Cutting data for milling
RAKU® TOOL   SB-0301

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formula for calculating speed (spindle)

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

$$14968 \ [\text{rpm}] = \frac{940 \ [\text{m/min}] \times 1000}{20{,}0 \ [\text{mm}] \times 3{,}14}$$

formula for calculating axis feed rate

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

$$28200 \ [\text{mm/min}] = 15000 \ [\text{rpm}] \times 0{,}940 \ [\text{mm}] \times 2 \ [\text{number}]$$

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	700	0,940	11.146	20.955	10,00	20,00	86,0	20,0
torus	12,0	2	430	0,920	11.412	20.998	6,00	12,00	55,0	16,0
torus	6,0	2	218	0,900	11.571	20.828	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	650	1,000	10.350	20.701	0,20	2,00	67,0	17,0
ball	12,0	2	390	1,000	10.350	20.701	0,12	1,20	52,0	10,5
ball	6,0	2	195	1,000	10.350	20.701	0,06	0,60	23,0	10,0

recommended cutting data for roughing

parameter	symbol	unit	roughing recommendation min.	ideal	max.
radial infeed:	a_e	[mm]	- x D_c	**0,50 x D_c**	0,80 x D_c
axial infeed:	a_p	[mm]	0,10 x D_c	**1,00 x D_c**	5,00 x D_c
number of teeth:	z_n	[number]	1	**1**	2

recommended cutting data for finishing

parameter	symbol	unit	finishing recommendation min.	ideal	max.
radial infeed:	a_e	[mm]	- x D_c	**0,01 x D_c**	0,10 x D_c
axial infeed:	a_p	[mm]	- x D_c	**0,50 x D_c**	1,00 x D_c
number of teeth:	z_n	[number]	1	**1**	2

parameter	symbol	unit	user specifications
cutting speed:	V_c	[m/min]	selection in the diagram
feed/tooth:	f_z	[mm]	selection in the diagram
speed (spindle):	n	[rpm]	calculation by user
axis feed rate:	V_f	[mm/min]	calculation by user
cutting diameter:	D_c	[mm]	processing specific
tool total length:	L_0	[mm]	processing specific
tool unclamping length:	L_1	[mm]	processing specific
tool cutting length:	L_2	[mm]	processing specific

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Cutting data diagram for milling
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feed/tooth f_z [mm]

roughing
finishing

V_c 218

V_c 430

V_c 700

with solely climb milling, the f_z value can be increased by 10%

2,00
1,95
1,90
1,85
1,80
1,75
1,70
1,65
1,60
1,55
1,50
1,45
1,40
1,35
1,30
1,25
1,20
1,15
1,10
1,05
1,00
0,95
0,90
0,85
0,80
0,75
0,70
0,65
0,60
0,55
0,50

1,000   1,000   1,000

0,900   0,920   0,940

0   100   200   300   400   500   600   700   800   900   1.000   1.100   1.200

cutting speed Vc [m/min]
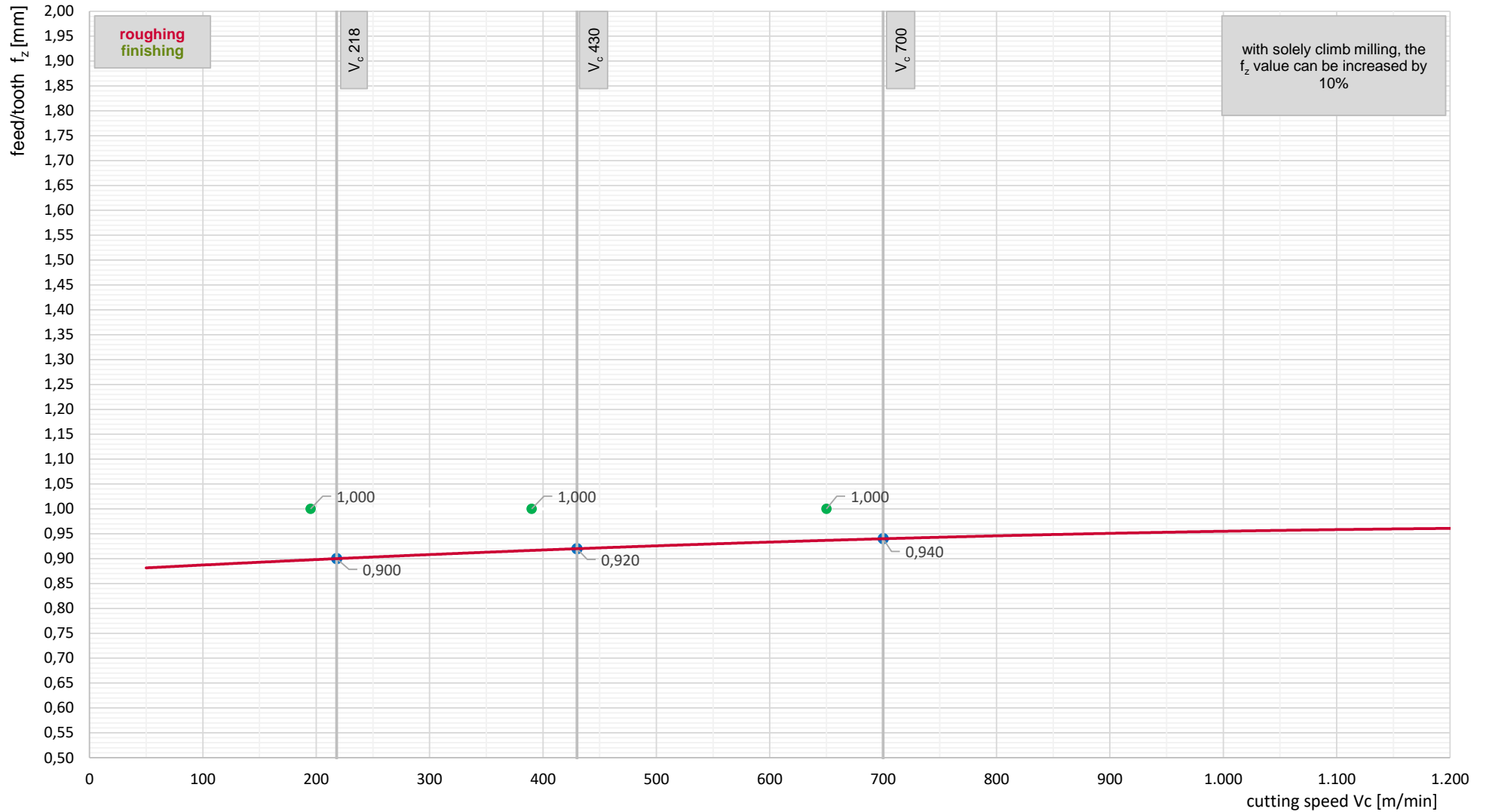
RAMPF Advanced Polymers GmbH & Co. KG

Robert-Bosch-Str. 8 -10 l 72661 Grafenberg l Germany
T +49.7123.9342-0
E advanced.polymers@rampf-group.com

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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_e	a_p	offset	f_z	V_c
roughing torus D6	vol. roughing following contour	3,00	6,00	0,60	0,90	218
roughing torus D12	vol. roughing following contour	6,00	12,00	0,12	0,92	430
roughing torus D20	vol. roughing following contour	10,00	20,00	2,00	0,94	700
finishing ball D6	zigzag stroke milling	0,06	0,60	0,00	1,00	195
finishing ball D12	zigzag stroke milling	0,12	1,20	0,00	1,00	390
finishing ball D20	zigzag stroke milling	0,20	2,00	0,00	1,00	650

tools used on the demonstrator

tool manufacturer	tool type	D_c	L_0	L_1	L_2	z_n
hufschmied-tools.com/de/	PROTO-LINE / Torus	6,0	60,0	23,0	8,0	2
hufschmied-tools.com/de/	PROTO-LINE / Torus	12,0	100,0	55,0	16,0	2
hufschmied-tools.com/de/	PROTO-LINE / Torus	20,0	104,0	86,0	20,0	2
hufschmied-tools.com/de/	PROTO-LINE / Kugel	6,0	60,0	23,0	10,0	2
hufschmied-tools.com/de/	PROTO-LINE / Kugel	12,0	83,0	52,0	10,5	2
hufschmied-tools.com/de/	PROTO-LINE / Kugel	20,0	104,0	67,0	17,0	2

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