

SUPERIOR PERFORMANCE



HX2 MULTI HELIX



Chatter free design allows for increased cutting depths and feed rates.

Premium grade carbide substrate and high heat resistant coating for increased tool life.

Multiple helix flute design for silent machining and excellent surface finish.

Unique sinusoidal flute geometry for reduced resonance vibration and smooth chip evacuation.

IDEAL FOR MATERIAL GROUPS



HX2 END MILLS



Designed for Stainless Steels, Titanium, Inconel, Cast Iron and Steel <HRc40



www.europatool.co.uk

APPLICATION GUIDE

INDEX

●: Excellent ○: Good

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HX2 MULTIPLE HELIX MILLING CUTTERS



COMPLETELY NEW MILLING GENERATION
WORLD'S FIRST. VERY SMOOTH CHIP REMOVAL AND SILENT MACHINING
AVOIDS RESONANCE VIBRATION DUE TO THE UNIQUE SINUSOIDAL FLUTE FORM DESIGN
IMPROVES SURFACE FINISH DUE TO THE CHATTER FREE DESIGN
INCREASED CUTTING DEPTH AND FEED RATES

APPLICATION
HX2 : STAINLESS STEELS, TITANIUM ALLOYS, INCONEL

MATERIAL	K30/40	PREMIUM GRADE CARBIDE
COATING	AlTiN	HARDNESS: HV (0.05) = 3,500 OXIDISATION TEMP: 900 DEG C
GEOMETRY	SINUSOIDAL	HIGH RAKE MEDIUM CORE

HX2 VS COMPETITORS

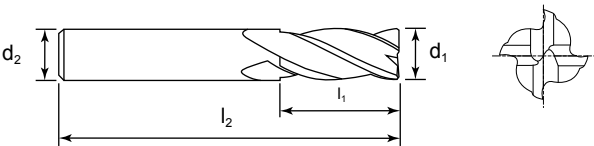
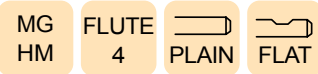
HX2 CHARACTERISTICS

HX2	CONVENTIONAL	HX2	CONVENTIONAL
CROSS SECTION OF CORE			
		Chip flow: Very smooth	Chip flow: Not smooth

GEOMETRY COMPARISON BETWEEN HX2 AND COMPETITORS

	HX2 END MILL	COMPETITORS END MILLS
HELIX	SINUSOIDAL	UNEQUAL CONSTANT
END INDEX	 EQUAL	 UNEQUAL
RADIAL RAKE ANGLE	CHANGEABLE	CONSTANT
RADIAL PRIMARY RELIEF & TYPE	CHANGEABLE & ECCENTRIC	CONSTANT & ECCENTRIC
FLUTE FORM DESIGN	UNIQUE	CONVENTIONAL

4 FLUTE SHORT LENGTH HX2



Series No. 136123, 136323

▶ cutting conditions : p.16

Minimized tool deflection
Corner protected
Reduced tool vibration

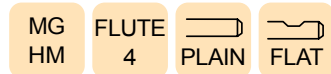
EUROPA CODE FLATTED	EUROPA CODE PLAIN	CUTTING DIAMETER d ₁	SHANK DIAMETER d ₂	LENGTH OF CUT l ₁	OVERALL LENGTH l ₂
1361230300	1363230300	3.0	6	7.0	54
1361230400	1363230400	4.0	6	8.0	54
1361230500	1363230500	5.0	6	10.0	54
1361230600	1363230600	6.0	6	10.0	54
1361230800	1363230800	8.0	8	12.0	58
1361231000	1363231000	10.0	10	14.0	66
1361231200	1363231200	12.0	12	16.0	73
1361231400	1363231400	14.0	14	18.0	75
1361231600	1363231600	16.0	16	22.0	82
1361231800	1363231800	18.0	18	24.0	84
1361232000	1363232000	20.0	20	26.0	92

MILL DIA TOLERANCE	SHANK DIA TOLERANCE
0~-0.03	h6

●: Excellent ○: Good

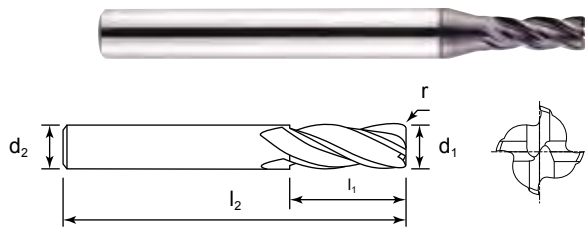
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O	O		●	●	O	O	●	●	●						
13	14	16	23		33	34	51	52	53	71	72	73	74	83	84
O	O		●		O	O	●	●	●						

4 FLUTE SHORT LENGTH
CORNER RADIUS HX2



Series No. 137123, 137323

► cutting conditions : p.16



Minimized tool deflection
Corner protected
Reduced tool vibration

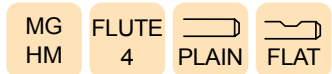
EUROPA CODE FLATTED	EUROPA CODE PLAIN	CUTTING DIAMETER d ₁	CORNER RADIUS r	SHANK DIAMETER d ₂	LENGTH OF CUT l ₁	OVERALL LENGTH l ₂
1371230300	1373230300	3.0	0.3	6	7.0	54
1371230400	1373230400	4.0	0.3	6	8.0	54
1371230500	1373230500	5.0	0.3	6	10.0	54
1371230600	1373230600	6.0	0.5	6	10.0	54
1371230800	1373230800	8.0	0.5	8	12.0	58
1371231000	1373231000	10.0	0.5	10	14.0	66
1371231200	1373231200	12.0	0.7	12	16.0	73
1371231400	1373231400	14.0	0.7	14	18.0	75
1371231600	1373231600	16.0	1.0	16	22.0	82
1371231800	1373231800	18.0	1.0	18	24.0	84
1371232000	1373232000	20.0	1.0	20	26.0	92

MILL DIA TOLERANCE	SHANK DIA TOLERANCE
0~-0.03	h6

●: Excellent ○: Good

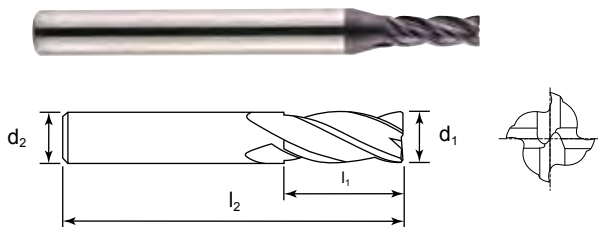
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O	O		●	●	O	O	●	●	●						
13	14	16	23		33	34	51	52	53	71	72	73	74	83	84
O	O		●		O	O	●	●	●						

4 FLUTE LONG LENGTH HX2



Series No. 138123, 138323

► cutting conditions : p.16



Minimized tool deflection
Corner protected
Reduced tool vibration

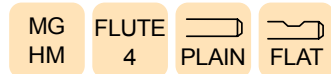
EUROPA CODE FLATTED	EUROPA CODE PLAIN	CUTTING DIAMETER d ₁	SHANK DIAMETER d ₂	LENGTH OF CUT l ₁	OVERALL LENGTH l ₂
1381230300	1383230300	3.0	6	8.0	57
1381230400	1383230400	4.0	6	11.0	57
1381230500	1383230500	5.0	6	13.0	57
1381230600	1383230600	6.0	6	13.0	57
1381230800	1383230800	8.0	8	19.0	63
1381231000	1383231000	10.0	10	22.0	72
1381231200	1383231200	12.0	12	26.0	83
1381231400	1383231400	14.0	14	26.0	83
1381231600	1383231600	16.0	16	32.0	92
1381231800	1383231800	18.0	18	32.0	92
1381232000	1383232000	20.0	20	38.0	104
1381232500	1383232500	25.0	25	38.0	108

MILL DIA TOLERANCE	SHANK DIA TOLERANCE
0~-0.03	h6

●: Excellent ○: Good

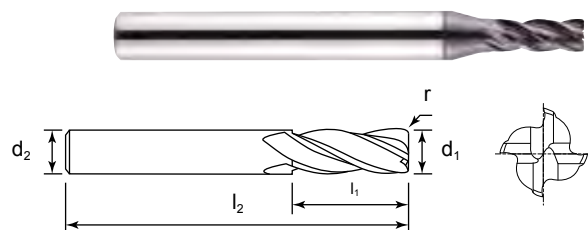
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O	O		●	●	O	O	●	●	●						
13	14	16	23		33	34	51	52	53	71	72	73	74	83	84
O	O		●		O	O	●	●	●						

4 FLUTE LONG LENGTH
CORNER RADIUS HX2



Series No. 139123, 139323

► cutting conditions : p.16

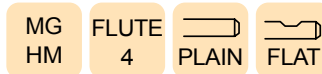


Minimized tool deflection
Corner protected
Reduced tool vibration

EUROPA CODE FLATTED	EUROPA CODE PLAIN	CUTTING DIAMETER d ₁	CORNER RADIUS r	SHANK DIAMETER d ₂	LENGTH OF CUT l ₁	OVERALL LENGTH l ₂
1391230300	1393230300	3.0	0.3	6	8.0	57
1391230400	1393230400	4.0	0.3	6	11.0	57
1391230500	1393230500	5.0	0.3	6	13.0	57
1391230600	1393230600	6.0	0.5	6	13.0	57
1391230800	1393230800	8.0	0.5	8	19.0	63
1391231000	1393231000	10.0	0.5	10	22.0	72
1391231200	1393231200	12.0	0.7	12	26.0	83
1391231400	1393231400	14.0	0.7	14	26.0	83
1391231600	1393231600	16.0	1.0	16	32.0	92
1391231800	1393231800	18.0	1.0	18	32.0	92
1391232000	1393232000	20.0	1.0	20	38.0	104

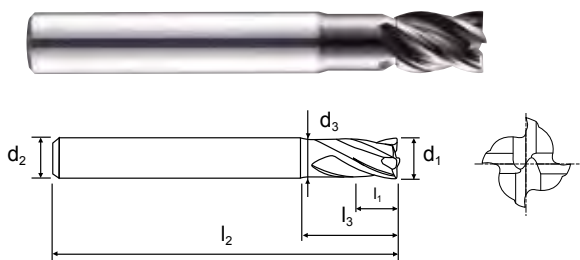
MILL DIA TOLERANCE	SHANK DIA TOLERANCE
0~-0.03	h6

4 FLUTE
EXTENDED NECK HX2



Series No. 146123, 146323

► cutting conditions : p.16



Minimized tool deflection
Corner protected
Reduced tool vibration

EUROPA CODE FLATTED	EUROPA CODE PLAIN	CUTTING DIAMETER d ₁	SHANK DIAMETER d ₂	LENGTH OF CUT l ₁	EFFECTIVE LENGTH l ₃	OVERALL LENGTH l ₂	NECK DIAMETER d ₃
1461230300	1463230300	3.0	6	7.0	12.0	54	2.7
146123013	1463239013	3.0	6	7.0	17.0	57	2.7
1461230400	1463230400	4.0	6	8.0	15.0	57	3.7
146123014	1463239014	4.0	6	8.0	22.0	63	3.7
1461230500	1463230500	5.0	6	10.0	17.0	57	4.7
1461239015	1463239015	5.0	6	10.0	27.0	67	4.7
1461230600	1463230600	6.0	6	10.0	15.0	57	5.5
1461239001	1463239001	6.0	6	10.0	20.0	62	5.5
1461239002	1463239002	6.0	6	10.0	32.0	74	5.5
1461230800	1463230800	8.0	8	12.0	20.0	63	7.5
1461239003	1463239003	8.0	8	12.0	30.0	73	7.5
1461239004	1463239004	8.0	8	12.0	46.0	90	7.5
1461231000	1463231000	10.0	10	14.0	25.0	72	9.2
1461239005	1463239005	10.0	10	14.0	35.0	82	9.2
1461239006	1463239006	10.0	10	14.0	55.0	102	9.2
1461231200	1463231200	12.0	12	16.0	30.0	83	11
1461239007	1463239007	12.0	12	16.0	40.0	93	11
1461239008	1463239008	12.0	12	16.0	64.0	117	11
1461231600	1463231600	16.0	16	22.0	38.0	92	15
1461239009	1463239009	16.0	16	22.0	55.0	109	15
1461239010	1463239010	16.0	16	22.0	87.0	141	15
1461232000	1463232000	20.0	20	26.0	50.0	104	19
1461239011	1463239011	20.0	20	26.0	70.0	124	19
1461239012	1463239012	20.0	20	26.0	110.0	164	19

MILL DIA TOLERANCE	SHANK DIA TOLERANCE
0~-0.03	h6

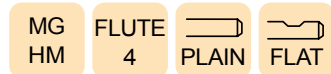
●: Excellent ○: Good

P		H	M		K		S			N				O	
11	12	15	21	22	31	32	41	42	43	61	62	63	64	81	82
O	O		●	●	O	O	●	●	●						
13	14	16	23		33	34	51	52	53	71	72	73	74	83	84
O	O		●		O	O	●	●	●						

●: Excellent ○: Good

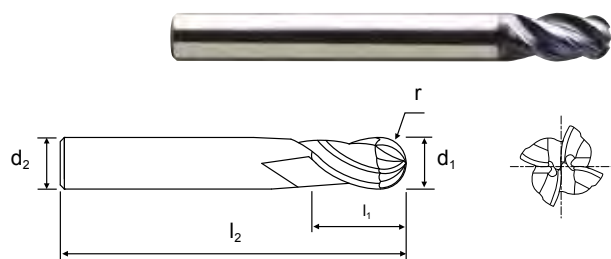
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O	O		●	●	O	O	●	●	●						
13	14	16	23		33	34	51	52	53	71	72	73	74	83	84
O	O		●		O	O	●	●	●						

4 FLUTE LONG LENGTH
BALL NOSE HX2



Series No. 134123, 134323

► cutting conditions : p.17

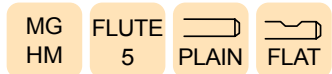


Minimized tool deflection
Reduced tool vibration

EUROPA CODE FLATTED	EUROPA CODE PLAIN	CUTTING DIAMETER d ₁	RADIUS r	SHANK DIAMETER d ₂	LENGTH OF CUT l ₁	OVERALL LENGTH l ₂
1341230300	1343230300	3.0	1.5	6	8.0	57
1341230400	1343230400	4.0	2.0	6	11.0	57
1341230500	1343230500	5.0	2.5	6	13.0	57
1341230600	1343230600	6.0	3.0	6	13.0	57
1341230800	1343230800	8.0	4.0	8	19.0	63
1341231000	1343231000	10.0	5.0	10	22.0	72
1341231200	1343231200	12.0	6.0	12	26.0	83
1341231400	1343231400	14.0	7.0	14	26.0	83
1341231600	1343231600	16.0	8.0	16	32.0	92
1341231800	1343231800	18.0	9.0	18	32.0	92
1341232000	1343232000	20.0	10.0	20	38.0	104
1341232500	1343232500	25.0	12.5	25	38.0	108

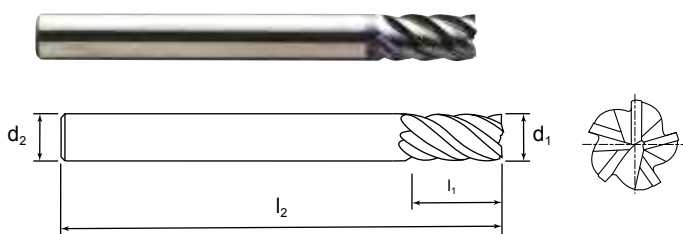
MILL DIA. TOLERANCE	SHANK DIA. TOLERANCE
0~-0.03	h6

5 FLUTE LONG LENGTH HX2



Series No. 135123, 135323

► cutting conditions : p.18



Minimized tool deflection
Corner protected
Reduced tool vibration

EUROPA CODE FLATTED	EUROPA CODE PLAIN	CUTTING DIAMETER d ₁	SHANK DIAMETER d ₂	LENGTH OF CUT l ₁	OVERALL LENGTH l ₂
1351230600	1353230600	6.0	6	13.0	57
1351230800	1353230800	8.0	8	19.0	63
1351231000	1353231000	10.0	10	22.0	72
1351231200	1353231200	12.0	12	26.0	83
1351231400	1353231400	14.0	14	26.0	83
1351231600	1353231600	16.0	16	32.0	92
1351231800	1353231800	18.0	18	32.0	92
1351232000	1353232000	20.0	20	38.0	104
1351232500	1353232500	25.0	25	38.0	108

MILL DIA. TOLERANCE(mm)	SHANK DIA. TOLERANCE
0~-0.03	h6

●: Excellent ○: Good

P		H	M		K		S			N				O	
11	12	15	21	22	31	32	41	42	43	61	62	63	64	81	82
O	O		●	●	O	O	●	●	●						
13	14	16	23		33	34	51	52	53	71	72	73	74	83	84
O	O		●		O	O	●	●	●						

●: Excellent ○: Good

P		H	M		K		S			N				O	
11	12	15	21	22	31	32	41	42	43	61	62	63	64	81	82
O	O		●	●	O	O	●	●	●						
13	14	16	23		33	34	51	52	53	71	72	73	74	83	84
O	O		●		O	O	●	●	●						



HX2
CUTTING DATA

HX2 CUTTING CONDITION

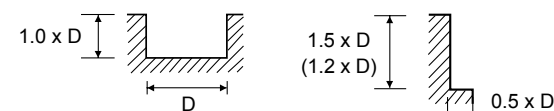


136123,136323,137123,137323,138123,138323,139123,139323, 146323, 146123 (4 Flute, All Square End)

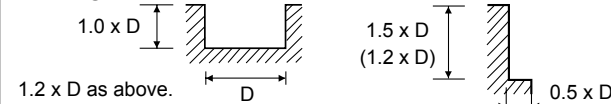
MATERIAL GROUP	HRc		Size (mm)											
			3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
P	11	< 30	v _c (m/min)	125	125	125	125	125	140	140	140	140	140	140
	12		n	13475	10105	8085	6735	5050	4455	3710	3180	2785	2225	1780
	13		f _z	0.005	0.008	0.011	0.016	0.027	0.039	0.047	0.049	0.053	0.059	0.063
	14		f (mm/min)	275	330	340	435	555	690	695	620	590	585	450
M	21	30-45	v _c (m/min)	95	95	95	95	95	95	95	95	95	95	95
	22		n	10185	7600	6110	5095	3820	3055	2545	2180	1910	1695	1215
	23		f _z	0.005	0.008	0.013	0.018	0.028	0.048	0.056	0.06	0.063	0.07	0.077
	24		f (mm/min)	195	250	310	360	435	590	565	520	480	475	380
	25		v _c (m/min)	135	135	135	135	135	135	135	135	135	135	135
	26		n	14260	10750	8655	7130	5345	4275	3565	3055	2670	2375	1710
	27		f _z	0.004	0.006	0.009	0.013	0.022	0.034	0.04	0.043	0.045	0.05	0.055
	28		f (mm/min)	205	255	310	360	465	585	565	520	480	475	380
K	31		v _c (m/min)	125	125	125	125	125	140	140	140	140	140	140
	32		n	13475	10105	8085	6735	5050	4455	3710	3180	2785	2225	1780
	33		f _z	0.005	0.008	0.011	0.016	0.027	0.039	0.047	0.049	0.053	0.059	0.063
	34		f (mm/min)	275	330	370	435	555	690	695	620	590	585	450
S	41		v _c (m/min)	95	95	95	95	95	95	95	95	95	95	95
	42		n	10185	7600	6110	5095	3820	3055	2545	2180	1910	1695	1215
	43		f _z	0.005	0.008	0.013	0.018	0.028	0.048	0.056	0.06	0.063	0.07	0.077
	44		f (mm/min)	195	250	310	360	435	590	565	520	480	475	380
	51		v _c (m/min)	25	25	25	25	25	25	25	25	25	25	25
	52		n	2715	2005	1630	1355	1015	815	675	580	505	405	320
	53		f _z	0.005	0.007	0.012	0.018	0.031	0.018	0.056	0.06	0.064	0.069	0.077
	54		f (mm/min)	55	55	80	95	125	155	150	140	130	125	110

STEEL, STAINLESS STEEL, CAST IRON

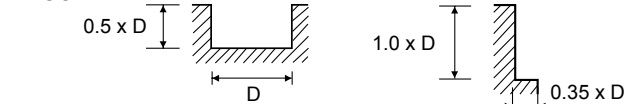
1.2 x D axial cutting depth should be applied for short length tools above ø8mm



TITANIUM



INCONEL



► The data shown is based on medial length tools. Please adjust machining conditions according to length.

v_c - cutting speed (m/min)
n - RPM (rev/min)
f_z - feed rate (mm/tooth)
f - feed rate (mm/rev)
z - No. of teeth
a_p - axial depth of cut
a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

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HX2 CUTTING CONDITION

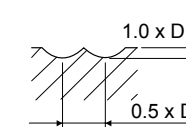


134123, 134323 (4 Flute Ball Nose)

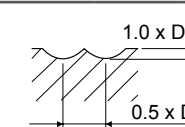


MATERIAL GROUP	HRc		Size (mm)											
			3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
P	11	< 30	v _c (m/min)	135	135	135	135	135	135	135	135	135	135	135
	12		n	14324	10740	8590	7460	5370	4290	3580	3070	2680	2380	1710
	13		f _z	0.025	0.025	0.03	0.038	0.06	0.06	0.07	0.075	0.075	0.08	0.09
	14		f (mm/min)	1430	1070	1030	1140	1280	1030	1000	920	800	760	680
M	21	30-45	v _c (m/min)	75	75	75	75	75	75	75	75	75	75	75
	22		n	8220	6160	4930	4110	3080	2460	2050	1700	1540	1370	980
	23		f _z	0.02	0.02	0.025	0.041	0.045	0.05	0.055	0.06	0.06	0.064	0.069
	24		f (mm/min)	650	490	490	670	550	490	450	400	370	350	270
	25		v _c (m/min)	70	70	70	70	70	70	70	70	70	70	70
	26		n	7420	5570	4450	3710	2780	2220	1850	1590	1390	1230	890
	27		f _z	0.015	0.015	0.025	0.03	0.04	0.045	0.05	0.054	0.054	0.059	0.059
	28		f (mm/min)	440	330	440	440	440	400	370	340	300	290	210
K	31		v _c (m/min)	135	135	135	135	135	135	135	135	135	135	135
	32		n	14324	10740	8590	7460	5370	4290	3580	3070	2680	2380	1710
	33		f _z	0.025	0.025	0.03	0.038	0.06	0.06	0.07	0.075	0.075	0.08	0.09
	34		f (mm/min)	1430	1070	1030	1140	1280	1030	1000	920	800	760	680
S	41		v _c (m/min)	55	55	55	55	55	55	55	55	55	55	55
	42		n	5830	4370	3500	2910	2180	1750	1450	1250	1090	970	700
	43		f _z	0.012	0.012	0.015	0.02	0.03	0.03	0.04	0.042	0.044	0.049	0.06
	44		f (mm/min)	280	210	210	230	260	210	230	210	190	190	190
	51		v _c (m/min)	30	30	30	30	30	30	30	30	30	30	30
	52		n	3180	2380	1910	1590	1190	950	790	680	590	530	470
	53		f _z	0.011	0.011	0.01	0.016	0.025	0.026	0.038	0.04	0.047	0.052	0.053
	54		f (mm/min)	140	100	80	100	120	100	120	115	110	110	80

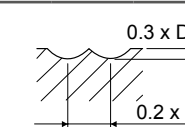
STEEL, STAINLESS STEEL, CAST IRON



TITANIUM



INCONEL



v_c - cutting speed (m/min)
n - RPM (rev/min)
f_z - feed rate (mm/tooth)
f - feed rate (mm/rev)
z - No. of teeth
a_p - axial depth of cut
a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

All recommendations are based on ideal machining conditions. Adjustments may need to be made according to your set-up. The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.

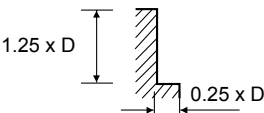
HX2 CUTTING CONDITION



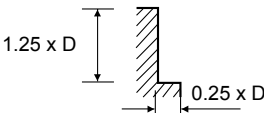
135123, 135323 (5 Flute)

MATERIAL GROUP		HRc		Size (mm)								
				6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
P	11	< 30	v _c (m/min)	135	135	135	135	135	135	135	135	135
	12		n	7270	5450	4360	3630	3110	2720	2390	2180	1720
	13		f _z	0.034	0.038	0.05	0.063	0.069	0.076	0.082	0.089	0.09
	14		f (mm/min)	1240	1040	1100	1150	1080	1040	980	970	770
M	21		v _c (m/min)	115	115	115	115	115	115	115	115	115
			n	6060	4540	3630	3030	2600	2270	2030	1810	1460
			f _z	0.03	0.032	0.038	0.063	0.065	0.069	0.072	0.076	0.077
			f (mm/min)	920	720	690	960	850	780	730	690	560
	23		v _c (m/min)	105	105	105	105	105	105	105	105	105
			n	5660	4240	3390	3830	2420	2120	1850	1690	1340
			f _z	0.03	0.032	0.038	0.043	0.064	0.068	0.072	0.076	0.077
			f (mm/min)	860	670	640	820	770	720	670	640	510
K	31		v _c (m/min)	135	135	135	135	135	135	135	135	135
	32		n	7270	5450	4360	3630	3110	2720	2390	2180	1720
	33		f _z	0.034	0.038	0.05	0.063	0.069	0.076	0.082	0.089	0.09
	34		f (mm/min)	1240	1040	1100	1150	1080	1040	980	970	770
S	41		v _c (m/min)	85	85	85	85	85	85	85	85	85
			n	4440	3330	2660	220	1900	1660	1500	1330	1080
			f _z	0.03	0.031	0.038	0.05	0.057	0.063	0.069	0.075	0.078
			f (mm/min)	670	520	500	560	540	520	510	500	420
	51		v _c (m/min)	25	25	25	25	25	25	25	25	25
			n	1450	1090	870	720	620	540	440	430	320
			f _z	0.017	0.02	0.025	0.036	0.045	0.048	0.054	0.06	0.062
			f (mm/min)	120	110	110	130	140	130	120	130	100

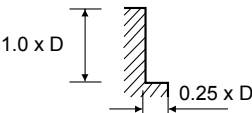
STEEL, STAINLESS STEEL, CAST IRON



TITANIUM



INCONEL



v_c - cutting speed (m/min)
n - RPM (rev/min)
f_z - feed rate (mm/tooth)
f - feed rate (mm/rev)
z - No. of teeth
a_p - axial depth of cut
a_e - radial depth of cut

To calculate RPM from cutting speed: $n = \frac{v_c \cdot 1000}{\pi \cdot \phi}$

To calculate cutting speed from RPM: $v_c = \frac{n \cdot \pi \cdot \phi}{1000}$

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