



SGS[®]
Solid Carbide Tools



Z-CARB

www.kyocera-sgstool.co.uk



Keeping the world moving



ADVANCED PATENTED DESIGN

DELIVERS ADVANCED PRODUCTIVITY

With conventional end mills, the cutting teeth entering and exiting the material creates a natural rhythm that results in damaging harmonics. Harmonics produce a frequency that resonates through the entire tool, resulting in one of the most damaging forms of cutter wear known as chatter.

Chatter degrades the quality of your finish. It also creates tool pressure which has a negative effect on tool life. If you use conventional long reach tools, your chatter problem is further compounded by deflection, which limits your maximum speeds and cutting depths. Until now, your only choice was to adjust your operating parameters to account for the limitations of your conventional end mill.

WITH ITS PATENTED, ONE-OF-A-KIND GEOMETRY, THE Z-CARB-AP OFFERS **THREE STAGES OF CHATTER SUPPRESSION**, RESULTING IN THE QUIETEST, MOST STABLE MILLING EXPERIENCE AVAILABLE.



ENHANCED CORNER GEOMETRY WITH TIGHT TOLERANCE CORNER RADIUS

- Improved accuracy
- Improved shearing capabilities
- Reduces tool pressure

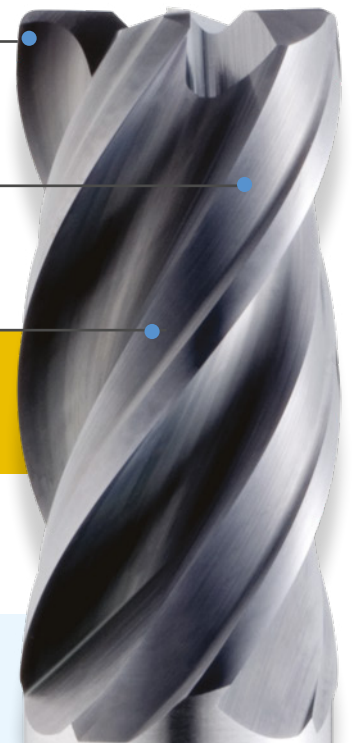
UNEQUAL HELIX DESIGN

- Eliminates harmful harmonics unequal flute spacing
- Suppresses chatter

PATENTED VARIABLE RAKE ANGLE

- Controls cutting zone temperature
- Produces ideal chip shape and size

- New Expanded tools
- Now also available with HAIMER SAFE-LOCK option on select diameters



THREE STAGES OF CHATTER SUPPRESSION

1 Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge of typical end mills, which helps to suppress the development of damaging harmonics.

2 The patented unequal helix design aids in eliminating the damaging harmonics that occur during typical machining by changing the angle at which each cutting edge enters and exits the material during the milling process.

3 The rake angle is the main factor that determines the size and shape of the chip, as well as the pressure and temperature of the cutting zone. By incorporating the SGS Patented Variable Rake Geometry, the Z-Carb-AP can alter and control the cutting dynamic like no other tool available, which takes chatter suppression to a whole new level of advanced productivity.

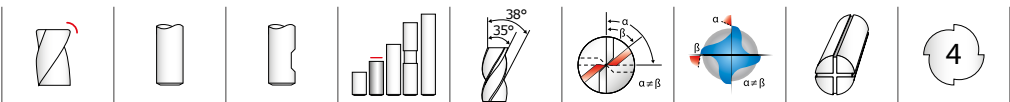
LONG REACH DESIGNS

- Cut deeper and faster in long reach applications



	AlTiN	Ti-NAMITE-X	Ti-NAMITE-X Advantages over AlTiN
Hardness (HV)	2549 HV	3059 HV	Increased hardness offers better resistance to abrasion wear and improved coating strength.
Young's	460 GPa	368 Gpa	Increased toughness in the coating improves the Modulus of performance in applications that encounter a high Elasticity level of mechanical stress such as milling.
Adhesion	70 N	130 N	Good adhesion is critical to optimum performance; the level of measured adhesion has been proven to have a direct relationship to overall tool life. With a denser more uniform coating structure Ti-NAMITE-X improves the ability for the coating to perform at higher temperatures due to an increased oxidation stability.

www.sgstool.com



Z1MPCR
METRIC SERIES

- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design changes the cutting angle to improve harmonics
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

mm					EDP NO.		
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	Ti-NAMITE-X	Ti-NAMITE-X W/FLAT	JetStream
1,0	3,0	57,0	6,0	0,1	46873*	—	—
1,5	4,5	57,0	6,0	0,1	46849*	—	—
2,0	6,0	57,0	6,0	0,2	46850*	—	—
2,5	7,0	57,0	6,0	0,2	46874*	—	—
3,0	8,0	57,0	6,0	0,3	46851	—	—
3,0	8,0	57,0	6,0	0,5	46880	—	—
4,0	11,0	57,0	6,0	0,3	46852	—	—
4,0	11,0	57,0	6,0	0,5	46881	—	—
5,0	13,0	57,0	6,0	0,3	46853	—	—
6,0	13,0	57,0	6,0	0,25	46882	—	—
6,0	13,0	57,0	6,0	0,5	46854	—	—
6,0	13,0	57,0	6,0	1,0	46855	—	—
6,0	13,0	57,0	6,0	1,5	46884	—	—
8,0	19,0	63,0	8,0	0,5	46856	—	—
8,0	19,0	63,0	8,0	1,0	46857	—	—
8,0	19,0	63,0	8,0	1,5	46886	—	—
8,0	19,0	63,0	8,0	2,0	46887	—	—
10,0	22,0	72,0	10,0	0,5	46858	—	—
10,0	22,0	72,0	10,0	1,0	46859	—	—
10,0	22,0	72,0	10,0	1,5	46889	—	—
10,0	22,0	72,0	10,0	2,0	46890	—	—
10,0	22,0	72,0	10,0	2,5	46891	—	—
12,0	26,0	83,0	12,0	0,5	46860	46909	—
12,0	26,0	83,0	12,0	0,75	46861	46910	46493
12,0	26,0	83,0	12,0	1,0	46893	46911	—
12,0	26,0	83,0	12,0	1,5	46894	46912	—
12,0	26,0	83,0	12,0	2,0	46895	46913	—
12,0	26,0	83,0	12,0	2,5	46896	46914	—
12,0	26,0	83,0	12,0	3,0	42718	46915	42719
14,0	26,0	83,0	14,0	1,0	46862	46916	46494
16,0	32,0	92,0	16,0	1,0	46863	46917	46495
16,0	32,0	92,0	16,0	1,5	46898	46918	—

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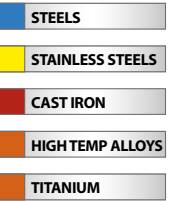
TOLERANCES (mm)

<3 DIAMETER
DC = +0,012/−0,012
DCON = h₆
RE = +0,000/−0,025

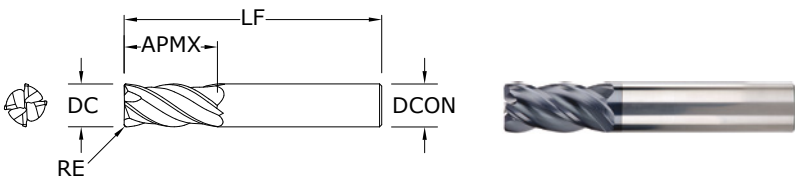
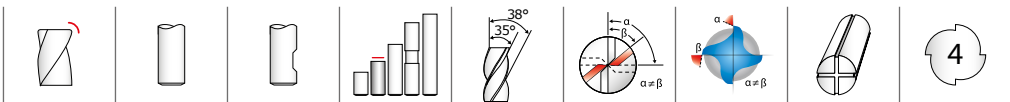
3–6 DIAMETER
DC = +0,000/−0,030
DCON = h₆
RE = +0,000/−0,050

>6–10 DIAMETER
DC = +0,000/−0,040
DCON = h₆
RE = +0,000/−0,050

>10–25 DIAMETER
DC = +0,000/−0,050
DCON = h₆
RE = +0,000/−0,050



For patent information visit www.ksptpatents.com



Z1MPCR
METRIC SERIES

mm					EDP NO.		
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	Ti-NAMITE-X	Ti-NAMITE-X W/FLAT	JetStream
16,0	32,0	92,0	16,0	2,0	46899	46919	—
16,0	32,0	92,0	16,0	2,5	46900	46920	—
16,0	32,0	92,0	16,0	3,0	46864	46921	42721
16,0	32,0	92,0	16,0	4,0	46867	46944	—
20,0	38,0	104,0	20,0	1,0	46865	46922	46497
20,0	38,0	104,0	20,0	1,5	46903	46923	—
20,0	38,0	104,0	20,0	2,0	46904	46924	—
20,0	38,0	104,0	20,0	2,5	46905	46925	—
20,0	38,0	104,0	20,0	3,0	42722	46926	42723
20,0	38,0	104,0	20,0	4,0	46868	46945	—
20,0	38,0	104,0	20,0	5,0	46869	46946	—
25,0	38,0	104,0	25,0	1,0	46866	46927	46498

CONTINUED

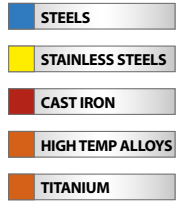
TOLERANCES (mm)

<3 DIAMETER
DC = +0,012/−0,012
DCON = h₆
RE = +0,000/−0,025

3–6 DIAMETER
DC = +0,000/−0,030
DCON = h₆
RE = +0,000/−0,050

>6–10 DIAMETER
DC = +0,000/−0,040
DCON = h₆
RE = +0,000/−0,050

>10–25 DIAMETER
DC = +0,000/−0,050
DCON = h₆
RE = +0,000/−0,050



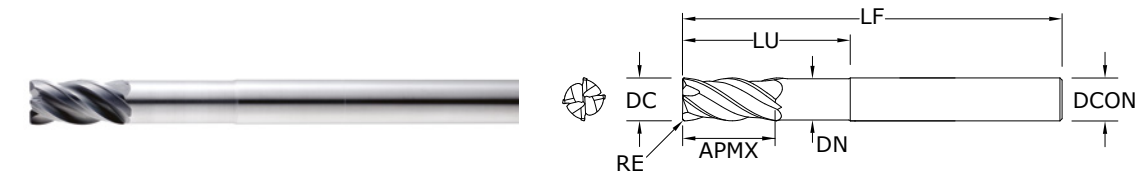
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METRIC
Z-Carb-AP



Z1MPIC •
Z1MPLC
METRIC SERIES

- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design changes the cutting angle to improve harmonics
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Long reach design allows for deeper and faster cuts
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



mm								EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE		Ti-NAMITE-X	Ti-NAMITE-X W/FLAT
6,0	8,0	75,0	6,0	24,0	5,49	0,5		46821	—
8,0	10,0	75,0	8,0	32,0	7,49	1,0		46822	—
8,0	10,0	75,0	8,0	32,0	7,49	2,0		46823	—
10,0	12,0	100,0	10,0	40,0	9,50	1,0		46824	—
10,0	12,0	100,0	10,0	40,0	9,50	2,0		46825	—
12,0	15,0	100,0	12,0	48,0	11,48	1,0		46826	46928
12,0	15,0	100,0	12,0	48,0	11,48	1,5		46827	46929
12,0	15,0	100,0	12,0	48,0	11,48	2,0		46828	46930
12,0	15,0	100,0	12,0	48,0	11,48	3,0		46829	46931
12,0	26,0	83,0	12,0	36,0	11,48	2,5		—	42731
12,0	26,0	83,0	12,0	36,0	11,48	3,0		—	42732
12,0	26,0	83,0	12,0	36,0	11,48	4,0		—	42733
16,0	32,0	92,0	16,0	42,0	15,49	2,5		—	42734
16,0	32,0	92,0	16,0	42,0	15,49	4,0		—	42735
16,0	32,0	92,0	16,0	42,0	15,49	6,0		—	42736
16,0	20,0	115,0	16,0	65,0	15,49	1,0		46830	46932
16,0	20,0	115,0	16,0	65,0	15,49	1,5		46831	46933
16,0	20,0	115,0	16,0	65,0	15,49	2,0		46832	46934
16,0	20,0	115,0	16,0	65,0	15,49	3,0		46833	46935
16,0	20,0	115,0	16,0	65,0	15,49	4,0		46834	46936
16,0	20,0	115,0	16,0	65,0	15,49	5,0		46835	46937
20,0	24,0	140,0	20,0	80,0	19,48	1,0		46836	46938
20,0	24,0	140,0	20,0	80,0	19,48	1,5		46837	46939
20,0	24,0	140,0	20,0	80,0	19,48	2,0		46838	46940
20,0	24,0	140,0	20,0	80,0	19,48	3,0		46839	46941
20,0	24,0	140,0	20,0	80,0	19,48	4,0		46840	46942
20,0	24,0	140,0	20,0	80,0	19,48	5,0		46841	46943
20,0	38,0	104,0	20,0	52,0	19,48	2,5		—	42737
20,0	38,0	104,0	20,0	52,0	19,48	4,0		—	42738
20,0	38,0	104,0	20,0	52,0	19,48	6,0		—	42739

TOLERANCES (mm)

6 DIAMETER

DC = +0,000/−0,030

DCON = h₆

RE = +0,000/−0,050

>6–10 DIAMETER

DC = +0,000/−0,040

DCON = h₆

RE = +0,000/−0,050

>10–20 DIAMETER

DC = +0,000/−0,050

DCON = h₆

RE = +0,000/−0,050

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

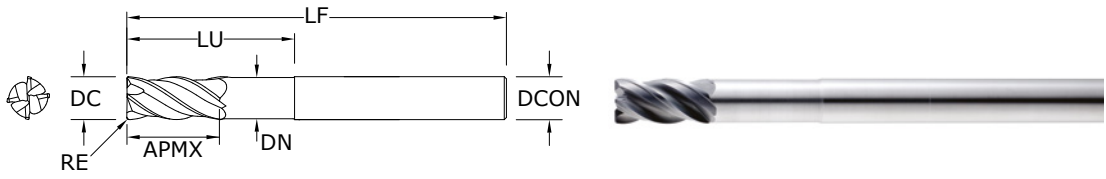
TITANIUM

HARDENED STEELS

For patent information visit
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METRIC
Z-Carb-AP Long Reach



Z1MLOR
METRIC SERIES

TOLERANCES (mm)

6 DIAMETER

DC = +0,000/−0,030

DCON = h₆

RE = +0,000/−0,050

>6–10 DIAMETER

DC = +0,000/−0,040

DCON = h₆

RE = +0,000/−0,050

>10–25 DIAMETER

DC = +0,000/−0,050

DCON = h₆

RE = +0,000/−0,050

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

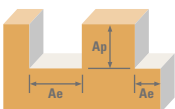
TITANIUM

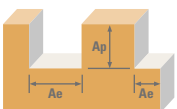
HARDENED STEELS

For patent information visit
www.ksptpatents.com

mm								EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	REACH LU	NECK DIAMETER DN		Ti-NAMITE-X (TX)	
6.0	13.0	57.0	6.0	0.25	20.0	5,49		46882LR20	
6.0	13.0	57.0	6.0	0.5	20.0	5,49		46854LR20	
6.0	13.0	57.0	6.0	1.0	20.0	5,49		46855LR20	
6.0	13.0	57.0	6.0	1.5	20.0	5,49		46884LR20	
8.0	19.0	63.0	8.0	0.5	26.0	7,49		46856LR26	
8.0	19.0	63.0	8.0	1.0	26.0	7,49		46857LR26	
8.0	19.0	63.0	8.0	1.5	26.0	7,49		46886LR26	
8.0	19.0	63.0	8.0	2.0	26.0	7,49		46887LR26	
10.0	22.0	72.0	10.0	0.5	32.0	9,50		46858LR32	
10.0	22.0	72.0	10.0	1.0	32.0	9,50		46859LR32	
10.0	22.0	72.0	10.0	1.5	32.0	9,50		46889LR32	
10.0	22.0	72.0	10.0	2.0	32.0	9,50		46890LR32	
10.0	22.0	72.0	10.0	2.5	32.0	9,50		46891LR32	
12.0	26.0	83.0	12.0	0.5	38.0	11,48		46860LR38	
12.0	26.0	83.0	12.0	0.75	38.0	11,48		46861LR38	
12.0	26.0	83.0	12.0	1.0	38.0	11,48		46893LR38	
12.0	26.0	83.0	12.0	1.5	38.0	11,48		46894LR38	
12.0	26.0	83.0	12.0	2.0	38.0	11,48		46895LR38	
12.0	26.0	83.0	12.0	2.5	38.0	11,48		46896LR38	
12.0	26.0	83.0	12.0	3.0	38.0	11,48		42718LR38	
16.0	32.0	92.0	16.0	1.0	50.0	15,49		46863LR50	
16.0	32.0	92.0	16.0	1.5	50.0	15,49		46898LR50	
16.0	32.0	92.0	16.0	2.0	50.0	15,49		46899LR50	
16.0	32.0	92.0	16.0	2.5	50.0	15,49		46900LR50	
16.0	32.0	92.0	16.0	3.0	50.0	15,49		46864LR50	
16.0	32.0	92.0	16.0	4.0	50.0	15,49		46867LR50	
20.0	38.0	104.0	20.0	1.0	62.0	19,48		46865LR62	
20.0	38.0	104.0	20.0	1.5	62.0	19,48		46903LR62	
20.0	38.0	104.0	20.0	2.0	62.0	19,48		46904LR62	
20.0	38.0	104.0	20.0	2.5	62.0	19,48		46905LR62	
20.0	38.0	104.0	20.0	3.0	62.0	19,48		42722LR62	
20.0	38.0	104.0	20.0	4.0	62.0	19,48		46868LR62	
20.0	38.0	104.0	20.0	5.0	62.0	19,48		46869LR62	

- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter suppression and patented edge geometry for shearing and strength
- Chatter-free geometry allows deep cutting and high speed machining
- Central coolant hole delivers coolant effectively to the cutting zone enhancing chip removal when pocketing or slotting
- Enhanced corner geometry with tight tolerance corner radii
- Excels at roughing, ramping, high speed machining and finishing in a variety of materials
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

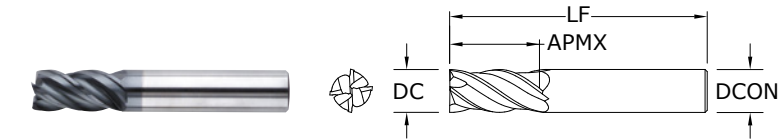
Series Z1M, Z1MPCR, Z1MPIC, Z1MPLC Metric		Hardness			Vc (m/min)	DC • mm										
			Ae x DC	Ap x DC		1	3	6	8	10	12	16	20	25		
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc		≤ 0.5	≤ 1.5	169	RPM	53803	17934	8967	6725	5380	4484	3363	2690	2152
						(135-203)	Fz	0.0030	0.0109	0.029	0.049	0.061	0.074	0.087	0.099	0.108
						Feed (mm/min)	646	782	1040	1318	1313	1327	1170	1065	930	
				1	≤ 1	134	RPM	42654	14218	7109	5332	4265	3555	2666	2133	1706
						(107-161)	Fz	0.0030	0.0109	0.029	0.049	0.061	0.074	0.087	0.099	0.108
						Feed (mm/min)	512	620	825	1045	1041	1052	928	845	737	
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc		≤ 0.5	≤ 1.5	96	RPM	30537	10179	5089	3817	3054	2545	1909	1527	1221
						(77-115)	Fz	0.0023	0.0081	0.022	0.036	0.045	0.055	0.067	0.075	0.080
						Feed (mm/min)	281	330	448	550	550	560	511	458	391	
				1	≤ 1	76	RPM	24235	8078	4039	3029	2424	2020	1515	1212	969
						(61-91)	Fz	0.0023	0.0081	0.022	0.036	0.045	0.055	0.067	0.075	0.080
						Feed (mm/min)	223	262	355	436	436	444	406	364	310	
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc		≤ 0.5	≤ 1.5	149	RPM	47501	15834	7917	5938	4750	3958	2969	2375	1900
						(119-179)	Fz	0.0023	0.0081	0.022	0.036	0.045	0.055	0.067	0.075	0.080
						Feed (mm/min)	437	513	697	855	855	871	796	713	608	
				1	≤ 1	119	RPM	37807	12602	6301	4726	3781	3151	2363	1890	1512
						(95-143)	Fz	0.0023	0.0081	0.022	0.036	0.045	0.055	0.067	0.075	0.080
						Feed (mm/min)	348	408	555	681	681	693	633	567	484	
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc		≤ 0.5	≤ 1.5	104	RPM	32960	10987	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063
						Feed (mm/min)	237	281	374	494	488	472	420	389	332	
				1	≤ 1	82	RPM	26174	8725	4362	3272	2617	2181	1636	1309	1047
						(66-99)	Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063
						Feed (mm/min)	188	223	297	393	387	375	334	309	264	
STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc		≤ 0.5	≤ 1.5	94	RPM	30052	10017	5009	3756	3005	2504	1878	1503	1202	
					(76-113)	Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063	
					Feed (mm/min)	216	256	341	451	445	431	383	355	303		
			1	≤ 1	76	RPM	24235	8078	4039	3029	2424	2020	1515	1212	969	
					(61-91)	Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063	
					Feed (mm/min)	174	207	275	364	359	347	309	286	244		
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc		≤ 0.5	≤ 1.5	136	RPM	43139	14380	7190	5392	4314	3595	2696	2157	1726
						(109-163)	Fz	0.0028	0.0099	0.026	0.045	0.056	0.067	0.079	0.091	0.098
						Feed (mm/min)	483	569	748	971	966	963	852	785	676	
				1	≤ 1	108	RPM	34414	11471	5736	4302	3441	2868	2151	1721	1377
						(87-130)	Fz	0.0028	0.0099	0.026	0.045	0.056	0.067	0.079	0.091	0.098
						Feed (mm/min)	385	454	597	774	771	769	680	626	540	

Series Z1M, Z1MPCR, Z1MPIC, Z1MPLC Metric		Hardness			Vc (m/min)	DC • mm										
			1	3		6	8	10	12	16	20	25				
K	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc		≤ 0.5	≤ 1.5	104	RPM	32960	10987	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.0020	0.0074	0.020	0.034	0.043	0.050	0.059	0.067	0.074
						Feed (mm/min)	264	325	439	560	567	549	486	442	390	
				1	≤ 1	82	RPM	26174	8725	4362	3272	2617	2181	1636	1309	1047
						(66-99)	Fz	0.0020	0.0074	0.020	0.034	0.043	0.050	0.059	0.067	0.074
						Feed (mm/min)	209	258	349	445	450	436	386	351	310	
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc		≤ 0.5	≤ 1.5	24	RPM	7755	2585	1293	969	776	646	485	388	310
						(20-29)	Fz	0.0018	0.0061	0.016	0.027	0.034	0.041	0.048	0.053	0.060
						Feed (mm/min)	56	63	83	105	105	106	93	82	74	
				1	≤ 1	20	RPM	6301	2100	1050	788	630	525	394	315	252
						(16-24)	Fz	0.0018	0.0061	0.016	0.027	0.034	0.041	0.048	0.053	0.060
						Feed (mm/min)	45	51	67	85	86	86	76	67	60	
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc		≤ 0.5	≤ 1.5	19	RPM	6010	2003	1002	751	601	501	376	301	240
						(15-23)	Fz	0.0013	0.0043	0.011	0.019	0.024	0.028	0.033	0.037	0.042
						Feed (mm/min)	31	34	44	57	58	56	50	44	40	
				1	≤ 1	15	RPM	4847	1616	808	606	485	404	303	242	194
						(12-18)	Fz	0.0013	0.0043	0.011	0.019	0.024	0.028	0.033	0.037	0.042
						Feed (mm/min)	25	28	36	46	47	45	40	36	33	
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc		≤ 0.5	≤ 1.5	66	RPM	20842	6947	3474	2605	2084	1737	1303	1042	834	
					(52-79)	Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
					Feed (mm/min)	167	197	264	333	333	333	292	267	233		
			1	≤ 1	52	RPM	16480	5493	2747	2060	1648	1373	1030	824	659	
					(41-62)	Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
					Feed (mm/min)	132	156	209	264	264	264	231	211	185		
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc		≤ 0.5	≤ 1.5	23	RPM	7271	2424	1212	909	727	606	454	364	291	
					(18-27)	Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
					Feed (mm/min)	58	69	92	116	116	116	102	93	81		
			1	≤ 1	18	RPM	5816	1939	969	727	582	485	364	291	233	
					(15-22)	Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
					Feed (mm/min)	47	55	74	93	93	93	81	74	65		
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc		≤ 0.5	≤ 1.5	56	RPM	17934	5978	2989	2242	1793	1495	1121	897	717
						(45-68)	Fz	0.0018	0.0066	0.017	0.030	0.037	0.043	0.051	0.059	0.065
						Feed (mm/min)	129	158	203	269	265	257	229	212	187	
				1	≤ 1	44	RPM	14057	4686	2343	1757	1406	1171	879	703	562
						(35-53)	Fz	0.0018	0.0066	0.017	0.030	0.037	0.043	0.051	0.059	0.065
						Feed (mm/min)	101	124	159	211	208	201	179	166	146	



Z1M
METRIC SERIES

- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design reduces damaging harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)



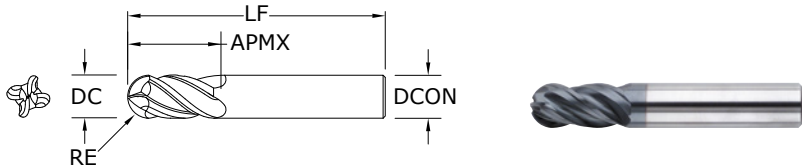
mm				EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	Ti-NAMITE-X (TX)	JetStream
3,0	8,0	57,0	6,0	46357	—
4,0	11,0	57,0	6,0	46358	—
5,0	13,0	57,0	6,0	46359	—
6,0	13,0	57,0	6,0	46360	—
8,0	19,0	63,0	8,0	46362	—
10,0	22,0	72,0	10,0	46364	—
12,0	26,0	83,0	12,0	46366	—
14,0	26,0	83,0	14,0	46368	46506
16,0	32,0	92,0	16,0	46370	46507
18,0	32,0	92,0	18,0	46372	46508
20,0	38,0	104,0	20,0	46374	46509
25,0	38,0	104,0	25,0	46376	46510

Refer to page 47 for speed & feed recommendations

TOLERANCES (mm)

- 3–6 DIAMETER**
DC = +0,000/–0,030
DCON = h₆
- >6–10 DIAMETER**
DC = +0,000/–0,040
DCON = h₆
- >10–25 DIAMETER**
DC = +0,000/–0,050
DCON = h₆
- STEELS
 - STAINLESS STEELS
 - CAST IRON
 - HIGH TEMP ALLOYS
 - TITANIUM
 - HARDENED STEELS

For patent information visit www.ksptpatents.com



Z1MB
METRIC SERIES

mm				EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	Ti-NAMITE-X (TX)	JetStream
3,0	8,0	57,0	6,0	46354	—
4,0	11,0	57,0	6,0	46355	—
5,0	13,0	57,0	6,0	46356	—
6,0	13,0	57,0	6,0	46343	—
8,0	19,0	63,0	8,0	46344	—
10,0	22,0	72,0	10,0	46345	—
12,0	26,0	83,0	12,0	46346	—
14,0	26,0	83,0	14,0	46347	46518
16,0	32,0	92,0	16,0	46348	46519
18,0	32,0	92,0	18,0	46349	46520
20,0	38,0	104,0	20,0	46350	46521
25,0	38,0	104,0	25,0	46351	46522

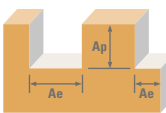
RE = 1/2 Cutting Diameter (DC)

TOLERANCES (mm)

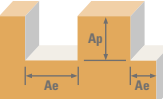
- 3–6 DIAMETER**
DC = +0,000/–0,030
DCON = h₆
- RE = +0,000/–0,015**
- >6–10 DIAMETER**
DC = +0,000/–0,040
DCON = h₆
- RE = +0,000/–0,020**
- >10–25 DIAMETER**
DC = +0,000/–0,050
DCON = h₆
- RE = +0,000/–0,025**
- STEELS
 - STAINLESS STEELS
 - CAST IRON
 - HIGH TEMP ALLOYS
 - TITANIUM
 - HARDENED STEELS

For patent information visit www.ksptpatents.com

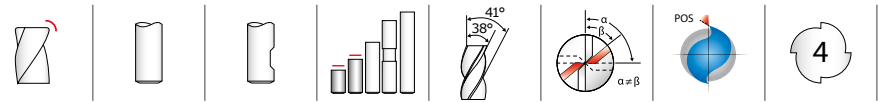
- Unequal helix design reduces damaging harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)

Series Z1MB Metric	Hardness			Vc (m/min)	DC • mm									
		Ae x DC	Ap x DC		3	6	8	10	12	16	20	25		
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	 Profile	≤ 0.5	≤ 1.5	169	RPM	17934	8967	6725	5380	4484	3363	2690	2152
					(135-203)	Fz	0.009	0.024	0.041	0.051	0.060	0.079	0.086	0.088
					Feed (mm/min)	654	861	1091	1090	1076	1067	927	753	
		 Slot	1	≤ 1	134	RPM	14218	7109	5332	4265	3555	2666	2133	1706
					(107-161)	Fz	0.009	0.024	0.041	0.051	0.060	0.079	0.086	0.088
					Feed (mm/min)	519	682	865	864	853	846	735	597	
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	 Profile	≤ 0.5	≤ 1.5	96	RPM	10179	5089	3817	3054	2545	1909	1527	1221
					(77-115)	Fz	0.007	0.019	0.030	0.037	0.046	0.061	0.067	0.068
					Feed (mm/min)	274	391	456	456	464	469	407	330	
		 Slot	1	≤ 1	76	RPM	8078	4039	3029	2424	2020	1515	1212	969
					(61-91)	Fz	0.007	0.019	0.030	0.037	0.046	0.061	0.067	0.068
					Feed (mm/min)	217	310	362	362	368	372	323	262	
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	 Profile	≤ 0.5	≤ 1.5	149	RPM	15834	7917	5938	4750	3958	2969	2375	1900
					(119-179)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
					Feed (mm/min)	456	532	709	709	684	699	608	475	
		 Slot	1	≤ 1	119	RPM	12602	6301	4726	3781	3151	2363	1890	1512
					(95-143)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
					Feed (mm/min)	363	423	565	565	544	557	484	378	
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	 Profile	≤ 0.5	≤ 1.5	104	RPM	10987	5493	4120	3296	2747	2060	1648	1318
					(83-124)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050
					Feed (mm/min)	211	316	387	387	369	380	334	264	
		 Slot	1	≤ 1	82	RPM	8725	4362	3272	2617	2181	1636	1309	1047
					(66-99)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050
					Feed (mm/min)	168	251	307	307	293	302	265	209	
STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	 Profile	≤ 0.5	≤ 1.5	94	RPM	10017	5009	3756	3005	2504	1878	1503	1202	
				(76-113)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050	
				Feed (mm/min)	192	288	353	353	337	346	305	240		
	 Slot	1	≤ 1	76	RPM	8078	4039	3029	2424	2020	1515	1212	969	
				(61-91)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050	
				Feed (mm/min)	155	233	284	284	271	279	246	194		
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	 Profile	≤ 0.5	≤ 1.5	136	RPM	14380	7190	5392	4314	3595	2696	2157	1726
					(109-163)	Fz	0.008	0.024	0.038	0.048	0.058	0.077	0.083	0.085
					Feed (mm/min)	483	690	828	828	828	828	713	587	
		 Slot	1	≤ 1	108	RPM	11471	5736	4302	3441	2868	2151	1721	1377
					(87-130)	Fz	0.008	0.024	0.038	0.048	0.058	0.077	0.083	0.085
					Feed (mm/min)	385	551	661	661	661	661	569	468	

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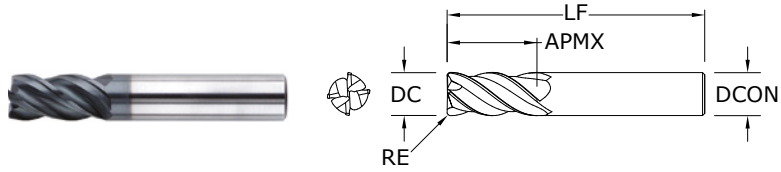
Series Z1MB Metric	Hardness			Vc (m/min)	DC • mm									
		Ae x DC	Ap x DC		3	6	8	10	12	16	20	25		
K	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	 Profile	≤ 0.5	≤ 1.5	104	RPM	10987	5493	4120	3296	2747	2060	1648	1318
					(83-124)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
					Feed (mm/min)	316	369	492	492	475	485	422	330	
		 Slot	1	≤ 1	82	RPM	8725	4362	3272	2617	2181	1636	1309	1047
					(66-99)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
					Feed (mm/min)	251	293	391	391	377	385	335	262	
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	 Profile	≤ 0.5	≤ 1.5	24	RPM	2585	1293	969	776	646	485	388	310
					(20-29)	Fz	0.005	0.010	0.017	0.021	0.024	0.033	0.037	0.038
					Feed (mm/min)	55	50	66	53	62	65	58	47	
		 Slot	1	≤ 1	20	RPM	2100	1050	788	630	525	394	315	252
					(16-24)	Fz	0.005	0.010	0.017	0.021	0.024	0.033	0.037	0.038
					Feed (mm/min)	40	40	54	54	50	52	47	38	
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	 Profile	≤ 0.5	≤ 1.5	19	RPM	2003	1002	751	601	501	376	301	240
					(15-23)	Fz	0.002	0.007	0.011	0.013	0.017	0.020	0.024	0.025
					Feed (mm/min)	19	29	32	32	34	31	29	24	
		 Slot	1	≤ 1	15	RPM	1583	792	594	475	396	297	238	190
					(12-18)	Fz	0.002	0.007	0.011	0.013	0.017	0.020	0.024	0.025
					Feed (mm/min)	15	23	25	25	27	24	23	19	
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	 Profile	≤ 0.5	≤ 1.5	66	RPM	6947	3474	2605	2084	1737	1303	1042	834	
				(52-79)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
				Feed (mm/min)	133	167	222	222	217	213	189	150		
	 Slot	1	≤ 1	52	RPM	5493	2747	2060	1648	1373	1030	824	659	
				(41-62)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
				Feed (mm/min)	105	132	176	176	171	169	149	119		
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	 Profile	≤ 0.5	≤ 1.5	23	RPM	2424	1212	909	727	606	454	364	291	
				(18-27)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
				Feed (mm/min)	47	58	78	78	76	74	66	52		
	 Slot	1	≤ 1	18	RPM	1939	969	727	582	485	364	291	233	
				(15-22)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
				Feed (mm/min)	37	47	62	62	60	60	53	42		
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	 Profile	≤ 0.5	≤ 1.5	56	RPM	5978	2989	2242	1793	1495	1121	897	717
					(45-68)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
					Feed (mm/min)	115	143	191	191	186	184	163	129	
		 Slot	1	≤ 1	44	RPM	4686	2343	1757	1406	1171	879	703	562
					(35-53)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
					Feed (mm/min)	90	112	150	150	146	144	127	101	

Bhn (Brinell) HRC (Rockwell C)
rpm = (Vc x 1000) / (DC x 3.14)
mm/min = Fz x 4 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x DC maximum)
feed rates listed have chip thinning adjustments included where applicable
refer to the SGS Tool Wizard* for complete technical information (www.kyocera-sgstool.com)



ZH1MCRS •
ZH1MCR
METRIC SERIES

- The original Z-Carb design with an enhanced core and higher helix suited for the demands of high temperature alloys
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut for difficult to machine materials
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)



mm					EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	Ti-NAMITE-A (AITiN)	Ti-NAMITE-A (AITiN) W/FLAT
6,0	10,0	54,0	6,0	0,5	—	42712
6,0	13,0	57,0	6,0	0,5	46450	—
6,0	13,0	57,0	6,0	1,0	46451	—
6,0	13,0	57,0	6,0	1,5	46452	—
8,0	12,0	58,0	8,0	0,5	—	42713
8,0	19,0	63,0	8,0	0,5	46453	—
8,0	19,0	63,0	8,0	1,0	46454	—
8,0	19,0	63,0	8,0	1,5	46455	—
10,0	14,0	66,0	10,0	0,5	—	42714
10,0	22,0	72,0	10,0	0,5	46456	—
10,0	22,0	72,0	10,0	1,0	46457	—
10,0	22,0	72,0	10,0	1,5	46458	—
10,0	22,0	72,0	10,0	2,0	46459	—
12,0	16,0	73,0	12,0	0,75	—	42715
12,0	26,0	83,0	12,0	0,5	46460	46471
12,0	26,0	83,0	12,0	1,0	46461	46472
12,0	26,0	83,0	12,0	1,5	46462	46473
12,0	26,0	83,0	12,0	2,0	46463	46474
12,0	26,0	83,0	12,0	3,0	46464	46475
16,0	22,0	82,0	16,0	1,0	—	42716
16,0	32,0	92,0	16,0	1,5	46465	46476
16,0	32,0	92,0	16,0	2,0	46466	46477
16,0	32,0	92,0	16,0	3,0	46467	46478
16,0	32,0	92,0	16,0	4,0	46482	46483
20,0	26,0	92,0	20,0	1,0	—	42717
20,0	38,0	104,0	20,0	3,0	46468	46479
20,0	38,0	104,0	20,0	4,0	46469	46480
20,0	38,0	104,0	20,0	5,0	46470	46481

TOLERANCES (mm)

6 DIAMETER
DC = +0,000/−0,030
DCON = h₆
RE = +0,000/−0,050

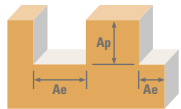
>6–10 DIAMETER
DC = +0,000/−0,040
DCON = h₆
RE = +0,000/−0,050

>10–20 DIAMETER
DC = +0,000/−0,050
DCON = h₆
RE = +0,000/−0,050

HIGH TEMP ALLOYS

TITANIUM

For patent information visit
www.ksptpatents.com



Series ZH1MCRS, ZH1MCR Metric	Hardness			Vc (m/min)	DC • mm					
		Ae x DC	Ap x DC		6	10	12	20		
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRC	 Profile	≤ 0.5	≤ 1.5	26	RPM	1373	824	687	412
					(21-31)	Fz	0.017	0.032	0.041	0.053
						Feed (mm/min)	93	105	113	87
		 Slot	1	≤ 1	21	RPM	1131	679	565	339
					(17-26)	Fz	0.017	0.032	0.041	0.053
						Feed (mm/min)	77	87	93	72
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRC	 Profile	≤ 0.5	≤ 1.5	21	RPM	1131	679	565	339
					(17-26)	Fz	0.012	0.024	0.029	0.037
						Feed (mm/min)	54	65	66	50
		 Slot	1	≤ 1	17	RPM	889	533	444	267
					(13-20)	Fz	0.012	0.024	0.029	0.037
						Feed (mm/min)	43	51	52	39
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRC	 Profile	≤ 0.5	≤ 1.5	66	RPM	3474	2084	1737	1042
					(52-79)	Fz	0.019	0.041	0.049	0.057
						Feed (mm/min)	264	342	340	238
		 Slot	1	≤ 1	52	RPM	2747	1648	1373	824
					(41-62)	Fz	0.019	0.041	0.049	0.057
						Feed (mm/min)	209	270	269	188
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRC	 Profile	≤ 0.5	≤ 1.5	23	RPM	1212	727	606	364
					(18-27)	Fz	0.019	0.041	0.049	0.057
						Feed (mm/min)	92	119	119	83
		 Slot	1	≤ 1	18	RPM	969	582	485	291
					(15-22)	Fz	0.019	0.041	0.049	0.057
						Feed (mm/min)	74	95	95	66

Bhn (Brinell) HRC (Rockwell C)
rpm = (Vc x 1000) / (DC x 3.14)
ipm = Fz x 4 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x DC maximum)
feed rates listed have chip thinning adjustments included where applicable
refer to the SGS Tool Wizard* for complete technical information (www.kyocera-sgtool.com)

METRIC

Z-Carb-MD



ZD1MCR

METRIC SERIES

- The original Z-Carb design with negative rake, heavy core, and higher helix for strength and shearing of hard mold & die materials
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials 35-60HRC (327 to 654 Bhn)

mm							EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	Ti-NAMITE-X
3,0	4,0	57,0	6,0	15,0	2,62	0,2	46560
4,0	5,0	57,0	6,0	15,0	3,61	0,3	46561
5,0	6,0	57,0	6,0	15,0	4,60	0,5	46562
6,0	7,0	57,0	6,0	15,0	5,61	1,0	46563
8,0	10,0	63,0	8,0	25,0	7,62	1,0	46564
10,0	12,0	72,0	10,0	30,0	9,60	1,0	46565
12,0	15,0	83,0	12,0	35,0	11,61	1,0	46566
16,0	20,0	92,0	16,0	45,0	15,60	1,5	46567
20,0	24,0	104,0	20,0	55,0	19,61	2,0	46568

TOLERANCES (mm)

3–6 DIAMETER
DC = +0,000/–0,030
DCON = h₈
RE = +0,000/–0,050

>6–10 DIAMETER
DC = +0,000/–0,040
DCON = h₈
RE = +0,000/–0,050

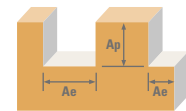
>10–20 DIAMETER
DC = +0,000/–0,050
DCON = h₈
RE = +0,000/–0,050

HARDENED STEELS

For patent information visit www.ksptpatents.com

METRIC

Z-Carb-MD



Series ZD1MCR Metric	Hardness			Vc (m/min)	Diameter (DC) (mm)								
		Ae x DC	Ap x DC		3	6	8	10	12	16	20		
TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	 Profile	≤ 0.4	≤ 1	123	RPM	13087	6544	4908	3926	3272	2454	1963
					(99-148)	Fz	0.012	0.029	0.049	0.061	0.072	0.083	0.112
					Feed (mm/min)	628	754	963	963	942	817	879	
		 Slot	1	≤ 0.4	98	RPM	10340	5170	3878	3102	2585	1939	1551
					(78-117)	Fz	0.012	0.029	0.049	0.061	0.072	0.083	0.112
					Feed (mm/min)	496	596	761	761	744	645	695	
H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 475 Bhn or ≤ 50 HRc	 Profile	≤ 0.4	≤ 1	64	RPM	6786	3393	2545	2036	1696	1272	1018
					(51-77)	Fz	0.010	0.024	0.041	0.051	0.060	0.068	0.093
					Feed (mm/min)	261	326	413	413	407	347	380	
		 Slot	1	≤ 0.4	52	RPM	5493	2747	2060	1648	1373	1030	824
					(41-62)	Fz	0.010	0.024	0.041	0.051	0.060	0.068	0.093
					Feed (mm/min)	211	264	334	334	330	281	308	
TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 655 Bhn or ≤ 60 HRc	 Profile	≤ 0.4	≤ 1	27	RPM	2908	1454	1091	872	727	545	436
					(22-33)	Fz	0.005	0.012	0.021	0.027	0.031	0.036	0.048
					Feed (mm/min)	56	70	93	93	91	79	84	
		 Slot	1	≤ 0.4	21	RPM	2262	1131	848	679	565	424	339
					(17-26)	Fz	0.005	0.012	0.021	0.027	0.031	0.036	0.048
					Feed (mm/min)	43	54	72	72	71	62	65	

Bhn (Brinell) HRC (Rockwell C)
rpm = (Vc x 1000) / (DC x 3.14)
ipm = Fz x 4 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x DC maximum)
feed rates listed have chip thinning adjustments included where applicable
refer to the SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

REGRIND, RECOAT AND ALTERATION SERVICES

Before

Re-manufactured to original geometry



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sales team, who often think of completely different ways of giving the customer what they need rather than just using off-the-shelf products. They even go as far as developing new concepts and geometries to ensure we meet whatever their need may be.

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SGS[®] Solid Carbide Tools

OUR SERVICES

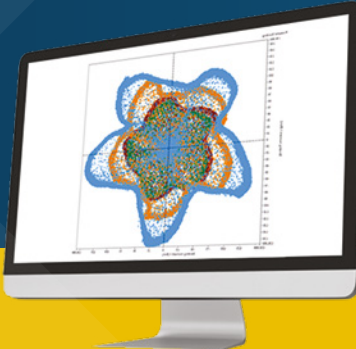


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Using the latest technology in spindle monitoring and high-magnification measuring equipment, we can develop tooling to suit your application and material specification.



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