	0.074 - 0.1 16.0	-	-
18	f_z (mm) a_p (mm)	-	-	-	0.081 - 0.11 18.0	-	-
20	f_z (mm) a_p (mm)	-	-	-	0.089 - 0.12 20.0	-	-
25	f_z (mm) a_p (mm)	-	-	-	0.11 - 0.15 25.0	-	-

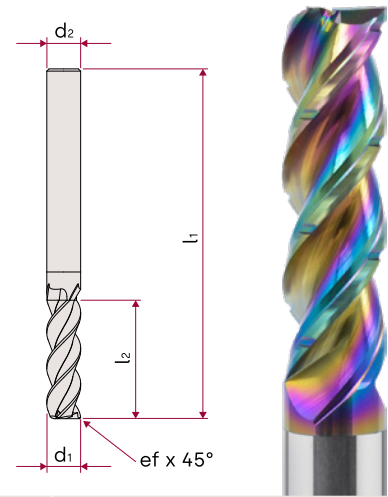
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	● A ● KU ○ GFK	-	-
ROUGH FINE	-	-	-	137 246 438 250 450 800	-	-

① ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

Trochoidal milling cutters

NT02







Order no.	d_1	l_2	l_1	ef	d_2	z	Cylinder shank
164155	6	21	62	0.2	6	3	HA
164156	6	21	62	0.2	6	3	HB
164157	8	28	68	0.2	8	3	HA
164158	8	28	68	0.2	8	3	HB
164159	10	35	80	0.2	10	3	HA
164160	10	35	80	0.2	10	3	HB
164161	12	42	93	0.2	12	3	HA
164162	12	42	93	0.2	12	3	HB
164163	16	56	108	0.2	16	3	HA
164164	16	56	108	0.2	16	3	HB
164165	20	70	126	0.2	20	3	HA
164166	20	70	126	0.2	20	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f_z (mm) a_p (mm)	-	-	-	0.055 - 0.07 6.0	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.08 - 0.1 8.0	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.11 - 0.13 10.0	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.143 - 0.17 12.0	-	-
16	f_z (mm) a_p (mm)	-	-	-	0.19 - 0.22 16.0	-	-
20	f_z (mm) a_p (mm)	-	-	-	0.25 - 0.3 20.0	-	-

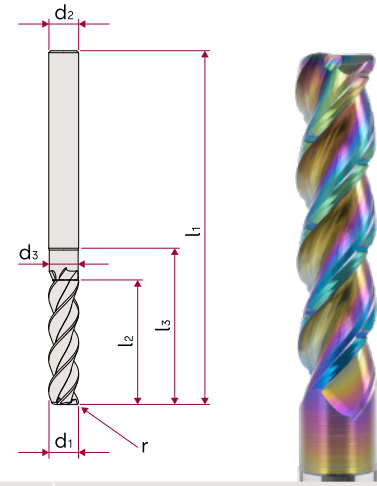
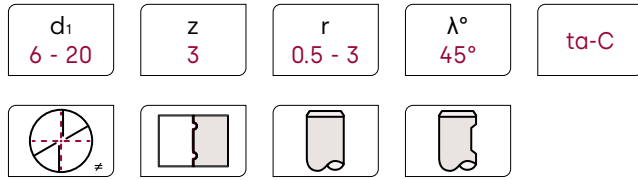
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	  	-	-
ROUGH FINE	-	-	-	- 120 200 280	-	-

 ● = Primary application | ○ = Secondary application | A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

Trochoidal milling cutters

NT03








Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Cylinder shank
164085	6	25	31	5.8	71	0.5	6	3	HA
164086	6	25	31	5.8	71	0.5	6	3	HB
164087	6	25	31	5.8	71	1	6	3	HA
164088	6	25	31	5.8	71	1	6	3	HB
164089	8	33	41	7.8	80	0.5	8	3	HA
164090	8	33	41	7.8	80	0.5	8	3	HB
164091	8	33	41	7.8	80	1	8	3	HA
164092	8	33	41	7.8	80	1	8	3	HB
164093	8	33	41	7.9	80	2	8	3	HA
164094	8	33	41	7.9	80	2	8	3	HB
164095	10	41	51	9.7	95	0.5	10	3	HA
164096	10	41	51	9.7	95	0.5	10	3	HB
164097	10	41	51	9.7	95	1	10	3	HA
164098	10	41	51	9.7	95	1	10	3	HB
164099	10	41	51	9.7	95	2	10	3	HA
164100	10	41	51	9.7	95	2	10	3	HB
164101	12	49	61	11.7	109	0.5	12	3	HA
164102	12	49	61	11.7	109	0.5	12	3	HB
164103	12	49	61	11.7	109	1	12	3	HA
164104	12	49	61	11.7	109	1	12	3	HB
164105	12	49	61	11.7	109	2	12	3	HA
164106	12	49	61	11.7	109	2	12	3	HB
164107	16	65	81	15.7	132	2	16	3	HA
164108	16	65	81	15.7	132	2	16	3	HB




Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z	Cylinder shank
164109	16	65	81	15.7	132	3	16	3	HA
164110	16	65	81	15.7	132	3	16	3	HB
164111	20	82	101	19.5	154	2	20	3	HA
164112	20	82	101	19.5	154	2	20	3	HB
164113	20	82	101	19.5	154	3	20	3	HA
164114	20	82	101	19.5	154	3	20	3	HB

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
6	f _z (mm) a _p (mm)	-	-	-	0.055 - 0.07 18.0	-	-
8	f _z (mm) a _p (mm)	-	-	-	0.08 - 0.1 24.0	-	-
10	f _z (mm) a _p (mm)	-	-	-	0.11 - 0.13 30.0	-	-
12	f _z (mm) a _p (mm)	-	-	-	0.143 - 0.17 36.0	-	-
16	f _z (mm) a _p (mm)	-	-	-	0.19 - 0.22 48.0	-	-
20	f _z (mm) a _p (mm)	-	-	-	0.25 - 0.3 60.0	-	-

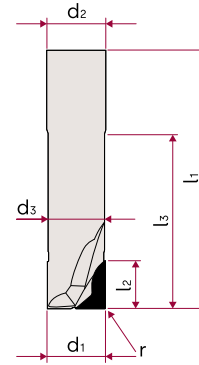
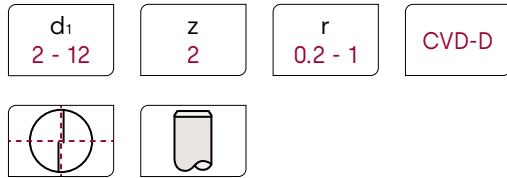
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	    	-	-
ROUGH FINE	-	-	-	- 120 200 280	-	-


 = Primary application |
  = Secondary application |
 A = Aluminium | KU = Plastic | GFK = Glass fiber reinforced plastic

CVD-D milling cutter – End mills

NR03



Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
164548	2	2.5	10	1.9	50	0.2	4	2
164549	3	2.5	10	2.8	75	0.2	6	2
164550	3	2.5	10	2.8	75	0.5	6	2
164551	4	2.5	20	3.8	75	0.2	6	2
164552	4	2.5	20	3.8	75	0.5	6	2
164553	6	6	20	5.6	100	0.2	6	2
164554	6	6	20	5.6	100	0.5	6	2
164555	6	6	20	5.6	100	1	6	2
164556	8	6	20	7.6	100	0.2	8	2
164557	8	6	20	7.6	100	0.5	8	2
164558	8	6	20	7.6	100	1	8	2
164559	10	8	30	9.6	100	0.2	10	2
164560	10	8	30	9.6	100	0.5	10	2
164561	10	8	30	9.6	100	1	10	2
164562	12	9	35	11.6	107	0.2	12	2
164563	12	9	35	11.6	107	0.5	12	2
164564	12	9	35	11.6	107	1	12	2

Application data

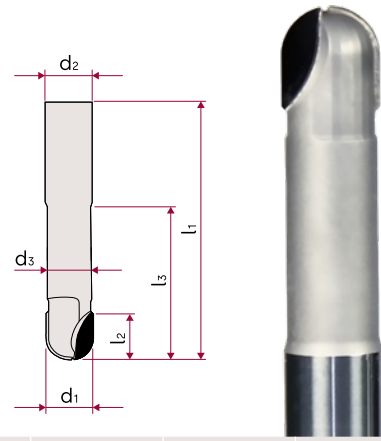
Material	V_c [m/min]	a_p [mm]	$a_e \times d_1$ [mm]	Cooling	Feed direction
alSi <12% Si	1800	0.6	0.3	Emulsion / MMS	Synchronization
alSi >12% Si	800	0.5	0.25		
Glass ceramic	250	0.2	0.3		
PMMa acryl	1100	0.5	0.5	Emulsion is an advantage	Synchronization
PF66 – GF30	700	0.5	0.3		Counter rotation
PeeK – GF30	700	0.5	0.25		
POM – GF30	800	0.5	0.5		
PTFE – GF30	700	0.5	0.3		
CFK	250	0.4	0.25	Dry / Air - KSS / MMS possible	
GFK	500	0.5	0.3		
AFK aramid	300	0.45	0.3		
Zirkon	150	0.5	0.4		Synchronization

Material	Feed per tooth f_z [mm]						
	Ø 2	Ø 3	Ø 4	Ø 6	Ø 8	Ø 10	Ø 12
alSi <12% Si	0.01	0.02	0.02	0.04	0.06	0.08	0.1
alSi >12% Si	0.01	0.01	0.02	0.03	0.05	0.06	0.08
Glass ceramic	0.025	0.035	-	-	-	-	-
PMMa acryl	0.01	0.015	0.02	0.03	0.05	0.07	0.09
PF66 – GF30	0.008	0.01	0.015	0.025	0.04	0.06	0.08
PeeK – GF30	0.007	0.008	0.01	0.02	0.03	0.05	0.07
POM – GF30	0.008	0.01	0.015	0.025	0.04	0.06	0.08
PTFE – GF30	0.01	0.015	0.02	0.03	0.05	0.07	0.09
CFK	0.008	0.01	0.015	0.025	0.04	0.06	0.08
GFK	0.01	0.015	0.02	0.03	0.05	0.07	0.09
AFK aramid	0.01	0.015	0.02	0.03	0.05	0.07	0.09
Zirkon	0.01	0.02	0.02	0.04	0.06	0.08	0.1

CVD-D milling cutter – Ball nose end mill cutters

NV03

d_1 2 - 12	z 2	r 1 - 6	CVD-D



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
164565	2	2.5	10	1.9	50	1	4	2
164566	2	2.5	10	1.9	75	1	6	2
164567	3	2.5	10	2.8	75	1.5	6	2
164568	4	2.5	20	3.8	75	2	6	2
164569	6	6	20	5.6	100	3	6	2
164570	8	6	20	7.6	100	4	8	2
164571	10	8	30	9.6	100	5	10	2
164572	12	9	35	11.6	107	6	12	2

Product overview

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

Technical information

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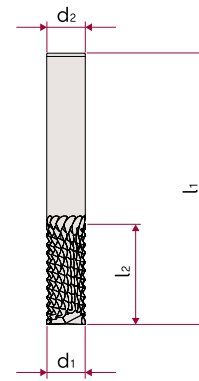
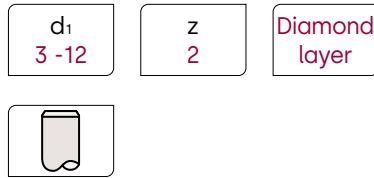
Application data

Material	V_c [m/min]	a_p [mm]	$a_e \times d_1$ [mm]	Cooling	Feed direction
alSi <12% Si	1800	0.2	0.1	Emulsion / MMS	Synchronization
alSi >12% Si	800	0.15	0.1		
Glass ceramic	250	0.1	0.15		
PMMa acryl	1100	0.15	0.15	Emulsion is an advantage	Synchronization
PF66 – GF30	700	0.15	0.1		Synchronization
PeeK – GF30	700	0.15	0.1		
POM – GF30	800	0.15	0.15		
PTFE – GF30	700	0.15	0.1	Dry / Air - KSS / MMS possible	Synchronization / Counter rotation
CFK	250	0.15	0.1		
GFK	500	0.15	0.1		
AFK aramid	300	0.15	0.1		
Zirkon	150	0.15	0.15		Synchronization

Material	Feed per tooth f_z [mm]						
	Ø 2	Ø 3	Ø 4	Ø 6	Ø 8	Ø 10	Ø 12
alSi <12% Si	0.01	0.02	0.02	0.04	0.06	0.08	0.1
alSi >12% Si	0.01	0.01	0.02	0.03	0.05	0.06	0.08
Glass ceramic	0.025	0.035	-	-	-	-	-
PMMa acryl	0.01	0.015	0.02	0.03	0.05	0.07	0.09
PF66 – GF30	0.008	0.01	0.015	0.025	0.04	0.06	0.08
PeeK – GF30	0.007	0.008	0.01	0.02	0.03	0.05	0.07
POM – GF30	0.008	0.01	0.015	0.025	0.04	0.06	0.08
PTFE – GF30	0.01	0.015	0.02	0.03	0.05	0.07	0.09
CFK	0.008	0.01	0.015	0.025	0.04	0.06	0.08
GFK	0.01	0.015	0.02	0.03	0.05	0.07	0.09
AFK aramid	0.01	0.015	0.02	0.03	0.05	0.07	0.09
Zirkon	0.01	0.02	0.02	0.04	0.06	0.08	0.1

Graphite – End mills

GX01



Order no.	d ₁	l ₂	l ₁	d ₂	z
162422	3	10	50	3	2
162423	4	10	50	4	2
162424	6	20	57	6	2
162425	8	20	60	8	2
162426	10	25	70	10	2
162427	12	30	85	12	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
		f _z (mm) a _p (mm)	-	-	-	0.2 - 0.25 3 - 4	-
6	f _z (mm) a _p (mm)	-	-	-	0.28 - 0.3 5 - 6	-	-
8	f _z (mm) a _p (mm)	-	-	-	0.32 - 0.35 8	-	-
10	f _z (mm) a _p (mm)	-	-	-	0.35 - 0.38 10	-	-
12	f _z (mm) a _p (mm)	-	-	-	0.38 - 0.4 12	-	-

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	G	-	-
ROUGH FINE	-	-	-	- 400 500 600	-	-

● = Primary application | G = Graphit

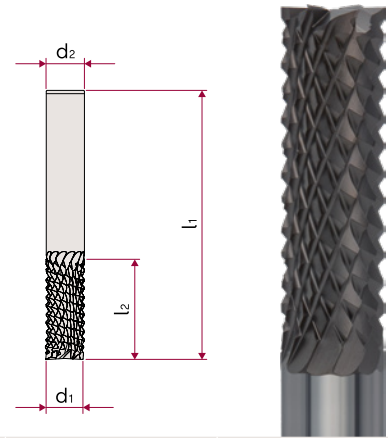
Graphite – End mills

GX02

d_1
4 - 12

z
8 - 16

Diamond
layer



Order no.	d_1	l_2	l_1	d_2	z
162428	4	16	50	4	8
162429	5	16	57	6	8
162430	6	19	57	6	10
162431	8	25	63	8	12
162432	10	25	72	10	14
162433	12	30	83	12	16

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm)	-	-	-	0.2 - 0.25	-	-
	a_p (mm)	-	-	-	3 - 4	-	-
6	f_z (mm)	-	-	-	0.28 - 0.3	-	-
	a_p (mm)	-	-	-	5 - 6	-	-
8	f_z (mm)	-	-	-	0.32 - 0.35	-	-
	a_p (mm)	-	-	-	8	-	-
10	f_z (mm)	-	-	-	0.35 - 0.38	-	-
	a_p (mm)	-	-	-	10	-	-
12	f_z (mm)	-	-	-	0.38 - 0.4	-	-
	a_p (mm)	-	-	-	12	-	-

P/K – Steel/cast iron

H – Hardened materials

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	G	-	-
ROUGH FINE	-	-	-	- 400 500 600	-	-

① ● = Primary application | G = Graphit

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics


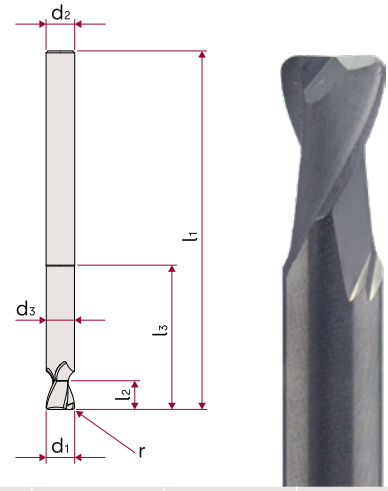
Technical information

Index

Graphite – Torus milling cutters

GR03

d_1 0.4 - 6	z 2	r 0.05 - 0.5	λ° 30°	Diamond layer 6 + 2 μm
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
163709	0.4	0.4	4	0.35	55	0.05	3	2
163710	0.5	0.5	10	0.45	55	0.05	3	2
163711	0.8	1	4	0.75	55	0.08	3	2
163712	1	1	5	0.9	55	0.1	3	2
163713	1	1	10	0.9	55	0.1	3	2
163714	1	1	15	0.9	55	0.1	3	2
163715	1.5	2	10	1.4	55	0.15	3	2
163716	1.5	2	15	1.4	55	0.15	3	2
163717	2	2	10	1.9	65	0.2	3	2
163718	2	2	15	1.9	65	0.2	3	2
163719	2	2	20	1.9	65	0.2	3	2
163720	2	2	25	1.9	65	0.2	3	2
163721	2	2	15	1.9	65	0.5	3	2
163722	2.5	3	20	2.4	65	0.2	6	2
163723	3	3	15	2.9	65	0.3	4	2
163724	3	3	25	2.9	75	0.3	4	2
163725	3	3	30	2.9	75	0.5	4	2
163726	3	3	20	2.9	65	0.5	6	2
163727	4	4	30	3.9	75	0.5	5	2
163728	4	4	40	3.9	90	0.5	5	2
163729	6	6	30	5.9	75	0.5	6	2
163730	6	6	40	5.9	90	0.5	6	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.4 - 0.8	f_z (mm) a_p (mm)	-	-	-	0.003 - 0.005 0.4 - 0.8	-	-
1 - 1.5	f_z (mm) a_p (mm)	-	-	-	0.009 - 0.01 1.0 - 1.5	-	-
2 - 2.5	f_z (mm) a_p (mm)	-	-	-	0.013 - 0.015 2.0 - 2.5	-	-
3	f_z (mm) a_p (mm)	-	-	-	0.013 - 0.015 3.0	-	-
4	f_z (mm) a_p (mm)	-	-	-	0.026 - 0.03 4.0	-	-
6	f_z (mm) a_p (mm)	-	-	-	0.04 - 0.045 6.0	-	-

Speed (V_c in m/min)

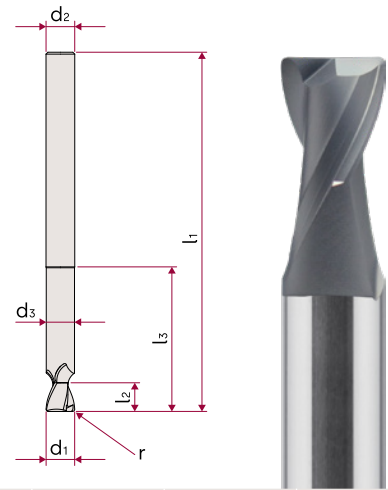
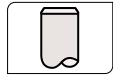
Application	P	M	K	N	S	H
	-	-	-	G	-	-
ROUGH FINE	-	-	-	126 155 271 200 350	-	-

● = Primary application | G = Graphit

Graphite – Torus milling cutters

GR04

d_1 0.2 - 12	z 2	r 0.02 - 1	λ° 30°	Diamond layer 10 + 2 μm
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
163359	0.2	0.2	0.6	0.18	55	0.02	4	2
163360	0.2	0.2	1.5	0.18	55	0.02	4	2
163361	0.2	0.2	1	0.18	55	0.02	3	2
163362	0.2	0.2	1	0.18	55	0.02	4	2
163363	0.2	0.2	1	0.18	55	0.05	3	2
163364	0.2	0.2	1	0.18	55	0.05	4	2
163365	0.3	0.3	1	0.27	55	0.02	3	2
163366	0.3	0.3	1	0.27	55	0.02	4	2
163367	0.3	0.3	1.5	0.27	55	0.02	4	2
163368	0.3	0.3	3	0.27	55	0.02	3	2
163369	0.3	0.3	3	0.27	55	0.02	4	2
163370	0.3	0.3	4.5	0.27	55	0.02	4	2
163371	0.3	0.3	6	0.27	55	0.02	4	2
163372	0.3	0.3	1	0.27	55	0.05	3	2
163373	0.3	0.3	3	0.27	55	0.05	3	2
163374	0.3	0.3	3	0.27	55	0.05	4	2
163470	0.3	0.3	1	0.27	55	0.05	4	2
163375	0.4	0.4	2	0.35	55	0.05	3	2
163376	0.4	0.4	4	0.35	55	0.05	3	2
163377	0.4	0.4	8	0.35	55	0.05	3	2
163378	0.4	0.4	8	0.35	55	0.05	4	2
163482	0.4	0.4	2	0.35	55	0.05	4	2
163483	0.4	0.4	4	0.35	55	0.05	4	2
163484	0.4	0.4	6	0.35	55	0.05	4	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163379	0.5	0.5	2	0.45	55	0.05	3	2
163380	0.5	0.5	5	0.45	55	0.05	3	2
163381	0.5	0.5	10	0.45	55	0.05	3	2
163382	0.5	0.5	10	0.45	55	0.05	4	2
163491	0.5	0.5	2	0.45	55	0.05	4	2
163492	0.5	0.5	5	0.45	55	0.05	4	2
163493	0.5	0.5	2.5	0.45	55	0.05	4	2
163494	0.5	0.5	3.5	0.45	55	0.05	4	2
163495	0.5	0.5	7	0.45	55	0.05	4	2
163383	0.6	0.8	3	0.56	55	0.06	3	2
163384	0.6	0.8	6	0.56	55	0.06	3	2
163385	0.6	0.8	9	0.56	55	0.06	3	2
163386	0.6	0.8	12	0.56	55	0.06	3	2
163502	0.6	0.8	3	0.56	55	0.06	4	2
163503	0.6	0.8	6	0.56	55	0.06	4	2
163504	0.6	0.8	9	0.56	55	0.06	4	2
163505	0.6	0.8	12	0.56	55	0.06	4	2
163506	0.6	0.8	11	0.56	55	0.06	4	2
163387	0.8	1	4	0.75	55	0.08	3	2
163388	0.8	1	8	0.75	55	0.08	3	2
163389	0.8	1	12	0.75	55	0.08	3	2
163390	0.8	1	16	0.75	55	0.08	3	2
163511	0.8	1	4	0.75	55	0.08	4	2
163512	0.8	1	8	0.75	55	0.08	4	2
163513	0.8	1	12	0.75	55	0.08	4	2
163514	0.8	1	16	0.75	55	0.08	4	2
163391	1	1	5	0.9	55	0.1	3	2
163392	1	1	10	0.9	55	0.1	3	2
163393	1	1	15	0.9	55	0.1	3	2
163394	1	1	20	0.9	55	0.1	3	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163395	1	1	25	0.9	55	0.1	3	2
163396	1	1	5	0.9	55	0.1	4	2
163397	1	1	10	0.9	55	0.1	4	2
163398	1	1	15	0.9	55	0.1	4	2
163399	1	1	20	0.9	55	0.1	4	2
163400	1	1	25	0.9	55	0.1	4	2
163401	1	1	15	0.9	55	0.1	6	2
163402	1.2	1.5	5	1.1	55	0.12	3	2
163403	1.2	1.5	10	1.1	55	0.12	3	2
163404	1.2	1.5	15	1.1	55	0.12	3	2
163405	1.2	1.5	15	1.1	55	0.12	4	2
163406	1.2	1.5	10	1.1	55	0.12	4	2
163407	1.2	1.5	5	1.1	55	0.12	4	2
163408	1.5	2	5	1.4	55	0.15	3	2
163409	1.5	2	8	1.4	55	0.15	3	2
163410	1.5	2	10	1.4	55	0.15	3	2
163411	1.5	2	15	1.4	55	0.15	3	2
163412	1.5	2	20	1.4	55	0.15	3	2
163413	1.5	2	25	1.4	55	0.15	3	2
163414	1.5	2	25	1.4	55	0.15	4	2
163415	1.5	2	20	1.4	55	0.15	4	2
163416	1.5	2	15	1.4	55	0.15	4	2
163417	1.5	2	10	1.4	55	0.15	4	2
163418	1.5	2	8	1.4	55	0.15	4	2
163419	1.5	2	5	1.4	55	0.15	4	2
163420	1.5	2	15	1.4	55	0.15	6	2
163421	1.8	2	10	1.7	55	0.18	3	2
163422	1.8	2	20	1.7	55	0.18	3	2
163423	1.8	2	20	1.7	55	0.18	4	2
163424	1.8	2	10	1.7	55	0.18	4	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163425	2	2	6	1.9	55	0.2	4	2
163426	2	2	10	1.9	65	0.2	3	2
163427	2	2	15	1.9	65	0.2	3	2
163428	2	2	20	1.9	65	0.2	3	2
163429	2	2	25	1.9	65	0.2	3	2
163430	2	2	10	1.9	65	0.5	3	2
163431	2	2	15	1.9	65	0.5	3	2
163432	2	2	20	1.9	65	0.5	3	2
163433	2	2	25	1.9	65	0.5	3	2
163434	2	2	25	1.9	65	0.5	4	2
163435	2	2	20	1.9	65	0.2	6	2
163436	2	2	10	1.9	65	0.2	4	2
163437	2	2	12	1.9	55	0.2	4	2
163438	2	2	24	1.9	65	0.2	4	2
163439	2	2	15	1.9	65	0.2	4	2
163440	2	2	20	1.9	65	0.2	4	2
163441	2	2	25	1.9	65	0.2	4	2
163442	2	2	30	1.9	65	0.2	4	2
163443	2	2	6	1.9	55	0.5	4	2
163444	2	2	18	1.9	65	0.2	4	2
163445	2	2	10	1.9	65	0.5	4	2
163446	2	2	12	1.9	55	0.5	4	2
163448	2	2	15	1.9	65	0.5	4	2
163449	2	2	18	1.9	65	0.5	4	2
163450	2	2	20	1.9	65	0.5	4	2
163451	2	2	24	1.9	65	0.5	4	2
163452	2	2	30	1.9	65	0.5	4	2
163447	2.5	3	20	2.4	65	0.2	6	2
163453	3	3	15	2.9	65	0.3	4	2
163454	3	3	25	2.9	75	0.3	4	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163455	3	3	10	2.9	65	0.5	4	2
163456	3	3	15	2.9	65	0.5	4	2
163457	3	3	20	2.9	65	0.5	4	2
163458	3	3	25	2.9	75	0.5	4	2
163459	3	3	30	2.9	75	0.5	4	2
163460	3	3	45	2.9	90	0.5	6	2
163461	3	3	20	2.9	65	0.5	6	2
163462	3	3	9	2.9	65	0.3	6	2
163463	3	3	12	2.9	65	0.3	6	2
163464	3	3	18	2.9	65	0.3	6	2
163465	3	3	30	2.9	75	0.3	6	2
163466	3	3	45	2.9	90	0.3	6	2
163467	3	3	8	2.9	65	0.5	6	2
163468	3	3	12	2.9	65	0.5	6	2
163469	3	3	18	2.9	65	0.5	6	2
163471	3.5	3	20	3.4	65	0.5	6	2
163472	4	4	15	3.9	65	0.4	6	2
163473	4	4	25	3.9	75	0.4	6	2
163474	4	4	20	3.9	65	0.5	6	2
163475	4	4	30	3.9	75	0.5	6	2
163476	4	4	40	3.9	90	0.5	6	2
163478	4	4	15	3.9	65	0.3	6	2
163479	4	4	10	3.9	65	0.5	6	2
163480	4	4	12	3.9	65	0.5	6	2
163481	4	4	24	3.9	75	0.5	6	2
163477	5	5	15	4.9	65	0.5	6	2
163485	5	5	20	4.9	75	0.5	6	2
163486	5	5	30	4.9	75	0.5	6	2
163487	5	5	40	4.9	90	0.5	6	2
163488	5	5	50	4.9	90	0.5	6	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163489	6	6	30	5.9	75	0.3	6	2
163490	6	6	20	5.9	75	0.5	6	2
163496	6	6	30	5.9	75	0.5	6	2
163497	6	6	40	5.9	90	0.5	6	2
163498	6	6	50	5.9	90	0.5	6	2
163499	6	6	60	5.9	100	0.5	6	2
163500	6	6	30	5.9	75	1	6	2
163501	6	6	40	5.9	90	1	6	2
163507	8	8	30	7.8	80	0.5	8	2
163508	8	8	60	7.8	100	0.5	8	2
163509	8	8	30	7.8	80	1	8	2
163510	8	8	60	7.8	100	1	8	2
163515	10	10	30	9.8	80	0.5	10	2
163516	10	10	60	9.8	100	0.5	10	2
163517	10	10	30	9.8	80	1	10	2
163518	10	10	60	9.8	100	1	10	2
163519	12	12	30	11.8	80	0.5	12	2
163520	12	12	60	11.8	100	0.5	12	2
163521	12	12	30	11.8	80	1	12	2
163522	12	12	60	11.8	100	1	12	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.2 - 0.4	f_z (mm) a_p (mm)	-	-	-	0.001 - 0.003 0.1 - 0.4	-	-
0.5 - 0.8	f_z (mm) a_p (mm)	-	-	-	0.002 - 0.005 0.25 - 0.8	-	-
1 - 1.5	f_z (mm) a_p (mm)	-	-	-	0.006 - 0.01 0.5 - 1.5	-	-
1.8 - 2.5	f_z (mm) a_p (mm)	-	-	-	0.006 - 0.015 0.9 - 2.5	-	-
3 - 3.5	f_z (mm) a_p (mm)	-	-	-	0.008 - 0.015 1.5 - 3.5	-	-
4	f_z (mm) a_p (mm)	-	-	-	0.017 - 0.03 2.0 - 4.0	-	-
5	f_z (mm) a_p (mm)	-	-	-	0.017 - 0.03 2.5 - 5.0	-	-
6	f_z (mm) a_p (mm)	-	-	-	0.025 - 0.045 3.0 - 6.0	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.034 - 0.06 4.0 - 8.0	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.045 - 0.08 5.0 - 10.0	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.056 - 0.1 6.0 - 12.0	-	-

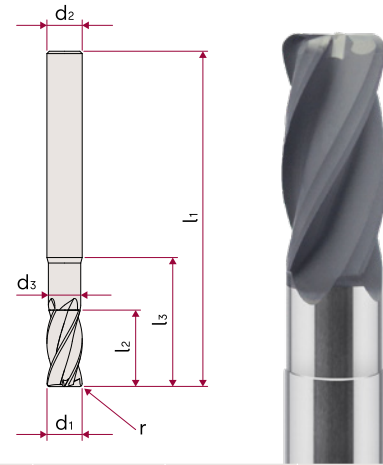
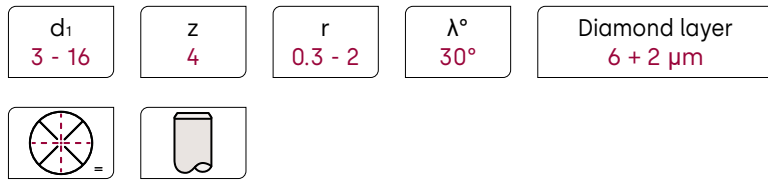
Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	G	-	-
ROUGH FINE	-	-	-	60 94 101 190 320	-	-

 ● = Primary application | G = Graphit

Graphite – Torus milling cutters

GR05



Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
163655	3	6	14	2.7	50	0.3	3	4
163656	3	6	14	2.7	50	0.5	3	4
163657	3	6	14	2.7	50	1	3	4
163682	3	6	32	2.7	80	0.3	3	4
163683	3	6	32	2.7	80	0.5	3	4
163684	3	6	32	2.7	80	1	3	4
163658	4	8	16	3.7	50	0.4	4	4
163659	4	8	16	3.7	50	0.5	4	4
163660	4	8	16	3.7	50	1	4	4
163685	4	8	36	3.7	80	0.4	4	4
163686	4	8	36	3.7	80	0.5	4	4
163687	4	8	36	3.7	80	1	4	4
163661	5	10	18	4.6	54	0.5	5	4
163662	5	10	18	4.6	54	1	5	4
163688	5	10	40	4.6	80	0.5	5	4
163689	5	10	40	4.6	80	1	5	4
163663	6	13	21	5.5	57	0.5	6	4
163664	6	13	21	5.5	57	1	6	4
163665	6	13	21	5.5	57	1.5	6	4
163690	6	13	44	5.5	90	0.5	6	4
163691	6	13	44	5.5	90	1	6	4
163692	6	13	44	5.5	90	1.5	6	4
163666	8	15	27	7.4	63	0.5	8	4
163667	8	15	27	7.4	63	1	8	4

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163668	8	15	27	7.4	63	1.5	8	4
163669	8	15	27	7.4	63	2	8	4
163693	8	15	54	7.4	100	0.5	8	4
163694	8	15	54	7.4	100	1	8	4
163695	8	15	54	7.4	100	1.5	8	4
163696	8	15	54	7.4	100	2	8	4
163670	10	18	32	9.2	72	0.5	10	4
163671	10	18	32	9.2	72	1	10	4
163672	10	18	32	9.2	72	1.5	10	4
163673	10	18	32	9.2	72	2	10	4
163697	10	18	60	9.2	100	0.5	10	4
163698	10	18	60	9.2	100	1	10	4
163699	10	18	60	9.2	100	1.5	10	4
163700	10	18	60	9.2	100	2	10	4
163674	12	26	38	11	83	0.5	12	4
163675	12	26	38	11	83	1	12	4
163676	12	26	38	11	83	1.5	12	4
163677	12	26	38	11	83	2	12	4
163701	12	26	75	11	120	0.5	12	4
163702	12	26	75	11	120	1	12	4
163703	12	26	75	11	120	1.5	12	4
163704	12	26	75	11	120	2	12	4
163678	16	32	50	15	92	0.5	16	4
163679	16	32	50	15	92	1	16	4
163680	16	32	50	15	92	1.5	16	4
163681	16	32	50	15	92	2	16	4
163705	16	32	85	15	120	0.5	16	4
163706	16	32	85	15	120	1	16	4
163707	16	32	85	15	120	1.5	16	4
163708	16	32	85	15	120	2	16	4

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
3	f_z (mm)	-	-	-	0.014 - 0.025	-	-
	a_p (mm)	-	-	-	1.5 - 3.0	-	-
4	f_z (mm)	-	-	-	0.023 - 0.04	-	-
	a_p (mm)	-	-	-	2.0 - 4.0	-	-
5	f_z (mm)	-	-	-	0.023 - 0.04	-	-
	a_p (mm)	-	-	-	2.5 - 5.0	-	-
6	f_z (mm)	-	-	-	0.034 - 0.06	-	-
	a_p (mm)	-	-	-	3.0 - 6.0	-	-
8	f_z (mm)	-	-	-	0.045 - 0.08	-	-
	a_p (mm)	-	-	-	4.0 - 8.0	-	-
10	f_z (mm)	-	-	-	0.056 - 0.1	-	-
	a_p (mm)	-	-	-	5.0 - 10.0	-	-
12	f_z (mm)	-	-	-	0.056 - 0.1	-	-
	a_p (mm)	-	-	-	6.0 - 12.0	-	-
16	f_z (mm)	-	-	-	0.068 - 0.12	-	-
	a_p (mm)	-	-	-	8.0 - 16.0	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	G	-	-
ROUGH FINE	-	-	-	63 101 200 320	-	-

 ● = Primary application | G = Graphit

S – Special alloys & titanium

N – Non-ferrous metals & plastics

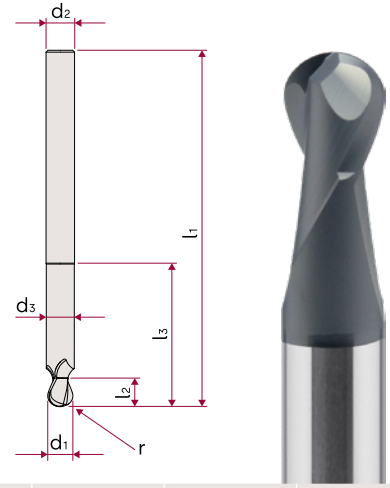
Technical information

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Graphite – Ball nose end mill cutters

GV01

d_1 0.2 - 12	z 2	r 0.1 - 6	λ° 30°	Diamond layer 10 + 2 μm
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
163523	0.2	0.2	0.6	0.18	55	0.1	4	2
163524	0.2	0.2	1.5	0.18	55	0.1	4	2
163525	0.2	0.2	1	0.18	55	0.1	3	2
163605	0.2	0.2	1	0.18	55	0.1	4	2
163526	0.3	0.3	1	0.27	55	0.15	3	2
163527	0.3	0.3	3	0.27	55	0.15	3	2
163528	0.3	0.3	5	0.27	55	0.15	3	2
163529	0.3	0.3	8	0.27	55	0.15	3	2
163575	0.3	0.3	1.5	0.27	55	0.15	4	2
163583	0.3	0.3	4.5	0.27	55	0.15	4	2
163587	0.3	0.3	6	0.27	55	0.15	4	2
163606	0.3	0.3	1	0.27	55	0.15	4	2
163607	0.3	0.3	3	0.27	55	0.15	4	2
163608	0.3	0.3	5	0.27	55	0.15	4	2
163609	0.3	0.3	8	0.27	55	0.15	4	2
163530	0.4	0.4	4	0.35	55	0.2	3	2
163531	0.4	0.4	6	0.35	55	0.2	3	2
163532	0.4	0.4	8	0.35	55	0.2	3	2
163588	0.4	0.4	2	0.35	55	0.2	4	2
163610	0.4	0.4	4	0.35	55	0.2	4	2
163611	0.4	0.4	6	0.35	55	0.2	4	2
163612	0.4	0.4	8	0.35	55	0.2	4	2
163533	0.5	0.5	5	0.45	55	0.25	3	2
163534	0.5	0.5	10	0.45	55	0.25	3	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163597	0.5	0.5	2.5	0.45	55	0.25	4	2
163598	0.5	0.5	3.5	0.45	55	0.25	4	2
163599	0.5	0.5	7.5	0.45	55	0.25	4	2
163613	0.5	0.5	5	0.45	55	0.25	4	2
163614	0.5	0.5	10	0.45	55	0.25	4	2
163535	0.6	0.8	6	0.56	55	0.3	3	2
163536	0.6	0.8	9	0.56	55	0.3	3	2
163537	0.6	0.8	12	0.56	55	0.3	3	2
163538	0.6	0.8	3	0.56	55	0.3	4	2
163615	0.6	0.8	6	0.56	55	0.3	4	2
163616	0.6	0.8	9	0.56	55	0.3	4	2
163617	0.6	0.8	12	0.56	55	0.3	4	2
163644	0.6	0.8	11	0.56	55	0.3	4	2
163539	0.7	0.9	7	0.65	55	0.35	3	2
163540	0.7	0.9	14	0.65	55	0.35	3	2
163618	0.7	0.9	7	0.65	55	0.35	4	2
163619	0.7	0.9	14	0.65	55	0.35	4	2
163541	0.8	1	4	0.75	55	0.4	4	2
163542	0.8	1	8	0.75	55	0.4	3	2
163543	0.8	1	12	0.75	55	0.4	3	2
163544	0.8	1	16	0.75	55	0.4	3	2
163545	0.8	1	45	0.75	75	0.4	4	2
163620	0.8	1	8	0.75	55	0.4	4	2
163621	0.8	1	12	0.75	55	0.4	4	2
163622	0.8	1	16	0.75	55	0.4	4	2
163546	1	1	5	0.9	55	0.5	3	2
163547	1	1	10	0.9	55	0.5	3	2
163548	1	1	15	0.9	55	0.5	3	2
163549	1	1	20	0.9	55	0.5	3	2
163550	1	1	25	0.9	55	0.5	3	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163551	1	1	30	0.9	55	0.5	3	2
163552	1	1	15	0.9	55	0.5	6	2
163623	1	1	5	0.9	55	0.5	4	2
163624	1	1	10	0.9	55	0.5	4	2
163625	1	1	15	0.9	55	0.5	4	2
163626	1	1	20	0.9	55	0.5	4	2
163627	1	1	25	0.9	55	0.5	4	2
163628	1	1	30	0.9	55	0.5	4	2
163553	1.2	1.5	5	1.1	55	0.6	3	2
163554	1.2	1.5	10	1.1	55	0.6	3	2
163555	1.2	1.5	15	1.1	55	0.6	3	2
163629	1.2	1.5	5	1.1	55	0.6	4	2
163630	1.2	1.5	10	1.1	55	0.6	4	2
163631	1.2	1.5	15	1.1	55	0.6	4	2
163556	1.5	2	5	1.4	55	0.75	3	2
163557	1.5	2	10	1.4	55	0.75	3	2
163558	1.5	2	15	1.4	55	0.75	3	2
163559	1.5	2	20	1.4	55	0.75	3	2
163560	1.5	2	25	1.4	55	0.75	3	2
163561	1.5	2	15	1.4	55	0.75	6	2
163632	1.5	2	5	1.4	55	0.75	4	2
163633	1.5	2	10	1.4	55	0.75	4	2
163634	1.5	2	15	1.4	55	0.75	4	2
163635	1.5	2	20	1.4	55	0.75	4	2
163636	1.5	2	25	1.4	55	0.75	4	2
163562	1.8	2	35	1.7	55	0.9	3	2
163637	1.8	2	10	1.7	55	0.9	4	2
163638	1.8	2	20	1.7	55	0.9	4	2
163563	2	2	10	1.9	55	1	3	2
163564	2	2	15	1.9	55	1	3	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163565	2	2	20	1.9	55	1	3	2
163566	2	2	25	1.9	65	1	3	2
163567	2	2	30	1.9	65	1	3	2
163568	2	2	20	1.9	65	1	6	2
163569	2	2	30	1.9	65	1	6	2
163570	2	2	6	1.9	55	1	6	2
163571	2	2	12	1.9	55	1	6	2
163572	2	2	18	1.9	65	1	6	2
163573	2	2	24	1.9	65	1	6	2
163639	2	2	10	1.9	55	1	4	2
163640	2	2	15	1.9	55	1	4	2
163641	2	2	20	1.9	55	1	4	2
163642	2	2	25	1.9	65	1	4	2
163643	2	2	30	1.9	65	1	4	2
163574	2.5	3	20	2.4	65	1.25	6	2
163576	3	3	10	2.9	65	1.5	4	2
163577	3	3	15	2.9	65	1.5	4	2
163578	3	3	20	2.9	65	1.5	4	2
163579	3	3	25	2.9	75	1.5	4	2
163580	3	3	30	2.9	75	1.5	4	2
163581	3	3	20	2.9	65	1.5	6	2
163582	3	3	45	2.9	75	1.5	4	2
163584	3	3	9	2.9	65	1.5	6	2
163585	3	3	18	2.9	65	1.5	6	2
163586	3	3	12	2.9	65	1.5	4	2
163589	3.5	3	20	3.4	65	1.75	6	2
163590	4	4	20	3.9	65	2	6	2
163591	4	4	30	3.9	75	2	6	2
163592	4	4	40	3.9	90	2	6	2
163593	4	4	10	3.9	65	2	6	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163594	4	4	12	3.9	65	2	6	2
163595	4	4	24	3.9	75	2	6	2
163596	5	5	15	4.9	65	2.5	6	2
163600	5	5	20	4.9	65	2.5	6	2
163601	5	5	30	4.9	75	2.5	6	2
163602	5	5	40	4.9	90	2.5	6	2
163603	5	5	50	4.9	90	2.5	6	2
163604	6	6	18	5.9	65	3	6	2
163645	6	6	30	5.9	75	3	6	2
163646	6	6	40	5.9	90	3	6	2
163647	6	6	50	5.9	90	3	6	2
163648	6	6	60	5.9	100	3	6	2
163649	8	8	30	7.8	80	4	8	2
163650	8	8	60	7.8	100	4	8	2
163651	10	10	30	9.8	80	5	10	2
163652	10	10	60	9.8	100	5	10	2
163653	12	12	30	11.8	83	6	12	2
163654	12	12	60	11.8	100	6	12	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.2 - 0.4	f_z (mm)	-	-	-	0.003 - 0.004	-	-
	a_p (mm)	-	-	-	0.006 - 0.012	-	-
0.5 - 0.8	f_z (mm)	-	-	-	0.004 - 0.008	-	-
	a_p (mm)	-	-	-	0.015 - 0.024	-	-
1 - 1.5	f_z (mm)	-	-	-	0.015 - 0.02	-	-
	a_p (mm)	-	-	-	0.03 - 0.045	-	-
1.8 - 2.5	f_z (mm)	-	-	-	0.02 - 0.025	-	-
	a_p (mm)	-	-	-	0.054 - 0.075	-	-
3 - 3.5	f_z (mm)	-	-	-	0.025 - 0.03	-	-
	a_p (mm)	-	-	-	0.09 - 0.11	-	-
4	f_z (mm)	-	-	-	0.033 - 0.04	-	-
	a_p (mm)	-	-	-	0.12	-	-
5	f_z (mm)	-	-	-	0.051 - 0.06	-	-
	a_p (mm)	-	-	-	0.15	-	-
6	f_z (mm)	-	-	-	0.053 - 0.06	-	-
	a_p (mm)	-	-	-	0.18	-	-
8	f_z (mm)	-	-	-	0.068 - 0.08	-	-
	a_p (mm)	-	-	-	0.24	-	-
10	f_z (mm)	-	-	-	0.085 - 0.1	-	-
	a_p (mm)	-	-	-	0.3	-	-
12	f_z (mm)	-	-	-	0.1 - 0.12	-	-
	a_p (mm)	-	-	-	0.36	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	G	-	-
ROUGH FINE	-	-	-	- 220 450	-	-

● = Primary application | G = Graphit

N – Non-ferrous metals & plastics

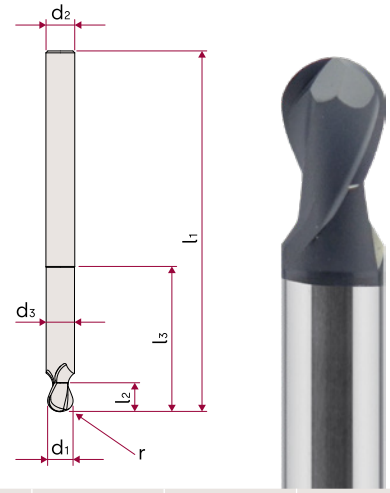
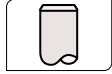
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Graphite – Ball nose end mill cutters

GV02

d_1 0.4 - 6	z 2	r 0.2 - 3	λ° 30°	Diamond layer 6 + 2 μm
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Order no.	d_1	l_2	l_3	d_3	l_1	r	d_2	z
163731	0.4	0.4	4	0.35	55	0.2	3	2
163732	0.4	0.4	6	0.35	55	0.2	3	2
163733	0.5	0.5	5	0.45	55	0.25	3	2
163734	0.5	0.5	10	0.45	55	0.25	3	2
163735	0.6	0.8	6	0.56	55	0.3	3	2
163736	0.8	1	8	0.75	55	0.4	3	2
163737	0.8	1	12	0.75	55	0.4	3	2
163738	1	1	5	0.9	55	0.5	3	2
163739	1	1	10	0.9	55	0.5	3	2
163740	1	1	15	0.9	55	0.5	3	2
163741	1	1	20	0.9	55	0.5	3	2
163742	1	1	15	0.9	55	0.5	6	2
163743	1.5	2	10	1.4	55	0.75	3	2
163744	1.5	2	15	1.4	55	0.75	3	2
163745	1.5	2	25	1.4	55	0.75	3	2
163746	2	2	10	1.9	55	1	3	2
163747	2	2	15	1.9	55	1	3	2
163748	2	2	20	1.9	55	1	3	2
163749	2	2	25	1.9	65	1	3	2
163750	2	2	30	1.9	65	1	3	2
163751	3	3	15	2.9	65	1.5	4	2
163752	3	3	30	2.9	75	1.5	4	2
163753	3.5	3	20	3.4	65	1.75	6	2
163754	4	4	20	3.9	65	2	5	2

Order no.	d ₁	l ₂	l ₃	d ₃	l ₁	r	d ₂	z
163755	4	4	30	3.9	75	2	5	2
163756	6	6	30	5.9	75	3	6	2
163757	6	6	50	5.9	90	3	6	2

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
0.4 - 0.8	f _z (mm)	-	-	-	0.004 - 0.008	-	-
	a _p (mm)	-	-	-	0.015 - 0.024	-	-
1 - 1.5	f _z (mm)	-	-	-	0.012 - 0.015	-	-
	a _p (mm)	-	-	-	0.03 - 0.045	-	-
2	f _z (mm)	-	-	-	0.02 - 0.025	-	-
	a _p (mm)	-	-	-	0.06	-	-
3 - 3.5	f _z (mm)	-	-	-	0.02 - 0.025	-	-
	a _p (mm)	-	-	-	0.09 - 0.11	-	-
4	f _z (mm)	-	-	-	0.033 - 0.04	-	-
	a _p (mm)	-	-	-	0.12	-	-
6	f _z (mm)	-	-	-	0.053 - 0.06	-	-
	a _p (mm)	-	-	-	0.18	-	-

Speed (V_c in m/min)

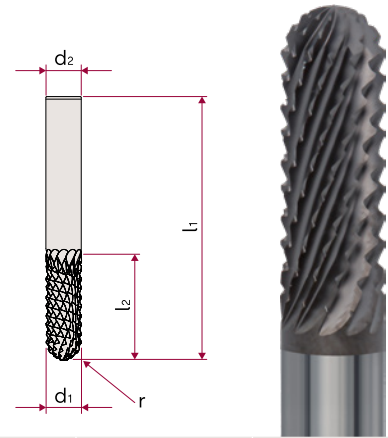
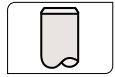
Application	P	M	K	N	S	H
	-	-	-	G	-	-
ROUGH FINE	-	-	-	- 220 450	-	-

● = Primary application | G = Graphit

Graphite – Ball nose end mill cutters

GV03

d_1 4 - 16	z 9 - 20	r 2 - 8	Diamond layer
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Order no.	d_1	l_2	l_1	r	d_2	z
161585	4	12	57	2	6	9
161586	5	15	57	2.5	6	10
161587	6	17	57	3	6	10
161588	8	20	63	4	8	12
161589	10	24	72	5	10	12
161590	12	30	83	6	12	16
161591	16	36	100	8	16	20

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm)	-	-	-	0.062 - 0.25	-	-
	a_p (mm)	-	-	-	0.06 - 0.8	-	-
5	f_z (mm)	-	-	-	0.082 - 0.28	-	-
	a_p (mm)	-	-	-	0.075 - 1	-	-
6	f_z (mm)	-	-	-	0.09 - 0.3	-	-
	a_p (mm)	-	-	-	0.09 - 1.2	-	-
8	f_z (mm)	-	-	-	0.102 - 0.35	-	-
	a_p (mm)	-	-	-	0.12 - 1.6	-	-
10	f_z (mm)	-	-	-	0.120 - 0.38	-	-
	a_p (mm)	-	-	-	0.15 - 2	-	-
12	f_z (mm)	-	-	-	0.155 - 0.4	-	-
	a_p (mm)	-	-	-	0.18 - 2.4.0	-	-
16	f_z (mm)	-	-	-	0.18 - 0.45	-	-
	a_p (mm)	-	-	-	0.24 - 3.2	-	-

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	G	-	-
ROUGH FINE	-	-	-	400 500 600 600 700 800	-	-

① ● = Primary application | G = Graphit

S – Special alloys & titanium

N – Non-ferrous metals & plastics

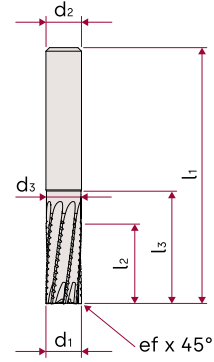
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CFK/GFK – End mills

CX01

d_1 4 - 16	z 8	ef 0.08 - 0.32	λ° 8°	Blank
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Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z
161741	4	11	19	3.9	57	0.08	6	8
161742	5	13	19	4.9	57	0.1	6	8
161743	6	13	19	5.8	57	0.12	6	8
161744	6	21	27	5.8	65	0.12	6	8
161745	8	19	25	7.8	63	0.16	8	8
161746	8	22	32	7.8	70	0.16	8	8
161747	10	22	30	9.7	72	0.2	10	8
161748	12	26	36	11.6	83	0.24	12	8
161749	16	32	42	15.5	92	0.32	16	8

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm)	-	-	-	0.012 - 0.04	-	-
	a_p (mm)	-	-	-	3 - 6	-	-
5 - 6	f_z (mm)	-	-	-	0.015 - 0.057	-	-
	a_p (mm)	-	-	-	5 - 9	-	-
8	f_z (mm)	-	-	-	0.017 - 0.073	-	-
	a_p (mm)	-	-	-	8 - 12	-	-
10	f_z (mm)	-	-	-	0.019 - 0.088	-	-
	a_p (mm)	-	-	-	10 - 15	-	-
12	f_z (mm)	-	-	-	0.021 - 0.101	-	-
	a_p (mm)	-	-	-	12 - 18	-	-
16	f_z (mm)	-	-	-	0.023 - 0.123	-	-
	a_p (mm)	-	-	-	16 - 24	-	-

Speed (V_c in m/min)


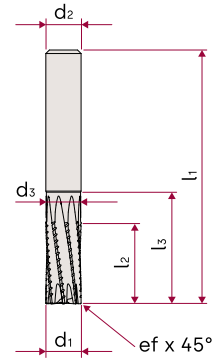
Application	P	M	K	N	S	H
	-	-	-	CFK GFK	-	-
ROUGH FINE	-	-	-	80 135 200 195 295 395	-	-

① ● = Primary application | ○ = Secondary application | CFK = Fiber reinforced plastic | GFK = Glass fiber reinforced plastic

CFK/GFK – End mills

CX02

d_1 4 - 16	z 8	ef 0.08 - 0.32	λ° 8°	Blank
-----------------	----------	---------------------	-----------------------	-------

Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z
161750	4	11	19	3.9	57	0.08	6	8
161751	5	13	19	4.9	57	0.1	6	8
161752	6	13	19	5.8	57	0.12	6	8
161753	6	21	27	5.8	65	0.12	6	8
161754	8	19	25	7.8	63	0.16	8	8
161755	8	22	32	7.8	70	0.16	8	8
161756	10	22	30	9.7	72	0.2	10	8
161757	12	26	36	11.6	83	0.24	12	8
161758	16	32	42	15.5	92	0.32	16	8

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm) a_p (mm)	-	-	-	0.012 - 0.04 3 - 6	-	-
5 - 6	f_z (mm) a_p (mm)	-	-	-	0.015 - 0.057 5 - 9	-	-
8	f_z (mm) a_p (mm)	-	-	-	0.017 - 0.073 8 - 12	-	-
10	f_z (mm) a_p (mm)	-	-	-	0.019 - 0.088 10 - 15	-	-
12	f_z (mm) a_p (mm)	-	-	-	0.021 - 0.101 12 - 18	-	-
16	f_z (mm) a_p (mm)	-	-	-	0.023 - 0.123 16 - 24	-	-

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	CFK ○ GFK	-	-
ROUGH FINE	-	-	-	80 135 200 195 295 395	-	-

① ● = Primary application | ○ = Secondary application | CFK = Fiber reinforced plastic | GFK = Glass fiber reinforced plastic

CFK/GFK – End mills

CX03

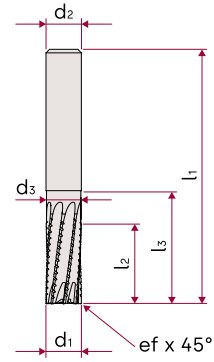
d_1
4 - 16

z
8

ef
0.08 - 0.32

λ°
8°

Diamond
layer



Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z
161759	4	11	19	3.9	57	0.08	6	8
161760	5	13	19	4.9	57	0.1	6	8
161761	6	13	19	5.8	57	0.12	6	8
161762	6	21	27	5.8	65	0.12	6	8
161763	8	19	25	7.8	63	0.16	8	8
161764	8	22	32	7.8	70	0.16	8	8
161765	10	22	30	9.7	72	0.2	10	8
161766	12	26	36	11.6	83	0.24	12	8
161767	16	32	42	15.5	92	0.32	16	8

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm)	-	-	-	0.012 - 0.021	-	-
	a_p (mm)	-	-	-	4.0 - 6.0	-	-
6	f_z (mm)	-	-	-	0.015 - 0.026	-	-
	a_p (mm)	-	-	-	6.0 - 9.0	-	-
8	f_z (mm)	-	-	-	0.017 - 0.031	-	-
	a_p (mm)	-	-	-	8.0 - 12.0	-	-
10	f_z (mm)	-	-	-	0.019 - 0.035	-	-
	a_p (mm)	-	-	-	10.0 - 15.0	-	-
12	f_z (mm)	-	-	-	0.021 - 0.038	-	-
	a_p (mm)	-	-	-	12.0 - 18.0	-	-
16	f_z (mm)	-	-	-	0.023 - 0.042	-	-
	a_p (mm)	-	-	-	16.0 - 24.0	-	-

Speed (V_c in m/min)


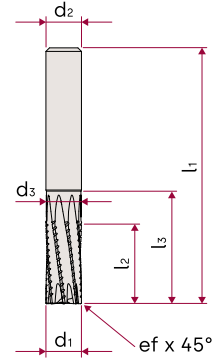
Application	P	M	K	N	S	H
	-	-	-	CFK ○ GFK	-	-
ROUGH FINE	-	-	-	100 213 325 235 358 480	-	-

① ● = Primary application | ○ = Secondary application | CFK = Fiber reinforced plastic | GFK = Glass fiber reinforced plastic

CFK/GFK – End mills

CX04

d_1 4 - 16	z 8	ef 0.08 - 0.32	λ° 8°	Diamond layer
-----------------	----------	---------------------	-----------------------	------------------

Order no.	d_1	l_2	l_3	d_3	l_1	ef	d_2	z
161768	4	11	19	3.9	57	0.08	6	8
161769	5	13	19	4.9	57	0.1	6	8
161770	6	13	19	5.8	57	0.12	6	8
161771	6	21	27	5.8	65	0.12	6	8
161772	8	19	25	7.8	63	0.16	8	8
161773	8	22	32	7.8	70	0.16	8	8
161774	10	22	30	9.7	72	0.2	10	8
161775	12	26	36	11.6	83	0.24	12	8
161776	16	32	42	15.5	92	0.32	16	8

Application data (f_z / a_p)

Diameter	Feed depth of cut	P	M	K	N	S	H
4	f_z (mm)	-	-	-	0.012 - 0.021	-	-
	a_p (mm)	-	-	-	4.0 - 6.0	-	-
6	f_z (mm)	-	-	-	0.015 - 0.026	-	-
	a_p (mm)	-	-	-	6.0 - 9.0	-	-
8	f_z (mm)	-	-	-	0.017 - 0.031	-	-
	a_p (mm)	-	-	-	8.0 - 12.0	-	-
10	f_z (mm)	-	-	-	0.019 - 0.035	-	-
	a_p (mm)	-	-	-	10.0 - 15.0	-	-
12	f_z (mm)	-	-	-	0.021 - 0.038	-	-
	a_p (mm)	-	-	-	12.0 - 18.0	-	-
16	f_z (mm)	-	-	-	0.023 - 0.042	-	-
	a_p (mm)	-	-	-	16.0 - 24.0	-	-

P/K – Steel/cast iron

H – Hardened materials

Speed (V_c in m/min)

Application	P	M	K	N	S	H
	-	-	-	CFK ○ GFK	-	-
ROUGH FINE	-	-	-	100 ● 213 325 235 ● 358 480	-	-

① ● = Primary application | ○ = Secondary application | CFK = Fiber reinforced plastic | GFK = Glass fiber reinforced plastic

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

Technical information

Index



Technical information

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High-frequency spindles

Modern spindle systems for effective milling performance.

Many milling machines – both newer machines and older models – have a relatively low maximum speed. A low maximum speed, of course, delivers advantages in roughing, but is the biggest brake on achieving effective feed rates. Low speeds likewise greatly restrict the advantages of modern CNC applications. The consequences are signifi-

cantly longer machining times, and a loss of profitable capacity.

Pokolm offers impressive solutions for just this problem: modern spindle systems for effective milling results.

Better surfaces and significant time savings.

The advantages are impressive: higher cutting speeds and utilizing the maximum feed rate – even for the smallest cutters. Surfaces are also improved, with a significant reduction in eroding work. This results in much shorter machining times, and allows users to make full use of the advantages of CNC.

Get the maximum speed from your machines with Pokolm spindles for excellent time savings.

Ask about our spindle service, including:

- Replacement parts
- Repairs
- Inspection
- Maintenance
- Swivel devices
- CNC machine connection



Our current spindle flyer is available here:

<https://www.pokolm.de/de/downloads/?did=137>
Or scan the QR code

Videos on high-frequency spindles are available at www.youtube.com/c/PokolmKnowHow

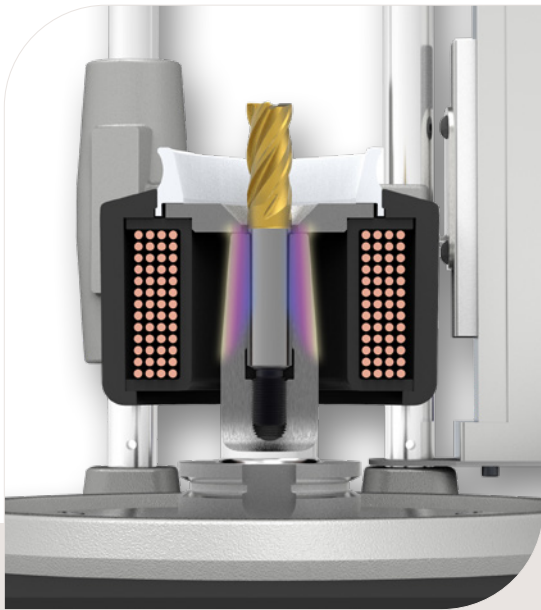
Shrinking technology

First shrink then mill

More and more users are switching to shrinking technology, thanks to the advantages it offers over common clamping methods. The biggest of these is extremely good concentricity, which guarantees the highest precision with significantly longer tool lives. In addition, shrinking technology creates an optimal frictional connection between the tool and arbor, ensuring high torque transmission. The ability to work at maximum speed is the best prerequisite for achieving an ideal surface grade and avoiding expensive ultrafine machining processes.

In comparison to traditional tool arbors, shrink fit mounts have a slimmer design, making it possible to use even the smallest tools at the greatest depths, something impossible with a collet chuck.

Pokolm offers a comprehensive range of shrinking technology products: a high-quality, well-engineered induction shrinking device, shrink fit arbors for all common machine connections, and the patented Pokolm Duoplug® connection system.

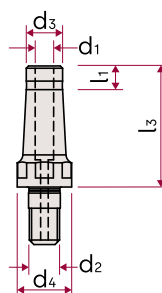


Videos on shrinking technology are available at www.youtube.com/c/PokolmKnowHow

The new threaded shrink fit adapter

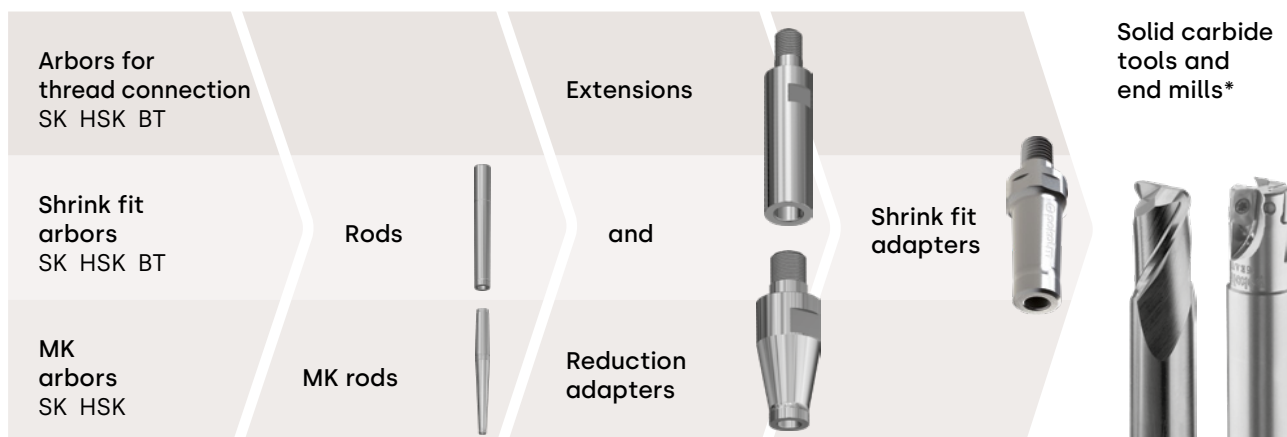
– an economical connection

- Problem solver for machining cavities, if the right shrink fit arbor is not available.
- Short and streamlined coolant feed inside the design
- Hexagonal contact surfaces – also suitable for using ring wrenches.
- Economical alternative in contrast to additional arbors for threaded arbors with M10, M12, M16 threads
- For shrink gripping of cutters with plain shank diameters 6 mm, 8 mm, 10 mm and 12 mm (shank quality at least h6)



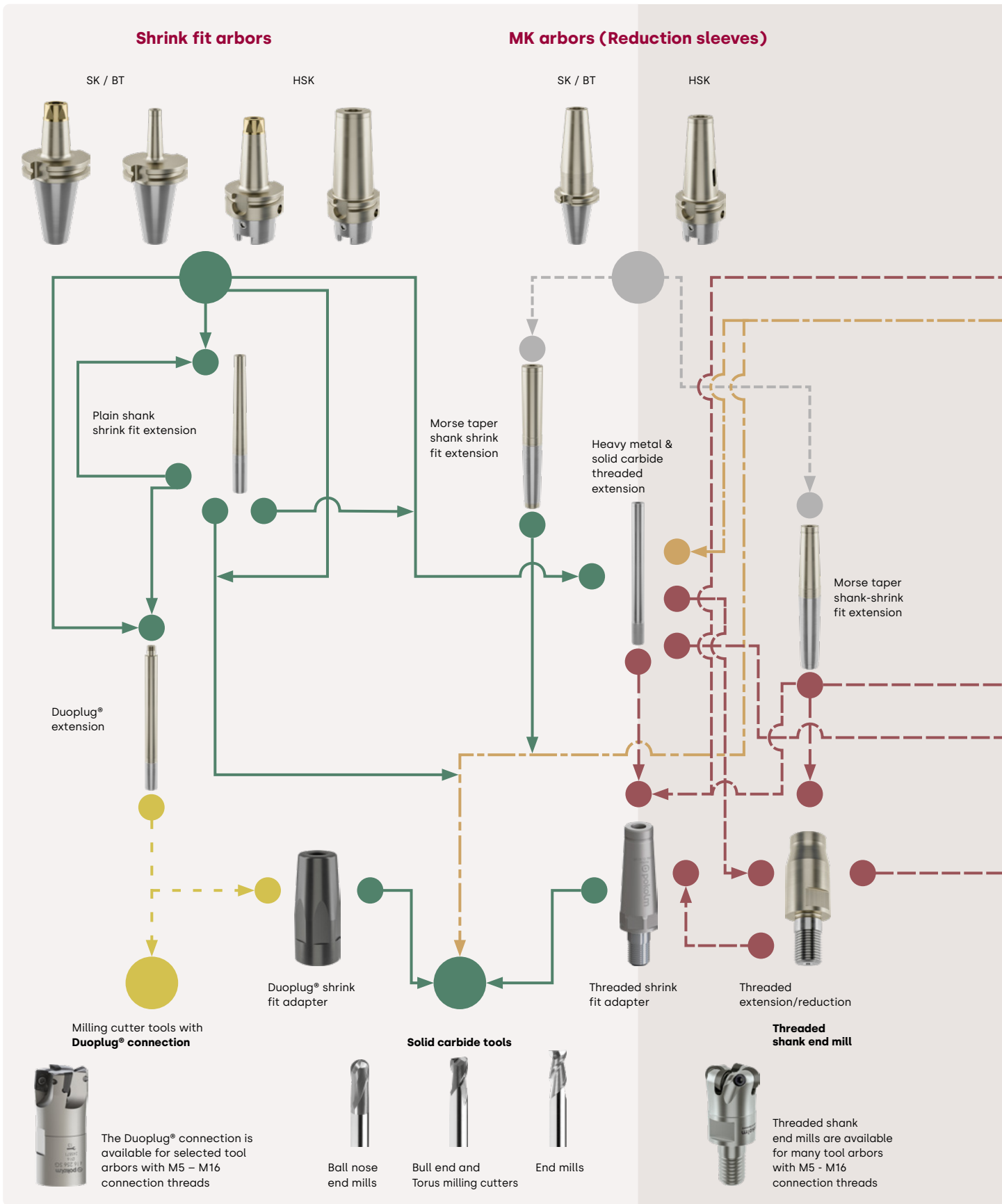
Order no.	d ₁	l ₃	A	d ₃	d ₄	d ₂	DIN/shape	l ₂	l ₁
Ø 6 mm									
40 06 10 784 S	6	40	-	12	18	10	-	17	7.8
40 06 12 784 S	6	40	-	12	21	12	-	19	7.8
40 06 16 784 S	6	40	-	12	29	16	-	27	7.8
Ø 8 mm									
40 08 10 784 S	8	40	-	16	18	10	-	17	7.8
40 08 12 784 S	8	40	-	16	21	12	-	19	7.8
40 08 16 784 S	8	40	-	16	29	16	-	27	7.8
Ø 10 mm									
60 10 10 784 S	10	60	-	18	18	10	-	17	-
60 10 12 784 S	10	60	-	20	21	12	-	19	7.8
60 10 16 784 S	10	60	-	20	29	16	-	27	7.8
Ø 12 mm									
60 12 12 784 S	12	60	-	21	21	12	-	19	-
60 12 16 784 S	12	60	-	24	29	16	-	27	7.8

Option to combine with the threaded shrink fit adapter



*when using suitable shrinking units, all plain shank tools and extensions can be used.

The Pokolm tool system



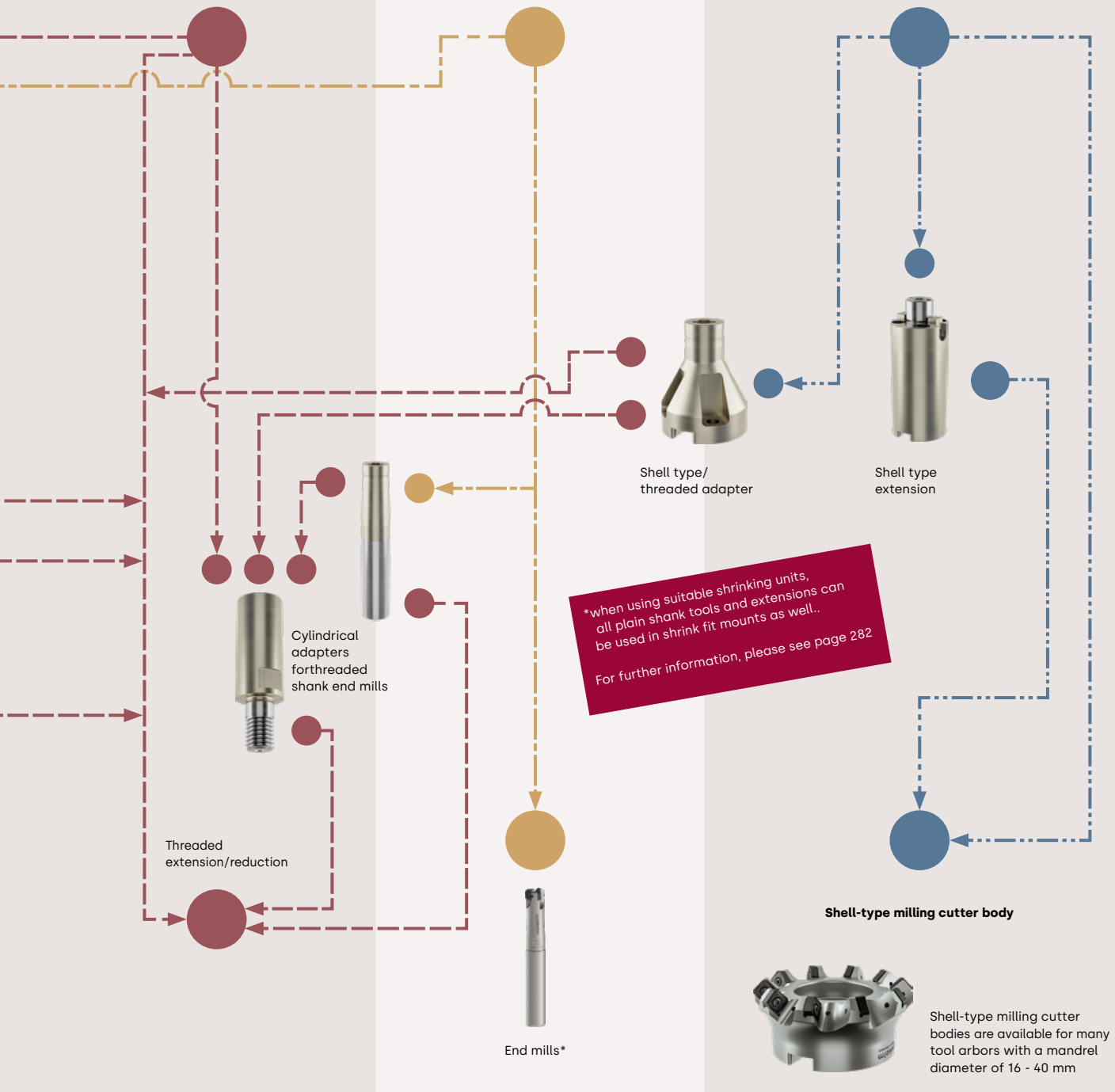
Arbors for thread connection



ER collet arbors



Arbors for shell type milling cutters



**when using suitable shrinking units, all plain shank tools and extensions can be used in shrink fit mounts as well..
For further information, please see page 282*

- Shrink fit connection
- - - - - Morse taper connection
- - - - - Threaded connection

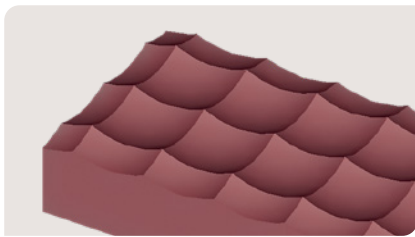
- ⋯⋯⋯ Shell-type connection
- - - - - ER collet connection
- - - - - Duoplug® connection

Surface grade

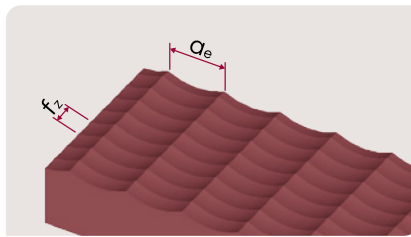
The goal of finishing a workpiece is to avoid or at least minimize the need for manual rework. However, there are many factors that influence the surface properties of a milled component:

- Component geometry, material
- Stability of the set-up and the machine
- Overhang and cutting parameters
- Precision, geometry, and the design of the tool and arbor system

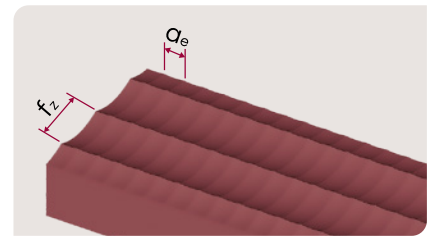
In addition to the points indicated above, the desired surface roughness R_{th} has a significant impact on both surface grade and machining times in finishing. Specifically selecting cutting parameters to achieve a defined roughness saves valuable time in finishing and ensures competitive machining times.



f_z equal to a_e (Machining type 1 and 3)



f_z less than a_e (Machining type 2 and 4)



f_z greater than a_e (Machining type 5)

Machining example:

Material: 1.2312, SK40-machine
 Area to be machined: 150 x 200 mm
 Tool: 08 214 with $d_1 = 8$, $z = 2$
 Other: $n = 14,000$ rpm | $V_c = 350$ m/min

	from		results:			
	f_z	a_e	V_f	Surface roughness [mm]	Total milling length in [mm]	Machining time
Machining type 1	0.08	0.08	2,240	0.0002	375,000	2 hr. 47 min
Machining type 2	0.08	0.16	2,240	0.0008	187,500	1 hr. 24 min.
Machining type 3	0.16	0.16	4,480	0.0008	187,500	42 min.
Machining type 4	0.16	0.32	4,480	0.0032	93,750	21 min.
Machining type 5	0.32	0.16	8,960	0.0008	187,500	21 min.

As a general rule:

"Double the side step or double the feed = half the milling time."

For $f_z = a_e$ then:

- Doubling the values reduces the machining time by three quarters.
- Dividing f_z and a_e by two, in contrast, results in a surface that is four times as smooth.

In most cases, selecting $f_z = a_e$ results in a very clean surface that stands out for its symmetrical appearance in both the advance and feed direction.

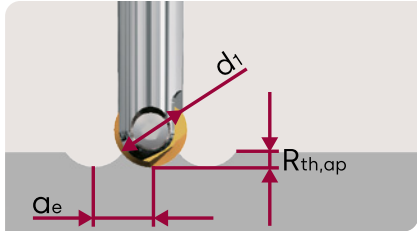
Definition of terms

d_1 Tool diameter [mm]
 $R_{th,ae}$ Depth of profile in the advance direction [mm]
 f_z Feed per tooth [mm]
 d_{eff} Effective tool diameter [mm]
 $R_{th,fz}$ Depth of profile in the feed direction [mm]

β Approach angle of the tool axis [°]
 r Tool radius in [mm]
 a_e Radial engagement (side step) [mm]
 a_p Axial engagement (depth of cut) [mm]
 V_f Feed rate [mm/min]

List of formulas

1a Calculation of theoretical depth of profile in the advance direction



Formula:

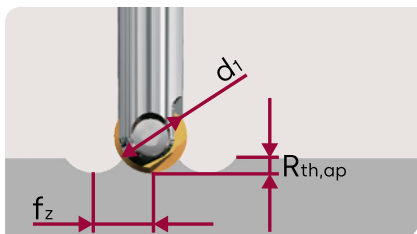
$$R_{th,ap} = \frac{d_1}{2} - \sqrt{\frac{d_1^2 - a_e^2}{4}}$$

Example:

$d_1 = 12$
 $a_e = 0.2$

$$R_{th,02} = \frac{12}{2} - \sqrt{\frac{12^2 - 0.2^2}{4}} = 0.000833$$

1b Calculation of theoretical depth of profile in the feed direction



Formula:

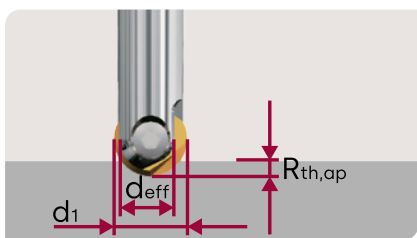
$$R_{th,fz} = \frac{d_1}{2} - \sqrt{\frac{d_1^2 - f_z^2}{4}}$$

Example:

$d_1 = 12$
 $f_z = 0.2$

$$R_{th,02} = \frac{12}{2} - \sqrt{\frac{12^2 - 0.2^2}{4}} = 0.000833$$

2a Calculation of the effective cutting edge diameter for spherical tools with a vertical axis



Formula:

$$d_{eff} = 2 \sqrt{a_p (d_1 - a_p)}$$

Example:

$d_1 = 12$
 $a_p = 0.2$

$$d_{eff} = 2 \sqrt{0.2 \cdot (12 - 0.2)} = 3.07$$

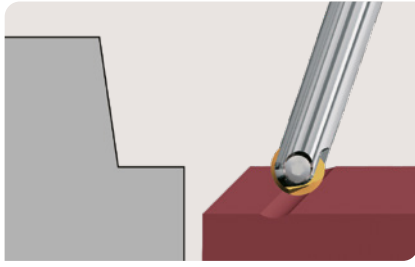
Skip the calculations:

Effective tool diameter for ball nose end mills depending on the feed depth:

a_p	Tool diameter d_1											
	1	2	3	4	5	6	7	8	10	12	16	20
0.1	0.60	0.87	1.08	1.25	1.40	1.54	1.66	1.78	1.99	2.18	2.52	2.82
0.2	0.80	1.20	1.50	1.74	1.96	2.15	2.33	2.50	2.80	3.07	3.56	3.98
0.3	0.92	1.43	1.80	2.11	2.37	2.62	3.84	3.04	3.41	3.75	4.34	4.86
0.4	0.98	1.60	2.04	2.40	2.71	2.99	3.25	3.49	3.92	4.31	5.00	5.60
0.5	1.00	1.73	2.24	2.65	3.00	3.32	3.61	3.87	4.36	4.80	5.57	6.24

2b

Calculation of the effective cutting edge diameter for spherical tools with a tilted axis



Formula:

$$d_{\text{eff}} = d_1 \cdot \sin \left(\beta + \arccos \left(1 - \frac{2 \cdot a_p}{d_1} \right) \right)$$

Example:

Formula applies to positive angles of attack.

$$\begin{aligned} d_1 &= 12 \\ a_p &= 0.2 \\ \beta &= 15^\circ \end{aligned}$$

$$d_{\text{eff}} = 12 \cdot \sin \left(15 + \arccos \left(1 - \frac{2 \cdot 0.2}{12} \right) \right) = 5.97$$

If a spherical tool is set at a tilted axis, the actual material removal will not change in contrast to vertical machining; however, the diameter range

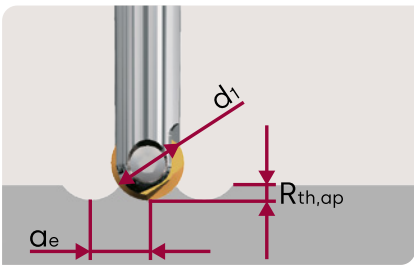
of the tool that enters the material will change. This will result in a different calculation for effective tool diameter (= in use).

Skip the calculations:

Effective cutting edge diameter for ball nose end mills depending on the approach angle and feed depth:

β	a _p	Tool diameter d ₁											
		1	2	3	4	5	6	7	8	10	12	16	20
10°	0.1	0.73	1.17	1.55	1.89	2.21	2.52	2.82	3.11	3.66	4.20	5.23	6.22
	0.2	0.89	1.46	1.93	2.34	2.73	3.09	3.44	3.78	4.42	5.04	6.21	7.32
	0.3	0.97	1.65	2.19	2.67	3.10	3.51	3.90	4.28	4.99	5.67	6.95	8.16
	0.4	1.00	1.78	2.39	2.92	3.40	3.85	4.28	4.68	5.46	6.19	7.56	8.85
	0.5	0.98	1.88	2.55	3.13	3.65	4.13	4.59	5.03	5.86	6.63	8.09	9.45
15°	0.1	0.79	1.31	1.77	2.19	2.59	2.99	3.36	3.74	4.46	5.16	6.53	7.85
	0.2	0.93	1.57	2.12	2.62	3.08	3.53	3.69	4.38	5.19	5.97	7.47	8.92
	0.3	0.99	1.74	2.36	2.92	3.43	3.92	4.40	4.85	5.73	6.57	8.18	9.72
	0.4	1.00	1.86	2.54	3.15	3.71	4.24	4.74	5.23	6.17	7.06	8.76	10.38
	0.5	0.97	1.92	2.68	3.33	3.93	4.50	5.04	5.55	6.54	7.48	9.26	10.95
20°	0.1	0.84	1.43	1.97	2.47	2.96	3.43	3.89	4.34	5.22	6.09	7.77	9.42
	0.2	0.69	1.67	2.30	2.87	3.41	3.94	4.45	4.95	5.91	6.85	8.68	10.44
	0.3	1.00	1.82	2.51	3.14	3.74	4.30	4.40	5.39	6.42	7.42	9.35	11.20
	0.4	0.99	1.91	2.67	3.35	3.99	4.59	5.17	5.74	6.83	7.88	9.89	11.83
	0.5	0.94	1.97	2.79	3.51	4.19	4.83	5.44	6.03	7.17	8.27	10.36	12.37
25°	0.1	0.88	1.55	2.16	2.74	3.30	3.84	4.38	4.91	5.95	6.96	8.96	10.92
	0.2	0.98	1.76	2.46	3.10	3.72	4.32	4.90	5.48	6.59	7.69	9.82	11.89
	0.3	1.00	1.89	2.65	3.30	4.01	4.65	5.27	5.88	7.06	8.21	10.44	12.61
	0.4	0.97	1.69	2.78	3.53	4.23	4.91	5.57	6.20	7.44	8.64	10.95	13.19
	0.5	0.91	1.99	2.87	3.67	4.41	5.12	5.80	6.47	7.75	9.00	11.39	13.69
30°	0.1	0.92	1.65	2.33	2.98	3.61	4.23	4.84	5.44	6.62	7.79	10.08	12.34
	0.2	0.99	1.84	2.60	3.31	4.00	4.67	5.32	5.96	7.22	8.46	10.88	13.25
	0.3	0.99	1.94	2.76	3.52	4.26	4.96	5.66	6.33	7.65	8.94	11.46	13.91
	0.4	0.95	1.99	2.87	3.68	4.45	5.19	5.91	6.62	7.99	9.33	11.93	14.45
	0.5	0.87	2.00	2.94	3.79	4.60	5.37	6.12	6.85	8.27	9.65	12.32	14.91

2c Calculation of the effective cutting edge diameter for toric tools



Formula:

$$d_{eff} = (d_1 - 2r) + 2\sqrt{a_p(2r - a_p)}$$

Example:

$d_1 = 12$
 $a_p = 0.2$
 $\beta = 15^\circ$

$$d_{eff} = (12 - 2 \cdot 5) + 2\sqrt{0.2 \cdot (2 \cdot 5 - 0.2)} = 4.8$$

Skip the calculations:

Effective cutting edge diameter for toric tools depending on the corner radius and feed depth:

r	a_p	Tool diameter d_1							
		6	8	10	12	15	16	20	25
2	0.1	3.25	5.25	7.25	9.25	-	13.25	17.25	-
	0.2	3.74	5.74	7.74	9.74	-	13.74	17.74	-
	0.3	4.11	6.11	8.11	10.11	-	14.11	18.11	-
	0.4	4.40	6.40	8.40	10.40	-	14.40	18.40	-
	0.5	4.65	6.65	8.65	10.65	-	14.65	18.65	-
2.5	0.1	2.40	4.40	6.40	8.40	11.40	12.40	16.40	-
	0.2	2.96	4.96	6.96	8.96	11.96	12.96	16.96	-
	0.3	3.37	5.37	7.37	9.37	12.37	13.37	17.37	-
	0.4	3.71	5.71	7.71	9.71	12.71	13.71	17.71	-
	0.5	4.00	6.00	8.00	10.00	13.00	14.00	18.00	-
3	0.1	-	3.54	-	-	-	-	-	-
	0.2	-	4.15	-	-	-	-	-	-
	0.3	-	4.62	-	-	-	-	-	-
	0.4	-	4.99	-	-	-	-	-	-
	0.5	-	5.32	-	-	-	-	-	-
3.5	0.1	-	-	-	6.66	9.66	10.66	14.66	19.66
	0.2	-	-	-	7.33	10.33	11.33	15.33	20.33
	0.3	-	-	-	7.84	10.84	11.84	15.84	20.84
	0.4	-	-	-	8.25	11.25	12.25	16.25	21.25
	0.5	-	-	-	8.61	11.61	12.61	16.61	21.61
4	0.1	-	-	3.78	-	-	-	-	18.78
	0.2	-	-	4.50	-	-	-	-	19.50
	0.3	-	-	5.04	-	-	-	-	20.04
	0.4	-	-	5.49	-	-	-	-	20.49
	0.5	-	-	5.87	-	-	-	-	20.87
5	0.1	-	-	-	3.99	-	-	11.99	16.99
	0.2	-	-	-	4.80	-	-	12.80	17.80
	0.3	-	-	-	5.41	-	-	13.41	18.41
	0.4	-	-	-	5.92	-	-	13.92	18.92
	0.5	-	-	-	6.36	-	-	14.36	19.36
7	0.1	-	-	-	-	-	4.36	-	-
	0.2	-	-	-	-	-	5.32	-	-
	0.3	-	-	-	-	-	6.05	-	-
	0.4	-	-	-	-	-	6.66	-	-
	0.5	-	-	-	-	-	7.20	-	-

Formulas and example calculations

Calculation of spindle revolutions [min⁻¹]:*¹

$$n = \frac{V_c \cdot 1000}{\pi \cdot d_{c/eff}}$$

Calculation of feed per tooth [mm/tooth]:

$$f_z = \frac{V_f}{(n \cdot z)}$$

Calculation of feed rate [mm/min]:

$$V_f = n \cdot z \cdot f_z$$

Calculation of required machine power [kW]:*²

$$P = \frac{a_e \cdot a_p \cdot V_f}{P}$$

Calculation of cutting speed [m/min]:*¹

$$V_c = \frac{\pi \cdot d_{c/eff} \cdot n}{1000}$$

Calculation of feed per revolution [mm/U]:

$$f_n = z \cdot f_z \quad f_n = \frac{V_f}{n}$$

Calculation of machining time [min]:

$$T = \frac{l_f}{V_f}$$

Calculation of chip volume [cm³/min]:

$$Q = \frac{a_e \cdot a_p \cdot V_f}{1000}$$

*¹ Please note that on flat contours, the effective tool diameter must be used for the calculation

*² Please note: This formula is used to calculate machine performance when machining steel.

Example calculation

Material	= 1.2343	Depth of cut	a_p	= 0.2 mm
Cutter	= NVV 1192 85 0602	Width of cut	a_e	= f_z
Cutter diameter	d_c = 6 mm	Cutting speed	V_c	= 100 m/min
Effective number of teeth	z = 2	Feed per tooth	f_z	= 0.1 mm

Calculation of effective cutting edge diameter:

$$d_{eff} = 2 \sqrt{0.2 \cdot (6 - 0.2)} = 2.15$$

Calculation of speed:

$$n = \frac{100 \cdot 1000}{\pi \cdot 2.15} = 14805 \text{ U/min}$$

Calculation of feed rate:

$$V_f = 14805 \cdot 2 \cdot 0.1 = 2961 \text{ mm/min}$$

Definition of terms

a_e	Width of cut [mm]	n	Spindle revolutions [U/min]
a_p	Depth of cut [mm]	p	(Required) machine power [kW]
d_c	Cutter diameter [mm]	Q	Chip volume [cm ³ /min]
d_{eff}	Effective tool diameter [mm]	T	Machining time [min]
f_z	Feed per tooth [mm/Zahn]	V_c	Cutting speed [m/min]
l_f	Total milling length [mm]	V_f	Feed rate [mm/min]
f_n	Feed per revolution [mm/U]	z	Effective number of teeth



Material overview with comparison table

M.-No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
P – Steel									
Unalloyed steel/structural steel									
1.0037	St37-2	S235JR	E34-2	37/23 HR	SN 400 B	Fe 360 B FU	1311	AE 235 B	1015
1.0044	St44-2	S275JR	E28-2	43/25 HR	SN 400 B	Fe 430 B FN	1412	AE 275 B	1020
1.0050	St50-2G	E295	A50-2	4360	SS 490	Fe 490	1550/2172	A 490	-
1.0070	St70-2G	E360	A70-2	4360	-	Fe 690	1655	A 690	-
1.0570	St52-3	S355J2G3	E36-3	50/35 HR	SM 490 A;B;C;YA;YB	Fe 510/ Fe 52 B FN/ Fe 52 C FN	2132/2134	AE 355 D	1024
1.1141	Ck15	C15E	XC 18	080 M 15	S15C	C16	1370	C15K	1015/ 1017
1.1191	Ck45	C45E	XC 45	080 M 46	S45C	C45	1672	C45E	1042/ 1045
1.1730	C45W	C45U	Y3 42/ Y3 48	EN 43 B	-	-	1672	F.114	1045
1.7131	16MnCr5	16MnCr5	16 MC 5	527 M 17	-	16MnCr5	2173/2511	F.1516	5115/ 5117
P – Steel									
Normal tool steels/cast steel									
1.2067	100Cr6	102Cr6	Y100 C	BL 3	SUJ 2	-	-	100Cr6	L 3
1.2162	21MnCr5	21MnCr5	-	-	-	-	-	-	-
1.2307	29Cr MoV9	29Cr MoV9	-	-	-	-	-	-	-
1.2311	40CrMn Mo7	35Cr Mo8	-	-	-	35Cr Mo8KU	-	F.5263	P 20
1.2312	40CrMn MoS8-6	-	-	-	-	-	-	X210CrW12	P 20+1
1.2323	48Cr MoV6-7	-	-	-	-	-	-	-	-
1.2341	6Cr Mo15-5	5Cr Mo16	-	-	-	-	-	-	P 4
1.2343	X37Cr MoV5-1	X37Cr MoV5-1	Z 38 CDV 5	BH 11	SKD 6	X37Cr MoV51KU	X37Cr MoV5-1	X37Cr MoV5-1	H 11
1.2344	X40Cr MoV5-1	X40Cr MoV5-1	Z 40 CDV 5	BH 13	SKD 61	X40Cr MoV511KU	2242	X40Cr MoV5-1	H 13
1.2842	90MnCr V8	90MnCr V8	90 MV 8	BO 2	-	90MnCr V8KU	-	F.5229	O 2

M.-No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
P – Steel									
Tool steels, difficult to machine/cast steel, difficult to machine									
1.2080	X210Cr12	X210Cr12	Z 200 C 12	BD 3	SKD 1	-	X210Cr12	X210Cr12	D 3
1.2363	X100Cr MoV5	X100Cr MoV5	Z 100 CDV 5	BA 2	SKD 12	X205Cr 12KU	2260	X100Cr MoV5	A 2
1.2369	81MoCr V42-16	-	-	-	-	X100Cr MoV51KU	-	-	613
1.2379	X153Cr MoV12	X153Cr MoV12	Z 160 CDV 12	BD 2	SKD 10/ SKD 11	X155Cr VMo121KU	2310	X153Cr MoV12	D 2
1.2567	30WCr V17-2	X30WCr V53	-	-	SKD 4	-	-	-	-
1.2708	54NiCr MoS6	-	-	-	-	-	-	-	-
1.2713	55NiCr MoV6	55NiCr MoV7	-	-	(SKT 4)	-	-	F.520.S	L 6
1.2738	40Cr MnNi Mo8-6-4	40Cr MnNi Mo8-6-4	-	-	-	-	-	-	-
1.2767	45NiCr Mo16	45NiCr Mo16	-	-	SKT 6	40NiCr MoV16KU	-	-	-
1.6358	X NiCoMo 18-9-5	-	-	-	-	-	-	-	-

M.-No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
S – Special alloys & titanium									
High-temperature resistant alloys									
1.3401	X120 Mn12	-	Z 120 M 12	BW 10	SCMnH 1	GX120 Mn12	2183	F.8251	-
1.4865	GX40 NiCrSi 38-19	GX40 NiCrSi 38-19	GX40 NiCrSi 38-19	3330 C 11/ 331 C 40	SCH 15	GX40 NiCrSi 38-19	GX40 NiCrSi 38-19	GX40 NiCrSi 38-19	-
2.4375	NiCu30Al (Monel K-500)	-	(NU30AT)	NA 18	-	-	-	-	Monel K-500
2.4610	NiMo16 Cr16Ti (Almenit 4610)	-	-	NA 45	-	-	-	-	Hastelloy C-4
2.4619	NiCr22 Mo7Cu (Coralloy 4619)	-	-	-	-	-	-	-	Hastelloy G-3
2.4631	NiCr20 TiAl (Nimonic 80A)	Ni-P95-HAT (AECMA)	NC 20 TA	(2HR201; HR401,601)	NCF 80 A	-	-	-	Nimonic 80A; HEV 5
2.4636	NiCo15 Cr15Mo AlTi (Dux 4636)	-	-	HR 4	-	-	-	-	Nimonic 115
2.4648	EL-NiCr 19Nb (Fox-Nibas 70/20)	-	-	-	-	-	-	-	-
2.4668	NiCr 19NbMo (Inconel 718)	NiCr19 Fe19Nb 5Mo3	NC 19 FeNb	NiCr19 Fe19Nb 5Mo3	NCF 718	NiCr19 Fe19Nb 5Mo3	NiCr19 Fe19Nb 5Mo3	NiCr19 Fe19Nb 5Mo3	Inconel 718 XEV-I
2.4856	NiCr22 Mo9Nb (Inconel 625)	NiCr22 M09Nb	NC22 FeDNb	Na 43/ Na 21	NCF 625	NiCr22 M09Nb	NiCr22 M09Nb	NiCr22 M09Nb	Inconel 625

M.-No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
S – Special alloys & titanium									
Titanium alloys									
-	Ti99, 5 HB 30-200	-	-	-	-	-	-	-	-
-	Ti99, 6 HB 30-170	-	-	-	-	-	-	-	-
-	Ti99, 7 HB 30-150	-	-	-	-	-	-	-	-
-	Ti99, 8 HB 30-120	-	-	-	-	-	-	-	-
-	TiAl6V4 ELI	-	-	TA 11	-	-	-	-	AMS R56401
-	TiAl5 Sn2.5	-	T-A5E	TA 14/17	-	-	-	-	AMS 54520
3.7025	Ti 1	-	-	2 TA 1	-	-	-	-	AMS R50250
3.7124	TiCu2	-	-	2 TA 21-24	-	-	-	-	-
3.7145	TiAl6 Sn2 Zr4Mo 2Si	-	-	-	-	-	-	-	AMS R54620
3.7165	TiAl6V4	-	T-A6V	TA 10-13/TA 28	-	-	-	-	AMS R56400
3.7175	TiAl6V6 Sn2	-	-	-	-	-	-	-	-
3.7184	TiAl4Mo4 Sn2	-	-	-	-	-	-	-	-
3.7185	TiAl4Mo4 Sn2	-	-	TA 45-51; TA 57	-	-	-	-	-
3.7225	Ti 1 Pd	-	-	TP 1	-	-	-	-	AMS 52250

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

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M.-No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
M – Stainless steel									
All types									
1.2316	X36Cr Mo17	X38Cr Mo16	Z 38 CD 16-01	X38Cr Mo16	-	X38Cr Mo16	-	F.5267	-
1.2367	X38Cr MoV5-3	X38Cr MoV5-3	Z 38 CDV 5-3	X38Cr MoV5-3	-	X38Cr MoV5-3	X38Cr MoV5-3	X38Cr MoV5-3	-
1.3543	X102Cr Mo17	X108Cr Mo17	Z 100 CD 17	X108Cr Mo17	SUS 440 C	X105Cr Mo17	X108Cr Mo17	F.3425	440 C
1.4059	GX22 CrNi17	-	Z 20 CN 17.2 M	ANC 2	-	-	-	-	-
1.4122	GX35Cr Mo17	X39Cr Mo17-1	Z 38 CD 16.1 Cl	X39Cr Mo17-1	-	X39Cr Mo17-1	X39Cr Mo17-1	X39Cr Mo17-1	-
1.4301	X5Cr Ni18-10	X5Cr Ni18-10	Z 6 CN 18.09	304 S 15	SUS 304	X5Cr Ni18-10	2332	F.3504	304
1.4305	X12Cr NiS18-8	X8Cr NiS18-9	Z 8 CNF 18-09	303 S 31	SUS 303	X10Cr NiS19-9	2346	F.3504	304
1.4340	GX40 CrNi27-4	-	-	-	-	GX35 CrNi2805	-	-	-
1.4401	X5 CrNiMo 17-12-2	X5 CrNiMo 17-12-2	Z 7 CND 17-11-02	316 S 33	SUS 316	X5 CrNiMo 17-12-2	2347	F.3534	304
1.4462	X2 CrNiMoN 22-5-3	X2 CrNiMoN 22-5-3	Z 2 CND 22-06-03	318 S 13	SUS 329J3L	X2 CrNiMoN 22-5-3	2377	X2 CrNiMoN 22-5-3	S 31803/ S 32205
1.4541	X10 CrNiTi 18-9	X6 CrNiTi 18-10	Z 6 CNT 18-10	321 S 31	SUS 321	X6 CrNiTi 18-10	2337	F.3523	321
1.4551	X10 CrNi 18-9	X5 CrNiNb 20-10KE	Z 6 CNNb 20-10	-	SUS Y 374	-	-	-	-
1.4571	X10 CrNiMo Ti18-10	X6 CrNiMo Ti17-12-2	Z 6 CNDT 17-12	320 S 31	SUS 316 Ti	X6 CrNiMo Ti17-12	2350	F.3535	316 Ti
1.4712	X10 CrSi6	-	-	-	-	-	-	-	-
1.4742	X10 CrAl18	X10 CrSi18	Z 10 CAS 18	430 S 15	SUS 430	X8Cr17	-	F.3113	430

M.-No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
K – Cast iron									
Gray cast iron									
0.6010	GG10	EN-GJL-100	Ft 10 D	GRADE100	FC 10	G 10	0110-00	FG 10	NO 20 B
0.6020	GG20	EN-GJL-200	Ft 20 D	GRADE200	FC 20	G 20	0120-00	FG 20	NO 30 B
0.6030	GG30	EN-GJL-300	Ft 30 D	GRADE300	FC 30	G 30	0130-00	FG 30	NO 45 B
0.6040	GG40	EN-GJL-350	Ft 35 D	GRADE350	FC 35	G 35	0135-00	FG 35	-
K – Cast iron									
Spheroidal graphite cast iron									
0.7040	GGG-40	EN-GJS-400-15	FGS 400-12	SNG 420/12	FCD 400	GS 400/12	07 17-02	FGE 38-17	60-40-18
0.7050	GGG-50	EN-GJS-500-7	FGS 500-7	SNG 500/7	FCD 500	GS 500/7	07 27-02	FGD 50-7	65-45-12
0.7060	GGG-60	EN-GJS-600-3	FGS 600-3	SNG 600/3	FCD 600	GS 600/3	07 32-03	FGE 60-2	80-55-06
0.7070	GGG-70	EN-GJS-700-2U	FGS 700-2	SNG 700/2	FCD 700	GS 700/2	07 37-01	FGS 70-2	100-70-03
0.7080	GGG-80	EN-GJS-800-2	FGS 800-2	SNG 800/2	FCD 800	GS 800/2	-	-	120-90-02
K – Cast iron									
Hardened cast metal									
GTS 35-10	EN-GJMB-350-10	MN 35-10	B 340/12	-	-	08 15	-	32510	-
GTS 45-06	EN-GJMB-450-6	-	P 440/7	-	-	08 52	-	40010	-
GTS 55-04	EN-GJMB-550-4	MN 50-5	P 510/4	-	-	08 54	-	50005	-
GTS 65-02	EN-GJMB-650-2	MN 60-3	P 570/3	-	-	08 85	-	70003	-

P/K – Steel/cast iron

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M.-No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
N – Non-ferrous metals & plastics									
Aluminum									
3.0255	Al99.5	EN-AW-1050A	A 59050C	L31/L34/L36	-	-	-	-	1000
3.1325	AlCuMg1	EN-AW-2017A	-	-	-	-	-	-	-
3.2163	G-ALSi9Cu3	EN-AC-46200	-	-	-	-	-	-	-
3.2315	AlMgSi1	EN-AW-6082	-	-	-	-	-	-	-
3.2383	G-ALSi10Mg	-	-	LM 9	-	-	4253	-	A 360.2
3.2581	G-ALSi12	EN-AW-2017A	-	LM6	-	-	4261	-	A 413.2
3.3535	AlMg3	EN-AW-5754	-	-	-	-	-	-	-
3.4345	AlZnMgCu0,5	EN-AW-7022	AZ4GU/9051	L 86	-	-	-	-	7050
3.5105	GMgZn4SE1Zr1	-	G-Z4TR	MAG 5	-	-	-	-	ZE 41
3.5812	G-MgAl8Zn1	-	G-Z4TR	MAG 5	-	-	-	-	AZ 81
N – Non-ferrous metals & plastics									
Copper									
-	CuMn5F36	-	-	-	-	-	-	-	-
-	CuSi2MnF34	-	-	-	-	-	-	-	-
-	E-Cu57	-	-	-	-	-	-	-	-
-	CuZn15	-	CuZn15	CZ 102	-	-	-	-	C 23000
-	CuZn30	-	CuZn30	CZ 106	-	-	-	-	C 26000
-	CuZn37	-	CuZn37	CZ 108	-	C 2720	-	-	C 27700
-	CuZn36Pb3	-	-	-	-	-	-	-	-
-	G-CuZn34Al2	-	U-Z36N3	HTB 1	-	-	-	-	C 86200
-	G-CuSn5ZnPb	-	U-E5Pb5Z5	LG 2	-	-	-	-	C 83600
-	G-CuPb10Sn	-	U-E10Pb10	LB 2	-	-	-	-	C 93700
-	CuCrZr	-	U-Cr0,8Zr	CC 102	-	-	-	-	C18200

M.-No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
N – Non-ferrous metals & plastics									
Graphite									
-	ISO-63	-	-	-	-	-	-	-	-
-	ISO-90	-	-	-	-	-	-	-	-
-	ISO-93	-	-	-	-	-	-	-	-
-	ISO-95	-	-	-	-	-	-	-	-
N – Non-ferrous metals & plastics									
Plastics									
-	Ureol® 5211 A/B	-	-	-	-	-	-	-	-
-	Ureol® 5212 A/B	-	-	-	-	-	-	-	-
-	Ureol® 5213 A/B	-	-	-	-	-	-	-	-
-	Ureol® 5214 A/B	-	-	-	-	-	-	-	-
-	Ureol® 5215 A/B	-	-	-	-	-	-	-	-
-	Ureol® 5216 A/B	-	-	-	-	-	-	-	-
-	Ureol® 5217 A/B	-	-	-	-	-	-	-	-
-	Ureol® 5218 A/B	-	-	-	-	-	-	-	-
-	Ureol® 5219 A/B	-	-	-	-	-	-	-	-

Product overview

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

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M.-No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
H – Hardened materials									
Up to 48 HRC									
1.2311	40CrMn Mo7	35Cr Mo8	-	-	-	35Cr Mo8KU	-	-	-
1.2312	40CrMn MoS8-6	-	-	-	-	-	-	-	-
1.2323	48Cr MoV6-7	-	-	-	-	-	-	-	-
1.2343	X38Cr MoV5-1	X37Cr MoV5-1	Z 38 CDV 5	BH 11	SKD 6	X37Cr MoV51KUa	X37Cr MoV5-1	F.520.G	H 11
1.2344	X40Cr MoV51	X40Cr MoV5-1	Z 40 CDV 5	BH 13	SKD 61	X40Cr MoV511KU	2242	X40Cr MoV5-1	H 13
1.2708	54NiCr MoS6	-	-	-	-	-	-	-	-
1.2842	90MnCr V8	90MnCr V8	90Mv8	BO 2	-	90MnVCr 8KU	90MnCr V8	F.5229	O 2
H – Hardened materials									
Up to 55 HRC									
1.2080	X210 Cr12	X210 Cr12	Z 200 C 12	BD 3	SKD 1	X210 Cr12	X210 Cr12	F.521	D 3
1.2323	48Cr MoV6-7	-	-	-	-	-	-	-	-
1.2344	X40Cr MoV5-1	X40Cr MoV5-1	Z 40 CDV 5	BH 13	SKD 61	X40Cr MoV5-1	2242	X40Cr MoV5-1	H 13
1.2363	X100Cr MoV51	X100Cr MoV5	Z 100 CDV 5	BA 2	SKD 12	X100Cr MoV5	2260	X100Cr MoV5	A 2
1.2369	81MoCr V42-16	-	-	-	-	-	-	-	613
1.2379	X155Cr VMo12-1	X153Cr MoV12	Z 160 CDV 12	BD 2	SKD 11	X153Cr MoV12	2310	X153Cr MoV12	D 2
1.2567	30WCr V17-2	X30WCr V53	-	-	SKD 4	-	-	-	-
1.2708	54NiCr MoS6	-	-	-	-	-	-	-	-
1.2713	55NiCr MoV6	55NiCr MoV7	55NCDV7	-	SKT 4	-	-	F.520.S	L 6
1.2738	40Cr MnNiMo 8-6-4	40Cr MnNiMo 8-6-4	40Cr MnNiMo 8-6-4	40Cr MnNiMo 8-6-4	40Cr MnNiMo 8-6-4	40Cr MnNiMo 8-6-4	40Cr MnNiMo 8-6-4	40Cr MnNiMo 8-6-4	40Cr MnNiMo 8-6-4
1.2767	X45NiCr Mo4	45NiCr Mo16	45NiCr Mo16	45NiCr Mo16	SKT 6	45NiCr Mo16	45NiCr Mo16	45NiCr Mo16	-
1.2842	90MnCr V8	90MnCr V8	90MnCr V8	BO 2	-	90MnCr V8	90MnCr V8	90MnCr V8	O 2

M.-No.	DIN	European standard	France AFNOR	Great Britain BS	Japan JIS	Italy UNI	Sweden SS	Spain U.N.E./I.H.A	USA AISI/SAE
H – Hardened materials									
Up to 65 HRC									
1.2080	X210 Cr12	X210 Cr12	Z 200 C 12	BD 3	SKD 1	X210 Cr12	X210 Cr12	X210 Cr12	D 3
1.2363	X100Cr MoV5	X100Cr MoV5	Z 100 CDV 5	BA 2	SKD 12	X100Cr MoV5	2260	X100Cr MoV5	A 2
1.2369	81MoCr V42-16	-	-	-	-	-	-	-	613
1.2379	X153Cr MoV12	X153Cr MoV12	Z 160 CDV 12	BD 2	SKD 10	X153Cr MoC12	2310	X153Cr MoC12	D 2
1.2767	45NiCr Mo16	45NiCr Mo16	45NiCr Mo16	45NiCr Mo16	SKT 6	45NiCr Mo16	45NiCr Mo16	45NiCr Mo16	-
1.2842	90MnCr V8	90MnCr V8	90MnCr V8	BO2	-	90MnCr V8	90MnCr V8	90MnCr V8	O 2

Hardness comparison table

Tensile strength, Vickers, Brinell and Rockwell hardness

Tensile strength Rm N/mm ²	Vickers hardness HV10	Brinell hardness HB	Rockwell hardness HRC	Tensile strength Rm N/mm ²	Vickers hardness HV10	Brinell hardness HB	Rockwell hardness HRC
255	80	76.0	-	900	280	266	27.1
270	85	80.7	-	915	285	271	27.8
285	90	85.5	-	930	290	276	28.5
305	95	90.2	-	950	295	280	29.2
320	100	95.0	-	965	300	285	29.8
335	105	99.8	-	995	310	295	31.0
350	110	105	-	1030	320	304	32.2
370	115	109	-	1060	330	314	33.3
385	120	114	-	1095	340	323	34.4
400	125	119	-	1125	350	33	35.5
415	130	124	-	1155	360	342	36.6
430	135	128	-	1190	370	352	37.7
450	140	133	-	1220	380	361	38.8
465	145	138	-	1255	390	371	39.8
480	150	143	-	1290	400	380	40.8
495	155	147	-	1320	410	390	41.8
510	160	152	-	1350	420	399	42.7
530	165	156	-	1385	430	409	43.6
545	170	162	-	1420	440	418	44.5
560	175	166	-	1455	450	428	45.3
575	180	171	-	1485	460	437	46.1
595	185	176	-	1520	470	447	46.9
610	190	181	-	1555	480	456	47.7
625	195	185	-	1595	490	466	48.4
640	200	190	-	1630	500	475	49.1
660	205	195	-	1665	510	485	49.8
675	210	199	-	1700	520	494	50.5
690	215	204	-	1740	530	504	51.1
705	220	209	-	1775	540	513	51.7
720	225	214	-	1810	550	523	52.3
740	230	219	-	1845	560	532	53.0
755	235	223	-	1880	570	542	53.6
770	240	228	20.3	1920	580	551	54.1
785	245	233	21.3	1955	590	561	54.7
800	250	238	22.2	1995	600	570	55.2
820	255	242	23.1	2030	610	580	55.7
835	260	247	24.0	2070	620	589	56.3
850	265	252	24.8	2105	630	599	56.8
865	270	257	25.6	2145	640	608	57.3
880	275	261	26.4	2180	650	618	57.8

Tensile strength Rm N/mm ²	Vickers hardness HV10	Brinell hardness HB	Rockwell hardness HRC
-	660	-	58.3
-	670	-	58.8
-	680	-	59.2
-	690	-	59.7
-	700	-	60.1
-	720	-	61.0
-	740	-	61.8
-	760	-	62.5
-	780	-	63.3
-	800	-	64.0
-	820	-	64.7
-	840	-	65.3
-	860	-	65.9
-	880	-	66.4
-	900	-	67.0
-	920	-	67.5
-	940	-	68.0

Product overview

P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

Technical information

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H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

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P/K – Steel/cast iron

H – Hardened materials

M – Stainless steels

S – Special alloys & titanium

N – Non-ferrous metals & plastics

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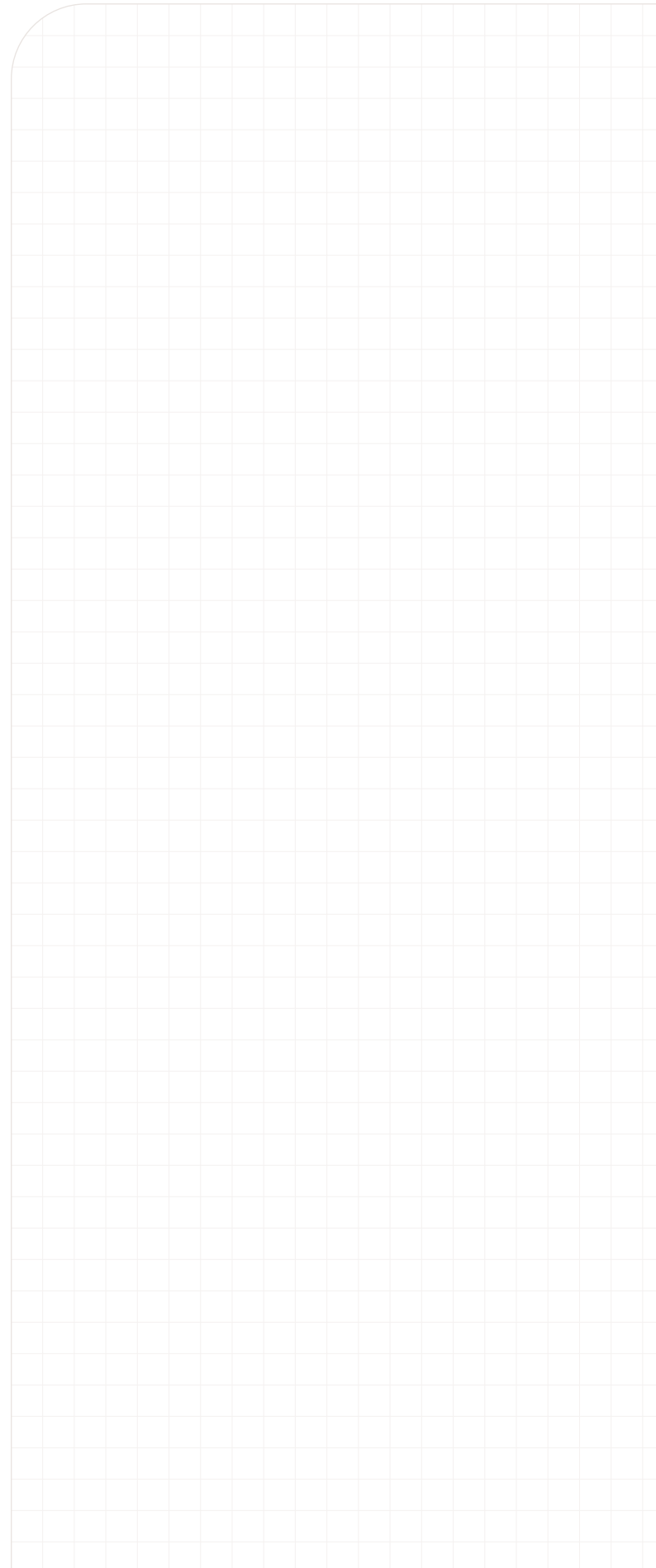
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At a glance

Product features



Cylindrical



Weldon



Internal coolant supply



Equal division



Unequal division



Center cut



Chip breaker



Cord toothed

Product features



Primary application



Secondary application



Aluminium



Plastic



Titan



Graphit



HWF - Heat-resistant alloys



GFK - Glass fiber reinforced plastic



CFK - Fiber reinforced plastic



HRC 45-55



HRC 55-60




HRC 60-65

Imprint

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