



Chatter-Free Z-Carb-MD™

Revolutionary Chatter-Free Geometry

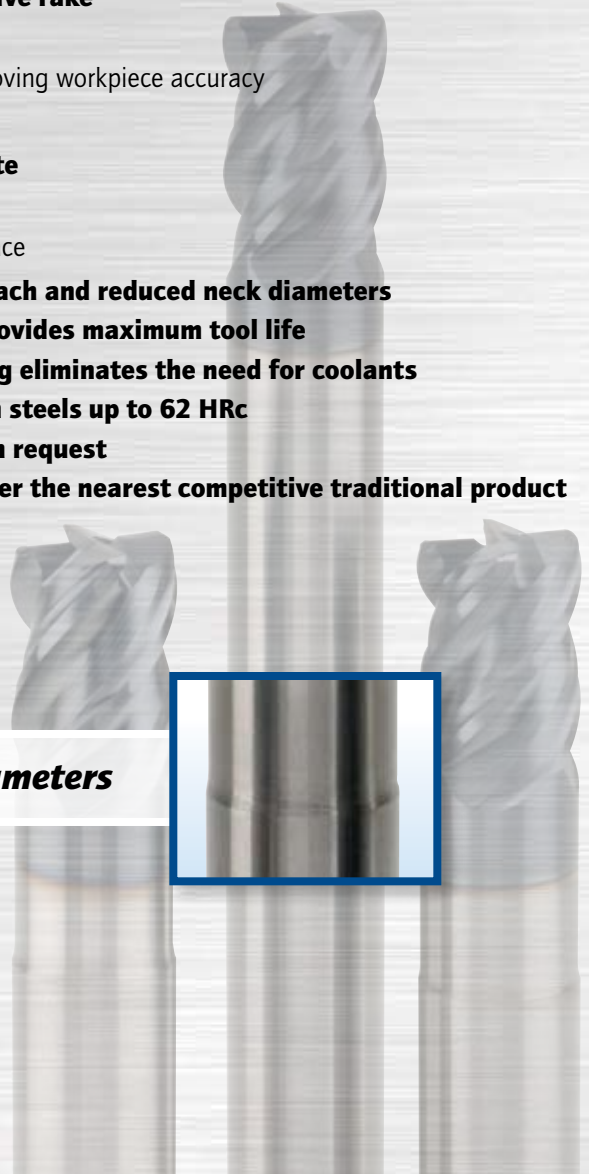


SGS: Experts in Mold & Die.

Chatter poses a big problem when machining hardened steels. Conventional end mills simply can't leave a smooth surface finish when run at extremely high speeds. At high metal removal rates, the **Z-Carb-MD** produces a chatter-free finish, which leaves minimal stock for the **Power-Carb** End Mill.

Features & Benefits

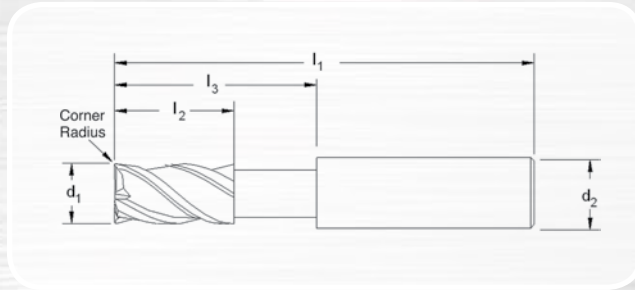
- **Patented unequal helix design**
 - Significantly reduces chatter
 - Superior workpiece finishes
 - Extends tool life
- **Heavy duty core and negative rake**
 - Enhances edge strength
 - Lessens deflection, improving workpiece accuracy
 - Allows higher feed rates
- **Innovative carbide substrate**
 - Provides higher wear
 - Exceptional chip resistance
- **Available with extended reach and reduced neck diameters**
- **Special corner geometry provides maximum tool life**
- **Ti-NAMITE-A (AlTiN) coating eliminates the need for coolants**
- **Exceptional performance in steels up to 62 HRc**
- **Weldon flats available upon request**
- **200% improved tool life over the nearest competitive traditional product**



Reduced Neck Diameters



Fractional

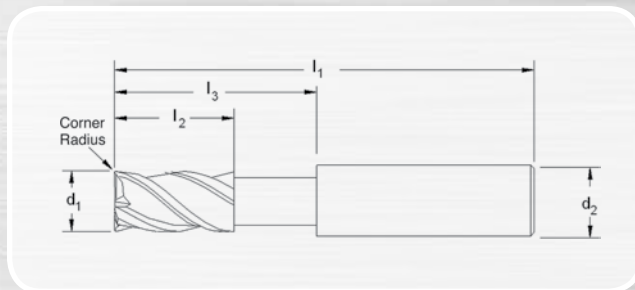


FRACTIONAL TOLERANCES:	
Cutting Diameter	Shank Diameter
1/8-1/4 = +.0000/-0.0012	
1/4 = +.0000/-0.0012	1/8 - 3/8 = -.0001 / -.0003
> 1/4 - 3/8 = +.0000/-0.0016	> 3/8 - 1 = -.0001 / -.0004
> 3/8 - 1 = +.0000/-0.002	

Z-CARB-MD™ SERIES ZD1CR 4 FLUTE-SINGLE END-CORNER RADIUS

Cutting Diameter d_1	Shank Diameter d_2	Length of Cut l_2	Overall Length l_1	Reach l_3	Corner Radius	Ti-NAMITE-A (AlTiN) EDP No.
1/8	1/4	5/32	2-1/2	1/2	.010	36780
3/16	1/4	7/32	2-1/2	3/4	.020	36781
1/4	1/4	9/32	2-1/2	3/4	.020	36782
5/16	5/16	13/32	2-1/2	1	.040	36783
3/8	3/8	15/32	2-1/2	1	.040	36784
7/16	7/16	9/16	2-3/4	1	.040	36785
1/2	1/2	5/8	3	1-1/4	.040	36786
1/2	1/2	5/8	4-1/2	2-1/4	.040	36787
5/8	5/8	3/4	3-1/2	1-1/2	.040	36788
5/8	5/8	3/4	4-1/2	2-1/4	.040	36789
5/8	5/8	3/4	5-1/2	3-1/4	.040	36790
3/4	3/4	15/16	4	1-3/4	.060	36791
3/4	3/4	15/16	4-1/2	2-1/4	.060	36792
3/4	3/4	15/16	5-1/2	3-1/4	.060	36793

Metric

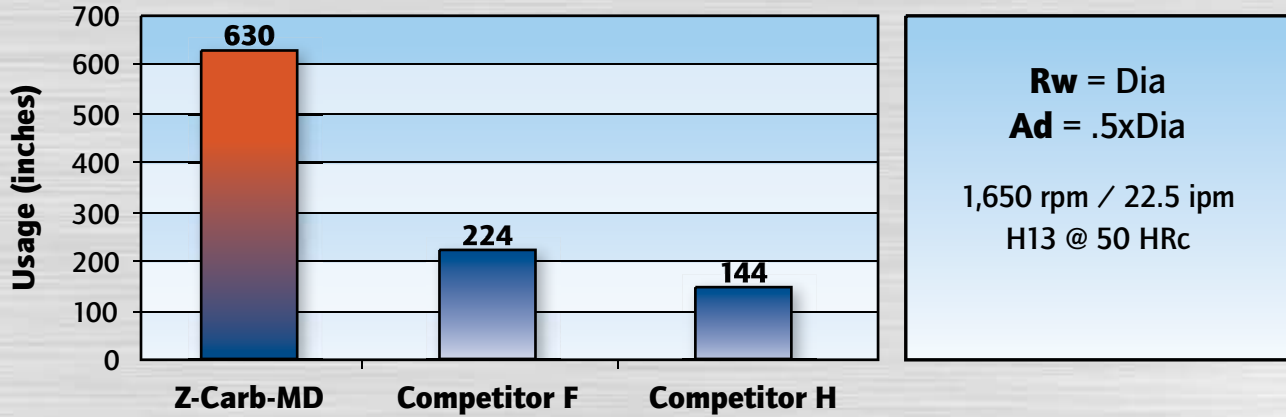


METRIC TOLERANCES:	
Cutting Diameter	Shank Diameter
3 - 6 = +0 / -0.030	6 - 10 = -0.0025 / -0.0075
6 = +0 / -0.030	6 - 10 = -0.0025 / -0.0075
> 6 - 10 = +0 / -0.040	> 10 - 20 = -0.0025 / -0.010
> 10 - 20 = +0 / -0.050	

Z-CARB-MD™ SERIES ZD1MCR 4 FLUTE-SINGLE END-CORNER RADIUS

Cutting Diameter d_1 mm	Shank Diameter d_2 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Reach l_3 mm	Corner Radius mm	Ti-NAMITE-A (AlTiN) EDP No.
3	6	4	57	15	0.2	46560
4	6	5	57	15	0.3	46561
5	6	6	57	15	0.5	46562
6	6	7	57	15	1	46563
8	8	10	63	25	1	46564
10	10	12	72	30	1	46565
12	12	15	83	35	1	46566
16	16	20	92	45	1.5	46567
20	20	24	104	55	2	46568

Tool Life Comparison



Application Tips

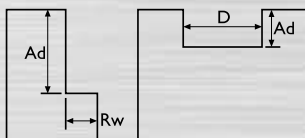
- Pressurized air with oil extends tool life in materials <40 HRc
- Use dry air when roughing materials harder than 40 HRc
- Unique coating eliminates flood coolant requirements
- Climb milling is preferred
- Attention to programming details, tool holders, TIR, balance, etc. contribute to additional tool life
- Ramping at 10 to 30 degrees is the preferred entry method. Use slotting speeds with 25-50 percent slotting feed. Avoid plunging.

Speed and Feed Recommendations

Slotting		Steels 30-45 HRC		Steels >45-55 HRC		Steels >55-60 HRC	
		Rw 1xD Ad ≤ .5xD		Rw 1xD Ad ≤ .5xD		Rw 1xD Ad ≤ .3xD	
		215 sfm in / tooth	65 m / min mm / tooth	120 sfm in / tooth	36 m / min mm / tooth	65 sfm in / tooth	20 m / min mm / tooth
Diameter (D)							
1/8	3mm	0.0006	0.02	0.0005	0.01	0.0004	0.01
3/16	5mm	0.0009	0.02	0.0008	0.02	0.0006	0.02
1/4	6mm	0.0013	0.03	0.0010	0.03	0.0008	0.02
5/16	8mm	0.0016	0.04	0.0013	0.03	0.0009	0.02
3/8	10mm	0.0019	0.05	0.0015	0.04	0.0011	0.03
7/16		0.0022	0.06	0.0018	0.05	0.0013	0.03
1/2	12mm	0.0025	0.06	0.0020	0.05	0.0015	0.04
5/8	16mm	0.0031	0.08	0.0025	0.06	0.0019	0.05
3/4	20mm	0.0038	0.10	0.0030	0.08	0.0023	0.06

Profiling		Steels 30-45 HRC		Steels >45-55 HRC		Steels >55-60 HRC	
		Rw ≤ .5xD Ad ≤ 1xD		Rw ≤ .5xD Ad ≤ 1xD		Rw ≤ .3xD Ad ≤ 1xD	
		265 sfm in / tooth	80 m / min mm / tooth	150 sfm in / tooth	45 m / min mm / tooth	80 sfm in / tooth	24 m / min mm / tooth
Diameter (D)							
1/8	3mm	0.0009	0.02	0.0007	0.02	0.0005	0.01
3/16	5mm	0.0013	0.03	0.0011	0.03	0.0008	0.02
1/4	6mm	0.0018	0.05	0.0014	0.04	0.0011	0.03
5/16	8mm	0.0022	0.06	0.0018	0.05	0.0013	0.03
3/8	10mm	0.0026	0.07	0.0021	0.05	0.0016	0.04
7/16		0.0031	0.08	0.0026	0.07	0.0018	0.05
1/2	12mm	0.0035	0.09	0.0028	0.07	0.0021	0.05
5/8	16mm	0.0044	0.11	0.0035	0.09	0.0026	0.07
3/4	20mm	0.0053	0.13	0.0042	0.11	0.0032	0.08

High Speed Profiling		Steels 30-45 HRC		Steels >45-55 HRC		Steels >55-60 HRC	
		Rw ≤ .1xD Ad ≤ .1xD		Rw ≤ .1xD Ad ≤ .1xD		Rw ≤ .1xD Ad ≤ .1xD	
		560 sfm in / tooth	170 m / min mm / tooth	490 sfm in / tooth	150 m / min mm / tooth	250 sfm in / tooth	75 m / min mm / tooth
Diameter (D)							
1/8	3mm	0.0011	0.03	0.0009	0.02	0.0006	0.02
3/16	5mm	0.0017	0.04	0.0013	0.03	0.0009	0.02
1/4	6mm	0.0022	0.06	0.0018	0.05	0.0013	0.03
5/16	8mm	0.0028	0.07	0.0022	0.06	0.0016	0.04
3/8	10mm	0.0033	0.08	0.0026	0.07	0.0019	0.05
7/16		0.0039	0.10	0.0031	0.08	0.0022	0.06
1/2	12mm	0.0044	0.11	0.0035	0.09	0.0025	0.06
5/8	16mm	0.0055	0.14	0.0044	0.11	0.0031	0.08
3/4	20mm	0.0066	0.17	0.0053	0.13	0.0038	0.10



Radial Width of Cut (Rw) Axial Depth of Cut (Ad) Tool Diameter (D)