

roundtool.com

# High-Performance Solid Carbide Round Tools

for Die & Mold, Medical, Consumer Electronic,  
Aerospace, Composite & Micro Machining



 **RoundTool**<sup>®</sup>  
L A B O R A T O R I E S

2015 Catalog



Made in the USA



**“Not just where machining is, but where machining will be.”**

RoundTool Laboratories was created to combine American manufacturing efficiency and product creativity with the high quality standards of Japanese and Western European carbide round tool manufacturing. We use only the best technology available from throughout the world, combined into a product line that offers the ultimate in milling, drilling and routing application productivity yet is affordable and made in the USA.

We guarantee your satisfaction. This Company was created with a total “white-paper” approach; there are no compromises regarding performance. Either we’ll meet or beat your current machining value on approved test, or we’ll credit your tools.

At RoundTool Labs we take great pride in manufacturing solid carbide rotary cutting tools that our customers will want to use time and again. Our product is direct evidence of that. Please ask for it by name.

Sincerely,

David Povich  
President



## Tool Series Nomenclature

**In Order: Series • Flute Count • End Condition • Coating Type • Size**

Examples:

**GR4SD1 1/2**

GR Series, 4 flute, Square end, D1 coated, 1/2” diameter

**MP2BAT 0.1**

MP Series, 2 flute, Ball end, AT coated, 0.1 mm diameter

**LR8X3BUC .031**

LR8X Series, 3 flute, Ball end, UnCoated, .031 diameter

**GRERN4BD2 .030**

GR Extended Reach w/Neck Series, 4 flute, Ball end, D2 coated, .030 diameter

**SS5SA1 .062**

SS Series, 5 flute, Square end, A1 coated, .062 diameter

**HT6RAT 6.0**

HT Series, 6 flute, Radius end, AT coated, 6.0mm diameter

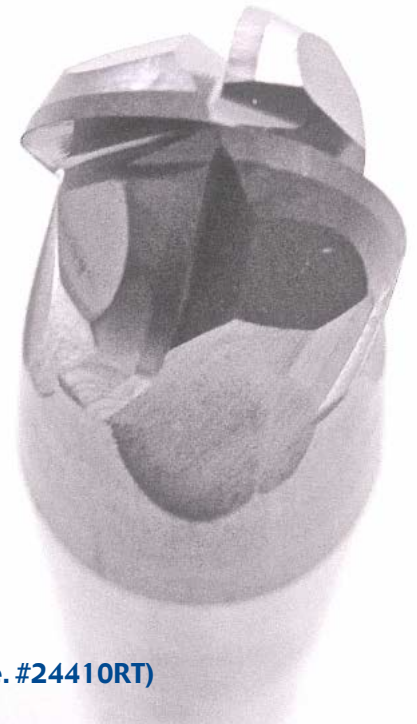
**DM4BAT 1/4L**

DM Series, 4 flute, Ball end, AT coated, 1/4” diameter Long selection

**MD2PUC 0.75**

MD Series, 2 flute, Pointed end, UnCoated, 0.75mm diameter

Please use listed EDP #'s followed by the “RT” suffix for inquiries and ordering (i.e. #24410RT)



Manufactured in the USA  
toolalliance.com



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Special note: All RoundTool Laboratories EDP #'s will carry an "RT" suffix within the Tool Alliance database.  
Uniform Code Council (UCC) #713646



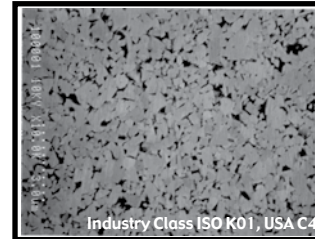
1 **ULTRA-Grain**

## Components of Guaranteed Quality

**COMPONENT #1: Carbide Substrate** From being the first Company to introduce MicroGrain carbide to the mass-market round tool industry through the present day, Tool Alliance® has consistently innovated new powder and grade combinations for demanding applications. We recognize that our material is the very first Significant Characteristic. By creating partnerships with a limited number of tungsten powder and cemented-carbide material suppliers, we are able to guarantee that our customers receive precision-tolerance tools ground from only the purest, finest grades available worldwide. The following photographs of Ultra-Carb® 1 and Ultra-Grain® 2 respectively demonstrate the complexity of the compound we commonly refer to as Cemented Carbide. Taken at magnification of 10,000 X through an SEM (Scanning Electron Microscope), the visible grains are tungsten while the cobalt binder appears as dark shadows. The largest tungsten grains appearing in the Ultra-Carb photo are less than one micron in size. Note that these grades are two samples representing more than a dozen different substrates we use throughout our product lines, each having a particular application niche. Compared to other industry participants, you will find that Tool Alliance offers the best month-to-month and year-to-year consistency in carbide grain structure.



**Ultra-Carb® 1**  
Cobalt Percentage: 6%  
Grain Size (µm): ≤ 0.8  
Hardness: 93.5 HRa  
Fracture Toughness (K1c): 6.6  
TRS (GPa): 3.8  
Density (gm/cc): 14.90

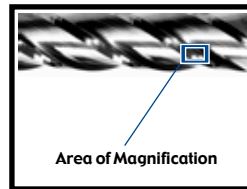


**Ultra-Grain® 2**  
Cobalt Percentage: 8%  
Grain Size (µm): ≤ 0.6  
Hardness: 93.8 HRa  
Fracture Toughness (K1c): 5.8  
TRS (GPa): 4.0  
Density (gm/cc): 14.6

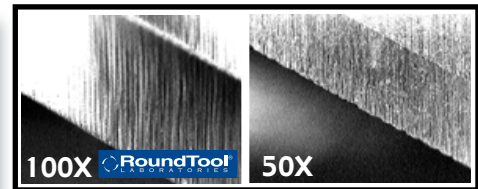


2 **SmoothGrind**

**COMPONENT #2: The Grinding Process** After selecting the best material available, Tool Alliance has perfected the manufacturing technology to optimize 100% of its physical properties. We call this process SmoothGrind®. Years in development, SmoothGrind is the result of a proprietary combination of material, abrasive, coolant, machine-tool, software, and grinding method technologies that produce cutting tools with superior qualitative characteristics. Sharper and longer lasting cutting edges, enhanced work piece finishes, and improved lubricity are just some of the benefits brought to you by the latest solid carbide rotary tooling advances from Tool Alliance. The following photographs display a RoundTool end mill primary relief featuring SmoothGrind (left) versus a major competitor's product (right). To fully demonstrate the difference, the RoundTool end mill is shown at double the magnification. Note the straight line of our end mill's primary relief in comparison to the jagged edge of the competing product. Keep in mind the competitive end mill is a very good product that has a large following, yet the difference is substantial.



Area of Magnification



**SmoothGrind® Competitor's**

3 **SmoothContricity**



**COMPONENT #3: The Tooling Process** All the best physical ingredients are wasted unless they are pulled together in a comprehensive system that maximizes their respective attributes. Tool Alliance calls this process SmoothContricity®. Our customer base represents the leading edge of machine tool utilization, and SmoothContricity ensures that optimum results are obtained using qualitative features; minimal run-out (TIR), industry-leading tolerances on diameter & radius, and 100% Shrink Fit Ready (SFR) shanks. Combined, these attributes allow our consumers to reach full machining potential and position the cutting tool as a systematic contributor to process consistency and repeatability.

35% tighter shank tolerance than h6!



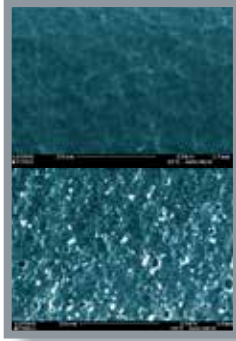
Shrink Fit Ready

4 **SmoothEdge**



**COMPONENT #4: The Edge Preparation Process**

Our cutting edges are literally too sharp for certain materials. For our carbide inserts and now increasingly for our solid carbide round tools, proper edge preparation can yield huge productivity improvements to "out of the box" tool application. Using a treatment we call SmoothEdge® and performed on machine tools developed in our own R&D lab, we've taken the mystery out of tool "break-in" and provided a consistency that can be counted on time and again. The process ranges from SmoothEdge 1, a micro-blasting treatment using extremely fine aluminum oxide powder (this procedure is standard with any non-micro coated product) to SmoothEdge 5, which adds a double cycle of honing & lubricity treatments. All five will sound and run smooth from the first cut and protect your tooling investment from unnecessary potential for chipping during your initial tooling paths. Big productivity gains can be achieved in certain applications as well due to improved chip formation and evacuation. Learn more about SmoothEdge at [toolalliance.com](http://toolalliance.com).



Our coating @ 2,000X (top).  
Everybody else's (bottom).

# SmoothCoat® 5

**COMPONENT #5: The Coating Process** The challenge of finding a coating method to leverage 100% of the inherent assets of our carbide grade and grinding technologies was difficult. What we finally discovered was such a perfect fit and so logical for our product lines that we invested heavily into the process we now call SmoothCoat®. Much more than simply the standard arc-deposited PVD coating, SmoothCoat involves sputter multi-layering and a multi-step prep & post operation called Micro-Blasting. The advantages of this procedure include relieving of tensile stresses underneath the cutting edge, increased stability of the coating surface, and perhaps most importantly, elevating SmoothGrind even another notch by leveling and activating the cemented carbide substrate. The result is a smooth, shiny, tough, and durable surface that can withstand tomorrow's machining requirements and outlast competitive coatings. Additionally, we've made it a standard feature on thousands of our standard catalog items. Our coating services are performed within our own factories for quality & extremely quick turnaround times.

**RoundTool Lab's Standard Coating Availability** Coating selection usually included within the EDP but for indicated Series it is added as a suffix to the EDP#.

Other Tool Alliance coatings:



Uncoated



AITiN HSN<sup>2</sup>



TiB<sub>2</sub>



TiCN

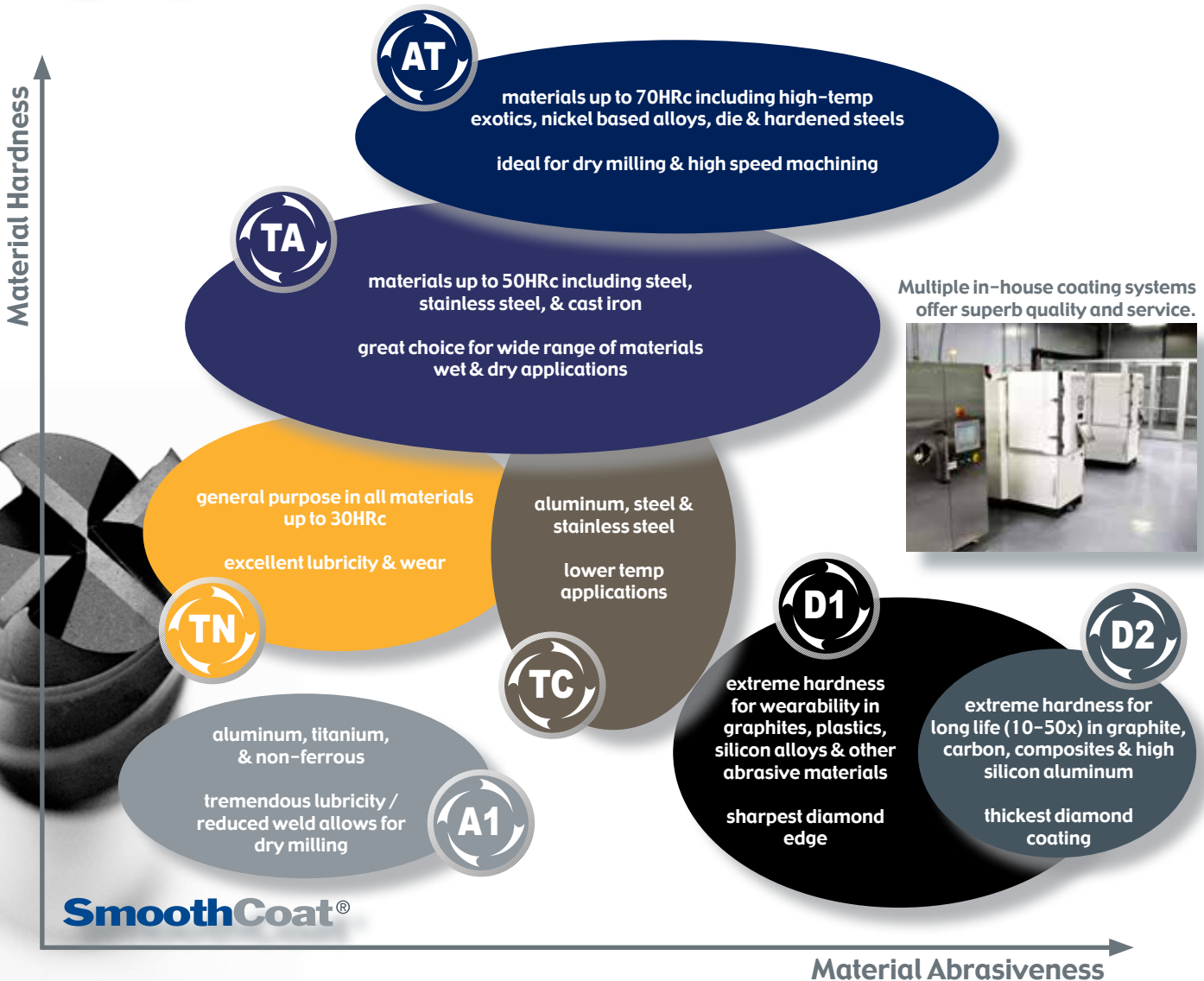


PVD Diamond



CVD Diamond

Standard Coatings available at respective "Coated" List Price



SmoothCoat®

Material Abrasiveness

# new! MP & MPL Series: Multi-Purpose decimal micro end mills



Specs (micro end mills cutting diameter < 1/8"):  
Cutting Diam +.0003 / -.0003  
Shank Diam +.0000 / -.0002  
Radius ± .00015  
SFR = Shrink Fit Ready

1/8" shank

**1.5X** MP2S / MP2B 2-flute, LOC = 1.5X  
MP4S / MP4B 4-flute, LOC = 1.5X

**3.0X** MPL2S / MPL2B 2-flute, LOC = 3.0X  
MPL4S / MPL4B 4-flute, LOC = 3.0X

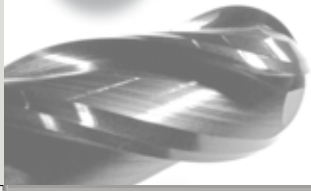


Diam	2 Sq	2 Ball	4 Sq	4 Ball	UnCoat	ATcoat	D1coat	2 Sq	2 Ball	4 Sq	4 Ball	UnCoat	ATcoat	D1coat
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**Premium carbide substrate with advanced geometry featuring two different LOC to Diameter ratios and AT or D1 coating.**

- Designed for diverse application range
- Match rigidity to app via a choice of 1.5X (MP) or 3.0X (MPL) LOC to Diameter ratios
- Available UnCoated, AT coated, or D1 coated
- Use AT in cobalt chrome, steels, stainless, high-temp alloys, and more
- Use D1 PVD Diamond in graphites, aluminum-silicon alloys, carbon fiber composites, reinforced plastics, & more
- One price for all square & ball end, two & four flute configurations (within same coating category)
- For the MP & MPL Series only, add the UC, AT, or D1 suffix to the EDP # when ordering (#43254D1).
- 1 1/2" OAL
- 1/8" shank
- Tight diameter tolerance of ± .0003

.003	40578	40678			\$22.00	\$26.00	\$30.00	40634	40734			\$27.00	\$31.00	\$34.00
.004	40579	40679			\$22.00	\$26.00	\$30.00	40635	40735			\$27.00	\$31.00	\$34.00
.005	40799	40899			\$15.00	\$17.00	\$20.00	40636	40736			\$18.00	\$20.00	\$23.00
.006	40800	40900			\$15.00	\$17.00	\$20.00	40637	40737			\$18.00	\$20.00	\$23.00
.007	40002	40102			\$15.00	\$17.00	\$20.00	40638	40738			\$18.00	\$20.00	\$23.00
.008	40003	40103			\$15.00	\$17.00	\$20.00	40639	40739			\$18.00	\$20.00	\$23.00
.009	40004	40104			\$15.00	\$17.00	\$20.00	40640	40740			\$18.00	\$20.00	\$23.00
.010	43244	43344	40599	40699	\$13.00	\$15.00	\$18.00	40009	40048	40660	40760	\$16.00	\$18.00	\$21.00
.011	43245	43345	40600	40700	\$13.00	\$15.00	\$18.00	40010	40049	40661	40761	\$16.00	\$18.00	\$21.00
.012	43246	43346	40601	40701	\$13.00	\$15.00	\$18.00	40011	40050	40662	40762	\$16.00	\$18.00	\$21.00
.013	43247	43347	40602	40702	\$13.00	\$15.00	\$18.00	40012	40051	40663	40763	\$16.00	\$18.00	\$21.00
.014	43298	43398	40603	40703	\$13.00	\$15.00	\$18.00	40013	40052	40664	40764	\$16.00	\$18.00	\$21.00
.015	43249	43349	40604	40704	\$13.00	\$15.00	\$18.00	40014	40053	40665	40765	\$16.00	\$18.00	\$21.00
.016	43250	43350	40605	40705	\$13.00	\$15.00	\$18.00	40015	40054	40666	40766	\$16.00	\$18.00	\$21.00
.017	43251	43351	40606	40706	\$13.00	\$15.00	\$18.00	40016	40055	40667	40767	\$16.00	\$18.00	\$21.00
.018	43252	43352	40607	40707	\$13.00	\$15.00	\$18.00	40017	40056	40668	40768	\$16.00	\$18.00	\$21.00
.019	43253	43353	40608	40708	\$13.00	\$15.00	\$18.00	40018	40057	40669	40769	\$16.00	\$18.00	\$21.00
.020	43254	43354	40609	40709	\$13.00	\$15.00	\$18.00	40019	40040	40670	40770	\$16.00	\$18.00	\$21.00
.021	43255	43355	40610	40710	\$12.50	\$14.50	\$18.00	40020	40058	40671	40771	\$15.50	\$18.00	\$21.00
.022	43256	43356	40611	40711	\$12.50	\$14.50	\$17.50	40021	40059	40772	40877	\$15.50	\$17.50	\$20.50
.023	43257	43357	40612	40712	\$12.50	\$14.50	\$17.50	40022	40060	40778	40878	\$15.50	\$17.50	\$20.50
.024	43258	43358	40613	40713	\$12.50	\$14.50	\$17.50	40023	40061	40779	40879	\$15.50	\$17.50	\$20.50
.025	43259	43359	42259	42359	\$12.50	\$14.50	\$17.50	40024	40041	40073	40090	\$15.50	\$17.50	\$20.50
.026	43260	43360	42260	42360	\$12.50	\$14.50	\$17.50	40025	40062	40074	40091	\$15.50	\$17.50	\$20.50
.027	43261	43361	42261	42361	\$12.50	\$14.50	\$17.50	40026	40063	40075	40092	\$15.50	\$17.50	\$20.50
.028	43262	43362	42262	42362	\$12.50	\$14.50	\$17.50	40027	40064	40076	40093	\$15.50	\$17.50	\$20.50
.029	43263	43363	42263	42363	\$12.50	\$14.50	\$17.50	40028	40065	40077	40094	\$15.50	\$17.50	\$20.50
.030	43264	43364	42264	42364	\$12.00	\$14.00	\$17.00	40029	40042	40078	40095	\$15.00	\$17.00	\$20.00
.031	43265	43365	42265	42365	\$12.00	\$14.00	\$17.00	40030	40043	40079	40096	\$15.00	\$17.00	\$20.00
.032	40005	40574	40470	40570	\$12.00	\$14.00	\$17.00	40031	40066	40080	40097	\$15.00	\$17.00	\$20.00
.033	40580	40680	40614	40714	\$12.00	\$14.00	\$17.00	40641	40741	40780	40880	\$15.00	\$17.00	\$20.00
.034	40581	40681	40615	40715	\$12.00	\$14.00	\$17.00	40642	40742	40781	40881	\$15.00	\$17.00	\$20.00
.035	43266	43366	42266	42366	\$12.00	\$14.00	\$17.00	40047	40067	40081	40098	\$15.00	\$17.00	\$20.00
.036	40582	40682	40616	40716	\$12.00	\$14.00	\$17.00	40643	40743	40782	40882	\$15.00	\$17.00	\$20.00
.037	40006	40575	40471	40571	\$12.00	\$14.00	\$17.00	40032	40068	40082	40099	\$15.00	\$17.00	\$20.00
.038	40583	40683	40617	40717	\$12.00	\$14.00	\$17.00	40644	40744	40783	40883	\$15.00	\$17.00	\$20.00
.039	40584	40684	40618	40718	\$12.00	\$14.00	\$17.00	40645	40745	40784	40884	\$15.00	\$17.00	\$20.00
.040	43267	43367	42267	42367	\$12.00	\$14.00	\$17.00	40033	40044	40083	40100	\$15.00	\$17.00	\$20.00
.041	40585	40685	40619	40719	\$12.00	\$14.00	\$17.00	40646	40746	40785	40885	\$15.00	\$17.00	\$20.00
.042	40586	40686	40620	40720	\$12.00	\$14.00	\$17.00	40647	40747	40786	40886	\$15.00	\$17.00	\$20.00
.043	40587	40687	40621	40721	\$12.00	\$14.00	\$17.00	40648	40748	40787	40887	\$15.00	\$17.00	\$20.00
.044	40588	40688	40623	40723	\$12.00	\$14.00	\$17.00	40649	40749	40788	40888	\$15.00	\$17.00	\$20.00
.045	40589	40689	40624	40724	\$12.00	\$14.00	\$17.00	40650	40750	40789	40889	\$15.00	\$17.00	\$20.00
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.056	40596	40696	40631	40731	\$11.00	\$13.00	\$16.00	40657	40757	40796	40896	\$14.00	\$16.00	\$19.00
.057	40008	40577	40473	40573	\$11.00	\$13.00	\$16.00	40038	40071	40088	40111	\$14.00	\$16.00	\$19.00
.058	40597	40697	40632	40732	\$11.00	\$13.00	\$16.00	40658	40758	40797	40897	\$14.00	\$16.00	\$19.00
.059	40598	40698	40633	40733	\$11.00	\$13.00	\$16.00	40659	40759	40798	40898	\$14.00	\$16.00	\$19.00
.060	43271	43371	42271	42371	\$11.00	\$13.00	\$16.00	40039	40072	40089	40112	\$14.00	\$16.00	\$19.00
.062	44000	44100	45000	45100	\$11.00	\$13.00	\$16.00	44016	44116	45016	45116	\$14.00	\$16.00	\$19.00
.065	44001	44101	45001	45101	\$11.00	\$13.00	\$16.00	44017	44117	45017	45117	\$14.00	\$16.00	\$19.00



**Specs (micro end mills cutting diameter < 1/8"):**  
Cutting Diam +.0003 / -.0003  
Shank Diam +.0000 / -.0002  
Radius ± .00015  
SFR = Shrink Fit Ready

Diam	1.5X MP2S / MP2B 2-flute, LOC = 1.5X			MP4S / MP4B 4-flute, LOC = 1.5X			3.0X MPL2S / MPL2B 2-flute, LOC = 3.0X			MPL4S / MPL4B 4-flute, LOC = 3.0X				
	2 Sq	2 Ball	4 Sq	4 Ball	UnCoat	ATcoat	D1coat	2 Sq	2 Ball	4 Sq	4 Ball	UnCoat	ATcoat	D1coat
.070	44002	44102	45002	45102	\$11.00	\$13.00	\$16.00	44018	44118	45018	45118	\$14.00	\$16.00	\$19.00
.075	44003	44103	45003	45103	\$11.00	\$13.00	\$16.00	44019	44119	45019	45119	\$14.00	\$16.00	\$19.00
.078	44004	44104	45004	45104	\$11.00	\$13.00	\$16.00	44020	44120	45020	45120	\$14.00	\$16.00	\$19.00
.080	44005	44105	45005	45105	\$11.00	\$13.00	\$16.00	44021	44121	45021	45121	\$14.00	\$16.00	\$19.00
.085	44006	44106	45006	45106	\$11.00	\$13.00	\$16.00	44022	44122	45022	45122	\$14.00	\$16.00	\$19.00
.090	44007	44107	45007	45107	\$11.00	\$13.00	\$16.00	44023	44123	45023	45123	\$14.00	\$16.00	\$19.00
.093	44008	44108	45008	45108	\$11.00	\$13.00	\$16.00	44024	44124	45024	45124	\$14.00	\$16.00	\$19.00
.095	44009	44109	45009	45109	\$11.00	\$13.00	\$16.00	44025	44125	45025	45125	\$14.00	\$16.00	\$19.00
.100	44010	44110	45010	45110	\$11.00	\$13.00	\$16.00	44026	44126	45026	45126	\$14.00	\$16.00	\$19.00
.105	44011	44111	45011	45111	\$11.00	\$13.00	\$16.00	44027	44127	45027	45127	\$14.00	\$16.00	\$19.00
.110	44012	44112	45012	45112	\$11.00	\$13.00	\$16.00	44028	44128	45028	45128	\$14.00	\$16.00	\$19.00
.115	44013	44113	45013	45113	\$11.00	\$13.00	\$16.00	44029	44129	45029	45129	\$14.00	\$16.00	\$19.00
.118	44014	44114	45014	45114	\$11.00	\$13.00	\$16.00	44030	44130	45030	45130	\$14.00	\$16.00	\$19.00
.120	44015	44115	45015	45115	\$11.00	\$13.00	\$16.00	44031	44131	45031	45131	\$14.00	\$16.00	\$19.00



1/8" shank

## new! MP & MPL Series: Multi-Purpose metric micro end mills

Premium carbide substrate with advanced geometry featuring two different LOC to Diameter ratios and AT or D1 coating.

- Designed for diverse application range • 38 mm OAL • 3.0 mm shank
- Tight diameter tolerance of ± 0.008 mm
- Available UnCoated, AT (AlTiN) coated, or D1 PVD Diamond coated
- Match rigidity to application via choice of 1.5X (MP) or 3.0X (MPL) LOC to Diameter ratios
- Use AT in cobalt chrome, steels, stainless, high-temp alloys, and more
- Use D1 in graphites, aluminum-silicon alloys, carbon fiber composites, reinforced plastics, and more
- One price for all square & ball end, two & four flute configurations (within respective coating category)

**35% tighter shank tolerance than h6!**  
Shrink-Fit Ready!



**Specs (MM micro end mills cutting diameter < 3.0mm):**  
Cutting Diam +0.008 / -0.008mm  
Shank Diam +0.000 / -0.005mm  
Radius ± 0.004mm  
SFR = Shrink Fit Ready

Diam	1.5X MP2S / MP2B 2-flute, LOC = 1.5X			MP4S / MP4B 4-flute, LOC = 1.5X			3.0X MPL2S / MPL2B 2-flute, LOC = 3.0X			MPL4S / MPL4B 4-flute, LOC = 3.0X				
	2 Sq	2 Ball	4 Sq	4 Ball	UnCoat	ATcoat	D1coat	2 Sq	2 Ball	4 Sq	4 Ball	UnCoat	ATcoat	D1coat
0.10mm	40801	40901			\$21.00	\$23.00	\$26.00	40813	40913			\$24.00	\$26.00	\$29.00
0.15	40802	40902			\$15.00	\$17.00	\$20.00	40814	40914			\$18.00	\$20.00	\$26.00
0.20	40803	40903			\$15.00	\$17.00	\$20.00	40815	40915			\$18.00	\$20.00	\$26.00
0.25	43272	43372	40804	40904	\$13.00	\$15.00	\$18.00	40113	40139	40816	40916	\$16.00	\$18.00	\$21.00
0.30	43273	43373	40805	40905	\$13.00	\$15.00	\$18.00	40114	40140	40817	40917	\$16.00	\$18.00	\$21.00
0.35	43274	43374	40806	40906	\$13.00	\$15.00	\$18.00	40115	40141	40818	40918	\$16.00	\$18.00	\$21.00
0.40	43275	43375	40807	40907	\$13.00	\$15.00	\$18.00	40116	40142	40819	40919	\$16.00	\$18.00	\$21.00
0.45	43276	43376	40808	40908	\$13.00	\$15.00	\$18.00	40117	40143	40820	40920	\$16.00	\$18.00	\$21.00
0.50	43277	43377	40809	40909	\$13.00	\$15.00	\$18.00	40118	40144	40821	40921	\$16.00	\$18.00	\$21.00
0.55	43278	43378	40810	40910	\$12.50	\$14.50	\$17.50	40119	40145	40822	40922	\$15.50	\$17.50	\$20.50
0.60	43279	43379	40811	40911	\$12.50	\$14.50	\$17.50	40120	40146	40823	40923	\$15.50	\$17.50	\$20.50
0.65	43280	43380	40812	40912	\$12.50	\$14.50	\$17.50	40121	40147	40824	40924	\$15.50	\$17.50	\$20.50
0.70	43281	43381	42281	42381	\$12.50	\$14.50	\$17.50	40122	40148	40165	40182	\$15.50	\$17.50	\$20.50
0.75	43282	43382	42282	42382	\$12.50	\$14.50	\$17.50	40123	40149	40166	40183	\$15.50	\$17.50	\$20.50
0.80	43283	43383	42283	42383	\$12.00	\$14.00	\$17.00	40124	40150	40167	40184	\$15.00	\$17.00	\$20.00
0.85	43284	43384	42284	42384	\$12.00	\$14.00	\$17.00	40125	40151	40168	40185	\$15.00	\$17.00	\$20.00
0.90	43285	43385	42285	42385	\$12.00	\$14.00	\$17.00	40126	40152	40169	40186	\$15.00	\$17.00	\$20.00
0.95	43286	43386	42286	42386	\$12.00	\$14.00	\$17.00	40127	40153	40170	40187	\$15.00	\$17.00	\$20.00
1.00	43287	43387	42287	42387	\$12.00	\$14.00	\$17.00	40128	40154	40171	40188	\$15.00	\$17.00	\$20.00
1.05	43288	43388	42288	42388	\$12.00	\$14.00	\$17.00	40129	40155	40172	40189	\$15.00	\$17.00	\$20.00
1.10	43289	43389	42289	42389	\$12.00	\$14.00	\$17.00	40130	40156	40173	40190	\$15.00	\$17.00	\$20.00
1.15	43290	43390	42290	42390	\$12.00	\$14.00	\$17.00	40131	40157	40174	40191	\$15.00	\$17.00	\$20.00
1.20	43291	43391	42291	42391	\$12.00	\$14.00	\$17.00	40132	40158	40175	40192	\$15.00	\$17.00	\$20.00
1.25	43292	43392	42292	42392	\$12.00	\$14.00	\$17.00	40133	40159	40176	40193	\$15.00	\$17.00	\$20.00
1.30	43293	43393	42293	42393	\$11.00	\$13.00	\$16.00	40134	40160	40177	40194	\$14.00	\$16.00	\$19.00
1.35	43294	43394	42294	42394	\$11.00	\$13.00	\$16.00	40135	40161	40178	40195	\$14.00	\$16.00	\$19.00
1.40	43295	43395	42295	42395	\$11.00	\$13.00	\$16.00	40136	40162	40179	40196	\$14.00	\$16.00	\$19.00
1.45	43296	43396	42296	42396	\$11.00	\$13.00	\$16.00	40137	40163	40180	40197	\$14.00	\$16.00	\$19.00
1.50	43297	43397	42297	42397	\$11.00	\$13.00	\$16.00	40138	40164	40181	40198	\$14.00	\$16.00	\$19.00



3.0mm shank



# GR Series: UnCoated decimal micro end mills

High strength and hardness solid carbide end mills

with reduced rake & increased helix. Featuring LOC = 5X diameter.



Specs (micro end mills cutting diameter < 1/8"): Cutting Diam +.0003 / -.0003  
Shank Diam +.0000 / -.0002  
Radius ± .00015  
SFR = Shrink Fit Ready



- Designed for milling of hardened steels, non-metals & non-ferrous alloys
- Proprietary cemented carbide grade offers extremely high hardness and density
- Features heavy core construction for maximum rigidity • Tight tolerance ± .0003

1/8" shank



Diam	LOC	OAL	Shank	2 flute Square UnCoated		2 flute Ball UnCoated		4 flute Square UnCoated		4 flute Ball UnCoated		Price
				EDP#		EDP#		EDP#		EDP#		
.005	.025	1-1/2	1/8	11270		11275						\$21.00
.006	.030	1-1/2	1/8	11271		11276						\$21.00
.007	.035	1-1/2	1/8	11272		11277						\$21.00
.008	.040	1-1/2	1/8	11273		11278						\$21.00
.009	.045	1-1/2	1/8	11274		11279						\$21.00
.010	.050	1-1/2	1/8	10001		10065		11242		11256		\$19.00
.011	.055	1-1/2	1/8	10002		10066		11243		11257		\$19.00
.012	.060	1-1/2	1/8	10003		10067		11244		11258		\$19.00
.013	.065	1-1/2	1/8	10004		10068		11245		11259		\$19.00
.014	.070	1-1/2	1/8	10005		10069		11246		11260		\$19.00
.015	.075	1-1/2	1/8	10006		10070		11247		11261		\$19.00
.016	.080	1-1/2	1/8	10007		10071		11248		11262		\$19.00
.017	.085	1-1/2	1/8	10008		10072		11249		11263		\$19.00
.018	.090	1-1/2	1/8	10009		10073		11250		11264		\$19.00
.019	.095	1-1/2	1/8	10010		10074		11251		11265		\$19.00
.020	.100	1-1/2	1/8	10011		10075		12232		12234		\$18.50
.021	.105	1-1/2	1/8	10012		10076		11252		11266		\$18.50
.022	.110	1-1/2	1/8	10013		10077		11253		11267		\$18.50
.023	.115	1-1/2	1/8	10014		10078		11254		11268		\$18.50
.024	.120	1-1/2	1/8	10015		10079		11255		11269		\$18.50
.025	.125	1-1/2	1/8	10016		10080		10129		10178		\$18.50
.026	.130	1-1/2	1/8	10017		10081		10130		10179		\$18.50
.027	.135	1-1/2	1/8	10018		10082		10131		10180		\$18.50
.028	.140	1-1/2	1/8	10019		10083		10132		10181		\$18.50
.029	.145	1-1/2	1/8	10020		10084		10133		10182		\$18.50
.030	.150	1-1/2	1/8	10021		10085		10134		10183		\$18.00
.031	.155	1-1/2	1/8	10022		10086		10135		10184		\$18.00
.032	.160	1-1/2	1/8	10023		10087		10136		10185		\$18.00
.033	.165	1-1/2	1/8	10024		10088		10137		10186		\$18.00
.034	.170	1-1/2	1/8	10025		10089		10138		10187		\$18.00
.035	.175	1-1/2	1/8	10026		10090		10139		10188		\$18.00
.036	.180	1-1/2	1/8	10027		10091		10140		10189		\$18.00
.037	.185	1-1/2	1/8	10028		10092		10141		10190		\$18.00
.038	.190	1-1/2	1/8	10029		10093		10142		10191		\$18.00
.039	.195	1-1/2	1/8	10030		10094		10143		10192		\$18.00
.040	.200	1-1/2	1/8	10031		10095		10144		10193		\$18.00
.041	.205	1-1/2	1/8	10032		10096		10145		10194		\$18.00
.042	.210	1-1/2	1/8	10033		10097		10146		10195		\$18.00
.043	.215	1-1/2	1/8	10034		10098		10147		10196		\$18.00
.044	.220	1-1/2	1/8	10035		10099		10148		10197		\$18.00
.045	.225	1-1/2	1/8	10036		10100		10149		10198		\$18.00
.046	.230	1-1/2	1/8	10037		10101		10150		10199		\$18.00
.047	.235	1-1/2	1/8	10038		10102		10151		10200		\$18.00
.048	.240	1-1/2	1/8	10039		10103		10152		10201		\$18.00
.049	.245	1-1/2	1/8	10040		10104		10153		10202		\$18.00
.050	.250	1-1/2	1/8	10041		10105		10154		10203		\$17.00
.051	.255	1-1/2	1/8	10042		10106		10155		10204		\$17.00
.052	.260	1-1/2	1/8	10043		10107		10156		10205		\$17.00
.053	.265	1-1/2	1/8	10044		10108		10157		10206		\$17.00
.054	.270	1-1/2	1/8	10045		10109		10158		10207		\$17.00
.055	.275	1-1/2	1/8	10046		10110		10159		10208		\$17.00
.056	.280	1-1/2	1/8	10047		10111		10160		10209		\$17.00
.057	.285	1-1/2	1/8	10048		10112		10161		10210		\$17.00
.058	.290	1-1/2	1/8	10049		10113		10162		10211		\$17.00
.059	.295	1-1/2	1/8	10050		10114		10163		10212		\$17.00
.060	.300	1-1/2	1/8	10051		10115		10164		10213		\$17.00
.061	.305	1-1/2	1/8	10052		10116		10165		10214		\$17.00
.062	.310	1-1/2	1/8	10053		10117		10166		10215		\$17.00





**Specs (micro end mills cutting diameter < 1/8"):**  
Cutting Diam  $\pm .0003 / -.0003$   
Shank Diam  $\pm .0000 / -.0002$   
Radius  $\pm .00015$   
SFR = Shrink Fit Ready

**new! GR Series: AT coated decimal micro end mills**  
**Thick core, high strength solid carbide end mills for die steels & hardened materials featuring proprietary AlTiN coating & LOC = 5X diameter.**



- Designed for milling of hard metals • Tight tolerance  $\pm .0003$
- Proprietary cemented carbide grade and AlTiN coating
- Features extended lengths of cut with heavy core for strength

**1/8" shank**



**Diam LOC OAL Shank**

				2 flute Square AT Coated EDP#	2 flute Ball AT Coated EDP#	4 flute Square AT Coated EDP#	4 flute Ball AT Coated EDP#	Price
.005	.025	1-1/2	1/8	00634	00639			\$23.00
.006	.030	1-1/2	1/8	00635	00640			\$23.00
.007	.035	1-1/2	1/8	00636	00641			\$23.00
.008	.040	1-1/2	1/8	00637	00642			\$23.00
.009	.045	1-1/2	1/8	00638	00643			\$23.00
.010	.050	1-1/2	1/8	00230	00293	00644	00658	\$21.00
.011	.055	1-1/2	1/8	00231	00294	00645	00659	\$21.00
.012	.060	1-1/2	1/8	00232	00295	00646	00660	\$21.00
.013	.065	1-1/2	1/8	00233	00296	00647	00661	\$21.00
.014	.070	1-1/2	1/8	00234	00297	00648	00662	\$21.00
.015	.075	1-1/2	1/8	00235	00298	00649	00663	\$21.00
.016	.080	1-1/2	1/8	00236	00299	00650	00664	\$21.00
.017	.085	1-1/2	1/8	00237	00300	00651	00665	\$21.00
.018	.090	1-1/2	1/8	00238	00301	00652	00666	\$21.00
.019	.095	1-1/2	1/8	00239	00302	00653	00667	\$21.00
.020	.100	1-1/2	1/8	00240	00303	00346	00395	\$20.50
.021	.105	1-1/2	1/8	00241	00304	00654	00668	\$20.50
.022	.110	1-1/2	1/8	00242	00305	00655	00669	\$20.50
.023	.115	1-1/2	1/8	00243	00306	00656	00670	\$20.50
.024	.120	1-1/2	1/8	00244	00307	00657	00671	\$20.50
.025	.125	1-1/2	1/8	00245	00308	00347	00396	\$20.50
.026	.130	1-1/2	1/8	00246	00309	00348	00397	\$20.50
.027	.135	1-1/2	1/8	00247	00310	00349	00398	\$20.50
.028	.140	1-1/2	1/8	00248	00311	00350	00399	\$20.50
.029	.145	1-1/2	1/8	00249	00312	00351	00400	\$20.50
.030	.150	1-1/2	1/8	00250	00313	00352	00401	\$20.00
.031	.155	1-1/2	1/8	00251	00314	00353	00402	\$20.00
.032	.160	1-1/2	1/8	00252	00315	00354	00403	\$20.00
.033	.165	1-1/2	1/8	00253	00316	00355	00404	\$20.00
.034	.170	1-1/2	1/8	00254	00317	00366	00405	\$20.00
.035	.175	1-1/2	1/8	00255	00318	00367	00406	\$20.00
.036	.180	1-1/2	1/8	00266	00319	00368	00407	\$20.00
.037	.185	1-1/2	1/8	00267	00320	00369	00408	\$20.00
.038	.190	1-1/2	1/8	00268	00321	00370	00409	\$20.00
.039	.195	1-1/2	1/8	00269	00322	00371	00410	\$20.00
.040	.200	1-1/2	1/8	00270	00323	00372	00411	\$20.00
.041	.205	1-1/2	1/8	00271	00324	00373	00412	\$20.00
.042	.210	1-1/2	1/8	00272	00325	00374	00413	\$20.00
.043	.215	1-1/2	1/8	00273	00326	00375	00414	\$20.00
.044	.220	1-1/2	1/8	00274	00327	00376	00415	\$20.00
.045	.225	1-1/2	1/8	00275	00328	00377	00416	\$20.00
.046	.230	1-1/2	1/8	00276	00329	00378	00417	\$20.00
.047	.235	1-1/2	1/8	00277	00330	00379	00418	\$20.00
.048	.240	1-1/2	1/8	00278	00331	00380	00419	\$20.00
.049	.245	1-1/2	1/8	00279	00332	00381	00420	\$20.00
.050	.250	1-1/2	1/8	00280	00333	00382	00421	\$19.00
.051	.255	1-1/2	1/8	00281	00334	00383	00422	\$19.00
.052	.260	1-1/2	1/8	00282	00335	00384	00423	\$19.00
.053	.265	1-1/2	1/8	00283	00336	00385	00424	\$19.00
.054	.270	1-1/2	1/8	00284	00337	00386	00425	\$19.00
.055	.275	1-1/2	1/8	00285	00338	00387	00426	\$19.00
.056	.280	1-1/2	1/8	00286	00339	00388	00427	\$19.00
.057	.285	1-1/2	1/8	00287	00340	00389	00428	\$19.00
.058	.290	1-1/2	1/8	00288	00341	00390	00429	\$19.00
.059	.295	1-1/2	1/8	00289	00342	00391	00430	\$19.00
.060	.300	1-1/2	1/8	00290	00343	00392	00431	\$19.00
.061	.305	1-1/2	1/8	00291	00344	00393	00432	\$19.00
.062	.310	1-1/2	1/8	00292	00345	00394	00433	\$19.00



# GR Series: D1 PVD Diamond coated decimal micro end mills

High strength, high hardness solid carbide end mills for graphite & abrasive materials featuring LOC = 5X diameter and proprietary coating for medium to long-run setups.



- Designed for graphite and abrasive non-metals • Tight diameter tolerance ± .0003
- Proprietary cemented carbide grade and D1 PVD diamond coating
- Superior abrasion resistance for superb price / performance valuation



Diam	LOC	OAL	Shank	2 flute Square D1 Coated EDP#	2 flute Ball D1 Coated EDP#	4 flute Square D1 Coated EDP#	4 flute Ball D1 Coated EDP#	Price
.005	.025	1-1/2	1/8	11204	11209			\$26.00
.006	.030	1-1/2	1/8	11205	11210			\$26.00
.007	.035	1-1/2	1/8	11206	11211			\$26.00
.008	.040	1-1/2	1/8	11207	11212			\$26.00
.009	.045	1-1/2	1/8	11208	11213			\$26.00
.010	.050	1-1/2	1/8	10227	10291	11214	11228	\$24.00
.011	.055	1-1/2	1/8	10228	10292	11215	11229	\$24.00
.012	.060	1-1/2	1/8	10229	10293	11216	11230	\$24.00
.013	.065	1-1/2	1/8	10230	10294	11217	11231	\$24.00
.014	.070	1-1/2	1/8	10231	10295	11218	11232	\$24.00
.015	.075	1-1/2	1/8	10232	10296	11219	11233	\$24.00
.016	.080	1-1/2	1/8	10233	10297	11220	11234	\$24.00
.017	.085	1-1/2	1/8	10234	10298	11221	11235	\$24.00
.018	.090	1-1/2	1/8	10235	10299	11222	11236	\$24.00
.019	.095	1-1/2	1/8	10236	10300	11223	11237	\$24.00
.020	.100	1-1/2	1/8	10237	10301	12236	12238	\$23.50
.021	.105	1-1/2	1/8	10238	10302	11224	11238	\$23.50
.022	.110	1-1/2	1/8	10239	10303	11225	11239	\$23.50
.023	.115	1-1/2	1/8	10240	10304	11226	11240	\$23.50
.024	.120	1-1/2	1/8	10241	10305	11227	11241	\$23.50
.025	.125	1-1/2	1/8	10242	10306	10355	10404	\$23.50
.026	.130	1-1/2	1/8	10243	10307	10356	10405	\$23.50
.027	.135	1-1/2	1/8	10244	10308	10357	10406	\$23.50
.028	.140	1-1/2	1/8	10245	10309	10358	10407	\$23.50
.029	.145	1-1/2	1/8	10246	10310	10359	10408	\$23.50
.030	.150	1-1/2	1/8	10247	10311	10360	10409	\$23.00
.031	.155	1-1/2	1/8	10248	10312	10361	10410	\$23.00
.032	.160	1-1/2	1/8	10249	10313	10362	10411	\$23.00
.033	.165	1-1/2	1/8	10250	10314	10363	10412	\$23.00
.034	.170	1-1/2	1/8	10251	10315	10364	10413	\$23.00
.035	.175	1-1/2	1/8	10252	10316	10365	10414	\$23.00
.036	.180	1-1/2	1/8	10253	10317	10366	10415	\$23.00
.037	.185	1-1/2	1/8	10254	10318	10367	10416	\$23.00
.038	.190	1-1/2	1/8	10255	10319	10368	10417	\$23.00
.039	.195	1-1/2	1/8	10256	10320	10369	10418	\$23.00
.040	.200	1-1/2	1/8	10257	10321	10370	10419	\$23.00
.041	.205	1-1/2	1/8	10258	10322	10371	10420	\$23.00
.042	.210	1-1/2	1/8	10259	10323	10372	10421	\$23.00
.043	.215	1-1/2	1/8	10260	10324	10373	10422	\$23.00
.044	.220	1-1/2	1/8	10261	10325	10374	10423	\$23.00
.045	.225	1-1/2	1/8	10262	10326	10375	10424	\$23.00
.046	.230	1-1/2	1/8	10263	10327	10376	10425	\$23.00
.047	.235	1-1/2	1/8	10264	10328	10377	10426	\$23.00
.048	.240	1-1/2	1/8	10265	10329	10378	10427	\$23.00
.049	.245	1-1/2	1/8	10266	10330	10379	10428	\$23.00
.050	.250	1-1/2	1/8	10267	10331	10380	10429	\$22.00
.051	.255	1-1/2	1/8	10268	10332	10381	10430	\$22.00
.052	.260	1-1/2	1/8	10269	10333	10382	10431	\$22.00
.053	.265	1-1/2	1/8	10270	10334	10383	10432	\$22.00
.054	.270	1-1/2	1/8	10271	10335	10384	10433	\$22.00
.055	.275	1-1/2	1/8	10272	10336	10385	10434	\$22.00
.056	.280	1-1/2	1/8	10273	10337	10386	10435	\$22.00
.057	.285	1-1/2	1/8	10274	10338	10387	10436	\$22.00
.058	.290	1-1/2	1/8	10275	10339	10388	10437	\$22.00
.059	.295	1-1/2	1/8	10276	10340	10389	10438	\$22.00
.060	.300	1-1/2	1/8	10277	10341	10390	10439	\$22.00
.061	.305	1-1/2	1/8	10278	10342	10391	10440	\$22.00
.062	.310	1-1/2	1/8	10279	10343	10392	10441	\$22.00

# new! GRER & GRERN Series: Extended Reach 4 flute micro end mills

High strength and hardness, 3" extra-long solid carbide end mills featuring LOC = 5X diameter & available standard neck clearance (GRERN).

1/8" shank



- Designed for machining electrodes & other reach applications • 3" OAL
- Proprietary cemented carbide grade & available AT, D1 or D2 coating
- Use D1 (PVD) or D2 (CVD) Diamond coating for graphite & abrasive non-metals
- Use AT coating for die steels and other hard metals
- Tight diameter tolerance of  $\pm .0003$  (except for D2 coated  $+.0005/-0.001$ )
- "N" designates inclusion of extended clearance neck (GRERN)

**SFR 35% tighter shank tolerance than h6!**  
Shrink-Fit Ready!



Diam	LOC	LBS	OAL	Shank	GRER4UC 4 flute UnCoated			GRER4AT 4 flute AT Coated			GRER4D1 4 flute D1 Coated			GRER4D2 4 flute D2 Coated		
					Square EDP#	Ball EDP#	Price	Square EDP#	Ball EDP#	Price	Square EDP#	Ball EDP#	Price	Square EDP#	Ball EDP#	Price
.015	.075		3"	1/8	00127	00716	\$24.00	00672	00779	\$27.00	00015	00049	\$31.00	00813	00825	\$60.00
.015N	.075	.150	3"	1/8	00128	00717	\$30.00	00673	00780	\$33.00	00016	00050	\$37.00	00814	00826	\$66.00
.020	.100		3"	1/8	00129	00718	\$24.00	00674	00781	\$27.00	00017	00051	\$31.00	00815	00827	\$60.00
.020N	.100	.200	3"	1/8	00746	00719	\$30.00	00675	00782	\$33.00	00018	00052	\$37.00	00816	00828	\$66.00
.025	.125		3"	1/8	00747	00720	\$24.00	00676	00783	\$27.00	00019	00053	\$31.00	00817	00829	\$60.00
.025N	.125	.250	3"	1/8	00748	00721	\$30.00	00678	00784	\$33.00	00020	00054	\$37.00	00818	00830	\$66.00
.030	.150		3"	1/8	00749	00722	\$24.00	00679	00785	\$27.00	00021	00055	\$31.00	00819	00831	\$60.00
.030N	.150	.300	3"	1/8	00750	00723	\$30.00	00680	00786	\$33.00	00022	00056	\$37.00	00820	00832	\$66.00
.031	.155		3"	1/8	00751	00724	\$24.00	00681	00787	\$27.00	00023	00057	\$31.00	00821	00833	\$60.00
.031N	.155	.310	3"	1/8	00752	00725	\$30.00	00682	00788	\$33.00	00024	00058	\$37.00	00822	00834	\$66.00
.035	.175		3"	1/8	00753	00726	\$24.00	00683	00789	\$27.00	00025	00059	\$31.00	00823	00835	\$60.00
.035N	.175	.350	3"	1/8	00754	00727	\$30.00	00684	00790	\$33.00	00026	00060	\$37.00	00824	00836	\$66.00
.040	.200		3"	1/8	00755	00728	\$24.00	00685	00791	\$27.00	00027	00061	\$31.00	00825	00837	\$60.00
.040N	.200	.400	3"	1/8	00756	00729	\$30.00	00686	00792	\$33.00	00028	00062	\$37.00	00826	00838	\$66.00
.045	.225		3"	1/8	00757	00730	\$24.00	00687	00793	\$27.00	00029	00063	\$31.00	00827	00839	\$60.00
.045N	.225	.450	3"	1/8	00758	00731	\$30.00	00688	00794	\$33.00	00030	00064	\$37.00	00828	00840	\$66.00
.047	.235		3"	1/8	00759	00732	\$24.00	00689	00795	\$27.00	00031	00065	\$31.00	00829	00841	\$60.00
.047N	.235	.500	3"	1/8	00760	00733	\$30.00	00690	00796	\$33.00	00032	00066	\$37.00	00830	00842	\$66.00
.050	.250		3"	1/8	00761	00734	\$24.00	00691	00797	\$27.00	00033	00067	\$31.00	00831	00843	\$60.00
.050N	.250	.500	3"	1/8	00762	00735	\$30.00	00692	00798	\$33.00	00034	00068	\$37.00	00832	00844	\$66.00
.060	.300		3"	1/8	00763	00736	\$24.00	00693	00799	\$27.00	00035	00069	\$31.00	00833	00845	\$60.00
.060N	.300	1.0"	3"	1/8	00764	00737	\$30.00	00694	00800	\$33.00	00036	00070	\$37.00	00834	00846	\$66.00
.062	.310		3"	1/8	00765	00738	\$24.00	00695	00801	\$27.00	00037	00071	\$31.00	00835	00847	\$60.00
.062N	.310	1.0"	3"	1/8	00766	00739	\$30.00	00696	00802	\$33.00	00038	00072	\$37.00	00836	00848	\$66.00
.075	.375		3"	1/8	00767	00740	\$24.00	00697	00803	\$27.00	00039	00073	\$31.00	00837	00849	\$60.00
.075N	.375	1.0"	3"	1/8	00768	00741	\$30.00	00698	00804	\$33.00	00040	00074	\$37.00	00838	00850	\$66.00
.078	.390		3"	1/8	00769	00742	\$24.00	00699	00805	\$27.00	00041	00075	\$31.00	00839	00851	\$60.00
.078N	.390	1.0"	3"	1/8	00770	00743	\$30.00	00772	00806	\$33.00	00042	00076	\$37.00	00840	00852	\$66.00
.090	.450		3"	1/8	00771	00744	\$24.00	00773	00807	\$27.00	00043	00077	\$31.00	00841	00853	\$60.00
.090N	.450	1.0"	3"	1/8	00226	00745	\$30.00	00774	00808	\$33.00	00044	00078	\$37.00	00842	00854	\$66.00
.093	.465		3"	1/8	00227	00746	\$24.00	00775	00809	\$27.00	00045	00079	\$31.00	00843	00855	\$60.00
.093N	.465	1.25"	3"	1/8	00228	00747	\$30.00	00776	00810	\$33.00	00046	00080	\$37.00	00844	00856	\$66.00
.1245	.625		3"	1/8	00229	00748	\$24.00	00777	00811	\$27.00	00047	00081	\$31.00	00845	00857	\$60.00
.1245N	.625	1.5"	3"	1/8	00715	00745	\$30.00	00778	00812	\$33.00	00048	00082	\$37.00	00846	00858	\$66.00



Specs (micro end mills cutting diameter < 1/8"):  
Cutting Diam  $\pm .0003$  /  $-.0003$   
Shank Diam  $\pm .0000$  /  $-.0002$   
Radius  $\pm .00015$   
SFR = Shrink Fit Ready



HSM's New Best Friend



SmoothConcricity®

Maximized Tool Concentricity Exclusively by Tool Alliance®

# GR Series: UnCoated fractional end mills

Thick core, high strength, high hardness solid carbide end mills with increased helix and extended cutting lengths.



- Designed for milling of hardened steels, non-metals & non-ferrous alloys
- Proprietary cemented carbide grade offers extremely high hardness and density
- Features heavy core construction for maximum rigidity
- Tight tolerance with SmoothGrind polish-ground surfaces
- Regular, Long (L), and Extra-Long (XL) lengths



Diam	LOC	OAL	Shank
1/64	5/64	1-1/2	1/8
1/32	5/32	1-1/2	1/8
1/32L	1/16	2"	1/8
1/32XL	1/4	2"	1/8
3/64	15/64	1-1/2	1/8
1/16	5/16	1-1/2	1/8
1/16L	1/4	2"	1/8
1/16XL	1/2	2"	1/8
5/64	25/64	1-1/2	1/8
3/32	15/32	1-1/2	1/8
7/64	35/64	1-1/2	1/8
1/8	5/8	1-1/2	1/8
1/8L	1/2	3"	1/8
1/8XL	1"	4"	1/8
9/64	45/64	2"	3/16
5/32	3/4	2"	3/16
11/64	3/4	2"	3/16
3/16	3/4	2"	3/16
3/16L	3/4	3"	3/16
3/16XL	1-3/8	4"	3/16
7/32	1"	2-1/2	1/4
1/4	1"	2-1/2	1/4
1/4L	1"	4"	1/4
1/4XL	1-1/2	6"	1/4
5/16	1"	2-1/2	5/16
3/8	1"	2-1/2	3/8
3/8L	1-3/8	4"	3/8
3/8XL	2"	6"	3/8
7/16	1"	3"	7/16
1/2	1-1/4	3"	1/2
1/2L	1-3/8	4"	1/2
1/2XL	2"	6"	1/2
5/8	1-3/8	3-1/2	5/8
3/4	1-3/8	4"	3/4
1"	1-3/8	4"	1"

2 flute Square UnCoated		2 flute Ball UnCoated		4 flute Square UnCoated		4 flute Ball UnCoated	
EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
00837	\$19.00	00854	\$21.00	00871	\$19.00	00888	\$21.00
00838	\$18.00	00855	\$20.00	00872	\$18.00	00889	\$20.00
00839	\$21.00	00708	\$23.00	11156	\$21.00	11175	\$23.00
00840	\$25.00	00007	\$27.00	11157	\$25.00	11176	\$27.00
23106	\$17.00	23108	\$19.00	23100	\$17.00	23103	\$19.00
10054	\$17.00	10118	\$19.00	10167	\$17.00	10216	\$19.00
11099	\$20.00	11169	\$22.00	11158	\$20.00	11177	\$22.00
11020	\$25.00	11032	\$27.00	11026	\$25.00	11038	\$27.00
10055	\$16.00	10119	\$18.00	10168	\$16.00	10217	\$18.00
10056	\$16.00	10120	\$18.00	10169	\$16.00	10218	\$18.00
10057	\$16.00	10121	\$18.00	10170	\$16.00	10219	\$18.00
10058	\$15.00	10122	\$17.00	10171	\$15.00	10220	\$17.00
11100	\$21.00	11170	\$23.00	11159	\$21.00	11178	\$23.00
11021	\$30.00	11033	\$32.00	11027	\$30.00	11039	\$32.00
10059	\$21.00	10123	\$23.00	10172	\$21.00	10221	\$23.00
10060	\$21.00	10124	\$23.00	10173	\$21.00	10222	\$23.00
10061	\$21.00	10125	\$23.00	10174	\$21.00	10223	\$23.00
10062	\$21.00	10126	\$23.00	10175	\$21.00	10224	\$23.00
11101	\$27.00	11171	\$29.00	11160	\$27.00	11179	\$29.00
11022	\$38.00	11034	\$40.00	11028	\$38.00	11040	\$40.00
10063	\$26.00	10127	\$29.00	10176	\$26.00	10225	\$29.00
10064	\$26.00	10128	\$29.00	10177	\$26.00	10226	\$29.00
11023	\$35.00	11035	\$38.00	11029	\$35.00	11041	\$38.00
11102	\$52.00	11172	\$55.00	11161	\$52.00	11180	\$55.00
10713	\$32.00	10716	\$36.00	10719	\$32.00	10722	\$36.00
10714	\$40.00	10717	\$45.00	10720	\$40.00	10723	\$45.00
11024	\$58.00	11036	\$63.00	11030	\$58.00	11042	\$63.00
11103	\$82.00	11173	\$87.00	11167	\$82.00	11181	\$87.00
10997	\$60.00	10998	\$68.00	11001	\$60.00	11002	\$68.00
10715	\$62.00	10718	\$70.00	10721	\$62.00	10724	\$70.00
11155	\$76.00	11174	\$84.00	11168	\$76.00	11182	\$84.00
11025	\$100.00	11037	\$108.00	11031	\$100.00	11043	\$108.00
00851	\$110.00	00861	\$120.00	00868	\$110.00	00874	\$120.00
00852	\$140.00	00863	\$152.00	00869	\$140.00	00876	\$152.00
00859	\$230.00	00866	\$245.00	00873	\$230.00	00878	\$245.00



Specs (micro end mills cutting diameter < 1/8"):  
Cutting Diam +.0003 / -.0003  
Shank Diam +.0000 / -.0002  
Radius ± .00015  
SFR = Shrink Fit Ready



Specs (fractional end mills cut diameter ≥ 1/8"):  
Cutting Diam +.0000 / -.0015  
Shank Diam +.0000 / -.00025  
Radius ± .00075  
SFR = Shrink Fit Ready

# new! GR Series: AT coated fractional end mills w/Edge Prep

Thick core, high strength solid carbide end mills for die steels & hardened materials featuring proprietary AlTiN coating & SmoothEdge 4.



- Designed for milling of hard metals; excellent for medical & aerospace alloys
- Tight tolerance with included edge prep & SmoothGrind finishes
- Proprietary cemented carbide grade and AlTiN coating • SE1 below 1/8"
- Features extended lengths of cut with heavy core for strength
- Regular, Long (L), and Extra-Long (XL) lengths

Diam	LOC	OAL	Shank	2 flute Square AT Coated EDP# Price		2 flute Ball AT Coated EDP# Price		4 flute Square AT Coated EDP# Price		4 flute Ball AT Coated EDP# Price	
				EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
1/64	5/64	1-1/2	1/8	00895	\$21.00	00912	\$23.00	00929	\$21.00	00946	\$23.00
1/32	5/32	1-1/2	1/8	00896	\$20.00	00913	\$22.00	00930	\$20.00	00947	\$22.00
1/32L	1/16	2"	1/8	00897	\$23.00	00914	\$25.00	00931	\$23.00	00948	\$25.00
1/32XL	1/4	2"	1/8	00898	\$27.00	00915	\$29.00	00932	\$27.00	00949	\$29.00
3/64	15/64	1-1/2	1/8	00899	\$19.00	00916	\$21.00	00933	\$19.00	00950	\$21.00
1/16	5/16	1-1/2	1/8	00434	\$19.00	00449	\$21.00	00464	\$19.00	00479	\$21.00
1/16L	1/4	2"	1/8	00900	\$22.00	00917	\$24.00	00934	\$22.00	00951	\$24.00
1/16XL	1/2	2"	1/8	00901	\$27.00	00918	\$29.00	00935	\$27.00	00952	\$29.00
5/64	25/64	1-1/2	1/8	00435	\$18.00	00450	\$20.00	00465	\$18.00	00480	\$20.00
3/32	15/32	1-1/2	1/8	00436	\$18.00	00451	\$20.00	00466	\$18.00	00481	\$20.00
7/64	35/64	1-1/2	1/8	00437	\$18.00	00452	\$20.00	00467	\$18.00	00482	\$20.00
1/8	5/8	1-1/2	1/8	00438	\$17.00	00453	\$19.00	00468	\$17.00	00483	\$19.00
1/8L	1/2	3"	1/8	00902	\$24.00	00919	\$27.00	00936	\$24.00	00953	\$27.00
1/8XL	1"	4"	1/8	00903	\$34.00	00920	\$36.00	00937	\$34.00	00954	\$36.00
9/64	45/64	2"	3/16	00439	\$24.50	00454	\$26.50	00469	\$24.50	00484	\$26.50
5/32	3/4	2"	3/16	00440	\$24.50	00455	\$26.50	00470	\$24.50	00485	\$26.50
11/64	3/4	2"	3/16	00441	\$24.50	00456	\$26.50	00471	\$24.50	00486	\$26.50
3/16	3/4	2"	3/16	00442	\$24.50	00457	\$26.50	00472	\$24.50	00487	\$26.50
3/16L	3/4	3"	3/16	00904	\$32.00	00921	\$34.00	00938	\$32.00	00955	\$34.00
3/16XL	1-3/8	4"	3/16	00905	\$44.00	00922	\$46.00	00939	\$44.00	00956	\$46.00
7/32	1"	2-1/2	1/4	00443	\$31.00	00458	\$34.00	00473	\$31.00	00488	\$34.00
1/4	1"	2-1/2	1/4	00444	\$31.00	00459	\$34.00	00474	\$31.00	00489	\$34.00
1/4L	1"	4"	1/4	00906	\$42.00	00923	\$45.00	00940	\$42.00	00957	\$45.00
1/4XL	1-1/2	6"	1/4	00907	\$61.00	00924	\$64.00	00941	\$61.00	00958	\$64.00
5/16	1"	2-1/2	5/16	00445	\$39.00	00460	\$43.00	00475	\$39.00	00490	\$43.00
3/8	1"	2-1/2	3/8	00446	\$47.00	00461	\$52.00	00476	\$47.00	00491	\$52.00
3/8L	1-3/8	4"	3/8	00908	\$67.00	00925	\$72.00	00942	\$67.00	00959	\$72.00
3/8XL	2"	6"	3/8	00909	\$97.00	00926	\$102.00	00943	\$97.00	00960	\$102.00
7/16	1"	3"	7/16	00447	\$70.00	00462	\$78.00	00477	\$70.00	00492	\$78.00
1/2	1-1/4	3"	1/2	00448	\$72.00	00463	\$80.00	00478	\$72.00	00493	\$80.00
1/2L	1-3/8	4"	1/2	00910	\$89.00	00927	\$97.00	00944	\$89.00	00961	\$97.00
1/2XL	2"	6"	1/2	00911	\$118.00	00928	\$126.00	00945	\$118.00	00962	\$126.00
5/8	1-3/8	3-1/2	5/8	12340	\$125.00	12343	\$135.00	12346	\$125.00	12349	\$135.00
3/4	1-3/8	4"	3/4	12341	\$158.00	12344	\$170.00	12347	\$158.00	12350	\$170.00
1"	1-3/8	4"	1"	12342	\$255.00	12345	\$270.00	12348	\$255.00	12351	\$270.00



Specs (micro end mills cutting diameter < 1/8"): Cutting Diam +.0003 / -.0003 Shank Diam +.0000 / -.0002 Radius ± .00015 SFR = Shrink Fit Ready



Specs (fractional end mills cut diameter ≥ 1/8"): Cutting Diam +.0000 / -.0015 Shank Diam +.0000 / -.00025 Radius ± .00075 SFR = Shrink Fit Ready

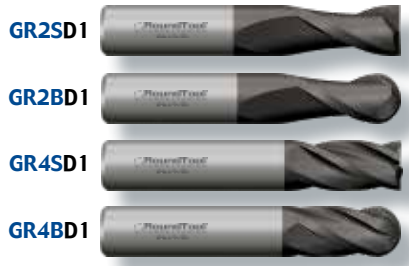


SFR 35% tighter shank tolerance than h6! Shrink-Fit Ready!



## GR Series: D1 PVD Diamond coated fractional end mills

High strength, high hardness solid carbide end mills for graphite & abrasive materials featuring extended LOC's and proprietary coating for medium to long-run setups.



- Designed for graphite and abrasive non-metals
- Proprietary cemented carbide grade and D1 PVD diamond coating
- Hard, thin and smooth D1 for extremely sharp cutting edge
- Superior abrasion resistance for superb price / performance valuation
- Extremely close diameter tolerances
- Regular, Long (L), and Extra-Long (XL) lengths



Diam	LOC	OAL	Shank	2 flute Square D1 Coated		2 flute Ball D1 Coated		4 flute Square D1 Coated		4 flute Ball D1 Coated	
				EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
1/64	5/64	1-1/2	1/8	12378	\$24.00	12379	\$26.00	12380	\$24.00	12381	\$26.00
1/32	5/32	1-1/2	1/8	12382	\$23.00	12383	\$25.00	12384	\$23.00	12385	\$25.00
1/32L	1/16	2"	1/8	00700	\$26.00	00702	\$28.00	11189	\$26.00	11690	\$28.00
1/32XL	1/4	2"	1/8	00701	\$30.00	00703	\$32.00	11190	\$30.00	11691	\$32.00
3/64	15/64	1-1/2	1/8	12386	\$22.00	12387	\$24.00	12388	\$22.00	12389	\$24.00
1/16	5/16	1-1/2	1/8	10280	\$22.00	10344	\$24.00	10393	\$22.00	10442	\$24.00
1/16L	1/4	2"	1/8	11183	\$25.00	11197	\$27.00	11191	\$25.00	11692	\$27.00
1/16XL	1/2	2"	1/8	11044	\$30.00	11056	\$32.00	11050	\$30.00	11162	\$32.00
5/64	25/64	1-1/2	1/8	10281	\$21.00	10345	\$23.00	10394	\$21.00	10443	\$23.00
3/32	15/32	1-1/2	1/8	10282	\$21.00	10346	\$23.00	10395	\$21.00	10444	\$23.00
7/64	35/64	1-1/2	1/8	10283	\$21.00	10347	\$23.00	10396	\$21.00	10445	\$23.00
1/8	5/8	1-1/2	1/8	10284	\$20.00	10348	\$22.00	10397	\$20.00	10446	\$22.00
1/8L	1/2	3"	1/8	11184	\$28.00	11198	\$30.00	11192	\$28.00	11693	\$30.00
1/8XL	1"	4"	1/8	11045	\$38.00	11057	\$40.00	11051	\$38.00	11063	\$40.00
9/64	45/64	2"	3/16	10285	\$27.00	10349	\$29.00	10398	\$27.00	10447	\$29.00
5/32	3/4	2"	3/16	10286	\$27.00	10350	\$29.00	10399	\$27.00	10448	\$29.00
11/64	3/4	2"	3/16	10287	\$27.00	10351	\$29.00	10400	\$27.00	10449	\$29.00
3/16	3/4	2"	3/16	10288	\$27.00	10352	\$29.00	10401	\$27.00	10450	\$29.00
3/16L	3/4	3"	3/16	11185	\$35.50	11199	\$37.50	11193	\$35.50	11694	\$37.50
3/16XL	1-3/8	4"	3/16	11046	\$48.50	11058	\$50.50	11052	\$48.50	11064	\$50.50
7/32	1"	2-1/2	1/4	10289	\$35.00	10353	\$38.00	10402	\$35.00	10451	\$38.00
1/4	1"	2-1/2	1/4	10290	\$35.00	10354	\$38.00	10403	\$35.00	10452	\$38.00
1/4L	1"	4"	1/4	11047	\$47.50	11059	\$50.50	11053	\$47.50	11065	\$50.50
1/4XL	1-1/2	6"	1/4	11186	\$68.00	11200	\$71.00	11194	\$68.00	11695	\$71.00
5/16	1"	2-1/2	5/16	10725	\$42.00	10728	\$46.00	10731	\$42.00	10734	\$46.00
3/8	1"	2-1/2	3/8	10726	\$51.00	10729	\$56.00	10732	\$51.00	10735	\$56.00
3/8L	1-3/8	4"	3/8	11048	\$72.00	11060	\$77.00	11054	\$72.00	11166	\$77.00
3/8XL	2"	6"	3/8	11187	\$103.00	11202	\$108.00	11195	\$103.00	11696	\$108.00
7/16	1"	3"	7/16	10999	\$74.00	11000	\$82.00	11003	\$74.00	11004	\$82.00
1/2	1-1/4	3"	1/2	10727	\$77.00	10730	\$85.00	10733	\$77.00	10736	\$85.00
1/2L	1-3/8	4"	1/2	11735	\$96.00	11736	\$104.00	11737	\$96.00	11738	\$104.00
1/2XL	2"	6"	1/2	11049	\$128.00	11061	\$136.00	11055	\$128.00	11062	\$136.00
5/8	1-3/8	3-1/2	5/8	12352	\$132.00	12355	\$142.00	12358	\$132.00	12361	\$142.00
3/4	1-3/8	4"	3/4	12353	\$166.00	12356	\$178.00	12359	\$166.00	12362	\$178.00
1"	1-3/8	4"	1"	12354	\$267.00	12357	\$282.00	12360	\$267.00	12363	\$282.00

### Prep Yourself



## SmoothEdge®

Surface & Edge Preparations Exclusively by Tool Alliance®



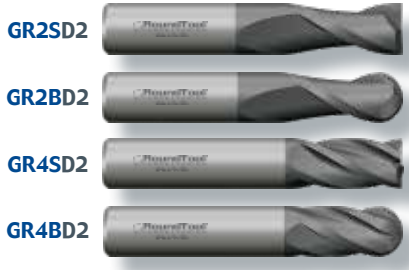
**Specs (micro end mills cutting diameter < 1/8"):**  
Cutting Diam +.0003 / -.0003  
Shank Diam +.0000 / -.0002  
Radius ± .00015  
SFR = Shrink Fit Ready



**Specs (fractional end mills cut diameter ≥ 1/8"):**  
Cutting Diam +.0000 / -.0015  
Shank Diam +.0000 / -.00025  
Radius ± .00075  
SFR = Shrink Fit Ready

## GR Series: D2 CVD Diamond coated fractional end mills

**High strength, high hardness solid carbide end mills for graphite & abrasive materials featuring extended LOC's and proprietary CVD diamond coating for long-run setups.**



- Designed for graphite and abrasive non-metals
- Proprietary cemented carbide grade and D2 CVD diamond coating
- Our hardest, thickest, longest lasting diamond coating
- Maximum tool life and wear resistance for long production runs
- Tight diameter tolerances for CVD diamond
- Regular, Long (L), and Extra-Long (XL) lengths

Diam	LOC	OAL	Shank	2 flute Square D2 Coated		2 flute Ball D2 Coated		4 flute Square D2 Coated		4 flute Ball D2 Coated	
				EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
.015	.075	1-1/2	1/8	10770	\$58.00	10782	\$60.00	12376	\$58.00	12377	\$60.00
.020	.100	1-1/2	1/8	10771	\$58.00	10783	\$60.00	12240	\$58.00	12242	\$60.00
.031	.155	1-1/2	1/8	10772	\$49.00	10784	\$51.00	10796	\$49.00	10808	\$51.00
1/32L	1/16	2"	1/8	00704	\$49.00	00706	\$51.00	12061	\$49.00	12089	\$51.00
1/32XL	1/4	2"	1/8	00705	\$53.00	00707	\$55.00	12063	\$53.00	12091	\$55.00
3/64	15/64	1-1/2	1/8	10773	\$45.00	10785	\$47.00	10797	\$45.00	10809	\$47.00
1/16	5/16	1-1/2	1/8	10774	\$45.00	10786	\$47.00	10798	\$45.00	10810	\$47.00
1/16L	1/4	2"	1/8	12062	\$48.00	12086	\$50.00	12065	\$48.00	12093	\$50.00
1/16XL	1/2	2"	1/8	12064	\$53.00	12088	\$55.00	12067	\$53.00	12095	\$55.00
5/64	25/64	1-1/2	1/8	12203	\$44.00	12217	\$46.00	12210	\$44.00	12225	\$46.00
3/32	15/32	1-1/2	1/8	10775	\$44.00	10787	\$46.00	10799	\$44.00	10811	\$46.00
7/64	35/64	1-1/2	1/8	12204	\$44.00	12218	\$46.00	12211	\$44.00	12226	\$46.00
1/8	5/8	1-1/2	1/8	10776	\$43.00	10788	\$45.00	10800	\$43.00	10812	\$45.00
1/8L	1/2	3"	1/8	12066	\$49.00	12090	\$51.00	12069	\$49.00	12097	\$51.00
1/8XL	1"	4"	1/8	12068	\$58.00	12092	\$60.00	12071	\$58.00	12099	\$60.00
9/64	45/64	2"	3/16	12205	\$66.50	12219	\$68.50	12212	\$66.50	12227	\$68.50
5/32	3/4	2"	3/16	12206	\$66.50	12220	\$68.50	12213	\$66.50	12228	\$68.50
11/64	3/4	2"	3/16	12207	\$66.50	12221	\$68.50	12214	\$66.50	12229	\$68.50
3/16	3/4	2"	3/16	10777	\$66.50	10789	\$68.50	10801	\$66.50	10813	\$68.50
3/16L	3/4	3"	3/16	12070	\$72.50	12094	\$74.50	12073	\$72.50	12101	\$74.50
3/16XL	1-3/8	4"	3/16	12072	\$83.50	12096	\$85.50	12075	\$83.50	12103	\$85.50
7/32	1"	2-1/2	1/4	12208	\$88.50	12223	\$91.50	12215	\$88.50	12230	\$91.50
1/4	1"	2-1/2	1/4	10778	\$88.50	10790	\$91.50	10802	\$88.50	10814	\$91.50
1/4L	1"	4"	1/4	12074	\$97.50	12098	\$100.50	12077	\$97.50	12105	\$100.50
1/4XL	1-1/2	6"	1/4	12076	\$148.50	12100	\$151.50	12079	\$148.50	12107	\$151.50
5/16	1"	2-1/2	5/16	10779	\$115.00	10791	\$119.00	10803	\$115.00	10815	\$119.00
3/8	1"	2-1/2	3/8	10780	\$146.50	10792	\$151.50	10804	\$146.50	10816	\$151.50
3/8L	1-3/8	4"	3/8	12078	\$164.50	12102	\$169.50	12081	\$164.50	12109	\$169.50
3/8XL	2"	6"	3/8	12080	\$247.00	12104	\$252.00	12083	\$247.00	12111	\$252.00
7/16	1"	3"	7/16	12209	\$178.50	12224	\$186.50	12216	\$178.50	12231	\$186.50
1/2	1-1/4	3"	1/2	10781	\$196.00	10793	\$204.00	10805	\$196.00	10817	\$204.00
1/2L	1-3/8	4"	1/2	11745	\$208.00	11746	\$216.00	11747	\$208.00	11748	\$216.00
1/2XL	2"	6"	1/2	12084	\$305.00	12108	\$313.00	12087	\$305.00	12115	\$313.00
5/8	1-3/8	3-1/2	5/8	12364	\$272.00	12367	\$282.00	12370	\$272.00	12373	\$282.00
3/4	1-3/8	4"	3/4	12365	\$358.00	12368	\$370.00	12371	\$358.00	12374	\$370.00
1"	1-3/8	4"	1"	12366	\$730.00	12369	\$745.00	12372	\$730.00	12375	\$745.00



**SFR** 35% tighter shank tolerance than h6!  
Shrink-Fit Ready!



**D2** Specs (micro end mills cut diameter < 1/8" w/ D2 coat):  
Cutting Diam +.0005 / -.001  
Shank Diam +.0005 / -.0002  
Radius ± .00075  
SFR = Shrink Fit Ready

**D2** Specs (fractional end mills cut diameter ≥ 1/8" w/ D2 coat):  
Cutting Diam +.0000 / -.0020  
Shank Diam +.0000 / -.00025  
Radius ± .0010  
SFR = Shrink Fit Ready

## GR Series: UnCoated fractional w/Radius

Thick core, high strength, high hardness solid carbide end mills with increased helix and featuring extended cutting lengths.

- Designed for milling of hardened steels, non-metals & non-ferrous alloys • Tight diameter tolerance
- Proprietary cemented carbide grade offers extremely high hardness and density
- Features heavy core construction for maximum rigidity • Regular, Long (L), and Extra-Long (XL) lengths



Specs (micro end mills cutting diameter < 1/8"): Cutting Diam +.0003 / -.0003  
Shank Diam +.0000 / -.0002  
Radius ± .00015  
SFR = Shrink Fit Ready



Specs (fractional end mills cut diameter ≥ 1/8"): Cutting Diam +.0000 / -.0015  
Shank Diam +.0000 / -.00025  
Radius ± .00075  
SFR = Shrink Fit Ready

GR2RUC



GR4RUC



Diam	LOC	OAL	Shank	.015 Rad		.031 Rad		.062 Rad		Corner Rad UnCoated Price
				2 flute EDP#	4 flute EDP#	2 flute EDP#	4 flute EDP#	2 flute EDP#	4 flute EDP#	
1/16L	1/4	2"	1/8	12245	12262					\$25.00
1/16XL	1/2	2"	1/8	12246	12263					\$30.00
1/8	5/8	1-1/2	1/8	12247	12264	12279	12294			\$20.00
1/8L	1/2	3"	1/8	12248	12265	12280	12295			\$26.00
1/8XL	1"	4"	1/8	12249	12266	12281	12296			\$35.00
3/16	3/4	2"	3/16	12250	12267	12282	12297			\$27.00
3/16L	3/4	3"	3/16	12251	12268	12283	12298			\$33.00
3/16XL	1-3/8	4"	3/16	12252	12269	12284	12299	12310	12321	\$44.00
1/4	1"	2-1/2	1/4	12253	12270	12285	12300	12311	12322	\$33.00
1/4L	1"	4"	1/4	12254	12271	12286	12301	12312	12323	\$42.00
1/4XL	1-1/2	6"	1/4	12255	12272	12287	12302	12313	12324	\$59.00
3/8	1"	2-1/2	3/8	12256	12273	12288	12303	12314	12325	\$50.00
3/8L	1-3/8	4"	3/8	12257	12274	12289	12304	12315	12326	\$68.00
3/8XL	2"	6"	3/8	12258	12275	12290	12305	12316	12327	\$92.00
1/2	1-1/4	3"	1/2	12259	12276	12291	12306	12317	12328	\$76.00
1/2L	1-3/8	4"	1/2	12260	12277	12292	12307	12318	12329	\$90.00
1/2XL	2"	6"	1/2	12261	12278	12293	12308	12319	12330	\$114.00

## GR Series: AT coated fractional w/Radius & Edge Prep

Thick core, high strength, high hardness solid carbide end mills with increased helix, featuring extended cutting lengths & SmoothEdge 4.

- Designed for milling of die & hardened steels and other hard metals • Tight diameter tolerance
- Proprietary cemented carbide grade offers extremely high hardness and density • SE1 for diameters < 1/8"
- Features heavy core construction for maximum rigidity • Regular, Long (L), and Extra-Long (XL) lengths



GR2RAT



GR4RAT







Diam	LOC	OAL	Shank	.015 Rad		.031 Rad		.062 Rad		Corner Rad+AT Price
				2 flute EDP#	4 flute EDP#	2 flute EDP#	4 flute EDP#	2 flute EDP#	4 flute EDP#	
1/16L	1/4	2"	1/8	00963	00980					\$27.00
1/16XL	1/2	2"	1/8	00964	00981					\$32.00
1/8	5/8	1-1/2	1/8	00965	00982	00997	01012			\$22.00
1/8L	1/2	3"	1/8	00966	00983	00998	01013			\$29.00
1/8XL	1"	4"	1/8	00967	00984	00999	01014			\$39.00
3/16	3/4	2"	3/16	00968	00985	01000	01015			\$31.00
3/16L	3/4	3"	3/16	00969	00986	01001	01016			\$38.00
3/16XL	1-3/8	4"	3/16	00970	00987	01002	01017	01028	01039	\$50.00
1/4	1"	2-1/2	1/4	00971	00988	01003	01018	01029	01040	\$38.00
1/4L	1"	4"	1/4	00972	00989	01004	01019	01030	01041	\$49.00
1/4XL	1-1/2	6"	1/4	00973	00990	01005	01020	01031	01042	\$67.00
3/8	1"	2-1/2	3/8	00974	00991	01006	01021	01032	01043	\$58.00
3/8L	1-3/8	4"	3/8	00975	00992	01007	01022	01033	01044	\$77.00
3/8XL	2"	6"	3/8	00976	00993	01008	01023	01034	01045	\$105.00
1/2	1-1/4	3"	1/2	00977	00994	01009	01024	01035	01046	\$86.00
1/2L	1-3/8	4"	1/2	00978	00995	01010	01025	01036	01047	\$102.00
1/2XL	2"	6"	1/2	00979	00996	01011	01026	01037	01048	\$130.00



## GR Series: D1 PVD Diamond coated w/Radius

**High hardness & strength solid carbide end mills for graphite & abrasive materials featuring extended LOC's and proprietary coating for medium to long-run setups.**





- Designed for graphite and abrasive non-metals • Extremely close diameter tolerances & sharpness for diamond
- Proprietary cemented carbide grade, application-specific geometry, and thin & smooth D1 PVD diamond coating
- Superior abrasion resistance for superb price / performance valuation • Regular, Long (L), and Extra-Long (XL) lengths

GR2RD1					<b>.015 Rad</b>		<b>.031 Rad</b>		<b>.062 Rad</b>		
	GR4RD1				D1 Coated		D1 Coated		D1 Coated		
		$\varnothing$ Diam	LOC	OAL	Shank	2 flute EDP#	4 flute EDP#	2 flute EDP#	4 flute EDP#	2 flute EDP#	4 flute EDP#
	1/16L	1/4	2"	1/8	11698	11704					\$30.00
	1/16XL	1/2	2"	1/8	11163	11164					\$35.00
	1/8	5/8	1-1/2	1/8	10705	10706	10763	10764			\$25.00
	1/8L	1/2	3"	1/8	11699	11705	11727	11714			\$33.00
	1/8XL	1"	4"	1/8	11165	11066	11077	11078			\$43.00
	3/16	3/4	2"	3/16	10707	10708	10765	10766			\$33.00
	3/16L	3/4	3"	3/16	11700	11706	11710	11715			\$41.50
	3/16XL	1-3/8	4"	3/16	11067	11068	11079	11080	11091	11092	\$54.50
	1/4	1"	2-1/2	1/4	10709	10710	10767	10768	10807	10842	\$42.00
	1/4L	1"	4"	1/4	11069	11070	11081	11082	11093	11094	\$54.50
	1/4XL	1-1/2	6"	1/4	11701	11707	11711	11716	11720	11724	\$75.00
	3/8	1"	2-1/2	3/8	10711	10712	10769	10794	10843	10854	\$61.00
	3/8L	1-3/8	4"	3/8	11071	11072	11083	11084	11095	11096	\$82.00
	3/8XL	2"	6"	3/8	11702	11708	11712	11717	11721	11725	\$113.00
	1/2	1-1/4	3"	1/2	10761	10762	10795	10806	10855	10970	\$91.00
	1/2L	1-3/8	4"	1/2	11739	11742	11740	11743	11741	11744	\$110.00
	1/2XL	2"	6"	1/2	11703	11074	11085	11086	11097	11098	\$142.00

## GR Series: D2 CVD Diamond coated w/Radius

**High hardness & strength solid carbide end mills for graphite & abrasive materials featuring extended LOC's and proprietary CVD diamond coating for long-run setups.**

- Designed for graphite and abrasive non-metals • Tight diameter tolerances for CVD diamond
- Proprietary cemented carbide grade, application-specific geometry, and thick & hard D2 CVD diamond coating
- Maximum tool life & wear resistance for long production runs • Regular, Long (L), and Extra-Long (XL) lengths

GR2RD2					<b>.015 Rad</b>		<b>.031 Rad</b>		<b>.062 Rad</b>		
	GR4RD2				D2 Coated		D2 Coated		D2 Coated		
		$\varnothing$ Diam	LOC	OAL	Shank	2 flute EDP#	4 flute EDP#	2 flute EDP#	4 flute EDP#	2 flute EDP#	4 flute EDP#
	1/16L	1/4	2"	1/8	12110	12117					\$53.00
	1/16XL	1/2	2"	1/8	12112	12119					\$58.00
	1/8	5/8	1-1/2	1/8	12177	12178	12187	12188			\$48.00
	1/8L	1/2	3"	1/8	12114	12121	12134	12141			\$54.00
	1/8XL	1"	4"	1/8	12116	12123	12136	12143			\$63.00
	3/16	3/4	2"	3/16	12179	12180	12189	12190			\$72.50
	3/16L	3/4	3"	3/16	12118	12125	12138	12145			\$78.50
	3/16XL	1-3/8	4"	3/16	12120	12127	12140	12147	12156	12163	\$89.50
	1/4	1"	2-1/2	1/4	12181	12182	12191	12192	12197	12198	\$95.50
	1/4L	1"	4"	1/4	12122	12129	12142	12149	12158	12165	\$104.50
	1/4XL	1-1/2	6"	1/4	12124	12131	12144	12151	12160	12167	\$155.50
	3/8	1"	2-1/2	3/8	12183	12184	12193	12194	12199	12200	\$156.50
	3/8L	1-3/8	4"	3/8	12126	12133	12146	12153	12162	12169	\$174.50
	3/8XL	2"	6"	3/8	12128	12135	12148	12155	12164	12171	\$257.00
	1/2	1-1/4	3"	1/2	12185	12186	12195	12196	12201	12202	\$208.00
	1/2L	1-3/8	4"	1/2	11749	11752	11750	11753	11751	11754	\$222.00
	1/2XL	2"	6"	1/2	12132	12139	12152	12159	12168	12175	\$319.00

**Specs (micro end mills cut diameter < 1/8" w/ D2 coat):**  
Cutting Diam +.0005 / -.001  
Shank Diam +.0000 / -.0002  
Radius ± .00075  
SFR = Shrink Fit Ready

**Specs (fractional end mills cut diameter ≥ 1/8" w/ D2 coat):**  
Cutting Diam +.0000 / -.0020  
Shank Diam +.0000 / -.00025  
Radius ± .0010  
SFR = Shrink Fit Ready



## GR Series: UnCoated metric end mills

High strength, high hardness solid carbide end mills  
for wide application range featuring extended cutting lengths.



- Designed for milling of hardened steels, non-metals & non-ferrous alloys
- Proprietary cemented carbide grade offers extremely high hardness and density
- Features heavy core construction for maximum rigidity • Tight tolerance
- Sharp, polished SmoothGrind cutting edges and surfaces

Diam	LOC	OAL	Shank					Price
				EDP#	EDP#	EDP#	EDP#	
0.25mm	1.2	38	3.0	10453	10487			\$19.00
0.3	1.5	38	3.0	10454	10488			\$19.00
0.4	2.0	38	3.0	10455	10489			\$19.00
0.5	2.5	38	3.0	10456	10490	12233	12235	\$19.00
0.6	3.0	38	3.0	10457	10491			\$19.00
0.7	3.5	38	3.0	10458	10492	10521	10550	\$18.00
0.8	4.0	38	3.0	10459	10493	10522	10551	\$18.00
0.9	4.5	38	3.0	10460	10494	10523	10552	\$18.00
1.0	5.0	38	3.0	10461	10495	10524	10553	\$18.00
1.1	5.5	38	3.0	10462	10496	10525	10554	\$18.00
1.2	6.0	38	3.0	10463	10497	10526	10555	\$18.00
1.3	6.5	38	3.0	10464	10498	10527	10556	\$18.00
1.4	7.0	38	3.0	10465	10499	10528	10557	\$18.00
1.5	7.5	38	3.0	10466	10500	10529	10558	\$17.00
1.6	8.0	38	3.0	10467	10501	10530	10559	\$17.00
1.7	8.5	38	3.0	10468	10502	10531	10560	\$17.00
1.8	9.0	38	3.0	10469	10503	10532	10561	\$17.00
1.9	9.5	38	3.0	10470	10504	10533	10562	\$17.00
2.0	10.0	38	3.0	10471	10505	10534	10563	\$17.00
2.1	10.5	38	3.0	10472	10506	10535	10564	\$17.00
2.2	11.0	38	3.0	10473	10507	10536	10565	\$17.00
2.3	11.5	38	3.0	10474	10508	10537	10566	\$17.00
2.4	12.0	38	3.0	10475	10509	10538	10567	\$17.00
2.5	12.5	38	3.0	10476	10510	10539	10568	\$17.00
2.6	13.0	38	3.0	10477	10511	10540	10569	\$17.00
2.7	13.5	38	3.0	10478	10512	10541	10570	\$17.00
2.8	14.0	38	3.0	10479	10513	10542	10571	\$17.00
2.9	14.5	38	3.0	10480	10514	10543	10572	\$17.00
3.0	15	38	3.0	10481	10515	10544	10573	\$16.00
3.5	16	50	4.0	10482	10516	10545	10574	\$22.00
4.0	20	50	4.0	10483	10517	10546	10575	\$22.00
4.5	20	50	5.0	10484	10518	10547	10576	\$23.50
5.0	20	50	5.0	10485	10519	10548	10577	\$23.50
6.0	25	63	6.0	10486	10520	10549	10578	\$27.00
8.0	28	63	8.0	10737	10740	10743	10746	\$35.00
10.0	30	70	10.0	10738	10741	10744	10747	\$58.00
12.0	32	74	12.0	10739	10742	10745	10748	\$68.00

35% tighter shank tolerance than h6!  
Shrink-Fit Ready!



Specs (MM micro end mills cutting diameter < 3.0mm):  
Cutting Diam +0.008 / -0.008mm  
Shank Diam +0.000 / -0.005mm  
Radius ± 0.004mm  
SFR = Shrink Fit Ready

Specs (MM end mills cutting diameter ≥ 3.0mm):  
Cutting Diam +0.000 / -0.038mm  
Shank Diam +0.000 / -0.0064mm  
Radius ± 0.019mm  
SFR = Shrink Fit Ready

## GR metric with Radius:

GR4RUC

new!



## 4 flute UnCoated metric rads



Diam	LOC	OAL	Shank	Rad 0.2mm	Rad 0.3mm	Rad 0.5mm	Rad 1.0mm	Rad 1.5mm	Rad 2.0mm	Rad 2.5mm	Rad 3.0mm	Corner Rad UnCoated Price
				EDP#	EDP#	EDP#	EDP#	EDP#	EDP#	EDP#	EDP#	
3.0mm	15	38	3.0	44035	44036	44037	44038					\$20.00
4.0	20	50	4.0	44039	44040	44041	44042					\$26.00
5.0	20	50	5.0	44044	44045	44046	44047	44048				\$27.50
6.0	25	63	6.0	44050	44051	44052	44053	44054	44055			\$33.00
8.0	28	63	8.0	44057	44058	44059	44060	44061	44062	44063		\$42.50
10.0	30	70	10.0	44065	44066	44067	44068	44069	44070	44071	44072	\$66.00
12.0	32	74	12.0	44073	44074	44075	44076	44077	44078	44079	44080	\$76.00

## GR Series: AT coated metric end mills w/Edge Prep

**Thick core, high strength solid carbide end mills for die steels & hardened materials featuring proprietary AlTiN coating and SmoothEdge 4.**



- Designed for milling of die steels & other hard metals • Tight tolerance
- Proprietary cemented carbide grade and AlTiN coating • SE1 below 3.0mm
- Features extended lengths of cut with heavy core for strength
- Strengthened cutting edges and reduced break-in with SmoothEdge 4

Diam	LOC	OAL	Shank	2 flute Square AT coated EDP#		2 flute Ball AT coated EDP#		4 flute Square AT coated EDP#		4 flute Ball AT coated EDP#		Price
0.25mm	1.2	38	3.0	00494	00531							\$21.00
0.3	1.5	38	3.0	00495	00532							\$21.00
0.4	2.0	38	3.0	00496	00533							\$21.00
0.5	2.5	38	3.0	00497	00534	00568	00601					\$21.00
0.6	3.0	38	3.0	00498	00535							\$21.00
0.7	3.5	38	3.0	00499	00536	00569	00602					\$20.00
0.8	4.0	38	3.0	00500	00537	00570	00603					\$20.00
0.9	4.5	38	3.0	00501	00538	00571	00604					\$20.00
1.0	5.0	38	3.0	00502	00539	00572	00605					\$20.00
1.1	5.5	38	3.0	00503	00540	00573	00606					\$20.00
1.2	6.0	38	3.0	00504	00541	00574	00607					\$20.00
1.3	6.5	38	3.0	00505	00542	00575	00608					\$20.00
1.4	7.0	38	3.0	00506	00543	00576	00609					\$20.00
1.5	7.5	38	3.0	00507	00544	00577	00610					\$19.00
1.6	8.0	38	3.0	00508	00545	00578	00611					\$19.00
1.7	8.5	38	3.0	00509	00546	00579	00612					\$19.00
1.8	9.0	38	3.0	00510	00547	00580	00613					\$19.00
1.9	9.5	38	3.0	00511	00548	00581	00614					\$19.00
2.0	10.0	38	3.0	00512	00549	00582	00615					\$19.00
2.1	10.5	38	3.0	00513	00550	00583	00616					\$19.00
2.2	11.0	38	3.0	00514	00551	00584	00617					\$19.00
2.3	11.5	38	3.0	00515	00552	00585	00618					\$19.00
2.4	12.0	38	3.0	00516	00553	00586	00619					\$19.00
2.5	12.5	38	3.0	00517	00554	00587	00620					\$19.00
2.6	13.0	38	3.0	00518	00555	00588	00621					\$19.00
2.7	13.5	38	3.0	00519	00556	00589	00622					\$19.00
2.8	14.0	38	3.0	00520	00557	00590	00623					\$19.00
2.9	14.5	38	3.0	00521	00558	00591	00624					\$19.00
3.0	15	38	3.0	00522	00559	00592	00625					\$18.00
3.5	16	50	4.0	00523	00560	00593	00626					\$24.50
4.0	20	50	4.0	00524	00561	00594	00627					\$24.50
4.5	20	50	5.0	00525	00562	00595	00628					\$27.00
5.0	20	50	5.0	00526	00563	00596	00629					\$27.00
6.0	25	63	6.0	00527	00564	00597	00630					\$32.00
8.0	28	63	8.0	00528	00565	00598	00631					\$42.50
10.0	30	70	10.0	00529	00566	00599	00632					\$67.00
12.0	32	74	12.0	00530	00567	00600	00633					\$77.00

### GR metric w/ Rad + AT: GR4RAT

**new!**



Rad	Rad	Rad	Rad	Rad	Rad	Rad	Rad	Rad	Corner Rad
0.2mm	0.3mm	0.5mm	1.0mm	1.5mm	2.0mm	2.5mm	3.0mm	AT+SE4	Price
EDP#	EDP#	EDP#	EDP#	EDP#	EDP#	EDP#	EDP#		
44135	44136	44137	44138						\$22.00
44139	44140	44141	44142						\$28.50
44144	44145	44146	44147	44148					\$31.00
44150	44151	44152	44153	44154	44155				\$38.00
44157	44158	44159	44160	44161	44162	44163			\$50.00
44165	44166	44167	44168	44169	44170	44171	44172		\$75.00
44173	44174	44175	44176	44177	44178	44179	44180		\$85.00






## GR Series: D1 PVD Diamond coated metric end mills

High strength, high hardness solid carbide end mills for graphite & abrasive materials featuring extended LOC's and proprietary coating for medium to long-run setups.



- Designed for graphite and abrasive non-metals
- Proprietary cemented carbide grade and D1 PVD diamond coating
- Superior abrasion resistance for superb price / performance valuation
- Extremely close diameter tolerances with our thinnest & smoothest diamond
- Features SmoothGrind sharp & polished cutting edges



Diam	LOC	OAL	Shank					
				2 flute Square D1 Coated EDP#	2 flute Ball D1 Coated EDP#	4 flute Square D1 Coated EDP#	4 flute Ball D1 Coated EDP#	Price
0.25mm	1.2	38	3.0	10579	10613			\$24.00
0.3	1.5	38	3.0	10580	10614			\$24.00
0.4	2.0	38	3.0	10581	10615			\$24.00
0.5	2.5	38	3.0	10582	10616	12237	12239	\$24.00
0.6	3.0	38	3.0	10583	10617			\$24.00
0.7	3.5	38	3.0	10584	10618	10647	10676	\$23.00
0.8	4.0	38	3.0	10585	10619	10648	10677	\$23.00
0.9	4.5	38	3.0	10586	10620	10649	10678	\$23.00
1.0	5.0	38	3.0	10587	10621	10650	10679	\$23.00
1.1	5.5	38	3.0	10588	10622	10651	10680	\$23.00
1.2	6.0	38	3.0	10589	10623	10652	10681	\$23.00
1.3	6.5	38	3.0	10590	10624	10653	10682	\$23.00
1.4	7.0	38	3.0	10591	10625	10654	10683	\$23.00
1.5	7.5	38	3.0	10592	10626	10655	10684	\$22.00
1.6	8.0	38	3.0	10593	10627	10656	10685	\$22.00
1.7	8.5	38	3.0	10594	10628	10657	10686	\$22.00
1.8	9.0	38	3.0	10595	10629	10658	10687	\$22.00
1.9	9.5	38	3.0	10596	10630	10659	10688	\$22.00
2.0	10.0	38	3.0	10597	10631	10660	10689	\$22.00
2.1	10.5	38	3.0	10598	10632	10661	10690	\$22.00
2.2	11.0	38	3.0	10599	10633	10662	10691	\$22.00
2.3	11.5	38	3.0	10600	10634	10663	10692	\$22.00
2.4	12.0	38	3.0	10601	10635	10664	10693	\$22.00
2.5	12.5	38	3.0	10602	10636	10665	10694	\$22.00
2.6	13.0	38	3.0	10603	10637	10666	10695	\$22.00
2.7	13.5	38	3.0	10604	10638	10667	10696	\$22.00
2.8	14.0	38	3.0	10605	10639	10668	10697	\$22.00
2.9	14.5	38	3.0	10606	10640	10669	10698	\$22.00
3.0	15	38	3.0	10607	10641	10670	10699	\$21.00
3.5	16	50	4.0	10608	10642	10671	10700	\$28.00
4.0	20	50	4.0	10609	10643	10672	10701	\$28.00
4.5	20	50	5.0	10610	10644	10673	10702	\$31.00
5.0	20	50	5.0	10611	10645	10674	10703	\$31.00
6.0	25	63	6.0	10612	10646	10675	10704	\$36.00
8.0	28	63	8.0	10749	10752	10755	10758	\$45.00
10.0	30	70	10.0	10750	10753	10756	10759	\$72.00
12.0	32	74	12.0	10751	10754	10757	10760	\$83.00

### GR metric w/ Rad + D1:

GR4RD1

**new!**



### 4 flute D1 coated metric rads



Diam	LOC	OAL	Shank	Rad	Rad	Rad	Rad	Rad	Rad	Rad	Rad	Corner Rad +D1 Price
				0.2mm EDP#	0.3mm EDP#	0.5mm EDP#	1.0mm EDP#	1.5mm EDP#	2.0mm EDP#	2.5mm EDP#	3.0mm EDP#	
3.0mm	15	38	3.0	00130	00131	00132	00133					\$25.00
4.0	20	50	4.0	00134	00135	00136	00137					\$32.00
5.0	20	50	5.0	00139	00140	00141	00142	00143				\$35.00
6.0	25	63	6.0	00145	00146	00147	00148	00149	00150			\$42.00
8.0	28	63	8.0	00152	00153	00154	00155	00156	00157	00158		\$52.50
10.0	30	70	10.0	00160	00161	00162	00163	00164	00165	00166	00167	\$80.00
12.0	32	74	12.0	00168	00169	00170	00171	00172	00173	00174	00175	\$91.00

## GR Series: D2 CVD Diamond coated metric end mills

**High strength, high hardness solid carbide end mills for graphite & abrasive materials featuring extended LOC's and proprietary CVD diamond coating for long-run setups.**



- Designed for graphite and abrasive non-metals
- Proprietary cemented carbide grade and D2 CVD diamond coating
- Our thickest, hardest, longest lasting diamond coating
- Maximum tool life and wear resistance for long production runs
- Tight diameter tolerances for CVD diamond

Diam	LOC	OAL	Shank
0.5mm	2.5	38	3.0
1.0	5.0	38	3.0
1.5	7.5	38	3.0
2.0	10	38	3.0
3.0	15	38	3.0
4.0	20	50	4.0
5.0	20	50	5.0
6.0	25	63	6.0
8.0	28	63	8.0
10.0	30	70	10.0
12.0	32	74	12.0

2 flute Square D2 Coated		2 flute Ball D2 Coated		4 flute Square D2 Coated		4 flute Ball D2 Coated	
EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
00710	\$58.00	00711	\$60.00	00712	\$58.00	12243	\$60.00
10890	\$49.00	10900	\$51.00	10910	\$49.00	10920	\$51.00
10891	\$45.00	10901	\$47.00	10911	\$45.00	10921	\$47.00
10892	\$44.00	10902	\$46.00	10912	\$44.00	10922	\$46.00
10893	\$43.00	10903	\$45.00	10913	\$43.00	10923	\$45.00
10894	\$66.50	10904	\$68.50	10914	\$66.50	10924	\$68.50
10895	\$86.00	10905	\$88.00	10915	\$86.00	10925	\$88.00
10896	\$88.50	10906	\$91.50	10916	\$88.50	10926	\$91.50
10897	\$115.00	10907	\$119.00	10917	\$115.00	10927	\$119.00
10898	\$176.50	10908	\$181.50	10918	\$176.50	10928	\$181.50
10899	\$196.00	10909	\$204.00	10919	\$196.00	10929	\$204.00

### GR metric w/ Rad + D2:

GR4RD2

**new!**



Diam	LOC	OAL	Shank
3.0mm	15	38	3.0
4.0	20	50	4.0
5.0	20	50	5.0
6.0	25	63	6.0
8.0	28	63	8.0
10.0	30	70	10.0
12.0	32	74	12.0



### 4 flute D2 coated metric rads



Rad 0.2mm	Rad 0.3mm	Rad 0.5mm	Rad 1.0mm	Rad 1.5mm	Rad 2.0mm	Rad 2.5mm	Rad 3.0mm	Corner Rad +D2
EDP#	EDP#	EDP#	EDP#	EDP#	EDP#	EDP#	EDP#	Price
00180	00181	00182	00183					\$48.00
00184	00185	00186	00187					\$71.50
00189	00190	00191	00192	00193				\$90.00
00195	00196	00197	00198	00199	00200			\$95.50
00202	00203	00204	00205	00206	00207	00208		\$125.50
00210	00211	00212	00213	00214	00215	00216	00217	\$184.50
00218	00219	00220	00221	00222	00223	00224	00225	\$208.00



**Specs (MM micro end mills cut diameter < 3.0mm w/ D2 coat):**  
Cutting Diam +0.013 / -0.025mm  
Shank Diam +0.000 / -0.005mm  
Radius ± 0.019mm  
SFR = Shrink Fit Ready



**Specs (MM end mills cutting diameter ≥ 3.0mm w/ D2 coat):**  
Cutting Diam +0.000 / -0.050mm  
Shank Diam +0.000 / -0.0064mm  
Radius ± 0.025mm  
SFR = Shrink Fit Ready



**35% tighter shank tolerance than h6!**  
Shrink-Fit Ready!



# HT Series: AT coated 6 or 8 flute Square & Radius

High strength, heavy core solid carbide end mills for high-speed machining of heat-treated & hardened materials up to 70HRC.

- Designed for peripheral milling or toroidal slotting • Proprietary cemented carbide grade and SmoothCoat AlTiN
- Includes SmoothEdge 1 edge prep • Maximum tool life and performance in HSM applications



### HT6SAT

### Square w/AT HT6 or HT8SAT

### Radius w/AT HT6 or HT8RAT

Diam	LOC	OAL	Shank	Flutes
1/8	1/2	1-1/2	1/8	6
3/16	5/8	2"	3/16	6
1/4	3/4	2-1/2	1/4	6
5/16	13/16	2-1/2	5/16	6
3/8	1"	2-1/2	3/8	6
1/2	1"	3"	1/2	6
5/8	1-1/4	3-1/2	5/8	8
3/4	1-1/2	4"	3/4	8
1"	1-1/2	4"	1"	8

EDP#	Price
23900	\$21.50
23902	\$25.00
23904	\$31.00
23906	\$38.00
23908	\$49.00
23910	\$75.00
23912	\$136.00
23914	\$180.00
23916	\$280.00

Radius	EDP#	Price
.010	23918	\$23.00
.010	23920	\$27.00
.010	23922	\$34.00
.010	23924	\$42.00
.030	23926	\$54.00
.030	23928	\$82.00
.030	23930	\$144.00
.030	23932	\$190.00
.030	23934	\$290.00

### Metric Square HT6 or HT8SAT

### Metric Radius HT6 or HT8RAT

Diam	LOC	OAL	Shank	Flutes
3.0mm	12	38	3.0	6
4.0	14	50	4.0	6
5.0	16	50	5.0	6
6.0	19	63	6.0	6
8.0	20	63	8.0	6
10.0	25	70	10.0	6
12.0	30	74	12.0	6
16.0	32	89	16.0	8
20.0	38	100	20.0	8

EDP#	Price
23960	\$21.50
23962	\$24.00
23964	\$25.00
23966	\$31.00
23968	\$38.00
23970	\$62.00
23972	\$75.00
23974	\$136.00
23976	\$200.00

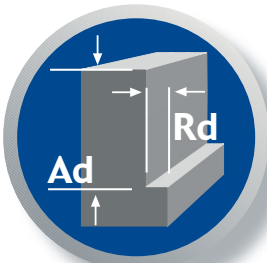
Radius	EDP#	Price
0.3	23978	\$23.00
0.3	23980	\$26.00
0.3	23982	\$27.00
0.3	23984	\$34.00
0.3	23986	\$42.00
0.3	23988	\$67.00
0.3	23990	\$82.00
0.3	23992	\$144.00
0.3	23994	\$210.00

Specs (fractional end mills cut diameter  $\geq 1/8$ ):  
Cutting Diam  $+0.000 / -0.015$   
Shank Diam  $+0.000 / -0.0025$   
Radius  $\pm .00075$   
SFR = Shrink Fit Ready

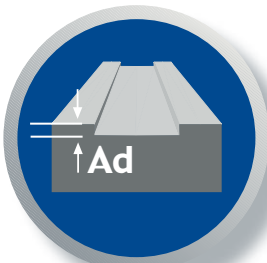
Specs (MM end mills cutting diameter  $\geq 3.0$ mm):  
Cutting Diam  $+0.000 / -0.038$ mm  
Shank Diam  $+0.000 / -0.0064$ mm  
Radius  $\pm 0.019$ mm  
SFR = Shrink Fit Ready

• Axial depth (Ad) and Radial depth (Rd) are expressed in % of cutter diameter.

• If recommended speed is higher than machine tool's capacity, run at maximum RPM and reduce feed appropriately.



Peripheral milling



Slot milling

Material Hardness	35 - 45 HRC		45 - 55 HRC		55 - 65 HRC		65 - 70 HRC	
Depth of cut Peripheral:	Ad = 1.5xD	Rd = .1xD	Ad = 1.0xD	Rd = .05xD	Ad = 1.0xD	Rd = .03xD	Ad = 1.0xD	Rd = .02xD
Depth of cut Slotting:	Ad = .1xD		Ad = .1xD		Ad = .05xD		Ad = .02xD	
	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
Fractional Mill Diameter	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
1/8"	18,000	85	13,500	48	11,000	33	7,600	21
3/16"	12,000	86	9,000	54	7,500	36	5,000	21
1/4"	9,200	100	7,500	72	5,600	40	3,800	20
5/16"	7,000	05	5,600	74	4,200	50	3,000	27
3/8"	5,600	105	4,300	76	3,500	50	2,500	27
1/2"	3,800	90	3,000	55	2,500	30	1,500	15

Material Hardness	35 - 45 HRC		45 - 55 HRC		55 - 65 HRC		65 - 70 HRC	
Depth of cut Peripheral:	Ad = 1.5xD	Rd = .1xD	Ad = 1.0xD	Rd = .05xD	Ad = 1.0xD	Rd = .03xD	Ad = 1.0xD	Rd = .02xD
Depth of cut Slotting:	Ad = .1xD		Ad = .1xD		Ad = .05xD		Ad = .02xD	
	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
Metric Mill Diameter	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min
3.0 mm	19,500	2,300	14,000	1,280	11,900	900	8,050	600
4.0	14,000	2,600	11,000	1,670	9,000	1,050	6,000	600
5.0	10,750	2,600	7,300	1,550	5,550	1,100	4,400	510
6.0	9,700	2,500	7,600	1,850	6,000	1,280	3,700	510
8.0	7,000	2,700	5,600	1,900	4,200	1,280	2,800	640
10.0	5,600	2,765	4,400	2,000	3,600	1,450	2,250	685
12.0	4,650	2,750	3,700	1,790	3,000	1,150	1,900	500

## **new!** CBN Series: Cubic Boron Nitride 2 flute micro ball end mills

High speed and high precision milling of hardened steels up to 70HRc.

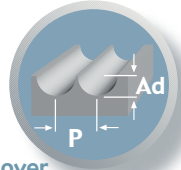


**CBN2BUC**



Specs (CBN micro end mills):  
Cutting Diam +.0004 / -.0004  
Shank Diam +.0000 / -.0003  
Radius ± .0002  
SFR = Shrink Fit Ready

- Solid CBN head yields extremely hard & durable cutting surface
- Mills a superb polished surface finish on work piece material
- Extremely long life and high chipping resistance
- Precision ball accuracy tolerance of ± .0002
- Oversized 1/4" carbide shank for strength w/ 2" OAL
- Clearance neck followed by 15° TPS for reach
- Up to 20X life of solid carbide end mill
- UnCoated



Ad = Axial DOC  
P = Radial step over



Diam	Radius	LOC	LBS	Neck Ø	OAL	Shank	CBN2BUC 2 flute Ball		Recommendations (for 62-70 HRc)			
							EDP#	Price	Speed	Feed	Ad	P
.10	.0050	.009	.035	.009	2"	1/4	51000	\$340.00	50,000	40	.0003	.0006
.015	.0075	.012	.047	.014	2"	1/4	51001	\$340.00	50,000	50	.0004	.0008
.020	.0100	.016	.051	.019	2"	1/4	51002	\$340.00	50,000	50	.0004	.0008
.025	.0125	.016	.063	.024	2"	1/4	51003	\$340.00	50,000	60	.0004	.0010
1/32	.0156	.020	.079	.030	2"	1/4	51004	\$340.00	50,000	80	.0006	.0012
1/16	.0312	.040	.169	.061	2"	1/4	51005	\$340.00	50,000	120	.0009	.0020

## **new!** NF Series: Non-Ferrous 2 flute micro end mills

High helix, square end design for improved milling of aluminum, copper, brass, bronze & related alloys featuring proprietary SmoothCoat micro coatings.



**NF2SUC**



Specs (micro end mills cutting diameter < 1/8"):  
Cutting Diam +.0003 / -.0003  
Shank Diam +.0000 / -.0002  
Radius ± .00015  
SFR = Shrink Fit Ready

- Designed for milling of non-ferrous materials • Tight tolerance ± .0003
- Proprietary cemented carbide grade with 3 different SmoothCoat micro coatings
- Features 45° helix for improved finish & increased chip removal
- LOC equals 3X cutting diameter • Necks & modifications available
- Use UnCoated for general purpose needs, corner rad alterations, etc.
- Use TC (TiCN) coated for abrasive alloys
- Use A1 (TiB2) coated for non-abrasive aluminum & magnesium alloys
- Use D1 PVD diamond coated for extremely abrasive non-ferrous alloys

Diam	LOC	OAL	Shank	UnCoated NF2SUC		TC Coated NF2STC		A1 Coated NF2SA1		D1 Coated NF2SD1	
				EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
.031	.093	1-1/2	1/8	50800	\$15.00	50801	\$17.00	50802	\$18.00	50803	\$20.00
.035	.105	1-1/2	1/8	50804	\$15.00	50805	\$17.00	50806	\$18.00	50807	\$20.00
.039	.117	1-1/2	1/8	50808	\$15.00	50809	\$17.00	50810	\$18.00	50811	\$20.00
.040	.120	1-1/2	1/8	50812	\$15.00	50813	\$17.00	50814	\$18.00	50815	\$20.00
.045	.135	1-1/2	1/8	50816	\$15.00	50817	\$17.00	50818	\$18.00	50819	\$20.00
.047	.141	1-1/2	1/8	50820	\$15.00	50821	\$17.00	50822	\$18.00	50823	\$20.00
.050	.150	1-1/2	1/8	50824	\$14.00	50825	\$16.00	50826	\$17.00	50827	\$19.00
.055	.165	1-1/2	1/8	50828	\$14.00	50829	\$16.00	50830	\$17.00	50831	\$19.00
.060	.180	1-1/2	1/8	50832	\$14.00	50833	\$16.00	50834	\$17.00	50835	\$19.00
.062	.186	1-1/2	1/8	50836	\$14.00	50837	\$16.00	50838	\$17.00	50839	\$19.00
.065	.195	1-1/2	1/8	50840	\$14.00	50841	\$16.00	50842	\$17.00	50843	\$19.00
.070	.210	1-1/2	1/8	50844	\$14.00	50845	\$16.00	50846	\$17.00	50847	\$19.00
.075	.225	1-1/2	1/8	50848	\$14.00	50849	\$16.00	50850	\$17.00	50851	\$19.00
.078	.234	1-1/2	1/8	50852	\$14.00	50853	\$16.00	50854	\$17.00	50855	\$19.00
.080	.240	1-1/2	1/8	50856	\$14.00	50857	\$16.00	50858	\$17.00	50859	\$19.00
.085	.255	1-1/2	1/8	50860	\$14.00	50861	\$16.00	50862	\$17.00	50863	\$19.00
.090	.270	1-1/2	1/8	50864	\$14.00	50865	\$16.00	50866	\$17.00	50867	\$19.00
.093	.279	1-1/2	1/8	50868	\$14.00	50869	\$16.00	50870	\$17.00	50871	\$19.00
.095	.285	1-1/2	1/8	50872	\$14.00	50873	\$16.00	50874	\$17.00	50875	\$19.00
.100	.300	1-1/2	1/8	50876	\$14.00	50877	\$16.00	50878	\$17.00	50879	\$19.00
.118	.354	1-1/2	1/8	50880	\$14.00	50881	\$16.00	50882	\$17.00	50883	\$19.00
.1245	.375	1-1/2	1/8	50884	\$14.00	50885	\$16.00	50886	\$17.00	50887	\$19.00

## new! SS Series: 5 flute micro end mills for finishing

High helix, square end design for finishing operations in stainless, steels, titanium, high-temp alloys & more featuring proprietary SmoothCoat micro coatings.



1/8" shank



Specs (micro end mills cutting diameter < 1/8"):  
Cutting Diam +.0003 / -.0003  
Shank Diam +.0000 / -.0002  
Radius ± .00015  
SFR = Shrink Fit Ready

- Designed for finishing of tough ferrous materials • Tight tolerance ± .0003
- Proprietary cemented carbide grade with 3 different SmoothCoat micro coatings
- Features 45° helix with heavy core for strength
- LOC equals 3X cutting diameter • Necks & modifications available
- Use UnCoated for general purpose needs, corner rad alterations, etc.
- Use AT (AlTiN) coated for stainless, carbon, & tool steels, and high temp alloys
- Use A1 (TiB2) coated for titanium
- Use D1 PVD diamond coated for CFC's, graphite, plastics, and aluminum-silicon alloys



Diam	LOC	OAL	Shank
.031	.093	1-1/2	1/8
.040	.120	1-1/2	1/8
.047	.141	1-1/2	1/8
.050	.150	1-1/2	1/8
.060	.180	1-1/2	1/8
.062	.186	1-1/2	1/8
.070	.210	1-1/2	1/8
.078	.234	1-1/2	1/8
.080	.240	1-1/2	1/8
.090	.270	1-1/2	1/8
.093	.279	1-1/2	1/8
.100	.300	1-1/2	1/8
.1245	.375	1-1/2	1/8

5 flute UnCoated SS5SUC		5 flute AT Coated SS5SAT		5 flute A1 Coated SS5SA1		5 flute D1 Coated SS5SD1	
Square EDP#	Price	Square EDP#	Price	Square EDP#	Price	Square EDP#	Price
50900	\$17.00	50901	\$19.00	50902	\$20.00	50903	\$22.00
50904	\$17.00	50905	\$19.00	50906	\$20.00	50907	\$22.00
50908	\$17.00	50909	\$19.00	50910	\$20.00	50911	\$22.00
50912	\$16.00	50913	\$18.00	50914	\$19.00	50915	\$21.00
50916	\$16.00	50917	\$18.00	50918	\$19.00	50919	\$21.00
50920	\$16.00	50921	\$18.00	50922	\$19.00	50923	\$21.00
50924	\$16.00	50925	\$18.00	50926	\$19.00	50927	\$21.00
50928	\$16.00	50929	\$18.00	50930	\$19.00	50931	\$21.00
50932	\$16.00	50933	\$18.00	50934	\$19.00	50935	\$21.00
50936	\$16.00	50937	\$18.00	50938	\$19.00	50939	\$21.00
50940	\$16.00	50941	\$18.00	50942	\$19.00	50943	\$21.00
50944	\$16.00	50945	\$18.00	50946	\$19.00	50947	\$21.00
50948	\$16.00	50949	\$18.00	50950	\$19.00	50951	\$21.00

## new! SSL Series: Long 5 flute micro end mills for finishing

High helix, square end design for finishing operations in stainless, steels, titanium, high-temp alloys & more featuring proprietary SmoothCoat and 2.5" OAL.



1/8" shank



Specs (micro end mills cutting diameter < 1/8"):  
Cutting Diam +.0003 / -.0003  
Shank Diam +.0000 / -.0002  
Radius ± .00015  
SFR = Shrink Fit Ready

- Designed for finishing of tough ferrous materials • Tight tolerance ± .0003
- Proprietary cemented carbide grade with 3 different SmoothCoat micro coatings
- Features 45° helix with heavy core for strength with OAL = 2.5"
- LOC equals 5X cutting diameter • Necks & modifications available
- Use UnCoated for general purpose needs, corner rad alterations, etc.
- Use AT (AlTiN) coated for stainless, carbon, & tool steels, and high temp alloys
- Use A1 (TiB2) coated for titanium
- Use D1 diamond coated for CFC's, graphite, and aluminum-silicon alloys



Diam	LOC	OAL	Shank
.031	.155	2-1/2	1/8
.040	.200	2-1/2	1/8
.047	.235	2-1/2	1/8
.050	.250	2-1/2	1/8
.060	.300	2-1/2	1/8
.062	.310	2-1/2	1/8
.070	.350	2-1/2	1/8
.078	.390	2-1/2	1/8
.080	.400	2-1/2	1/8
.090	.450	2-1/2	1/8
.093	.465	2-1/2	1/8
.100	.500	2-1/2	1/8
.1245	.625	2-1/2	1/8

5 flute UnCoated SSL5SUC		5 flute AT Coated SSL5SAT		5 flute A1 Coated SSL5SA1		5 flute D1 Coated SSL5SD1	
Square EDP#	Price	Square EDP#	Price	Square EDP#	Price	Square EDP#	Price
50952	\$26.00	50953	\$29.00	50954	\$31.00	50955	\$33.00
50956	\$26.00	50957	\$29.00	50958	\$31.00	50959	\$33.00
50960	\$26.00	50961	\$29.00	50962	\$31.00	50963	\$33.00
50964	\$26.00	50965	\$29.00	50966	\$31.00	50967	\$33.00
50968	\$26.00	50969	\$29.00	50970	\$31.00	50971	\$33.00
50972	\$26.00	50973	\$29.00	50974	\$31.00	50975	\$33.00
50976	\$26.00	50977	\$29.00	50978	\$31.00	50979	\$33.00
50980	\$26.00	50981	\$29.00	50982	\$31.00	50983	\$33.00
50984	\$26.00	50985	\$29.00	50986	\$31.00	50987	\$33.00
50988	\$26.00	50989	\$29.00	50990	\$31.00	50991	\$33.00
50992	\$26.00	50993	\$29.00	50994	\$31.00	50995	\$33.00
50996	\$26.00	50997	\$29.00	50998	\$31.00	50999	\$33.00
51100	\$26.00	51101	\$29.00	51102	\$31.00	51103	\$33.00



**new!** **LR5X Series: Long Reach 3 flute micro end mills**  
Short flute length for rigidity in deep cavity milling with 5X diameter reach  
featuring proprietary SmoothCoat micro coating and 2.5" OAL.



LR5X3UC (pictured)

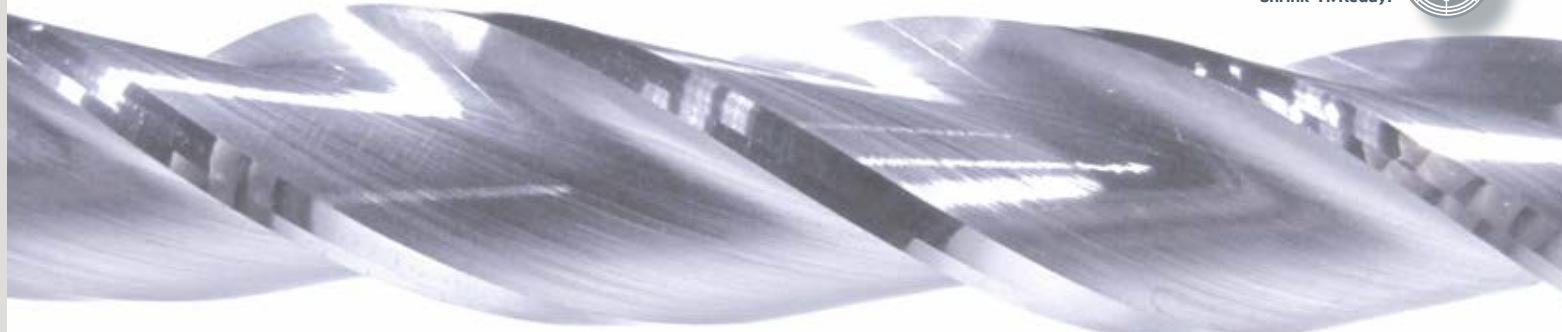
Also available as LR5X3SUC and LR5X3BUC plus 3 coating options.

- Designed for cavity milling of a wide range of materials • Tight tolerance  $\pm .0003$
- Proprietary cemented carbide grade with 3 different SmoothCoat micro coatings
- Features three flutes @ 30° helix & reduced neck for clearance
- LOC = 1.5X cutting diameter • Total length below shank (LBS) = 5X.
- Use UnCoated for general purpose needs
- Use AT (AlTiN) coated for high-temp exotics & alloys, die & hardened steels, stainless
- Use A1 (TiB2) coated for titanium, aluminum & other non-ferrous materials
- Use D1 diamond coated for graphites & other extremely abrasive non-ferrous alloys



Diam	End	LOC	LBS	OAL	Shank	3 flute UnCoated LR5X3UC		3 flute AT Coated LR5X3AT		3 flute A1 Coated LR5X3A1		3 flute D1 Coated LR5X3D1	
						EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
.031	Square	.046	.156	2-1/2	1/8	50640	\$26.00	50641	\$29.00	50642	\$31.00	50643	\$33.00
.031	.005 Rad	.046	.156	2-1/2	1/8	50644	\$26.00	50645	\$29.00	50646	\$31.00	50647	\$33.00
.031	.010 Rad	.046	.156	2-1/2	1/8	50648	\$26.00	50649	\$29.00	50650	\$31.00	50651	\$33.00
.031	Ball	.046	.156	2-1/2	1/8	50652	\$26.00	50653	\$29.00	50654	\$31.00	50655	\$33.00
.047	Square	.070	.250	2-1/2	1/8	50656	\$26.00	50657	\$29.00	50658	\$31.00	50659	\$33.00
.047	.005 Rad	.070	.250	2-1/2	1/8	50660	\$26.00	50661	\$29.00	50662	\$31.00	50663	\$33.00
.047	.010 Rad	.070	.250	2-1/2	1/8	50664	\$26.00	50665	\$29.00	50666	\$31.00	50667	\$33.00
.047	Ball	.070	.250	2-1/2	1/8	50668	\$26.00	50669	\$29.00	50670	\$31.00	50671	\$33.00
.062	Square	.093	.312	2-1/2	1/8	50672	\$26.00	50673	\$29.00	50674	\$31.00	50675	\$33.00
.062	.005 Rad	.093	.312	2-1/2	1/8	50676	\$26.00	50677	\$29.00	50678	\$31.00	50679	\$33.00
.062	.010 Rad	.093	.312	2-1/2	1/8	50680	\$26.00	50681	\$29.00	50682	\$31.00	50683	\$33.00
.062	.015 Rad	.093	.312	2-1/2	1/8	50684	\$26.00	50685	\$29.00	50686	\$31.00	50687	\$33.00
.062	Ball	.093	.312	2-1/2	1/8	50688	\$26.00	50689	\$29.00	50690	\$31.00	50691	\$33.00
.078	Square	.117	.406	2-1/2	1/8	50692	\$26.00	50693	\$29.00	50694	\$31.00	50695	\$33.00
.078	.005 Rad	.117	.406	2-1/2	1/8	50696	\$26.00	50697	\$29.00	50698	\$31.00	50699	\$33.00
.078	.010 Rad	.117	.406	2-1/2	1/8	50700	\$26.00	50701	\$29.00	50702	\$31.00	50703	\$33.00
.078	.015 Rad	.117	.406	2-1/2	1/8	50704	\$26.00	50705	\$29.00	50706	\$31.00	50707	\$33.00
.078	Ball	.117	.406	2-1/2	1/8	50708	\$26.00	50709	\$29.00	50710	\$31.00	50711	\$33.00
.093	Square	.139	.500	2-1/2	1/8	50712	\$26.00	50713	\$29.00	50714	\$31.00	50715	\$33.00
.093	.005 Rad	.139	.500	2-1/2	1/8	50716	\$26.00	50717	\$29.00	50718	\$31.00	50719	\$33.00
.093	.010 Rad	.139	.500	2-1/2	1/8	50720	\$26.00	50721	\$29.00	50722	\$31.00	50723	\$33.00
.093	.015 Rad	.139	.500	2-1/2	1/8	50724	\$26.00	50725	\$29.00	50726	\$31.00	50727	\$33.00
.093	Ball	.139	.500	2-1/2	1/8	50728	\$26.00	50729	\$29.00	50730	\$31.00	50731	\$33.00
.1245	Square	.187	.625	2-1/2	1/8	50732	\$26.00	50733	\$29.00	50734	\$31.00	50735	\$33.00
.1245	.005 Rad	.187	.625	2-1/2	1/8	50736	\$26.00	50737	\$29.00	50738	\$31.00	50739	\$33.00
.1245	.010 Rad	.187	.625	2-1/2	1/8	50740	\$26.00	50741	\$29.00	50742	\$31.00	50743	\$33.00
.1245	.015 Rad	.187	.625	2-1/2	1/8	50744	\$26.00	50745	\$29.00	50746	\$31.00	50747	\$33.00
.1245	Ball	.187	.625	2-1/2	1/8	50748	\$26.00	50749	\$29.00	50750	\$31.00	50751	\$33.00

35% tighter shank tolerance than h6!  
Shrink-Fit Ready!



# new! LR8X Series: Long Reach 3 flute micro end mills

Short flute length for rigidity in deep cavity milling with 8X diameter reach  
featuring proprietary SmoothCoat micro coatings and 2.5" OAL.



LR8X3UC (pictured)

Also available as LR8X3SUC and LR8X3BUC plus 3 coating options.

- Designed for cavity milling of a wide range of materials • Tight tolerance  $\pm .0003$
- Proprietary cemented carbide grade with 3 different SmoothCoat micro coatings
- Features three flutes @ 30° helix & reduced neck for clearance
- LOC = 1.5X cutting diameter • Total length below shank (LBS) = 8X.
- Use UnCoated for general purpose needs
- Use AT (AlTiN) coated for high-temp exotics & alloys, die & hardened steels, stainless
- Use A1 (TiB2) coated for titanium, aluminum & other non-ferrous materials
- Use D1 PVD diamond coated for graphites & other extremely abrasive non-ferrous alloys

1/8" shank



Specs (micro end mills cutting diameter < 1/8"):  
Cutting Diam  $\pm .0003 / -.0003$   
Shank Diam  $\pm .0000 / -.0002$   
Radius  $\pm .00015$   
SFR = Shrink Fit Ready



Diam	End	LOC	LBS	OAL	Shank	3 flute UnCoated LR8X3UC		3 flute AT Coated LR8X3AT		3 flute A1 Coated LR8X3A1		3 flute D1 Coated LR8X3D1	
						EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
.031	Square	.046	.250	2-1/2	1/8	51640	\$27.00	51641	\$30.00	51642	\$32.00	51643	\$34.00
.031	.005 Rad	.046	.250	2-1/2	1/8	51644	\$27.00	51645	\$30.00	51646	\$32.00	51647	\$34.00
.031	.010 Rad	.046	.250	2-1/2	1/8	51648	\$27.00	51649	\$30.00	51650	\$32.00	51651	\$34.00
.031	Ball	.046	.250	2-1/2	1/8	51652	\$27.00	51653	\$30.00	51654	\$32.00	51655	\$34.00
.047	Square	.070	.375	2-1/2	1/8	51656	\$27.00	51657	\$30.00	51658	\$32.00	51659	\$34.00
.047	.005 Rad	.070	.375	2-1/2	1/8	51660	\$27.00	51661	\$30.00	51662	\$32.00	51663	\$34.00
.047	.010 Rad	.070	.375	2-1/2	1/8	51664	\$27.00	51665	\$30.00	51666	\$32.00	51667	\$34.00
.047	Ball	.070	.375	2-1/2	1/8	51668	\$27.00	51669	\$30.00	51670	\$32.00	51671	\$34.00
.062	Square	.093	.500	2-1/2	1/8	51672	\$27.00	51673	\$30.00	51674	\$32.00	51675	\$34.00
.062	.005 Rad	.093	.500	2-1/2	1/8	51676	\$27.00	51677	\$30.00	51678	\$32.00	51679	\$34.00
.062	.010 Rad	.093	.500	2-1/2	1/8	51680	\$27.00	51681	\$30.00	51682	\$32.00	51683	\$34.00
.062	.015 Rad	.093	.500	2-1/2	1/8	51684	\$27.00	51685	\$30.00	51686	\$32.00	51687	\$34.00
.062	Ball	.093	.500	2-1/2	1/8	51688	\$27.00	51689	\$30.00	51690	\$32.00	51691	\$34.00
.078	Square	.117	.625	2-1/2	1/8	51692	\$27.00	51693	\$30.00	51694	\$32.00	51695	\$34.00
.078	.005 Rad	.117	.625	2-1/2	1/8	51696	\$27.00	51697	\$30.00	51698	\$32.00	51699	\$34.00
.078	.010 Rad	.117	.625	2-1/2	1/8	51700	\$27.00	51701	\$30.00	51702	\$32.00	51703	\$34.00
.078	.015 Rad	.117	.625	2-1/2	1/8	51704	\$27.00	51705	\$30.00	51706	\$32.00	51707	\$34.00
.078	Ball	.117	.625	2-1/2	1/8	51708	\$27.00	51709	\$30.00	51710	\$32.00	51711	\$34.00
.093	Square	.139	.750	2-1/2	1/8	51712	\$27.00	51713	\$30.00	51714	\$32.00	51715	\$34.00
.093	.005 Rad	.139	.750	2-1/2	1/8	51716	\$27.00	51717	\$30.00	51718	\$32.00	51719	\$34.00
.093	.010 Rad	.139	.750	2-1/2	1/8	51720	\$27.00	51721	\$30.00	51722	\$32.00	51723	\$34.00
.093	.015 Rad	.139	.750	2-1/2	1/8	51724	\$27.00	51725	\$30.00	51726	\$32.00	51727	\$34.00
.093	Ball	.139	.750	2-1/2	1/8	51728	\$27.00	51729	\$30.00	51730	\$32.00	51731	\$34.00
.1245	Square	.187	.950	2-1/2	1/8	51732	\$27.00	51733	\$30.00	51734	\$32.00	51735	\$34.00
.1245	.005 Rad	.187	.950	2-1/2	1/8	51736	\$27.00	51737	\$30.00	51738	\$32.00	51739	\$34.00
.1245	.010 Rad	.187	.950	2-1/2	1/8	51740	\$27.00	51741	\$30.00	51742	\$32.00	51743	\$34.00
.1245	.015 Rad	.187	.950	2-1/2	1/8	51744	\$27.00	51745	\$30.00	51746	\$32.00	51747	\$34.00
.1245	Ball	.187	.950	2-1/2	1/8	51748	\$27.00	51749	\$30.00	51750	\$32.00	51751	\$34.00

35% tighter shank tolerance than h6!  
Shrink-Fit Ready!



## Material Warning



**SmoothCoat**<sup>®</sup>

SuperNitride PVD Hard Coatings Exclusively by Tool Alliance<sup>®</sup>

## new! LR12X Series: Long Reach 3 flute micro end mills

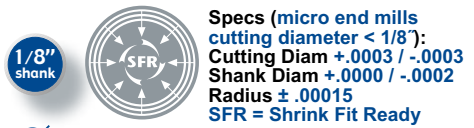
**Short flute length for rigidity in deep cavity milling with 12X diameter reach featuring proprietary SmoothCoat micro coatings and 2.5" OAL.**



LR12X3RUC (pictured)

Also available as LR12X3SUC and LR12X3BUC plus 3 coating options.

- Designed for cavity milling of a wide range of materials • Tight tolerance ± .0003
- Proprietary cemented carbide grade with 3 different SmoothCoat micro coatings
- Features three flutes @ 30° helix & reduced neck for clearance
- LOC = 1.5X cutting diameter • Total length below shank (LBS) = 12X.
- Use UnCoated for general purpose needs
- Use AT (AlTiN) coated for high-temp exotics & alloys, die & hardened steels, stainless
- Use A1 (TiB2) coated for titanium, aluminum & other non-ferrous materials
- Use D1 diamond coated for graphites & other extremely abrasive non-ferrous alloys



Diam	End	LOC	LBS	OAL	Shank	3 flute UnCoated LR12X3UC		3 flute AT Coated LR12X3AT		3 flute A1 Coated LR12X3A1		3 flute D1 Coated LR12X3D1	
						EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
.031	Square	.046	.375	2-1/2	1/8	52640	\$28.00	52641	\$31.00	52642	\$33.00	52643	\$35.00
.031	.005 Rad	.046	.375	2-1/2	1/8	52644	\$28.00	52645	\$31.00	52646	\$33.00	52647	\$35.00
.031	.010 Rad	.046	.375	2-1/2	1/8	52648	\$28.00	52649	\$31.00	52650	\$33.00	52651	\$35.00
.031	Ball	.046	.375	2-1/2	1/8	52652	\$28.00	52653	\$31.00	52654	\$33.00	52655	\$35.00
.047	Square	.070	.570	2-1/2	1/8	52656	\$28.00	52657	\$31.00	52658	\$33.00	52659	\$35.00
.047	.005 Rad	.070	.570	2-1/2	1/8	52660	\$28.00	52661	\$31.00	52662	\$33.00	52663	\$35.00
.047	.010 Rad	.070	.570	2-1/2	1/8	52664	\$28.00	52665	\$31.00	52666	\$33.00	52667	\$35.00
.047	Ball	.070	.570	2-1/2	1/8	52668	\$28.00	52669	\$31.00	52670	\$33.00	52671	\$35.00
.062	Square	.093	.750	2-1/2	1/8	52672	\$28.00	52673	\$31.00	52674	\$33.00	52675	\$35.00
.062	.005 Rad	.093	.750	2-1/2	1/8	52676	\$28.00	52677	\$31.00	52678	\$33.00	52679	\$35.00
.062	.010 Rad	.093	.750	2-1/2	1/8	52680	\$28.00	52681	\$31.00	52682	\$33.00	52683	\$35.00
.062	.015 Rad	.093	.750	2-1/2	1/8	52684	\$28.00	52685	\$31.00	52686	\$33.00	52687	\$35.00
.062	Ball	.093	.750	2-1/2	1/8	52688	\$28.00	52689	\$31.00	52690	\$33.00	52691	\$35.00
.078	Square	.117	.940	2-1/2	1/8	52692	\$28.00	52693	\$31.00	52694	\$33.00	52695	\$35.00
.078	.005 Rad	.117	.940	2-1/2	1/8	52696	\$28.00	52697	\$31.00	52698	\$33.00	52699	\$35.00
.078	.010 Rad	.117	.940	2-1/2	1/8	52700	\$28.00	52701	\$31.00	52702	\$33.00	52703	\$35.00
.078	.015 Rad	.117	.940	2-1/2	1/8	52704	\$28.00	52705	\$31.00	52706	\$33.00	52707	\$35.00
.078	Ball	.117	.940	2-1/2	1/8	52708	\$28.00	52709	\$31.00	52710	\$33.00	52711	\$35.00
.093	Square	.139	1.125	2-1/2	1/8	52712	\$28.00	52713	\$31.00	52714	\$33.00	52715	\$35.00
.093	.005 Rad	.139	1.125	2-1/2	1/8	52716	\$28.00	52717	\$31.00	52718	\$33.00	52719	\$35.00
.093	.010 Rad	.139	1.125	2-1/2	1/8	52720	\$28.00	52721	\$31.00	52722	\$33.00	52723	\$35.00
.093	.015 Rad	.139	1.125	2-1/2	1/8	52724	\$28.00	52725	\$31.00	52726	\$33.00	52727	\$35.00
.093	Ball	.139	1.125	2-1/2	1/8	52728	\$28.00	52729	\$31.00	52730	\$33.00	52731	\$35.00
.1245	Square	.187	1.500	2-1/2	1/8	52732	\$28.00	52733	\$31.00	52734	\$33.00	52735	\$35.00
.1245	.005 Rad	.187	1.500	2-1/2	1/8	52736	\$28.00	52737	\$31.00	52738	\$33.00	52739	\$35.00
.1245	.010 Rad	.187	1.500	2-1/2	1/8	52740	\$28.00	52741	\$31.00	52742	\$33.00	52743	\$35.00
.1245	.015 Rad	.187	1.500	2-1/2	1/8	52744	\$28.00	52745	\$31.00	52746	\$33.00	52747	\$35.00
.1245	Ball	.187	1.500	2-1/2	1/8	52748	\$28.00	52749	\$31.00	52750	\$33.00	52751	\$35.00

## About the technology partners of RoundTool Laboratories®

Our technology partners are second to none. We find premiere firms, the technological leaders in their respective industries, throughout the world and work with them in progressive, win-win relationships to bring our customers the very finest components and characteristics that we build into our products. Constant reinvestment into our company-owned factories promise long-term stability & consistency in delivering Performance & Solutions to carbide rotary tooling consumers everywhere.

Coating systems

5-axis VMC control

Robotics

Grinding centers

CNC grinder controls & software

Substrate, abrasive, coolants & workholding



# DM Series: AT coated heavy core Ball Nose

High strength, high hardness solid carbide ball end mills for HSM roughing & finishing of hardened alloys up to 65HRc.



- Designed for milling complex contours and shapes in hard metals
- Proprietary cemented carbide grade, AlTiN coating & edge prep
- Maximum tool life and performance in HSM applications
- Extremely close diameter & radius tolerances
- Order by EDP# or "DM2BAT 1/4L"



DM2BAT



DM4BAT



2 flute Ball AT  
DM2BAT

4 flute Ball AT  
DM4BAT

Diam	LOC	LBS	Taper	OAL	Shank	2 flute Ball AT DM2BAT		4 flute Ball AT DM4BAT	
						EDP#	Price	EDP#	Price
.032	.032		5°	3"	1/4	24085	\$33.00	24485	\$33.00
.040	.040		5°	3"	1/4	24086	\$33.00	24486	\$33.00
1/16	1/16		5°	3"	1/4	24088	\$33.00	24488	\$33.00
.080	.080		5°	3"	1/4	24090	\$33.00	24490	\$33.00
3/32	3/32		5°	3"	1/4	24092	\$33.00	24492	\$33.00
1/8	1/8		5°	3"	1/4	24094	\$33.00	24494	\$33.00
3/16	3/16		5°	3"	1/4	24097	\$33.00	24497	\$33.00
1/4	1/4	1/2	5°	3"	1/4	24100	\$33.00	24400	\$33.00
1/4L	1/4		5°	4"	3/8	24101	\$68.00	24401	\$68.00
5/16	5/16		5°	4"	3/8	24103	\$68.00	24403	\$68.00
3/8	3/8	3/4	5°	4"	3/8	24104	\$68.00	24404	\$68.00
3/8L	3/8		5°	5"	1/2	24109	\$118.00	24409	\$118.00
1/2	1/2	1"	5°	4"	1/2	24107	\$100.00	24407	\$100.00
1/2L	1/2		5°	5"	5/8	24110	\$150.00	24410	\$150.00



Specs (DM Series fractional end mills):  
Cutting Diam +.0000 / -.0008  
Shank Diam +.0000 / -.00025  
Radius ± .0004  
SFR = Shrink Fit Ready

## Metric sizes

DM2BAT



DM4BAT



2 flute Ball AT  
DM2BAT

4 flute Ball AT  
DM4BAT

Diam	LOC	LBS	Taper	OAL	Shank	2 flute Ball AT DM2BAT		4 flute Ball AT DM4BAT	
						EDP#	Price	EDP#	Price
0.5mm	0.5		5°	75	6.0	24115	\$33.00	24415	\$33.00
1.0	1		5°	75	6.0	24116	\$33.00	24416	\$33.00
1.5	1.5		5°	75	6.0	24118	\$33.00	24418	\$33.00
2.0	2		5°	75	6.0	24120	\$33.00	24420	\$33.00
3.0	3		5°	75	6.0	24122	\$33.00	24422	\$33.00
4.0	4		5°	75	6.0	24124	\$33.00	24424	\$33.00
5.0	5		5°	75	6.0	24126	\$33.00	24426	\$33.00
6.0	6	12	5°	75	6.0	24136	\$33.00	24436	\$33.00
6.0	6		5°	100	8.0	24128	\$58.00	24428	\$58.00
8.0	8		5°	100	10.0	24130	\$76.00	24430	\$76.00
10.0	10	20	5°	100	10.0	24132	\$76.00	24432	\$76.00
12.0	12	24	5°	100	12.0	24134	\$100.00	24434	\$100.00



Specs (DM Series Metric size end mills):  
Cutting Diam +0.000 / -0.021mm  
Shank Diam +0.000 / -0.0064mm  
Radius ± 0.010mm  
SFR = Shrink Fit Ready



35% tighter shank tolerance than h6!  
Shrink-Fit Ready!



## DM Series: AT coated heavy core w/ Radius

**High strength, high hardness solid carbide radius end mills for HSM roughing & finishing of hardened alloys up to 65HRc.**



- Designed for milling complex contours and shapes in hard metals
- Proprietary cemented carbide grade, AlTiN coating & edge prep
- Maximum tool life and performance in HSM applications
- Extremely close diameter & radius tolerances
- Order by EDP# or "DM4RAT 1/4L .031"



∅	Diam	LOC	LBS	Taper	OAL	Shank
	1/8	1/8		5°	3"	1/4
	3/16	3/16		5°	3"	1/4
	1/4	1/4	1/2		3"	1/4
	1/4L	1/4		5°	4"	3/8
	3/8	3/8	3/4		4"	3/8
	3/8L	3/8		5°	5"	1/2
	1/2	1/2	1"		4"	1/2
	1/2L	1/2		5°	5"	5/8

Radius Size Rad	2 flute DM2RAT EDP#	4 flute DM4RAT EDP#	Radius Size Rad	2 flute DM2RAT EDP#	4 flute DM4RAT EDP#	Radius AT Coated Price
.015	24500	24502	.020	24501	24503	\$33.00
.015	24504	24506	.020	24505	24507	\$33.00
.020	24508	24510	.031	24509	24511	\$33.00
.020	24512	24514	.031	24513	24515	\$68.00
.031	24516	24518	.062	24517	24519	\$68.00
.031	24520	24522	.062	24521	24523	\$118.00
.031	24524	24526	.062	24525	24527	\$100.00
.031	24528	24530	.062	24529	24531	\$150.00

**Specs (DM Series fractional end mills):**  
Cutting Diam +.0000 / -.0008  
Shank Diam +.0000 / -.00025  
Radius ± .0004  
SFR = Shrink Fit Ready

### Metric sizes



∅	Diam	LOC	LBS	Taper	OAL	Shank
	3.0mm	3		5°	75	6.0
	4.0	4		5°	75	6.0
	5.0	5		5°	75	6.0
	6.0	6	12		75	6.0
	6.0	6		5°	100	8.0
	8.0	8		5°	100	10.0
	10.0	10	20		100	10.0
	12.0	12	24		100	12.0

Radius Size Rad	2 flute DM2RAT EDP#	4 flute DM4RAT EDP#	Radius Size Rad	2 flute DM2RAT EDP#	4 flute DM4RAT EDP#	Radius AT Coated Price
0.3	24532	24534	0.5	24533	24535	\$33.00
0.3	24536	24538	0.5	24537	24539	\$33.00
0.3	24540	24542	0.5	24541	24543	\$33.00
0.5	24544	24546	0.8	24545	24547	\$33.00
0.5	24548	24550	0.8	24549	24551	\$58.00
0.5	24552	24554	0.8	24553	24555	\$76.00
1.0	24556	24558	1.5	24557	24559	\$76.00
1.0	24560	24562	1.5	24561	24563	\$100.00

**Specs (DM Series Metric size end mills):**  
Cutting Diam +0.000 / -0.021mm  
Shank Diam +0.000 / -0.0064mm  
Radius ± 0.010mm  
SFR = Shrink Fit Ready

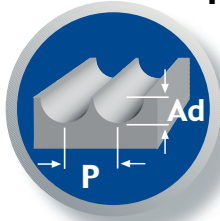


**35% tighter shank tolerance than h6!**  
Shrink-Fit Ready!

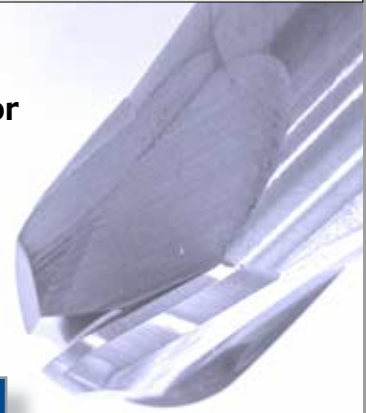


# DM Series: Technical Data

High strength, high hardness solid carbide ball end mills for high-speed machining of hardened alloys up to 65HRc.



- Designed for milling complex contours and shapes
- Proprietary cemented carbide grade and coating
- Maximum tool life and performance in HSM applications
- Pitch (P) and Axial depth (Ad) are expressed in % of cutter diameter
- If recommended speed is higher than machine tool's capacity, run at maximum RPM and reduce feed appropriately



Material Hardness	30 - 40 HRc		40 - 45 HRc		45 - 55 HRc		55 - 60 HRc		60 - 65 HRc	
Depth of Cut	Ad = .1xD	P=.2xD	Ad = .05xD	P=.2xD	Ad = .03xD	P=.1xD	Ad = .02xD	P=.1xD	Ad = .01xD	P=.1xD
	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
Fractional Diameter	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
.032	38,800	39	38,800	39	38,800	39	38,800	34	37,600	21
.040	31,040	59	31,040	59	31,040	59	28,000	55	15,550	21
1/16"	31,040	74	31,040	74	31,040	74	28,000	70	15,550	23
.080	31,040	74	31,040	74	31,040	74	28,000	70	15,550	23
3/32"	31,040	74	31,040	74	31,040	74	28,000	70	15,550	23
1/8"	23,925	86	23,925	80	20,925	80	18,925	70	10,425	23
3/16"	14,550	97	14,550	91	12,550	83	11,050	75	6,400	23
1/4"	12,025	97	12,025	85	10,625	83	9,625	75	8,425	25
5/16"	9,300	72	9,300	72	8,100	62	7,300	56	4,100	19
3/8"	7,285	54	7,285	54	6,300	46	5,650	40	3,400	15
7/16"	6,425	49	6,425	49	5,600	43	5,100	39	3,000	14
1/2"	6,125	48	6,125	48	5,325	42	4,775	38	2,675	13

Specs (DM Series fractional end mills):  
Cutting Diam +0.000 / -0.008  
Shank Diam +0.000 / -0.0025  
Radius ± .0004  
SFR = Shrink Fit Ready

Material Hardness	30 - 40 HRc		40 - 45 HRc		45 - 55 HRc		55 - 60 HRc		60 - 65 HRc	
Depth of Cut	Ad = .1xD	P=.2xD	Ad = .05xD	P=.2xD	Ad = .03xD	P=.1xD	Ad = .02xD	P=.1xD	Ad = .01xD	P=.1xD
	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
Metric Mill Diameter	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min	RPM	mm/min
0.50 mm	38,800	991	38,800	991	38,800	991	38,800	864	37,600	533
1.0 mm	31,040	1,499	31,040	1,499	31,040	1,499	28,000	1,397	15,550	533
1.5 mm	31,040	1,880	31,040	1,880	31,040	1,880	28,000	1,778	15,550	584
2.0 mm	31,040	1,880	31,040	1,880	31,040	1,880	28,000	1,778	15,550	584
3.0 mm	31,040	1,880	31,040	1,880	31,040	1,880	28,000	1,778	15,550	584
4.0 mm	23,925	2,184	23,925	2,032	20,925	2,032	18,925	1,778	10,425	584
5.0 mm	14,550	2,464	14,550	2,311	12,550	2,108	11,050	1,905	6,400	584
6.0 mm	12,025	2,464	12,025	2,159	10,625	2,108	9,625	1,905	8,425	635
8.0 mm	9,300	1,829	9,300	1,829	8,100	1,575	7,300	1,422	4,100	483
10.0 mm	7,285	1,372	7,285	1,372	6,300	1,168	5,650	1,016	3,400	381
12.0 mm	6,425	1,245	6,425	1,245	5,600	1,092	5,100	991	3,000	356

Specs (DM Series Metric size end mills):  
Cutting Diam +0.000 / -0.021mm  
Shank Diam +0.000 / -0.0064mm  
Radius ± 0.010mm  
SFR = Shrink Fit Ready

**35% tighter shank tolerance than h6!**  
Shrink-Fit Ready!



**new!** **GRD Series: Downshear 4 flute fractional end mills**  
High strength, high hardness solid carbide square end mills featuring left-hand helix / right-hand cut "downshear" cutting geometry.



- Designed for "push down" work-piece applications (LHS/RHC)
- Proprietary cemented carbide grade, SmoothEdge & SmoothCoat where applicable
- Use UnCoated for general purpose needs, corner rad alterations, etc.
- Use AT coated for stainless, carbon, & tool steels, and high temp alloys (includes SE4)
- Use D1 diamond coated for CFC's, graphite, plastics, and aluminum-silicon alloys
- Use D2 diamond coated for long-run jobs in CFC's, graphite, & aluminum-silicon alloys

**GRD4SUC**  
**35% tighter shank tolerance than h6!**  
Shrink-Fit Ready!  
Specs (fractional end mills cut diameter ≥ 1/8"):  
Cutting Diam +.0000 / -.0015  
Shank Diam +.0000 / -.00025  
Radius ± .00075

Diam	LOC	OAL	Shank	UnCoated GRD4SUC		AT Coated w/ SE4 GRD4SAT		D1 Coated GRD4SD1		D2 Coated GRD4SD2	
				EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
1/16	5/16	1-1/2	1/8	24600	\$19.00	24601	\$21.00	24602	\$24.00	24603	\$47.00
1/8	5/8	1-1/2	1/8	24604	\$17.00	24605	\$19.00	24606	\$22.00	24607	\$45.00
3/16	3/4	2"	3/16	24608	\$24.00	24609	\$27.00	24610	\$30.00	24611	\$69.50
1/4	1"	2-1/2	1/4	24612	\$29.00	24613	\$34.00	24614	\$38.00	24615	\$91.50
5/16	1"	2-1/2	5/16	24616	\$36.00	24617	\$43.00	24618	\$46.00	24619	\$119.00
3/8	1"	2-1/2	3/8	24620	\$46.00	24621	\$54.00	24622	\$57.00	24623	\$152.50
7/16	1"	3"	7/16	24624	\$66.00	24625	\$76.00	24626	\$80.00	24627	\$184.50
1/2	1-1/4	3"	1/2	24628	\$70.00	24629	\$80.00	24630	\$85.00	24631	\$202.00
5/8	1-3/8	3-1/2	5/8	24632	\$120.00	24633	\$135.00	24634	\$142.00	24635	\$281.50
3/4	1-3/8	4"	3/4	24636	\$152.00	24637	\$170.00	24638	\$178.00	24639	\$370.00
1"	1-3/8	4"	1"	24640	\$250.00	24641	\$275.00	24642	\$287.50	24643	\$750.00

**new!** **SU & SD Series: Slow Helix 4 flute fractional end mills**  
For materials that easily tear or shred during routing / milling featuring both UpCut (upshear) and DownCut (downshear) geometry.



- SD4S has slower helix and sharper edge than the GRD4S Series
- Use Base EDP and add UC, AT, D1 or D2 suffix for coating selection

Diam	LOC	OAL	Shank	UpCut		DownCut		UnCoated Price	AT Price	D1 Price	D2 Price
				EDP#	Price	EDP#	Price				
1/16	5/16	1-1/2	1/8	24645	\$15.00	24665	\$15.00	\$16.50	\$19.50	\$44.00	
1/8	5/8	1-1/2	1/8	24646	\$14.00	24666	\$14.00	\$15.50	\$18.50	\$42.00	
3/16	3/4	2"	3/16	24647	\$21.00	24667	\$21.00	\$23.00	\$26.00	\$66.50	
1/4	1"	2-1/2	1/4	24648	\$25.00	24668	\$25.00	\$28.00	\$32.00	\$87.50	
5/16	1"	2-1/2	5/16	24649	\$32.00	24669	\$32.00	\$36.00	\$40.00	\$115.00	
3/8	1"	2-1/2	3/8	24650	\$41.00	24670	\$41.00	\$45.00	\$50.00	\$147.50	
7/16	1"	3"	7/16	24651	\$60.00	24671	\$60.00	\$66.00	\$72.00	\$178.50	
1/2	1-1/4	3"	1/2	24652	\$65.00	24672	\$65.00	\$71.00	\$77.00	\$197.00	
5/8	1-3/8	3-1/2	5/8	24653	\$108.00	24673	\$108.00	\$120.00	\$130.00	\$269.50	
3/4	1-3/8	4"	3/4	24654	\$137.00	24674	\$137.00	\$150.00	\$162.00	\$355.00	
1"	1-3/8	4"	1"	24655	\$210.00	24675	\$210.00	\$230.00	\$244.00	\$710.00	

**new!** **OU & OD Series: Single flute helical routers**  
High polish & sharp edge for plastics and related materials in both UpCut and DownCut.



Diam	LOC	OAL	Shank	Square EDP#	UnCoated Price	D1 Price
1/8	5/8	2"	1/8	24685	\$16.40	\$20.70
3/16	3/4	2"	3/16	24686	\$17.70	\$22.70
1/4	3/4	2-1/2	1/4	24687	\$19.60	\$26.00
1/4L	1-1/4	3"	1/4	24688	\$25.20	\$31.90
3/8	1-1/8	3"	3/8	24689	\$38.70	\$48.00
1/2	1-1/2	4"	1/2	24690	\$67.50	\$82.20



Diam	LOC	OAL	Shank	Square EDP#	UnCoated Price	D1 Price
1/8	5/8	2"	1/8	24695	\$16.40	\$20.70
3/16	3/4	2"	3/16	24696	\$17.70	\$22.70
1/4	3/4	2-1/2	1/4	24697	\$19.60	\$26.00
1/4L	1-1/4	3"	1/4	24698	\$25.20	\$31.90
3/8	1-1/8	3"	3/8	24699	\$38.70	\$48.00
1/2	1-1/2	4"	1/2	24700	\$67.50	\$82.20

## new! CUD Series: Compression Up/Down routers

Tight tolerance square end router for wide material range featuring 2+2 or 4+4 design.

- Designed for compression routing of a wide range of materials
- Proprietary cemented carbide grade with sharp & polished SmoothGrind cutting edges plus available SmoothCoat
- Use UnCoated for general purpose routing needs • Use A1 (TiB2) coated for titanium, aluminum & other non-ferrous materials
- Use thin, smooth, & hard D1 PVD diamond coating for plastics, woods, composites, CFRP's, honeycombs & other abrasive materials
- Use hard & thick D2 CVD diamond coating for long-run jobs in composites, CFRP's, honeycombs & other abrasive materials



						CUD UnCoated		CUD A1 Coated		CUD D1 Coated		CUD D2 Coated	
						Square EDP#	Price	Square EDP#	Price	Square EDP#	Price	Square EDP#	Price
1/4	2+2	3/4	.285	2-1/2	1/4	30416	\$35.00	58281	\$39.10	58365	\$43.50	58366	\$97.50
1/4	2+2	1"	.285	2-1/2	1/4	58361	\$38.00	58282	\$42.10	58367	\$46.50	58368	\$100.50
1/4	4+4	.905	.250	2-1/2	1/4	40418	\$39.00	58283	\$43.10	58369	\$47.50	58370	\$101.50
1/4L	4+4	1-1/4	.250	2-1/2	1/4	40417	\$42.00	58284	\$46.10	58371	\$50.50	58372	\$104.50
3/8	2+2	1"	.435	3"	3/8	58210	\$52.00	58285	\$58.00	58373	\$61.50	58374	\$157.50
3/8	2+2	1-1/8	.435	3"	3/8	58362	\$52.00	58286	\$58.00	58375	\$61.50	58376	\$157.50
1/2	2+2	1"	.435	3"	1/2	58363	\$58.50	58287	\$65.30	58377	\$72.00	58378	\$189.50
1/2	2+2	1-1/8	.435	3"	1/2	58221	\$59.50	58288	\$66.30	58379	\$73.00	58380	\$190.50
1/2	2+2	1-1/8	.435	4"	1/2	58220	\$74.00	58289	\$82.80	58381	\$91.00	58382	\$204.00
1/2	2+2	1-3/8	.435	3"	1/2	58190	\$61.50	58290	\$68.30	58383	\$75.00	58384	\$192.50
1/2	2+2	1-3/8	.435	4"	1/2	58230	\$77.00	58291	\$85.80	58385	\$94.00	58386	\$207.00
1/2	2+2	1-5/8	.435	4"	1/2	58240	\$79.00	58292	\$87.80	58387	\$96.00	58388	\$283.00
5/8	2+2	1-5/8	.735	4"	5/8	58250	\$145.50	58293	\$155.60	58389	\$166.50	58390	\$399.00
5/8	2+2	1-7/8	.735	5"	5/8	58260	\$162.00	58294	\$177.90	58391	\$194.50	58392	\$415.00
5/8	2+2	2-1/4	.735	5"	5/8	53864	\$169.50	58295	\$185.40	58393	\$202.00	58394	\$422.50
3/4	2+2	1-5/8	.860	4"	3/4	58270	\$165.00	58296	\$177.00	58395	\$189.00	58396	\$513.00
3/4	2+2	2-1/2	.985	5"	3/4	58280	\$206.00	58297	\$224.50	58397	\$244.50	58398	\$554.00

## FR Series: Fiberglass Routers

Large routers with various end styles for a wide material range.

- Designed for routing of a wide range of materials
- Plain, Burr, End Mill, Drill point, and Fish Tail end features
- Proprietary cemented carbide grade with 3 different SmoothCoat coatings
- Use UnCoated for general purpose routing needs
- Use A1 (TiB2) coated for titanium, aluminum & other non-ferrous materials
- Use D1 PVD diamond coated for composites, CFRP's, honeycombs, plastics, woods & other abrasive materials • Use hard & thick D2 CVD diamond coating for long-run jobs in composites, CFRP's, honeycombs & other abrasive materials

D1 PVD Diamond coating is the perfect compliment for routing abrasive materials with our FR Series. The smoothness of our sputter based process helps evacuate the material up and out of the cut with superb lubricity. The hardness of D1's multi-layered surface lends outstanding wear characteristics when routing in the types of material for which the Series is designed. Add D1 (or A1/D2) as a suffix to the EDP #.



FRNOUC



new!

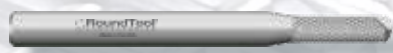
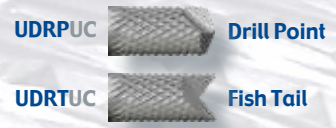
				FRNO EDP#	UC Price	A1 Price	D1 Price	D2 Price	FRBS EDP#	FREM EDP#	FRDP EDP#	FRFT EDP#	UC Price	A1 Price	D1 Price	D2 Price
1/8	1/2	1-1/2	1/8	32001	\$7.00	\$8.90	\$11.90	\$34.90	32101	32201	32301	32401	\$8.20	\$10.50	\$13.10	\$36.10
3/16	5/8	2"	3/16	32002	\$10.30	\$12.90	\$15.90	\$55.40	32102	32202	32302	32402	\$12.90	\$15.90	\$18.50	\$58.00
1/4	3/4	2-1/2	1/4	32003	\$11.70	\$15.80	\$18.80	\$72.80	32103	32203	32303	32403	\$14.50	\$19.10	\$21.60	\$75.60
1/4L	1"	3"	1/4	32007	\$14.70	\$19.20	\$22.20	\$76.20	32107	32207	32307	32407	\$17.80	\$22.50	\$25.30	\$79.30
5/16	1"	2-1/2	5/16	32004	\$19.50	\$24.00	\$28.00	\$101.00	32104	32204	32304	32404	\$24.70	\$29.70	\$33.20	\$106.20
3/8	1"	2-1/2	3/8	32005	\$22.80	\$28.30	\$32.30	\$128.30	32105	32205	32305	32405	\$28.00	\$34.30	\$37.50	\$133.50
1/2	1"	3"	1/2	32006	\$37.70	\$44.50	\$49.50	\$167.00	32106	32206	32306	32406	\$44.20	\$52.80	\$56.00	\$173.50
<b>Metric Diameters</b>																
6.0mm	19	63	6.0	32008	\$11.70	\$15.80	\$18.80	\$72.80	32108	32208	32308	32408	\$14.50	\$19.10	\$21.60	\$75.60
6.0	25	76	6.0	32009	\$14.70	\$19.20	\$22.20	\$76.20	32109	32209	32309	32409	\$17.80	\$22.50	\$25.30	\$79.30
8.0	25	63	8.0	32010	\$19.50	\$24.00	\$28.00	\$101.00	32110	32210	32310	32410	\$24.70	\$29.70	\$33.20	\$106.20
10.0	25	70	10.0	32011	\$28.00	\$36.00	\$40.40	\$144.90	32111	32211	32311	32411	\$35.90	\$44.30	\$48.30	\$152.80
12.0	25	75	12.0	32012	\$37.70	\$44.50	\$49.50	\$167.00	32112	32212	32312	32412	\$44.20	\$52.80	\$56.00	\$173.50



## new! UDR Series: UpDraft fractional Routers

**Tight tolerance router for a wide material range.**

- Designed for UpDraft routing of a wide range of materials
- Tight tolerance +0 / -.0005 w/ either 130° drill Point or fish Tail end
- Proprietary cemented carbide grade with 2 different SmoothCoat micro coatings
- Use UnCoated for general purpose routing needs
- Use A1 (TiB2) coated for titanium, aluminum & other non-ferrous materials
- Use D1 PVD diamond coated for composites, CFRP's, honeycombs, plastics, woods & other abrasive materials

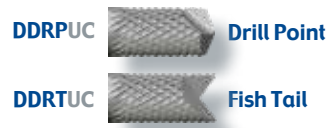


Diam	End	LOC	OAL	Shank	UDR UnCoated		UDR A1 Coated		UDR D1 Coated	
					EDP#	Price	EDP#	Price	EDP#	Price
1/32	Fish Tail	.255	1-1/2	1/8	50530	\$9.50	50531	\$11.50	50532	\$14.50
1/32	Drill Point	.255	1-1/2	1/8	50533	\$9.50	50534	\$11.50	50535	\$14.50
3/64	Fish Tail	.255	1-1/2	1/8	50536	\$9.50	50537	\$11.50	50538	\$14.50
3/64	Drill Point	.255	1-1/2	1/8	50539	\$9.50	50540	\$11.50	50541	\$14.50
1/16	Fish Tail	.255	1-1/2	1/8	50542	\$9.50	50543	\$11.50	50544	\$14.50
1/16	Drill Point	.255	1-1/2	1/8	50545	\$9.50	50546	\$11.50	50547	\$14.50
3/32	Fish Tail	.395	1-1/2	1/8	50548	\$9.50	50549	\$11.50	50550	\$14.50
3/32	Drill Point	.395	1-1/2	1/8	50551	\$9.50	50552	\$11.50	50553	\$14.50
1/8	Fish Tail	.500	1-1/2	1/8	50554	\$9.50	50555	\$11.50	50556	\$14.50
1/8	Drill Point	.500	1-1/2	1/8	50557	\$9.50	50558	\$11.50	50559	\$14.50
3/16	Fish Tail	.625	2"	3/16	50560	\$14.50	50561	\$17.00	50562	\$20.00
3/16	Drill Point	.625	2"	3/16	50563	\$14.50	50564	\$17.00	50565	\$20.00
1/4	Fish Tail	.750	2"	1/4	50566	\$17.00	50567	\$20.00	50568	\$23.00
1/4	Drill Point	.750	2"	1/4	50569	\$17.00	50570	\$20.00	50571	\$23.00
1/4	Fish Tail	.750	2-1/2	1/4	50572	\$18.50	50573	\$21.50	50574	\$24.50
1/4	Drill Point	.750	2-1/2	1/4	50575	\$18.50	50576	\$21.50	50577	\$24.50
1/4	Fish Tail	1"	3"	1/4	50578	\$22.50	50579	\$26.00	50580	\$29.00
1/4	Drill Point	1"	3"	1/4	50581	\$22.50	50582	\$26.00	50583	\$29.00

## new! DDR Series: DownDraft fractional Routers

**Tight tolerance router for a wide material range.**

- Designed for DownDraft routing of a wide range of materials
- Tight tolerance +0 / -.0005 w/ either 130° drill Point or fish Tail end
- Proprietary cemented carbide grade with 2 different SmoothCoat micro coatings
- Use UnCoated for general purpose routing needs
- Use A1 (TiB2) coated for titanium, aluminum & other non-ferrous materials
- Use D1 PVD diamond coated for composites, CFRP's, honeycombs, plastics, woods & other abrasive materials



Diam	End	LOC	OAL	Shank	DDR UnCoated		DDR A1 Coated		DDR D1 Coated	
					EDP#	Price	EDP#	Price	EDP#	Price
1/32	Fish Tail	.255	1-1/2	1/8	50584	\$9.50	50585	\$11.50	50586	\$14.50
1/32	Drill Point	.255	1-1/2	1/8	50587	\$9.50	50588	\$11.50	50589	\$14.50
3/64	Fish Tail	.255	1-1/2	1/8	50590	\$9.50	50591	\$11.50	50592	\$14.50
3/64	Drill Point	.255	1-1/2	1/8	50593	\$9.50	50594	\$11.50	50595	\$14.50
1/16	Fish Tail	.255	1-1/2	1/8	50596	\$9.50	50597	\$11.50	50598	\$14.50
1/16	Drill Point	.255	1-1/2	1/8	50599	\$9.50	50600	\$11.50	50601	\$14.50
3/32	Fish Tail	.395	1-1/2	1/8	50602	\$9.50	50603	\$11.50	50604	\$14.50
3/32	Drill Point	.395	1-1/2	1/8	50605	\$9.50	50606	\$11.50	50607	\$14.50
1/8	Fish Tail	.500	1-1/2	1/8	50608	\$9.50	50609	\$11.50	50610	\$14.50
1/8	Drill Point	.500	1-1/2	1/8	50611	\$9.50	50612	\$11.50	50613	\$14.50
3/16	Fish Tail	.625	2"	3/16	50614	\$14.50	50615	\$17.00	50616	\$20.00
3/16	Drill Point	.625	2"	3/16	50617	\$14.50	50618	\$17.00	50619	\$20.00
1/4	Fish Tail	.750	2"	1/4	50620	\$17.00	50621	\$20.00	50622	\$23.00
1/4	Drill Point	.750	2"	1/4	50623	\$17.00	50624	\$20.00	50625	\$23.00
1/4	Fish Tail	.750	2-1/2	1/4	50626	\$18.50	50627	\$21.50	50628	\$24.50
1/4	Drill Point	.750	2-1/2	1/4	50629	\$18.50	50630	\$21.50	50631	\$24.50
1/4	Fish Tail	1"	3"	1/4	50632	\$22.50	50633	\$26.00	50634	\$29.00
1/4	Drill Point	1"	3"	1/4	50635	\$22.50	50636	\$26.00	50637	\$29.00










## new! MD Series: 2 flute precision Micro Drills

**Tight tolerance drills w/4-facet point featuring proprietary SmoothCoat for micro tools.**

- Designed for micro drilling of a wide range of materials • Tight tolerance +0/- .0003 • Proprietary cemented carbide grade & SmoothCoat • Use UnCoated for general purpose needs • Use AT coated for high-temp exotics & alloys, die & hardened steels, stainless • Use A1 coated for titanium, aluminum & other non-ferrous materials • Use D1 coated for graphites & other extremely abrasive non-ferrous alloys

**1/8"**  
shank



						MD2PUC		MD2PAT		MD2PA1		MD2PD1	
													
	Drill Size	LOC	Point	OAL	Shank	EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
.0040	0.10mm	.070	118°	1-1/2	1/8	50000	\$30.00	50001	\$32.00	50002	\$33.00	50003	\$36.00
.0050	0.13mm	.070	118°	1-1/2	1/8	50004	\$30.00	50005	\$32.00	50006	\$33.00	50007	\$36.00
.0059	#97	.120	118°	1-1/2	1/8	50008	\$30.00	50009	\$32.00	50010	\$33.00	50011	\$36.00
.0063	#96	.120	118°	1-1/2	1/8	50012	\$30.00	50013	\$32.00	50014	\$33.00	50015	\$36.00
.0067	#95	.150	118°	1-1/2	1/8	50016	\$30.00	50017	\$32.00	50018	\$33.00	50019	\$36.00
.0071	#94	.150	118°	1-1/2	1/8	50020	\$28.00	50021	\$30.00	50022	\$31.00	50023	\$34.00
.0075	#93	.150	118°	1-1/2	1/8	50024	\$28.00	50025	\$30.00	50026	\$31.00	50027	\$34.00
.0079	#92	.150	118°	1-1/2	1/8	50028	\$25.00	50029	\$27.00	50030	\$28.00	50031	\$31.00
.0083	#91	.150	118°	1-1/2	1/8	50032	\$25.00	50033	\$27.00	50034	\$28.00	50035	\$31.00
.0087	#90	.150	118°	1-1/2	1/8	50036	\$25.00	50037	\$27.00	50038	\$28.00	50039	\$31.00
.0091	#89	.220	118°	1-1/2	1/8	50040	\$25.00	50041	\$27.00	50042	\$28.00	50043	\$31.00
.0095	#88	.220	118°	1-1/2	1/8	50044	\$25.00	50045	\$27.00	50046	\$28.00	50047	\$31.00
.0098	0.25mm	.220	118°	1-1/2	1/8	50048	\$21.00	50049	\$23.00	50050	\$24.00	50051	\$27.00
.0100	#87	.220	118°	1-1/2	1/8	50052	\$21.00	50053	\$23.00	50054	\$24.00	50055	\$27.00
.0105	#86	.220	118°	1-1/2	1/8	50056	\$14.00	50057	\$16.00	50058	\$17.00	50059	\$20.00
.0110	#85	.220	118°	1-1/2	1/8	50060	\$14.00	50061	\$16.00	50062	\$17.00	50063	\$20.00
.0115	#84	.220	118°	1-1/2	1/8	50064	\$11.00	50065	\$12.00	50066	\$13.00	50067	\$16.00
.0118	0.30mm	.280	118°	1-1/2	1/8	50068	\$11.00	50069	\$12.00	50070	\$13.00	50071	\$16.00
.0120	#83	.280	118°	1-1/2	1/8	50072	\$11.00	50073	\$12.00	50074	\$13.00	50075	\$16.00
.0125	#82	.280	118°	1-1/2	1/8	50076	\$10.00	50077	\$11.00	50078	\$12.00	50079	\$15.00
.0130	#81	.280	118°	1-1/2	1/8	50080	\$10.00	50081	\$11.00	50082	\$12.00	50083	\$15.00
.0135	#80	.280	130°	1-1/2	1/8	50084	\$7.00	50085	\$8.00	50086	\$9.00	50087	\$12.00
.0138	0.35mm	.280	130°	1-1/2	1/8	50088	\$7.00	50089	\$8.00	50090	\$9.00	50091	\$12.00
.0145	#79	.280	130°	1-1/2	1/8	50092	\$7.00	50093	\$8.00	50094	\$9.00	50095	\$12.00
.0156	1/64"	.295	130°	1-1/2	1/8	50096	\$7.00	50097	\$8.00	50098	\$9.00	50099	\$12.00
.0157	0.40mm	.295	130°	1-1/2	1/8	50100	\$7.00	50101	\$8.00	50102	\$9.00	50103	\$12.00
.0160	#78	.295	130°	1-1/2	1/8	50104	\$7.00	50105	\$8.00	50106	\$9.00	50107	\$12.00
.0177	0.45mm	.295	130°	1-1/2	1/8	50108	\$7.00	50109	\$8.00	50110	\$9.00	50111	\$12.00
.0180	#77	.295	130°	1-1/2	1/8	50112	\$7.00	50113	\$8.00	50114	\$9.00	50115	\$12.00
.0197	0.50mm	.310	130°	1-1/2	1/8	50116	\$7.00	50117	\$8.00	50118	\$9.00	50119	\$12.00
.0200	#76	.310	130°	1-1/2	1/8	50120	\$7.00	50121	\$8.00	50122	\$9.00	50123	\$12.00
.0210	#75	.310	130°	1-1/2	1/8	50124	\$7.00	50125	\$8.00	50126	\$9.00	50127	\$12.00
.0217	0.55mm	.340	130°	1-1/2	1/8	50128	\$7.00	50129	\$8.00	50130	\$9.00	50131	\$12.00
.0225	#74	.340	130°	1-1/2	1/8	50132	\$7.00	50133	\$8.00	50134	\$9.00	50135	\$12.00
.0236	0.60mm	.340	130°	1-1/2	1/8	50136	\$7.00	50137	\$8.00	50138	\$9.00	50139	\$12.00
.0240	#73	.340	130°	1-1/2	1/8	50140	\$7.00	50141	\$8.00	50142	\$9.00	50143	\$12.00
.0250	#72	.340	130°	1-1/2	1/8	50144	\$7.00	50145	\$8.00	50146	\$9.00	50147	\$12.00
.0256	0.65mm	.340	130°	1-1/2	1/8	50148	\$7.00	50149	\$8.00	50150	\$9.00	50151	\$12.00
.0260	#71	.340	130°	1-1/2	1/8	50152	\$7.00	50153	\$8.00	50154	\$9.00	50155	\$12.00
.0276	0.70mm	.400	130°	1-1/2	1/8	50156	\$7.00	50157	\$8.00	50158	\$9.00	50159	\$12.00
.0280	#70	.400	130°	1-1/2	1/8	50160	\$6.00	50161	\$7.00	50162	\$8.00	50163	\$11.00
.0292	#69	.400	130°	1-1/2	1/8	50164	\$6.00	50165	\$7.00	50166	\$8.00	50167	\$11.00
.0295	0.75mm	.400	130°	1-1/2	1/8	50168	\$6.00	50169	\$7.00	50170	\$8.00	50171	\$11.00
.0310	#68	.400	130°	1-1/2	1/8	50172	\$6.00	50173	\$7.00	50174	\$8.00	50175	\$11.00
.0312	1/32"	.400	130°	1-1/2	1/8	50176	\$6.00	50177	\$7.00	50178	\$8.00	50179	\$11.00
.0315	0.80mm	.400	130°	1-1/2	1/8	50180	\$6.00	50181	\$7.00	50182	\$8.00	50183	\$11.00
.0320	#67	.400	130°	1-1/2	1/8	50184	\$6.00	50185	\$7.00	50186	\$8.00	50187	\$11.00
.0330	#66	.400	130°	1-1/2	1/8	50188	\$6.00	50189	\$7.00	50190	\$8.00	50191	\$11.00
.0335	0.85mm	.400	130°	1-1/2	1/8	50192	\$6.00	50193	\$7.00	50194	\$8.00	50195	\$11.00
.0354	0.90mm	.400	130°	1-1/2	1/8	50196	\$6.00	50197	\$7.00	50198	\$8.00	50199	\$11.00
.0360	#64	.400	130°	1-1/2	1/8	50200	\$6.00	50201	\$7.00	50202	\$8.00	50203	\$11.00
.0370	#63	.400	130°	1-1/2	1/8	50204	\$6.00	50205	\$7.00	50206	\$8.00	50207	\$11.00
.0374	0.95mm	.400	130°	1-1/2	1/8	50208	\$6.00	50209	\$7.00	50210	\$8.00	50211	\$11.00
.0380	#62	.400	130°	1-1/2	1/8	50212	\$6.00	50213	\$7.00	50214	\$8.00	50215	\$11.00
.0390	#61	.400	130°	1-1/2	1/8	50216	\$6.00	50217	\$7.00	50218	\$8.00	50219	\$11.00
.0394	1.00mm	.400	130°	1-1/2	1/8	50220	\$6.00	50221	\$7.00	50222	\$8.00	50223	\$11.00
.0400	#60	.400	130°	1-1/2	1/8	50224	\$6.00	50225	\$7.00	50226	\$8.00	50227	\$11.00
.0410	#59	.400	130°	1-1/2	1/8	50228	\$6.00	50229	\$7.00	50230	\$8.00	50231	\$11.00
.0413	1.05mm	.400	130°	1-1/2	1/8	50232	\$6.00	50233	\$7.00	50234	\$8.00	50235	\$11.00
.0420	#58	.400	130°	1-1/2	1/8	50236	\$6.00	50237	\$7.00	50238	\$8.00	50239	\$11.00
.0433	1.10mm	.400	130°	1-1/2	1/8	50240	\$6.00	50241	\$7.00	50242	\$8.00	50243	\$11.00
.0440	1.12mm	.400	130°	1-1/2	1/8	50244	\$6.00	50245	\$7.00	50246	\$8.00	50247	\$11.00
.0453	1.15mm	.400	130°	1-1/2	1/8	50248	\$6.00	50249	\$7.00	50250	\$8.00	50251	\$11.00

## new! MD Series: 2 flute precision Micro Drills (continued)

1/8" shank

Diam	Drill Size	LOC	Point	OAL	Shank	MD UnCoated		MD w/AT Coat		MD w/A1 Coat		MD w/D1 Coat	
						EDP#	Price	EDP#	Price	EDP#	Price	EDP#	Price
.0465	#56	.400	130°	1-1/2	1/8	50252	\$6.00	50253	\$7.00	50254	\$8.00	50255	\$11.00
.0469	3/64"	.400	130°	1-1/2	1/8	50256	\$6.00	50257	\$7.00	50258	\$8.00	50259	\$11.00
.0472	1.20mm	.400	130°	1-1/2	1/8	50260	\$6.00	50261	\$7.00	50262	\$8.00	50263	\$11.00
.0492	1.25mm	.400	130°	1-1/2	1/8	50264	\$6.00	50265	\$7.00	50266	\$8.00	50267	\$11.00
.0512	1.30mm	.400	130°	1-1/2	1/8	50268	\$6.00	50269	\$7.00	50270	\$8.00	50271	\$11.00
.0520	#55	.400	130°	1-1/2	1/8	50272	\$6.00	50273	\$7.00	50274	\$8.00	50275	\$11.00
.0531	1.35mm	.400	130°	1-1/2	1/8	50276	\$6.00	50277	\$7.00	50278	\$8.00	50279	\$11.00
.0550	#54	.400	130°	1-1/2	1/8	50280	\$6.00	50281	\$7.00	50282	\$8.00	50283	\$11.00
.0551	1.40mm	.400	130°	1-1/2	1/8	50284	\$6.00	50285	\$7.00	50286	\$8.00	50287	\$11.00
.0571	1.45mm	.400	130°	1-1/2	1/8	50288	\$6.00	50289	\$7.00	50290	\$8.00	50291	\$11.00
.0591	1.50mm	.400	130°	1-1/2	1/8	50292	\$6.00	50293	\$7.00	50294	\$8.00	50295	\$11.00
.0595	#53	.400	130°	1-1/2	1/8	50296	\$6.00	50297	\$7.00	50298	\$8.00	50299	\$11.00
.0610	1.55mm	.400	130°	1-1/2	1/8	50300	\$6.00	50301	\$7.00	50302	\$8.00	50303	\$11.00
.0625	1/16"	.400	130°	1-1/2	1/8	50304	\$6.00	50305	\$7.00	50306	\$8.00	50307	\$11.00
.0630	1.60mm	.400	130°	1-1/2	1/8	50308	\$6.00	50309	\$7.00	50310	\$8.00	50311	\$11.00
.0635	#52	.400	130°	1-1/2	1/8	50312	\$6.00	50313	\$7.00	50314	\$8.00	50315	\$11.00
.0650	1.65mm	.400	130°	1-1/2	1/8	50316	\$6.00	50317	\$7.00	50318	\$8.00	50319	\$11.00
.0669	1.70mm	.400	130°	1-1/2	1/8	50320	\$6.00	50321	\$7.00	50322	\$8.00	50323	\$11.00
.0670	#51	.400	130°	1-1/2	1/8	50324	\$6.00	50325	\$7.00	50326	\$8.00	50327	\$11.00
.0689	1.75mm	.400	130°	1-1/2	1/8	50328	\$6.00	50329	\$7.00	50330	\$8.00	50331	\$11.00
.0700	#50	.400	130°	1-1/2	1/8	50332	\$6.00	50333	\$7.00	50334	\$8.00	50335	\$11.00
.0709	1.80mm	.400	130°	1-1/2	1/8	50336	\$6.00	50337	\$7.00	50338	\$8.00	50339	\$11.00
.0728	1.85mm	.400	130°	1-1/2	1/8	50340	\$6.00	50341	\$7.00	50342	\$8.00	50343	\$11.00
.0730	#49	.400	130°	1-1/2	1/8	50344	\$6.00	50345	\$7.00	50346	\$8.00	50347	\$11.00
.0748	1.90mm	.400	130°	1-1/2	1/8	50348	\$6.00	50349	\$7.00	50350	\$8.00	50351	\$11.00
.0760	#48	.400	130°	1-1/2	1/8	50352	\$6.00	50353	\$7.00	50354	\$8.00	50355	\$11.00
.0781	5/64"	.400	130°	1-1/2	1/8	50356	\$6.00	50357	\$7.00	50358	\$8.00	50359	\$11.00
.0785	#47	.400	130°	1-1/2	1/8	50360	\$6.00	50361	\$7.00	50362	\$8.00	50363	\$11.00
.0787	2.00mm	.400	130°	1-1/2	1/8	50364	\$6.00	50365	\$7.00	50366	\$8.00	50367	\$11.00
.0807	2.05mm	.400	130°	1-1/2	1/8	50368	\$6.00	50369	\$7.00	50370	\$8.00	50371	\$11.00
.0810	#46	.400	130°	1-1/2	1/8	50372	\$6.00	50373	\$7.00	50374	\$8.00	50375	\$11.00
.0820	#45	.400	130°	1-1/2	1/8	50376	\$6.00	50377	\$7.00	50378	\$8.00	50379	\$11.00
.0827	2.10mm	.400	130°	1-1/2	1/8	50380	\$6.00	50381	\$7.00	50382	\$8.00	50383	\$11.00
.0846	2.15mm	.400	130°	1-1/2	1/8	50384	\$6.00	50385	\$7.00	50386	\$8.00	50387	\$11.00
.0860	#44	.400	130°	1-1/2	1/8	50388	\$6.00	50389	\$7.00	50390	\$8.00	50391	\$11.00
.0866	2.20mm	.400	130°	1-1/2	1/8	50392	\$6.00	50393	\$7.00	50394	\$8.00	50395	\$11.00
.0886	2.25mm	.400	130°	1-1/2	1/8	50396	\$6.00	50397	\$7.00	50398	\$8.00	50399	\$11.00
.0890	#43	.400	130°	1-1/2	1/8	50400	\$6.00	50401	\$7.00	50402	\$8.00	50403	\$11.00
.0906	2.30mm	.400	130°	1-1/2	1/8	50404	\$6.00	50405	\$7.00	50406	\$8.00	50407	\$11.00
.0925	2.35mm	.400	130°	1-1/2	1/8	50408	\$6.00	50409	\$7.00	50410	\$8.00	50411	\$11.00
.0935	#42	.400	130°	1-1/2	1/8	50412	\$6.00	50413	\$7.00	50414	\$8.00	50415	\$11.00
.0938	3/32"	.400	130°	1-1/2	1/8	50416	\$6.00	50417	\$7.00	50418	\$8.00	50419	\$11.00
.0945	2.40mm	.400	130°	1-1/2	1/8	50420	\$6.00	50421	\$7.00	50422	\$8.00	50423	\$11.00
.0960	#41	.400	130°	1-1/2	1/8	50424	\$6.00	50425	\$7.00	50426	\$8.00	50427	\$11.00
.0965	2.45mm	.400	130°	1-1/2	1/8	50428	\$6.00	50429	\$7.00	50430	\$8.00	50431	\$11.00
.0980	#40	.400	130°	1-1/2	1/8	50432	\$6.00	50433	\$7.00	50434	\$8.00	50435	\$11.00
.0984	2.50mm	.400	130°	1-1/2	1/8	50436	\$6.00	50437	\$7.00	50438	\$8.00	50439	\$11.00
.0995	#39	.400	130°	1-1/2	1/8	50440	\$6.00	50441	\$7.00	50442	\$8.00	50443	\$11.00
.1004	2.55mm	.400	130°	1-1/2	1/8	50444	\$6.00	50445	\$7.00	50446	\$8.00	50447	\$11.00
.1015	#38	.400	130°	1-1/2	1/8	50448	\$6.00	50449	\$7.00	50450	\$8.00	50451	\$11.00
.1024	2.60mm	.400	130°	1-1/2	1/8	50452	\$6.00	50453	\$7.00	50454	\$8.00	50455	\$11.00
.1040	#37	.400	130°	1-1/2	1/8	50456	\$6.00	50457	\$7.00	50458	\$8.00	50459	\$11.00
.1043	2.65mm	.400	130°	1-1/2	1/8	50460	\$6.00	50461	\$7.00	50462	\$8.00	50463	\$11.00
.1063	2.70mm	.400	130°	1-1/2	1/8	50464	\$6.00	50465	\$7.00	50466	\$8.00	50467	\$11.00
.1065	#36	.400	130°	1-1/2	1/8	50468	\$6.00	50469	\$7.00	50470	\$8.00	50471	\$11.00
.1083	2.75mm	.400	130°	1-1/2	1/8	50472	\$6.00	50473	\$7.00	50474	\$8.00	50475	\$11.00
.1094	7/64"	.400	130°	1-1/2	1/8	50476	\$6.00	50477	\$7.00	50478	\$8.00	50479	\$11.00
.1100	#35	.400	130°	1-1/2	1/8	50480	\$6.00	50481	\$7.00	50482	\$8.00	50483	\$11.00
.1110	#34	.400	130°	1-1/2	1/8	50484	\$6.00	50485	\$7.00	50486	\$8.00	50487	\$11.00
.1122	2.85mm	.400	130°	1-1/2	1/8	50488	\$6.00	50489	\$7.00	50490	\$8.00	50491	\$11.00
.1130	#33	.400	130°	1-1/2	1/8	50492	\$6.00	50493	\$7.00	50494	\$8.00	50495	\$11.00
.1142	2.90mm	.400	130°	1-1/2	1/8	50496	\$6.00	50497	\$7.00	50498	\$8.00	50499	\$11.00
.1160	#32	.400	130°	1-1/2	1/8	50500	\$6.00	50501	\$7.00	50502	\$8.00	50503	\$11.00
.1161	2.95mm	.400	130°	1-1/2	1/8	50504	\$6.00	50505	\$7.00	50506	\$8.00	50507	\$11.00
.1181	3.00mm	.400	130°	1-1/2	1/8	50508	\$6.00	50509	\$7.00	50510	\$8.00	50511	\$11.00
.1200	#31	.400	130°	1-1/2	1/8	50512	\$6.00	50513	\$7.00	50514	\$8.00	50515	\$11.00
.1201	3.05mm	.400	130°	1-1/2	1/8	50516	\$6.00	50517	\$7.00	50518	\$8.00	50519	\$11.00
.1220	3.10mm	.400	130°	1-1/2	1/8	50520	\$6.00	50521	\$7.00	50522	\$8.00	50523	\$11.00
.1240	3.15mm	.400	130°	1-1/2	1/8	50524	\$6.00	50525	\$7.00	50526	\$8.00	50527	\$11.00
.1250	1/8"	.400	130°	1-1/2	1/8	50528	\$6.00	50529	\$7.00	50638	\$8.00	50639	\$11.00

## new! BP Series: 2 flute Brad Point drills

Tight tolerance drills with brad (spur) point featuring D1 SmoothCoat or UnCoated.

- Designed for drilling composites, plastics, wood, fiberglass, and more • Tight tolerance +0/-0.0003 • Proprietary cemented carbide grade plus available D1 SmoothCoat • Use UnCoated for general purpose needs • Use D1 coated for graphites & other extremely abrasive non-ferrous alloys • Fractional, Wire Gage, Letter, and Metric size ranges • Features 140° brad point



Drill Specifications:  
Cutting Diam +.000/-0.003  
Shank Diam +.000/-0.003  
SFR = Shrink Fit Ready

BP2UC



Diam	LOF	OAL	EDP#	UC Price	D1 Coat
3/64	3/4	1-1/2	61203	\$10.00	\$14.40
1/16	3/4	1-1/2	61204	\$10.00	\$14.40
5/64	7/8	1-3/4	61205	\$10.20	\$14.70
3/32	1"	2"	61206	\$10.60	\$15.10
7/64	1-1/4	2-1/4	61207	\$11.80	\$17.10
1/8	1-1/4	2-1/4	61208	\$12.20	\$17.50
9/64	1-3/8	2-1/2	61209	\$14.00	\$19.90
5/32	1-3/8	2-1/2	61210	\$16.20	\$22.10
11/64	1-5/8	2-3/4	61211	\$18.00	\$23.90
3/16	1-5/8	2-3/4	61212	\$18.20	\$24.10
13/64	1-3/4	3"	61213	\$21.70	\$30.50
7/32	1-3/4	3"	61214	\$24.10	\$32.90
15/64	2"	3-1/4	61215	\$26.00	\$34.80
1/4	2"	3-1/4	61216	\$27.70	\$36.50
17/64	2-1/8	3-1/2	61217	\$31.90	\$42.20
9/32	2-1/8	3-1/2	61218	\$35.00	\$45.30
19/64	2-3/8	3-3/4	61219	\$37.30	\$48.20
5/16	2-3/8	3-3/4	61220	\$40.20	\$50.60
21/64	2-1/2	4"	61221	\$43.30	\$57.10
11/32	2-1/2	4"	61222	\$47.90	\$61.70
23/64	2-3/4	4-1/4	61223	\$53.20	\$67.00
3/8	2-3/4	4-1/4	61224	\$52.50	\$66.30
25/64	2-7/8	4-1/2	61225	\$66.00	\$83.20
13/32	2-7/8	4-1/2	61226	\$71.00	\$88.20
27/64	2-7/8	4-1/2	61227	\$78.20	\$95.40
7/16	2-7/8	4-1/2	61228	\$83.50	\$100.70
29/64	3"	4-3/4	61229	\$91.70	\$114.60
15/32	3"	4-3/4	61230	\$97.00	\$119.90
31/64	3"	4-3/4	61231	\$101.40	\$124.30
1/2	3"	4-3/4	61232	\$98.70	\$121.60
17/32	4"	6"	61233	\$149.60	\$181.10
9/16	4"	6"	61234	\$160.50	\$192.00
19/32	4"	6"	61235	\$184.40	\$215.90
5/8	4"	6"	61236	\$186.50	\$218.00
21/32	4"	6"	61237	\$211.00	\$251.00
11/16	4"	6"	61238	\$214.60	\$254.70
3/4	4"	6"	61239	\$250.30	\$290.40
13/16	4"	6"	61291	\$342.00	\$387.80
7/8	4"	6"	61292	\$362.70	\$408.50
15/16	4"	6"	61293	\$366.80	\$418.30
1"	4"	6"	61294	\$362.80	\$414.30

Diam	LOF	OAL	EDP#	UC Price	D1 Coat
1	1-3/4	3-1/4	61301	\$26.30	\$35.10
2	1-3/4	3"	61302	\$25.00	\$33.80
3	1-3/4	3"	61303	\$23.50	\$32.30
4	1-3/4	3"	61304	\$22.90	\$31.70
5	1-3/4	3"	61305	\$22.30	\$31.10
6	1-3/4	3"	61306	\$22.10	\$30.90
7	1-3/4	3"	61307	\$21.10	\$29.90
8	1-3/4	3"	61308	\$20.80	\$29.60
9	1-3/4	3"	61309	\$20.20	\$29.00
10	1-5/8	2-3/4	61310	\$19.80	\$28.60
11	1-5/8	2-3/4	61311	\$19.70	\$28.50
12	1-5/8	2-3/4	61312	\$19.40	\$28.20
13	1-5/8	2-3/4	61313	\$18.90	\$27.10
14	1-5/8	2-3/4	61314	\$18.80	\$27.00
15	1-5/8	2-3/4	61315	\$18.60	\$26.80
16	1-5/8	2-3/4	61316	\$18.40	\$26.60
17	1-5/8	2-3/4	61317	\$18.20	\$26.40
18	1-5/8	2-3/4	61318	\$17.70	\$25.90
19	1-5/8	2-3/4	61319	\$17.60	\$25.80
20	1-3/8	2-1/2	61320	\$17.10	\$25.30
21	1-3/8	2-1/2	61321	\$16.80	\$25.00
22	1-3/8	2-1/2	61322	\$16.70	\$24.90
23	1-3/8	2-1/2	61323	\$16.00	\$24.20
24	1-3/8	2-1/2	61324	\$15.30	\$23.50
25	1-3/8	2-1/2	61325	\$14.90	\$23.10
26	1-3/8	2-1/2	61326	\$14.50	\$22.70
27	1-3/8	2-1/2	61327	\$14.50	\$22.70
28	1-3/8	2-1/2	61328	\$14.00	\$22.20
29	1-3/8	2-1/2	61329	\$13.80	\$22.00
30	1-3/8	2-1/4	61330	\$13.10	\$21.30
31	1-1/4	2-1/4	61331	\$12.90	\$18.90
32	1-1/4	2-1/4	61332	\$12.70	\$18.60
33	1-1/4	2-1/4	61333	\$12.30	\$18.20
34	1-1/4	2-1/4	61334	\$12.30	\$18.20
35	1-1/4	2-1/4	61335	\$12.00	\$18.00
36	1-1/4	2-1/4	61336	\$11.80	\$17.70
37	1-1/4	2-1/4	61337	\$11.80	\$17.70
38	1-1/4	2-1/4	61338	\$11.80	\$17.70
39	1-1/4	2-1/4	61339	\$11.80	\$17.70
40	1"	2"	61340	\$11.10	\$15.60
41	1"	2"	61341	\$10.60	\$15.10
42	1"	2"	61342	\$10.60	\$15.10
43	1"	2"	61343	\$10.20	\$14.70
44	1"	2"	61344	\$10.20	\$14.70
45	7/8	1-3/4	61345	\$10.20	\$14.70
46	7/8	1-3/4	61346	\$10.20	\$14.70
47	7/8	1-3/4	61347	\$10.20	\$14.70
48	7/8	1-3/4	61348	\$10.00	\$14.40
49	7/8	1-3/4	61349	\$10.00	\$14.40
50	7/8	1-3/4	61350	\$10.00	\$14.40
51	3/4	1-1/2	61351	\$10.00	\$14.40
52	3/4	1-1/2	61352	\$10.00	\$14.40
53	3/4	1-1/2	61353	\$10.00	\$14.40
54	3/4	1-1/2	61354	\$10.00	\$14.40
55	3/4	1-1/2	61355	\$10.00	\$14.40
56	3/4	1-1/2	61356	\$10.00	\$14.40
57	3/4	1-1/2	61357	\$10.00	\$14.40
58	3/4	1-1/2	61358	\$10.00	\$14.40
59	3/4	1-1/2	61359	\$10.00	\$14.40
60	3/4	1-1/2	61360	\$10.00	\$14.40

Diam	LOF	OAL	EDP#	UC Price	D1 Coat
A	2"	3-1/4	61241	\$27.00	\$35.80
B	2"	3-1/4	61242	\$27.40	\$36.20
C	2"	3-1/4	61243	\$28.10	\$36.90
D	2"	3-1/4	61244	\$28.70	\$37.50
E	2"	3-1/4	61245	\$29.80	\$38.60
F	2"	3-1/2	61246	\$31.90	\$42.20
G	2-1/8	3-1/2	61247	\$31.90	\$42.20
H	2-1/8	3-1/2	61248	\$33.10	\$43.50
I	2-1/8	3-1/2	61249	\$33.80	\$44.20
J	2-1/8	3-1/2	61250	\$34.80	\$45.20
K	2-1/8	3-1/2	61251	\$35.00	\$45.30
L	2-1/8	3-1/2	61252	\$36.20	\$46.60
M	2-3/8	3-3/4	61253	\$37.30	\$47.70
N	2-3/8	3-3/4	61254	\$40.20	\$50.60
O	2-3/8	3-3/4	61255	\$42.60	\$56.40
P	2-3/8	4"	61256	\$43.30	\$57.10
Q	2-1/2	4"	61285	\$46.80	\$60.60
R	2-1/2	4"	61286	\$47.90	\$61.70
S	2-1/2	4"	61287	\$50.50	\$64.30
T	2-3/4	4-1/4	61288	\$53.20	\$67.00
U	2-3/4	4-1/4	61289	\$55.90	\$69.70
V	2-3/4	4-1/4	61290	\$59.10	\$76.30
W	2-7/8	4-1/2	61257	\$59.10	\$76.30
X	2-7/8	4-1/2	61258	\$69.30	\$86.50
Y	2-7/8	4-1/2	61259	\$69.30	\$86.50
Z	2-7/8	4-1/2	61260	\$77.10	\$94.40

Diam	LOF	OAL	EDP#	UC Price	D1 Coat
1.0mm	13	38	61261	\$10.00	\$14.40
1.5	19	38	61262	\$10.00	\$14.40
2.0	22	44	61263	\$10.20	\$14.70
2.5	25	50	61264	\$11.10	\$15.60
3.0	32	57	61265	\$12.70	\$18.00
3.5	35	63	61266	\$14.00	\$19.90
4.0	35	63	61267	\$16.70	\$24.90
4.5	41	70	61268	\$18.40	\$26.60
5.0	44	76	61269	\$20.60	\$29.40
5.5	44	76	61270	\$23.50	\$32.30
6.0	50	82	61271	\$27.00	\$35.80
6.5	50	82	61272	\$31.80	\$42.20
7.0	54	89	61273	\$34.70	\$45.10
7.5	60	95	61274	\$37.30	\$47.70
8.0	60	95	61275	\$42.60	\$56.40
8.5	63	101	61276	\$46.80	\$60.60
9.0	70	108	61277	\$50.50	\$64.30
9.5	70	108	61278	\$55.90	\$69.70
10.0	73	114	61279	\$66.00	\$83.20
10.5	73	114	61280	\$77.10	\$94.40
11.0	73	114	61281	\$78.20	\$95.40
11.5	76	120	61282	\$91.70	\$114.60
12.0	76	120	61283	\$101.40	\$124.30
12.5	76	120	61284	\$103.30	\$126.20

RTL's D1 PVD Diamond coating is the perfect compliment for drilling abrasive and soft materials with our special brad style point. The smoothness of our sputter based process helps evacuate the material up and out of the hole with superb lubricity. The hardness of D1's multi-layered surface lends outstanding wear characteristics when making holes in the types of material for which the brad point is designed. Add D1 as a suffix to the EDP # for inclusion of coating for this Series.



Drill Specifications (Metric):  
Cutting Diam +0.000/-0.008 mm  
Shank Diam +0.000/-0.008 mm  
SFR = Shrink Fit Ready

# Technical Data: GR Diamond Coated Series / D1 & D2

Speeds and Feeds for milling graphite and abrasive materials.

Use maximum spindle RPM to achieve up to 3000 SFPM.

- D1 & D2 coated GR Series will likely utilize your maximum possible spindle speed
- For reference, the chart below displays your achievable SFPM based upon your machining center
- Tool life should be 10–50 times that of uncoated carbide with improved accuracy and finish
- Long life allows unattended machining and part completion without tooling change
- Premium carbide substrate and special material preparation increases coating adhesion

Diam	mm	100 SFPM	250 SFPM	500 SFPM	3000 SFPM	Roughing Feed Rate CPT	Finishing Feed Rate CPT	Roughing Feed mm per tooth	Finishing Feed mm per tooth
		30 M/min	75 M/min	150 M/min	900 M/min				
1/64	0.4	24000	60000	max rpm	max rpm	.0002 - .0005	.0002 - .0003	0.005 - 0.013	0.005 - 0.008
1/32	0.8	12000	30000	60000	max rpm	.0005 - .001	.0003 - .0006	0.013 - 0.025	0.008 - 0.015
1/16	1.5	6100	15300	30500	max rpm	.0008 - .002	.0005 - .0013	0.203 - 0.051	0.013 - 0.033
3/32	2.5	4100	10200	20400	max rpm	.001 - .0022	.0008 - .0015	0.025 - 0.056	0.020 - 0.038
1/8	3.0	3050	7640	15300	max rpm	.001 - .0025	.001 - .002	0.025 - 0.064	0.025 - 0.051
3/16	4.5	2050	5100	10200	61000	.002 - .0035	.001 - .0025	0.051 - 0.090	0.025 - 0.064
1/4	6.0	1500	3820	7640	45800	.0025 - .0045	.001 - .0035	0.064 - 0.114	0.025 - 0.090
5/16	8.0	1220	3050	6120	36700	.003 - .005	.001 - .004	0.076 - 0.127	0.025 - 0.102
3/8	10.0	1020	2550	5100	30500	.003 - .006	.001 - .004	0.076 - 0.152	0.025 - 0.102
7/16	11.0	875	2200	4365	26200	.004 - .008	.001 - .005	0.102 - 0.203	0.025 - 0.127
1/2	12.0	765	1900	3820	23000	.005 - .012	.001 - .006	0.127 - 0.305	0.025 - 0.152

Metric dimensions and recommendations displayed in blue type. M/min = surface meters per minute. SFPM = surface feet per minute. Feed rates displayed in chip load per tooth.

## Typical Applications for D1 & D2 Diamond:

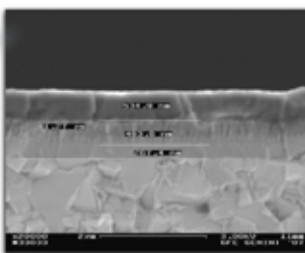
- Graphites
- Aluminum-Silicon Alloys
- Carbon Fiber Composites
- Plastics
- Green Ceramics
- Copper Alloys
- Brass Magnesium
- Hard Carbons
- Fiberglass
- High Silicon Aluminum
- Composite CFRP's
- Metal Matrix Composites
- Wood Composites
- Delrin
- Kevlar
- PEEK
- Glass-Filled Composites



## About our D1 & D2 Diamond Coatings:

RoundTool Laboratories Diamond Coated End Mill Series are a perfect match on graphite molds for EDM. Our D1 and D2 coatings offer industry leading wear resistance when subjected to the abrasive properties of EDM graphite parts. RoundTool offers two versions of diamond; D1 is a PVD applied diamond while our D2 is a CVD application. Supporting both Series is a carbide end mill specially designed and manufactured with graphite milling in mind. While other companies simply coat standard off-the-shelf end mills, the GR-D1 and GR-D2 represent customized engineering featuring higher helix & heavier core, which in turn offer freer cutting and less deflection. These two series have also achieved great success in other applications featuring highly abrasive materials.

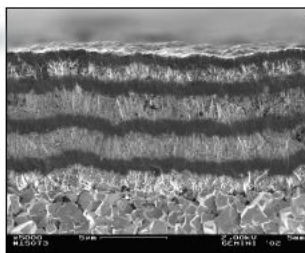
### SmoothCoat®



SmoothCoat® D1: RoundTool Lab's new generation of D1 raises the bar on PVD diamond coatings. D1 PVD Diamond is a smooth amorphous diamond coating that also maintains an extremely upsharp cutting edge. D1 offers the highest value proposition in a large majority of applications. Short, medium, and long running jobs all benefit from D1's unique attributes, and small diameter end mills particularly are complimented by the smooth & thin coating structure. These end mills will produce the finest finish and most accurate cut of our diamond selection. D1 end mills also have a quick turnaround time with our in-house coating facility.

Type: PVD Color: Shiny Black Thickness per side: 1.75 – 2.5 microns

### SmoothCoat®



SmoothCoat® D2: RoundTool Lab's new generation of D2 is a "grown on" CVD diamond coating that offers the highest wear resistance in machining graphite and abrasive non-metals. Tool life can be increased by up to 50x that of standard uncoated carbide end mills. With long tool life and minimal wear, D2 coated end mills improve part accuracy and workpiece tolerance levels. D2 end mills have a longer lead time due to the amount of time spent in the coating vessel physically growing the diamond crystalline structure.

Type: CVD Color: Flat Dark Grey Thickness per side: 4–6 microns



# new! Technical Data: MP, GR, GRD, SS, NF & LRX Series

Speeds and Feeds for a variety of materials.

35% tighter shank tolerance than h6!  
Shrink-Fit Ready!



Peripheral Milling: Full length of cut possible if radial depth  $\leq$  10% of tool diameter.



Slot Milling: Based on axial depth < 20% of tool diameter.

- Data is for UnCoated (UC) condition of tool
- For coated tools, increase SFM by at least 25%
- For D1 and D2 coatings please refer to their separate Data sheet on page #37
- If recommended speed is higher than machine tool's capacity, run at maximum RPM and reduce feed rate accordingly

## Fractional Data



Peripheral Milling SFPM



Slotting SFPM

### Feed Per Tooth based on End Mill Diameter

			< .010	1/64"	1/32"	1/16"	1/8"	3/16"	1/4"	3/8"	1/2"
<b>Non-Ferrous</b>											
6061 T6 Aluminum	up to 2000	up to 1500	.0001	.00015	.0002	.0004	.0008	.0012	.0015	.002	.003
Copper, Brass, Bronze	up to 1200	up to 1000	.0001	.00015	.0002	.0004	.0008	.0012	.0015	.002	.003
Plastics	up to 2000	up to 1500	.00015	.0002	.0003	.0006	.001	.002	.003	.004	.005
<b>Steels</b>											
1018, 1020	150 to 300	125 to 250	.0001	.00015	.0002	.00025	.0005	.001	.0015	.002	.0025
4140, 4340, P20	125 to 250	125 to 225	.00007	.0001	.00015	.00025	.0005	.0007	.001	.0015	.002
A2, D2, H13 $\leq$ 32HRC	125 to 225	100 to 150	.00007	.0001	.00015	.00025	.0005	.0007	.001	.0015	.002
A2, D2, H13 $\geq$ 32HRC	100 to 125	100 to 125	.0001	.00015	.0001	.00015	.0003	.0005	.0008	.0010	.0015
<b>Stainless Steels</b>											
15-5, 17-4 $\leq$ 32HRC	150 to 350	100 to 225	.00007	.0001	.00015	.00025	.0005	.0007	.001	.0015	.002
15-5, 17-4 $\geq$ 32HRC	100 to 125	100 to 150	.00005	.00008	.0001	.00015	.0003	.0005	.0008	.0010	.0015
303, 304, 316	150 to 300	125 to 225	.00007	.0001	.00015	.00025	.0005	.0007	.001	.0012	.0015
420, 440C	150 to 250	125 to 225	.00007	.0001	.00015	.00025	.0005	.0007	.001	.0015	.0015
<b>High Temp Alloys</b>											
Inconel 625	75 to 150	75 to 125	.00005	.00008	.0001	.00015	.0005	.0007	.001	.0015	.002
Inconel 718	50 to 120	50 to 110	.00005	.00008	.0001	.00013	.0003	.0005	.001	.0015	.0015
6Al-4V Titanium	100 to 150	75 to 125	.00005	.00008	.0001	.00015	.0005	.0007	.001	.001	.0015
<b>Cast Iron</b>											
Gray Iron $\leq$ 32HRC	150 to 300	125 to 250	.0001	.00015	.0002	.00025	.0005	.0007	.001	.0015	.002
Ductile Iron	150 to 250	125 to 250	.0001	.00015	.0002	.00025	.0005	.0007	.001	.0015	.002

## Metric Data



Peripheral Milling M/Min



Slotting M/Min

### Feed Per Tooth based on End Mill Diameter

			< 1.0mm	2.0 mm	3.0 mm	4.0 mm	5.0 mm	6.0 mm	8.0 mm	10 mm	12 mm
<b>Non-Ferrous</b>											
6061 T6 Aluminum	up to 600	up to 450	0.005	0.007	0.025	0.025	0.030	0.038	0.050	0.050	0.076
Copper, Brass, Bronze	up to 365	up to 300	0.005	0.007	0.025	0.025	0.030	0.038	0.050	0.050	0.076
Plastics	up to 600	up to 450	0.0075	0.009	0.025	0.025	0.050	0.076	0.100	0.100	0.130
<b>Steels</b>											
1018, 1020	45 to 90	38 to 76	0.005	0.005	0.015	0.018	0.025	0.038	0.050	0.050	0.065
4140, 4340, P20	38 to 76	38 to 68	0.004	0.005	0.012	0.014	0.018	0.025	0.038	0.038	0.050
A2, D2, H13 $\leq$ 32HRC	38 to 68	30 to 45	0.004	0.005	0.012	0.014	0.018	0.025	0.038	0.038	0.050
A2, D2, H13 $\geq$ 32HRC	30 to 38	30 to 38	0.005	0.005	0.010	0.010	0.012	0.020	0.025	0.025	0.038
<b>Stainless Steels</b>											
15-5, 17-4 $\leq$ 32HRC	45 to 110	30 to 68	0.004	0.005	0.012	0.014	0.018	0.025	0.038	0.038	0.050
15-5, 17-4 $\geq$ 32HRC	30 to 38	30 to 45	0.0025	0.005	0.010	0.010	0.012	0.020	0.025	0.025	0.038
303, 304, 316	45 to 90	38 to 68	0.004	0.005	0.012	0.014	0.018	0.025	0.030	0.030	0.038
420, 440C	45 to 76	38 to 68	0.004	0.005	0.012	0.014	0.018	0.025	0.038	0.038	0.038
<b>High Temp Alloys</b>											
Inconel 625	22 to 45	22 to 38	0.0025	0.005	0.012	0.012	0.018	0.025	0.038	0.038	0.050
Inconel 718	15 to 36	15 to 34	0.0025	0.005	0.010	0.010	0.012	0.025	0.038	0.038	0.038
6Al-4V Titanium	30 to 45	22 to 38	0.0025	0.005	0.012	0.012	0.018	0.025	0.025	0.025	0.038
<b>Cast Iron</b>											
Gray Iron $\leq$ 32HRC	45 to 90	38 to 76	0.005	0.007	0.012	0.014	0.018	0.025	0.038	0.038	0.050
Ductile Iron	45 to 76	38 to 76	0.005	0.007	0.012	0.014	0.018	0.025	0.038	0.038	0.050

# Terms & Conditions

**Our goal is to delight our customers.**

**Ordering Information:** All RoundTool® products have a Series-Size designator and EDP number. Both should be used when entering orders via e-mail, fax, phone, or postal mail communications. RoundTool EDP numbers bear an "RT" suffix to differentiate themselves from other Tool Alliance product lines. This suffix is not displayed in the catalog but will be printed on all official correspondence.

**Availability:** RoundTool® products are available mostly through select Industrial Distributors worldwide. Locally, your Industrial Distributor can provide communication, technical assistance, and inventory support. Standard products are subject to prior sale.

**Pricing:** All prices shown are effective November 3, 2014, supersede and cancel all previous listed prices, and are subject to change without notice. The amount of any present or future sales tax, value-added tax, or similar tax applicable to the products listed herein shall be added to the purchase price and paid by the customer. All sales made at list price less standard applicable distributor discount. Contract pricing must be obtained in writing via current quotation, with stated pricing, effective date, and expiration date, to be valid.

**Shipping:** Preferred carriers are Federal Express 'Express Saver' (Guaranteed 3-Day), and Federal Express premium services. Prices quoted herein are F.O.B. our Factory in Huntington Beach, California, U.S.A.

**Terms:** Domestic and Export Net 30 Days.

**Minimum Charge:** \$50.00 Net (U.S. Dollar).

**Returned Items:** Current catalog items are returnable subject to a 25% handling charge and approval by the RoundTool® Inspection Department. Credit cannot be issued for any product that has in any way been modified, machined, altered, coated, marked, or displaying other characteristics that render it in a "used" condition. A Return Authorization (RA) number must be obtained from the RoundTool® Sales Department prior to return. Returned product must be sent to the Factory for credit; consignment locations are not capable of issuing either RA's or credit memos. Special tools are not returnable.

**Specials Policy:** We reserve the right to overship or undership and invoice special tools up to a 10% variance per item. Quantities under 10 are subject to a one-piece variance. Any variations to this policy must be stated in advance as it will effect pricing upon quotation. Special orders cannot be cancelled without prior approval and proper consideration.

**Product Warranty:** RoundTool® warrants that products sold by it shall be free from defects in materials and workmanship. RoundTool Labs will replace, repair, or grant credit for any product which does not comply with this warranty. This warranty does not apply to any products which have been in any way modified, machined, misused, subjected to accident, or used beyond normal life. Warranty claims should be made through the distributor from whom the product was purchased. There are no other warranties, expressed or implied, made by us except as expressed above, and we neither assume nor authorize any other firm or person to assume for it any other obligation or liability in connection with our products.

**Cooperative Advertising:** RoundTool® does not participate in any cooperative advertising programs with either industrial distributors or manufacturer's representatives. This policy allows us to avoid any possible favoritism or conflicts of interest, and keeps costs and sales prices as low as possible.



is friendly to the environment. All paper products are separated for reuse and shredded for packaging materials. Shipping boxes are reused when possible. Conservation programs are in place for reduced energy use (additionally, our coastal location eliminates the need for artificial heating or cooling on most days). All displaced materials during the manufacturing process are collected, separated, and returned to a materials recycler. Coolants are recycled when appropriate. Mop water is evaporated and resultant sediment is properly disposed. Skylights provide natural lighting and reduce electricity usage.

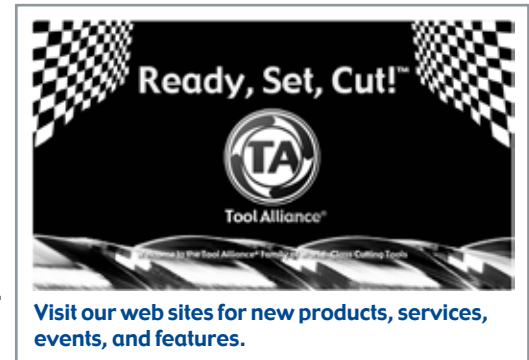
**Visit our factories** on your next trip to the greater Los Angeles / San Diego, CA area (solid carbide) or Fort Myers / Naples, FL (indexable). View our automated facilities, meet our Associates, and tell us how we can better grow our relationship together. Huntington Beach is officially "Surf City" with miles of open beach on the Pacific Ocean, and we're minutes away from attractions such as Disneyland, Knott's, Universal Studios, Reagan and Nixon Presidential Libraries, Getty Museum, Dodger Stadium, Staples Center, Angel Stadium, Honda Center, The Tool Alliance Club, and the list goes on. The closest airport is Orange County (SNA), followed by Long Beach (LGB), Los Angeles (LAX), and then Ontario (ONT). Fort Myers (airport code RSW) is on the beautiful Gulf of Mexico coast, a recreational haven, home to Major League Baseball spring training, and within a 3-hour drive to Orlando, Tampa Bay, Sarasota, Miami, Fort Lauderdale, the Everglades, and more.

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<b>Tool Alliance / Florida</b> Mil-Tec, Incorporated 5578 6th Street West Lehigh Acres, FL 33971 (800) 564-5832 • fax (866) 244-0298	<b>Tool Alliance / California</b> Ultra-Tool Int'l Inc. 5451 McFadden Avenue Huntington Beach, CA 92649 (800) 854-2431 • fax (714) 891-7816	See us on the web at: <b>toolalliance.com</b> eMail: <b>sales@toolalliance.com</b> RoundTool Catalog Version 2015 All contents Copyright Tool Alliance	



# RoundTool Laboratories® sales features:

- The Company has a well known brand, superb quality reputation, and a 45 year operating history.
- Tool Alliance is dedicated solely to the solid carbide rotary tooling industry.
- We are privately held, operate with long-term focus and goals, and manufacture our products within our USA-based company-owned factories.
- Our substrate, geometry, and coating are specially selected for each application and Series.
- Our cutting tools have extremely accurate diameter, radius, and concentricity characteristics.
- All RoundTool products are "SFR" (Shrink-Fit Ready).
- Our grinding method and coating process yields an extremely sharp and long lasting cutting edge.
- We offer a full line of standard tools including "hard to find" items.
- We offer proprietary coatings such as PVD Diamond (D1), CVD Diamond (D2), TiB2 (A1) and HSN<sup>2</sup> (AT).
- We can stock firm blanket orders.
- We offer quick turnaround on special blueprint items.
- We have a great mix of Automation and Craftsmanship.
- Both fractional and metric size ranges are offered.
- We have sales offices in both coastal time zones (Florida and California).
- We strongly support traditional Industrial Distribution.
- We have large standard inventories and excellent service levels.



## About the technology of RoundTool® and Tool Alliance®:

We obsess over details that create the finest cutting tools available. Our reward is customer satisfaction via increasing their factory productivity. We cannot be the best without thinking differently, so over a 45 year operating history we've developed proprietary technologies that yield significant characteristics of cutting tools unlike any you'll find elsewhere:

- SmoothGrind® = Polished cutting edges for extreme sharpness and lubricity.
- SmoothConcricity® = Precision grinding, tool holding, and tolerances for minimized TIR.
- SmoothCoat® = Sputter-based SuperNitride PVD coating for superior surface hardness & uniformity.
- SmoothEdge® = Surface and edge preparations for lubricity and minimized break-in.



Sharpness & Lubricity.  
No wonder it works better.

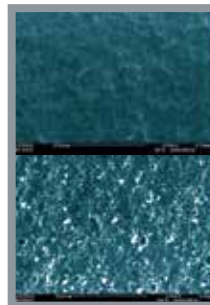
**SmoothGrind®**

Tight tolerances.  
Minimized run-out.



**SmoothConcricity®**

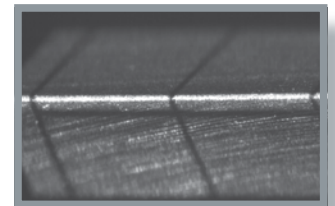
Our coating @ 2,000X (top).  
Everybody else's (bottom).



**SmoothCoat®**

Edge Integrity.  
Runs great on the first pass.

RoundTool end mill cutting edge magnified to display SE4 hone.



**SmoothEdge®**

**RoundTool®**  
LABORATORIES

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Huntington Beach, CA 92649  
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