

Routers



Routing

HIGH PERFORMANCE ROUTERS	SERIES	DESCRIPTION	PAGE	S&F PAGE
Carbon Composite	20-CCR	Multi-Flute Carbon Composite Fractional	386	388
	20M-CCR	Multi-Flute Carbon Composite Metric	386	389
	20-CCR-LHC	Multi-Flute Carbon Composite Left Hand Cut Fractional	387	388
	20M-CCR-LHC	Multi-Flute Carbon Composite Left Hand Cut Metric	387	389
Coarse Cut Carbon Composite	31-CCR	Multi-Flute Coarse Composite Fractional	390	391
	31M-CCR	Multi-Flute Coarse Composite Metric	390	392
Compression	25	Multi-Flute Compression Fractional	393	394
	25M	Multi-Flute Compression Metric	393	395
GENERAL APPLICATION ROUTERS	SERIES	DESCRIPTION	PAGE	S&F PAGE
Up Cut	21	2 Flute Up Cut Fractional	396	398
	21M	2 Flute Up Cut Metric	396	399
Down Cut	22	2 Flute Down Cut Fractional	397	398
	22M	2 Flute Down Cut Metric	397	399

Speed & Feed Recommendations listed after each series

Ranurado

RANURADORES DE ALTO RENDIMIENTO	SERIE	DESCRIPCIÓN	PÁGINA	S&F PÁGINA
Compuesto de carbono	20-CCR	Filo múltiple, compuesto de carbono, fraccional	386	388
	20M-CCR	Filo múltiple, compuesto de carbono, métrico	386	389
	20-CCR-LHC	Filo múltiple, carbon composite corte hélice izquierda fraccional	387	388
	20M-CCR-LHC	Filo múltiple, carbo composite corte hélice izquierda métrico	387	389
Compuesto de carbono de corte grueso	31-CCR	Filo múltiple, compuesto grueso, fraccional	390	391
	31M-CCR	Filo múltiple, compuesto grueso, métrico	390	392
Compresión	25	Filo múltiple, compresión, fraccional	393	394
	25M	Filo múltiple, compresión, métrico	393	395

RANURADORES DE USO GENERAL	SERIE	DESCRIPCIÓN	PÁGINA	S&F PÁGINA
Corte ascendente	21	2 filos, corte ascendente, fraccional	396	398
	21M	2 filos, corte ascendente, métrico	396	399
Corte descendente	22	2 filos, corte descendente, fraccional	397	398
	22M	2 filos, corte descendente, métrico	397	399

Recomendaciones de velocidades y avances mostradas tras cada serie

Détourage

FRAISES A DETOURER HAUTE PERFORMANCE	SÈRIES	DESCRIPTION	PAGE	S&F PAGE
Composites carbone	20-CCR	Multi-dents pour composites carbone (fractionnel)	386	388
	20M-CCR	Multi-dents pour composites carbone (métrique)	386	389
	20-CCR-LHC	Multi-dents carbon composite coupe à gauche (fractionnel)	387	388
	20M-CCR-LHC	Multi-dents carbon composite coupe à gauche (métrique)	387	389
Pour composites carbone coupe grossière	31-CCR	Multi-dents pour composites grossiers (fractionnel)	390	391
	31M-CCR	Multi-dents pour composites grossiers (métrique)	390	392
Compression	25	Multi-dents de compression (fractionnel)	393	394
	25M	Multi-dents de compression (métrique)	393	395

FRAISES À DÉTOURER UNIVERSELLES	SÈRIES	DESCRIPTION	PAGE	S&F PAGE
Coupe ascendante	21	2 dents coupe ascendante (fractionnel)	396	398
	21M	2 dents coupe ascendante (métrique)	396	399
Coupe descendante	22	2 dents coupe descendante (fractionnel)	397	398
	22M	2 dents coupe descendante (métrique)	397	399

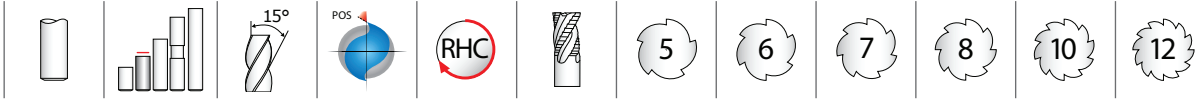
Recommandations de vitesse et avance indiquées après chaque série

HOCHLEISTUNGS-KONTURENFRÄSER	SERIE	BESCHREIBUNG	SEITE	S&F SEITE
Kohlefaserverbundwerkstoff	20-CCR	Zölliger Konturenfräser für Kohlefaserverbundwerkstoff	386	388
	20M-CCR	Konturenfräser für Kohlefaserverbundwerkstoff	386	389
	20-CCR-LHC	Mehrschneider Carbon Composite Links geschnittene zöllig	387	388
	20M-CCR-LHC	Mehrschneider Carbon Composite Links geschnittene metrisch	387	389
Grobschnitt Kohlefaserverbundwerkstoff	31-CCR	Zölliger Konturenfräser für Verbundkunststoff	390	391
	31M-CCR	Konturenfräser für Verbundkunststoff	390	392
Gegenläufiger Drall	25	Zölliger Gegenläufiger Konturenfräser	393	394
	25M	Gegenläufiger Konturenfräser	393	395

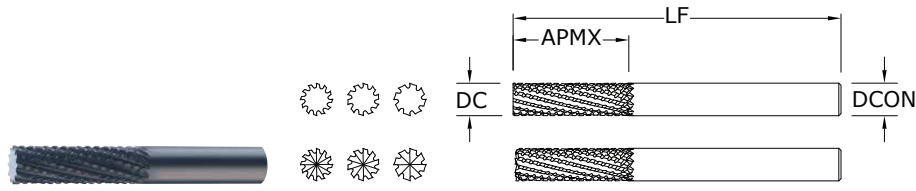
STANDARD-KONTURENFRÄSER	SERIE	BESCHREIBUNG	SEITE	S&F SEITE
Rechtsspirale	21	Zölliger VHM-Fräser mit 2 Schneiden (ziehend)	396	398
	21M	VHM-Fräser mit 2 Schneiden (ziehend)	396	399
Linksspirale	22	Zölliger VHM-Fräser mit 2 Schneiden (drückend)	397	398
	22M	VHM-Fräser mit 2 Schneiden (drückend)	397	399

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

Carbon Composite



20-CCR FRACTIONAL SERIES



- Multi-flute design and positive geometry to shear with minimal pressure and delamination
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

inch						EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	NO. OF FLUTES	END STYLE	UNCOATED	Di-NAMITE® (Diamond)
1/4	1	2-1/2	1/4	8	No End Cutting	72930	73013
1/4	1	2-1/2	1/4	8	End Cutting	72947	73012
5/16	1	2-1/2	5/16	10	No End Cutting	72948	73026
5/16	1	2-1/2	5/16	10	End Cutting	72949	73014
3/8	1-1/8	2-1/2	3/8	12	No End Cutting	72950	73028
3/8	1-1/8	2-1/2	3/8	12	End Cutting	72951	73027
1/2	1-1/2	3-1/2	1/2	12	No End Cutting	72952	73041
1/2	1-1/2	3-1/2	1/2	12	End Cutting	72953	73029

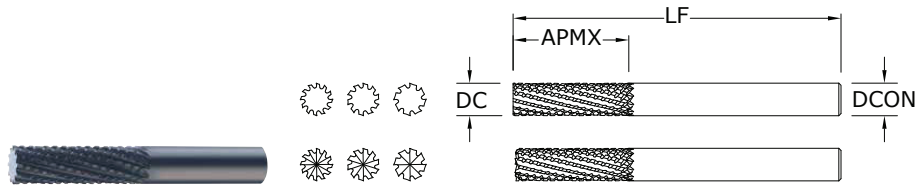
TOLERANCES (inch)

DC = +.000/-0.005
DCON = h₆

NON-FERROUS

For patent information visit www.ksptpatents.com

20M-CCR METRIC SERIES



- Multi-flute design and positive geometry to shear with minimal pressure and delamination
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

mm						EDP NO.		
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	NO. OF FLUTES	END STYLE	UNCOATED	Ti-NAMITE-B (TiB ₂)	Di-NAMITE® (Diamond)
2,0	6,0	38,0	3,0	5	End Cutting	82930	83100	83070
3,0	10,0	38,0	3,0	6	End Cutting	82931	83101	83071
4,0	12,0	50,0	4,0	7	End Cutting	82932	83102	83072
5,0	15,0	50,0	6,0	8	End Cutting	82933	83103	83073
6,0	25,0	63,0	6,0	8	No End Cutting	82966	83104	83027
6,0	25,0	63,0	6,0	8	End Cutting	82967	83105	83026
8,0	25,0	63,0	8,0	10	No End Cutting	82968	83106	83029
8,0	25,0	63,0	8,0	10	End Cutting	82969	83107	83028
10,0	28,0	63,0	10,0	12	No End Cutting	82970	83108	83042
10,0	28,0	63,0	10,0	12	End Cutting	82971	83109	83041
12,0	38,0	89,0	12,0	12	No End Cutting	82972	83110	83044
12,0	38,0	89,0	12,0	12	End Cutting	82973	83111	83043

TOLERANCES (mm)

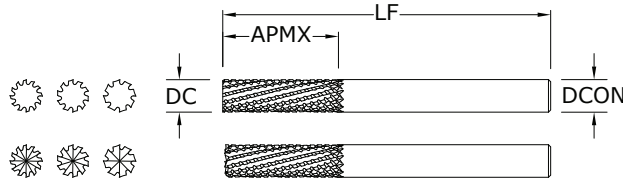
DC = +0,000/-0,130
DCON = h₆

NON-FERROUS

For patent information visit www.ksptpatents.com



FRACTIONAL & METRIC Carbon Composite



20-CCR-LHC FRACTIONAL SERIES

TOLERANCES (inch)

DC = +.000/-0.005

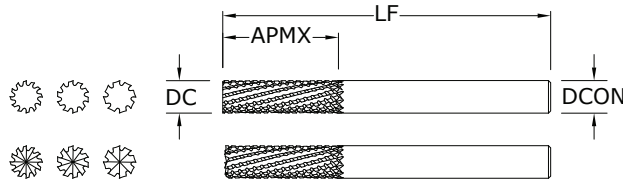
DCON = h_6

NON-FERROUS

For patent information visit www.ksptpatents.com

inch						EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	NO. OF FLUTES	END STYLE	UNCOATED	Di-NAMITE® (Diamond)
1/4	1	2-1/2	1/4	8	No End Cutting	73070	73078
1/4	1	2-1/2	1/4	8	End Cutting	73071	73079
5/16	1	2-1/2	5/16	10	No End Cutting	73072	73080
5/16	1	2-1/2	5/16	10	End Cutting	73073	73081
3/8	1-1/8	2-1/2	3/8	12	No End Cutting	73074	73082
3/8	1-1/8	2-1/2	3/8	12	End Cutting	73075	73083

- Multi-flute design and positive geometry to shear with minimal pressure and delamination
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics



20M-CCR-LHC METRIC SERIES

TOLERANCES (mm)

DC = +0,000/-0,130

DCON = h_6

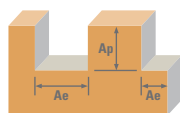
NON-FERROUS

For patent information visit www.ksptpatents.com

mm						EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	NO. OF FLUTES	END STYLE	UNCOATED	Di-NAMITE® (Diamond)
6,0	25,0	63,0	6,0	8	No End Cutting	83220	83230
6,0	25,0	63,0	6,0	8	End Cutting	83221	83231
8,0	25,0	63,0	8,0	10	No End Cutting	83222	83232
8,0	25,0	63,0	8,0	10	End Cutting	83223	83233
10,0	28,0	63,0	10,0	12	No End Cutting	83224	83234
10,0	28,0	63,0	10,0	12	End Cutting	83225	83235

- Multi-flute design and positive geometry to shear with minimal pressure and delamination
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Carbon Composite

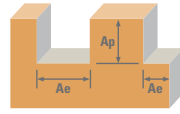


Series 20 Fractional	Ae x DC	Ap x DC	Vc (sfm)	DC • in					
				1/4	5/16	3/8	1/2		
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot 	1	≤ 1	400 (320-480)	RPM	6112	4890	4075	3056
					Fr	0.0049	0.0094	0.0135	0.0180
					Feed (ipm)	30	46	55	55
	Profile 	≤ 0.5	≤ 1.5	500 (400-600)	RPM	7640	6112	5093	3820
					Fr	0.0049	0.0094	0.0135	0.0180
					Feed (ipm)	38	58	69	69
	HSM 	≤ 0.05	≤ 2	825 (660-990)	RPM	12606	10085	8404	6303
					Fr	0.0111	0.0215	0.0309	0.0413
					Feed (ipm)	140	217	260	260
GFRP (FIBERGLASS)	Slot 	1	≤ 1	320 (256-384)	RPM	4890	3912	3260	2445
					Fr	0.0049	0.0095	0.0135	0.0180
					Feed (ipm)	24	37	44	44
	Profile 	≤ 0.5	≤ 1.5	400 (320-480)	RPM	6112	4890	4075	3056
					Fr	0.0049	0.0095	0.0135	0.0180
					Feed (ipm)	30	46	55	55
	HSM 	≤ 0.05	≤ 2	660 (528-792)	RPM	10085	8068	6723	5042
					Fr	0.0110	0.0214	0.0311	0.0414
					Feed (ipm)	111	173	209	209
CARBON, GRAPHITE	Slot 	1	≤ 1	480 (384-576)	RPM	7334	5868	4890	3667
					Fr	0.0064	0.0124	0.0180	0.0240
					Feed (ipm)	47	73	88	88
	Profile 	≤ 0.5	≤ 1.5	600 (480-720)	RPM	9168	7334	6112	4584
					Fr	0.0064	0.0124	0.0180	0.0240
					Feed (ipm)	59	91	110	110
	HSM 	≤ 0.05	≤ 2	990 (792-1188)	RPM	15127	12102	10085	7564
					Fr	0.0147	0.0287	0.0412	0.0549
					Feed (ipm)	223	347	415	415
PLASTICS	Slot 	1	≤ 1	665 (640-690)	RPM	10161	8129	6774	5081
					Fr	0.0077	0.0150	0.0217	0.0241
					Feed (ipm)	78	122	147	147
	Profile 	≤ 0.5	≤ 1.5	1000 (800-1200)	RPM	15280	12224	10187	7640
					Fr	0.0077	0.0150	0.0217	0.0241
					Feed (ipm)	118	183	221	184
	HSM 	≤ 0.05	≤ 2	1650 (1320-1980)	RPM	25212	20170	16808	12606
					Fr	0.0147	0.0287	0.0413	0.0551
					Feed (ipm)	370	579	694	694

HSM (high speed machining)
 rpm = Vc x 3.82 / DC
 ipm = Fr x rpm
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the SGS Tool Wizard® for complete technical information
www.kyocera-sgstool.com

Carbon Composite



Series 20M Metric	Ae x DC	Ap x DC	Vc (m/min)	DC • mm						
				3	6	8	10	12		
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot 	1	≤ 1	120 (96-164)	RPM	12722	6361	4771	3817	3181
					Fr	0.055	0.113	0.243	0.366	0.439
					Feed (mm/min)	700	720	1160	1395	1395
	Profile 	≤ 0.5	≤ 1.5	150 (120-180)	RPM	15903	7951	5963	4771	3976
					Fr	0.055	0.113	0.243	0.366	0.439
					Feed (mm/min)	875	900	1450	1744	1744
	HSM 	≤ 0.05	≤ 2	250 (200-300)	RPM	26504	13252	9939	7951	6626
					Fr	0.126	0.260	0.556	0.833	1.000
					Feed (mm/min)	3350	3450	5527	6625	6625
GFRP (FIBERGLASS)	Slot 	1	≤ 1	100 (80-120)	RPM	10602	5301	3976	3181	2650
					Fr	0.054	0.111	0.236	0.357	0.428
					Feed (mm/min)	570	587	940	1135	1135
	Profile 	≤ 0.5	≤ 1.5	120 (96-164)	RPM	12722	6361	4771	3817	3181
					Fr	0.054	0.111	0.236	0.357	0.428
					Feed (mm/min)	684	704	1128	1362	1362
	HSM 	≤ 0.05	≤ 2	200 (160-240)	RPM	21203	10602	7951	6361	5301
					Fr	0.124	0.261	0.557	1.011	1.213
					Feed (mm/min)	2629	2765	4430	6430	6430
CARBON, GRAPHITE	Slot 	1	≤ 1	145 (116-174)	RPM	15372	7686	5765	4612	3843
					Fr	0.069	0.152	0.323	0.482	0.579
					Feed (mm/min)	1061	1165	1860	2224	2224
	Profile 	≤ 0.5	≤ 1.5	185 (148-222)	RPM	19613	9807	7355	5884	4903
					Fr	0.069	0.152	0.323	0.482	0.579
					Feed (mm/min)	1353	1486	2373	2838	2838
	HSM 	≤ 0.05	≤ 2	300 (240-360)	RPM	31805	15903	11927	9542	7951
					Fr	0.159	0.348	0.740	1.109	1.331
					Feed (mm/min)	5057	5535	8820	10580	10580
PLASTICS	Slot 	1	≤ 1	245 (196-294)	RPM	25974	12987	9740	7792	6494
					Fr	0.069	0.150	0.319	0.477	0.572
					Feed (mm/min)	1792	1945	3107	3717	3717
	Profile 	≤ 0.5	≤ 1.5	305 (244-366)	RPM	32335	16168	12126	9701	8084
					Fr	0.069	0.150	0.319	0.477	0.572
					Feed (mm/min)	2231	2421	3868	4627	4627
	HSM 	≤ 0.05	≤ 2	505 (404-606)	RPM	53538	26769	20077	16062	13385
					Fr	0.159	0.344	0.732	1.097	1.316
					Feed (mm/min)	8513	9220	14690	17617	17617

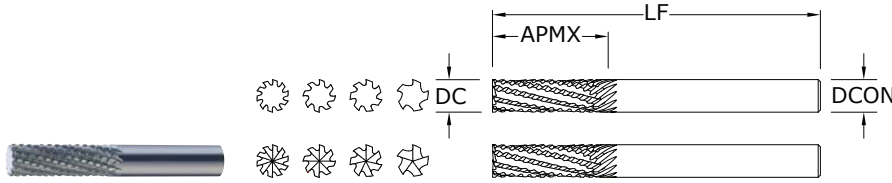
HSM (high speed machining)
 $rpm = (Vc \times 1000) / (DC \times 3.14)$
 $mm/min = Fr \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the SGS Tool Wizard® for complete technical information
www.kyocera-sgstool.com

Coarse Cut Carbon Composite



31-CCR FRACTIONAL SERIES



- Fewer, deeper flutes to prevent clogging in heavy routing
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

inch						EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	NO. OF FLUTES	END STYLE	UNCOATED	Di-NAMITE® (Diamond)
1/4	1	2-1/2	1/4	5	End Cutting	72954	72955
1/4	1	2-1/2	1/4	5	No End Cutting	72956	72957
5/16	1	2-1/2	5/16	7	End Cutting	72958	72959
5/16	1	2-1/2	5/16	7	No End Cutting	72960	72961
3/8	1-1/8	2-1/2	3/8	8	End Cutting	72962	72963
3/8	1-1/8	2-1/2	3/8	8	No End Cutting	72964	72965
1/2	1-1/2	3-1/2	1/2	10	End Cutting	72966	72967
1/2	1-1/2	3-1/2	1/2	10	No End Cutting	72968	72969

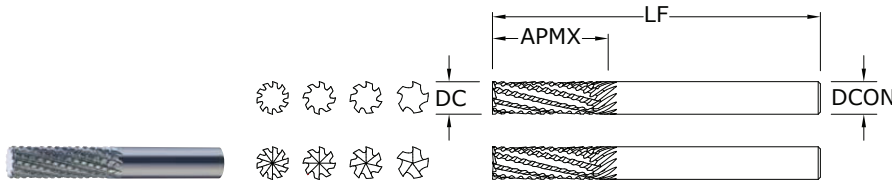
TOLERANCES (inch)

DC = +.000/-0.005
DCON = h₆

NON-FERROUS

For patent information visit www.ksptpatents.com

31M-CCR METRIC SERIES



- Fewer, deeper flutes to prevent clogging in heavy routing
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mm						EDP NO.		
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	NO. OF FLUTES	END STYLE	UNCOATED	Ti-NAMITE-B (TiB ₂)	Di-NAMITE® (Diamond)
6,0	25,0	63,0	6,0	5	End Cutting	82974	83200	82982
6,0	25,0	63,0	6,0	5	No End Cutting	82975	83201	82983
8,0	25,0	63,0	8,0	7	End Cutting	82976	83202	82984
8,0	25,0	63,0	8,0	7	No End Cutting	82977	83203	82985
10,0	28,0	63,0	10,0	8	End Cutting	82978	83204	82986
10,0	28,0	63,0	10,0	8	No End Cutting	82979	83205	82987
12,0	38,0	89,0	12,0	10	End Cutting	82980	83206	82988
12,0	38,0	89,0	12,0	10	No End Cutting	82981	83207	82989

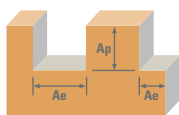
TOLERANCES (mm)

DC = +0,000/-0,130
DCON = h₆

NON-FERROUS

For patent information visit www.ksptpatents.com

Coarse Cut Carbon Composite



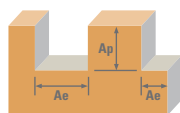
Series 31 Fractional

	Ae x DC	Ap x DC	Vc (sfm)	DC • in					
				1/4	5/16	3/8	1/2		
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot 	1	≤ 1	400	RPM	6112	4890	4075	3056
				(320-480)	Fr	0.0029	0.0065	0.0088	0.0147
					Feed (ipm)	18	32	36	45
	Profile 	≤ 0.5	≤ 1.5	500	RPM	7640	6112	5093	3820
				(400-600)	Fr	0.0029	0.0065	0.0088	0.0147
					Feed (ipm)	23	40	45	56
	HSM 	≤ 0.05	≤ 2	825	RPM	12606	10085	8404	6303
				(660-990)	Fr	0.0069	0.0151	0.0206	0.0344
					Feed (ipm)	87	152	173	217
GFRP (FIBERGLASS)	Slot 	1	≤ 1	320	RPM	4890	3912	3260	2445
				(256-384)	Fr	0.0031	0.0066	0.0089	0.0147
					Feed (ipm)	15	26	29	36
	Profile 	≤ 0.5	≤ 1.5	400	RPM	6112	4890	4075	3056
				(320-480)	Fr	0.0031	0.0066	0.0089	0.0147
					Feed (ipm)	19	33	36	45
	HSM 	≤ 0.05	≤ 2	660	RPM	10085	8068	6723	5042
				(528-792)	Fr	0.0069	0.0150	0.0205	0.0343
					Feed (ipm)	70	121	138	173
CARBON, GRAPHITE	Slot 	1	≤ 1	480	RPM	7334	5868	4890	3667
				(384-576)	Fr	0.0040	0.0087	0.0119	0.0199
					Feed (ipm)	29	51	58	73
	Profile 	≤ 0.5	≤ 1.5	600	RPM	9168	7334	6112	4584
				(480-720)	Fr	0.0040	0.0087	0.0119	0.0199
					Feed (ipm)	36	64	73	91
	HSM 	≤ 0.05	≤ 2	990	RPM	15127	12102	10085	7564
				(792-1188)	Fr	0.0092	0.0201	0.0275	0.0459
					Feed (ipm)	139	243	277	347
PLASTICS	Slot 	1	≤ 1	800	RPM	12224	9779	8149	6112
				(640-690)	Fr	0.0040	0.0087	0.0119	0.0200
					Feed (ipm)	49	85	97	122
	Profile 	≤ 0.5	≤ 1.5	1000	RPM	15280	12224	10187	7640
				(800-1200)	Fr	0.0040	0.0087	0.0119	0.0200
					Feed (ipm)	61	106	121	153
	HSM 	≤ 0.05	≤ 2	1650	RPM	25212	20170	16808	12606
				(1320-1980)	Fr	0.0092	0.0201	0.0275	0.0459
					Feed (ipm)	232	405	462	578

HSM (high speed machining)
 $rpm = Vc \times 3.82 / DC$
 $ipm = Fr \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
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www.kyocera-sgtool.com

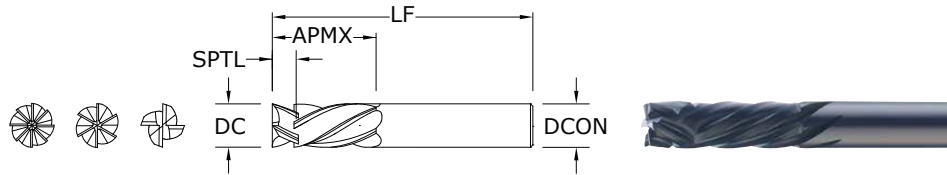
Coarse Cut Carbon Composite



Series 31M Metric	Ae x DC	Ap x DC	Vc (m/min)	DC • mm					
				6	8	10	12		
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot 	1	≤ 1	120	RPM	6361	4771	3817	3181
				(96-164)	Fr	0.071	0.170	0.244	0.366
					Feed (mm/min)	450	810	930	1165
	Profile 	≤ 0.5	≤ 1.5	150	RPM	7951	5963	4771	3976
				(120-180)	Fr	0.071	0.170	0.244	0.366
					Feed (mm/min)	563	1013	1163	1456
	HSM 	≤ 0.05	≤ 2	250	RPM	13252	9939	7951	6626
				(200-300)	Fr	0.162	0.388	0.555	0.832
					Feed (mm/min)	2150	3860	4415	5515
GFRP (FIBERGLASS)	Slot 	1	≤ 1	100	RPM	5301	3976	3181	2650
				(80-120)	Fr	0.069	0.165	0.237	0.357
					Feed (mm/min)	365	655	755	945
	Profile 	≤ 0.5	≤ 1.5	120	RPM	6361	4771	3817	3181
				(96-164)	Fr	0.069	0.165	0.237	0.357
					Feed (mm/min)	438	786	906	1134
	HSM 	≤ 0.05	≤ 2	200	RPM	10602	7951	6361	5301
				(160-240)	Fr	0.163	0.390	0.557	0.834
					Feed (mm/min)	1725	3100	3540	4420
CARBON, GRAPHITE	Slot 	1	≤ 1	145	RPM	7686	5765	4612	3843
				(116-174)	Fr	0.095	0.226	0.321	0.483
					Feed (mm/min)	728	1300	1480	1855
	Profile 	≤ 0.5	≤ 1.5	185	RPM	9807	7355	5884	4903
				(148-222)	Fr	0.095	0.226	0.321	0.483
					Feed (mm/min)	929	1659	1888	2367
	HSM 	≤ 0.05	≤ 2	300	RPM	15903	11927	9542	7951
				(240-360)	Fr	0.217	0.517	0.739	1.111
					Feed (mm/min)	3450	6170	7050	8830
PLASTICS	Slot 	1	≤ 1	245	RPM	12987	9740	7792	6494
				(196-294)	Fr	0.094	0.223	0.318	0.477
					Feed (mm/min)	1215	2175	2475	3100
	Profile 	≤ 0.5	≤ 1.5	305	RPM	16168	12126	9701	8084
				(244-366)	Fr	0.094	0.223	0.318	0.477
					Feed (mm/min)	1513	2708	3081	3859
	HSM 	≤ 0.05	≤ 2	505	RPM	26769	20077	16062	13385
				(404-606)	Fr	0.215	0.512	0.731	1.098
					Feed (mm/min)	5760	10280	11745	14700

HSM (high speed machining)
 $rpm = (Vc \times 1000) / (DC \times 3.14)$
 $mm/min = Fr \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the SGS Tool Wizard® for complete technical information
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25

FRACTIONAL SERIES

TOLERANCES (inch)

DC = +.000/-0.003

DCON = h₆

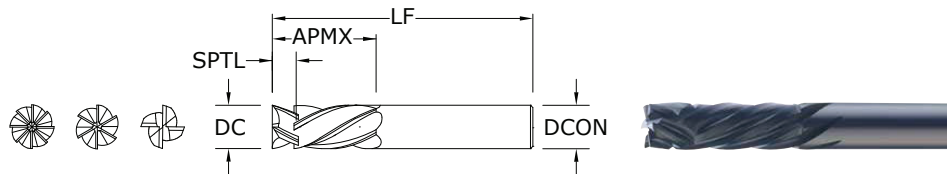
NON-FERROUS

For patent information visit

www.ksptpatents.com

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	SPLIT LENGTH SPTL	NO. OF FLUTES	EDP NO.	
						UNCOATED	Di-NAMITE® (Diamond)
1/4	1	2-1/2	1/4	11/64	4	72970	72971
5/16	1	2-1/2	5/16	7/32	4	72972	72973
3/8	1-1/8	2-1/2	3/8	17/64	6	72974	72975
1/2	1-1/2	3-1/2	1/2	23/64	8	72976	72977

- Compression-style helixes direct cutting forces inward, eliminating fiber breakout and delamination
- Primary/secondary relief grind for reduced friction and pressure
- Rigid, heavy core



25M

METRIC SERIES

TOLERANCES (mm)

DC = +0,000/-0,080

DCON = h₆

NON-FERROUS

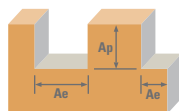
For patent information visit












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CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	SPLIT LENGTH SPTL	NO. OF FLUTES	EDP NO.	
						UNCOATED	Di-NAMITE® (Diamond)
6,0	25,0	63,0	6,0	4,10	4	82990	82991
8,0	25,0	63,0	8,0	5,58	4	82992	82993
10,0	28,0	63,0	10,0	7,05	6	82994	82995
12,0	38,0	89,0	12,0	8,60	8	82996	82997

- Compression-style helixes direct cutting forces inward, eliminating fiber breakout and delamination
- Primary/secondary relief grind for reduced friction and pressure
- Rigid, heavy core

Compression

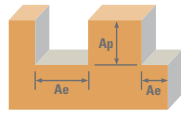


Series 25 Fractional	Profile 	Ae x DC	Ap x DC	Vc (sfm)	DC • in				
					1/4	5/16	3/8	1/2	
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Profile 	≤ 0.5	≤ 1.5	500	RPM	7640	6112	5093	3820
				(400-600)	Fz	0.0016	0.0030	0.0040	0.0048
				Feed (ipm)	49	73	122	147	
	HSM 	≤ 0.05	≤ 2	825	RPM	12606	10085	8404	6303
				(660-990)	Fz	0.0037	0.0069	0.0092	0.0110
				Feed (ipm)	187	278	464	555	
GFRP (FIBERGLASS)	Profile 	≤ 0.5	≤ 1.5	400	RPM	6112	4890	4075	3056
				(320-480)	Fz	0.0016	0.0030	0.0040	0.0048
				Feed (ipm)	39	59	98	117	
	HSM 	≤ 0.05	≤ 2	660	RPM	10085	8068	6723	5042
				(528-792)	Fz	0.0037	0.0069	0.0092	0.0110
				Feed (ipm)	149	223	371	444	
N CARBON, GRAPHITE	Profile 	≤ 0.5	≤ 1.5	600	RPM	9168	7334	6112	4584
				(480-720)	Fz	0.0020	0.0038	0.0050	0.0060
				Feed (ipm)	73	111	183	220	
	HSM 	≤ 0.05	≤ 2	990	RPM	15127	12102	10085	7564
				(792-1188)	Fz	0.0046	0.0086	0.0115	0.0138
				Feed (ipm)	278	416	696	835	
PLASTICS	Profile 	≤ 0.5	≤ 1.5	1000	RPM	15280	12224	10187	7640
				(800-1200)	Fz	0.0020	0.0038	0.0050	0.0060
				Feed (ipm)	122	186	306	367	
	HSM 	≤ 0.05	≤ 2	1650	RPM	25212	20170	16808	12606
				(1320-1980)	Fz	0.0046	0.0086	0.0115	0.0138
				Feed (ipm)	464	694	1160	1392	
MACHINABLE CERAMICS MACHINABLE GLASS	Profile 	≤ 0.5	≤ 1.5	50	RPM	764	611	509	382
				(40-60)	Fz	0.0008	0.0015	0.0020	0.0024
				Feed (ipm)	2.4	3.7	6.1	7.3	
	HSM 	≤ 0.05	≤ 2	85	RPM	1299	1039	866	649
				(68-102)	Fz	0.0018	0.0034	0.0046	0.0055
				Feed (ipm)	9.4	14.1	23.9	28.6	

HSM (high speed machining)
 $rpm = Vc \times 3.82 / DC$
 $ipm = Fz \times \text{number of flutes} \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
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Compression

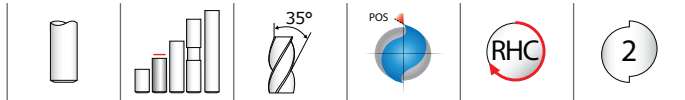


Series 25M Metric	Ae x DC	Ap x DC	Vc (m/min)	DC • mm					
				6	8	10	12		
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Profile 	≤ 0.5	≤ 1.5	150	RPM	7951	5963	4771	3976
				(96-164)	Fz	0.040	0.065	0.075	0.100
				Feed (mm/min)	1272	1550	2147	3181	
	HSM 	≤ 0.05	≤ 2	250	RPM	13252	9939	7951	6626
				(200-300)	Fz	0.095	0.145	0.175	0.235
				Feed (mm/min)	5036	5765	8349	12457	
GFRP (FIBERGLASS)	Profile 	≤ 0.5	≤ 1.5	120	RPM	6361	4771	3817	3181
				(96-164)	Fz	0.040	0.065	0.075	0.100
				Feed (mm/min)	1018	1240	1717	2544	
	HSM 	≤ 0.05	≤ 2	200	RPM	10602	7951	6361	5301
				(160-240)	Fz	0.095	0.145	0.175	0.235
				Feed (mm/min)	4029	4612	6679	9966	
N CARBON, GRAPHITE	Profile 	≤ 0.5	≤ 1.5	185	RPM	9807	7355	5884	4903
				(148-222)	Fz	0.050	0.080	0.095	0.125
				Feed (mm/min)	1961	2354	3354	4903	
	HSM 	≤ 0.05	≤ 2	300	RPM	15903	11927	9542	7951
				(240-360)	Fz	0.115	0.185	0.220	0.290
				Feed (mm/min)	7315	8826	12595	18447	
PLASTICS	Profile 	≤ 0.5	≤ 1.5	305	RPM	16168	12126	9701	8084
				(244-366)	Fz	0.050	0.080	0.095	0.125
				Feed (mm/min)	3234	3880	5529	8084	
	HSM 	≤ 0.05	≤ 2	505	RPM	26769	20077	16062	13385
				(404-606)	Fz	0.115	0.185	0.220	0.290
				Feed (mm/min)	12314	14857	21201	31052	
MACHINABLE CERAMICS MACHINABLE GLASS	Profile 	≤ 0.5	≤ 1.5	15	RPM	795	596	477	398
				(12-18)	Fz	0.020	0.035	0.045	0.050
				Feed (mm/min)	64	83	129	159	
	HSM 	≤ 0.05	≤ 2	25	RPM	1325	994	795	663
				(20-30)	Fz	0.045	0.075	0.085	0.115
				Feed (mm/min)	239	298	406	610	

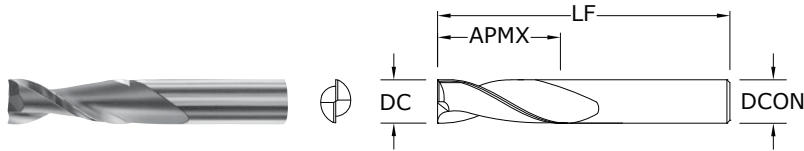
HSM (high speed machining)
 $rpm = (Vc \times 1000) / (DC \times 3.14)$
 $mm/min = Fz \times \text{number of flutes} \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
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Up Cut



21 FRACTIONAL SERIES



inch				EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED
1/8	1/2	2	1/4	90001
5/32	5/8	2-1/2	1/4	90005
3/16	3/4	2-1/2	1/4	90009
1/4	3/4	2-1/2	1/4	90013
1/4	1	2-1/2	1/4	90017
5/16	1	2-1/2	5/16	90021
5/16	1	3	1/2	90025
3/8	1	2-1/2	3/8	90029
3/8	1-1/4	3	1/2	90033
1/2	1-1/4	3	1/2	90037
1/2	1-1/2	3-1/2	1/2	90041
1/2	2	4	1/2	90045
5/8	2	4-1/2	5/8	90049
3/4	2	4-1/2	3/4	90053

TOLERANCES (inch)

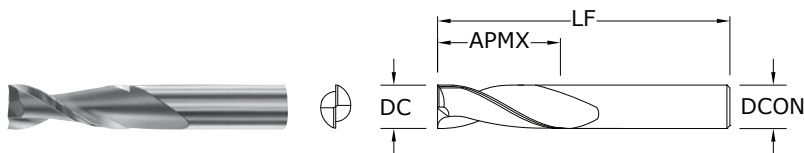
DC = +.000/-0.003

DCON = h₆

NON-FERROUS

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21M METRIC SERIES



mm				EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED
3,0	13,0	50,0	6,0	90101
4,0	16,0	63,0	6,0	90107
5,0	19,0	63,0	6,0	90109
6,0	25,0	63,0	6,0	90113
8,0	25,0	63,0	8,0	90121
10,0	31,0	75,0	10,0	90129
12,0	31,0	75,0	12,0	90137

TOLERANCES (mm)

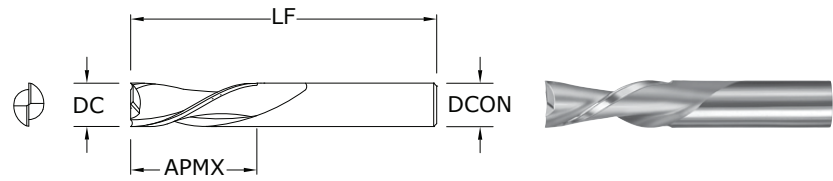
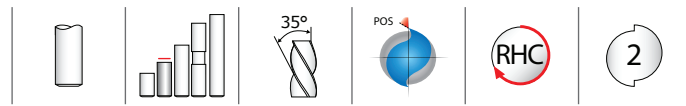
DC = +0,000/-0,080

DCON = h₆

NON-FERROUS

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Down Cut



22 FRACTIONAL SERIES

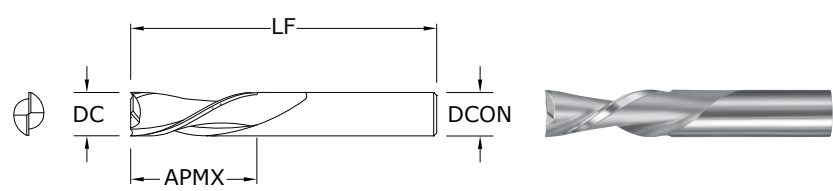
TOLERANCES (inch)

DC = +.000/- .003
DCON = h₆

NON-FERROUS

For patent information visit www.ksptpatents.com

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.
				UNCOATED
1/8	1/2	2	1/4	91001
5/32	5/8	2-1/2	1/4	91005
3/16	3/4	2-1/2	1/4	91009
1/4	3/4	2-1/2	1/4	91013
1/4	1	2-1/2	1/4	91017
5/16	1	2-1/2	5/16	91021
5/16	1	3	1/2	91025
3/8	1	2-1/2	3/8	91029
3/8	1-1/4	3	1/2	91033
1/2	1-1/4	3	1/2	91037
1/2	1-1/2	3-1/2	1/2	91041
1/2	2	4	1/2	91045
5/8	2	4-1/2	5/8	91049
3/4	2	4-1/2	3/4	91053



22M METRIC SERIES

TOLERANCES (mm)

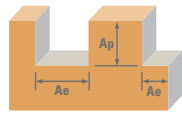
DC = +0,000/-0,080
DCON = h₆









NON-FERROUS

For patent information visit www.ksptpatents.com

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.
				UNCOATED
3,0	13,0	50,0	6,0	91101
4,0	16,0	63,0	6,0	91107
5,0	19,0	63,0	6,0	91109
6,0	25,0	63,0	6,0	91113
8,0	25,0	63,0	8,0	91121
10,0	31,0	75,0	10,0	91129
12,0	31,0	75,0	12,0	91137

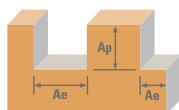
Up Cut Down Cut



Series 21, 22 Fractional	Ae x DC	Ap x DC	Vc (sfm)		DC • in					
					1/8	1/4	3/8	1/2	3/4	
HARDWOODS	Slot 	1	≤ 1	1550	RPM	47368	23684	15789	11842	7895
				(1240-1860)	Fz	0.0008	0.0015	0.0025	0.0030	0.0045
				Feed (ipm)	76	71	79	71	71	
	Profile 	≤ 0.5	≤ 1.5	1550	RPM	47368	23684	15789	11842	7895
				(1240-1860)	Fz	0.0008	0.0015	0.0025	0.0030	0.0045
				Feed (ipm)	76	71	79	71	71	
SOFTWOODS	Slot 	1	≤ 1	1950	RPM	59592	29796	19864	14898	9932
				(1560-2340)	Fz	0.0010	0.0020	0.0030	0.0035	0.0055
				Feed (ipm)	119	119	119	104	109	
	Profile 	≤ 0.5	≤ 1.5	1950	RPM	59592	29796	19864	14898	9932
				(1560-2340)	Fz	0.0010	0.0020	0.0030	0.0035	0.0055
				Feed (ipm)	119	119	119	104	109	
PLYWOODS	Slot 	1	≤ 1	1950	RPM	59592	29796	19864	14898	9932
				(1560-2340)	Fz	0.0013	0.0025	0.0040	0.0050	0.0075
				Feed (ipm)	155	149	159	149	149	
	Profile 	≤ 0.5	≤ 1.5	1950	RPM	59592	29796	19864	14898	9932
				(1560-2340)	Fz	0.0013	0.0025	0.0040	0.0050	0.0075
				Feed (ipm)	155	149	159	149	149	
N PLASTICS	Slot 	1	≤ 1	1950	RPM	59592	29796	19864	14898	9932
				(1560-2340)	Fz	0.0008	0.0017	0.0025	0.0035	0.0050
				Feed (ipm)	95	101	99	104	99	
	Profile 	≤ 0.5	≤ 1.5	1950	RPM	59592	29796	19864	14898	9932
				(1560-2340)	Fz	0.0008	0.0017	0.0025	0.0035	0.0050
				Feed (ipm)	95	101	99	104	99	

rpm = Vc x 3.82 / DC
ipm = Fz x 2 x rpm

METRIC
Up Cut
Down Cut



Series 21M, 22M Metric		Ae x DC		Ap x DC		Vc (m/min)	DC • mm				
							3	6	10	12	20
HARDWOODS	Slot	1	≤ 1	470 (376-564)	RPM	49828	24914	14948	12457	7474	
					Fz	0.020	0.040	0.065	0.075	0.115	
					Feed (mm/min)	1993	1993	1943	1869	1719	
	Profile	≤ 0.5	≤ 1.5	470 (376-564)	RPM	49828	24914	8155	4241	1509	
					Fz	0.020	0.040	0.065	0.075	0.115	
					Feed (mm/min)	1993	1993	1060	636	347	
SOFTWOODS	Slot	1	≤ 1	600 (480-720)	RPM	63610	31805	19083	15903	9542	
					Fz	0.025	0.050	0.075	0.090	0.140	
					Feed (mm/min)	3181	3181	2862	2862	2672	
	Profile	≤ 0.5	≤ 1.5	600 (480-720)	RPM	63610	31805	19083	15903	303467	
					Fz	0.025	0.050	0.075	0.090	0.140	
					Feed (mm/min)	3181	3181	2862	2862	84971	
PLYWOODS	Slot	1	≤ 1	600 (480-720)	RPM	63610	31805	19083	15903	9542	
					Fz	0.030	0.065	0.100	0.125	0.190	
					Feed (mm/min)	3817	4135	3817	3976	3626	
	Profile	≤ 0.5	≤ 1.5	600 (480-720)	RPM	63610	31805	19083	15903	303467	
					Fz	0.030	0.065	0.100	0.125	0.190	
					Feed (mm/min)	3817	4135	3817	3976	115318	
N PLASTICS	Slot	1	≤ 1	600 (480-720)	RPM	63610	31805	19083	15903	9542	
					Fz	0.020	0.040	0.065	0.090	0.125	
					Feed (mm/min)	2544	2544	2481	2862	2385	
	Profile	≤ 0.5	≤ 1.5	600 (480-720)	RPM	63610	31805	19083	15903	9542	
					Fz	0.020	0.040	0.065	0.090	0.125	
					Feed (mm/min)	2544	2544	2481	2862	2385	

rpm = (Vc x 1000) / (DC x 3.14)
mm/min = Fz x 2 x rpm