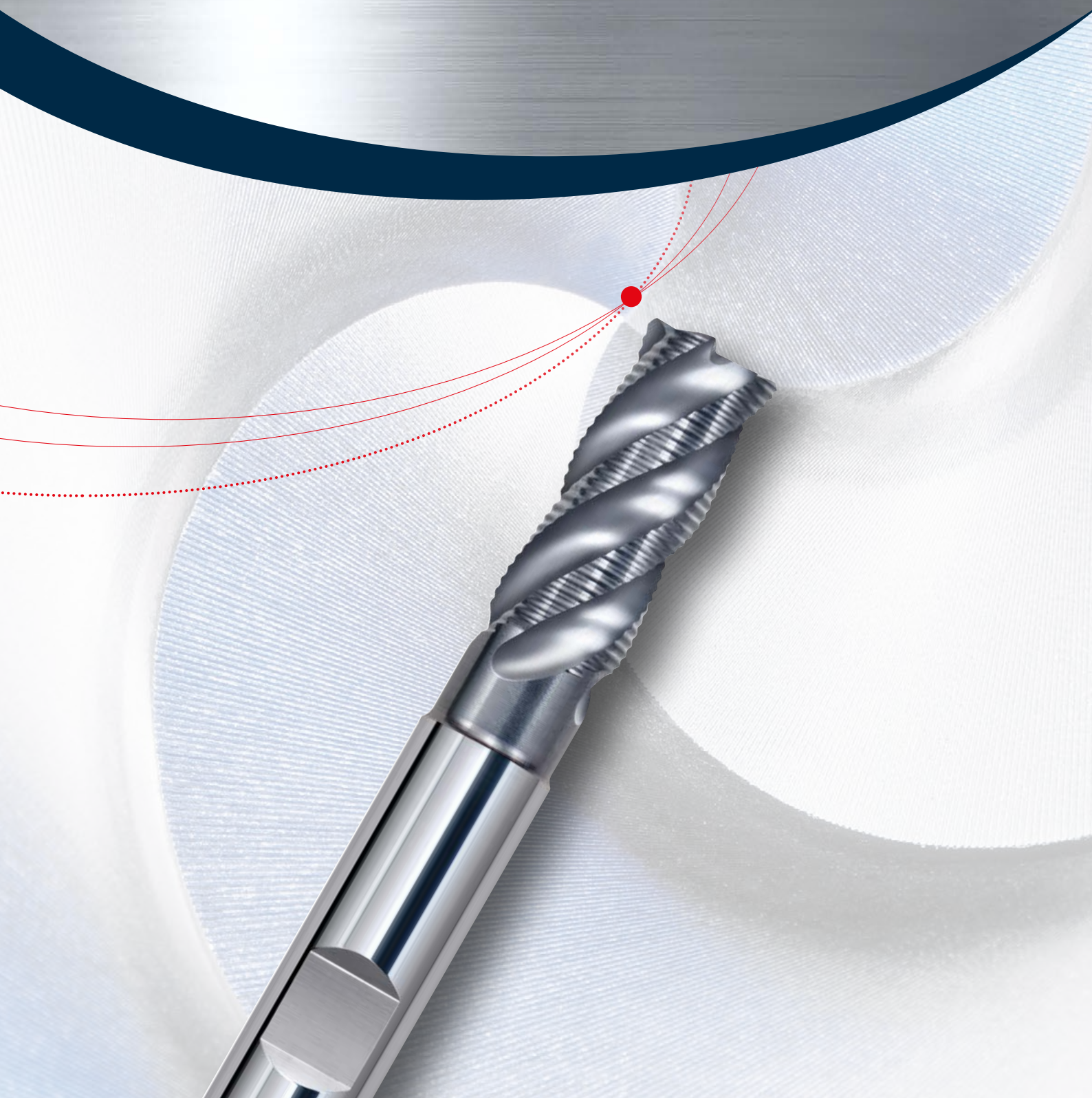


passion  
for precision



# SupraCarb<sup>®</sup> roughing cutter with FP profile



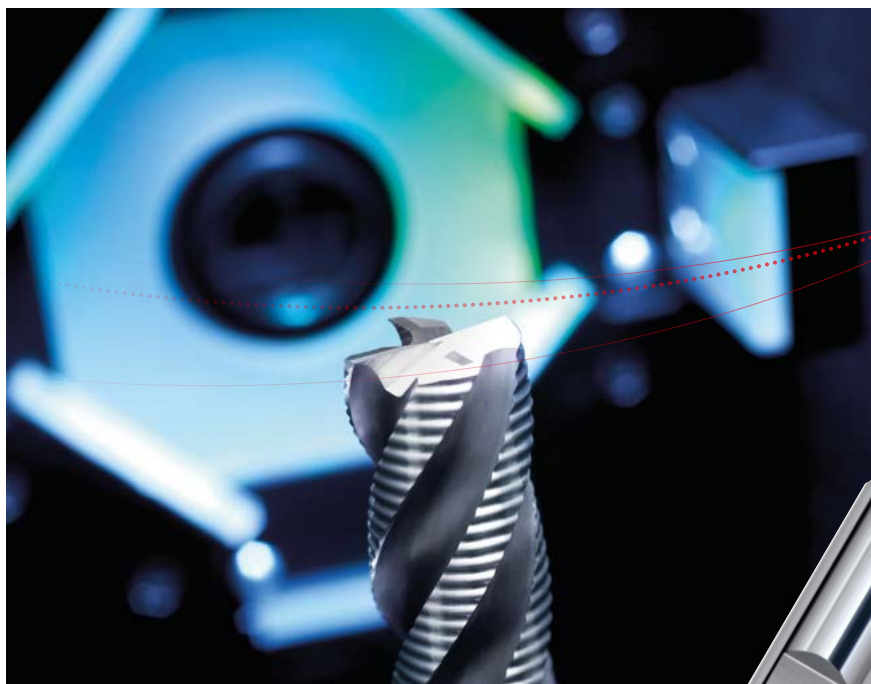
# 50% more performance – For HPC applications in steel materials

[ 2 ] The **SupraCarb®** roughing cutter sets new standards for rough machining steel materials. The ultra-tough carbide, the optimised cutting shape and the new super finish on the cutting edge combined with the tried and tested hard coating Polychrom from FRAISA lead to an impressive cutting performance. Up to 300% increase of tool life with the highest cutting performance are guaranteed in comparison to conventional roughing cutters.

With conventional roughing cutters made of carbide, cracks on the cutting edge are a well-known and unpopular phenomenon. Special rounding of the cutting edge largely solves this problem. FRAISA has developed this conditioning process ready for launch with **SupraCarb®** and uses it for new tools as well as for sharpening in the service centre. This allows the customer to benefit from the high performance of **SupraCarb®** in several ways.

## The advantages:

- Increase in machining performance by at least 50%
- Increase in tool life by up to 300%
- Vibration-free machining process
- Even wear
- Easy to grind several times



SupraCarb®:  
Article number  
P15336

Long service life thanks to Polychrom coating

## Geometry

The **SupraCarb®** is conditioned on the cutting edge with a specially developed procedure. The cutting radius after this safe process conditioning is approx. 8 µm. Due to the conditioning, chipping of the cutting edge is reduced by more than **50%**. This means that random cracks on the cutting edge are largely eliminated.

## Substrate (Tool material)

With the new **ultra-tough cutting material K40UF (MG10)** together with cutting edge conditioning, cracks that tend to occur during wet machining at exposed points of the profile are largely eliminated. This means the tool performance can be increased by up to **300%** by using cooling lubricant.

## Coating

**SupraCarb®** is coated with the tried and tested hard coating Polychrom from FRAISA. Polychrom offers excellent protection against abrasive wear. The hard coating also protects the tool perfectly against the consequences of thermal loads.

## Areas of application

All HPC applications in steel materials (incl. stainless steels) with strengths up to  $R_m = 1300 \text{ N/mm}^2$ , preferably performed with cooling lubricant. However, dry machining can also be performed in these materials.

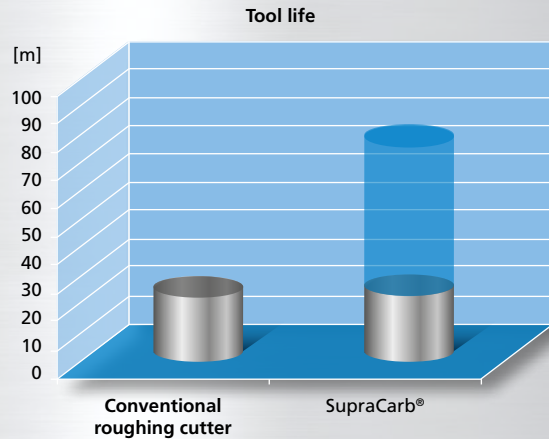
## Resharpener

The **SupraCarb®** can easily be resharpened several times. Both cutting edge conditioning and the hard coating Polychrom must be applied to a resharpened tool to attain the tool life and performance of a new tool.

The FRAISA regrinding centre for Europe in Willich near Düsseldorf is pleased to perform this work for you.

**SupraCarb®** with the regrinding service from FRAISA is therefore even more attractive for you.

## Tool performance



Application data according to cutting data recommendation  
Material: Tempered steel 1.7225  
Cooling lubricant: Emulsion

## Wear



Wear pattern of conventional roughing cutters after 17 minutes of use in material 1.7725. The cracks on the elevated profile result in premature termination of machining. It is questionable whether regrinding is possible.



Wear pattern of the **SupraCarb®** after 17 minutes of use and application data like the tool in the above picture. An even, hardly visible wear on the cutting edge results. Continued use of the tool is ensured.

[ 3 ]

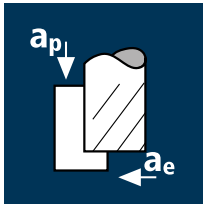
If you have any question, please send an email to [mail.ch@fraisa.com](mailto:mail.ch@fraisa.com). You may also directly contact our local customer consultant.

The FRAISA application engineers will be happy to advise you.

For further information, please refer to [fraisa.com](http://fraisa.com)

Where is it possible to ask questions concerning the product?

## Application



## Material

Steel  
< 850 N/mm<sup>2</sup>



d1 [mm]	z	v <sub>c</sub> [m/min]	f <sub>z</sub> [mm]	a <sub>p</sub> [mm]	a <sub>e</sub> [mm]	n [min <sup>-1</sup> ]	v <sub>f</sub> [mm/min]	Q [cm <sup>3</sup> /min]
3.00	3	180	0.015	3.600	1.800	19100	860	5.6
4.00	3	180	0.020	4.800	2.400	14325	860	9.9
5.00	4	180	0.025	6.000	3.000	11460	1145	20.6
6.00	4	180	0.030	7.200	3.600	9550	1145	29.7
8.00	4	180	0.040	9.600	4.800	7160	1145	52.8
10.00	4	180	0.050	12.000	6.000	5730	1145	82.5
12.00	4	180	0.055	14.400	7.200	4775	1050	108.9
16.00	4	180	0.055	19.200	9.600	3580	790	145.2
20.00	4	180	0.060	24.000	12.000	2865	690	198.0

Steel  
850 - 1100 N/mm<sup>2</sup>



3.00	3	130	0.015	3.600	1.800	13795	620	4.0
4.00	3	130	0.020	4.800	2.400	10345	620	7.2
5.00	4	130	0.025	6.000	3.000	8275	830	14.9
6.00	4	130	0.030	7.200	3.600	6895	830	21.5
8.00	4	130	0.040	9.600	4.800	5175	830	38.1
10.00	4	130	0.050	12.000	6.000	4140	830	59.6
12.00	4	130	0.055	14.400	7.200	3450	760	78.7
16.00	4	130	0.055	19.200	9.600	2585	570	104.9
20.00	4	130	0.060	24.000	12.000	2070	495	143.0

Titanium alloys  
> 300 HB  
[Ti6Al4V]



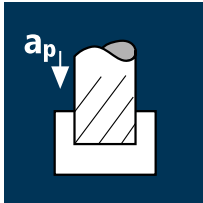
3.00	3	45	0.010	3.600	1.800	4775	145	0.9
4.00	3	45	0.015	4.800	2.400	3580	160	1.9
5.00	4	45	0.020	6.000	3.000	2865	230	4.1
6.00	4	45	0.025	7.200	3.600	2385	240	6.2
8.00	4	45	0.030	9.600	4.800	1790	215	9.9
10.00	4	45	0.040	12.000	6.000	1430	230	16.5
12.00	4	45	0.045	14.400	7.200	1195	215	22.3
16.00	4	45	0.045	19.200	9.600	895	160	29.7
20.00	4	45	0.050	24.000	12.000	715	145	41.3

Inox normal  
[Cr-Ni/1.4301]  
[Cr-Ni-Mo/1.4571]



3.00	3	60	0.010	3.600	1.800	6365	190	1.2
4.00	3	60	0.015	4.800	2.400	4775	215	2.5
5.00	4	60	0.020	6.000	3.000	3820	305	5.5
6.00	4	60	0.025	7.200	3.600	3185	320	8.3
8.00	4	60	0.030	9.600	4.800	2385	285	13.2
10.00	4	60	0.040	12.000	6.000	1910	305	22.0
12.00	4	60	0.045	14.400	7.200	1590	285	29.7
16.00	4	60	0.045	16.800	8.400	1195	215	30.3
20.00	4	60	0.050	24.000	12.000	955	190	55.0

[ 4 ]



Steel  
< 850 N/mm<sup>2</sup>



3.00	3	150	0.015	3.000	3.000	15915	715	6.4
4.00	3	150	0.020	4.000	4.000	11935	715	11.5
5.00	4	150	0.025	5.000	5.000	9550	955	23.9
6.00	4	150	0.030	6.000	6.000	7960	955	34.4
8.00	4	150	0.040	8.000	8.000	5970	955	61.1
10.00	4	150	0.050	10.000	10.000	4775	955	95.5
12.00	4	150	0.055	12.000	12.000	3980	875	126.1
16.00	4	150	0.055	16.000	16.000	2985	655	168.1
20.00	4	150	0.060	20.000	20.000	2385	575	229.2

Steel  
850 - 1100 N/mm<sup>2</sup>



3.00	3	80	0.015	3.000	3.000	8490	380	3.4
4.00	3	80	0.020	4.000	4.000	6365	380	6.1
5.00	4	80	0.025	5.000	5.000	5095	510	12.7
6.00	4	80	0.030	6.000	6.000	4245	510	18.3
8.00	4	80	0.040	8.000	8.000	3185	510	32.6
10.00	4	80	0.050	10.000	10.000	2545	510	50.9
12.00	4	80	0.055	12.000	12.000	2120	465	67.2
16.00	4	80	0.055	16.000	16.000	1590	350	89.6
20.00	4	80	0.060	20.000	20.000	1275	305	122.2

Titanium alloys  
> 300 HB  
[Ti6Al4V]



3.00	3	35	0.010	3.000	3.000	3715	110	1.0
4.00	3	35	0.015	4.000	4.000	2785	125	2.0
5.00	4	35	0.020	5.000	5.000	2230	180	4.5
6.00	4	35	0.025	6.000	6.000	1855	185	6.7
8.00	4	35	0.030	8.000	8.000	1395	165	10.7
10.00	4	35	0.040	10.000	10.000	1115	180	17.8
12.00	4	35	0.045	12.000	12.000	930	165	24.1
16.00	4	35	0.045	16.000	16.000	695	125	32.1
20.00	4	35	0.050	20.000	20.000	555	110	44.6

Inox normal  
[Cr-Ni/1.4301]  
[Cr-Ni-Mo/1.4571]



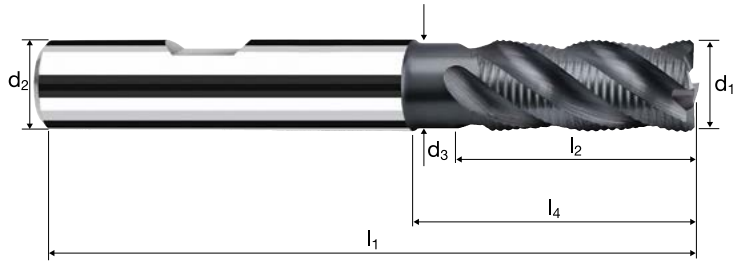
3.00	3	50	0.010	3.000	3.000	5305	160	1.4
4.00	3	50	0.015	4.000	4.000	3980	180	2.9
5.00	4	50	0.020	5.000	5.000	3185	255	6.4
6.00	4	50	0.025	6.000	6.000	2655	265	9.5
8.00	4	50	0.030	8.000	8.000	1990	240	15.3
10.00	4	50	0.040	10.000	10.000	1590	255	25.5
12.00	4	50	0.045	12.000	12.000	1325	240	34.4
16.00	4	50	0.045	16.000	16.000	995	180	45.8
20.00	4	50	0.050	20.000	20.000	795	160	63.7

# Cylindrical end mills SupraCarb®

Profiled, normal version with short neck



HM  
MG10      $\lambda$  38°  
                  $\gamma$  0°



Roughing

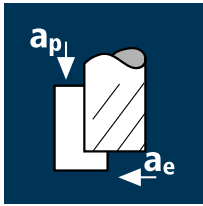
Finishing



Rm < 850	Rm 850-1100	Rm 1100-1300						Inox Stainless	Ti Titanium	GG(G) Tool Steel
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Example: Order-N°.											POLYCHROM		
		Coating	Article-N°.	ø-Code									
		P	15336	180									
Ø Code	d <sub>1</sub> e8	d <sub>2</sub> h6	d <sub>3</sub>	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	45°	α	z			
180	3.00	6.00	2.80	57	8.00	14.00	20.63	0.25	4.5°	3		●	
220	4.00	6.00	3.70	57	11.00	16.00	20.95	0.30	3.0°	3		●	
260	5.00	6.00	4.60	57	13.00	18.00	21.27	0.35	1.5°	4		●	
300	6.00	6.00	5.50	57	13.00	19.34	20.00	0.35	0.0°	4		●	
391	8.00	8.00	7.40	63	19.00	25.29	26.00	0.45	0.0°	4		●	
450	10.00	10.00	9.20	72	22.00	30.20	31.00	0.60	0.0°	4		●	
501	12.00	12.00	11.00	83	26.00	36.13	37.00	0.60	0.0°	4		●	
570	14.00	14.00	13.00	83	26.00	36.13	37.00	0.60	0.0°	4		●	
610	16.00	16.00	15.00	92	32.00	42.13	43.00	0.70	0.0°	4		●	
612	16.00	16.00	15.00	92	32.00	42.13	43.00	0.70	0.0°	6		●	
640	18.00	18.00	17.00	92	32.00	42.13	43.00	0.70	0.0°	4		●	
682	20.00	20.00	19.00	104	38.00	52.13	53.00	0.70	0.0°	4		●	
684	20.00	20.00	19.00	104	38.00	52.13	53.00	0.70	0.0°	6		●	

## Application

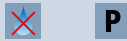


## Material

Steel  
< 850 N/mm<sup>2</sup>



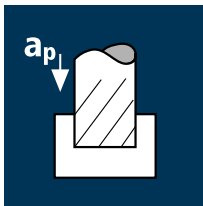
Steel  
850 - 1100 N/mm<sup>2</sup>



Titanium alloys  
> 300 HB  
[Ti6Al4V]



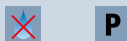
Inox normal  
[Cr-Ni/1.4301]  
[Cr-Ni-Mo/1.4571]



Steel  
< 850 N/mm<sup>2</sup>



Steel  
850 - 1100 N/mm<sup>2</sup>



Titanium alloys  
> 300 HB  
[Ti6Al4V]



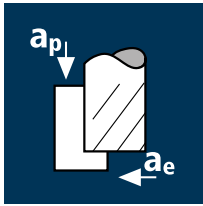
Inox normal  
[Cr-Ni/1.4301]  
[Cr-Ni-Mo/1.4571]



d1 [mm]	z	v <sub>c</sub> [m/min]	f <sub>z</sub> [mm]	a <sub>p</sub> [mm]	a <sub>e</sub> [mm]	n [min <sup>-1</sup> ]	v <sub>f</sub> [mm/min]	Q [cm <sup>3</sup> /min]
6.00	4	180	0.035	9.600	1.200	9550	1335	15.4
8.00	4	180	0.045	12.800	1.600	7160	1290	26.4
10.00	4	180	0.060	16.000	2.000	5730	1375	44.0
12.00	4	180	0.070	19.200	2.400	4775	1335	61.6
16.00	4	180	0.075	25.600	3.200	3580	1075	88.0
20.00	4	180	0.080	32.000	4.000	2865	915	117.3
6.00	4	130	0.035	9.600	1.200	6895	965	11.1
8.00	4	130	0.045	12.800	1.600	5175	930	19.1
10.00	4	130	0.060	16.000	2.000	4140	995	31.8
12.00	4	130	0.070	19.200	2.400	3450	965	44.5
16.00	4	130	0.075	25.600	3.200	2585	775	63.6
20.00	4	130	0.080	32.000	4.000	2070	660	84.7
6.00	4	45	0.025	9.600	1.200	2385	240	2.8
8.00	4	45	0.035	12.800	1.600	1790	250	5.1
10.00	4	45	0.045	16.000	2.000	1430	260	8.3
12.00	4	45	0.055	19.200	2.400	1195	265	12.1
16.00	4	45	0.060	25.600	3.200	895	215	17.6
20.00	4	45	0.065	32.000	4.000	715	185	23.8
6.00	4	60	0.025	9.600	1.200	3185	320	3.7
8.00	4	60	0.035	12.800	1.600	2385	335	6.8
10.00	4	60	0.045	16.000	2.000	1910	345	11.0
12.00	4	60	0.055	19.200	2.400	1590	350	16.1
16.00	4	60	0.060	25.600	3.200	1195	285	23.5
20.00	4	60	0.065	32.000	4.000	955	250	31.8
6.00	4	150	0.030	3.300	6.000	7960	955	18.9
8.00	4	150	0.040	4.400	8.000	5970	955	33.6
10.00	4	150	0.050	5.500	10.000	4775	955	52.5
12.00	4	150	0.055	6.600	12.000	3980	875	69.3
16.00	4	150	0.055	8.800	16.000	2985	655	92.4
20.00	4	150	0.060	11.000	20.000	2385	575	126.1
6.00	4	80	0.030	3.300	6.000	4245	510	10.1
8.00	4	80	0.040	4.400	8.000	3185	510	17.9
10.00	4	80	0.050	5.500	10.000	2545	510	28.0
12.00	4	80	0.055	6.600	12.000	2120	465	37.0
16.00	4	80	0.055	8.800	16.000	1590	350	49.3
20.00	4	80	0.060	11.000	20.000	1275	305	67.2
6.00	4	35	0.025	3.300	6.000	1855	185	3.7
8.00	4	35	0.030	4.400	8.000	1395	165	5.9
10.00	4	35	0.040	5.500	10.000	1115	180	9.8
12.00	4	35	0.045	6.600	12.000	930	165	13.2
16.00	4	35	0.045	8.800	16.000	695	125	17.6
20.00	4	35	0.050	11.000	20.000	555	110	24.5
6.00	4	50	0.025	3.300	6.000	2655	265	5.3
8.00	4	50	0.030	4.400	8.000	1990	240	8.4
10.00	4	50	0.040	5.500	10.000	1590	255	14.0
12.00	4	50	0.045	6.600	12.000	1325	240	18.9
16.00	4	50	0.045	8.800	16.000	995	180	25.2
20.00	4	50	0.050	11.000	20.000	795	160	35.0



## Application

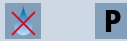


## Material

Steel  
< 850 N/mm<sup>2</sup>



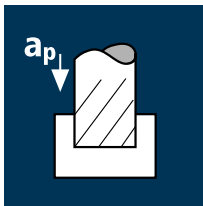
Steel  
850 - 1100 N/mm<sup>2</sup>



Titanium alloys  
> 300 HB  
[Ti6Al4V]



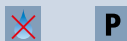
Inox normal  
[Cr-Ni/1.4301]  
[Cr-Ni-Mo/1.4571]



Steel  
< 850 N/mm<sup>2</sup>



Steel  
850 - 1100 N/mm<sup>2</sup>



Titanium alloys  
> 300 HB  
[Ti6Al4V]



Inox normal  
[Cr-Ni/1.4301]  
[Cr-Ni-Mo/1.4571]

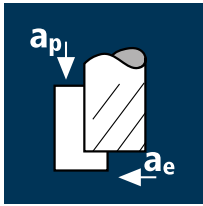


d1 [mm]	z	v <sub>c</sub> [m/min]	f <sub>e</sub> [mm]	a <sub>p</sub> [mm]	a <sub>e</sub> [mm]	n [min <sup>-1</sup> ]	v <sub>f</sub> [mm/min]	Q [cm <sup>3</sup> /min]
6.00	4	180	0.035	7.200	1.800	9550	1335	17.3
8.00	4	180	0.045	9.600	2.400	7160	1290	29.7
10.00	4	180	0.060	12.000	3.000	5730	1375	49.5
12.00	4	180	0.070	14.400	3.600	4775	1335	69.3
16.00	4	180	0.075	19.200	4.800	3580	1075	99.0
20.00	4	180	0.080	24.000	6.000	2865	915	132.0
6.00	4	130	0.035	7.200	1.800	6895	965	12.5
8.00	4	130	0.045	9.600	2.400	5175	930	21.5
10.00	4	130	0.060	12.000	3.000	4140	995	35.8
12.00	4	130	0.070	14.400	3.600	3450	965	50.1
16.00	4	130	0.075	19.200	4.800	2585	775	71.5
20.00	4	130	0.080	24.000	6.000	2070	660	95.3
6.00	4	45	0.025	7.200	1.800	2385	240	3.1
8.00	4	45	0.035	9.600	2.400	1790	250	5.8
10.00	4	45	0.045	12.000	3.000	1430	260	9.3
12.00	4	45	0.055	14.400	3.600	1195	265	13.6
16.00	4	45	0.060	19.200	4.800	895	215	19.8
20.00	4	45	0.065	24.000	6.000	715	185	26.8
6.00	4	60	0.025	7.200	1.800	3185	320	4.1
8.00	4	60	0.035	9.600	2.400	2385	335	7.7
10.00	4	60	0.045	12.000	3.000	1910	345	12.4
12.00	4	60	0.055	14.400	3.600	1590	350	18.2
16.00	4	60	0.060	19.200	4.800	1195	285	26.4
20.00	4	60	0.065	24.000	6.000	955	250	35.8
6.00	4	150	0.030	3.600	6.000	7960	955	20.6
8.00	4	150	0.040	4.800	8.000	5970	955	36.7
10.00	4	150	0.050	6.000	10.000	4775	955	57.3
12.00	4	150	0.055	7.200	12.000	3980	875	75.6
16.00	4	150	0.055	9.600	16.000	2985	655	100.8
20.00	4	150	0.060	12.000	20.000	2385	575	137.5
6.00	4	80	0.030	3.600	6.000	4245	510	11.0
8.00	4	80	0.040	4.800	8.000	3185	510	19.6
10.00	4	80	0.050	6.000	10.000	2545	510	30.6
12.00	4	80	0.055	7.200	12.000	2120	465	40.3
16.00	4	80	0.055	9.600	16.000	1590	350	53.8
20.00	4	80	0.060	12.000	20.000	1275	305	73.3
6.00	4	35	0.025	3.600	6.000	1855	185	4.0
8.00	4	35	0.030	4.800	8.000	1395	165	6.4
10.00	4	35	0.040	6.000	10.000	1115	180	10.7
12.00	4	35	0.045	7.200	12.000	930	165	14.4
16.00	4	35	0.045	9.600	16.000	695	125	19.3
20.00	4	35	0.050	12.000	20.000	555	110	26.7
6.00	4	50	0.025	3.600	6.000	2655	265	5.7
8.00	4	50	0.030	4.800	8.000	1990	240	9.2
10.00	4	50	0.040	6.000	10.000	1590	255	15.3
12.00	4	50	0.045	7.200	12.000	1325	240	20.6
16.00	4	50	0.045	9.600	16.000	995	180	27.5
20.00	4	50	0.050	12.000	20.000	795	160	38.2





## Application

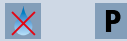


## Material

Steel  
< 850 N/mm<sup>2</sup>



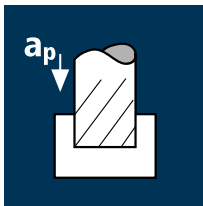
Steel  
850 - 1100 N/mm<sup>2</sup>



Titanium alloys  
> 300 HB  
[Ti6Al4V]



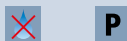
Inox normal  
[Cr-Ni/1.4301]  
[Cr-Ni-Mo/1.4571]



Steel  
< 850 N/mm<sup>2</sup>



Steel  
850 - 1100 N/mm<sup>2</sup>



Titanium alloys  
> 300 HB  
[Ti6Al4V]



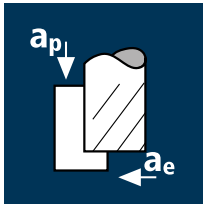
Inox normal  
[Cr-Ni/1.4301]  
[Cr-Ni-Mo/1.4571]



d1 [mm]	z	v <sub>c</sub> [m/min]	f <sub>z</sub> [mm]	a <sub>p</sub> [mm]	a <sub>e</sub> [mm]	n [min <sup>-1</sup> ]	v <sub>f</sub> [mm/min]	Q [cm <sup>3</sup> /min]
6.00	4	180	0.030	7.200	1.500	9550	1145	12.4
8.00	4	180	0.040	9.600	2.000	7160	1145	22.0
10.00	4	180	0.055	12.000	2.500	5730	1260	37.8
12.00	4	180	0.065	14.400	3.000	4775	1240	53.6
16.00	4	180	0.070	19.200	4.000	3580	1005	77.0
20.00	4	180	0.075	24.000	5.000	2865	860	103.1
6.00	4	130	0.030	7.200	1.500	6895	830	8.9
8.00	4	130	0.040	9.600	2.000	5175	830	15.9
10.00	4	130	0.055	12.000	2.500	4140	910	27.3
12.00	4	130	0.065	14.400	3.000	3450	895	38.7
16.00	4	130	0.070	19.200	4.000	2585	725	55.6
20.00	4	130	0.075	24.000	5.000	2070	620	74.5
6.00	4	45	0.025	7.200	1.500	2385	240	2.6
8.00	4	45	0.035	9.600	2.000	1790	250	4.8
10.00	4	45	0.045	12.000	2.500	1430	260	7.7
12.00	4	45	0.055	14.400	3.000	1195	265	11.3
16.00	4	45	0.060	19.200	4.000	895	215	16.5
20.00	4	45	0.065	24.000	5.000	715	185	22.3
6.00	4	60	0.025	7.200	1.500	3185	320	3.4
8.00	4	60	0.035	9.600	2.000	2385	335	6.4
10.00	4	60	0.045	12.000	2.500	1910	345	10.3
12.00	4	60	0.055	14.400	3.000	1590	350	15.1
16.00	4	60	0.060	19.200	4.000	1195	285	22.0
20.00	4	60	0.065	24.000	5.000	955	250	29.8
6.00	4	150	0.025	3.000	6.000	7960	795	14.3
8.00	4	150	0.035	4.000	8.000	5970	835	26.7
10.00	4	150	0.045	5.000	10.000	4775	860	43.0
12.00	4	150	0.050	6.000	12.000	3980	795	57.3
16.00	4	150	0.050	8.000	16.000	2985	595	76.4
20.00	4	150	0.055	10.000	20.000	2385	525	105.0
6.00	4	80	0.025	3.000	6.000	4245	425	7.6
8.00	4	80	0.035	4.000	8.000	3185	445	14.3
10.00	4	80	0.045	5.000	10.000	2545	460	22.9
12.00	4	80	0.050	6.000	12.000	2120	425	30.6
16.00	4	80	0.050	8.000	16.000	1590	320	40.7
20.00	4	80	0.055	10.000	20.000	1275	280	56.0
6.00	4	35	0.020	3.000	6.000	1855	150	2.7
8.00	4	35	0.030	4.000	8.000	1395	165	5.3
10.00	4	35	0.035	5.000	10.000	1115	155	7.8
12.00	4	35	0.040	6.000	12.000	930	150	10.7
16.00	4	35	0.040	8.000	16.000	695	110	14.3
20.00	4	35	0.045	10.000	20.000	555	100	20.1
6.00	4	50	0.020	3.000	6.000	2655	210	3.8
8.00	4	50	0.030	4.000	8.000	1990	240	7.6
10.00	4	50	0.035	5.000	10.000	1590	225	11.1
12.00	4	50	0.040	6.000	12.000	1325	210	15.3
16.00	4	50	0.040	8.000	16.000	995	160	20.4
20.00	4	50	0.045	10.000	20.000	795	145	28.6



## Application



## Material

Steel  
< 850 N/mm<sup>2</sup>



d1 [mm]	z	v <sub>c</sub> [m/min]	f <sub>c</sub> [mm]	a <sub>p</sub> [mm]	a <sub>e</sub> [mm]	n [min <sup>-1</sup> ]	v <sub>f</sub> [mm/min]	Q [cm <sup>3</sup> /min]
3.00	3	180	0.015	3.000	2.100	19100	860	5.4
4.00	3	180	0.020	4.000	2.800	14325	860	9.6
5.00	4	180	0.030	5.000	3.500	11460	1375	24.1
6.00	4	180	0.035	6.000	4.200	9550	1335	33.7
8.00	4	180	0.045	8.000	5.600	7160	1290	57.8
10.00	4	180	0.055	10.000	7.000	5730	1260	88.2
12.00	4	180	0.060	12.000	8.400	4775	1145	115.5
16.00	4	180	0.065	16.000	11.200	3580	930	166.8

Steel  
850 - 1100 N/mm<sup>2</sup>



3.00	3	130	0.015	3.000	2.100	13795	620	3.9
4.00	3	130	0.020	4.000	2.800	10345	620	7.0
5.00	4	130	0.030	5.000	3.500	8275	995	17.4
6.00	4	130	0.035	6.000	4.200	6895	965	24.3
8.00	4	130	0.045	8.000	5.600	5175	930	41.7
10.00	4	130	0.055	10.000	7.000	4140	910	63.7
12.00	4	130	0.060	12.000	8.400	3450	830	83.4
16.00	4	130	0.065	16.000	11.200	2585	670	120.5

Titanium alloys  
> 300 HB  
[Ti6Al4V]



3.00	3	45	0.015	3.000	2.100	4775	215	1.4
4.00	3	45	0.020	4.000	2.800	3580	215	2.4
5.00	4	45	0.020	5.000	3.500	2865	230	4.0
6.00	4	45	0.025	6.000	4.200	2385	240	6.0
8.00	4	45	0.035	8.000	5.600	1790	250	11.2
10.00	4	45	0.045	10.000	7.000	1430	260	18.0
12.00	4	45	0.050	12.000	8.400	1195	240	24.1
16.00	4	45	0.050	16.000	11.200	895	180	32.1

Inox normal  
[Cr-Ni/1.4301]  
[Cr-Ni-Mo/1.4571]



3.00	3	60	0.015	3.000	2.100	6365	285	1.8
4.00	3	60	0.020	4.000	2.800	4775	285	3.2
5.00	4	60	0.020	5.000	3.500	3820	305	5.3
6.00	4	60	0.025	6.000	4.200	3185	320	8.0
8.00	4	60	0.035	8.000	5.600	2385	335	15.0
10.00	4	60	0.045	10.000	7.000	1910	345	24.1
12.00	4	60	0.050	12.000	8.400	1590	320	32.1
16.00	4	60	0.050	16.000	11.200	1195	240	42.8

Steel  
< 850 N/mm<sup>2</sup>



3.00	3	150	0.015	3.000	3.000	15915	715	6.4
4.00	3	150	0.020	4.000	4.000	11935	715	11.5
5.00	4	150	0.025	5.000	5.000	9550	955	23.9
6.00	4	150	0.030	6.000	6.000	7960	955	34.4
8.00	4	150	0.040	8.000	8.000	5970	955	61.1
10.00	4	150	0.050	10.000	10.000	4775	955	95.5
12.00	4	150	0.055	12.000	12.000	3980	875	126.1
16.00	4	150	0.055	16.000	16.000	2985	655	168.1

Steel  
850 - 1100 N/mm<sup>2</sup>



3.00	3	80	0.015	3.000	3.000	8490	380	3.4
4.00	3	80	0.020	4.000	4.000	6365	380	6.1
5.00	4	80	0.025	5.000	5.000	5095	510	12.7
6.00	4	80	0.030	6.000	6.000	4245	510	18.3
8.00	4	80	0.040	8.000	8.000	3185	510	32.6
10.00	4	80	0.050	10.000	10.000	2545	510	50.9
12.00	4	80	0.055	12.000	12.000	2120	465	67.2
16.00	4	80	0.055	16.000	16.000	1590	350	89.6

Titanium alloys  
> 300 HB  
[Ti6Al4V]



3.00	3	35	0.010	3.000	3.000	3715	110	1.0
4.00	3	35	0.015	4.000	4.000	2785	125	2.0
5.00	4	35	0.020	5.000	5.000	2230	180	4.5
6.00	4	35	0.025	6.000	6.000	1855	185	6.7
8.00	4	35	0.030	8.000	8.000	1395	165	10.7
10.00	4	35	0.040	10.000	10.000	1115	180	17.8
12.00	4	35	0.045	12.000	12.000	930	165	24.1
16.00	4	35	0.045	16.000	16.000	695	125	32.1

Inox normal  
[Cr-Ni/1.4301]  
[Cr-Ni-Mo/1.4571]



3.00	3	50	0.010	3.000	3.000	5305	160	1.4
4.00	3	50	0.015	4.000	4.000	3980	180	2.9
5.00	4	50	0.020	5.000	5.000	3185	255	6.4
6.00	4	50	0.025	6.000	6.000	2655	265	9.5
8.00	4	50	0.030	8.000	8.000	1990	240	15.3
10.00	4	50	0.040	10.000	10.000	1590	255	25.5
12.00	4	50	0.045	12.000	12.000	1325	240	34.4
16.00	4	50	0.045	16.000	16.000	995	180	45.8





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