

OPTIMUM

LINE



HPMT

THE FUTURE OF PRECISION MACHINING

Race towards a
faster production



www.hpmt-industries.com



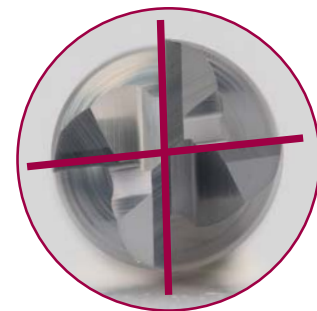
The Optimum Line series is designed to bring you premium features at cost-effective rates. With its Ideal Edge Design, it provide enhanced tool durability and less vibration for finer finishing.

1 Differential Pitch (DP) Design

Reduces Vibrations

- Maximizes productivity and tool life

End Face View



Differential Pitch (DP)

2 Superior Coating

Enhances Heat Resistance

- Reduce tool wear to achieve cost-effective machining

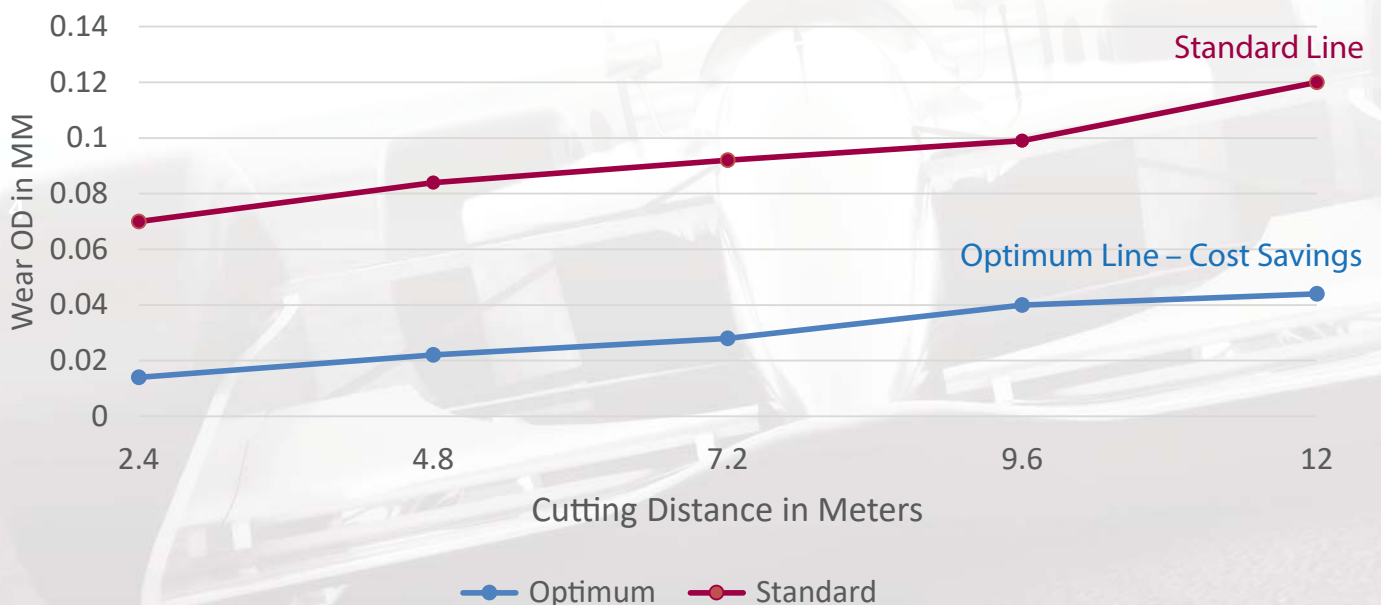
3 Ideal Cutting Edge

Enhances Durability

- Provide edge protection to prolong tool life

Disclaimer :
Wear OD Comparison Graph are based on cutting cindition on page 3

Wear OD Comparison





OPTIMUM LINE

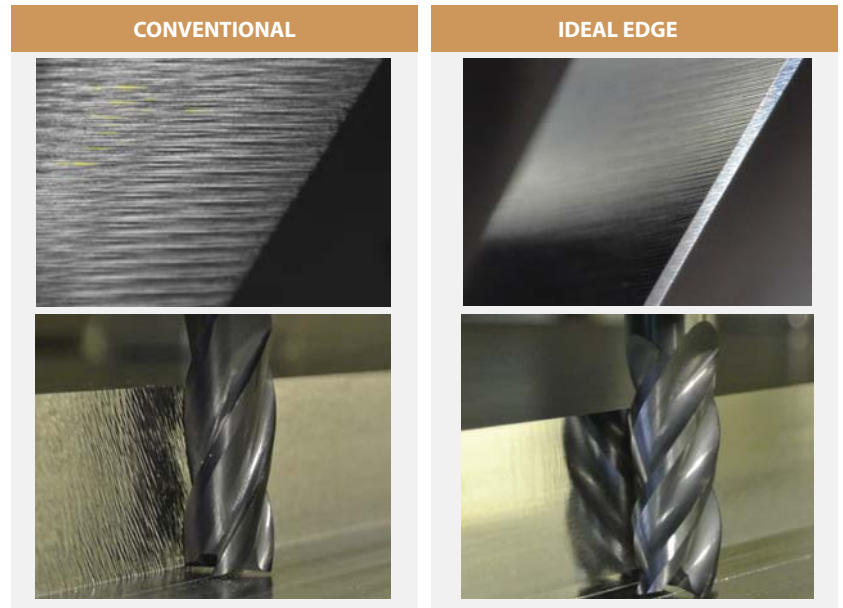


Features Comparison



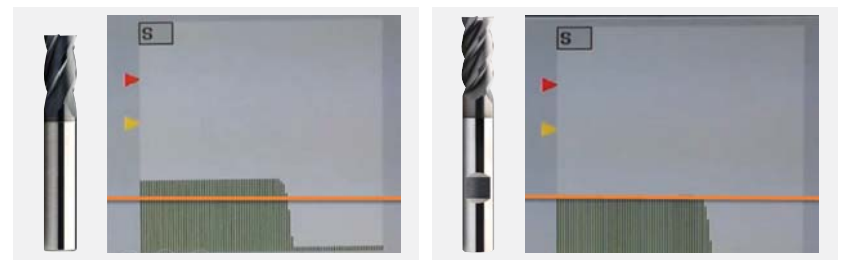
Ideal Cutting Edge

Provide a stable cutting edge with reduced possibility of chipping



Optimized Tool Geometry

Allows for improved shearing and lower spindle loads



Positive Rake Angle

Enables smooth chips evacuation due to small size chips generated



Slotting Test Report on P20


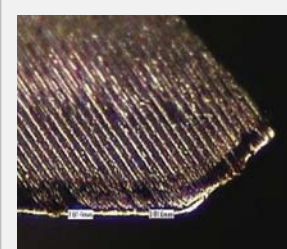
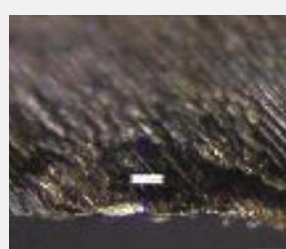


WORKPIECES	CUTTING CONDITIONS
Material	Cutting Speed : 4500 rpm (Vc = 127m/min)
.....	Feed Rate : 540 mm/min (fz = 0.03 mm/z)
Hardness	Ap : 6 mm
	Ae : 6 mm
	Coolant : Dry cut with air blow
	Machine : Makino S33



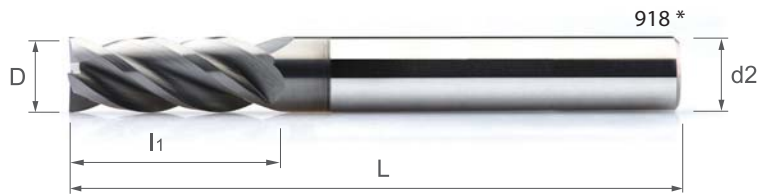
Operation Type: Slotting

Tool Diameter	: 6 mm
Total Cutting Distance	: 12 Meters
Total Cutting Time	: 0.5 Hours
MRR (Q)	: 19.44 cm ³ /min

After the 60th Layer (12 Meters)

STANDARD LINE		OPTIMUM LINE	
			
	Load = 23.0%		Load = 20.2%
	Avg. Flank Wear = 0.035 mm		Avg. Flank Wear = 0.024 mm
			

Optimum Line DP Standard Endmill



EDPNo./EDV-Nr./ CODEusine/CodiceEDP	Dimension (mm)				918 *
	D	l1	L	d2 (h6)	G6110
=*+Ødata					
0100 050 03	1	3	50	3	●
0100 050 04	1	3	50	4	●
0150 050 03	1.5	4.5	50	3	●
0150 050 04	1.5	4.5	50	4	●
0200 050 03	2	6.5	50	3	●
0200 050 04	2	6.5	50	4	●
0250 050 03	2.5	6.5	50	3	●
0250 050 04	2.5	6.5	50	4	●
0300 050 03	3	9	50	3	●
0300 050 04	3	9	50	4	●
0300 050 06	3	9	50	6	●
0400	4	12	50	4	●
0400 050 06	4	12	50	6	●
0500	5	15	50	5	●
0500 050 06 15	5	15	50	6	●
0600 050 16	6	16	50	6	●
0600 060	6	20	60	6	●
0800 22	8	22	64	8	●
1000 075	10	22	75	10	●
1000 070 27	10	27	70	10	●
1200 075 32	12	32	75	12	●
1400	14	32	90	14	○
1600	16	32	90	16	●
1800	18	38	100	18	○
2000	20	38	100	20	●

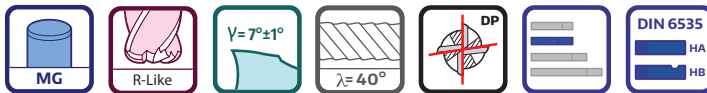
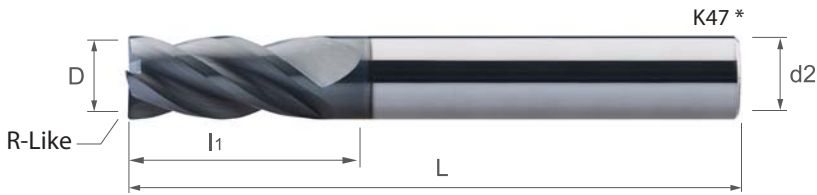
Material group - Material-Gruppe - Groupe matière - Gruppo materiali - 材质主类

N01	N02	N03	K01	K02	P01	P02	P03	M01	M02	S01	S02	S03	H01	H02	O1	O2
●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○

Working Material	Cutting Parameter
-	-

TECHNICAL SPECIFICATIONS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

Optimum Line DP R-Like Endmill



EDPNo./EDV-Nr./ CODEusine/CodiceEDP	Dimension (mm)						K47 *	K38 *
	D	I1	I2	L	d2 (h6)	R-Like	HA H6110	HB H6110
=*+Ødata								
0100 050 03	1	3		50	3	0.02	●	-
0150 050 03	1.5	4.5		50	3	0.05	●	-
0200 050 03	2	6.5		50	3	0.05	●	-
0250 050 03	2.5	6.5		50	3	0.05	●	-
0300 050 03	3	9	15	50	3	0.1	●	-
0300 050 06	3	9	15	50	6	0.1	●	●
0400	4	12	20	50	4	0.1	●	-
0400 057 06 11	4	11	20	57	6	0.1	●	●
0500	5	15	20	50	5	0.1	●	-
0500 057 06 13	5	13	20	57	6	0.1	●	●
0600 057 13	6	13	20	57	6	0.1	●	●
0600 060	6	20	25	60	6	0.1	●	●
0800	8	20	26	64	8	0.2	●	●
1000 072	10	22	32	72	10	0.2	●	●
1000 070 27	10	27	32	70	10	0.2	●	●
1200 083 26	12	26	37	83	12	0.2	●	●
1400 083 26	14	26	37	83	14	0.2	●	●
1600 092	16	32	42	92	16	0.2	●	●
1800 092 32	18	32	42	92	18	0.2	●	●
2000 104	20	38	50	104	20	0.2	●	●

K52 * K53 *



R - Like is an enhanced edge protection.

Material group - Material-Gruppe - Groupe matière - Gruppo materiali - 材质主类

N01	N02	N03	K01	K02	P01	P02	P03	M01	M02	S01	S02	S03	H01	H02	O1	O2
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Working Material	Cutting Parameter
-	9-12

TECHNICAL SPECIFICATIONS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

1 Differential Pitch (DP) Design

Reduces Vibrations

- Maximizes productivity and tool life

2 Superior Coating Grade

- Improves tool performance and stability

3 Superior Coating

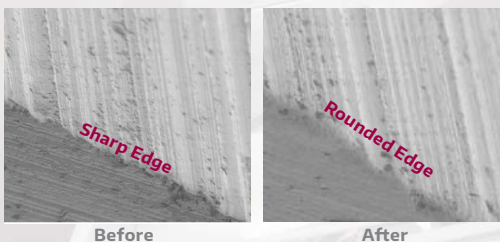
Enhances Cutting Performance

- Improve wear and fracture resistance in machining wide range of materials
- Superior cutting performance on wet machining

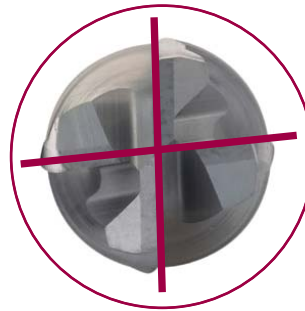
4 Cutting Edge Preparation

Enhances Tool Life

- Less material adhere on the cutting edge for stable machining
- Improve wear resistance and reduce excessive friction



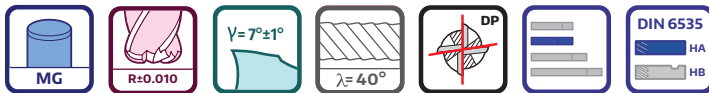
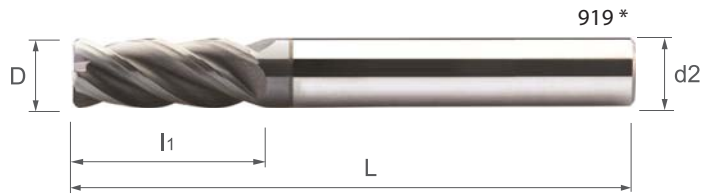
End Face View



Differential Pitch (DP)



Optimum Line DP Torus Endmill



EDPNo./EDV-Nr./ CODEusine/CodiceEDP =*+Ødata	Dimension (mm)						919 *
	D	l1	l2	L	d2 (h6)	R	H6110
0100 050 0300 010	1	3		50	3	0.1	●
0150 050 0300 020	1.5	4.5		50	3	0.2	●
0200 050 0300 020	2	6.5		50	3	0.2	●
0250 050 0300 030	2.5	6.5		50	3	0.3	●
0300 050 0300 030	3	9	15	50	3	0.3	●
0300 050 0300 050	3	9	15	50	3	0.5	●
0300 057 0600 030	3	9	15	57	6	0.3	●
0300 057 0600 050	3	9	15	57	6	0.5	●
0400 050 0400 030	4	12	20	50	4	0.3	●
0400 050 0400 050	4	12	20	50	4	0.5	●
0400 057 0600 030	4	12	20	57	6	0.3	●
0400 057 0600 050	4	12	20	57	6	0.5	●
0500 050 0500 030	5	15	22	50	5	0.3	●
0500 050 0500 050	5	15	22	50	5	0.5	●
0500 057 0600 030	5	15	22	57	6	0.3	●
0500 057 0600 050	5	15	22	57	6	0.5	●
0600 057 0600 030	6	16	22	57	6	0.3	●
0600 057 0600 050	6	16	22	57	6	0.5	●
0600 057 0600 100	6	16	22	57	6	1	●
0800 064 0800 030	8	20	26	64	8	0.3	●
0800 064 0800 050	8	20	26	64	8	0.5	●
0800 064 0800 100	8	20	26	64	8	1	●
0800 064 0800 200	8	20	26	64	8	2	●
1000 070 1000 050	10	22	30	70	10	0.5	●
1000 070 1000 100	10	22	30	70	10	1	●
1000 070 1000 200	10	22	30	70	10	2	●
1200 083 1200 050	12	25	35	83	12	0.5	●
1200 083 1200 100	12	25	35	83	12	1	●

919 *

cont'd ►

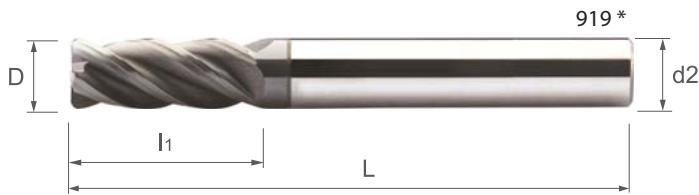
Material group - Material-Gruppe - Groupe matière - Gruppo materiali - 材质主类

N01	N02	N03	K01	K02	P01	P02	P03	M01	M02	S01	S02	S03	H01	H02	O1	O2
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Working Material	Cutting Parameter
-	9-12

TECHNICAL SPECIFICATIONS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

Optimum Line DP Torus Endmill

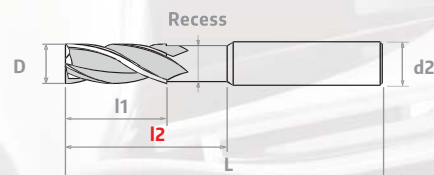


EDPNo./EDV-Nr./ CODEusine/CodiceEDP	Dimension (mm)						919 *
	D	L1	L2	L	d2 (h6)	R	H6110
=*+Ødata							
1200 083 1200 200	12	25	35	83	12	2	●
1600 090 1600 050	16	32	42	90	16	0.5	●
1600 090 1600 100	16	32	42	90	16	1	●
1600 090 1600 200	16	32	42	90	16	2	●
1600 090 1600 300	16	32	42	90	16	3	●
2000 100 2000 050	20	38	50	100	20	0.5	●
2000 100 2000 100	20	38	50	100	20	1	●
2000 100 2000 200	20	38	50	100	20	2	●
2000 100 2000 300	20	38	50	100	20	3	●

991 *

Tools with recess upon request

- Fräser mit **Freistellung** auf Bestellung
- Outils a vec **dégagemen t** sur demande
- Utensilli con **riduzione gambo** su richiesta a
- 密齿立铣刀带颈位特别要求



Material group - Material-Gruppe - Groupe matière - Gruppo materiali - 材质主类

N01	N02	N03	K01	K02	P01	P02	P03	M01	M02	S01	S02	S03	H01	H02	O1	O2
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Working Material	Cutting Parameter
-	9-12

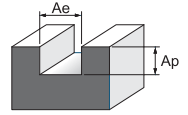
TECHNICAL SPECIFICATIONS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

Optimum Line Cutting Parameters

Ramping	P						M				K	
Work Material	Carbon Steel		Alloy Steel		Prehardened Steel		Stainless Steel		Stainless Steel		Grey Cast Iron	
Properties	320 < Rm < 880		520 < Rm < 1200		35 ≤ HRC < 45		High Machinability		Low Machinability		520 < Rm < 1200	
Cutting Depth, Ap	1.00 × D		1.00 × D		1.00 × D		1.00 × D		1.00 × D		1.00 × D	
Ramping angle	45°		45°		30°		15°		10°		45°	
Diameter, D	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	0.017	-	0.017	-	0.016	-	0.005	-	0.005	-	0.005
4	-	0.024	-	0.024	-	0.023	-	0.009	-	0.006	-	0.006
5	-	0.031	-	0.032	-	0.031	-	0.011	-	0.008	-	0.008
6	-	0.037	-	0.038	-	0.037	-	0.015	-	0.009	-	0.010
8	-	0.052	-	0.054	-	0.053	-	0.020	-	0.013	-	0.014
10	120	0.069	105	0.071	95	0.070	90	0.024	50	0.017	125	0.018
12	-	0.086	-	0.090	-	0.089	-	0.030	-	0.021	-	0.023
14	-	0.101	-	0.105	-	0.104	-	0.037	-	0.024	-	0.031
16	-	0.120	-	0.126	-	0.126	-	0.045	-	0.038	-	0.035
18	-	0.135	-	0.141	-	0.141	-	0.050	-	0.051	-	0.043
20	-	0.157	-	0.165	-	0.165	-	0.058	-	0.069	-	0.048

Ramping	N				S	
Work Material	Wrought Aluminium		Cast Aluminium		Titanium Alloy	
Properties	Si < 9%		Si ≥ 9%		-	
Cutting Depth, Ap	1.00 × D		1.00 × D		1.00 × D	
Ramping angle	30°		45°		10°	
Diameter, D	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	-	0.013	-	0.012	-	0.012
4	-	0.017	-	0.017	-	0.016
5	-	0.022	-	0.023	-	0.021
6	-	0.027	-	0.028	-	0.025
8	-	0.038	-	0.040	-	0.035
10	150	0.047	135	0.049	60	0.043
12	-	0.060	-	0.063	-	0.057
14	-	0.070	-	0.077	-	0.066
16	-	0.084	-	0.093	-	0.080
18	-	0.094	-	0.105	-	0.090
20	-	0.110	-	0.122	-	0.105

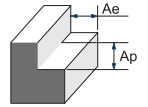
Optimum Line Cutting Parameters



Slotting	P						M				K	
Work Material	Carbon Steel		Alloy Steel		Prehardened Steel		Stainless Steel		Stainless Steel		Grey Cast Iron	
Properties	320 < Rm < 880		520 < Rm < 1200		35 ≤ HRC < 45		High Machinability		Low Machinability		520 < Rm < 1200	
Cutting Depth, Ap	0.60 × D		0.50 × D		0.50 × D		0.50 × D		0.30 × D		0.60 × D	
Cutting Depth, Ae	1.00 × D		1.00 × D		1.00 × D		1.00 × D		1.00 × D		1.00 × D	
Diameter, D	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	0.009	-	0.009	-	0.011	-	0.007	-	0.005	-	0.005
4	-	0.013	-	0.012	-	0.015	-	0.012	-	0.006	-	0.007
5	-	0.017	-	0.016	-	0.020	-	0.014	-	0.008	-	0.009
6	-	0.020	-	0.019	-	0.024	-	0.019	-	0.009	-	0.010
8	-	0.028	-	0.027	-	0.034	-	0.025	-	0.013	-	0.014
10	190	0.035	175	0.034	120	0.043	95	0.033	50	0.017	140	0.018
12	-	0.045	-	0.043	-	0.055	-	0.045	-	0.021	-	0.023
14	-	0.055	-	0.053	-	0.069	-	0.056	-	0.024	-	0.028
16	-	0.063	-	0.061	-	0.079	-	0.066	-	0.038	-	0.032
18	-	0.074	-	0.073	-	0.094	-	0.082	-	0.051	-	0.040
20	-	0.083	-	0.081	-	0.105	-	0.091	-	0.069	-	0.045

Slotting	N				S	
Work Material	Wrought Aluminium		Cast Aluminium		Titanium Alloy	
Properties	Si < 9%		Si ≥ 9%		-	
Cutting Depth, Ap	0.80 × D		0.70 × D		0.30 × D	
Cutting Depth, Ae	1.00 × D		1.00 × D		1.00 × D	
Diameter, D	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	-	0.009	-	0.009	-	0.011
4	-	0.012	-	0.012	-	0.015
5	-	0.016	-	0.016	-	0.019
6	-	0.019	-	0.019	-	0.023
8	-	0.026	-	0.027	-	0.032
10	250	0.033	220	0.034	65	0.040
12	-	0.041	-	0.043	-	0.052
14	-	0.051	-	0.052	-	0.061
16	-	0.058	-	0.060	-	0.073
18	-	0.068	-	0.071	-	0.083
20	-	0.075	-	0.079	-	0.097

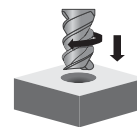
Optimum Line Cutting Parameters



Side Milling	P						M				K	
Work Material	Carbon Steel		Alloy Steel		Prehardened Steel		Stainless Steel		Stainless Steel		Grey Cast Iron	
Properties	320 < Rm < 880		520 < Rm < 1200		35 ≤ HRC < 45		High Machinability		Low Machinability		520 < Rm < 1200	
Cutting Depth, Ap	1.15 × D		1.00 × D		1.00 × D		1.00 × D		0.70 × D		1.00 × D	
Cutting Depth, Ae	0.30 × D		0.30 × D		0.30 × D		0.30 × D		0.30 × D		0.30 × D	
Diameter, D	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)
1		0.003		0.006		0.005		0.002		0.002		0.007
2		0.006		0.012		0.011		0.004		0.005		0.015
3		0.009		0.018		0.017		0.007		0.008		0.024
4		0.013		0.027		0.022		0.009		0.010		0.032
5		0.017		0.034		0.031		0.014		0.013		0.042
6		0.020		0.041		0.037		0.016		0.016		0.050
8	200	0.028	185	0.061	140	0.056	100	0.024	50	0.023	160	0.071
10		0.035		0.076		0.070		0.030		0.028		0.088
12		0.045		0.102		0.094		0.038		0.038		0.110
14		0.055		0.125		0.118		0.049		0.048		0.134
16		0.063		0.143		0.139		0.057		0.055		0.153
18		0.074		0.168		0.167		0.071		0.068		0.186
20		0.082		0.187		0.185		0.086		0.075		0.206

Side Milling	N				S	
Work Material	Wrought Aluminium		Cast Aluminium		Titanium Alloy	
Properties	Si < 9%		Si ≥ 9%		-	
Cutting Depth, Ap	1.20 × D		1.10 × D		0.80 × D	
Cutting Depth, Ae	0.30 × D		0.30 × D		0.30 × D	
Diameter, D	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)
1		0.003		0.003		0.006
2		0.006		0.006		0.014
3		0.009		0.009		0.024
4		0.012		0.012		0.031
5		0.016		0.016		0.047
6		0.019		0.019		0.056
8	260	0.027	230	0.027	80	0.079
10		0.033		0.034		0.098
12		0.042		0.043		0.130
14		0.049		0.050		0.158
16		0.058		0.060		0.181
18		0.065		0.068		0.212
20		0.076		0.079		0.236

Optimum Line Cutting Parameters



Plugging	P						K		N			
Work Material	Carbon Steel		Alloy Steel		Prehardened Steel		Grey Cast Iron		Wrought Aluminium		Cast Aluminium	
Properties	320 < Rm < 880		520 < Rm < 1200		35 ≤ HRC < 45		520 < Rm < 1200		Si < 9%		Si ≥ 9%	
Cutting Depth, Ap	-		-		-		-		-		-	
Cutting Depth, Ae	1.00 × D		1.00 × D		1.00 × D		1.00 × D		1.00 × D		1.00 × D	
Diameter, D	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)	Vc (m/min)	Fz (mm)
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	0.016	-	0.016	-	0.015	-	0.005	-	0.012	-	0.012
4	-	0.023	-	0.023	-	0.022	-	0.006	-	0.016	-	0.017
5	-	0.030	-	0.030	-	0.029	-	0.008	-	0.022	-	0.022
6	-	0.036	-	0.036	-	0.035	-	0.010	-	0.026	-	0.027
8	-	0.050	-	0.051	-	0.050	-	0.014	-	0.036	-	0.038
10	125	0.066	110	0.068	100	0.067	125	0.018	155	0.046	140	0.048
12	-	0.083	-	0.086	-	0.085	-	0.023	-	0.058	-	0.061
14	-	0.097	-	0.100	-	0.099	-	0.031	-	0.067	-	0.075
16	-	0.116	-	0.120	-	0.119	-	0.035	-	0.081	-	0.090
18	-	0.130	-	0.135	-	0.134	-	0.043	-	0.091	-	0.101
20	-	0.151	-	0.157	-	0.157	-	0.048	-	0.106	-	0.118

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