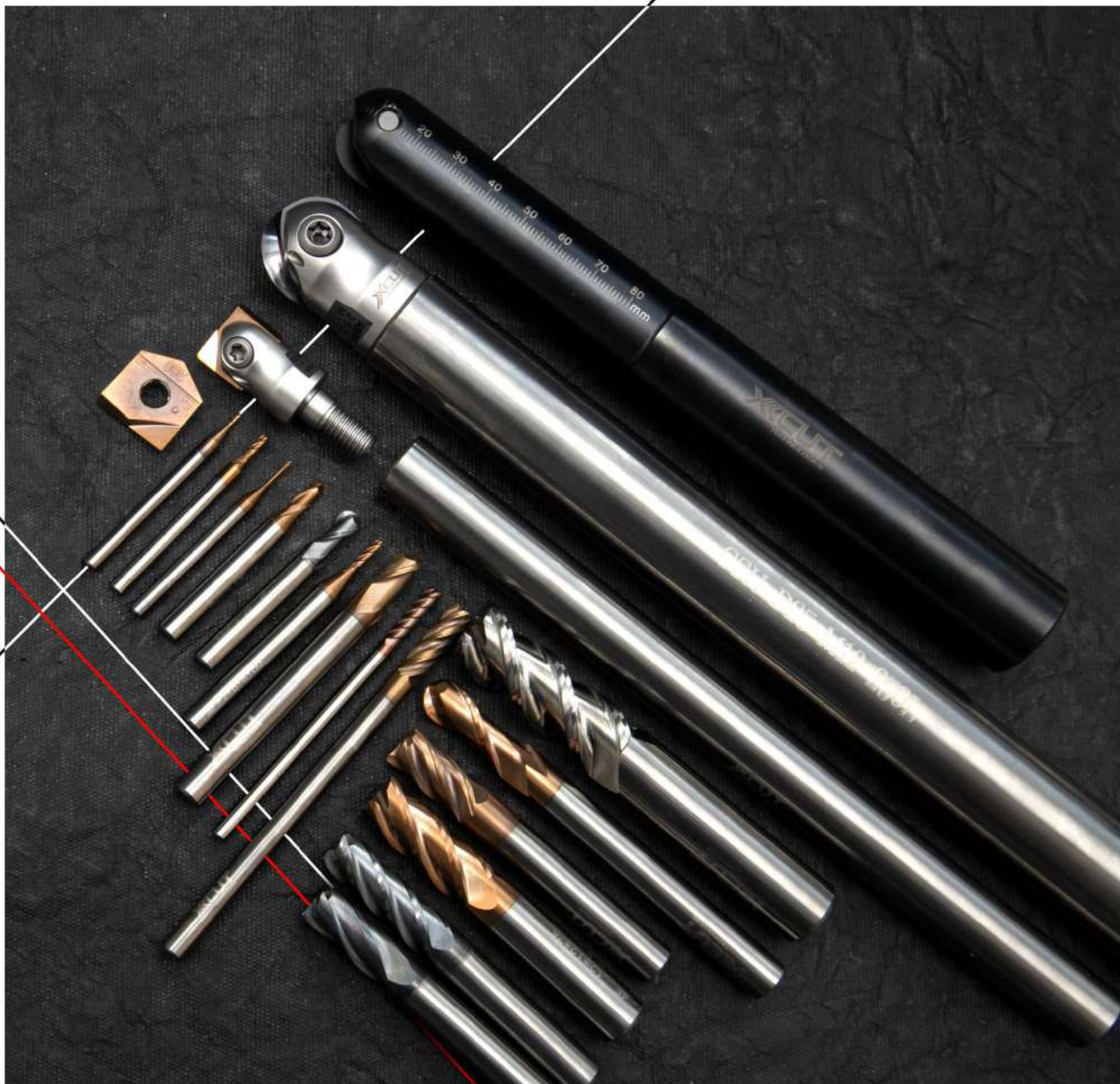




SOLID CARBIDE

- X-CUT Solid Carbide Series Covers Semi Finishing And Finishing Application
- Available in Standard Endmill & ballnose 2 Flutes, 4 Flutes, Multi Flutes as well as in ribs,
- Suitability for Tough Materials upto 62HRC

SOLID CARBIDE INDEX

Solid Carbide

329-392

DH-S

333-359

4 Flute Standard Endmills	334
4 Flute Square Long & Extra Long Endmills	335
2 Flute Standard Ballnose	336
2 Flute Long & Extra Long Ballnose	337
4 Flute Corner Radius Standard Endmills	338
4 Flute Corner Radius Long & Extra Long Endmills	339
Cutting Parameter	340-359

DELTA-HARD

360-380

4 Flute Standard Endmill	360
2 Flute Standard Ballnose	361
4 Flute Long Endmill Series	362
2 Flute Long Ballnose Series	363
4 Flute Ballnose line	364
4 Flute Corner Radius Endmill	365
Extra Long Length 4 Flute Square Endmill	366
2 Flute Rib Endmill	367
2 Flute BallNose Rib Endmill	368
4 Flute Rib Endmill	369
Cutting Parameter	370-380

SOLID CARBIDE INDEX

DELTA-MAXX

381-392

4 Flute Standard Endmill	381
4 Flute Long Endmill Series	382
2 Flute Standard Ballnose Line	383
2 Flute Long Ballnose Series	384
4 Flute Ballnose Line	385
4 Flute Corner Radius Endmill	386
Cutting Paramete	387-391



DH-S SERIES

Application

1. Finishing in Die and Mould
2. General Engineering Industries

Features

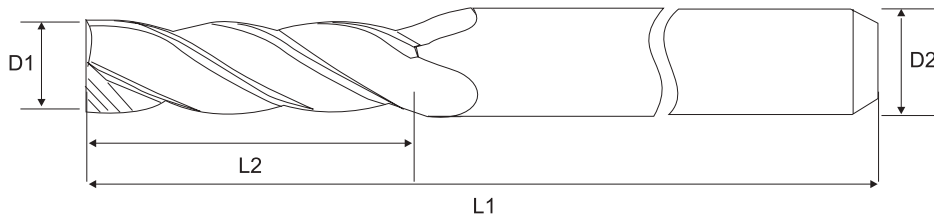
- Works on materials from 50-68 HRC
- Available in
 - 4 flute (standard and long lengths)
 - 2 flute ballnose (standard and long lengths)
 - 4 flute corner radius (standard and long lengths)
- Can compete with all competitors on performance

Benefits

- Works on Die and mould applications as well as stainless steels with high chromium content
- Higher helix and negative rake allows for smoother operation
- Can be even used with coolant as well for certain materials

DH-S SERIES

4 Flute Standard Endmills



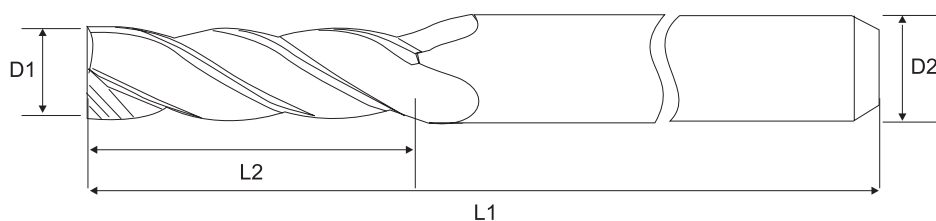
ITEM DESCRIPTION	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
EM1N4D4DH-S	1	4	3	50	●
EM1N4F6DH-S	1	4	6	50	●
EM1.5N4D4DH-S	1.5	4	4	50	●
EM2.5N4D4DH-S	2.5	4	8	50	●
EM3N4DH-S	3	3	9	50	●
EM3N4D4DH-S	3	4	8	50	●
EM4N4DH-S	4	4	10	50	●
EM5N4DH-S	5	3	13	50	●
EM5N4D6DH-S	5	6	13	50	●
EM6N4DH-S	6	6	15	30	●
EM8N4DH-S	8	8	20	60	●
EM10N4DH-S	10	10	24	75	●
EM12N4DH-S	12	12	24	75	●
EM16N4DH-S	16	16	40	100	●



● STOCKABLE ○ NON STOCKABLE

DH-S SERIES

4 Flute Square Long & Extra Long Endmills



ITEM DESCRIPTION	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
EM3L4DH-S	3	4	16	75	○
EM4L4DH-S	4	4	16	75	●
EM5L4DH-S	5	6	25	75	○
EM6L4DH-S	6	6	24	75	●
EM6LR4DH-S	6	6	24	100	●
EM6XL4DH-S	6	6	50	150	○
EM8L4DH-S	8	8	25	75	●
EM8LR4DH-S	8	8	32	100	●
EM8XL4DH-S	8	8	60	150	○
EM10LR4DH-S	10	10	40	100	●
EM10XL4DH-S	10	10	60	150	○
EM12LR4DH-S	12	12	40	100	●
EM12XL4DH-S	12	12	60	100	○
EM16XL4DH-S	16	16	60	150	○

TiSi

MG

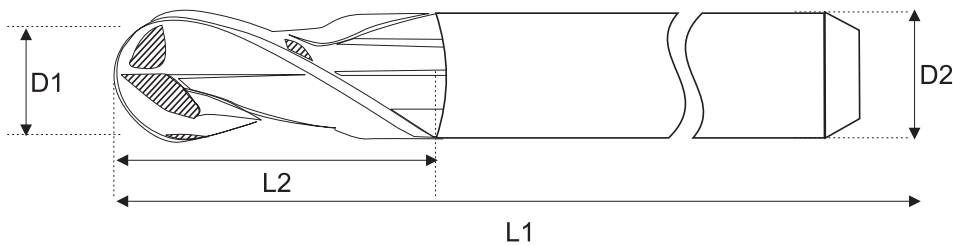
0.4
µmCo
12%HRC
>60

4Flute

● STOCKABLE ○ NON STOCKABLE

DH-S SERIES

2 Flute Standard Ballnose



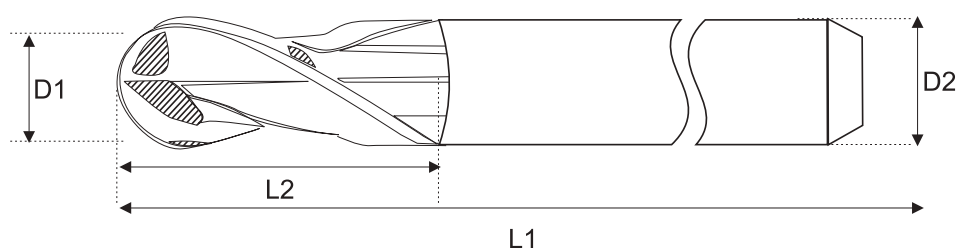
ITEM DESCRIPTION	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
BN0.8N2F6DH-S	R0.4	4	6	50	○
BN1N2D4DH-S	R0.5	4	2	50	●
BN1N2F6DH-S	R0.5	4	6	50	○
BN1N2F10DH-S	R0.5	4	10	50	○
BN1.5N2D4DH-S	R0.75	4	4	50	●
BN1.5N2F10DH-S	R0.75	4	10	50	○
BN1.5N2F12DH-S	R0.75	4	12	50	○
BN2N2D4DH-S	R1	4	4	50	●
BN2N2F10DH-S	R1	4	10	50	○
BN2N2F12DH-S	R1	4	12	50	○
BN2.5N2D4DH-S	R1.25	4	6	50	○
BN3N2D4DH-S	12	4	6	50	●
BN3N2F12DH-S	R1.5	4	12	50	○
BN3N2F20DH-S	R1.5	4	20	50	○
BN4N2DH-S	R2	4	8	50	●
BN4N2F20DH-S	R2	4	20	60	●
BN5N2D6DH-S	R2.5	6	10	50	●
BN6N2DH-S	R3	6	12	50	●
BN8N2DH-S	R4	8	16	60	●
BN10N2DH-S	R5	10	20	75	●
BN12N2DH-S	R6	12	25	75	●



● STOCKABLE ○ NON STOCKABLE

DH-S SERIES

2 Flute Long & Extra Long Ballnose



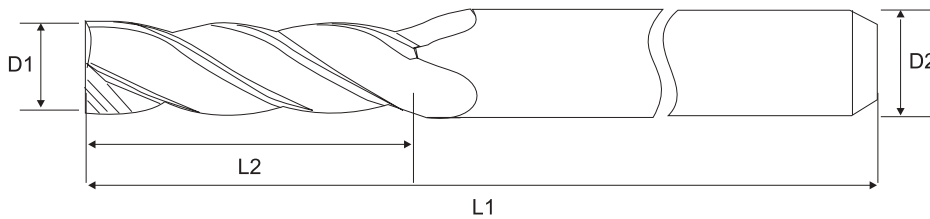
ITEM DESCRIPTION	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
BN3XL2004DH-S	R1.5	4	8	100	○
BN4L2DH-S	R2	4	10	75	●
BN4XL2DH-S	R2	4	10	100	●
BN6L2H-S	R3	6	12	75	○
BN6LR2DH-S	R3	6	12	100	●
BN8L2DH-S	R4	8	16	75	○
BN8LR2DH-S	R4	8	16	100	●
BN10LR2DH-S	R5	10	20	100	●
BN12LR2DH-S	R6	12	24	100	●

● STOCKABLE ○ NON STOCKABLE



DH-S SERIES

4 Flute Corner Radius Standard Endmills



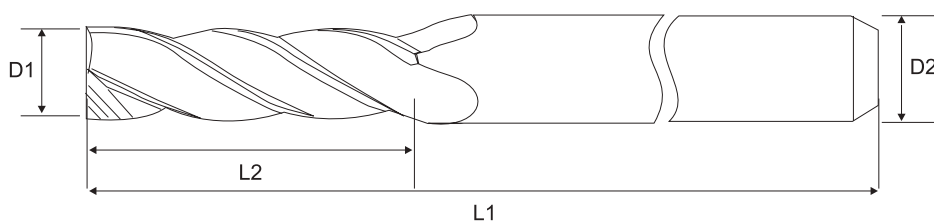
ITEM DESCRIPTION	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
EM3N4CR0.5D4DH-S	3R0.5	4	6	50	○
EM3N4CR1D4DH-S	3R1	4	6	50	○
EM4N4CR0.5DH-S	4R1	4	8	50	○
EM4N4CR1DH-S	4R1	4	8	50	○
EM5N4CR0.5D6DH-S	5R0.5	6	10	50	○
EM5N4CR1D6DH-S	5R1	6	10	50	○
EM6N4CR0.5DH-S	6R0.5	6	12	50	●
EM6N4CR1DH-S	6R1	6	12	50	●
EM8N4CR0.5DH-S	8R0.5	8	16	60	●
EM8N4CR1DH-S	8R1	8	16	60	●
EM10N4CR0.5DH-S	10R0.5	10	20	75	●
EM10N4CR1DH-S	10R1	10	20	75	●
EM12N4CR0.5DH-S	12R0.5	12	24	75	●
EM12N4CR1DH-S	12R1	12	24	75	●

STOCKABLE ○ NON STOCKABLE ●



DH-S SERIES

4 Flute Corner Radius Long & Extra Long Endmills



ITEM DESCRIPTION	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
EM6L4CR0.5DH-S	6R0.5	6	20	75	○
EM6L4CR1DH-S	6R1	6	20	75	○
EM6LR4CR0.5DH-S	6R0.5	6	20	100	○
EM6LR4CR1DH-S	6R1	6	20	100	○
EM8L4CR0.5DH-S	8R0.5	8	20	75	○
EM8L4CR1DH-S	8R1	8	20	75	○
EM8LR4CR0.5DH-S	8R0.5	8	20	100	○
EM8LR4CR1DH-S	8R1	8	20	100	○
EM10L4CR0.5DH-S	10R0.5	10	20	100	●
EM10L4CR1DH-S	10R1	10	20	100	●
EM10XL4CR0.5DH-S	10R0.5	10	30	150	○
EM10XL4CR1DH-S	10R1	10	30	150	○
EM12L4CR0.5DH-S	12R0.5	12	24	100	●
EM12L4CR1DH-S	12R1	12	24	100	●
EM12XL4CR0.5DH-S	12R0.5	12	30	150	○
EM12XL4CR1DH-S	12R1	12	30	150	○



● STOCKABLE ○ NON STOCKABLE

Cutting Parameter - Ballnose Standard

PROFILE MILLING	$\alpha \leq 15^\circ$								
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
"HARDENED STEEL (55-62 HRC) AISI H13,AISI H13, AISI D2 SKH, SKS ETC"	M28	0.3	2	38.00	0.000 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 160
		0.4	2	50.00	0.000 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	21 - 160
		0.8	2	101.00	0.002 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 320
		0.8	2	101.00	0.002 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	161 - 320
		1.0	2	126.00	0.003 - 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	240 - 400
		1.5	2	187 - 188	0.005 - 0.007	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	39790 - 40000	400 - 560
		2.0	2	187 - 251	0.008 - 0.010	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	29790 - 40000	480 - 800
		2.5	2	187 - 281	0.010 - 0.012	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	23840 - 35750	480 - 860
		3	2	187 - 281	0.012 - 0.015	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	19860 - 29790	480 - 890
		4	2	187 - 281	0.017 - 0.019	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	14900 - 22350	510 - 850
		5	2	187 - 281	0.021 - 0.024	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11920 - 17880	500 - 860
		6	2	187 - 281	0.026 - 0.029	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	9930 - 14900	520 - 860
		8	2	187 - 281	0.033 - 0.036	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	7450 - 11170	490 - 800
		10	2	187 - 281	0.039 - 0.043	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5960 - 8940	460 - 770
		12	2	187 - 281	0.045 - 0.050	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4970 - 7450	450 - 750
		14	2	187 - 281	0.052 - 0.057	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4260 - 6380	440 - 730
		16	2	187 - 281	0.058 - 0.064	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3720 - 5590	430 - 720
		18	2	187 - 281	0.065 - 0.071	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3310 - 4970	430 - 710
		20	2	187 - 281	0.071 - 0.078	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2980 - 4470	420 - 700

PROFILE MILLING	$\alpha > 15^\circ$								
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL(55 - 62 HRC). AISI H13, AISI D2 SKH, SKS ETC	M28	0.3	2	38.00	0.000 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 80
		0.4	2	50.00	0.000 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 160
		0.8	2	101.00	0.002 - 0.003	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 240
		0.8	2	101.00	0.002 - 0.003	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 240
		1.0	2	126.00	0.002 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 320
		1.5	2	175 - 188	0.004 - 0.006	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	37080 - 40000	300 - 480
		2.0	2	175 - 251	0.006 - 0.008	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	27810 - 40000	330 - 640
		2.5	2	175 - 262	0.008 - 0.010	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	22250 - 33370	360 - 670
		3	2	175 - 262	0.010 - 0.012	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	18540 - 27810	370 - 670
		4	2	175 - 262	0.013 - 0.015	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	13900 - 20860	360 - 630
		5	2	175 - 262	0.017 - 0.019	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11120 - 16680	380 - 630
		6	2	175 - 262	0.021 - 0.023	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	9270 - 13900	390 - 640
		8	2	175 - 262	0.026 - 0.029	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	6950 - 10430	360 - 600
		10	2	175 - 262	0.031 - 0.034	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5560 - 8340	340 - 570
		12	2	175 - 262	0.036 - 0.040	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4630 - 6950	330 - 560
		14	2	175 - 262	0.041 - 0.046	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3970 - 5960	330 - 550
		16	2	175 - 262	0.047 - 0.051	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3480 - 5210	330 - 530
		18	2	175 - 262	0.052 - 0.057	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3090 - 4630	320 - 530
		20	2	175 - 262	0.057 - 0.063	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2780 - 4170	320 - 530

Cutting Parameter - Ballnose Standard

PROFILE MILLING	$\alpha \leq 15^\circ$								
MATERIAL	MATERIAL GROUPS	O1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
"HARDENED STEEL (55-62 HRC) AISI H13,AISI H13, AISI D2 SKH, SKS ETC"	M28	0.3	2	38.00	0.000 - 0.000	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		0.4	2	50.00	0.000 - 0.000	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		0.8	2	101.00	0.000 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		0.8	2	101.00	0.000 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		1.0	2	126.00	0.001 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		1.5	2	140 ~ 188	0.002 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	29790 ~ 40000	120 ~ 160
		2.0	2	140 ~ 234	0.002 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	22350 ~ 37240	90 ~ 220
		2.5	2	140 ~ 234	0.003 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	17880 ~ 29790	110 ~ 240
		3	2	140 ~ 234	0.004 - 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	14900 ~ 24830	120 ~ 250
		4	2	140 ~ 234	0.006 - 0.006	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11170 ~ 18620	130 ~ 220
		5	2	140 ~ 234	0.007 - 0.008	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	8940 ~ 14900	130 ~ 240
		6	2	140 ~ 234	0.009 - 0.010	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	7450 ~ 12410	130 ~ 250
		8	2	140 ~ 234	0.011 - 0.012	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5590 ~ 9310	120 ~ 220
		10	2	140 ~ 234	0.013 - 0.014	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4470 ~ 7450	120 ~ 220
		12	2	140 ~ 234	0.015 - 0.017	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3720 ~ 6210	120 ~ 210
		14	2	140 ~ 234	0.017 - 0.019	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3190 ~ 5320	110 ~ 210
		16	2	140 ~ 234	0.019 - 0.021	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3190 ~ 5320	110 ~ 200
		18	2	140 ~ 234	0.022 - 0.024	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2480 ~ 4140	110 ~ 200
		20	2	140 ~ 234	0.024 - 0.026	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2230 ~ 3720	110 ~ 190

PROFILE MILLING	$\alpha > 15^\circ$								
MATERIAL	MATERIAL GROUPS	O1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (55 ~ 60 HRC) AISI D2	M33	0.3	2	38.00	0.000 - 0.000	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		0.4	2	50.00	0.000 - 0.000	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		0.8	2	101.00	0.000 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		0.8	2	101.00	0.000 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		1.0	2	126.00	0.001 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		1.5	2	131 ~ 188	0.001 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	27810 ~ 40000	60 ~ 160
		2.0	2	131 ~ 218	0.002 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	20860 ~ 34760	80 ~ 140
		2.5	2	131 ~ 218	0.002 - 0.003	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	16680 ~ 27810	70 ~ 170
		3	2	131 ~ 218	0.003 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	13900 ~ 23170	80 ~ 190
		4	2	131 ~ 218	0.004 - 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	10430 ~ 17380	80 ~ 170
		5	2	131 ~ 218	0.006 - 0.006	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	8340 ~ 13900	100 ~ 170
		6	2	131 ~ 218	0.007 - 0.008	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	6950 ~ 11590	100 ~ 190
		8	2	131 ~ 218	0.009 - 0.010	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5210 ~ 8690	90 ~ 170
		10	2	131 ~ 218	0.010 - 0.011	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4170 ~ 6950	80 ~ 150
		12	2	131 ~ 218	0.012 - 0.013	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3480 ~ 5790	80 ~ 150
		14	2	131 ~ 219	0.014 - 0.015	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2980 ~ 4970	80 ~ 150
		16	2	131 ~ 218	0.016 - 0.017	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2610 ~ 4340	80 ~ 150
		18	2	131 ~ 218	0.017 - 0.019	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2320 ~ 3860	80 ~ 150
		20	2	131 ~ 219	0.019 - 0.021	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2090 ~ 3480	80 ~ 150

Cutting Parameter - Ballnose Long

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	01 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (45 - 52 HRC), AISI H13, AISI D2, SUS 420 ETC	M26,27	0.3	2	38.00	0.001 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 80
		0.4	2	50.00	0.000 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 160
		0.8	2	101	0.002 - 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 400
		0.8	2	101	0.002 - 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 400
		1.0	2	126	0.004 - 0.006	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	320 - 480
		1.5	2	187 - 188	0.007 - 0.009	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	39730 - 40000	560 - 720
		2.0	2	187 - 251	0.010 - 0.012	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	29790 - 40000	600 - 960
		2.5	2	187 - 262	0.013 - 0.016	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	23840 - 33370	620 - 1070
		3	2	187 - 262	0.016 - 0.019	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	19860 - 27810	640 - 1060
		4	2	187 - 262	0.022 - 0.025	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	14900 - 20860	660 - 1040
		5	2	187 - 262	0.029 - 0.032	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11920 - 16680	690 - 1070
		6	2	187 - 262	0.035 - 0.038	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	9930 - 13900	700 - 1060
		8	2	187 - 262	0.043 - 0.048	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	7450 - 10430	640 - 1000
		10	2	187 - 262	0.052 - 0.057	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5960 - 8340	620 - 950
		12	2	187 - 262	0.061 - 0.067	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4970 - 6950	610 - 930
		14	2	187 - 262	0.069 - 0.076	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4260 - 5960	590 - 910
		16	2	187 - 262	0.078 - 0.085	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3720 - 5210	580 - 890
		18	2	187 - 262	0.086 - 0.095	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3310 - 4630	570 - 880
		20	2	187 - 162	0.095 - 0.104	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2980 - 4170	570 - 870

PROFILE MILLING		$\alpha \geq 15^\circ$							
MATERIAL	MATERIAL GROUPS	01 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (45 - 52 HRC), AISI H13, AISI D2, SUS 420 ETC	M26,27	0.3	2	38.00	0.001 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 80
		0.4	2	50.00	0.000 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 160
		0.8	2	101.00	0.002 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 320
		0.8	2	101.00	0.002 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 320
		1.0	2	126.00	0.003 - 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	240 - 400
		1.5	2	175 - 188	0.005 - 0.007	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	37080 - 40000	370 - 560
		2.0	2	175 - 245	0.008 - 0.010	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	27810 - 38930	440 - 780
		2.5	2	175 - 245	0.010 - 0.012	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	22250 - 31140	450 - 750
		3	2	175 - 245	0.013 - 0.015	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	18540 - 25950	480 - 780
		4	2	175 - 245	0.018 - 0.020	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	13900 - 19470	500 - 780
		5	2	175 - 245	0.023 - 0.025	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11120 - 15570	510 - 780
		6	2	175 - 245	0.028 - 0.031	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	9270 - 12980	520 - 800
		8	2	175 - 245	0.035 - 0.038	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	6950 - 9730	490 - 740
		10	2	175 - 245	0.042 - 0.046	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5560 - 7790	470 - 720
		12	2	175 - 245	0.048 - 0.053	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4630 - 6490	440 - 690
		14	2	175 - 245	0.055 - 0.061	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3970 - 5560	440 - 680
		16	2	175 - 245	0.062 - 0.068	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3480 - 4870	430 - 660
		18	2	175 - 245	0.069 - 0.076	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3090 - 4330	430 - 660
		20	2	175 - 245	0.076 - 0.083	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2780 - 3890	420 - 650

Cutting Parameter - Ballnose Long

PROFILE MILLING	$\alpha < 15^\circ$								
MATERIAL	MATERIAL GROUPS	01 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL 152 63 HRC) AISI H13, AISI D2, SUS 420 ETC	M28	0.3	2	38.00	0.000 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 160
		0.4	2	50	0.000 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 160
		0.8	2	101	0.002 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 320
		0.8	2	101	0.002 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 320
		1	2	126	0.003 - 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	240 - 400
		1.5	2	150 ~ 188	0.005 - 0.007	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	31780 - 40000	320 - 560
		2	2	150 ~ 188	0.008 - 0.010	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	23840 - 35750	380 - 720
		2.5	2	150 ~ 188	0.010 - 0.012	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	19070 - 28600	380 - 690
		3	2	150 ~ 188	0.012 - 0.015	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	15890 - 23840	380 - 720
		4	2	150 ~ 188	0.017 - 0.019	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11920 - 17880	410 - 680
		5	2	150 ~ 188	0.021 - 0.024	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	9530 - 14300	400 - 690
		6	2	150 ~ 188	0.026 - 0.029	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	7950 - 11920	410 - 690
		8	2	150 ~ 188	0.033 - 0.036	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5960 - 8940	390 - 640
		10	2	150 ~ 188	0.039 - 0.043	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4770 - 7150	370 - 610
		12	2	150 ~ 188	0.045 - 0.050	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3970 - 5960	360 - 600
		14	2	150 ~ 188	0.052 - 0.057	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3410 - 5110	350 - 580
		16	2	150 ~ 188	0.058 - 0.064	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2980 - 4470	350 - 570
		18	2	150 ~ 224	0.065 - 0.071	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2650 - 3970	340 - 560
		20	2	150 ~ 188	0.071 - 0.078	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2380 - 3580	340 - 560

PROFILE MILLING	$\alpha \geq 15^\circ$								
MATERIAL	MATERIAL GROUPS	01 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (52 ~ 63 HRC) AISI H13, AISI D2, SKH ETC	M28	0.3	2	38.00	0.000 - 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 80
		0.4	2	50.00	0.000 - 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 - 160
		0.8	2	101.00	0.002 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 240
		0.8	2	101.00	0.002 - 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 240
		1.0	2	126.00	0.003 - 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 - 320
		1.5	2	175 ~ 188	0.005 - 0.007	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	29660 - 40000	240 - 480
		2.0	2	175 ~ 245	0.008 - 0.010	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	22250 - 33370	270 - 530
		2.5	2	175 ~ 245	0.010 - 0.012	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	17800 - 26700	280 - 530
		3	2	175 ~ 245	0.013 - 0.015	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	14830 - 22250	300 - 530
		4	2	175 ~ 245	0.018 - 0.020	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11120 - 16680	290 - 500
		5	2	175 ~ 245	0.023 - 0.025	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	8900 - 13350	300 - 510
		6	2	175 ~ 245	0.028 - 0.031	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	7420 - 11120	310 - 510
		8	2	175 ~ 245	0.035 - 0.038	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5560 - 8340	290 - 480
		10	2	175 ~ 245	0.042 - 0.046	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4450 - 6670	280 - 450
		12	2	175 ~ 245	0.048 - 0.053	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3710 - 5560	270 - 440
		14	2	175 ~ 245	0.055 - 0.061	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3180 - 4770	260 - 440
		16	2	175 ~ 245	0.062 - 0.068	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2780 - 4170	260 - 430
		18	2	175 ~ 245	0.069 - 0.076	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2470 - 3710	260 - 420
		20	2	175 ~ 245	0.076 - 0.083	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2220 - 3340	250 - 420

Cutting Parameter - Ballnose Long

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	01 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (55-60 HRC) AISI D2	M33	0.3	2	38	0.000 ~ 0.000	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.4	2	50	0.000 ~ 0.000	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.8	2	101	0.000 ~ 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.8	2	101	0.000 ~ 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		1	2	112 ~ 126	0.0001 ~ 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	35750 ~ 40030	70 ~ 80
		1.5	2	112 ~ 187	0.002 ~ 0.002	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	23840 ~ 39730	100 ~ 160
		2	2	112 ~ 187	0.002 ~ 0.003	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	17880 ~ 29790	70 ~ 180
		2.5	2	112 ~ 187	0.003 ~ 0.004	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	14300 ~ 23840	90 ~ 190
		3	2	112 ~ 187	0.004 ~ 0.005	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	11920 ~ 19860	100 ~ 200
		4	2	112 ~ 187	0.006 ~ 0.006	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	8940 ~ 14900	110 ~ 180
		5	2	112 ~ 187	0.007 ~ 0.008	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	7150 ~ 11920	100 ~ 190
		6	2	112 ~ 187	0.009 ~ 0.010	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	5960 ~ 9930	110 ~ 110
		8	2	112 ~ 187	0.011 ~ 0.012	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	4470 ~ 7450	100 ~ 180
		10	2	112 ~ 187	0.013 ~ 0.014	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	3580 ~ 5960	90 ~ 170
		12	2	112 ~ 187	0.015 ~ 0.017	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2980 ~ 4970	90 ~ 170
		14	2	112 ~ 187	0.017 ~ 0.019	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2550 ~ 4260	90 ~ 160
		16	2	112 ~ 187	0.019 ~ 0.021	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2230 ~ 3720	80 ~ 160
		18	2	113 ~ 187	0.022 ~ 0.024	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1990 ~ 3310	90 ~ 160
		20	2	112 ~ 187	0.024 ~ 0.026	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1790 ~ 2980	90 ~ 150

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	01 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (55-60 HRC) AISI D2	M33	0.3	2	38	0.000 ~ 0.000	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.4	2	50	0.000 ~ 0.000	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.8	2	101	0.000 ~ 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.8	2	101	0.000 ~ 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		1	2	105 ~ 126	0.001 ~ 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	33370 ~ 40303	70 ~ 80
		1.5	2	105 ~ 175	0.001 ~ 0.002	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	22250 ~ 37080	40 ~ 150
		2	2	105 ~ 175	0.002 ~ 0.002	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	16680 ~ 27810	70 ~ 110
		2.5	2	105 ~ 175	0.002 ~ 0.003	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	13350 ~ 22250	50 ~ 130
		3	2	105 ~ 175	0.003 ~ 0.004	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	11120 ~ 18540	70 ~ 150
		4	2	105 ~ 175	0.004 ~ 0.005	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	8340 ~ 13900	70 ~ 140
		5	2	105 ~ 175	0.006 ~ 0.006	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	6670 ~ 11120	80 ~ 130
		6	2	105 ~ 175	0.007 ~ 0.008	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	5560 ~ 9270	80 ~ 150
		8	2	105 ~ 175	0.009 ~ 0.010	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	4170 ~ 6950	80 ~ 140
		10	2	105 ~ 175	0.010 ~ 0.011	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	3340 ~ 5560	70 ~ 120
		12	2	105 ~ 175	0.012 ~ 0.013	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2780 ~ 4630	70 ~ 120
		14	2	105 ~ 175	0.014 ~ 0.015	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2380 ~ 3970	70 ~ 120
		16	2	105 ~ 175	0.016 ~ 0.017	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2090 ~ 3480	70 ~ 120
		18	2	105 ~ 175	0.017 ~ 0.019	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1850 ~ 3090	60 ~ 120
		20	2	105 ~ 175	0.019 ~ 0.021	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1670 ~ 2780	60 ~ 120

Cutting Parameter - Ballnose Extralong

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (45 ~ 52 HRC), AISI H13, AISI D2, SUS 420 ETC	M28	0.3	2	38	-0.001 ~ 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		0.4	2	50	0.000 ~ 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 160
		0.8	2	101	0.002 ~ 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 ~ 400
		0.8	2	101	0.002 ~ 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 ~ 400
		1	2	117 ~ 126	0.004 ~ 0.006	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	35750 ~ 40030	300 ~ 480
		1.5	2	117 ~ 164	0.007 ~ 0.009	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	23840 ~ 39730	350 ~ 630
		2	2	117 ~ 164	0.010 ~ 0.012	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	17880 ~ 29790	370 ~ 630
		2.5	2	117 ~ 164	0.013 ~ 0.016	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	14300 ~ 23840	390 ~ 670
		3	2	117 ~ 164	0.016 ~ 0.019	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11920 ~ 19860	400 ~ 660
		4	2	117 ~ 164	0.022 ~ 0.025	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	8940 ~ 14900	410 ~ 650
		5	2	117 ~ 164	0.029 ~ 0.032	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	7150 ~ 11920	430 ~ 670
		6	2	117 ~ 164	0.035 ~ 0.038	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5960 ~ 9930	430 ~ 660
		8	2	117 ~ 164	0.043 ~ 0.048	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4470 ~ 7450	400 ~ 630
		10	2	117 ~ 164	0.052 ~ 0.057	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3580 ~ 5960	390 ~ 590
		12	2	117 ~ 164	0.061 ~ 0.067	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2980 ~ 4970	380 ~ 580
		14	2	117 ~ 164	0.069 ~ 0.076	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2550 ~ 4260	370 ~ 570
		16	2	117 ~ 164	0.078 ~ 0.085	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2230 ~ 3720	360 ~ 550
		18	2	117 ~ 164	0.086 ~ 0.095	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	1990 ~ 3310	360 ~ 550
		20	2	117 ~ 164	0.095 ~ 0.104	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	1790 ~ 2980	350 ~ 540

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (45 ~ 52 HRC), AISI H13, AISI D2, SUS 420 ETC	M26,27	0.3	2	38	0.001 ~ 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 80
		0.4	2	50	0.000 ~ 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 160
		0.8	2	101	0.002 ~ 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 ~ 320
		0.8	2	101	0.002 ~ 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 ~ 320
		1	2	109 ~ 126	0.003 ~ 0.005	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	34760 ~ 40000	210 ~ 400
		1.5	2	109 ~ 153	0.005 ~ 0.007	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	23170 ~ 32440	230 ~ 450
		2	2	109 ~ 153	0.008 ~ 0.010	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	17380 ~ 24330	280 ~ 490
		2.5	2	109 ~ 153	0.010 ~ 0.012	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	13900 ~ 19471	280 ~ 470
		3	2	109 ~ 153	0.013 ~ 0.015	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11590 ~ 16220	300 ~ 490
		4	2	109 ~ 153	0.018 ~ 0.020	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	8690 ~ 12170	310 ~ 490
		5	2	109 ~ 153	0.023 ~ 0.025	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	6950 ~ 9730	320 ~ 490
		6	2	109 ~ 153	0.028 ~ 0.031	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5790 ~ 8110	320 ~ 500
		8	2	109 ~ 153	0.035 ~ 0.018	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4340 ~ 6080	300 ~ 460
		10	2	109 ~ 153	0.042 ~ 0.046	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3480 ~ 4870	290 ~ 450
		12	2	109 ~ 153	0.048 ~ 0.053	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2900 ~ 4060	280 ~ 430
		14	2	109 ~ 153	0.055 ~ 0.061	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2480 ~ 3480	270 ~ 420
		16	2	109 ~ 153	0.062 ~ 0.068	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2170 ~ 3040	270 ~ 410
		18	2	109 ~ 153	0.069 ~ 0.076	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	1930 ~ 2700	270 ~ 410
		20	2	109 ~ 153	0.076 ~ 0.083	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3740 ~ 2430	260 ~ 400

Cutting Parameter - Ballnose Extralong

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (52 ~ 63 HRC) AISI H13, AISI D2, SKH ETC	M28	0.3	2	38	0.000 - 0.002	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 160
		0.4	2	50	0.000 - 0.002	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 160
		0.8	2	94 ~ 101	0.002 - 0.004	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	37240 ~ 40000	150 ~ 320
		0.8	2	94 ~ 101	0.002 - 0.004	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	37240 ~ 40000	150 ~ 320
		1	2	94 ~ 126	0.003 - 0.005	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	29790 ~ 40000	180 ~ 400
		1.5	2	94 ~ 140	0.005 - 0.007	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	19860 ~ 29790	200 ~ 420
		2	2	94 ~ 140	0.008 - 0.010	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	14903 ~ 22350	240 ~ 450
		2.5	2	94 ~ 140	0.010 - 0.012	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	11920 ~ 17880	240 ~ 430
		3	2	94 ~ 140	0.012 - 0.015	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	9930 ~ 14900	240 ~ 450
		4	2	94 ~ 140	0.017 ~ 0.019	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	7450 ~ 11170	250 ~ 420
		5	2	94 ~ 140	0.021 ~ 0.024	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	5960 ~ 8940	250 ~ 430
		6	2	94 ~ 140	0.026 ~ 0.029	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	4970 ~ 7450	260 ~ 430
		8	2	94 ~ 140	0.033 ~ 0.036	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	3720 ~ 5590	250 ~ 400
		10	2	94 ~ 140	0.039 ~ 0.043	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2980 ~ 4470	230 ~ 380
		12	2	94 ~ 140	0.045 ~ 0.050	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2480 ~ 3720	220 ~ 370
		14	2	94 ~ 140	0.052 ~ 0.057	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2130 ~ 3190	220 ~ 360
		16	2	94 ~ 140	0.068 ~ 0.064	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1860 ~ 2790	220 ~ 360
		18	2	94 ~ 140	0.065 ~ 0.071	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1660 ~ 2480	220 ~ 350
		20	2	94 ~ 140	0.071 ~ 0.078	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1490 ~ 2230	210 ~ 350

Cutting Parameter - Ballnose Extralong

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (55-60 HRC) AISI D2	M33	0.3	2	38	0.000 - 0.000	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.4	2	50	0.000 - 0.000	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.8	2	70 ~ 101	0.000 - 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	27930 ~ 40000	20 ~ 80
		0.8	2	70 ~ 101	0.000 - 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	27930 ~ 40000	20 ~ 80
		1	2	70 ~ 117	0.001 - 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	22350 ~ 37240	40 ~ 70
		1.5	2	70 ~ 117	0.002 - 0.002	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	14900 ~ 24830	60 ~ 100
		2	2	70 ~ 117	0.002 - 0.003	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	11170 ~ 18620	40 ~ 110
		2.5	2	70 ~ 117	0.003 - 0.004	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	8940 ~ 14900	50 ~ 120
		3	2	70 ~ 117	0.004 - 0.005	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	7450 ~ 12410	60 ~ 120
		4	2	70 ~ 117	0.006 - 0.006	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	5590 ~ 9310	70 ~ 110
		5	2	70 ~ 117	0.007 - 0.008	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	4470 ~ 7450	60 ~ 120
		6	2	70 ~ 117	0.009 - 0.010	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	3720 ~ 6210	70 ~ 120
		8	2	70 ~ 117	0.011 - 0.012	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2790 ~ 4660	60 ~ 110
		10	2	70 ~ 117	0.013 - 0.014	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2230 ~ 3720	60 ~ 100
		12	2	70 ~ 117	0.015 - 0.017	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1860 ~ 3100	60 ~ 110
		14	2	70 ~ 117	0.017 - 0.019	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1600 ~ 2660	50 ~ 100
		16	2	70 ~ 117	0.019 - 0.021	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1400 ~ 2330	50 ~ 100
		18	2	70 ~ 117	0.022 - 0.024	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1240 ~ 2070	50 ~ 100
		20	2	70 ~ 117	0.024 - 0.026	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1120 ~ 1860	50 ~ 100

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (55-60 HRC) AISI D2	M33	0.3	2	38	0.000 - 0.000	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.4	2	50	0.000 - 0.000	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.8	2	66 ~ 101	0.000 - 0.001	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.1D$	26070 ~ 40000	20 ~ 80
		0.8	2	66 ~ 101	0.000 - 0.001	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.1D$	26070 ~ 40000	20 ~ 80
		1	2	66 ~ 109	0.001 - 0.001	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.1D$	20860 ~ 34760	40 ~ 70
		1.5	2	66 ~ 109	0.001 - 0.002	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.1D$	13900 ~ 23170	30 ~ 90
		2	2	66 ~ 109	0.002 - 0.002	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	10430 ~ 17380	40 ~ 70
		2.5	2	66 ~ 109	0.002 - 0.003	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	8340 ~ 13900	30 ~ 80
		3	2	66 ~ 109	0.003 - 0.004	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	69500 ~ 11590	40 ~ 90
		4	2	65 ~ 109	0.004 - 0.005	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	5210 ~ 8690	40 ~ 90
		5	2	66 ~ 109	0.006 - 0.006	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	4170 ~ 6950	50 ~ 80
		6	2	66 ~ 109	0.007 - 0.008	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	3480 ~ 5790	50 ~ 90
		8	2	66 ~ 109	0.009 - 0.010	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	2610 ~ 4340	50 ~ 90
		10	2	66 ~ 109	0.010 - 0.011	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	2090 ~ 3480	40 ~ 80
		12	2	66 ~ 109	0.012 - 0.013	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	1740 ~ 2900	40 ~ 80
		14	2	66 ~ 109	0.014 - 0.015	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	1490 ~ 2480	40 ~ 70
		16	2	65 ~ 109	0.016 - 0.017	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	1300 ~ 2170	40 ~ 70
		18	2	66 ~ 109	0.017 - 0.019	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	1160 ~ 1930	40 ~ 70
		20	2	65 ~ 109	0.019 - 0.021	$\leq 0.5D(\text{MAX}0.5)$	$\leq 0.2D$	1040 ~ 1740	40 ~ 70

Cutting Parameter - Ballnose Long

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL(45 ~ 52 HRC) AISI H13, AISI D2, SUS 420 ETC	M26,27	0.3	4	38	-0.001 ~ 0.001	50.05EHMAX0.5)	≤ 0.10	40000	20 ~ 160
		0.4	4	50	0.000 ~ 0.001	50.05D(MAX0.5)	≤ 0.10	40000	20 ~ 160
		0.8	4	101	0.002 ~ 0.003	50.05EHMAX0.5)	≤ 0.10	40000	320 ~ 480
		0.8	4	101	0.002 ~ 0.003	50.05D(MAX0.5)	≤ 0.10	40000	320 ~ 480
		1	4	126	0.003 ~ 0.004	50.051NMAX0.5)	≤ 0.10	40000	480 ~ 640
		1.5	4	187 ~ 188	0.005 ~ 0.007	50.051XMAX0.5)	≤ 0.10	39730 ~ 40000	790 ~ 1120
		2	4	187 ~ 251	0.007 ~ 0.009	50.05EHMAX0.5)	≤ 0.20	29790 ~ 40000	830 ~ 1440
		2.5	4	187 ~ 262	0.010 ~ 0.012	50.05D(MAX0.5)	≤ 0.20	23840 ~ 33370	950 ~ 1600
		3	4	187 ~ 262	0.012 ~ 0.014	50.05EHMAX0.5)	≤ 0.20	19860 ~ 27810	950 ~ 1560
		4	4	187 ~ 262	0.017 ~ 0.019	50.05ERMAX0.5)	≤ 0.20	14900 ~ 20860	1010 ~ 1590
		5	4	187 ~ 262	0.021 ~ 0.024	50.05C4MAX0.5)	≤ 0.20	11920 ~ 16680	1000 ~ 1600
		6	4	187 ~ 262	0.026 ~ 0.029	50.0501MAX0.5)	≤ 0.20	9930 ~ 13900	1030 ~ 1610
		8	4	187 ~ 262	0.033 ~ 0.036	50.051(MAX0.5)	≤ 0.20	7450 ~ 10430	980 ~ 1500
		10	4	187 ~ 262	0.039 ~ 0.043	50.0501MAX0.5)	≤ 0.20	5960 ~ 8340	930 ~ 1430
		12	4	187 ~ 262	0.045 ~ 0.050	50.051(MAX0.5)	≤ 0.20	4970 ~ 6950	890 ~ 1390
		14	4	187 ~ 262	0.052 ~ 0.057	50.0501MAX0.5)	≤ 0.20	4260 ~ 5960	890 ~ 1360
		16	4	187 ~ 262	0.058 ~ 0.064	50.05D(MAX0.5)	≤ 0.20	3720 ~ 5210	860 ~ 1330
		18	4	187 ~ 262	0.065 ~ 0.071	50.0501MAX0.5)	≤ 0.20	3310 ~ 4630	860 ~ 1310
		20	4	187 ~ 262	0.071 ~ 0.078	50.051(MAX0.5)	≤ 0.20	2980 ~ 4170	850 ~ 1300

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL(45 ~ 52 RC) AISI H13, AISI D2, SUS 420 ETC	M26,27	0.3	4	38	0.000 ~ 0.001	$\leq 0.05D(MAX0.5)$	≤ 0.10	40000	20 ~ 160
		0.4	4	50	0.000 ~ 0.001	$\leq 0.05D(MAX0.5)$	≤ 0.10	40000	20 ~ 160
		0.8	4	101	0.001 ~ 0.003	$\leq 0.05D(MAX0.5)$	≤ 0.10	40000	160 ~ 480
		0.8	4	101	0.001 ~ 0.003	$\leq 0.05D(MAX0.5)$	≤ 0.10	40000	160 ~ 480
		1	4	126	0.002 ~ 0.003	$\leq 0.05D(MAX0.5)$	≤ 0.10	40000	320 ~ 480
		1.5	4	175 ~ 188	0.004 ~ 0.005	$\leq 0.05D(MAX0.5)$	≤ 0.10	37080 ~ 40000	590 ~ 800
		2	4	175 ~ 245	0.006 ~ 0.007	$\leq 0.05D(MAX0.5)$	≤ 0.20	27810 ~ 38930	670 ~ 1090
		2.5	4	175 ~ 245	0.008 ~ 0.009	$\leq 0.05D(MAX0.5)$	≤ 0.20	22250 ~ 31140	710 ~ 1120
		3	4	175 ~ 245	0.010 ~ 0.011	$\leq 0.05D(MAX0.5)$	≤ 0.20	18540 ~ 25950	740 ~ 1140
		4	4	175 ~ 245	0.013 ~ 0.015	$\leq 0.05D(MAX0.5)$	≤ 0.20	13900 ~ 19470	720 ~ 1170
		S	4	175 ~ 245	0.017 ~ 0.019	$\leq 0.05D(MAX0.5)$	≤ 0.20	11120 ~ 15570	760 ~ 1180
		6	4	175 ~ 245	0.021 ~ 0.023	$\leq 0.05D(MAX0.5)$	≤ 0.20	9270 ~ 12980	780 ~ 1190
		8	4	175 ~ 245	0.026 ~ 0.029	$\leq 0.05D(MAX0.5)$	≤ 0.20	6950 ~ 9730	720 ~ 1130
		10	4	175 ~ 245	0.031 ~ 0.034	$\leq 0.05D(MAX0.5)$	≤ 0.20	5560 ~ 7790	690 ~ 1060
		12	4	175 ~ 245	0.036 ~ 0.040	$\leq 0.05D(MAX0.5)$	≤ 0.20	4630 ~ 6490	670 ~ 1040
		14	4	175 ~ 245	0.041 ~ 0.046	$\leq 0.05D(MAX0.5)$	≤ 0.20	3970 ~ 5560	650 ~ 1020
		16	4	175 ~ 245	0.047 ~ 0.051	$\leq 0.05D(MAX0.5)$	≤ 0.20	3480 ~ 4870	650 ~ 990
		18	4	175 ~ 245	0.052 ~ 0.057	$\leq 0.05D(MAX0.5)$	≤ 0.20	3090 ~ 4330	640 ~ 990
		20	4	175 ~ 244	0.057 ~ 0.063	$\leq 0.05D(MAX0.5)$	≤ 0.20	2780 ~ 3890	630 ~ 980

Cutting Parameter - Ballnose Long

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL(52 ~ 63 HRC) AISI H13, AISI D2, SKH ETC	M28	0.3	4	38	0.000 ~ 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 160
		0.4	4	50	0.000 ~ 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 320
		0.8	4	101	0.001 ~ 0.003	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 ~ 480
		0.8	4	101	0.001 ~ 0.003	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 ~ 480
		1	4	126	0.002 ~ 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	320 ~ 640
		1.5	4	150 ~ 188	0.004 ~ 0.006	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	31780 ~ 40000	510 ~ 960
		2	4	150 ~ 225	0.006 ~ 0.007	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	23840 ~ 35750	570 ~ 1000
		2.5	4	150 ~ 225	0.007 ~ 0.009	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	19070 ~ 28600	530 ~ 1030
		3	4	150 ~ 225	0.009 ~ 0.011	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	15890 ~ 23840	570 ~ 1050
		4	4	150 ~ 225	0.013 ~ 0.014	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11920 ~ 17880	620 ~ 1000
		5	4	150 ~ 225	0.016 ~ 0.018	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	9530 ~ 14300	610 ~ 1030
		6	4	150 ~ 225	0.020 ~ 0.022	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	7950 ~ 11920	640 ~ 1050
		8	4	150 ~ 225	0.024 ~ 0.027	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5960 ~ 8940	570 ~ 970
		10	4	150 ~ 225	0.029 ~ 0.032	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4770 ~ 7150	550 ~ 920
		12	4	150 ~ 225	0.034 ~ 0.037	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3970 ~ 5960	540 ~ 880
		14	4	150 ~ 225	0.039 ~ 0.043	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3410 ~ 5110	530 ~ 880
		16	4	150 ~ 225	0.044 ~ 0.048	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2980 ~ 4470	520 ~ 860
		18	4	150 ~ 224	0.048 ~ 0.053	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2650 ~ 3970	510 ~ 840
		20	4	150 ~ 225	0.053 ~ 0.059	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2380 ~ 3580	500 ~ 840

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (52' 63 HRC AISI H13, AISI D2, SKH ETC	M28	0.3	4	38	0.000 ~ 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 160
		0.4	4	50	0.000 ~ 0.001	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	20 ~ 160
		0.8	4	101	0.001 ~ 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 ~ 320
		0.8	4	101	0.001 ~ 0.002	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	160 ~ 320
		1	4	126	0.002 ~ 0.003	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	40000	320 ~ 480
		1.5	4	140 ~ 188	0.003 ~ 0.004	$\leq 0.050(\text{MAX}0.5)$	≤ 0.10	29660 ~ 40000	360 ~ 640
		2	4	140 ~ 210	0.005 ~ 0.006	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	22250 ~ 33370	450 ~ 800
		2.5	4	140 ~ 210	0.006 ~ 0.007	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	17800 ~ 26700	430 ~ 750
		3	4	140 ~ 210	0.007 ~ 0.009	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	14830 ~ 22250	420 ~ 800
		4	4	140 ~ 210	0.010 ~ 0.012	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	11120 ~ 16680	440 ~ 800
		5	4	140 ~ 210	0.013 ~ 0.014	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	8900 ~ 13350	460 ~ 750
		6	4	140 ~ 210	0.016 ~ 0.017	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	7420 ~ 11120	470 ~ 760
		8	4	140 ~ 210	0.020 ~ 0.021	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	5560 ~ 8340	440 ~ 700
		10	4	140 ~ 210	0.023 ~ 0.026	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	4450 ~ 6670	410 ~ 690
		12	4	140 ~ 210	0.027 ~ 0.030	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3710 ~ 5560	400 ~ 670
		14	4	140 ~ 210	0.031 ~ 0.034	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	3180 ~ 4770	390 ~ 650
		16	4	140 ~ 210	0.035 ~ 0.038	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2780 ~ 4170	390 ~ 630
		18	4	140 ~ 210	0.039 ~ 0.043	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2470 ~ 3710	390 ~ 640
		20	2	139 ~ 210	0.043 ~ 0.047	$\leq 0.050(\text{MAX}0.5)$	≤ 0.20	2220 ~ 3340	380 ~ 630

Cutting Parameter - Ballnose Long

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (55-60HRC) AISI D2	M33	0.3	4	38	0.000 - 0.000	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.4	4	50	0.000 - 0.000	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.8	4	101	0.000 - 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 160
		0.8	4	101	0.000 - 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 160
		1	4	112 ~ 126	0.001 - 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	35750 ~ 40000	140 ~ 160
		1.5	4	112 ~ 187	0.001 - 0.002	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	23840 ~ 39730	100 ~ 320
		2	4	112 ~ 187	0.002 - 0.002	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	17880 ~ 29790	140 ~ 240
		2.5	4	112 ~ 187	0.002 - 0.003	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	14300 ~ 23840	110 ~ 290
		3	4	112 ~ 187	0.003 - 0.004	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	11920 ~ 19860	140 ~ 320
		4	4	112 ~ 187	0.004 - 0.005	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	8940 ~ 14900	140 ~ 300
		5	4	112 ~ 187	0.005 - 0.006	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	7150 ~ 11920	140 ~ 290
		6	4	112 ~ 187	0.007 - 0.007	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	5960 ~ 9930	170 ~ 280
		8	4	112 ~ 187	0.008 - 0.009	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	4470 ~ 7450	140 ~ 270
		10	4	112 ~ 187	0.010 - 0.011	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	3580 ~ 5960	140 ~ 260
		12	4	112 ~ 187	0.011 - 0.012	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2980 ~ 4970	130 ~ 240
		14	4	112 ~ 187	0.013 - 0.014	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2550 ~ 4260	130 ~ 240
		16	4	112 ~ 187	0.015 - 0.016	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2230 ~ 3720	130 ~ 240
		18	4	113 ~ 187	0.016 - 0.018	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1990 ~ 3310	130 ~ 240
		20	4	112 ~ 187	0.018 - 0.020	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1790 ~ 2980	130 ~ 240

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (55-60HRC) AISI D2	M33	0.3	4	38	0.000 - 0.000	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.4	4	50	0.000 - 0.000	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 80
		0.8	4	101	0.000 - 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 160
		0.8	4	101	0.000 - 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	40000	20 ~ 160
		1	4	105 ~ 126	0.000 - 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	33370 ~ 40000	20 ~ 160
		1.5	4	105 ~ 175	0.001 - 0.001	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.1D$	22250 ~ 37080	90 ~ 150
		2	4	105 ~ 175	0.001 - 0.002	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	16680 ~ 27810	70 ~ 220
		2.5	4	105 ~ 175	0.002 - 0.002	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	13350 ~ 22250	110 ~ 180
		3	4	105 ~ 175	0.002 - 0.003	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	11120 ~ 18540	90 ~ 220
		4	4	105 ~ 175	0.003 - 0.004	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	8340 ~ 13900	100 ~ 220
		5	4	105 ~ 175	0.004 - 0.005	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	6670 ~ 11120	110 ~ 220
		6	4	105 ~ 175	0.005 - 0.006	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	5560 ~ 9270	110 ~ 220
		8	4	105 ~ 175	0.007 - 0.007	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	4170 ~ 6950	120 ~ 190
		10	4	105 ~ 175	0.008 - 0.009	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	3340 ~ 5560	110 ~ 200
		12	4	105 ~ 175	0.009 - 0.010	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2780 ~ 4630	100 ~ 190
		14	4	105 ~ 175	0.010 - 0.011	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2380 ~ 3970	100 ~ 170
		16	4	105 ~ 175	0.012 - 0.013	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	2090 ~ 3480	100 ~ 180
		18	4	105 ~ 175	0.013 - 0.014	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1850 ~ 3090	100 ~ 170
		20	4	105 ~ 175	0.014 - 0.016	$\leq 0.05D(\text{MAX}0.5)$	$\leq 0.2D$	1670 ~ 2780	90 ~ 180

Cutting Parameter - Square Endmill Standard

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEENED STEEL (45-52HRC) AISI HT3	M26	1	4	50 ~ 70	0.005 ~ 0.007	≤ 1.0 D	≤ 0.3 D	15920 ~ 22280	320 ~ 620
		1	4	50 ~ 70	0.008 ~ 0.011	≤ 1.0 D	≤ 0.3 D	10610 ~ 14850	340 ~ 650
		2	4	50 ~ 70	0.012 ~ 0.015	≤ 1.0 D	≤ 0.3 D	7960 ~ 11140	380 ~ 670
		2.5	4	50 ~ 70	0.016 ~ 0.019	≤ 1.0 D	≤ 0.3 D	6370 ~ 8910	410 ~ 680
		3	4	50 ~ 70	0.020 ~ 0.023	≤ 1.0 D	≤ 0.5 D (MAX0.5)	5310 ~ 7430	420 ~ 680
		4	4	50 ~ 70	0.028 ~ 0.031	≤ 1.0 D	≤ 0.5 D (MAX0.5)	3980 ~ 5570	450 ~ 690
		5	4	50 ~ 70	0.035 ~ 0.039	≤ 1.0 D	≤ 0.5 D (MAX0.5)	3180 ~ 4460	450 ~ 700
		6	4	50 ~ 70	0.043 ~ 0.048	≤ 1.0 D	≤ 0.5 D (MAX0.5)	2650 ~ 3710	460 ~ 710
		8	4	50 ~ 70	0.054 ~ 0.059	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1990 ~ 2790	430 ~ 660
		10	4	50 ~ 70	0.064 ~ 0.071	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1590 ~ 2230	410 ~ 630
		12	4	50 ~ 70	0.075 ~ 0.083	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1330 ~ 1860	400 ~ 620
		14	4	50 ~ 70	0.086 ~ 0.094	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1140 ~ 1590	390 ~ 600
		16	4	50 ~ 70	0.096 ~ 0.106	≤ 1.0 D	≤ 0.5 D (MAX0.5)	990 ~ 1390	380 ~ 590
		18	4	50 ~ 70	0.107 ~ 0.118	≤ 1.0 D	≤ 0.5 D (MAX0.5)	880 ~ 1240	380 ~ 590
		20	4	50 ~ 70	0.117 ~ 0.129	≤ 1.0 D	≤ 0.5 D (MAX0.5)	800 ~ 1110	370 ~ 570
		22	4	50 ~ 70	0.128 ~ 0.141	≤ 1.0 D	≤ 0.5 D (MAX0.5)	720 ~ 1010	370 ~ 570
		25	4	50 ~ 70	0.144 ~ 0.158	≤ 1.0 D	≤ 0.5 D (MAX0.5)	640 ~ 890	370 ~ 560
		18	4	50 ~ 70	0.039 ~ 0.043	≤ 1.0 D	≤ 0.5 D (MAX0.5)	2470 ~ 3710	370 ~ 570
		20	4	50 ~ 70	0.128 ~ 0.141	≤ 1.0 D	≤ 0.5 D (MAX0.5)	370 ~ 570	370 ~ 570
		25	4	50 ~ 70	0.144 ~ 0.158	≤ 1.0 D	≤ 0.5 D (MAX0.5)	640 ~ 890	370 ~ 560

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEENED STEEL (52-63H RC) AISI D2	M27,28	1	4	40 ~ 60	0.004 ~ 0.006	≤ 1.0 D	≤ 0.3 D	12730 ~ 19100	200 ~ 460
		1.5	4	40 ~ 60	0.006 ~ 0.009	≤ 1.0 D	≤ 0.3 D	8490 ~ 12730	200 ~ 460
		2	4	40 ~ 60	0.009 ~ 0.012	≤ 1.0 D	≤ 0.3 D	6370 ~ 9550	230 ~ 460
		2.5	4	40 ~ 60	0.012 ~ 0.015	≤ 1.0 D	≤ 0.3 D	5090 ~ 7640	240 ~ 460
		3	4	40 ~ 60	0.015 ~ 0.018	≤ 1.0 D	≤ 0.5 D (MAX0.5)	4240 ~ 6370	250 ~ 460
		4	4	40 ~ 60	0.021 ~ 0.024	≤ 1.0 D	≤ 0.5 D (MAX0.5)	3180 ~ 4770	270 ~ 460
		5	4	40 ~ 60	0.027 ~ 0.030	≤ 1.0 D	≤ 0.5 D (MAX0.5)	2550 ~ 3820	280 ~ 460
		6	4	40 ~ 60	0.032 ~ 0.036	≤ 1.0 D	≤ 0.5 D (MAX0.5)	2120 ~ 3180	270 ~ 460
		8	4	40 ~ 60	0.040 ~ 0.044	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1590 ~ 2390	250 ~ 420
		10	4	40 ~ 60	0.048 ~ 0.053	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1270 ~ 1910	240 ~ 400
		12	4	40 ~ 60	0.056 ~ 0.062	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1060 ~ 1590	240 ~ 390
		14	4	40 ~ 60	0.064 ~ 0.071	≤ 1.0 D	≤ 0.5 D (MAX0.5)	910 ~ 1360	230 ~ 390
		16	4	40 ~ 60	0.072 ~ 0.079	≤ 1.0 D	≤ 0.5 D (MAX0.5)	800 ~ 1190	230 ~ 380
		18	4	40 ~ 60	0.080 ~ 0.088	≤ 1.0 D	≤ 0.5 D (MAX0.5)	710 ~ 1060	230 ~ 370
		20	4	40 ~ 60	0.088 ~ 0.097	≤ 1.0 D	≤ 0.5 D (MAX0.5)	640 ~ 950	230 ~ 370
		22	4	40 ~ 60	0.096 ~ 0.106	≤ 1.0 D	≤ 0.5 D (MAX0.5)	580 ~ 870	220 ~ 370
		25	4	40 ~ 60	0.108 ~ 0.119	≤ 1.0 D	≤ 0.5 D (MAX0.5)	510 ~ 760	220 ~ 360

Cutting Parameter - Square Endmill Standard

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
MILLING MATERIAL GROUPS M33	M33	1	4	30 ~ 50	0.001 ~ 0.002	≤ 1.0 D	≤ 0.3 D	9550 ~ 15920	40 ~ 130
		2	4	30 ~ 50	0.002 ~ 0.003	≤ 1.0 D	≤ 0.3 D	6370 ~ 10610	50 ~ 130
		2	4	30 ~ 50	0.003 ~ 0.004	≤ 1.0 D	≤ 0.3 D	4770 ~ 7960	60 ~ 130
		3	4	30 ~ 50	0.004 ~ 0.005	≤ 1.0 D	≤ 0.3 D	3820 ~ 6370	60 ~ 130
		3	4	30 ~ 50	0.005 ~ 0.006	≤ 1.0 D	≤ 0.5 D(MAX0.5)	3180 ~ 5310	60 ~ 130
		4	4	30 ~ 50	0.007 ~ 0.008	≤ 1.0 D	≤ 0.5 D(MAX0.5)	2390 ~ 3980	70 ~ 130
		5	4	30 ~ 50	0.009 ~ 0.010	≤ 1.0 D	≤ 0.5 D(MAX0.5)	1910 ~ 3180	70 ~ 130
		6	4	30 ~ 50	0.011 ~ 0.012	≤ 1.0 D	≤ 0.5 D(MAX0.5)	1590 ~ 2650	70 ~ 130
		8	4	30 ~ 50	0.013 ~ 0.015	≤ 1.0 D	≤ 0.5 D(MAX0.5)	1190 ~ 1990	60 ~ 120
		10	4	30 ~ 50	0.016 ~ 0.018	≤ 1.0 D	≤ 0.5 D(MAX0.5)	950 ~ 1590	60 ~ 110
		12	4	30 ~ 50	0.019 ~ 0.021	≤ 1.0 D	≤ 0.5 D(MAX0.5)	800 ~ 1330	60 ~ 110
		14	4	30 ~ 50	0.021 ~ 0.024	≤ 1.0 D	≤ 0.5 D(MAX0.5)	680 ~ 1140	60 ~ 110
		16	4	30 ~ 50	0.024 ~ 0.026	≤ 1.0 D	≤ 0.5 D(MAX0.5)	600 ~ 990	60 ~ 100
		18	4	30 ~ 50	0.027 ~ 0.029	≤ 1.0 D	≤ 0.5 D(MAX0.5)	530 ~ 880	60 ~ 100
		20	4	30 ~ 50	0.029 ~ 0.032	≤ 1.0 D	≤ 0.5 D(MAX0.5)	480 ~ 800	60 ~ 100
		22	4	30 ~ 50	0.032 ~ 0.035	≤ 1.0 D	≤ 0.5 D(MAX0.5)	430 ~ 720	60 ~ 100
		25	4	30 ~ 50	0.036 ~ 0.040	≤ 1.0 D	≤ 0.5 D(MAX0.5)	380 ~ 640	50 ~ 100

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDED STEEL (45-52HRC) AISI H13	M26	1	4	50 ~ 70	0.004 ~ 0.006	≤ 0.05 D	1.0 D	15920 ~ 22280	250 ~ 530
		1.5	4	50 ~ 70	0.007 ~ 0.009	≤ 0.05 D	1.0 D	10610 ~ 14850	300 ~ 530
		2	4	50 ~ 70	0.010 ~ 0.012	≤ 0.05 D	1.0 D	7960 ~ 11140	320 ~ 530
		2.5	4	50 ~ 70	0.013 ~ 0.015	≤ 0.05 D	1.0 D	6370 ~ 8910	330 ~ 530
		3	4	50 ~ 70	0.016 ~ 0.019	≤ 0.05 D	1.0 D	5310 ~ 7430	340 ~ 560
		4	4	50 ~ 70	0.022 ~ 0.025	≤ 0.05 D	1.0 D	3980 ~ 5570	350 ~ 560
		5	4	50 ~ 70	0.028 ~ 0.032	≤ 0.05 D	1.0 D	3180 ~ 4460	360 ~ 570
		6	4	50 ~ 70	0.035 ~ 0.038	≤ 0.05 D	1.0 D	2650 ~ 3710	370 ~ 560
		8	4	50 ~ 70	0.043 ~ 0.047	≤ 0.05 D	1.0 D	1990 ~ 2790	340 ~ 520
		10	4	50 ~ 70	0.052 ~ 0.057	≤ 0.05 D	1.0 D	1590 ~ 2230	330 ~ 510
		12	4	50 ~ 70	0.060 ~ 0.066	≤ 0.05 D	1.0 D	1330 ~ 1860	320 ~ 490
		14	4	50 ~ 70	0.069 ~ 0.075	≤ 0.05 D	1.0 D	1140 ~ 1590	310 ~ 480
		16	4	50 ~ 70	0.077 ~ 0.085	≤ 0.05 D	1.0 D	990 ~ 1390	300 ~ 470
		18	4	50 ~ 70	0.085 ~ 0.094	≤ 0.05 D	1.0 D	880 ~ 1240	300 ~ 470
		20	4	50 ~ 70	0.094 ~ 0.103	≤ 0.05 D	1.0 D	800 ~ 1110	300 ~ 460
		22	4	50 ~ 70	0.102 ~ 0.113	≤ 0.05 D	1.0 D	720 ~ 1010	290 ~ 460
		25	4	50 ~ 70	0.115 ~ 0.127	≤ 0.05 D	1.0 D	640 ~ 890	290 ~ 450

Cutting Parameter - Square Endmill Standard

PROFILE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (52-63HRC) AISI D2	M27,28	1	4	40 ~ 60	0.003 ~ 0.005	≤ 0.05 D	1.0 D	12730 ~ 19100	150 ~ 380
		1.5	4	40 ~ 60	0.005 ~ 0.007	≤ 0.05 D	1.0 D	8490 ~ 12730	170 ~ 360
		2	4	40 ~ 60	0.007 ~ 0.010	≤ 0.05 D	1.0 D	6370 ~ 9550	180 ~ 380
		2.5	4	40 ~ 60	0.010 ~ 0.012	≤ 0.05 D	1.0 D	5090 ~ 7640	200 ~ 370
		3	4	40 ~ 60	0.012 ~ 0.014	≤ 0.05 D	1.0 D	4240 ~ 6370	200 ~ 360
		4	4	40 ~ 60	0.017 ~ 0.019	≤ 0.05 D	1.0 D	3180 ~ 4770	220 ~ 360
		5	4	40 ~ 60	0.021 ~ 0.024	≤ 0.05 D	1.0 D	2550 ~ 3820	210 ~ 370
		6	4	40 ~ 60	0.026 ~ 0.029	≤ 0.05 D	1.0 D	2120 ~ 3180	220 ~ 370
		8	4	40 ~ 60	0.032 ~ 0.036	≤ 0.05 D	1.0 D	1590 ~ 2390	200 ~ 340
		10	4	40 ~ 60	0.039 ~ 0.043	≤ 0.05 D	1.0 D	1270 ~ 1910	200 ~ 330
		12	4	40 ~ 60	0.045 ~ 0.050	≤ 0.05 D	1.0 D	1060 ~ 1590	190 ~ 320
		14	4	40 ~ 60	0.051 ~ 0.057	≤ 0.05 D	1.0 D	910 ~ 1360	190 ~ 310
		16	4	40 ~ 60	0.058 ~ 0.064	≤ 0.05 D	1.0 D	800 ~ 1190	190 ~ 300
		18	4	40 ~ 60	0.064 ~ 0.071	≤ 0.05 D	1.0 D	710 ~ 1060	180 ~ 300
		20	4	40 ~ 60	0.070 ~ 0.078	≤ 0.05 D	1.0 D	640 ~ 950	180 ~ 300
		22	4	40 ~ 60	0.077 ~ 0.085	≤ 0.05 D	1.0 D	580 ~ 870	180 ~ 300
		25	4	40 ~ 60	0.086 ~ 0.095	≤ 0.05 D	1.0 D	510 ~ 760	180 ~ 290

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (55-60 HRC) AISI D2	M33	1	4	30 ~ 50	0.001 ~ 0.001	≤ 0.05 D	1.0 D	9550 ~ 15920	40 ~ 60
		1.5	4	30 ~ 50	0.002 ~ 0.002	≤ 0.05 D	1.0 D	6370 ~ 10610	50 ~ 80
		2	4	30 ~ 50	0.002 ~ 0.003	≤ 0.05 D	1.0 D	4770 ~ 7960	40 ~ 100
		2.5	4	30 ~ 50	0.003 ~ 0.004	≤ 0.05 D	1.0 D	3820 ~ 6370	50 ~ 100
		3	4	30 ~ 50	0.004 ~ 0.005	≤ 0.05 D	1.0 D	3180 ~ 5310	50 ~ 110
		4	4	30 ~ 50	0.005 ~ 0.006	≤ 0.05 D	1.0 D	2390 ~ 3980	50 ~ 100
		5	4	30 ~ 50	0.007 ~ 0.008	≤ 0.05 D	1.0 D	1910 ~ 3180	50 ~ 100
		6	4	30 ~ 50	0.009 ~ 0.010	≤ 0.05 D	1.0 D	1590 ~ 2650	60 ~ 110
		8	4	30 ~ 50	0.011 ~ 0.012	≤ 0.05 D	1.0 D	1190 ~ 1990	50 ~ 100
		10	4	30 ~ 50	0.013 ~ 0.014	≤ 0.05 D	1.0 D	950 ~ 1590	50 ~ 90
		12	4	30 ~ 50	0.015 ~ 0.017	≤ 0.05 D	1.0 D	800 ~ 1330	50 ~ 90
		14	4	30 ~ 50	0.017 ~ 0.019	≤ 0.05 D	1.0 D	680 ~ 1140	50 ~ 90
		16	4	30 ~ 50	0.019 ~ 0.021	≤ 0.05 D	1.0 D	600 ~ 990	50 ~ 80
		18	4	30 ~ 50	0.021 ~ 0.024	≤ 0.05 D	1.0 D	530 ~ 880	40 ~ 80
		20	4	30 ~ 50	0.023 ~ 0.026	≤ 0.05 D	1.0 D	480 ~ 800	40 ~ 80
		22	4	30 ~ 50	0.026 ~ 0.028	≤ 0.05 D	1.0 D	430 ~ 720	40 ~ 80
		25	4	30 ~ 50	0.029 ~ 0.032	≤ 0.05 D	1.0 D	380 ~ 640	40 ~ 80

Cutting Parameter - Square Endmill Long

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (45-52HRC) AISI H13	M26	1	4	40 ~ 56	0.005 ~ 0.007	≤ 1.0 D	≤ 0.3 D	12730 ~ 17830	250 ~ 500
		1.5	4	40 ~ 56	0.008 ~ 0.011	≤ 1.0 D	≤ 0.3 D	8490 ~ 11880	270 ~ 520
		2	4	40 ~ 56	0.012 ~ 0.015	≤ 1.0 D	≤ 0.3 D	6370 ~ 8910	310 ~ 530
		2.5	4	40 ~ 56	0.016 ~ 0.019	≤ 1.0 D	≤ 0.3 D	5090 ~ 7130	330 ~ 540
		3	4	40 ~ 56	0.020 ~ 0.023	≤ 1.0 D	≤ 0.5 D (MAX0.5)	4240 ~ 5940	340 ~ 550
		4	4	40 ~ 56	0.028 ~ 0.031	≤ 1.0 D	≤ 0.5 D (MAX0.5)	3180 ~ 4460	360 ~ 550
		5	4	40 ~ 56	0.035 ~ 0.039	≤ 1.0 D	≤ 0.5 D (MAX0.5)	2550 ~ 3570	360 ~ 560
		6	4	40 ~ 56	0.043 ~ 0.048	≤ 1.0 D	≤ 0.5 D (MAX0.5)	2120 ~ 2970	360 ~ 570
		8	4	40 ~ 56	0.054 ~ 0.059	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1590 ~ 2230	340 ~ 530
		10	4	40 ~ 56	0.064 ~ 0.071	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1270 ~ 1780	330 ~ 510
		12	4	40 ~ 56	0.075 ~ 0.083	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1060 ~ 1490	320 ~ 490
		14	4	40 ~ 56	0.086 ~ 0.094	≤ 1.0 D	≤ 0.5 D (MAX0.5)	910 ~ 1270	310 ~ 480
		16	4	40 ~ 56	0.096 ~ 0.106	≤ 1.0 D	≤ 0.5 D (MAX0.5)	800 ~ 1110	310 ~ 470
		18	4	40 ~ 56	0.107 ~ 0.118	≤ 1.0 D	≤ 0.5 D (MAX0.5)	710 ~ 990	300 ~ 470
		20	4	40 ~ 56	0.117 ~ 0.129	≤ 1.0 D	≤ 0.5 D (MAX0.5)	640 ~ 890	300 ~ 460
		22	4	40 ~ 56	0.128 ~ 0.141	≤ 1.0 D	≤ 0.5 D (MAX0.5)	580 ~ 810	300 ~ 460
		25	4	40 ~ 56	0.144 ~ 0.158	≤ 1.0 D	≤ 0.5 D (MAX0.5)	510 ~ 710	290 ~ 450

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (52-63HRC) AISI D2	M27,28	1	4	32 ~ 48	0.004 ~ 0.006	≤ 1.0 D	≤ 0.3 D	10190 ~ 15280	160 ~ 370
		1.5	4	32 ~ 48	0.006 ~ 0.009	≤ 1.0 D	≤ 0.3 D	6790 ~ 10190	160 ~ 370
		2	4	32 ~ 48	0.009 ~ 0.012	≤ 1.0 D	≤ 0.3 D	5090 ~ 7640	180 ~ 370
		2.5	4	32 ~ 48	0.012 ~ 0.015	≤ 1.0 D	≤ 0.3 D	4070 ~ 6110	200 ~ 370
		3	4	32 ~ 48	0.015 ~ 0.018	≤ 1.0 D	≤ 0.5 D (MAX0.5)	3400 ~ 5090	200 ~ 370
		4	4	32 ~ 48	0.021 ~ 0.024	≤ 1.0 D	≤ 0.5 D (MAX0.5)	2550 ~ 3820	210 ~ 370
		5	4	32 ~ 48	0.027 ~ 0.030	≤ 1.0 D	≤ 0.5 D (MAX0.5)	2040 ~ 3060	220 ~ 370
		6	4	32 ~ 48	0.032 ~ 0.036	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1700 ~ 2550	220 ~ 370
		8	4	32 ~ 48	0.040 ~ 0.044	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1270 ~ 1910	200 ~ 340
		10	4	32 ~ 48	0.048 ~ 0.053	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1020 ~ 1530	200 ~ 320
		12	4	32 ~ 48	0.056 ~ 0.062	≤ 1.0 D	≤ 0.5 D (MAX0.5)	850 ~ 1270	190 ~ 310
		14	4	32 ~ 48	0.064 ~ 0.071	≤ 1.0 D	≤ 0.5 D (MAX0.5)	730 ~ 1090	190 ~ 310
		16	4	32 ~ 48	0.072 ~ 0.079	≤ 1.0 D	≤ 0.5 D (MAX0.5)	640 ~ 950	180 ~ 300
		18	4	32 ~ 48	0.080 ~ 0.088	≤ 1.0 D	≤ 0.5 D (MAX0.5)	570 ~ 850	180 ~ 300
		20	4	32 ~ 48	0.088 ~ 0.097	≤ 1.0 D	≤ 0.5 D (MAX0.5)	510 ~ 760	180 ~ 290
		22	4	32 ~ 48	0.096 ~ 0.106	≤ 1.0 D	≤ 0.5 D (MAX0.5)	460 ~ 690	180 ~ 290
		25	4	32 ~ 48	0.108 ~ 0.119	≤ 1.0 D	≤ 0.5 D (MAX0.5)	410 ~ 610	180 ~ 290

Cutting Parameter - Square Endmill Long

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (65-68 H RC) AISI D2	M27,28	1	4	24 ~ 40	0.001 ~ 0.002	≤1.0 D	≤ 0.3 D	7640 ~ 12730	30 ~ 100
		2.	4	24 ~ 40	0.002 ~ 0.003	≤1.0 D	≤ 0.3 D	5090 ~ 8490	40 ~ 100
		2	4	24 ~ 40	0.003 ~ 0.004	≤1.0 D	≤ 0.3 D	3820 ~ 6370	50 ~ 100
		3.	4	24 ~ 40	0.004 ~ 0.005	≤1.0 D	≤ 0.3 D	3060 ~ 5090	50 ~ 100
		3	4	24 ~ 40	0.005 ~ 0.006	≤1.0 D	≤0.5D(MAX0.5)	2550 ~ 4240	50 ~ 100
		4	4	24 ~ 40	0.007 ~ 0.008	≤1.0 D	≤0.5D(MAX0.5)	1910 ~ 3180	50 ~ 100
		5	4	24 ~ 40	0.009 ~ 0.010	≤1.0 D	≤0.5D(MAX0.5)	1530 ~ 2550	60 ~ 100
		6	4	24 ~ 40	0.011 ~ 0.012	≤1.0 D	≤0.5D(MAX0.5)	1270 ~ 2120	60 ~ 100
		8	4	24 ~ 40	0.013 ~ 0.015	≤1.0 D	≤0.5D(MAX0.5)	950 ~ 1590	50 ~ 100
		10	4	24 ~ 40	0.016 ~ 0.018	≤1.0 D	≤0.5D(MAX0.5)	760 ~ 1270	50 ~ 90
		12	4	24 ~ 40	0.019 ~ 0.021	≤1.0 D	≤0.5D(MAX0.5)	640 ~ 1060	50 ~ 90
		14	4	24 ~ 40	0.021 ~ 0.024	≤1.0 D	≤0.5D(MAX0.5)	550 ~ 910	50 ~ 90
		16	4	24 ~ 40	0.024 ~ 0.026	≤1.0 D	≤0.5D(MAX0.5)	480 ~ 800	50 ~ 80
		18	4	24 ~ 40	0.027 ~ 0.029	≤1.0 D	≤0.5D(MAX0.5)	420 ~ 710	50 ~ 80
		20	4	24 ~ 40	0.029 ~ 0.032	≤1.0 D	≤0.5D(MAX0.5)	380 ~ 640	40 ~ 80
		22	4	24 ~ 40	0.032 ~ 0.035	≤1.0 D	≤0.5D(MAX0.5)	350 ~ 580	40 ~ 80
		25	4	24 ~ 40	0.036 ~ 0.040	≤1.0 D	≤0.5D(MAX0.5)	310 ~ 510	40 ~ 80

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (55-60HRC) AISI H13	M26	1	4	40 ~ 56	0.004 ~ 0.006	≤0.05 D	1.0 D	12730 ~ 17830	200 ~ 430
		1.5	4	40 ~ 56	0.007 ~ 0.009	≤0.05 D	1.0 D	8490 ~ 11880	240 ~ 430
		2	4	40 ~ 56	0.010 ~ 0.012	≤0.05 D	1.0 D	6370 ~ 8910	250 ~ 430
		2.5	4	40 ~ 56	0.013 ~ 0.015	≤0.05 D	1.0 D	5090 ~ 7130	260 ~ 430
		3	4	40 ~ 56	0.016 ~ 0.019	≤0.05 D	1.0 D	4240 ~ 5940	270 ~ 450
		4	4	40 ~ 56	0.022 ~ 0.025	≤0.05 D	1.0 D	3180 ~ 4460	280 ~ 450
		5	4	40 ~ 56	0.028 ~ 0.032	≤0.05 D	1.0 D	2550 ~ 3570	290 ~ 460
		6	4	40 ~ 56	0.035 ~ 0.038	≤0.05 D	1.0 D	2120 ~ 2970	300 ~ 450
		8	4	40 ~ 56	0.043 ~ 0.047	≤0.05 D	1.0 D	1590 ~ 2230	270 ~ 420
		10	4	40 ~ 56	0.052 ~ 0.057	≤0.05 D	1.0 D	1270 ~ 1780	260 ~ 410
		12	4	40 ~ 56	0.060 ~ 0.066	≤0.05 D	1.0 D	1060 ~ 1490	250 ~ 390
		14	4	40 ~ 56	0.069 ~ 0.075	≤0.05 D	1.0 D	910 ~ 1270	250 ~ 380
		16	4	40 ~ 56	0.077 ~ 0.085	≤0.05 D	1.0 D	800 ~ 1110	250 ~ 380
		18	4	40 ~ 56	0.085 ~ 0.094	≤0.05 D	1.0 D	710 ~ 990	240 ~ 370
		20	4	40 ~ 56	0.094 ~ 0.103	≤0.05 D	1.0 D	640 ~ 890	240 ~ 370
		22	4	40 ~ 56	0.102 ~ 0.113	≤0.05 D	1.0 D	580 ~ 810	240 ~ 370
		25	4	40 ~ 56	0.115 ~ 0.127	≤0.05 D	1.0 D	510 ~ 710	230 ~ 360

Cutting Parameter - Square Endmill Long

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (52-63HRC) AISI D2	M27,28	1	4	32 ~ 48	0.003 ~ 0.005	≤0.05 D	1.0 D	10190 ~ 15280	120 ~ 310
		1.5	4	32 ~ 48	0.005 ~ 0.007	≤0.05 D	1.0 D	6790 ~ 10190	140 ~ 290
		2	4	32 ~ 48	0.007 ~ 0.010	≤0.05 D	1.0 D	5090 ~ 7640	140 ~ 310
		2.5	4	32 ~ 48	0.010 ~ 0.012	≤0.05 D	1.0 D	4070 ~ 6110	160 ~ 290
		3	4	32 ~ 48	0.012 ~ 0.014	≤0.05 D	1.0 D	3400 ~ 5090	160 ~ 290
		4	4	32 ~ 48	0.017 ~ 0.019	≤0.05 D	1.0 D	2550 ~ 3820	170 ~ 290
		5	4	32 ~ 48	0.021 ~ 0.024	≤0.05 D	1.0 D	2040 ~ 3060	170 ~ 290
		6	4	32 ~ 48	0.026 ~ 0.029	≤0.05 D	1.0 D	1700 ~ 2550	180 ~ 300
		8	4	32 ~ 48	0.032 ~ 0.036	≤0.05 D	1.0 D	1270 ~ 1910	160 ~ 280
		10	4	32 ~ 48	0.039 ~ 0.043	≤0.05 D	1.0 D	1020 ~ 1530	160 ~ 260
		12	4	32 ~ 48	0.045 ~ 0.050	≤0.05 D	1.0 D	850 ~ 1270	150 ~ 250
		14	4	32 ~ 48	0.051 ~ 0.057	≤0.05 D	1.0 D	730 ~ 1090	150 ~ 250
		16	4	32 ~ 48	0.058 ~ 0.064	≤0.05 D	1.0 D	640 ~ 950	150 ~ 240
		18	4	32 ~ 48	0.064 ~ 0.071	≤0.05 D	1.0 D	570 ~ 850	150 ~ 240
		20	4	32 ~ 48	0.070 ~ 0.078	≤0.05 D	1.0 D	510 ~ 760	140 ~ 240
		22	4	32 ~ 48	0.077 ~ 0.085	≤0.05 D	1.0 D	460 ~ 690	140 ~ 230
		25	4	32 ~ 48	0.086 ~ 0.095	≤0.05 D	1.0 D	410 ~ 610	140 ~ 230

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (63-68 HRC) AISI D2	M33	1	4	24 ~ 40	0.001 ~ 0.001	≤ 0.05 D	1.0 D	7640 ~ 12730	30 ~ 50
		1.5	4	24 ~ 40	0.002 ~ 0.002	≤ 0.05 D	1.0 D	5090 ~ 8490	40 ~ 70
		2	4	24 ~ 40	0.002 ~ 0.003	≤ 0.05 D	1.0 D	3820 ~ 6370	30 ~ 80
		2.5	4	24 ~ 40	0.003 ~ 0.004	≤ 0.05 D	1.0 D	3060 ~ 5090	40 ~ 80
		3	4	24 ~ 40	0.004 ~ 0.005	≤ 0.05 D	1.0 D	2550 ~ 4240	40 ~ 80
		4	4	24 ~ 40	0.005 ~ 0.006	≤ 0.05 D	1.0 D	1910 ~ 3180	40 ~ 80
		5	4	24 ~ 40	0.007 ~ 0.008	≤ 0.05 D	1.0 D	1530 ~ 2550	40 ~ 80
		6	4	24 ~ 40	0.009 ~ 0.010	≤ 0.05 D	1.0 D	1270 ~ 2120	50 ~ 80
		8	4	24 ~ 40	0.011 ~ 0.012	≤ 0.05 D	1.0 D	950 ~ 1590	40 ~ 80
		10	4	24 ~ 40	0.013 ~ 0.014	≤ 0.05 D	1.0 D	760 ~ 1270	40 ~ 70
		12	4	24 ~ 40	0.015 ~ 0.017	≤ 0.05 D	1.0 D	640 ~ 1060	40 ~ 70
		14	4	24 ~ 40	0.017 ~ 0.019	≤ 0.05 D	1.0 D	550 ~ 910	40 ~ 70
		16	4	24 ~ 40	0.019 ~ 0.021	≤ 0.05 D	1.0 D	480 ~ 800	40 ~ 70
		18	4	24 ~ 40	0.021 ~ 0.024	≤ 0.05 D	1.0 D	420 ~ 710	40 ~ 70
		20	4	24 ~ 40	0.023 ~ 0.026	≤ 0.05 D	1.0 D	380 ~ 640	30 ~ 70
		22	4	24 ~ 40	0.026 ~ 0.028	≤ 0.05 D	1.0 D	350 ~ 580	40 ~ 60
		25	4	24 ~ 40	0.029 ~ 0.032	≤ 0.05 D	1.0 D	310 ~ 510	40 ~ 70

Cutting Parameter - Square Endmill Extra Long

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (45-52HRC) AISI H13	M 26	1	4	25 ~ 35	0.005 ~ 0.007	≤ 1.0 D	≤ 0.3 D	7960 ~ 11140	160 ~ 310
		1.5	4	25 ~ 35	0.008 ~ 0.011	≤ 1.0 D	≤ 0.3 D	5310 ~ 7430	170 ~ 330
		2	4	25 ~ 35	0.012 ~ 0.015	≤ 1.0 D	≤ 0.3 D	3980 ~ 5570	190 ~ 330
		2.5	4	25 ~ 35	0.016 ~ 0.019	≤ 1.0 D	≤ 0.3 D	3180 ~ 4460	200 ~ 340
		3	4	25 ~ 35	0.020 ~ 0.023	≤ 1.0 D	≤ 0.5 D (MAX0.5)	2650 ~ 3710	210 ~ 340
		4	4	25 ~ 35	0.028 ~ 0.031	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1990 ~ 2790	220 ~ 350
		5	4	25 ~ 35	0.035 ~ 0.039	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1590 ~ 2230	220 ~ 350
		6	4	25 ~ 35	0.043 ~ 0.048	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1330 ~ 1860	230 ~ 360
		8	4	25 ~ 35	0.054 ~ 0.059	≤ 1.0 D	≤ 0.5 D (MAX0.5)	990 ~ 1390	210 ~ 330
		10	4	25 ~ 35	0.064 ~ 0.071	≤ 1.0 D	≤ 0.5 D (MAX0.5)	800 ~ 1110	200 ~ 320
		12	4	25 ~ 35	0.075 ~ 0.083	≤ 1.0 D	≤ 0.5 D (MAX0.5)	660 ~ 930	200 ~ 310
		14	4	25 ~ 35	0.086 ~ 0.094	≤ 1.0 D	≤ 0.5 D (MAX0.5)	570 ~ 800	200 ~ 300
		16	4	25 ~ 35	0.096 ~ 0.106	≤ 1.0 D	≤ 0.5 D (MAX0.5)	500 ~ 700	190 ~ 300
		18	4	25 ~ 35	0.107 ~ 0.118	≤ 1.0 D	≤ 0.5 D (MAX0.5)	440 ~ 620	190 ~ 290
		20	4	25 ~ 35	0.117 ~ 0.129	≤ 1.0 D	≤ 0.5 D (MAX0.5)	400 ~ 560	190 ~ 290
		22	4	25 ~ 35	0.128 ~ 0.141	≤ 1.0 D	≤ 0.5 D (MAX0.5)	360 ~ 510	180 ~ 290
		25	4	25 ~ 35	0.144 ~ 0.158	≤ 1.0 D	≤ 0.5 D (MAX0.5)	320 ~ 450	180 ~ 280

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (52-63HRC) AISI H13	M27,28	1	4	20 ~ 30	0.004 ~ 0.006	≤ 1.0 D	≤ 0.3 D	6370 ~ 9550	100 ~ 230
		1.5	4	20 ~ 30	0.006 ~ 0.009	≤ 1.0 D	≤ 0.3 D	4240 ~ 6370	100 ~ 230
		2	4	20 ~ 30	0.009 ~ 0.012	≤ 1.0 D	≤ 0.3 D	3180 ~ 4770	110 ~ 230
		2.5	4	20 ~ 30	0.012 ~ 0.015	≤ 1.0 D	≤ 0.3 D	2550 ~ 3820	120 ~ 230
		3	4	20 ~ 30	0.015 ~ 0.018	≤ 1.0 D	≤ 0.5 D (MAX0.5)	2120 ~ 3180	130 ~ 230
		4	4	20 ~ 30	0.021 ~ 0.024	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1590 ~ 2390	130 ~ 230
		5	4	20 ~ 30	0.027 ~ 0.030	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1270 ~ 1910	140 ~ 230
		6	4	20 ~ 30	0.032 ~ 0.036	≤ 1.0 D	≤ 0.5 D (MAX0.5)	1060 ~ 1590	140 ~ 230
		8	4	20 ~ 30	0.040 ~ 0.044	≤ 1.0 D	≤ 0.5 D (MAX0.5)	800 ~ 1190	130 ~ 210
		10	4	20 ~ 30	0.048 ~ 0.053	≤ 1.0 D	≤ 0.5 D (MAX0.5)	640 ~ 950	120 ~ 200
		12	4	20 ~ 30	0.056 ~ 0.062	≤ 1.0 D	≤ 0.5 D (MAX0.5)	530 ~ 800	120 ~ 200
		14	4	20 ~ 30	0.064 ~ 0.071	≤ 1.0 D	≤ 0.5 D (MAX0.5)	450 ~ 680	120 ~ 200
		16	4	20 ~ 30	0.072 ~ 0.079	≤ 1.0 D	≤ 0.5 D (MAX0.5)	400 ~ 600	120 ~ 190
		18	4	20 ~ 30	0.080 ~ 0.088	≤ 1.0 D	≤ 0.5 D (MAX0.5)	350 ~ 530	110 ~ 190
		20	4	20 ~ 30	0.088 ~ 0.097	≤ 1.0 D	≤ 0.5 D (MAX0.5)	320 ~ 480	110 ~ 190
		22	4	20 ~ 30	0.096 ~ 0.106	≤ 1.0 D	≤ 0.5 D (MAX0.5)	290 ~ 430	110 ~ 180
		25	4	20 ~ 30	0.108 ~ 0.119	≤ 1.0 D	≤ 0.5 D (MAX0.5)	250 ~ 380	110 ~ 180

Cutting Parameter - Square Endmill Extra Long

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (55-60HRC) AISI H13	M33	1	4	15 ~ 25	0.001 ~ 0.002	≤1.0 D	≤0.3 D	4770 ~ 7960	20 ~ 60
		1.5	4	15 ~ 25	0.002 ~ 0.003	≤1.0 D	≤0.3 D	3180 ~ 5310	30 ~ 60
		2	4	15 ~ 25	0.003 ~ 0.004	≤1.0 D	≤0.3 D	2390 ~ 3980	30 ~ 60
		25	4	15 ~ 25	0.004 ~ 0.005	≤1.0 D	≤0.3 D	1910 ~ 3180	30 ~ 60
		3	4	15 ~ 25	0.005 ~ 0.006	≤1.0 D	≤0.5 D (MAX0.5)	1590 ~ 2650	30 ~ 60
		4	4	15 ~ 25	0.007 ~ 0.008	≤1.0 D	≤0.5 D (MAX0.5)	1190 ~ 1990	30 ~ 60
		5	4	15 ~ 25	0.009 ~ 0.010	≤1.0 D	≤0.5 D (MAX0.5)	950 ~ 1590	30 ~ 60
		6	4	15 ~ 25	0.011 ~ 0.012	≤1.0 D	≤0.5 D (MAX0.5)	800 ~ 1330	40 ~ 60
		a	4	15 ~ 25	0.013 ~ 0.015	≤1.0 D	≤0.5 D (MAX0.5)	600 ~ 990	30 ~ 60
		10	4	15 ~ 25	0.016 ~ 0.018	≤1.0 D	≤0.5 D (MAX0.5)	480 ~ 800	30 ~ 60
		12	4	15 ~ 25	0.019 ~ 0.021	≤1.0 D	≤0.5 D (MAX0.5)	400 ~ 660	30 ~ 60
		14	4	15 ~ 25	0.021 ~ 0.024	≤1.0 D	≤0.5 D (MAX0.5)	340 ~ 570	30 ~ 50
		16	4	15 ~ 25	0.024 ~ 0.026	≤1.0 D	≤0.5 D (MAX0.5)	300 ~ 500	30 ~ 50
		18	4	15 ~ 25	0.027 ~ 0.029	≤1.0 D	≤0.5 D (MAX0.5)	270 ~ 440	30 ~ 50
		20	4	15 ~ 25	0.029 ~ 0.032	≤1.0 D	≤0.5 D (MAX0.5)	240 ~ 400	30 ~ 50
		22	4	15 ~ 25	0.032 ~ 0.035	≤1.0 D	≤0.5 D (MAX0.5)	220 ~ 360	30 ~ 50
		25	4	15 ~ 25	0.036 ~ 0.040	≤1.0 D	≤0.5 D (MAX0.5)	190 ~ 320	30 ~ 50

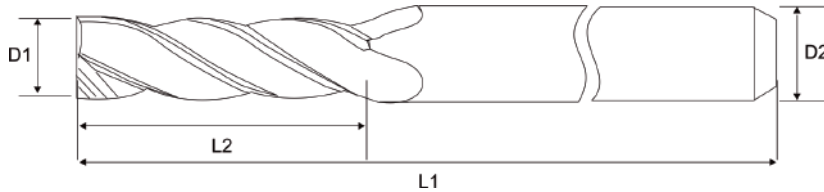
SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (45-52HRC) AISI H13	M27,28	1	4	25 ~ 35	0.004 ~ 0.006	≤ 0.05 D	1.0 D	7960 ~ 11140	130 ~ 270
		1.5	4	25 ~ 35	0.007 ~ 0.009	≤ 0.05 D	1.0 D	5310 ~ 7430	150 ~ 270
		2	4	25 ~ 35	0.010 ~ 0.012	≤ 0.05 D	1.0 D	3980 ~ 5570	160 ~ 270
		2.5	4	25 ~ 35	0.013 ~ 0.015	≤ 0.05 D	1.0 D	3180 ~ 4460	170 ~ 270
		3	4	25 ~ 35	0.016 ~ 0.019	≤ 0.05 D	1.0 D	2650 ~ 3710	170 ~ 280
		4	4	25 ~ 35	0.022 ~ 0.025	≤ 0.05 D	1.0 D	1990 ~ 2790	180 ~ 280
		5	4	25 ~ 35	0.028 ~ 0.032	≤ 0.05 D	1.0 D	1590 ~ 2230	180 ~ 290
		6	4	25 ~ 35	0.035 ~ 0.038	≤ 0.05 D	1.0 D	1330 ~ 1860	190 ~ 280
		8	4	25 ~ 35	0.043 ~ 0.047	≤ 0.05 D	1.0 D	990 ~ 1390	170 ~ 260
		10	4	25 ~ 35	0.052 ~ 0.057	≤ 0.05 D	1.0 D	800 ~ 1110	170 ~ 250
		12	4	25 ~ 35	0.060 ~ 0.066	≤ 0.05 D	1.0 D	660 ~ 930	160 ~ 250
		14	4	25 ~ 35	0.069 ~ 0.075	≤ 0.05 D	1.0 D	570 ~ 800	160 ~ 240
		16	4	25 ~ 35	0.077 ~ 0.085	≤ 0.05 D	1.0 D	500 ~ 700	150 ~ 240
		18	4	25 ~ 35	0.085 ~ 0.094	≤ 0.05 D	1.0 D	440 ~ 620	150 ~ 230
		20	4	25 ~ 35	0.094 ~ 0.103	≤ 0.05 D	1.0 D	400 ~ 560	150 ~ 230
		22	4	25 ~ 35	0.102 ~ 0.113	≤ 0.05 D	1.0 D	360 ~ 510	150 ~ 230
		25	4	25 ~ 35	0.115 ~ 0.127	≤ 0.05 D	1.0 D	320 ~ 450	150 ~ 230

Cutting Parameter - Square Endmill Extra Long

SLOTING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDEDNED STEEL (52-63HRC) AISI D2	M27,28	1	4	20 ~ 30	0.003 ~ 0.005	≤ 0.05 D	1.0 D	6370 ~ 9550	80 ~ 190
		1.5	4	20 ~ 30	0.005 ~ 0.007	≤ 0.05 D	1.0 D	4240 ~ 6370	80 ~ 180
		2	4	20 ~ 30	0.007 ~ 0.010	≤ 0.05 D	1.0 D	3180 ~ 4770	90 ~ 190
		2.5	4	20 ~ 30	0.010 ~ 0.012	≤ 0.05 D	1.0 D	2550 ~ 3820	100 ~ 180
		3	4	20 ~ 30	0.012 ~ 0.014	≤ 0.05 D	1.0 D	2120 ~ 3180	100 ~ 180
		4	4	20 ~ 30	0.017 ~ 0.019	≤ 0.05 D	1.0 D	1590 ~ 2390	110 ~ 180
		5	4	20 ~ 30	0.021 ~ 0.024	≤ 0.05 D	1.0 D	1270 ~ 1910	110 ~ 180
		6	4	20 ~ 30	0.026 ~ 0.029	≤ 0.05 D	1.0 D	1060 ~ 1590	110 ~ 180
		8	4	20 ~ 30	0.032 ~ 0.036	≤ 0.05 D	1.0 D	800 ~ 1190	100 ~ 170
		10	4	20 ~ 30	0.039 ~ 0.043	≤ 0.05 D	1.0 D	640 ~ 950	100 ~ 160
		12	4	20 ~ 30	0.045 ~ 0.050	≤ 0.05 D	1.0 D	530 ~ 800	100 ~ 160
		14	4	20 ~ 30	0.051 ~ 0.057	≤ 0.05 D	1.0 D	450 ~ 680	90 ~ 160
		16	4	20 ~ 30	0.058 ~ 0.064	≤ 0.05 D	1.0 D	400 ~ 600	90 ~ 150
		18	4	20 ~ 30	0.064 ~ 0.071	≤ 0.05 D	1.0 D	350 ~ 530	90 ~ 150
		20	4	20 ~ 30	0.070 ~ 0.078	≤ 0.05 D	1.0 D	320 ~ 480	90 ~ 150
		22	4	20 ~ 30	0.077 ~ 0.085	≤ 0.05 D	1.0 D	290 ~ 430	90 ~ 150
		25	4	20 ~ 30	0.086 ~ 0.095	≤ 0.05 D	1.0 D	250 ~ 380	180 ~ 280

DH SERIES

4 Flute Standard Endmill



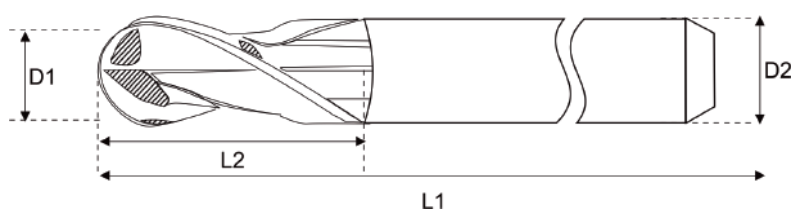
ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
EM1N4D4DH	1	4	3	50	●
EM1.5N4D4DH	1.5	4	4	50	●
EM2N4D4DH	2	4	6	50	●
EM3N4D4DH	3	4	8	50	●
EM3N4D4H	3	3	8	50	●
EM4N4DH	4	4	10	50	●
EMS4DH	5	5	13	50	●
EMSN4D6DH	5.	6	13	50	●
EM6N4DH	6	6	15	50	●
EM8N4DH	8	8	25	60	●
EM10N4DH	10	10	30	75	●
EM12N4DH	12	12	30	75	●
EM14N4DH	14	14	45	100	●
EM16N4DH	16	16	45	100	●
EM18N4DH	18	18	45	100	●
EM20N4DH	20	20	50	100	●

● STOCKABLE ○ NON STOCKABLE



DH SERIES

2 Flute Standard Ballnose



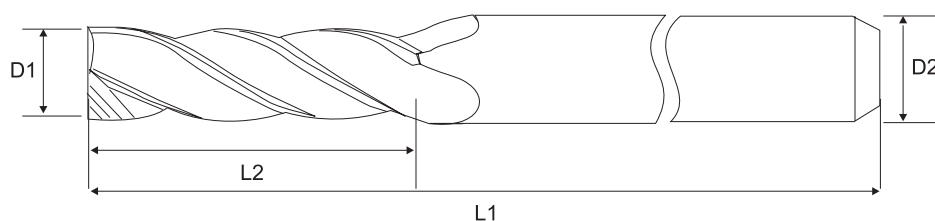
ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
BN1N2D4DH	1	4.	3	50	●
BN1.5N2D4DH	1.5	4	3	50	●
BN2N2D4DH	2	4	4	50	●
BN3N2DH	3	3	6	50	●
BN3N2D4DH	3	4	6	50	●
BN4N2DH	4	4	8	50	●
BN5N2DH	5	5	10	50	●
BN5N2D6DH	5.	6	10	50	●
BN6N2DH	6	6	12	50	●
BN8N2DH	8	8	16	60	●
BN10N2DH	10	10	20	75	●
BN12N2DH	12	12	25	75	●

● STOCKABLE ○ NON STOCKABLE



DH SERIES

4 Flute Long Endmill Series



ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
EM3L4D4DH	3	4	15	75	●
EM4L4DH	4T	4	15	75	●
EM5L4D6DH	5	6	20	75	●
EM6L4DH	6	6	24	75	●
EM8L4DH	8	8	25	50	●
EM4XL4DH	4	4	16	100	●
EM6LR4DH	6	6	24	100	●
EM8LR4DH	8	8	32	100	●
EM10LR4DH	10	10	40	100	●
EM12LR4DH	12	12	48	100	●

● STOCKABLE ○ NON STOCKABLE

TISI

MC

0.8
µm

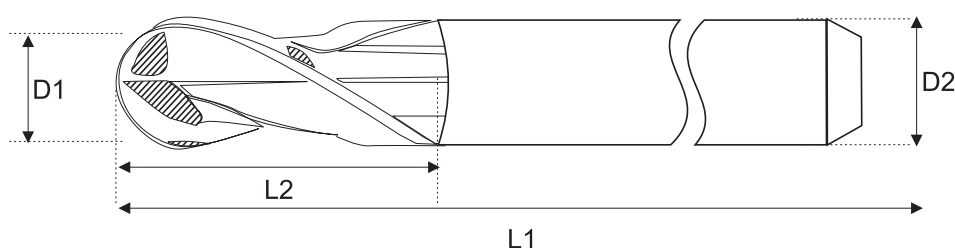
Co
10%

HRC
>50

4 flute

DH SERIES

2 Flute Long Ballnose Series



ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
BN3L2D4DH	3	4	8	75	●
BN3XL2D4DH	3	4	8	100	●
BN4L2DH	4	4	10	75	●
BN4XL2DH	4	4	10	100	●
BN6L2DH	6	6	12	75	●
BN6LR2DH	6	6	15	100	●
BN8L2DH	8	8	16	75	●
BN8LR2DH	8	8	20	100	●
BN10LR2DH	10	10	25	100	●
BN12LR2DH	12	12	30	100	●

● STOCKABLE ○ NON STOCKABLE

TiAIN

MG

0.8
μm

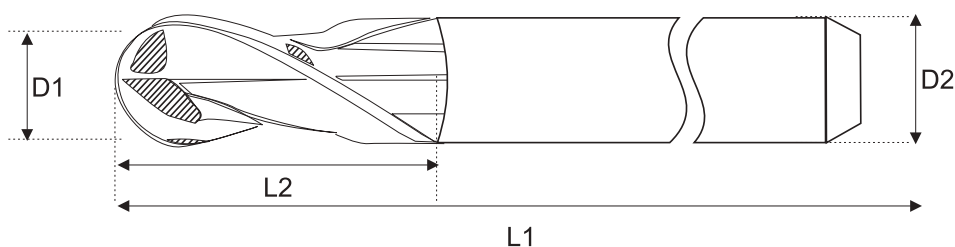
Co
10%

HRC
>40

2 flute

DH SERIES

4 Flute Ballnose Line



ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
BN2N4DH	2	4	4	50	●
BN3N4DH	3	3	6	50	●
BN4N4DH	4	4	8	50	●
BN5N4DH	5	5	12	50	●
BN6N4DH	6	6	12	50	●
BN8N4DH	8	8	16	60	●
BN10N4DH	10	10	20	75	●
BN12N4DH	12	12	25	75	●

● STOCKABLE ○ NON STOCKABLE

TiSi

MG

0.8
µm

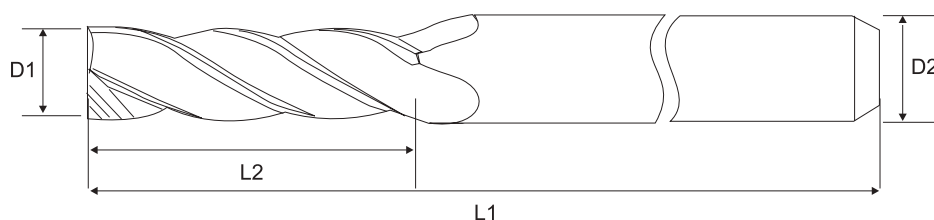
Co
10%

HRC
>50

4 flute

DH SERIES

4 Flute Corner Radius Endmill



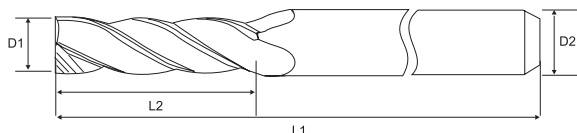
ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
EM3N4D4CR0.5DH	3R0.5	4	6	50	●
EM3N4D4CR1DH	3R1	4	6	50	●
EM4N4CR0.5DH	4R0.5	4	8	50	●
EM4N4CR1DH	4 R1	4	8	50	●
EM5N4CR0.5DH	5R0.5	5	10	50	●
EM5N4CR1DH	5R1	5	10	50	●
EM6N4CR0.5DH	6R0.5	6	12	50	●
EM6N4CR1DH	6R1	6	12	50	●
EM8N4CR0.5DH	8R0.5	8	16	60	●
EM8N4CR1DH	8R1	8	16	60	●
EM10N4CR0.5DH	10R0.5	10	20	75	●
EM10N4CR1DH	10R1	10	20	75	●
EM12N4CR0.5DH	12R0.5	12	24	75	●
EM12N4CR1DH	12R1	12	24	75	●

● STOCKABLE ○ NON STOCKABLE



DH SERIES

Extra Long Length 4 Flute Square Endmill



ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	Z	AVAILABILITY
EM6XL4DH	6	6	40	150	4	●
EM8XL4DH	8	8	40	150	4	●
EM10XL4DH	10	10	40	150	4	●
EM12XL4DH	12	12	50	150	4	●
EM16XL4DH	16	16	60	150	4	●
EM20XL4DH	20	20	60	150	4	●

● STOCKABLE ○ NON STOCKABLE

TiSi

MG

0.8
µm

Co
10%

HRC
>50

4 flute

DH SERIES

2 Flute Rib Endmill



ITEM NUMBER	D1(DIA)	L2 (WL)	L (OAL)	D2(SHANK)	AVAILABILITY
ME0.3F2LN2D4DH	0.3	2	50	4	○
ME0.3F4LN2D4DH	0.3	4	50	4	○
ME0.4F2LN2D4DH	0.4	2	50	4	○
ME0.4F4LN2D4DH	0.4	4	50	4	○
ME0.5F2LN2D4DH	0.5	2	50	4	●
ME0.5F4LN2D4DH	0.5	4	50	4	●
ME0.5F6LN2D4DH	0.5	6	50	4	●
ME0.5F8LN2D4DH	0.5	8	50	4	●
ME0.6F4LN2D4DH	0.6	4	50	4	○
ME0.6F6LN2D4DH	0.6	6	50	4	○
ME0.6F8LN2D4DH	0.6	8	50	4	○
ME0.8F4LN2D4DH	0.8	4	50	4	○
ME0.8F6LN2D4DH	0.8	6	50	4	○
ME0.8F8LN2D4DH	0.8	8	50	4	○
ME0.8F10LN2D4DH	0.8	10	50	4	○
ME1F6LN2D4DH	1	6	50	4	●
ME1F10LN2D4DH	1	10	50	4	●
ME1F12LN2D4DH	1	12	50	4	●
ME1F16LN2D4DH	1	16	50	4	●
ME1.5F8LN2D4DH	1.5	8	50	4	●
ME1.5F10LN2D4DH	1.5	10	50	4	●
ME1.5F12LN2D4DH	1.5	12	50	4	●
ME1.5F16LN2D4DH	1.5	16	50	4	●
ME2F8LN2D4DH	2	8	50	4	●
ME2F10LN2D4DH	2	10	50	4	●
ME2F12LN2D4DH	2	12	50	4	●
ME2F16LN2D4DH	2	16	50	4	●
ME2F20LN2D4DH	2	20	50	4	●
ME2.5F10LN2D4DH	2.5	10	50	4	○
ME2.5F16LN2D4DH	2.5	16	50	4	○
ME2.5F20LN2D4DH	2.5	20	50	4	○
ME3F12LN2D4DH	3	12	50	4	●
ME3F16LN2D4DH	3	16	50	4	●
ME3F20LN2D4DH	3	20	50	4	●
ME3F25LN2D4DH	3	25	50	4	○

● STOCKABLE ○ NON STOCKABLE

TiAlN

MG

0.8
μm

Co
10%

HRC
>40

2 flute

PLEASE NOTE : FLUTE LENGTH OF ALL ABOVE TOOLS IS 2 X DIAMETER . FOR EG: FOR 0.5MM DIA, FLUTE LENGTH IS 1MM.

MILLING

DH SERIES

2 Flute BallNose Rib Endmill



ITEM NUMBER	D1(DIA)	L2 (WL)	L (OAL)	D2(SHANK)	AVAILABILITY
MB0.5F2LN2D4DH	0.5	2	50	4	●
MB0.5F4LN2D4DH	0.5	4	50	4	●
MB0.5F6LN2D4DH	0.5	6	50	4	●
MB0.5F8LN2D4DH	0.5	8	50	4	●
MB0.6F4LN2D4DH	0.6	4	50	4	○
MB0.6F6LN2D4DH	0.6	6	50	4	○
MB0.6F8LN2D4DH	0.6	8	50	4	○
MB0.8F4LN2D4DH	0.8	4	50	4	○
MB0.8F6LN2D4DH	0.8	6	50	4	○
MB0.8F8LN2D4DH	0.8	8	50	4	○
MB0.8F10LN2D4DH	0.8	10	50	4	○
MB1F6LN2D4DH	1	6	50	4	●
MB1F10LN2D4DH	1	10	50	4	●
MB1F12LN2D4DH	1	12	50	4	●
MB1F16LN2D4DH	1	16	50	4	●
MB1.5F8LN2D4DH	1.5	8	50	4	●
MB1.5F10LN2D4DH	1.5	10	50	4	○
MB1.5F12LN2D4DH	1.5	12	50	4	●
MB1.5F16LN2D4DH	1.5	16	50	4	●
MB2F8LN2D4DH	2	8	50	4	●
MB2F10LN2D4DH	2	10	50	4	●
MB2F12LN2D4DH	2	12	50	4	●
MB2F16LN2D4DH	2	16	50	4	●
MB2F20LN2D4DH	2	20	50	4	○
MB2.5F10LN2D4DH	2.5	10	50	4	○
MB2.5F16LN2D4DH	2.5	16	50	4	○
MB2.5F20LN2D4DH	2.5	20	50	4	○
MB3F12LN2D4DH	3	12	50	4	●
MB3F16LN2D4DH	3	16	50	4	●
MB3F20LN2D4DH	3	20	50	4	●
MB3F25LN2D4DH	3	25	50	4	○

TIAIN

MG

0.8
µm

Co
10%

HRC
>40

2flute

● STOCKABLE ○ NON STOCKABLE

PLEASE NOTE : FLUTE LENGTH OF ALL ABOVE TOOLS IS 2 X DIAMETER . FOR EG: FOR 0.5MM DIA, FLUTE LENGTH IS 1MM

DH SERIES

4 Flute Rib Endmill



ITEM NUMBER	D1(DIA)	L2 (WL)	L (OAL)	D2(SHANK)	AVAILABILITY
ME1F6LN4D4DH	1	6	50	4	●
ME1F10LN4D4DH	1	10	50	4	●
ME1F12LN4D4DH	1	12	50	4	●
ME1F16LN4D4DH	1	16	50	4	●
ME1.5F8LN4D4DH	1.5	8	50	4	○
ME1.5F10LN4D4DH	1.5	10	50	4	●
ME1.5F12LN4D4DH	1.5	12	50	4	○
ME1.5F16LN4D4DH	1.5	16	50	4	●
ME2F8LN4D4DH	2	8	50	4	●
ME2F10LN4D4DH	2	10	50	4	●
ME2F12LN4D4DH	2	12	50	4	●
ME2F16LN4D4DH	2	16	50	4	●
ME2F20LN4D4DH	2	20	50	4	●
ME2.5F10LN4D4DH	2.5	10	50	4	○
ME2.5F16LN4D4DH	2.5	16	50	4	○
ME2.5F20LN4D4DH	2.5	20	50	4	○
ME3F12LN4D4DH	3	12	50	4	●
ME3F16LN4D4DH	3	16	50	4	●
ME3F20LN4D4DH	3	20	50	4	●
ME3F25LN4D4DH	3	25	50	4	○

TiSi

MC

0.8
µmCo
10%HRC
>50

4 flute

● STOCKABLE ○ NON STOCKABLE

PLEASE NOTE : FLUTE LENGTH OF ALL ABOVE TOOLS IS 2 X DIAMETER . FOR EG: FOR 0.5MM DIA, FLUTE LENGTH IS 1MM.

Cutting Parameter - Miniature Square Endmill Long Neck

2 FLUTES MINIATURE ENDMILL												
DEPTH OF CUT			HARDENED STEELS - M26,M27					HARDENED STEELS -M28,M33				
C	L2	AE (MM)	AP (MM)	VC(M/MIN)	FZ (MM)	N (MIN-1)	VF (MM/MIN)	AP (MM)	VC (M/MIN)	FZ (MM)	N (MIN-1)	VF(MM/MIN)
0.2	0.5T	1.00	0.040	25	0.002	40,000	160	0.034	25	0.001	40,000	80
0.2	1	1.00	0.016	23	0.002	37,400	140	0.014	23	0.001	37,400	70
0.2	1.5	1.00	0.011	22	0.002	34,800	121	0.010	22	0.001	34,800	61
0.3	1	1.00	0.040	38	0.002	40,000	160	0.034	38	0.001	40,000	80
0.3	2	1.00	0.020	33	0.002	34,800	121	0.017	33	0.001	34,800	61
0.3	3	1.00	0.012	28	0.001	29,600	88	0.010	28	0.001	29,600	44
0.4	2	1.00	0.032	47	0.003	37,400	210	0.027	47	0.003	37,301	209
0.4	3	1.00	0.023	44	0.003	34,800	182	0.019	44	0.003	34,708	181
0.4	4	1.00	0.016	37	0.002	29,600	131	0.014	37	0.002	29,522	131
0.4	5	1.00	0.013	34	0.002	27,000	109	0.011	34	0.002	26,929	109
0.5	2	1.00	0.050	62	0.004	39,099	315	0.043	57	0.004	35,916	264
0.5	4	1.00	0.025	50	0.003	31,474	204	0.021	45	0.003	28,912	171
0.5	6	1.00	0.017	42	0.003	26,391	143	0.014	38	0.002	24,243	120
0.5	8	1.00	0.013	34	0.002	21,309	93	0.011	31	0.002	19,574	78
0.6	2	1.00	0.080	68	0.005	35,916	336	0.068	60	0.004	31,831	239
0.6	4	1.00	0.040	59	0.004	31,246	254	0.034	52	0.003	27,693	181
0.6	6	1.00	0.024	50	0.003	26,577	184	0.020	44	0.003	23,555	131
0.6	8	1.00	0.018	46	0.003	24,243	153	0.016	41	0.002	21,486	109
0.6	10	1.00	0.015	37	0.002	19,574	100	0.013	33	0.002	17,348	71
0.7	2	1.00	0.140	70	0.005	31,831	328	0.119	60	0.005	27,284	259
0.7	4	1.00	0.056	65	0.005	29,762	286	0.048	56	0.004	25,510	226
0.7	6	1.00	0.035	56	0.004	25,624	212	0.030	48	0.004	21,963	168
0.7	8	1.00	0.025	52	0.004	23,555	179	0.022	44	0.003	20,190	142
0.7	10	1.00	0.020	43	0.003	19,417	122	0.017	37	0.003	16,643	96
0.8	4	1.00	0.064	65	0.005	26,042	278	0.054	56	0.004	22,321	198
0.8	6	1.00	0.046	61	0.005	24,231	241	0.039	52	0.004	20,770	171
0.8	8	1.00	0.032	52	0.004	20,610	174	0.027	44	0.003	17,666	124
0.8	10	1.00	0.027	47	0.004	18,800	145	0.023	41	0.003	16,114	103
0.8	12	1.00	0.021	43	0.003	16,990	119	0.018	37	0.003	14,563	84
0.9	6	1.00	0.060	61	0.005	21,539	230	0.051	52	0.005	18,462	185
0.9	8	1.00	0.045	56	0.005	19,930	197	0.038	48	0.004	17,083	158
0.9	10	1.00	0.033	52	0.004	18,321	166	0.028	44	0.004	15,703	134
0.9	15	1.00	0.023	38	0.003	13,493	90	0.019	33	0.003	11,565	72
1.0	6	1.00	0.067	61	0.006	19,385	226	0.057	52	0.005	16,616	166
1.0	8	1.00	0.050	56	0.005	17,937	194	0.043	48	0.004	15,374	142
1.0	10	1.00	0.040	52	0.005	16,489	164	0.034	44	0.004	14,133	120
1.0	12	1.00	0.033	47	0.004	15,040	136	0.028	41	0.004	12,891	100

Cutting Parameter - Miniature Square Endmill Long Neck

2 FLUTES MINIATURE ENDMILL												
DEPTH OF CUT			HARDENED STEELS - M26,M27					HARDENED STEELS -M28,M33				
C	L2	AE (MM)	AP (MM)	VC(M/MIN)	FZ (MM)	N (MIN-1)	VF (MM/MIN)	AP (MM)	VC (M/MIN)	FZ (MM)	N (MIN-1)	VF(MM/MIN)
1.0	14	1.00	0.029	43	0.004	13592	111	0.024	37	0.003	11650	82
1.0	16	1.00	0.025	38	0.004	12144	89	0.021	33	0.003	10409	65
1.2	6	1.00	0.096	65	0.007	17361	250	0.082	56	0.006	14881	188
1.2	8	1.00	0.080	61	0.007	16154	217	0.068	52	0.006	13846	163
1.2	10	1.00	0.060	56	0.006	14947	186	0.051	48	0.005	12812	139
1.2	12	1.00	0.048	52	0.006	13740	157	0.041	44	0.005	11777	118
1.4	6	1.00	0.140	70	0.008	15916	264	0.119	60	0.007	13642	200
1.4	8	1.00	0.112	65	0.007	14881	231	0.095	56	0.007	12755	175
1.4	10	1.00	0.080	61	0.007	13846	200	0.068	52	0.006	11868	151
1.4	12	1.00	0.070	56	0.006	12812	171	0.060	48	0.006	10981	130
1.4	14	1.00	0.056	52	0.006	11777	145	0.048	44	0.005	10095	110
1.4	16	1.00	0.051	52	0.006	11777	145	0.043	44	0.005	10095	110
1.5	6	1.00	0.150	70	0.009	14855	259	0.128	60	0.008	12732	212
1.5	8	1.00	0.120	65	0.008	13889	226	0.102	56	0.007	11904	185
1.5	10	1.00	0.100	61	0.007	12923	196	0.085	52	0.007	11077	160
1.5	12	1.00	0.075	56	0.007	11958	168	0.064	48	0.006	10249	137
1.5	14	1.00	0.067	56	0.007	11958	168	0.057	48	0.006	10249	137
1.5	16	1.00	0.060	52	0.006	10992	142	0.051	44	0.006	9422	116
1.5	18	1.00	0.050	47	0.006	10027	118	0.043	41	0.005	8594	97
1.5	20	1.00	0.046	47	0.006	10027	118	0.039	41	0.005	8594	97
1.6	6	1.00	0.213	70	0.009	13926	259	0.181	60	0.008	11937	199
1.6	8	1.00	0.128	65	0.008	13021	226	0.109	56	0.007	11161	174
1.6	10	1.00	0.107	61	0.008	12116	196	0.091	52	0.007	10385	151
1.6	12	1.00	0.091	61	0.008	12116	196	0.078	52	0.007	10385	151
1.6	14	1.00	0.080	56	0.007	11210	168	0.068	48	0.006	9609	129
1.6	16	1.00	0.064	52	0.007	10305	142	0.054	44	0.006	8833	109
1.6	18	1.00	0.058	52	0.007	10305	142	0.049	44	0.006	8833	109
1.6	20	1.00	0.053	47	0.006	9400	118	0.045	41	0.005	8057	91
1.8	6	1.00	0.240	70	0.010	12379	255	0.204	60	0.009	10611	198
1.8	8	1.00	0.180	70	0.010	12379	255	0.153	60	0.009	10611	198
1.8	10	1.00	0.144	65	0.009	11574	223	0.122	56	0.008	9921	173
1.8	12	1.00	0.120	61	0.009	10769	193	0.102	52	0.008	9231	150
1.8	14	1.00	0.103	61	0.009	10769	193	0.087	52	0.008	9231	150
1.8	16	1.00	0.090	56	0.008	9965	165	0.077	48	0.007	8541	128
1.8	18	1.00	0.072	52	0.007	9160	140	0.061	44	0.007	7852	108
1.8	20	1.00	0.065	52	0.007	9160	140	0.056	44	0.007	7852	108
2.0	6	1.00	0.267	70	0.011	11141	252	0.227	60	0.010	9550	197

Cutting Parameter - Miniature Square Endmill Long Neck

2 FLUTES MINIATURE ENDMILL												
DEPTH OF CUT			HARDENED STEELS - M26,M27					HARDENED STEELS -M28,M33				
C	L2	AE (MM)	AP (MM)	VC(M/MIN)	FZ (MM)	N (MIN-1)	VF (MM/MIN)	AP (MM)	VC (M/MIN)	FZ (MM)	N (MIN-1)	VF(MM/MIN)
2.0	8	1.00	0.200	70	0.011	11,141	252	0.170	60	0.010	9,550	197
2.0	10	1.00	0.160	65	0.010	10,416	220	0.136	56	0.009	8,929	172
2.0	12	1.00	0.133	61	0.010	9,692	190	0.113	52	0.009	8,308	149
2.0	14	1.00	0.114	61	0.010	9,692	190	0.097	52	0.009	8,308	149
2.0	16	1.00	0.100	56	0.009	8,968	163	0.085	48	0.008	7,687	128
2.0	18	1.00	0.089	56	0.009	8,968	163	0.076	48	0.008	7,687	128
2.0	20	1.00	0.080	52	0.008	8,244	138	0.068	44	0.007	7,067	108
2.0	25	1.00	0.067	47	0.007	7,520	115	0.057	41	0.007	6,446	90
2.0	30	1.00	0.053	43	0.007	6,796	94	0.045	37	0.006	5,825	73
2.5	8	1.00	0.333	70	0.013	8,913	230	0.283	60	0.012	7,640	191
2.5	10	1.00	0.250	70	0.013	8,913	230	0.213	60	0.012	7,640	191
2.5	12	1.00	0.250	70	0.013	8,913	230	0.213	60	0.012	7,640	191
2.5	14	1.00	0.200	65	0.012	8,333	201	0.170	56	0.011	7,143	167
2.5	16	1.00	0.167	61	0.011	7,754	174	0.142	52	0.010	6,646	145
2.5	18	1.00	0.143	61	0.011	7,754	174	0.121	52	0.010	6,646	145
2.5	20	1.00	0.125	56	0.010	7,175	149	0.106	48	0.010	6,150	124
2.5	25	1.00	0.100	52	0.009	6,595	126	0.085	44	0.009	5,653	105
2.5	30	1.00	0.083	47	0.008	6,016	105	0.071	41	0.008	5,157	87
3.0	8	1.00	0.600	70	0.015	7,427	221	0.510	60	0.014	6,366	185
3.0	10	1.00	0.400	70	0.015	7,427	221	0.340	60	0.014	6,366	185
3.0	12	1.00	0.300	70	0.015	7,427	221	0.255	60	0.014	6,366	185
3.0	14	1.00	0.300	70	0.015	7,427	221	0.255	60	0.014	6,366	185
3.0	16	1.00	0.240	65	0.014	6,944	193	0.204	56	0.013	5,952	162
3.0	18	1.00	0.200	61	0.013	6,461	167	0.170	52	0.012	5,538	140
3.0	20	1.00	0.200	61	0.013	6,461	167	0.170	52	0.012	5,538	140
3.0	25	1.00	0.150	56	0.012	5,979	143	0.128	48	0.011	5,125	120
4.0	10	1.00	0.800	70	0.019	5,571	217	0.680	60	0.019	4,775	182
4.0	15	1.00	0.533	70	0.019	5,571	217	0.453	60	0.019	4,775	182
4.0	20	1.00	0.320	65	0.018	5,208	189	0.272	56	0.017	4,464	159
4.0	25	1.00	0.267	61	0.017	4,846	164	0.227	52	0.016	4,154	138
4.0	30	1.00	0.229	61	0.017	4,846	164	0.194	52	0.016	4,154	138
4.0	40	1.00	0.160	52	0.014	4,122	119	0.136	44	0.014	3,533	100

Cutting Parameter - Hard 2 Flute Ballnose

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
ALLOY STEEL, TOOL STEEL, PREHARDENED STEEL(~45HRC) AISI H13, AISI D2, NAK	M12, M13, M14, M15, M18, M22 M23, M24, M25	0.5	2	63	0.008	$\leq 0.05D$	$\leq 0.1D$	40000	640
		0.6	2	75	0.009	$\leq 0.05D$	$\leq 0.1D$	40000	699
		0.7	2	88	0.009	$\leq 0.05D$	$\leq 0.1D$	40000	758
		0.8	2	101	0.010	$\leq 0.05D$	$\leq 0.1D$	40000	817
		0.9	2	113	0.011	$\leq 0.05D$	$\leq 0.1D$	40000	877
		1	2	126	0.012	$\leq 0.05D$	$\leq 0.1D$	40000	936
		1.5	2	188	0.015	$\leq 0.05D$	$\leq 0.2D$	40000	1231
		2	2	251	0.019	$\leq 0.05D$	$\leq 0.2D$	40000	1527
		2.5	2	314	0.023	$\leq 0.05D$	$\leq 0.2D$	40000	1823
		3	2	370	0.026	$\leq 0.05D$	$\leq 0.2D$	39258	2079
		4	2	370	0.034	$\leq 0.05D$	$\leq 0.2D$	29444	1994
		5	2	370	0.041	$\leq 0.05D$	$\leq 0.2D$	23555	1944
		6	2	370	0.049	$\leq 0.05D$	$\leq 0.2D$	19629	1910
		8	2	370	0.063	$\leq 0.05D$	$\leq 0.2D$	14722	1868
		10	2	370	0.078	$\leq 0.05D$	$\leq 0.2D$	11777	1842
		12	2	370	0.093	$\leq 0.05D$	$\leq 0.2D$	9815	1826
		14	2	370	0.093	$\leq 0.05D$	$\leq 0.2D$	8412	1565
		16	2	370	0.093	$\leq 0.05D$	$\leq 0.2D$	7361	1369
		18	2	370	0.093	$\leq 0.05D$	$\leq 0.2D$	6543	1217
		20	2	370	0.093	$\leq 0.05D$	$\leq 0.2D$	5889	1095
		22	2	370	0.093	$\leq 0.05D$	$\leq 0.2D$	5353	996
		25	2	370	0.093	$\leq 0.05D$	$\leq 0.2D$	4711	876

Cutting Parameter - Hard 2 Flute Ballnose

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (45 -50 HRC) AISI H13	M26, M32	0.5	2	63	0.006	$\leq 0.05D$	$\leq 0.1D$	40000	480
		0.6	2	75	0.007	$\leq 0.05D$	$\leq 0.1D$	40000	531
		0.7	2	88	0.007	$\leq 0.05D$	$\leq 0.1D$	40000	583
		0.8	2	101	0.008	$\leq 0.05D$	$\leq 0.1D$	40000	634
		0.9	2	113	0.009	$\leq 0.05D$	$\leq 0.1D$	40000	686
		1	2	126	0.009	$\leq 0.05D$	$\leq 0.1D$	40000	737
		1.5	2	188	0.012	$\leq 0.05D$	$\leq 0.2D$	40000	995
		2	2	250	0.016	$\leq 0.05D$	$\leq 0.2D$	39789	1246
		2.5	2	250	0.019	$\leq 0.05D$	$\leq 0.2D$	31831	1201
		3	2	250	0.022	$\leq 0.05D$	$\leq 0.2D$	26526	1172
		4	2	250	0.029	$\leq 0.05D$	$\leq 0.2D$	19894	1135
		5	2	250	0.035	$\leq 0.05D$	$\leq 0.2D$	15915	1113
		6	2	250	0.041	$\leq 0.05D$	$\leq 0.2D$	13263	1098
		8	2	250	0.054	$\leq 0.05D$	$\leq 0.2D$	9947	1079
		10	2	250	0.067	$\leq 0.05D$	$\leq 0.2D$	7958	1068
		12	2	250	0.080	$\leq 0.05D$	$\leq 0.2D$	6631	1061
		14	2	250	0.080	$\leq 0.05D$	$\leq 0.2D$	5684	909
		16	2	250	0.080	$\leq 0.05D$	$\leq 0.2D$	4974	796
		18	2	250	0.080	$\leq 0.05D$	$\leq 0.2D$	4421	707
		20	2	250	0.080	$\leq 0.05D$	$\leq 0.2D$	3979	637
		22	2	250	0.080	$\leq 0.05D$	$\leq 0.2D$	3617	579
		25	2	250	0.080	$\leq 0.05D$	$\leq 0.2D$	3183	509

Cutting Parameter - Hard

2 Flute Ballnose Long

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
ALLOY STEEL, TOOL STEEL, PRE-HARDENED STEEL (~45 HRC) AISI H13,AISI D12,NAK	M12,13,14,15,18, 22,23, 24,25	0.5	2	63	0.002 - 0.003	$\leq 0.05D$	$\leq 0.1D$	40000	160 - 240
		0.6	2	75	0.002 - 0.004	$\leq 0.05D$	$\leq 0.1D$	40000	160 - 320
		0.7	2	88	0.002 - 0.004	$\leq 0.05D$	$\leq 0.1D$	40000	160 - 320
		0.8	2	101	0.003 - 0.005	$\leq 0.05D$	$\leq 0.1D$	40000	240 - 400
		0.9	2	113	0.003 - 0.005	$\leq 0.05D$	$\leq 0.1D$	40000	240 - 400
		1	2	126	0.004 - 0.006	$\leq 0.05D$	$\leq 0.1D$	40000	320 - 480
		1.5	2	188	0.006 - 0.008	$\leq 0.05D$	$\leq 0.1D$	40000	480 - 640
		2	2	251	0.009 - 0.011	$\leq 0.05D$	$\leq 0.2D$	40000	720 - 880
		2.5	2	314	0.011 - 0.014	$\leq 0.05D$	$\leq 0.2D$	40000	880 - 1120
		3	2	377	0.014 - 0.016	$\leq 0.05D$	$\leq 0.2D$	40000	1120 - 1280
		4	2	432 ~ 503	0.019 - 0.021	$\leq 0.05D$	$\leq 0.2D$	34380 ~ 40000	1310 - 1680
		5	2	432 ~ 504	0.024 - 0.026	$\leq 0.05D$	$\leq 0.2D$	27500 ~ 32090	1320 ~ 1670
		6	2	432 ~ 504	0.029 - 0.031	$\leq 0.05D$	$\leq 0.2D$	22920 ~ 26740	1330 - 1660
		8	2	432 ~ 504	0.034 - 0.038	$\leq 0.05D$	$\leq 0.2D$	17190 ~ 20050	1170 - 1520
		10	2	432 ~ 504	0.040 - 0.044	$\leq 0.05D$	$\leq 0.2D$	13750 ~ 16040	1100 - 1410
		12	2	432 ~ 504	0.046 - 0.051	$\leq 0.05D$	$\leq 0.2D$	11460 ~ 13370	1050 - 1360
		14	2	432 ~ 504	0.052 - 0.057	$\leq 0.05D$	$\leq 0.2D$	9820 ~ 11460	1020 - 1310
		16	2	432 ~ 504	0.058 - 0.064	$\leq 0.05D$	$\leq 0.2D$	8590 ~ 10030	1000 - 1280
		18	2	432 ~ 504	0.064 - 0.070	$\leq 0.05D$	$\leq 0.2D$	7640 ~ 8910	980 - 1250
		20	2	432 ~ 504	0.070 - 0.077	$\leq 0.05D$	$\leq 0.2D$	6880 ~ 8020	960 - 1240
		22	2	432 ~ 504	0.076 - 0.083	$\leq 0.05D$	$\leq 0.2D$	6250 ~ 7290	950 - 1210
		25	2	432 ~ 504	0.084 - 0.093	$\leq 0.05D$	$\leq 0.2D$	5500 ~ 6420	920 - 1190

Cutting Parameter - Hard 2 Flute Ballnose Long

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
ALLOY STEEL, TOOL STEEL, PRE-HARDENED STEEL (~45 HRC) AISI H13,AISI D12,NAK	M12,13,14,15,18, 22,23, 24,25	0.5	2	63	0.001 - 0.003	$\leq 0.05D$	$\leq 0.1D$	40000	80 ~ 240
		0.6	2	75	0.002 ~ 0.003	$\leq 0.05D$	$\leq 0.1D$	40000	160 ~ 240
		0.7	2	88	0.002 ~ 0.004	$\leq 0.05D$	$\leq 0.1D$	40000	160 ~ 320
		0.8	2	101	0.002 ~ 0.004	$\leq 0.05D$	$\leq 0.1D$	40000	160 ~ 320
		0.9	2	113	0.003 ~ 0.004	$\leq 0.05D$	$\leq 0.1D$	40000	240 ~ 320
		1	2	126	0.003 ~ 0.005	$\leq 0.05D$	$\leq 0.1D$	40000	240 ~ 400
		1.5	2	188	0.005 ~ 0.007	$\leq 0.05D$	$\leq 0.1D$	40000	400 ~ 560
		2	2	251	0.007 ~ 0.009	$\leq 0.05D$	$\leq 0.2D$	40000	560 ~ 720
		2.5	2	314	0.009 ~ 0.011	$\leq 0.05D$	$\leq 0.2D$	40000	720 ~ 880
		3	2	377	0.011 ~ 0.013	$\leq 0.05D$	$\leq 0.2D$	40000	880 ~ 1040
		4	2	403 ~ 470	0.015 ~ 0.017	$\leq 0.05D$	$\leq 0.2D$	32090 ~ 37430	960 ~ 1270
		5	2	403 ~ 470	0.019 ~ 0.021	$\leq 0.05D$	$\leq 0.2D$	25670 ~ 29950	980 ~ 1260
		6	2	403 ~ 470	0.023 ~ 0.025	$\leq 0.05D$	$\leq 0.2D$	21390 ~ 24960	980 ~ 1250
		8	2	403 ~ 470	0.028 ~ 0.030	$\leq 0.05D$	$\leq 0.2D$	16040 ~ 18720	900 ~ 1120
		10	2	403 ~ 470	0.032 ~ 0.035	$\leq 0.05D$	$\leq 0.2D$	12830 ~ 14970	820 ~ 1050
		12	2	403 ~ 470	0.037 ~ 0.041	$\leq 0.05D$	$\leq 0.2D$	10700 ~ 12480	790 ~ 1020
		14	2	403 ~ 471	0.042 ~ 0.046	$\leq 0.05D$	$\leq 0.2D$	9170 ~ 10700	770 ~ 980
		16	2	403 ~ 470	0.046 ~ 0.051	$\leq 0.05D$	$\leq 0.2D$	8020 ~ 9360	740 ~ 950
		18	2	403 ~ 470	0.051 ~ 0.056	$\leq 0.05D$	$\leq 0.2D$	7130 ~ 8320	730 ~ 930
		20	2	403 ~ 471	0.056 ~ 0.061	$\leq 0.05D$	$\leq 0.2D$	6420 ~ 7490	720 ~ 910
		22	2	403 ~ 471	0.061 ~ 0.067	$\leq 0.05D$	$\leq 0.2D$	5830 ~ 6810	710 ~ 910
		25	2	403 ~ 470	0.068 ~ 0.074	$\leq 0.05D$	$\leq 0.2D$	5130 ~ 5990	700 ~ 890

Cutting Parameter - Hard

2 Flute Ballnose Long

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (45-55 HRC) AISI H13	M26,32	0.5	2	63	0.002 - 0.003	≤ 0.050	≤ 0.10	40000	160 - 240
		0.6	2	75	0.002 - 0.004	≤ 0.050	≤ 0.10	40000	160 - 320
		0.7	2	88	0.002 - 0.004	≤ 0.050	≤ 0.10	40000	160 - 320
		0.8	2	101	0.003 - 0.005	≤ 0.050	≤ 0.10	40000	240 - 400
		0.9	2	113	0.003 - 0.005	≤ 0.050	≤ 0.10	40000	240 - 400
		1	2	126	0.004 - 0.006	≤ 0.050	≤ 0.10	40000	320 - 480
		1.5	2	188	0.006 - 0.008	≤ 0.050	≤ 0.10	40000	480 - 640
		2	2	251	0.009 - 0.011	≤ 0.050	≤ 0.20	40000	720 - 880
		2.5	2	314	0.011 - 0.014	≤ 0.050	≤ 0.20	40000	880 - 1120
		3	2	377	0.014 - 0.016	≤ 0.050	≤ 0.20	40000	1120 - 1280
		4	2	432 ~ 503	0.019 - 0.021	≤ 0.050	≤ 0.20	34380 ~ 40000	1310 - 1680
		5	2	432 ~ 504	0.024 - 0.026	≤ 0.050	≤ 0.20	27500 ~ 32090	1320 - 1670
		6	2	432 ~ 504	0.029 - 0.031	≤ 0.050	≤ 0.20	22920 ~ 26740	1330 - 1660
		8	2	432 ~ 504	0.034 - 0.038	≤ 0.050	≤ 0.20	17190 ~ 20050	1170 - 1520
		10	2	432 ~ 504	0.040 - 0.044	≤ 0.050	≤ 0.20	13750 ~ 16040	1100 - 1410
		12	2	432 ~ 504	0.046 - 0.051	≤ 0.050	≤ 0.20	11460 ~ 13370	1050 - 1360
		14	2	432 ~ 504	0.052 - 0.057	≤ 0.050	≤ 0.20	9820 ~ 11460	1020 - 1310
		16	2	432 ~ 504	0.058 - 0.064	≤ 0.050	≤ 0.20	8590 ~ 10030	1000 - 1280
		18	2	432 ~ 504	0.064 - 0.070	≤ 0.050	≤ 0.20	7640 ~ 8910	980 - 1250
		20	2	432 ~ 504	0.070 - 0.077	≤ 0.050	≤ 0.20	6880 ~ 8020	960 - 1240
		22	2	432 ~ 504	0.076 - 0.083	≤ 0.050	≤ 0.20	6250 ~ 7290	950 - 1210
		25	2	432 ~ 504	0.084 - 0.093	≤ 0.050	≤ 0.20	5500 ~ 6420	920 - 1190

Cutting Parameter - Hard 2 Flute Ballnose Long

PROFILE MILLING		$\alpha < 15^\circ$							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (45-50 HRC) AISI H13	M26,32	0.5	2	63	0.000 - 0.002	≤ 0.050	≤ 0.10	40000	0 ~ 160
		0.6	2	75	0.001 - 0.002	≤ 0.050	≤ 0.10	40000	80 ~ 160
		0.7	2	88	0.001 - 0.003	≤ 0.050	≤ 0.10	40000	80 ~ 240
		0.8	2	101	0.002 - 0.003	≤ 0.050	≤ 0.10	40000	160 ~ 240
		0.9	2	113	0.002 - 0.004	≤ 0.050	≤ 0.10	40000	160 ~ 320
		1	2	126	0.003 - 0.004	≤ 0.050	≤ 0.10	40000	240 ~ 320
		1.5	2	168 ~ 188	0.005 - 0.007	≤ 0.050	≤ 0.10	35650 ~ 40000	360 ~ 560
		2	2	168 ~ 235	0.007 - 0.009	≤ 0.050	≤ 0.20	26740 ~ 37430	370 ~ 670
		2.5	2	168 ~ 235	0.009 - 0.011	≤ 0.050	≤ 0.20	21390 ~ 29950	390 ~ 660
		3	2	168 ~ 235	0.012 - 0.014	≤ 0.050	≤ 0.20	17830 ~ 24960	430 ~ 700
		4	2	168 ~ 235	0.016 - 0.018	≤ 0.050	≤ 0.20	13370 ~ 18720	430 ~ 670
		5	2	168 ~ 235	0.021 - 0.023	≤ 0.050	≤ 0.20	10700 ~ 14970	450 ~ 690
		6	2	168 ~ 235	0.025 - 0.028	≤ 0.050	≤ 0.20	8910 ~ 12480	450 ~ 700
		8	2	168 ~ 235	0.032 - 0.035	≤ 0.050	≤ 0.20	6680 ~ 9360	430 ~ 660
		10	2	168 ~ 235	0.038 - 0.042	≤ 0.050	≤ 0.20	5350 ~ 7490	410 ~ 630
		12	2	168 ~ 235	0.044 - 0.048	≤ 0.050	≤ 0.20	4460 ~ 6240	390 ~ 600
		14	2	168 ~ 235	0.050 - 0.055	≤ 0.050	≤ 0.20	3820 ~ 5350	380 ~ 590
		16	2	168 ~ 235	0.056 - 0.062	≤ 0.050	≤ 0.20	3340 ~ 4680	370 ~ 580
		18	2	168 ~ 235	0.063 - 0.069	≤ 0.050	≤ 0.20	2970 ~ 4160	370 ~ 570
		20	2	168 ~ 235	0.069 - 0.076	≤ 0.050	≤ 0.20	2670 ~ 3740	370 ~ 570
		22	2	168 ~ 235	0.075 - 0.083	≤ 0.050	≤ 0.20	2430 ~ 3400	360 ~ 560
		25	2	168 ~ 235	0.084 - 0.093	≤ 0.050	≤ 0.20	2140 ~ 2990	360 ~ 560

Cutting Parameter - Hard Endmill

Extra long

4 Z SLOTTING		4 FLUTES ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
STEEL AND CAST STEEL (35 HRC ~ 45HRC)	M22 M31	1	4	35 ~ 45	0.004 ~ 0.006	≤0.10	1.00	1140 ~ 14320	180 ~ 340
		1.5	4	35 ~ 45	0.006 ~ 0.008	≤0.10	1.00	7430 ~ 9550	180 ~ 310
		2	4	35 ~ 45	0.008 ~ 0.011	≤0.20	1.00	5570 ~ 7160	180 ~ 320
		2.5	4	35 ~ 45	0.011 ~ 0.013	≤0.20	1.00	4460 ~ 5730	200 ~ 300
		3	4	35 ~ 45	0.013 ~ 0.016	≤0.20	1.00	3710 ~ 4770	190 ~ 310
		4	4	35 ~ 45	0.018 ~ 0.021	≤0.20	1.00	2790 ~ 3580	200 ~ 300
		5	4	35 ~ 45	0.023 ~ 0.025	≤0.20	1.00	2230 ~ 2860	210 ~ 290
		6	4	35 ~ 45	0.028 ~ 0.030	≤0.20	1.00	1860 ~ 2390	210 ~ 290
		8	4	35 ~ 45	0.034 ~ 0.038	≤0.20	1.00	1390 ~ 1790	180 ~ 250
		10	4	35 ~ 45	0.041 ~ 0.045	≤0.20	1.00	1110 ~ 1430	180 ~ 250
		12	4	35 ~ 45	0.048 ~ 0.053	≤0.20	1.00	930 ~ 1190	180 ~ 240
		14	4	35 ~ 45	0.055 ~ 0.060	≤0.20	1.00	800 ~ 1020	170 ~ 240
		16	4	35 ~ 45	0.062 ~ 0.068	≤0.20	1.00	700 ~ 900	170 ~ 240
		18	4	35 ~ 45	0.068 ~ 0.075	≤0.20	1.00	620 ~ 800	170 ~ 240
		20	4	35 ~ 45	0.075 ~ 0.083	≤0.20	1.00	560 ~ 720	170 ~ 240
		22	4	35 ~ 45	0.082 ~ 0.090	≤0.20	1.00	510 ~ 650	170 ~ 230
		25	4	35 ~ 45	0.092 ~ 0.101	≤0.20	1.00	450 ~ 570	170 ~ 230

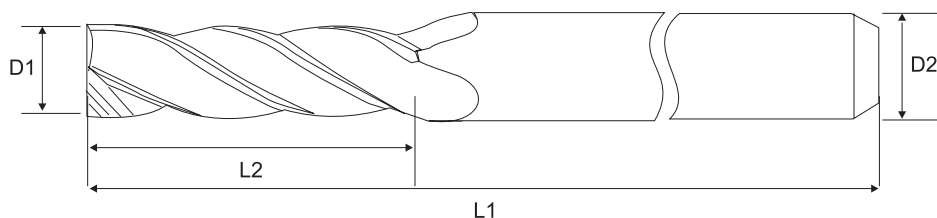
4 Z SLOTTING		4 FLUTES ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
ALLOY STEEL TOOL STEEL PRE-HARDENED STEEL (30 - 45 HRC) AISI H13 NAK	M20 M21 M24	1	4	25 ~ 35	0.002 ~ 0.005	≤0.10	1.00	7960 ~ 11140	60 ~ 220
		1.5	4	25 ~ 35	0.004 ~ 0.007	≤0.10	1.00	5310 ~ 7430	80 ~ 210
		2	4	25 ~ 35	0.006 ~ 0.009	≤0.20	1.00	3980 ~ 5570	100 ~ 200
		2.5	4	25 ~ 35	0.008 ~ 0.011	≤0.20	1.00	3180 ~ 4460	100 ~ 200
		3	4	25 ~ 35	0.010 ~ 0.013	≤0.20	1.00	2650 ~ 3710	110 ~ 190
		4	4	25 ~ 35	0.014 ~ 0.016	≤0.20	1.00	1990 ~ 2790	110 ~ 180
		5	4	25 ~ 35	0.018 ~ 0.020	≤0.20	1.00	1590 ~ 2230	110 ~ 180
		6	4	25 ~ 35	0.022 ~ 0.024	≤0.20	1.00	1330 ~ 1860	120 ~ 180
		8	4	25 ~ 35	0.027 ~ 0.030	≤0.20	1.00	990 ~ 1390	110 ~ 170
		10	4	25 ~ 35	0.032 ~ 0.035	≤0.20	1.00	800 ~ 1110	100 ~ 160
		12	4	25 ~ 35	0.038 ~ 0.041	≤0.20	1.00	660 ~ 930	100 ~ 150
		14	4	25 ~ 35	0.043 ~ 0.047	≤0.20	1.00	570 ~ 800	100 ~ 150
		16	4	25 ~ 35	0.048 ~ 0.053	≤0.20	1.00	500 ~ 700	100 ~ 150
		18	4	25 ~ 35	0.053 ~ 0.059	≤0.20	1.00	440 ~ 620	190 ~ 150
		20	4	25 ~ 35	0.059 ~ 0.065	≤0.20	1.00	400 ~ 560	90 ~ 150
		22	4	25 ~ 35	0.064 ~ 0.070	≤0.20	1.00	360 ~ 510	90 ~ 140
		25	4	25 ~ 35	0.072 ~ 0.079	≤0.20	1.00	320 ~ 450	90 ~ 140

Cutting Parameter - Square Endmill Standard

4 Z SLOTTING		4 FLUTES ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
HARDENED STEEL (45 - 50 HRC)	M26 M32	1	4	20 ~ 30	0.001 ~ 0.001	≤0.050	1.00	6370 ~ 9550	30 ~ 50
		1.5	4	20 ~ 30	0.002 ~ 0.002	≤0.050	1.00	4240 ~ 6370	30 ~ 50
		2	4	20 ~ 30	0.002 ~ 0.003	≤0.10	1.00	3180 ~ 4770	30 ~ 50
		2.5	4	20 ~ 30	0.003 ~ 0.004	≤0.10	1.00	2550 ~ 3820	30 ~ 50
		3	4	20 ~ 30	0.004 ~ 0.005	≤0.10	1.00	2120 ~ 3180	30 ~ 50
		4	4	20 ~ 30	0.005 ~ 0.006	≤0.10	1.00	1590 ~ 2390	30 ~ 50
		5	4	20 ~ 30	0.007 ~ 0.008	≤0.10	1.00	1270 ~ 1910	30 ~ 50
		6	4	20 ~ 30	0.009 ~ 0.010	≤0.10	1.00	1060 ~ 1590	30 ~ 50
		8	4	20 ~ 30	0.011 ~ 0.012	≤0.10	1.00	800 ~ 1190	30 ~ 50
		10	4	20 ~ 30	0.013 ~ 0.014	≤0.10	1.00	640 ~ 950	30 ~ 50
		12	4	20 ~ 30	0.015 ~ 0.017	≤0.10	1.00	530 ~ 800	30 ~ 50
		14	4	20 ~ 30	0.017 ~ 0.019	≤0.10	1.00	450 ~ 680	30 ~ 50
		16	4	20 ~ 30	0.019 ~ 0.021	≤0.10	1.00	400 ~ 600	30 ~ 50
		18	4	20 ~ 30	0.021 ~ 0.024	≤0.10	1.00	350 ~ 530	30 ~ 50
		20	4	20 ~ 30	0.023 ~ 0.026	≤0.10	1.00	320 ~ 480	30 ~ 50
		22	4	20 ~ 30	0.026 ~ 0.028	≤0.10	1.00	290 ~ 430	30 ~ 50
		25	4	20 ~ 30	0.029 ~ 0.032	≤0.10	1.00	250 ~ 380	30 ~ 50

DM SERIES

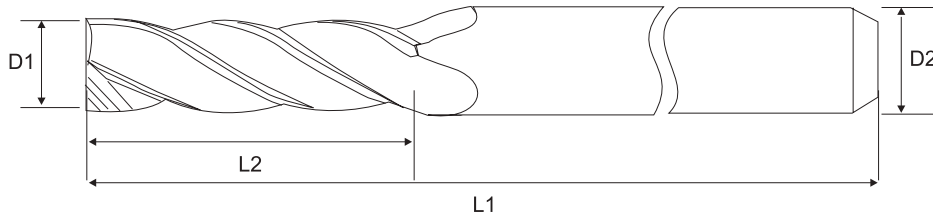
4 Flute Standard Endmill



ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
EM1N4D4DM	1	4	4	50	●
EM1.5N4D4DM	1.5	4	4	50	●
EM2N4D4DM	2	4	4	50	●
EM2.5N4D4DM	2.5	4	8	50	●
EM3N4D4DM	3	4	8	50	●
EM3N4DM	3	3	8	50	●
EM4N4DM	4	4	10	50	●
EM5N4DM	5	5	13	50	●
EM5N4D6DM	5	6	13	50	●
EM6N4DM	8	6	15	50	●
EM8N4DM	6	8	20	60	●
EM10N4DM	10	10	25	75	●
EM12N4DM	12	12	30	75	●
EM16N4DM	16	16	40	100	○
EM20N4DM	20	20	40	100	●

DM SERIES

4 Flute Long Endmill Series

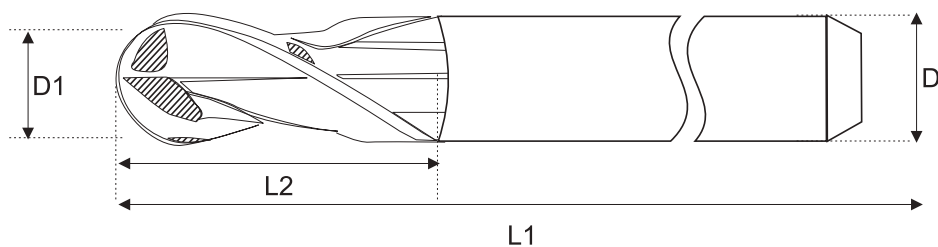


ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
EM3L4D4DM	3	4	15	75	●
EM4L4DM	4	4	15	75	●
EM5L4D6DM	5	6	20	75	●
EM6L4DM	6	6	24	75	●
EM8L4DM	8	8	25	75	●
EM4XL4DM	4	4	16	100	●
EM6LR4DM	6	6	24	100	●
EM8LR4DM	8	8	32	100	●
EM10L4DM	10	10	40	100	●
EM12L4DM	12	12	48	100	●



DM SERIES

2 Flute Standard Ballnose Line

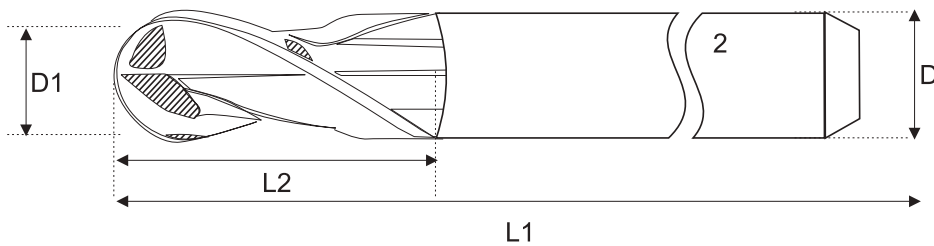


ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
BN1N2D4DM	1	4	3	50	●
BN1.5N2D4DM	1.5	4	4	50	●
BN2N2D4DM	2	4	4	50	●
BN2.5N2D4DM	2.5	4	6	50	●
BN3N2D4DM	3	4	6	50	●
BN4N2DM	4	4	8	50	●
BN6N2DM	6	6	12	50	●
BN8N2DM	8	8	16	60	●
BN10N2DM	10	10	25	75	●
BN12N2DM	12	12	25	75	●



DM SERIES

2 Flute Long Ballnose Series



ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
BN3L2D4DM	3	4	8	75	●
BN4L2DM	4	4	10	75	●
BN6L2DM	6	6	15	75	●
BN8L2DM	8	6	10	75	●
BN3XL2D4DM	3	8	8	100	●
BN4XL2DM	4	4	10	100	●
BN6LR2DM	6	6	15	100	●
BN8LR2DM	8	8	20	100	●
BN10LR2DM	10	10	25	100	●
BN12LR2DM	12	12	30	100	●

TiAIN

MC

0.8
µm

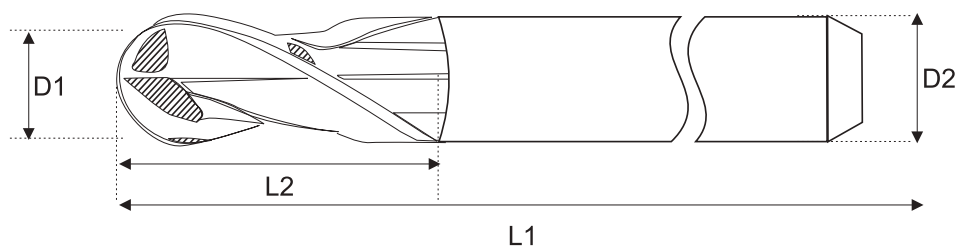
Co
10%

HRC
>40

2 flutes

DM SERIES

4 Flute Ballnose Line

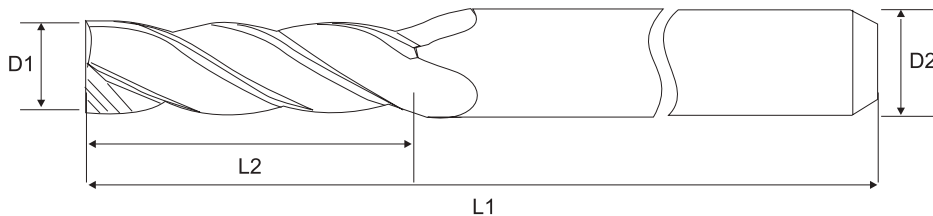


ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
BN1N4D4DEXT	1	4	2	50	●
BN1.5N4D4DEXT	1.5	4	3	50	●
BN2N4D4DEXT	2	4	4	50	●
BN2.5N4D4DEXT	2.5	4	5	50	●
BN3N4D4DEXT	3	4	6	50	●
BN3N4DEXT	3	3	6	50	●
BN4N4DEXT	4	4	8	50	●
BN5N4DEXT	5	5	10	50	●
BN6N4DEXT	6	6	12	50	●
BN8N4DEXT	8	8	16	60	●



DM SERIES

4 Flute Corner Radius Endmill



ITEM CODE	D1(DIA)	D2 (SHANK)	L2 (WL)	L1 (OAL)	AVAILABILITY
EM3N4D4CR0.5DM	3R0.5	4	6	50	●
EM3N4D4CR1DM	3R1	4	6	50	●
EM4N4CR0.5DM	4R0.5	4	8	50	●
EM4N4CR1DM	4R1	4	8	50	●
EM6N4CR0.5DM	6R0.5	6	12	50	●
EM6N4CR1DM	6R1	6	12	50	●
EM8N4CR0.5DM	8R0.5	8	16	60	●
EM8N4CR1DM	8R1	8	16	60	●
EM10N4CR0.5DM	10R0.5	10	20	75	●
EM10N4CR1DM	10R1	10	20	75	●
EM12N4CR0.5DM	12R0.5	12	24	75	●
EM12N4CR1DM	12R1	12	24	75	●



Cutting Parameter - Square Endmill Standard

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
CARBON STEEL (~30 HRC) AISI 1049 , SCM CAST, IRON FC250	M10,11,12,13,14	1	4	126	0.005 - 0.007	≤1.5D	≤ 0.5 D	40000	800 ~ 1120
		1.5	4	130 ~ 170	0.008 - 0.010	≤1.5D	≤ 0.5 D	27590 ~ 36080	880 ~ 1440
		2	4	130 ~ 170	0.011 - 0.014	≤1.5D	≤ 0.5 D	20690 ~ 27060	910 ~ 1520
		2.5	4	130 ~ 170	0.014 - 0.017	≤1.5D	≤ 0.5 D	16550 ~ 21650	930 ~ 1470
		3	4	130 ~ 170	0.017 - 0.020	≤1.5D	≤ 0.5 D	13790 ~ 18040	940 ~ 1440
		4	4	130 ~ 170	0.023 - 0.026	≤1.5D	≤ 0.5 D	10350 ~ 13530	950 ~ 1410
		5	4	130 ~ 170	0.029 - 0.032	≤1.5D	≤ 0.5 D	8280 ~ 10820	960 ~ 1380
		6	4	130 ~ 170	0.035 - 0.038	≤1.5D	≤ 0.5 D	6900 ~ 9020	970 ~ 1370
		8	4	130 ~ 170	0.042 - 0.046	≤1.5D	≤ 0.5 D	5170 ~ 6760	870 ~ 1240
		10	4	130 ~ 170	0.049 - 0.054	≤1.5D	≤ 0.5 D	4140 ~ 5410	810 ~ 1170
		12	4	130 ~ 170	0.057 - 0.062	≤1.5D	≤ 0.5 D	3450 ~ 4510	790 ~ 1120
		14	4	130 ~ 170	0.064 - 0.070	≤1.5D	≤ 0.5 D	2960 ~ 3870	760 ~ 1080
		16	4	130 ~ 170	0.071 - 0.078	≤1.5D	≤ 0.5 D	2590 ~ 3380	740 ~ 1050
		18	4	130 ~ 170	0.078 - 0.086	≤1.5D	≤ 0.5 D	2300 ~ 3010	720 ~ 1040
		20	4	130 ~ 170	0.086 - 0.094	≤1.5D	≤ 0.5 D	2070 ~ 2710	710 ~ 1020

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
CARBON STEEL (~30 HRC) AISI 1049 , SCM CAST, IRON FC250	M15,18,19 23,25	1	4	120 ~ 126	0.005 - 0.007	≤1.5D	≤ 0.5 D	38200 ~ 40000	760 ~ 1120
		1.5	4	120 ~ 140	0.008 - 0.010	≤1.5D	≤ 0.5 D	25460 ~ 29710	810 ~ 1190
		2	4	120 ~ 140	0.011 - 0.014	≤1.5D	≤ 0.5 D	19100 ~ 22280	840 ~ 1250
		2.5	4	120 ~ 140	0.014 - 0.017	≤1.5D	≤ 0.5 D	15280 ~ 17830	860 ~ 1210
		3	4	120 ~ 140	0.017 - 0.020	≤1.5D	≤ 0.5 D	12730 ~ 14850	870 ~ 1190
		4	4	120 ~ 140	0.023 - 0.026	≤1.5D	≤ 0.5 D	9550 ~ 11140	880 ~ 1160
		5	4	120 ~ 140	0.029 - 0.032	≤1.5D	≤ 0.5 D	7640 ~ 8910	890 ~ 1140
		6	4	120 ~ 140	0.035 - 0.038	≤1.5D	≤ 0.5 D	6370 ~ 7430	890 ~ 1130
		8	4	120 ~ 140	0.042 - 0.046	≤1.5D	≤ 0.5 D	4770 ~ 5570	800 ~ 1020
		10	4	120 ~ 140	0.049 - 0.054	≤1.5D	≤ 0.5 D	3820 ~ 4460	750 ~ 960
		12	4	120 ~ 140	0.057 - 0.062	≤1.5D	≤ 0.5 D	3180 ~ 3710	730 ~ 920
		14	4	120 ~ 140	0.064 - 0.070	≤1.5D	≤ 0.5 D	2730 ~ 3180	700 ~ 890
		16	4	120 ~ 140	0.071 - 0.078	≤1.5D	≤ 0.5 D	2390 ~ 2790	680 ~ 870
		18	4	120 ~ 140	0.078 - 0.086	≤1.5D	≤ 0.5 D	2120 ~ 2480	660 ~ 850
		20	4	120 ~ 140	0.086 - 0.094	≤1.5D	≤ 0.5 D	1910 ~ 2230	660 ~ 840

Cutting Parameter - Square Endmill Standard

SLOTING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
ALLOY STEEL TOOL STEEL PRE-HARDENED STEEL (30-45 HRC) AISI H13 NAK	M15,18,19, 23,25	1	4	60 ~ 80	0.003 ~ 0.006	≤1.5D	≤ 0.5 D	19100 ~ 25460	230 ~ 610
		1.5	4	60 ~ 80	0.006 ~ 0.008	≤1.5D	≤ 0.5 D	12730 ~ 16980	310 ~ 540
		2	4	60 ~ 80	0.008 ~ 0.011	≤1.5D	≤ 0.5 D	9550 ~ 12730	310 ~ 560
		2.5	4	60 ~ 80	0.011 ~ 0.014	≤1.5D	≤ 0.5 D	7640 ~ 10190	340 ~ 570
		3	4	60 ~ 80	0.014 ~ 0.016	≤1.5D	≤ 0.5 D	6370 ~ 8490	360 ~ 540
		4	4	60 ~ 80	0.019 ~ 0.022	≤1.5D	≤ 0.5 D	4770 ~ 6370	360 ~ 560
		5	4	60 ~ 80	0.024 ~ 0.027	≤1.5D	≤ 0.5 D	3820 ~ 5090	370 ~ 550
		6	4	60 ~ 80	0.029 ~ 0.032	≤1.5D	≤ 0.5 D	3180 ~ 4240	370 ~ 540
		8	4	60 ~ 80	0.036 ~ 0.040	≤1.5D	≤ 0.5 D	2390 ~ 3180	340 ~ 510
		10	4	60 ~ 80	0.043 ~ 0.048	≤1.5D	≤ 0.5 D	1910 ~ 2550	330 ~ 490
		12	4	60 ~ 80	0.051 ~ 0.056	≤1.5D	≤ 0.5 D	1590 ~ 2120	320 ~ 470
		14	4	60 ~ 80	0.058 ~ 0.064	≤1.5D	≤ 0.5 D	1360 ~ 1820	320 ~ 470
		16	4	60 ~ 80	0.065 ~ 0.071	≤1.5D	≤ 0.5 D	1190 ~ 1590	310 ~ 450
		18	4	60 ~ 80	0.072 ~ 0.079	≤1.5D	≤ 0.5 D	1060 ~ 1410	310 ~ 450
		20	4	60 ~ 80	0.079 ~ 0.087	≤1.5D	≤ 0.5 D	950 ~ 1270	300 ~ 440

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
TITANIUM ALLOYS HARDEDNED UP TO 35 HRC	M17	1	4	60 ~ 80	0.004 ~ 0.006	≤1.5D	≤ 0.5 D	19100 ~ 25460	310 ~ 610
		1.5	4	60 ~ 80	0.008 ~ 0.010	≤1.5D	≤ 0.5 D	12730 ~ 16980	410 ~ 680
		2	4	60 ~ 80	0.011 ~ 0.014	≤1.5D	≤ 0.5 D	9550 ~ 12730	420 ~ 710
		2.5	4	60 ~ 80	0.014 ~ 0.017	≤1.5D	≤ 0.5 D	7640 ~ 10190	430 ~ 690
		3	4	60 ~ 80	0.018 ~ 0.021	≤1.5D	≤ 0.5 D	6370 ~ 8490	460 ~ 710
		4	4	60 ~ 80	0.025 ~ 0.028	≤1.5D	≤ 0.5 D	4770 ~ 6370	480 ~ 710
		5	4	60 ~ 80	0.032 ~ 0.036	≤1.5D	≤ 0.5 D	3820 ~ 5090	490 ~ 730
		6	4	60 ~ 80	0.039 ~ 0.043	≤1.5D	≤ 0.5 D	3180 ~ 4240	500 ~ 730
		8	4	60 ~ 80	0.048 ~ 0.053	≤1.5D	≤ 0.5 D	2390 ~ 3180	460 ~ 670
		10	4	60 ~ 80	0.058 ~ 0.064	≤1.5D	≤ 0.5 D	1910 ~ 2550	440 ~ 650
		12	4	60 ~ 80	0.068 ~ 0.074	≤1.5D	≤ 0.5 D	1590 ~ 2120	430 ~ 630
		14	4	60 ~ 80	0.077 ~ 0.085	≤1.5D	≤ 0.5 D	1360 ~ 1820	420 ~ 620
		16	4	60 ~ 80	0.087 ~ 0.095	≤1.5D	≤ 0.5 D	1190 ~ 1590	410 ~ 600
		18	4	60 ~ 80	0.096 ~ 0.106	≤1.5D	≤ 0.5 D	1060 ~ 1410	410 ~ 600
		20	4	60 ~ 80	0.106 ~ 0.116	≤1.5D	≤ 0.5 D	950 ~ 1270	400 ~ 590

Cutting Parameter - Square Endmill Standard

SIDE MILLING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
NICKEL BASED ALLOYS HARDENED UP TO 35 HRC	M19,23	1	4	60 ~ 80	0.003 ~ 0.006	≤1.5D	≤ 0.5 D	19100 ~ 25460	230 ~ 610
		1.5	4	60 ~ 80	0.006 ~ 0.009	≤1.5D	≤ 0.5 D	12730 ~ 16980	310 ~ 610
		2	4	60 ~ 80	0.008 ~ 0.012	≤1.5D	≤ 0.5 D	9550 ~ 12730	310 ~ 610
		2.5	4	60 ~ 80	0.011 ~ 0.014	≤1.5D	≤ 0.5 D	7640 ~ 10190	340 ~ 570
		3	4	60 ~ 80	0.014 ~ 0.017	≤1.5D	≤ 0.5 D	6370 ~ 8490	360 ~ 580
		4	4	60 ~ 80	0.019 ~ 0.02	≤1.5D	≤ 0.5 D	4770 ~ 6370	360 ~ 560
		5	4	60 ~ 80	0.024 ~ 0.027	≤1.5D	≤ 0.5 D	3820 ~ 5090	370 ~ 550
		6	4	60 ~ 80	0.029 ~ 0.032	≤1.5D	≤ 0.5 D	3180 ~ 4240	370 ~ 540
		8	4	60 ~ 80	0.036 ~ 0.040	≤1.5D	≤ 0.5 D	2390 ~ 3180	340 ~ 510
		10	4	60 ~ 80	0.043 ~ 0.048	≤1.5D	≤ 0.5 D	1910 ~ 2550	330 ~ 490
		12	4	60 ~ 80	0.051 ~ 0.056	≤1.5D	≤ 0.5 D	1590 ~ 2120	320 ~ 470
		14	4	60 ~ 80	0.058 ~ 0.064	≤1.5D	≤ 0.5 D	1360 ~ 1820	320 ~ 470
		16	4	60 ~ 80	0.065 ~ 0.071	≤1.5D	≤ 0.5 D	1190 ~ 1590	310 ~ 450
		18	4	60 ~ 80	0.072 ~ 0.079	≤1.5D	≤ 0.5 D	1060 ~ 1410	310 ~ 450
		20	4	60 ~ 80	0.079 ~ 0.087	≤1.5D	≤ 0.5 D	950 ~ 1270	300 ~ 440

SLOTING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
CARBON STEEL (~30 HRC) AISI 1049, SCM CAST, IRON FC250	M10,11, 12,13,14	1	4	126	0.004 ~ 0.006	≤1.5D	≤ 0.5 D	40000	640 ~ 960
		1.5	4	130 ~ 170	0.006 ~ 0.008	≤1.5D	≤ 0.5 D	27590 ~ 36080	660 ~ 1150
		2	4	130 ~ 170	0.009 ~ 0.011	≤1.5D	≤ 0.5 D	20690 ~ 27060	740 ~ 1190
		2.5	4	130 ~ 170	0.011 ~ 0.013	≤1.5D	≤ 0.5 D	16550 ~ 21650	730 ~ 1130
		3	4	130 ~ 170	0.014 ~ 0.016	≤1.5D	≤ 0.5 D	13790 ~ 18040	770 ~ 1150
		4	4	130 ~ 170	0.018 ~ 0.021	≤1.5D	≤ 0.5 D	10350 ~ 13530	750 ~ 1140
		5	4	130 ~ 170	0.023 ~ 0.026	≤1.5D	≤ 0.5 D	8280 ~ 10820	760 ~ 1130
		6	4	130 ~ 170	0.028 ~ 0.031	≤1.5D	≤ 0.5 D	6900 ~ 9020	770 ~ 1120
		8	4	130 ~ 170	0.034 ~ 0.037	≤1.5D	≤ 0.5 D	5170 ~ 6760	700 ~ 1000
		10	4	130 ~ 170	0.040 ~ 0.044	≤1.5D	≤ 0.5 D	4140 ~ 5410	660 ~ 950
		12	4	130 ~ 170	0.045 ~ 0.050	≤1.5D	≤ 0.5 D	3450 ~ 4510	620 ~ 900
		14	4	130 ~ 170	0.051 ~ 0.056	≤1.5D	≤ 0.5 D	2960 ~ 3870	600 ~ 870
		16	4	130 ~ 170	0.057 ~ 0.063	≤1.5D	≤ 0.5 D	2590 ~ 3380	590 ~ 850
		18	4	130 ~ 170	0.063 ~ 0.069	≤1.5D	≤ 0.5 D	2300 ~ 3010	580 ~ 830
		20	4	130 ~ 170	0.068 ~ 0.075	≤1.5D	≤ 0.5 D	2070 ~ 2710	560 ~ 810

Cutting Parameter - Square Endmill Standard

SLOTING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
ALLOY STEEL TOOL STEEL PRE-HARDENED STEEL (30-45 HRC) AISI H13 NAK	M15,18,19, 23,25	1	4	120 ~ 126	0.004 ~ 0.006	≤1.00	1.0 D	38200 ~ 40000	610 ~ 960
		1.5	4	120 ~ 126	0.006 ~ 0.008	≤1.00	1.0 D	25460 ~ 29710	610 ~ 950
		2	4	120 ~ 126	0.009 ~ 0.011	≤1.00	1.0 D	19100 ~ 22280	690 ~ 980
		2.5	4	120 ~ 126	0.011 ~ 0.013	≤1.00	1.0 D	15280 ~ 17830	670 ~ 930
		3	4	120 ~ 126	0.014 ~ 0.016	≤1.00	1.0 D	12730 ~ 14850	710 ~ 950
		4	4	120 ~ 126	0.018 ~ 0.021	≤1.00	1.0 D	9550 ~ 11140	690 ~ 940
		5	4	120 ~ 126	0.023 ~ 0.026	≤1.00	1.0 D	7640 ~ 8910	700 ~ 930
		6	4	120 ~ 126	0.028 ~ 0.031	≤1.00	1.0 D	6370 ~ 7430	710 ~ 920
		8	4	120 ~ 126	0.034 ~ 0.037	≤1.00	1.0 D	4770 ~ 5570	650 ~ 820
		10	4	120 ~ 126	0.040 ~ 0.044	≤1.00	1.0 D	3820 ~ 4460	610 ~ 780
		12	4	120 ~ 126	0.045 ~ 0.050	≤1.00	1.0 D	3180 ~ 3710	570 ~ 740
		14	4	120 ~ 126	0.051 ~ 0.056	≤1.00	1.0 D	2730 ~ 3180	560 ~ 710
		16	4	120 ~ 126	0.057 ~ 0.063	≤1.00	1.0 D	2390 ~ 2790	540 ~ 700
		18	4	120 ~ 126	0.063 ~ 0.069	≤1.00	1.0 D	2120 ~ 2480	530 ~ 680
		20	4	120 ~ 126	0.068 ~ 0.075	≤1.00	1.0 D	1910 ~ 2230	520 ~ 670

SLOTING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
STAINLESS STEEL UP TO 35 HRC)	M16	1	4	60 ~ 80	0.003 ~ 0.005	≤1.50	≤ 0.5 D	19100 ~ 25460	230 ~ 510
		1.5	4	60 ~ 80	0.005 ~ 0.007	≤1.50	≤ 0.5 D	12730 ~ 16980	250 ~ 480
		2	4	60 ~ 80	0.007 ~ 0.009	≤1.50	≤ 0.5 D	9550 ~ 12730	270 ~ 460
		2.5	4	60 ~ 80	0.009 ~ 0.011	≤1.50	≤ 0.5 D	7640 ~ 10190	280 ~ 450
		3	4	60 ~ 80	0.011 ~ 0.013	≤1.50	≤ 0.5 D	6370 ~ 8490	280 ~ 440
		4	4	60 ~ 80	0.015 ~ 0.017	≤1.50	≤ 0.5 D	4770 ~ 6370	290 ~ 430
		5	4	60 ~ 80	0.019 ~ 0.021	≤1.50	≤ 0.5 D	3820 ~ 5090	290 ~ 430
		6	4	60 ~ 80	0.023 ~ 0.026	≤1.50	≤ 0.5 D	3180 ~ 4240	290 ~ 440
		8	4	60 ~ 80	0.029 ~ 0.032	≤1.50	≤ 0.5 D	2390 ~ 3180	280 ~ 410
		10	4	60 ~ 80	0.035 ~ 0.038	≤1.50	≤ 0.5 D	1910 ~ 2550	270 ~ 390
		12	4	60 ~ 80	0.041 ~ 0.045	≤1.50	≤ 0.5 D	1590 ~ 2120	260 ~ 380
		14	4	60 ~ 80	0.046 ~ 0.051	≤1.50	≤ 0.5 D	1360 ~ 1820	250 ~ 370
		16	4	60 ~ 80	0.052 ~ 0.057	≤1.50	≤ 0.5 D	1190 ~ 1590	250 ~ 360
		18	4	60 ~ 80	0.058 ~ 0.063	≤1.50	≤ 0.5 D	1060 ~ 1410	250 ~ 360
		20	4	60 ~ 80	0.063 ~ 0.070	≤1.50	≤ 0.5 D	950 ~ 1270	240 ~ 360

Cutting Parameter - Square Endmill Standard

SLOTING		SQUARE ENDMILL							
MATERIAL	MATERIAL GROUPS	D1 (MM)	Z	VC (M/MIN)	FZ (MM)	AP (MM)	AE (MM)	N (MIN-1)	VF (MM/MIN)
TITANIUM ALLOYS HARDEDNED UP TO 35 HRC	M17	1	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	19100 ~ 25460	230 ~ 510
		1.5	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	12730 ~ 16980	310 ~ 540
		2	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	9550 ~ 12730	340 ~ 560
		2.5	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	7640 ~ 10190	370 ~ 570
		3	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	6370 ~ 8490	360 ~ 580
		4	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	4770 ~ 6370	380 ~ 590
		5	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	3820 ~ 5090	400 ~ 570
		6	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	3180 ~ 4240	390 ~ 580
		8	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	2390 ~ 3180	370 ~ 550
		10	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	1910 ~ 2550	350 ~ 520
		12	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	1590 ~ 2120	340 ~ 500
		14	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	1360 ~ 1820	340 ~ 500
		16	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	1190 ~ 1590	330 ~ 480
		18	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	1060 ~ 1410	330 ~ 480
		20	4	60 ~ 80	≤1.00	1.0 D	≤ 0.5 D	950 ~ 1270	320 ~ 470