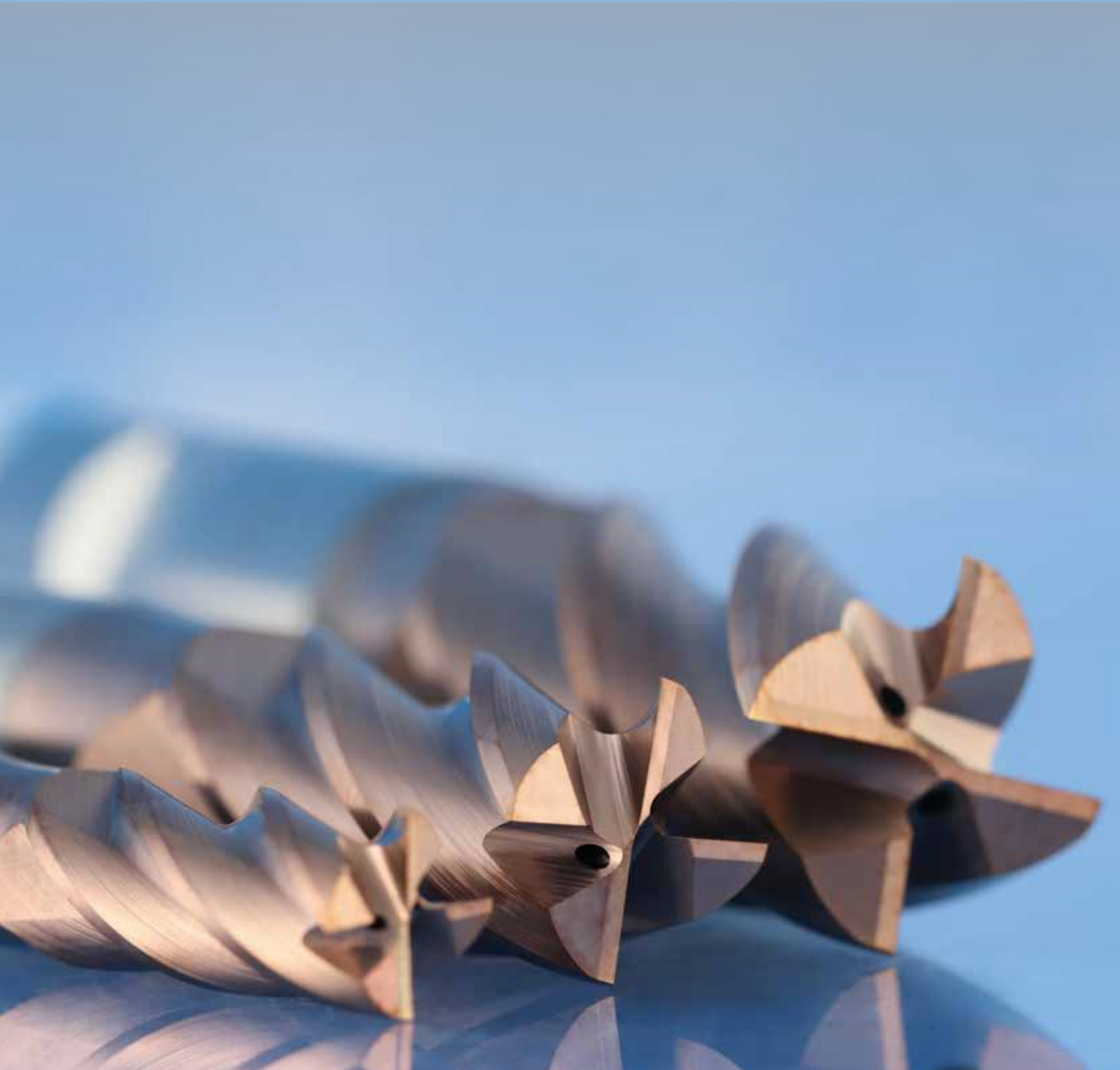




Jongen Werkzeugtechnik



VHM 494W HI06



Products from



Willich



North-Rhine
Westphalia



Germany



Europe

for



Europe

and the



The Tool VHM 494W HI06

Jongen has developed the solid carbide end mill VHM 494W HI06, so that chipping manufacturers can realize the benefits of their investments in more modern and more dynamic machines, especially in terms of productivity.

These tools with latest development level enable to transform the high dynamic and stiffness of the most recent machine generation, into highest economic efficiency.

The homogeneous cutting edge with defined cutting edge radius enables extremely long tool lives and reliable process security, even under difficult conditions.

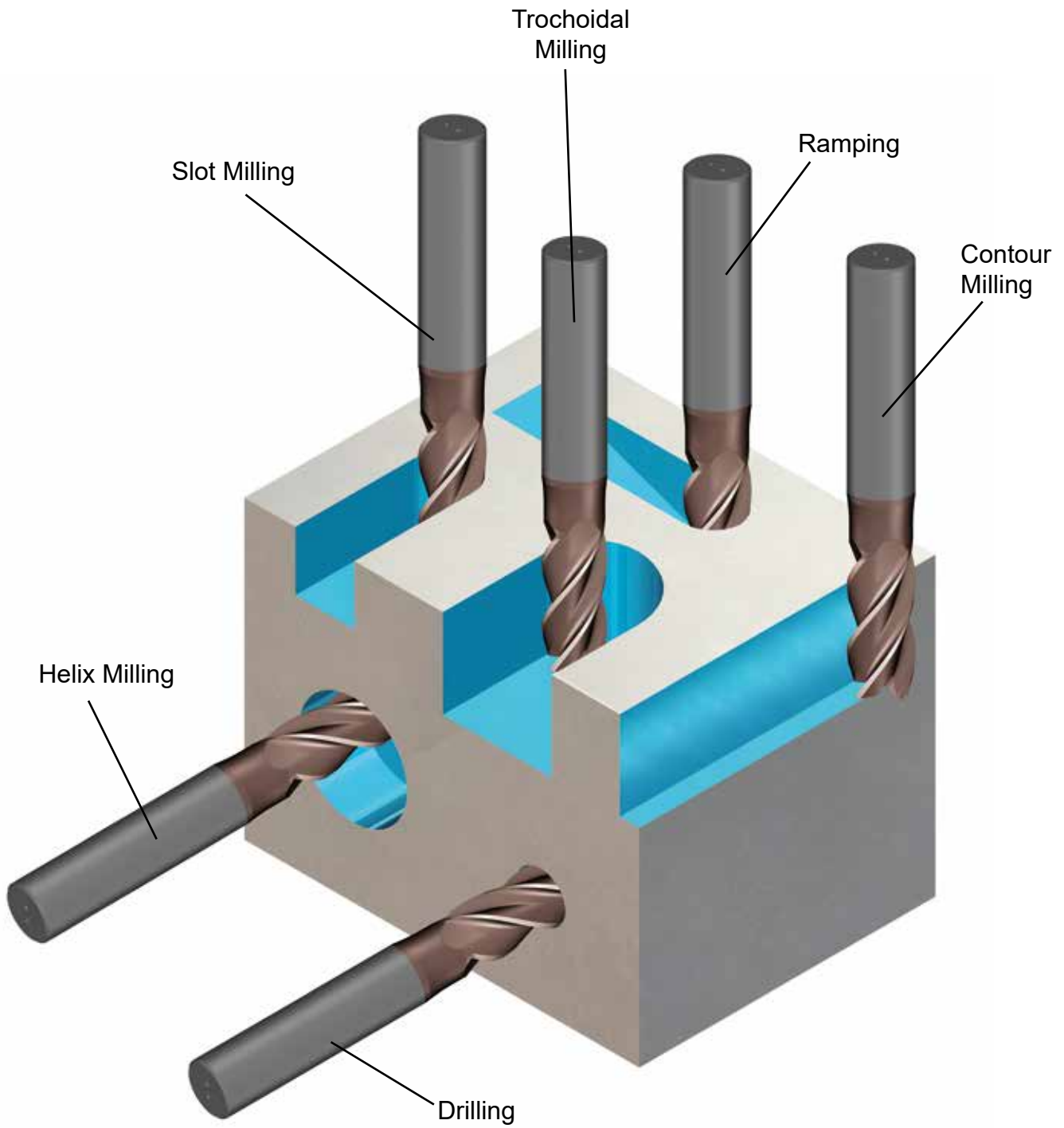
Internal coolant channels ensure optimum cooling of the cutting edge and an improved chip flow.

The improved tool stiffness with increased tolerance against vibrations is achieved by an optimized increasing neck length with soft transitions to the shank.

The VHM 494W HI06 are suitable for the machining of all common steels, right up to stainless steel and cast iron materials, thus the applicability is given for a wide range of machining tasks.



Application areas



Characteristics

Characteristic	Advantages
High performance shank tool	- Highest Productivity
Multifunctional application areas	<ul style="list-style-type: none"> - Drilling up to 1xD - Helix milling - Ramping with a ramping angle up to 45° - Slot milling - Contour milling - Trochoidal milling, especially of closed cavities (pocket milling) - Roughing and finishing
Internal cooling channels	- Better cooling and chip flow for full slot milling, ramping, helix- and pocket milling, as well as for drilling.
Edge chamfer	- High edge stability
Defined cutting edge preparation	<ul style="list-style-type: none"> - Better layer adhesion - Avoid high-frequency vibrations - Improved surface quality of the cutting edge → high wear resistance
Coupling made to DIN 6535-HB (Weldon)	- Safe pull out protection of the tool holder
Toric cut with soft transitions	<ul style="list-style-type: none"> - Increment of the utility length up to the DIN-clamping length - Improved tool stiffness with higher tolerance against vibrations
Unequal spiral angle and cutting pitch	<ul style="list-style-type: none"> - Prevent reliably vibrations - Smooth running and process security - Excellent surface finish
Special front surface geometry	<ul style="list-style-type: none"> - Allows very steep ramping angles and helix spirals, thus high removal rates - Very smooth machine running for milling operations with an high axial share - The tools can promptly penetrate up to the final working depth, to process from there with high ap-values the material

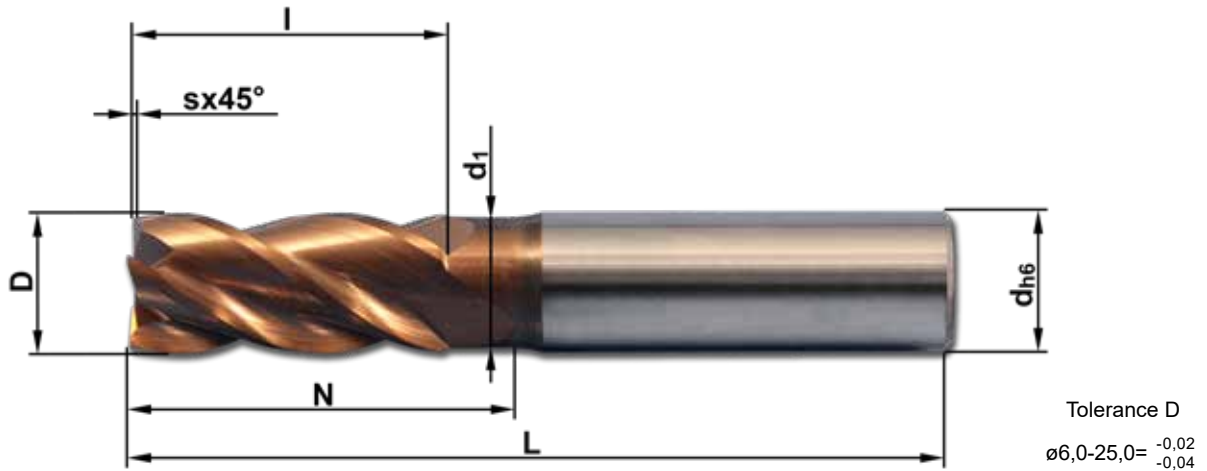
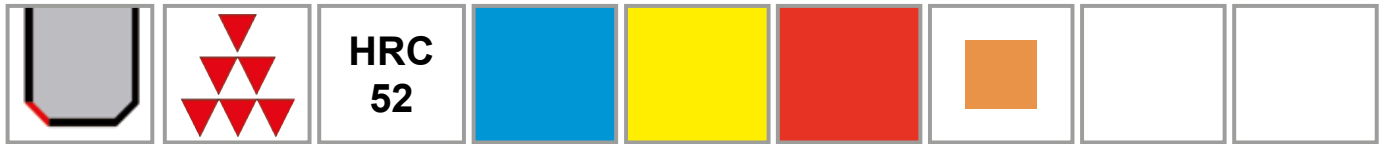
Characteristics

Characteristic	Advantages
Optimized macro geometry	<ul style="list-style-type: none"> - High chip removal rate - Large chip spaces allow a very high chip flow - Low power consumption by lower cutting forces
Optimized micro geometry	<ul style="list-style-type: none"> - Highest tool lives and at the same time highest feed rates
The carbide	<ul style="list-style-type: none"> - Finest grain quality (0,6µm grain size) in the field K10-K20, with middle hardness and good tenacity - Suitable for machining rust, acid, and heat resistant steels, such as chrome, nickel and cobalt alloyed steels
The coating	<p>TiAlSiN based HiPIMS-layer of latest development step</p> <ul style="list-style-type: none"> - High level of hardness and temperature stability thanks to Silicon-doping - Due to the HiPIMS technology extremely homogenous and high performance layer structure - Max. operating temperature up to 1.100°C
Carbide + Coating = Quality HI06	<ul style="list-style-type: none"> - Perfectly matched to one another - Suitable for wet milling, dry milling and minimal lubrication
Regrinding capability	<ul style="list-style-type: none"> - High cost-benefit factor

* HiPIMS = **H**igh **P**ower **I**mpulse **M**agnetron **S**puttering



Technical Data



Order-No.	D	s	l	N	d ₁	d	L	Z
VHM 494W-06 HI06	6	0,06x45°	13	19	5,5	6	58	4
VHM 494W-08 HI06	8	0,08x45°	18	26	7,3	8	64	4
VHM 494W-10 HI06	10	0,10x45°	22	30	9,3	10	73	4
VHM 494W-12 HI06	12	0,12x45°	26	36	11,2	12	84	4
VHM 494W-14 HI06	14	0,14x45°	30	38	13,2	14	84	4
VHM 494W-16 HI06	16	0,16x45°	34	45	15,0	16	93	4
VHM 494W-20 HI06	20	0,20x45°	42	54	19,0	20	104	4
VHM 494W-25 HI06	25	0,25x45°	54	70	24,0	25	130	4

Key to symbols



Roughing



Pre-finishing



Finishing



Steel



High grade steel



Cast iron GG(G)



Highly heat-resistant materials



Edge chamfer



Defined cutting edge preparation



Uneven cutting pitch



Average spiral angle



Shaft shape made to DIN 6535-HB (Weldon)

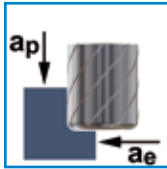


Submersible milling tool



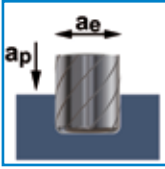
Internal cooling channels

Cutting Data Recommendation STEP MILLING



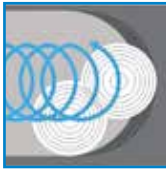
Material	D [mm]	Z	V _c [m/min]	f _z [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	V _f [mm/min]	Q [cm ³ /min]
General structural steel, unalloyed steel	6	4	210 (180-230)	0,035 (0,032-0,040)	9,6	2,68	11.180	1.560	40,24
	8	4	210 (180-230)	0,045 (0,042-0,054)	12,8	3,58	8.380	1.570	72,13
	10	4	210 (180-230)	0,060 (0,053-0,068)	18,5	4,48	6.700	1.580	130,95
	12	4	210 (180-230)	0,070 (0,065-0,083)	22,2	5,39	5.580	1.610	192,17
	14	4	210 (180-230)	0,085 (0,076-0,097)	25,9	6,29	4.780	1.610	261,64
	16	4	210 (180-230)	0,095 (0,086-0,110)	29,6	7,19	4.180	1.610	341,80
	20	4	210 (180-230)	0,120 (0,107-0,137)	37,0	8,99	3.350	1.590	529,55
Low alloyed steel	25	4	210 (180-230)	0,150 (0,134-0,171)	46,2	11,24	2.680	1.590	827,75
	6	4	175 (145-195)	0,025 (0,023-0,029)	9,6	2,38	9.320	930	21,27
	8	4	175 (145-195)	0,035 (0,030-0,038)	12,8	3,18	6.980	920	37,49
	10	4	175 (145-195)	0,040 (0,038-0,048)	18,5	3,98	5.580	940	68,99
	12	4	175 (145-195)	0,050 (0,047-0,060)	22,2	4,79	4.650	970	102,72
	14	4	175 (145-195)	0,060 (0,054-0,069)	25,9	5,59	3.980	960	138,41
	16	4	175 (145-195)	0,070 (0,062-0,079)	29,6	6,39	3.490	960	181,77
INOX, ferritic, sulphurised	20	4	175 (145-195)	0,085 (0,077-0,099)	37,0	7,99	2.790	960	283,21
	25	4	175 (145-195)	0,105 (0,096-0,123)	46,2	9,99	2.230	950	440,31
	6	4	150 (120-170)	0,025 (0,023-0,029)	9,3	2,68	7.980	800	19,89
	8	4	150 (120-170)	0,035 (0,030-0,038)	12,4	3,58	5.980	790	35,03
	10	4	150 (120-170)	0,040 (0,037-0,047)	17,5	4,48	4.780	780	61,47
	12	4	150 (120-170)	0,050 (0,046-0,059)	21,0	5,39	3.990	810	91,91
	14	4	150 (120-170)	0,060 (0,053-0,068)	24,5	6,29	3.420	810	124,05
INOX, martensitic	16	4	150 (120-170)	0,070 (0,061-0,078)	28,0	7,19	2.990	810	163,47
	20	4	150 (120-170)	0,085 (0,076-0,097)	35,0	8,99	2.390	800	252,35
	25	4	150 (120-170)	0,105 (0,095-0,121)	43,7	11,24	1.910	800	393,93
	6	4	95 (65-115)	0,025 (0,023-0,029)	8,7	2,68	5.060	510	11,77
	8	4	95 (65-115)	0,035 (0,030-0,038)	11,6	3,58	3.790	500	20,76
	10	4	95 (65-115)	0,040 (0,037-0,047)	16,5	4,48	3.030	500	36,66
	12	4	95 (65-115)	0,050 (0,046-0,059)	19,8	5,39	2.520	510	54,86
INOX, austenitic	14	4	95 (65-115)	0,060 (0,053-0,068)	23,1	6,29	2.160	510	74,10
	16	4	95 (65-115)	0,070 (0,061-0,078)	26,4	7,19	1.890	510	97,57
	20	4	95 (65-115)	0,085 (0,076-0,097)	33,0	8,99	1.510	510	150,71
	25	4	95 (65-115)	0,105 (0,095-0,121)	41,3	11,24	1.210	510	235,82
	6	4	115 (85-135)	0,025 (0,023-0,029)	9,3	2,38	6.120	610	13,55
	8	4	115 (85-135)	0,035 (0,030-0,038)	12,4	3,18	4.590	610	23,86
	10	4	115 (85-135)	0,040 (0,037-0,047)	17,5	3,98	3.670	600	41,86
Grey cast iron GJL	12	4	115 (85-135)	0,050 (0,046-0,059)	21,0	4,79	3.060	620	62,67
	14	4	115 (85-135)	0,060 (0,053-0,068)	24,5	5,59	2.620	620	84,50
	16	4	115 (85-135)	0,070 (0,061-0,078)	28,0	6,39	2.290	620	111,29
	20	4	115 (85-135)	0,085 (0,077-0,098)	35,0	7,99	1.830	620	173,94
	25	4	115 (85-135)	0,105 (0,095-0,122)	43,7	9,99	1.470	620	271,11
	6	4	190 (160-210)	0,035 (0,032-0,040)	9,6	2,68	10.110	1.420	36,41
	8	4	190 (160-210)	0,045 (0,042-0,054)	12,8	3,58	7.580	1.420	65,25
Grey cast iron GJS	10	4	190 (160-210)	0,060 (0,053-0,068)	18,5	4,48	6.060	1.430	118,52
	12	4	190 (160-210)	0,070 (0,065-0,083)	22,2	5,39	5.050	1.450	173,86
	14	4	190 (160-210)	0,085 (0,076-0,097)	25,9	6,29	4.330	1.450	236,71
	16	4	190 (160-210)	0,095 (0,086-0,110)	29,6	7,19	3.780	1.450	309,23
	20	4	190 (160-210)	0,120 (0,108-0,138)	37,0	8,99	3.030	1.450	482,98
	25	4	190 (160-210)	0,150 (0,134-0,171)	46,2	11,24	2.420	1.440	748,81
	6	4	145 (115-165)	0,035 (0,032-0,040)	9,6	2,68	7.720	1.080	27,79
High-heat resistant steel	8	4	145 (115-165)	0,045 (0,042-0,054)	12,8	3,58	5.780	1.090	49,81
	10	4	145 (115-165)	0,060 (0,053-0,068)	18,5	4,48	4.620	1.090	90,42
	12	4	145 (115-165)	0,070 (0,065-0,083)	22,2	5,39	3.850	1.110	132,70
	14	4	145 (115-165)	0,085 (0,076-0,097)	25,9	6,29	3.300	1.110	180,67
	16	4	145 (115-165)	0,095 (0,086-0,110)	29,6	7,19	2.890	1.110	235,81
	20	4	145 (115-165)	0,120 (0,108-0,138)	37,0	8,99	2.310	1.110	368,55
	25	4	145 (115-165)	0,150 (0,134-0,171)	46,2	11,24	1.850	1.100	571,22
High-heat resistant steel	6	4	55 (25-75)	0,015 (0,015-0,020)	7,5	2,08	2.930	200	3,10
	8	4	55 (25-75)	0,025 (0,021-0,026)	10,0	2,78	2.190	200	5,59
	10	4	55 (25-75)	0,030 (0,026-0,033)	14,5	3,48	1.750	200	10,24
	12	4	55 (25-75)	0,035 (0,032-0,041)	17,4	4,19	1.460	210	15,31
	14	4	55 (25-75)	0,040 (0,038-0,048)	20,3	4,89	1.250	210	20,85
	16	4	55 (25-75)	0,050 (0,043-0,055)	23,2	5,59	1.100	210	27,23
	20	4	55 (25-75)	0,060 (0,053-0,068)	29,0	6,99	880	210	41,76
25	4	55 (25-75)	0,075 (0,067-0,085)	36,3	8,74	700	210	65,67	

Cutting Data Recommendation SLOT MILLING



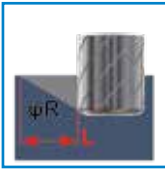
Material	D [mm]	Z	Vc [m/min]	fz [mm]	ap [mm]	ae [mm]	n [min ⁻¹]	Vf [mm/min]	Q [cm ³ /min]
General structural steel, unalloyed steel	6	4	180 (150-200)	0,030 (0,027-0,035)	7,2	6,0	9.580	1.150	49,64
	8	4	180 (150-200)	0,040 (0,036-0,046)	9,6	8,0	7.180	1.150	88,17
	10	4	180 (150-200)	0,050 (0,045-0,058)	12,0	10,0	5.740	1.150	137,76
	12	4	180 (150-200)	0,060 (0,055-0,070)	14,4	12,0	4.780	1.170	201,48
	14	4	180 (150-200)	0,070 (0,064-0,082)	16,8	14,0	4.100	1.160	273,54
	16	4	180 (150-200)	0,080 (0,073-0,093)	19,2	16,0	3.590	1.160	356,66
	20	4	180 (150-200)	0,100 (0,091-0,116)	24,0	20,0	2.870	1.160	555,84
Low alloyed steel	25	4	180 (150-200)	0,125 (0,113-0,145)	30,0	25,0	2.290	1.160	866,25
	6	4	145 (115-165)	0,020 (0,019-0,024)	6,6	6,0	7.720	650	25,66
	8	4	145 (115-165)	0,030 (0,025-0,032)	8,8	8,0	5.780	650	45,55
	10	4	145 (115-165)	0,035 (0,032-0,040)	11,0	10,0	4.620	650	71,17
	12	4	145 (115-165)	0,045 (0,039-0,049)	13,2	12,0	3.850	660	104,86
	14	4	145 (115-165)	0,050 (0,045-0,058)	15,4	14,0	3.300	660	142,30
	16	4	145 (115-165)	0,055 (0,051-0,066)	17,6	16,0	2.890	660	185,29
INOX, ferritic, sulphurised	20	4	145 (115-165)	0,070 (0,065-0,083)	22,0	20,0	2.310	670	292,60
	25	4	145 (115-165)	0,090 (0,081-0,104)	27,5	25,0	1.850	660	456,50
	6	4	105 (75-125)	0,020 (0,019-0,024)	6,6	6,0	5.590	470	18,57
	8	4	105 (75-125)	0,030 (0,025-0,032)	8,8	8,0	4.190	470	33,02
	10	4	105 (75-125)	0,035 (0,032-0,040)	11,0	10,0	3.350	470	51,48
	12	4	105 (75-125)	0,045 (0,039-0,049)	13,2	12,0	2.790	480	75,87
	14	4	105 (75-125)	0,050 (0,045-0,058)	15,4	14,0	2.390	480	103,06
INOX, martensitic	16	4	105 (75-125)	0,055 (0,051-0,066)	17,6	16,0	2.090	480	134,04
	20	4	105 (75-125)	0,070 (0,065-0,083)	22,0	20,0	1.670	480	211,64
	25	4	105 (75-125)	0,090 (0,081-0,104)	27,5	25,0	1.340	480	330,69
	6	4	70 (40-90)	0,020 (0,019-0,024)	6,6	6,0	3.730	310	12,36
	8	4	70 (40-90)	0,030 (0,025-0,032)	8,8	8,0	2.790	310	21,96
	10	4	70 (40-90)	0,035 (0,032-0,040)	11,0	10,0	2.230	310	34,32
	12	4	70 (40-90)	0,045 (0,039-0,049)	13,2	12,0	1.860	320	50,53
INOX, austenitic	14	4	70 (40-90)	0,050 (0,045-0,058)	15,4	14,0	1.590	320	68,56
	16	4	70 (40-90)	0,055 (0,051-0,066)	17,6	16,0	1.390	320	89,27
	20	4	70 (40-90)	0,070 (0,065-0,083)	22,0	20,0	1.120	320	141,24
	25	4	70 (40-90)	0,090 (0,081-0,104)	27,5	25,0	890	320	220,00
	6	4	85 (55-105)	0,020 (0,019-0,024)	6,6	6,0	4.520	380	15,05
	8	4	85 (55-105)	0,030 (0,025-0,032)	8,8	8,0	3.390	380	26,68
	10	4	85 (55-105)	0,035 (0,032-0,040)	11,0	10,0	2.710	380	41,69
Grey cast iron GJL	12	4	85 (55-105)	0,045 (0,039-0,049)	13,2	12,0	2.260	390	61,46
	14	4	85 (55-105)	0,050 (0,045-0,058)	15,4	14,0	1.940	390	83,44
	16	4	85 (55-105)	0,055 (0,051-0,066)	17,6	16,0	1.690	390	108,70
	20	4	85 (55-105)	0,070 (0,065-0,083)	22,0	20,0	1.350	390	171,16
	25	4	85 (55-105)	0,090 (0,081-0,104)	27,5	25,0	1.080	390	267,44
	6	4	135 (105-155)	0,030 (0,026-0,033)	7,2	6,0	7.190	830	35,99
	8	4	135 (105-155)	0,040 (0,035-0,045)	9,6	8,0	5.380	840	64,44
10	4	135 (105-155)	0,050 (0,044-0,056)	12,0	10,0	4.310	840	101,16	
Grey cast iron GJS	12	4	135 (105-155)	0,060 (0,054-0,069)	14,4	12,0	3.590	860	148,61
	14	4	135 (105-155)	0,070 (0,063-0,081)	16,8	14,0	3.070	860	202,27
	16	4	135 (105-155)	0,080 (0,072-0,092)	19,2	16,0	2.690	860	264,19
	20	4	135 (105-155)	0,100 (0,090-0,115)	24,0	20,0	2.150	860	412,80
	25	4	135 (105-155)	0,125 (0,113-0,144)	30,0	25,0	1.720	860	645,00
	6	4	105 (75-125)	0,030 (0,026-0,033)	7,2	6,0	5.590	650	27,99
	8	4	105 (75-125)	0,040 (0,035-0,045)	9,6	8,0	4.190	650	50,15
10	4	105 (75-125)	0,050 (0,044-0,056)	12,0	10,0	3.350	660	78,72	
High-heat resistant steel	12	4	105 (75-125)	0,060 (0,054-0,069)	14,4	12,0	2.790	670	115,60
	14	4	105 (75-125)	0,070 (0,063-0,081)	16,8	14,0	2.390	670	157,35
	16	4	105 (75-125)	0,080 (0,072-0,092)	19,2	16,0	2.090	670	205,52
	20	4	105 (75-125)	0,100 (0,090-0,115)	24,0	20,0	1.670	670	320,64
	25	4	105 (75-125)	0,125 (0,113-0,144)	30,0	25,0	1.340	670	501,00
	6	4	40 (10-60)	0,015 (0,013-0,016)	5,1	6,0	2.130	120	3,64
	8	4	40 (10-60)	0,020 (0,017-0,022)	6,8	8,0	1.600	120	6,58
10	4	40 (10-60)	0,025 (0,022-0,028)	8,5	10,0	1.280	120	10,37	
12	4	40 (10-60)	0,030 (0,027-0,035)	10,2	12,0	1.060	130	15,54	
14	4	40 (10-60)	0,035 (0,032-0,040)	11,9	14,0	910	130	21,16	
16	4	40 (10-60)	0,040 (0,036-0,046)	13,6	16,0	800	130	27,64	
20	4	40 (10-60)	0,050 (0,045-0,058)	17,0	20,0	640	130	43,18	
25	4	40 (10-60)	0,060 (0,056-0,071)	21,3	25,0	510	130	67,10	

Cutting Data Recommendation TROCHOIDAL MILLING



Material	D [mm]	Z	V _c [m/min]	f _z [mm]	h _m max [mm]	a _p [mm]	a _e [mm]	n [min ⁻¹]	V _f [mm/min]	Q [cm ³ /min]
General structural steel, unalloyed steel	6	4	250 (220-270)	0,030 (0,026-0,033)	0,029	11,7	1,19	13.310	1.540	21,48
	8	4	250 (220-270)	0,040 (0,035-0,045)	0,039	16,2	1,59	9.970	1.560	40,05
	10	4	250 (220-270)	0,050 (0,044-0,056)	0,049	20,9	1,99	7.970	1.560	64,97
	12	4	250 (220-270)	0,060 (0,054-0,069)	0,060	24,7	2,40	6.640	1.590	94,49
	14	4	250 (220-270)	0,070 (0,063-0,081)	0,070	28,5	2,80	5.690	1.590	127,12
	16	4	250 (220-270)	0,080 (0,072-0,092)	0,080	32,3	3,20	4.980	1.590	164,65
	20	4	250 (220-270)	0,105 (0,090-0,115)	0,100	39,9	4,00	3.980	1.590	254,08
Low alloyed steel	25	4	250 (220-270)	0,130 (0,113-0,144)	0,125	51,3	5,00	3.190	1.590	408,35
	6	4	230 (200-250)	0,025 (0,022-0,028)	0,024	11,7	1,14	12.240	1.180	15,67
	8	4	230 (200-250)	0,035 (0,029-0,037)	0,032	16,2	1,52	9.170	1.170	28,91
	10	4	230 (200-250)	0,040 (0,036-0,046)	0,040	20,9	1,90	7.340	1.170	46,58
	12	4	230 (200-250)	0,050 (0,044-0,056)	0,049	24,7	2,29	6.110	1.200	67,71
	14	4	230 (200-250)	0,060 (0,051-0,066)	0,057	28,5	2,68	5.240	1.190	91,12
	16	4	230 (200-250)	0,065 (0,059-0,075)	0,065	32,3	3,06	4.580	1.190	117,72
INOX, ferritic, sulphurised	20	4	230 (200-250)	0,085 (0,073-0,093)	0,081	39,9	3,82	3.660	1.190	180,92
	25	4	230 (200-250)	0,105 (0,092-0,117)	0,102	51,3	4,78	2.930	1.200	293,03
	6	4	170 (140-190)	0,025 (0,022-0,028)	0,024	11,7	1,07	9.050	870	10,87
	8	4	170 (140-190)	0,035 (0,029-0,037)	0,032	16,2	1,43	6.780	870	20,08
	10	4	170 (140-190)	0,040 (0,036-0,046)	0,040	20,9	1,79	5.420	870	32,44
	12	4	170 (140-190)	0,050 (0,044-0,056)	0,049	24,7	2,16	4.520	890	47,22
	14	4	170 (140-190)	0,060 (0,051-0,066)	0,057	28,5	2,52	3.870	880	63,35
INOX, martensitic	16	4	170 (140-190)	0,065 (0,059-0,075)	0,065	32,3	2,88	3.390	880	81,86
	20	4	170 (140-190)	0,085 (0,073-0,093)	0,081	39,9	3,60	2.710	880	125,97
	25	4	170 (140-190)	0,105 (0,092-0,117)	0,102	51,3	4,50	2.170	880	203,84
	6	4	110 (80-130)	0,025 (0,022-0,028)	0,024	11,7	1,01	5.860	560	6,64
	8	4	110 (80-130)	0,035 (0,029-0,037)	0,032	16,2	1,35	4.390	560	12,27
	10	4	110 (80-130)	0,040 (0,036-0,046)	0,040	20,9	1,69	3.510	560	19,82
	12	4	110 (80-130)	0,050 (0,044-0,056)	0,049	24,7	2,04	2.920	570	28,82
INOX, austenitic	14	4	110 (80-130)	0,060 (0,051-0,066)	0,057	28,5	2,38	2.500	570	38,66
	16	4	110 (80-130)	0,065 (0,059-0,075)	0,065	32,3	2,72	2.190	570	49,99
	20	4	110 (80-130)	0,085 (0,073-0,093)	0,081	39,9	3,40	1.750	570	76,92
	25	4	110 (80-130)	0,105 (0,092-0,117)	0,102	51,3	4,25	1.400	570	124,49
	6	4	130 (100-150)	0,020 (0,017-0,022)	0,019	11,7	0,98	6.920	530	6,02
	8	4	130 (100-150)	0,025 (0,023-0,029)	0,025	16,2	1,31	5.190	520	10,99
	10	4	130 (100-150)	0,035 (0,029-0,037)	0,032	20,9	1,64	4.150	530	18,17
Grey cast iron GJL	12	4	130 (100-150)	0,040 (0,035-0,045)	0,039	24,7	1,98	3.450	540	26,31
	14	4	130 (100-150)	0,045 (0,041-0,053)	0,046	28,5	2,31	2.960	540	35,81
	16	4	130 (100-150)	0,055 (0,047-0,060)	0,052	32,3	2,64	2.590	540	45,88
	20	4	130 (100-150)	0,065 (0,059-0,075)	0,065	39,9	3,30	2.070	540	70,84
	25	4	130 (100-150)	0,085 (0,073-0,093)	0,081	51,3	4,13	1.660	540	113,56
	6	4	215 (185-235)	0,030 (0,026-0,033)	0,029	11,7	1,19	11.440	1.330	18,48
	8	4	215 (185-235)	0,040 (0,035-0,045)	0,039	16,2	1,59	8.580	1.340	34,44
Grey cast iron GJS	10	4	215 (185-235)	0,050 (0,044-0,056)	0,049	20,9	1,99	6.860	1.340	55,86
	12	4	215 (185-235)	0,060 (0,054-0,069)	0,060	24,7	2,40	5.710	1.370	81,21
	14	4	215 (185-235)	0,070 (0,063-0,081)	0,070	28,5	2,80	4.900	1.370	109,33
	16	4	215 (185-235)	0,080 (0,072-0,092)	0,080	32,3	3,20	4.280	1.370	141,60
	20	4	215 (185-235)	0,105 (0,090-0,115)	0,100	39,9	4,00	3.430	1.370	218,65
	25	4	215 (185-235)	0,130 (0,113-0,144)	0,125	51,3	5,00	2.740	1.370	351,15
	High-heat resistant steel	6	4	170 (140-190)	0,030 (0,026-0,033)	0,029	11,7	1,19	9.050	1.050
8		4	170 (140-190)	0,040 (0,035-0,045)	0,039	16,2	1,59	6.780	1.060	27,23
10		4	170 (140-190)	0,050 (0,044-0,056)	0,049	20,9	1,99	5.420	1.060	44,17
12		4	170 (140-190)	0,060 (0,054-0,069)	0,060	24,7	2,40	4.520	1.080	64,20
14		4	170 (140-190)	0,070 (0,063-0,081)	0,070	28,5	2,80	3.870	1.080	86,42
16		4	170 (140-190)	0,080 (0,072-0,092)	0,080	32,3	3,20	3.390	1.080	111,94
20		4	170 (140-190)	0,105 (0,090-0,115)	0,100	39,9	4,00	2.710	1.080	172,85
High-heat resistant steel	25	4	170 (140-190)	0,130 (0,113-0,144)	0,125	51,3	5,00	2.170	1.080	277,79
	6	4	60 (30-80)	0,015 (0,014-0,017)	0,015	11,7	0,68	3.190	190	1,52
	8	4	60 (30-80)	0,020 (0,018-0,023)	0,020	16,2	0,91	2.390	190	2,82
	10	4	60 (30-80)	0,025 (0,023-0,029)	0,025	20,9	1,14	1.910	190	4,55
	12	4	60 (30-80)	0,030 (0,028-0,036)	0,031	24,7	1,38	1.590	200	6,71
	14	4	60 (30-80)	0,040 (0,033-0,043)	0,037	28,5	1,61	1.370	200	9,27
	16	4	60 (30-80)	0,045 (0,038-0,048)	0,042	32,3	1,84	1.200	200	11,89
High-heat resistant steel	20	4	60 (30-80)	0,055 (0,047-0,060)	0,052	39,9	2,30	960	200	18,17
	25	4	60 (30-80)	0,065 (0,059-0,075)	0,065	51,3	2,88	760	200	29,25

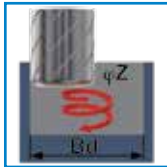
Cutting Data Recommendation RAMPING



Material	D [mm]	Z	Vc [m/min]	fz [mm]	ap max. [mm]	ae [mm]	φR max. [°]	L [mm]	n [min ⁻¹]	Vf [mm/min]
General structural steel, unalloyed steel	6	4	180 (150-200)	0,030 (0,027-0,035)	6,0	6,0	45	6,0	9.580	1.150
	8	4	180 (150-200)	0,040 (0,036-0,046)	8,0	8,0	45	8,0	7.180	1.150
	10	4	180 (150-200)	0,050 (0,045-0,058)	10,0	10,0	45	10,0	5.740	1.150
	12	4	180 (150-200)	0,060 (0,055-0,070)	12,0	12,0	45	12,0	4.780	1.170
	14	4	180 (150-200)	0,070 (0,064-0,082)	14,0	14,0	45	14,0	4.100	1.160
	16	4	180 (150-200)	0,080 (0,073-0,093)	16,0	16,0	45	16,0	3.590	1.160
	20	4	180 (150-200)	0,100 (0,091-0,116)	20,0	20,0	45	20,0	2.870	1.160
Low alloyed steel	25	4	180 (150-200)	0,125 (0,113-0,145)	25,0	25,0	45	25,0	2.290	1.160
	6	4	145 (115-165)	0,020 (0,019-0,024)	6,0	6,0	30	10,4	7.720	650
	8	4	145 (115-165)	0,030 (0,025-0,032)	8,0	8,0	30	13,9	5.780	650
	10	4	145 (115-165)	0,035 (0,032-0,040)	10,0	10,0	30	17,3	4.620	650
	12	4	145 (115-165)	0,045 (0,039-0,049)	12,0	12,0	30	20,8	3.850	660
	14	4	145 (115-165)	0,050 (0,045-0,058)	14,0	14,0	30	24,2	3.300	660
	16	4	145 (115-165)	0,055 (0,051-0,066)	16,0	16,0	30	27,7	2.890	660
INOX, ferritic, sulphurised	20	4	145 (115-165)	0,070 (0,065-0,083)	20,0	20,0	30	34,6	2.310	670
	25	4	145 (115-165)	0,090 (0,081-0,104)	25,0	25,0	30	43,3	1.850	660
	6	4	120 (90-140)	0,020 (0,019-0,024)	6,0	6,0	15	22,4	6.390	540
	8	4	120 (90-140)	0,030 (0,025-0,032)	8,0	8,0	15	29,9	4.790	540
	10	4	120 (90-140)	0,035 (0,032-0,040)	10,0	10,0	15	37,3	3.830	540
	12	4	120 (90-140)	0,045 (0,039-0,049)	12,0	12,0	15	44,8	3.190	550
	14	4	120 (90-140)	0,050 (0,045-0,058)	14,0	14,0	15	52,2	2.730	550
INOX, martensitic	16	4	120 (90-140)	0,055 (0,051-0,066)	16,0	16,0	15	59,7	2.390	540
	20	4	120 (90-140)	0,070 (0,065-0,083)	20,0	20,0	15	74,6	1.910	550
	25	4	120 (90-140)	0,090 (0,081-0,104)	25,0	25,0	15	93,3	1.530	550
	6	4	80 (50-100)	0,020 (0,019-0,024)	6,6	6,0	12	31,1	4.260	360
	8	4	80 (50-100)	0,030 (0,025-0,032)	8,8	8,0	12	41,4	3.190	360
	10	4	80 (50-100)	0,035 (0,032-0,040)	11,0	10,0	12	51,8	2.550	360
	12	4	80 (50-100)	0,045 (0,039-0,049)	13,2	12,0	12	62,1	2.130	370
INOX, austenitic	14	4	80 (50-100)	0,050 (0,045-0,058)	15,4	14,0	12	72,5	1.820	360
	16	4	80 (50-100)	0,055 (0,051-0,066)	17,6	16,0	12	82,8	1.590	360
	20	4	80 (50-100)	0,070 (0,065-0,083)	22,0	20,0	12	103,5	1.270	370
	25	4	80 (50-100)	0,090 (0,081-0,104)	27,5	25,0	12	129,4	1.020	370
	6	4	100 (70-120)	0,020 (0,019-0,024)	6,6	6,0	12	31,1	5.320	450
	8	4	100 (70-120)	0,030 (0,025-0,032)	8,8	8,0	12	41,4	3.990	450
	10	4	100 (70-120)	0,035 (0,032-0,040)	11,0	10,0	12	51,8	3.190	450
Grey cast iron GJL	12	4	100 (70-120)	0,045 (0,039-0,049)	13,2	12,0	12	62,1	2.660	460
	14	4	100 (70-120)	0,050 (0,045-0,058)	15,4	14,0	12	72,5	2.280	460
	16	4	100 (70-120)	0,055 (0,051-0,066)	17,6	16,0	12	82,8	1.990	450
	20	4	100 (70-120)	0,070 (0,065-0,083)	22,0	20,0	12	103,5	1.590	460
	25	4	100 (70-120)	0,090 (0,081-0,104)	27,5	25,0	12	129,4	1.270	460
	6	4	170 (140-190)	0,030 (0,026-0,033)	6,0	6,0	45	6,0	9.050	1.050
	8	4	170 (140-190)	0,040 (0,035-0,045)	8,0	8,0	45	8,0	6.780	1.060
10	4	170 (140-190)	0,050 (0,044-0,056)	10,0	10,0	45	10,0	5.420	1.060	
Grey cast iron GJS	12	4	170 (140-190)	0,060 (0,054-0,069)	12,0	12,0	45	12,0	4.520	1.080
	14	4	170 (140-190)	0,070 (0,063-0,081)	14,0	14,0	45	14,0	3.870	1.080
	16	4	170 (140-190)	0,080 (0,072-0,092)	16,0	16,0	45	16,0	3.390	1.080
	20	4	170 (140-190)	0,100 (0,090-0,115)	20,0	20,0	45	20,0	2.710	1.080
	25	4	170 (140-190)	0,125 (0,113-0,144)	25,0	25,0	45	25,0	2.170	1.080
	6	4	90 (60-110)	0,030 (0,026-0,033)	6,0	6,0	45	6,0	4.790	560
	8	4	90 (60-110)	0,040 (0,035-0,045)	8,0	8,0	45	8,0	3.590	560
10	4	90 (60-110)	0,050 (0,044-0,056)	10,0	10,0	45	10,0	2.870	560	
High-heat resistant steel	12	4	90 (60-110)	0,060 (0,054-0,069)	12,0	12,0	45	12,0	2.390	570
	14	4	90 (60-110)	0,070 (0,063-0,081)	14,0	14,0	45	14,0	2.050	570
	16	4	90 (60-110)	0,080 (0,072-0,092)	16,0	16,0	45	16,0	1.790	570
	20	4	90 (60-110)	0,100 (0,090-0,115)	20,0	20,0	45	20,0	1.430	570
	25	4	90 (60-110)	0,125 (0,113-0,144)	25,0	25,0	45	25,0	1.150	570
	6	4	40 (10-60)	0,015 (0,013-0,016)	4,0	6,0	6	38,1	2.130	120
	8	4	40 (10-60)	0,020 (0,017-0,022)	5,0	8,0	6	47,6	1.600	120
10	4	40 (10-60)	0,025 (0,022-0,028)	6,0	10,0	6	57,1	1.280	120	
High-heat resistant steel	12	4	40 (10-60)	0,030 (0,027-0,035)	8,0	12,0	6	76,1	1.060	130
	14	4	40 (10-60)	0,035 (0,032-0,040)	9,0	14,0	6	85,6	910	130
	16	4	40 (10-60)	0,040 (0,036-0,046)	10,0	16,0	6	95,1	800	130
	20	4	40 (10-60)	0,050 (0,045-0,058)	13,0	20,0	6	123,7	640	130
	25	4	40 (10-60)	0,060 (0,056-0,071)	16,0	25,0	6	152,2	510	130

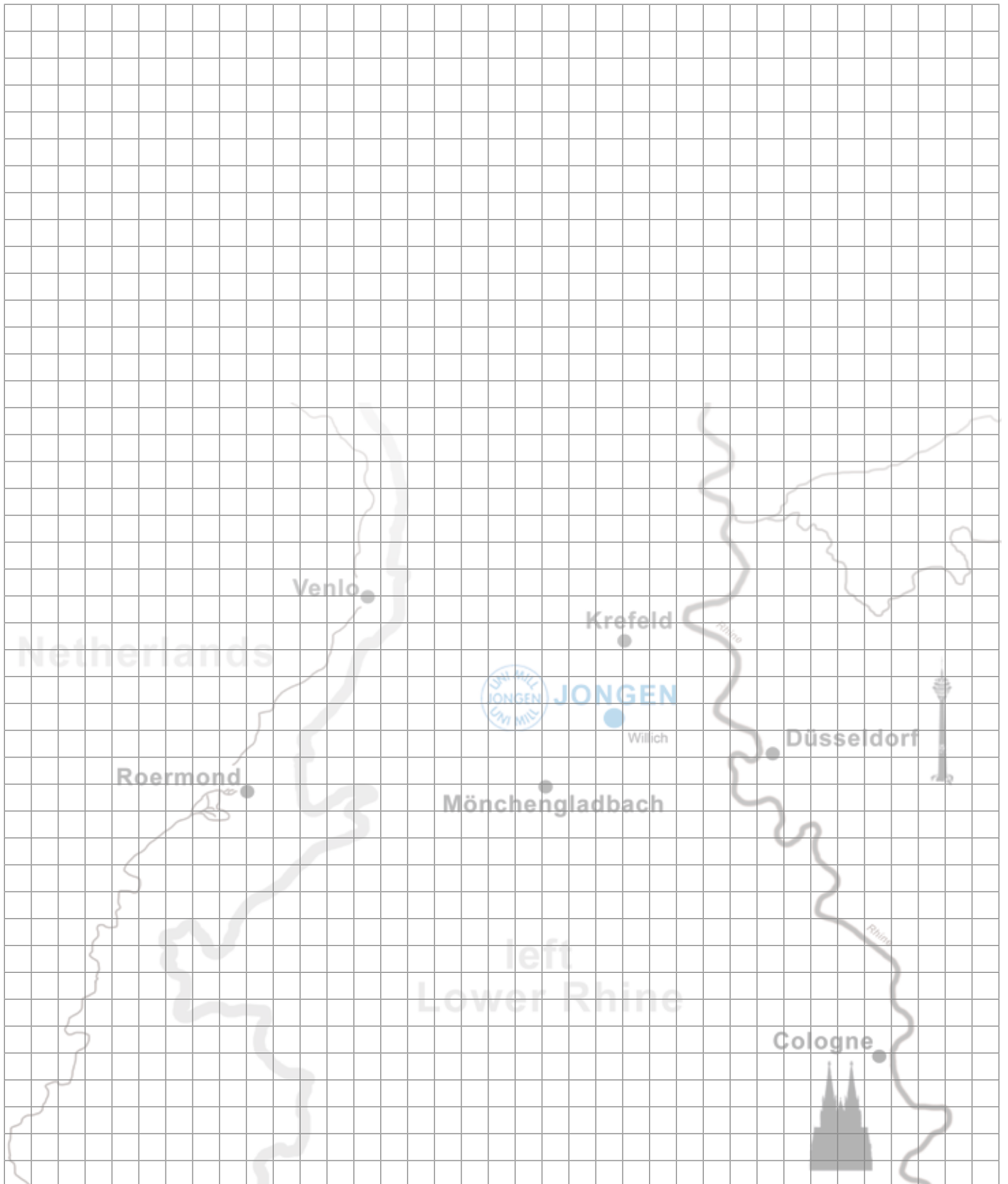
For drilling operations ($\phi R = 90^\circ$), we recommend to reduce f_z (feed speed per tooth) by 50%.

Cutting Data Recommendation HELIX MILLING



Material	D [mm]	Z	Vc [m/min]	fz [mm]	ap max./turn [mm]	ae [mm]	φZ max. [°]	Bd [mm]	n [min ⁻¹]	Vf [mm/min]
General structural steel, unalloyed steel	6	4	210 (180-230)	0,030 (0,027-0,035)	6,0	6,0	20,53	11,10	11.180	1.340
	8	4	210 (180-230)	0,040 (0,036-0,046)	8,0	8,0	20,53	14,80	8.380	1.340
	10	4	210 (180-230)	0,050 (0,045-0,058)	10,0	10,0	20,53	18,50	6.700	1.340
	12	4	210 (180-230)	0,060 (0,055-0,070)	12,0	12,0	20,53	22,20	5.580	1.360
	14	4	210 (180-230)	0,070 (0,064-0,082)	14,0	14,0	20,53	25,90	4.780	1.360
	16	4	210 (180-230)	0,080 (0,073-0,093)	16,0	16,0	20,53	29,60	4.180	1.360
	20	4	210 (180-230)	0,100 (0,091-0,116)	20,0	20,0	20,53	37,00	3.350	1.350
Low alloyed steel	25	4	210 (180-230)	0,125 (0,113-0,145)	25,0	25,0	20,53	46,25	2.680	1.350
	6	4	175 (145-195)	0,020 (0,019-0,024)	6,0	6,0	20,53	11,10	9.320	780
	8	4	175 (145-195)	0,030 (0,025-0,032)	8,0	8,0	20,53	14,80	6.980	780
	10	4	175 (145-195)	0,035 (0,032-0,040)	10,0	10,0	20,53	18,50	5.580	780
	12	4	175 (145-195)	0,045 (0,039-0,049)	12,0	12,0	20,53	22,20	4.650	800
	14	4	175 (145-195)	0,050 (0,045-0,058)	14,0	14,0	20,53	25,90	3.980	800
	16	4	175 (145-195)	0,055 (0,051-0,066)	16,0	16,0	20,53	29,60	3.490	790
INOX, ferritic, sulphurised	20	4	175 (145-195)	0,070 (0,065-0,083)	20,0	20,0	20,53	37,00	2.790	800
	25	4	175 (145-195)	0,090 (0,081-0,104)	25,0	25,0	20,53	46,25	2.230	800
	6	4	120 (90-140)	0,020 (0,019-0,024)	6,0	6,0	20,53	11,10	6.390	540
	8	4	120 (90-140)	0,030 (0,025-0,032)	8,0	8,0	20,53	14,80	4.790	540
	10	4	120 (90-140)	0,035 (0,032-0,040)	10,0	10,0	20,53	18,50	3.830	540
	12	4	120 (90-140)	0,045 (0,039-0,049)	12,0	12,0	20,53	22,20	3.190	550
	14	4	120 (90-140)	0,050 (0,045-0,058)	14,0	14,0	20,53	25,90	2.730	550
INOX, martensitic	16	4	120 (90-140)	0,055 (0,051-0,066)	16,0	16,0	20,53	29,60	2.390	540
	20	4	120 (90-140)	0,070 (0,065-0,083)	20,0	20,0	20,53	37,00	1.910	550
	25	4	120 (90-140)	0,090 (0,081-0,104)	25,0	25,0	20,53	46,25	1.530	550
	6	4	80 (50-100)	0,020 (0,019-0,024)	6,0	6,0	20,53	11,10	4.260	360
	8	4	80 (50-100)	0,030 (0,025-0,032)	8,0	8,0	20,53	14,80	3.190	360
	10	4	80 (50-100)	0,035 (0,032-0,040)	10,0	10,0	20,53	18,50	2.550	360
	12	4	80 (50-100)	0,045 (0,039-0,049)	12,0	12,0	20,53	22,20	2.130	370
INOX, austenitic	14	4	80 (50-100)	0,050 (0,045-0,058)	14,0	14,0	20,53	25,90	1.820	360
	16	4	80 (50-100)	0,055 (0,051-0,066)	16,0	16,0	20,53	29,60	1.590	360
	20	4	80 (50-100)	0,070 (0,065-0,083)	20,0	20,0	20,53	37,00	1.270	370
	25	4	80 (50-100)	0,090 (0,081-0,104)	25,0	25,0	20,53	46,25	1.020	370
	6	4	100 (70-120)	0,020 (0,019-0,024)	6,0	6,0	20,53	11,10	5.320	450
	8	4	100 (70-120)	0,030 (0,025-0,032)	8,0	8,0	20,53	14,80	3.990	450
	10	4	100 (70-120)	0,035 (0,032-0,040)	10,0	10,0	20,53	18,50	3.190	450
Grey cast iron GJL	12	4	100 (70-120)	0,045 (0,039-0,049)	12,0	12,0	20,53	22,20	2.660	460
	14	4	100 (70-120)	0,050 (0,045-0,058)	14,0	14,0	20,53	25,90	2.280	460
	16	4	100 (70-120)	0,055 (0,051-0,066)	16,0	16,0	20,53	29,60	1.990	450
	20	4	100 (70-120)	0,070 (0,065-0,083)	20,0	20,0	20,53	37,00	1.590	460
	25	4	100 (70-120)	0,090 (0,081-0,104)	25,0	25,0	20,53	46,25	1.270	460
	6	4	170 (140-190)	0,030 (0,026-0,033)	6,0	6,0	20,53	11,10	9.050	1.050
	8	4	170 (140-190)	0,040 (0,035-0,045)	8,0	8,0	20,53	14,80	6.780	1.060
Grey cast iron GJS	10	4	170 (140-190)	0,050 (0,044-0,056)	10,0	10,0	20,53	18,50	5.420	1.060
	12	4	170 (140-190)	0,060 (0,054-0,069)	12,0	12,0	20,53	22,20	4.520	1.080
	14	4	170 (140-190)	0,070 (0,063-0,081)	14,0	14,0	20,53	25,90	3.870	1.080
	16	4	170 (140-190)	0,080 (0,072-0,092)	16,0	16,0	20,53	29,60	3.390	1.080
	20	4	170 (140-190)	0,100 (0,090-0,115)	20,0	20,0	20,53	37,00	2.710	1.080
	25	4	170 (140-190)	0,125 (0,113-0,144)	25,0	25,0	20,53	46,25	2.170	1.080
	6	4	90 (60-110)	0,030 (0,026-0,033)	6,0	6,0	20,53	11,10	4.790	560
High-heat resistant steel	8	4	90 (60-110)	0,040 (0,035-0,045)	8,0	8,0	20,53	14,80	3.590	560
	10	4	90 (60-110)	0,050 (0,044-0,056)	10,0	10,0	20,53	18,50	2.870	560
	12	4	90 (60-110)	0,060 (0,054-0,069)	12,0	12,0	20,53	22,20	2.390	570
	14	4	90 (60-110)	0,070 (0,063-0,081)	14,0	14,0	20,53	25,90	2.050	570
	16	4	90 (60-110)	0,080 (0,072-0,092)	16,0	16,0	20,53	29,60	1.790	570
	20	4	90 (60-110)	0,100 (0,090-0,115)	20,0	20,0	20,53	37,00	1.430	570
	25	4	90 (60-110)	0,125 (0,113-0,144)	25,0	25,0	20,53	46,25	1.150	570
High-heat resistant steel	6	4	40 (10-60)	0,015 (0,013-0,016)	3,0	6,0	10,61	11,10	2.130	120
	8	4	40 (10-60)	0,020 (0,017-0,022)	4,0	8,0	10,61	14,80	1.600	120
	10	4	40 (10-60)	0,025 (0,022-0,028)	5,0	10,0	10,61	18,50	1.280	120
	12	4	40 (10-60)	0,030 (0,027-0,035)	6,0	12,0	10,61	22,20	1.060	130
	14	4	40 (10-60)	0,035 (0,032-0,040)	7,0	14,0	10,61	25,90	910	130
	16	4	40 (10-60)	0,040 (0,036-0,046)	8,0	16,0	10,61	29,60	800	130
	20	4	40 (10-60)	0,050 (0,045-0,058)	10,0	20,0	10,61	37,00	640	130
25	4	40 (10-60)	0,060 (0,056-0,071)	13,0	25,0	11,02	46,25	510	130	

Notes



The mentioned cutting parameters are standard values that may vary depending on processing, type of machine and material grade.
Errors, omissions and technical modifications are reserved.



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