

### formula for calculating speed (spindle)

$$n = \frac{V_c \times 1000}{D_c \times \pi}$$

$$14986[\text{rpm}] = \frac{940 [\text{m/min}] \times 1000}{20,0 [\text{mm}] \times 3,14}$$

### formula for calculating axis feed rate

$$V_f = n \times f_z \times z_n$$

$$6900 [\text{mm/min}] = 15000 [\text{rpm}] \times 0,230 [\text{mm}] \times 2 [\text{number}]$$

### recommended cutting data for roughing

parameter	symbol	unit
radial infeed:	$a_e$	[mm]
axial infeed:	$a_p$	[mm]
number of teeth:	$Z_n$	[number]

roughing recommendation		
min.	ideal	max.
- x $D_c$	<b>0,50 x <math>D_c</math></b>	0,50 x $D_c$
0,10 x $D_c$	<b>1,00 x <math>D_c</math></b>	1,00 x $D_c$
2	<b>2</b>	4

### recommended cutting data for finishing

parameter	symbol	unit
radial infeed:	$a_e$	[mm]
axial infeed:	$a_p$	[mm]
number of teeth:	$Z_n$	[number]

finishing recommendation		
min.	ideal	max.
- x $D_c$	<b>0,01 x <math>D_c</math></b>	0,05 x $D_c$
0,01 x $D_c$	<b>0,10 x <math>D_c</math></b>	0,2 x $D_c$
2	<b>2</b>	4

### validated cutting data for roughing

Type	$D_c$ [mm]	$Z_n$ [number]	$V_c$ [m/min]	$f_z$ [mm]	n [rpm]	$V_f$ [mm/min]	$a_e$ [mm]	$a_p$ [mm]	$L_1$ [mm]	$L_2$ [mm]
torus	20,0	2	940	0,230	14.968	6.885	10,00	20,00	86,0	20,0
torus	12,0	2	560	0,210	14.862	6.242	6,00	12,00	55,0	16,0
torus	6,0	2	280	0,205	14.862	6.093	3,00	6,00	23,0	8,0

### validated cutting data for finishing

Type	$D_c$ [mm]	$Z_n$ [number]	$V_c$ [m/min]	$f_z$ [mm]	n [rpm]	$V_f$ [mm/min]	$a_e$ [mm]	$a_p$ [mm]	$L_1$ [mm]	$L_2$ [mm]
ball	20,0	2	940	0,600	14.968	17.962	0,20	2,00	67,0	17,0
ball	12,0	2	560	0,580	14.862	17.240	0,12	1,20	52,0	10,5
ball	6,0	2	280	0,570	14.862	16.943	0,06	0,60	23,0	10,0

parameter	symbol	unit
cutting speed:	$V_c$	[m/min]
feed/tooth:	$f_z$	[mm]

speed (spindle):	n	[rpm]
axis feed rate:	$V_f$	[mm/min]

cutting diameter:	$D_c$	[mm]
tool total length:	$L_0$	[mm]
tool unclamping length:	$L_1$	[mm]
tool cutting length:	$L_2$	[mm]

user specifications
selection in the diagram
selection in the diagram

calculation by user
calculation by user

processing specific
processing specific
processing specific
processing specific

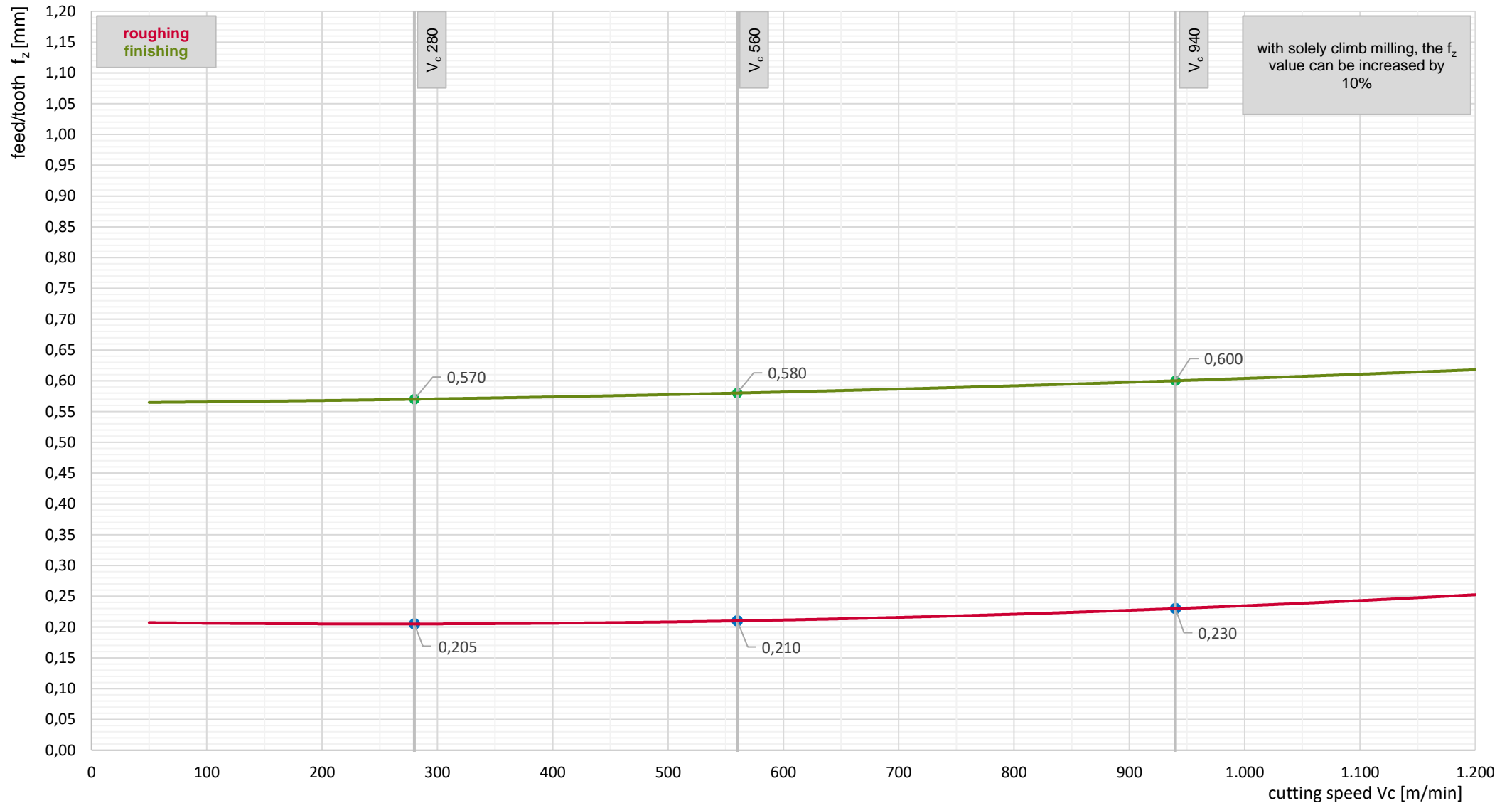


# Cutting data diagram for milling

## RAKU<sup>®</sup> TOOL WB-1404



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# Practical application of the cutting data

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### cutting data used on the demonstrator

sequence of processing	processing strategy	a <sub>e</sub>	a <sub>p</sub>	offset	f <sub>z</sub>	V <sub>c</sub>
roughing torus D6	vol. roughing following contour	3,00	6,00	0,60	0,23	280
roughing torus D12	vol. roughing following contour	6,00	12,00	0,12	0,21	560
roughing torus D20	vol. roughing following contour	10,00	20,00	2,00	0,21	940
finishing ball D6	zigzag stroke milling	0,06	0,60	0,00	0,57	280
finishing ball D12	zigzag stroke milling	0,12	1,20	0,00	0,58	560
finishing ball D20	zigzag stroke milling	0,20	2,00	0,00	0,60	940

### tools used on the demonstrator

tool manufacturer	tool type	D <sub>c</sub>	L <sub>0</sub>	L <sub>1</sub>	L <sub>2</sub>	Z <sub>n</sub>
<a href="http://hufschmied-tools.com/de/">hufschmied-tools.com/de/</a>	PROTO-LINE / Torus	6,0	60,0	23,0	8,0	2
<a href="http://hufschmied-tools.com/de/">hufschmied-tools.com/de/</a>	PROTO-LINE / Torus	12,0	100,0	55,0	16,0	2
<a href="http://hufschmied-tools.com/de/">hufschmied-tools.com/de/</a>	PROTO-LINE / Torus	20,0	104,0	86,0	20,0	2
<a href="http://hufschmied-tools.com/de/">hufschmied-tools.com/de/</a>	PROTO-LINE / Kugel	6,0	60,0	23,0	10,0	2
<a href="http://hufschmied-tools.com/de/">hufschmied-tools.com/de/</a>	PROTO-LINE / Kugel	12,0	83,0	52,0	10,5	2
<a href="http://hufschmied-tools.com/de/">hufschmied-tools.com/de/</a>	PROTO-LINE / Kugel	20,0	104,0	67,0	17,0	2



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