Guhring Coating and Reconditioning Services

We can restore used standard and special carbide and PCD drills, step drills, reamers, and end mills to their original factory quality, condition and performance. We also recoat in the same facility that we recondition. allowing for quicker turn-around and excellent quality control.

Utilizing the same high-precision CNC grinding machines that are used in Guhring's manufacturing plants, our Reconditioning Division is well-equipped to restore standard and special carbide and PCD tooling to its original factory quality, condition and performance.



Guhring's Reconditioning Division is staffed with its own customer service team, allowing for extraordinary and personalized service. Combined with our in-house coating chambers, our two U.S. locations - Brookfield, WI and New Hudson, MI - we are in a unique position to provide unmatched quality and service. Complimentary pickup and delivery is available to customers in southern WI, northern IL. and parts of MI and OH.

As a cutting tool manufacturer, Guhring offers a level of coating expertise without equal in the industry. Guhring was the first to introduce TiN coating (Titanium Nitride) to cutting tools in 1980 and has remained a global leader in developing and applying new coating technology to improve both cutting tool and wear part performance. Today, Guhring offers a full range of high performance PVD (Physical Vapor Deposition) coatings to meet customers' diverse needs,

• **TiN** (Titanium Nitride)

including:

- TiCN (Titanium Carbonitride)
- TIAIN (Titanium Aluminum Nitride)
- FIREX® (special TiN-TiAIN multilayer hard coating)
- Super-A™ (Aluminum Titanium Nitride)
- MolyGlide® (Molybdenum Disulfide-based soft coating)
- nano FIREX® (microlayer TiN-TiAIN multilayer hard coating)
- nano-A™ (microlayer AlTiN TiAlN Multilayer)

Performance benefits include: significantly increased tool and part life, reduced friction and heat buildup, and high resistance to edge buildup, galling and fissure propagation.



- High-precision CNC grinding machines
- Personalized customer service
- Reconditioning and coating at one facility
- Three U.S. locations; quick turnaround



www.guhring.com

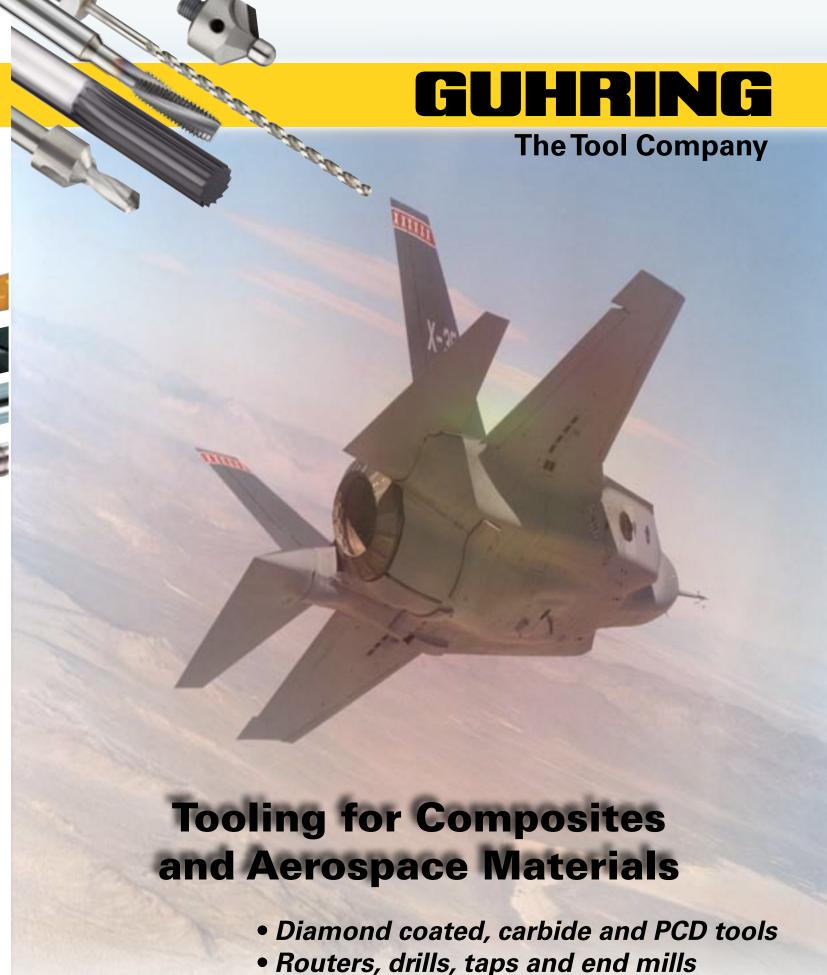
Guhring Incorporated Brookfield, WI Tel (262) 784-6730 (800) 776-6170 Fax (262) 784-9096

West Coast Distribution Center Huntington Beach, CA Tel (714) 841-3582 (800) 877-7202

Fax (714) 841-3592

Guhring Corporation Kitchener, ON, Canada Tel (519) 748-9664 (800) 463-5555 Fax (519) 748-2954

Item # 400001042



• Full special design capabilities

Composite Materials

DL100 2-Flute PCD Tipped End Mills - Series 3867



Series	No. Flutes	Cutting dia. (in)	Shank dia.	Overall length	Length of cut	Order Code
3867	2	1/4	1/4	2-1/2	3/4	6.350
3867	2	3/8	3/8	3	3/4	9.520
3867	2	1/2	1/2	3	1	12.700
3867	2	3/4	3/4	4	1	19.050

DL 100 3-Flute PCD Tipped End Mills - Series 3870



Series	No. Flutes	Cutting dia. (in)	Shank dia.	Overall length	Length of cut	Order Code
3870	3	3/8	3/8	3	1/2	9.520
3870	3	1/2	1/2	3	1/2	12.700
3870	3	3/4	3/4	3	1/2	19.050
3870	3	1	1	4	1	25.400

Series 5493 2-Flute Long Length Coolant Fed

Series 5492 2-Flute Center Cutting Coolant Fed PCD Tipped End Mill









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PCD (Polycrystalline Diamond) tooling provides the ultimate in wear resistance and tool life to maximize production efficiencies. Guhring produces four stocked standard series of PCD end mills that are used for machining highly abrasive composite materials as well as many high silicon grade aluminum parts. In addition, Guhring produces an extensive array of special design PCD end mills as well as reamers, drills and counterbores. Our engineers work directly with our customers to develop tooling designs that decrease machine cycle times while dramatically increasing tool life.

		Series 5492	Series 5493						
d1 = d2	d3	11	I1	12	13	14	r	No.	Order
mm	mm	mm	mm	mm	mm	mm	mm	flutes	code
6.000	5.700	57.0	75.00	8.00	21.00	36.00	0.1	2	6.000
8.000	7.400	63.0	100.00	8.00	27.00	36.00	0.1	2	8.000
8.000	7.400	63.0	100.00	12.00	27.00	36.00	0.1	2	8.001
10.000	9.400	72.0	100.00	8.00	32.00	40.00	0.1	2	10.000
10.000	9.400	72.0	100.00	16.00	32.00	40.00	0.1	2	10.001
12.000	11.200	83.0	100.00	8.00	38.00	45.00	0.1	2	12.000
12.000	11.200	83.0	100.00	16.00	38.00	45.00	0.1	2	12.001
14.000	13.000	83.0	100.00	8.00	38.00	45.00	0.1	2	14.000
14.000	13.000	83.0	100.00	16.00	38.00	45.00	0.1	2	14.001
16.000	15.000	100.0	150.00	12.00	52.00	48.00	0.1	2	16.000
16.000	15.000	100.0	150.00	20.00	52.00	48.00	0.1	2	16.001
18.000	17.000	100.0	125.00	12.00	52.00	48.00	0.1	2	18.000
18.000	17.000	100.0	125.00	20.00	52.00	48.00	0.1	2	18.001
20.000	19.000	100.0	150.00	12.00	50.00	50.00	0.1	2	20.000
20.000	19.000	100.0	150.00	20.00	50.00	50.00	0.1	2	20.001

CR 100 Diamond Coated Carbide Routers (square end) - Series 3083

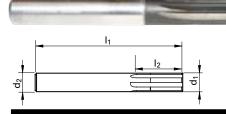


For slot and periphery milling in composite materials. Multiple flutes with maximum shearing action for high volume material removal, eliminating delamination of composite materials. Diamond coated sub-micro grain carbide for extended tool life.

d1 & d2 fract.	d1 & d2 mm	I1 inch	I2 inch	No. flutes	Order code
1/4	6.350	2.500	0.750	10	302284000
3/8	9.520	3.000	1.000	14	302284001
1/2	12.700	3.500	1.250	15	302284002
5/8	15.870	4.000	1.625	15	302284003

To order, specify series number and order code

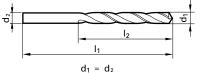
CR 100 Diamond Coated Carbide Routers (plunging) - Series 3084



fract.	mm	inch	inch	flutes	code
1/4	6.350	2.500	0.750	10	302284015
3/8	9.520	3.000	1.000	14	302284016
1/2	12.700	3.500	1.250	15	302284017
5/8	15.870	4.000	1.625	15	302284018
	1/4 3/8 1/2	fract. mm 1/4 6.350 3/8 9.520 1/2 12.700	fract. mm inch 1/4 6.350 2.500 3/8 9.520 3.000 1/2 12.700 3.500	fract. mm inch 1/4 6.350 2.500 0.750 3/8 9.520 3.000 1.000 1/2 12.700 3.500 1.250	fract. mm inch inch flutes 1/4 6.350 2.500 0.750 10 3/8 9.520 3.000 1.000 14 1/2 12.700 3.500 1.250 15

Diamond Coated

90° Drill for Composite Materials



Material-specific design and sub-micro grain carbide grade to machine carbon fiber-reinforced polymer (CFRP) composite materials by minimizing delamination and increasing tool life. A special 90° point angle increases hole quality, by lowering the thrust requirements.

Diamond coated for resistance to abrasion wear. Combination of point design, substrate, and coating provides longer tool life with substantially less cutting force.



^{*}Approximate final hole size

Feeds & Speeds - Drill and Routing Machining Parameters for Composite Material

Diam	Cutting Speed			RP	RPM				Fe	ed					
inch	mm	fee	t/min	m/	min	rev/r	min	inch	n/rev	mr	n/rev	inch	/min	mm/	min
0.1719	4.366	130	200	40	61	2889	4445	0.002	0.004	0.05	0.10	5.8	17.8	147	452
0.1915	4.864	130	200	40	61	2594	3990	0.002	0.004	0.05	0.10	5.2	16.0	132	405
0.2510	6.375	130	200	40	61	1979	3044	0.002	0.005	0.05	0.13	4.0	15.2	101	387
0.3125	7.938	130	200	40	61	1589	2445	0.002	0.005	0.05	0.13	3.2	12.2	81	311
0.3760	9.550	130	200	40	61	1321	2032	0.002	0.005	0.05	0.13	2.6	10.2	67	258
0.4380	11.125	130	200	40	61	1134	1745	0.002	0.005	0.05	0.13	2.3	8.7	58	222
0.5010	12.725	130	200	40	61	991	1525	0.002	0.005	0.05	0.13	2.0	7.6	50	194
0.1719	4.366	295	394	90	120	6557	8757	0.002	0.004	0.05	0.10	13.1	35.0	333	890
0.1915	4.864	295	394	90	120	5886	7861	0.002	0.004	0.05	0.10	11.8	31.4	299	799
0.2510	6.375	295	394	90	120	4490	5997	0.002	0.005	0.05	0.13	9.0	30.0	228	762
0.3125	7.938	295	394	90	120	3607	4817	0.002	0.005	0.05	0.13	7.2	24.1	183	612
0.3760	9.550	295	394	90	120	2998	4004	0.002	0.005	0.05	0.13	6.0	20.0	152	508
0.4380	11.125	295	394	90	120	2573	3437	0.002	0.005	0.05	0.13	5.1	17.2	131	436
0.5010	12.725	295	394	90	120	2250	3005	0.002	0.005	0.05	0.13	4.5	15.0	114	382
0.1719	4.366	395	820	120	250	8779	18226	0.002	0.004	0.05	0.10	17.6	72.9	446	1852
0.1915	4.864	395	820	120	250	7881	16360	0.002	0.004	0.05	0.10	15.8	65.4	400	1662
0.2510	6.375	395	820	120	250	6013	12482	0.002	0.005	0.05	0.13	12.0	62.4	305	1585
0.3125	7.938	395	820	120	250	4829	10026	0.002	0.005	0.05	0.13	9.7	50.1	245	1273
0.3760	9.550	395	820	120	250	4014	8332	0.002	0.005	0.05	0.13	8.0	41.7	204	1058
0.4380	11.125	395	820	120	250	3446	7153	0.002	0.005	0.05	0.13	6.9	35.8	175	908
0.5010	12.725	395	820	120	250	3012	6253	0.002	0.005	0.05	0.13	6.0	31.3	153	794
	inch 0.1719 0.1915 0.2510 0.3125 0.3760 0.4380 0.5010 0.1719 0.1915 0.2510 0.3125 0.3760 0.4380 0.5010 0.1719 0.1915 0.2510 0.3125 0.3760 0.4380 0.5010 0.1719 0.1915 0.2510 0.3125 0.3760 0.4380	0.1719 4.366 0.1915 4.864 0.2510 6.375 0.3125 7.938 0.3760 9.550 0.4380 11.125 0.5010 12.725 0.1719 4.366 0.1915 4.864 0.2510 6.375 0.3125 7.938 0.3760 9.550 0.4380 11.125 0.1719 4.366 0.1915 4.864 0.2510 6.375 0.3125 7.938 0.3760 9.550 0.4380 11.125	inch mm fee 0.1719 4.366 130 0.1915 4.864 130 0.2510 6.375 130 0.3125 7.938 130 0.3760 9.550 130 0.4380 11.125 130 0.5010 12.725 130 0.1719 4.366 295 0.1915 4.864 295 0.3125 7.938 295 0.3760 9.550 295 0.4380 11.125 295 0.1719 4.366 395 0.1915 4.864 395 0.1915 4.864 395 0.1915 4.864 395 0.2510 6.375 395 0.3125 7.938 395 0.3760 9.550 395 0.3760 9.550 395 0.4380 11.125 395	inch mm feet/min 0.1719 4.366 130 200 0.1915 4.864 130 200 0.2510 6.375 130 200 0.3125 7.938 130 200 0.3760 9.550 130 200 0.4380 11.125 130 200 0.5010 12.725 130 200 0.1719 4.366 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295 394 90 120</td><td>inch mm feet/min m/min rev/r 0.1719 4.366 130 200 40 61 2889 0.1915 4.864 130 200 40 61 2594 0.2510 6.375 130 200 40 61 1979 0.3125 7.938 130 200 40 61 1589 0.3760 9.550 130 200 40 61 1321 0.4380 11.125 130 200 40 61 1134 0.5010 12.725 130 200 40 61 991 0.1719 4.366 295 394 90 120 6557 0.1915 4.864 295 394 90 120 5886 0.2510 6.375 295 394 90 120 3607 0.3760 9.550 295 394 90 120 2998 0.4380</td><td>inch mm feet/min m/min rev/min 0.1719 4.366 130 200 40 61 2889 4445 0.1915 4.864 130 200 40 61 2594 3990 0.2510 6.375 130 200 40 61 1979 3044 0.3125 7.938 130 200 40 61 1589 2445 0.3760 9.550 130 200 40 61 1321 2032 0.4380 11.125 130 200 40 61 1134 1745 0.5010 12.725 130 200 40 61 991 1525 0.1719 4.366 295 394 90 120 6557 8757 0.1915 4.864 295 394 90 120 5886 7861 0.2510 6.375 295 394 90 120 4490 5997<</td><td>inch mm feet/min m/min rev/min incl 0.1719 4.366 130 200 40 61 2889 4445 0.002 0.1915 4.864 130 200 40 61 2594 3990 0.002 0.2510 6.375 130 200 40 61 1979 3044 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MILLING	inch	mm	SFM	m/min	rev/min	inch/rev	mm/rev	inch/min	mm/min	
	0.2500	6.350	500 700	152 213	7641 10698	0.003 0.006	0.08 0.15	22.9 64.2	582 1630	
Diamond Coated	0.3750	9.525	500 700	152 213	5094 7132	0.004 0.008	0.10 0.20	20.4 57.1	518 1449	
	0.5000	12.700	500 700	152 213	3821 5349	0.005 0.010	0.13 0.25	19.1 53.5	485 1359	
	0.7500	19.050	500 700	152 213	2547 3566	0.006 0.012	0.15 0.30	15.3 42.8	388 1087	
						1				
	0.2500	6.350	800 1000	244 305	12226 15283	0.003 0.006	0.08 0.15	36.7 91.7	932 2329	
PCD 2 Flute	0.3750	9.525	800 1000	244 305	8151 10189	0.004 0.008	0.10 0.20	32.6 81.5	828 2070	
	0.5000	12.700	800 1000	244 305	6113 7641	0.005 0.010	0.13 0.25	30.6 76.4	776 1941	
	0.6250	15.875	800 1000	244 305	4890 6113	0.006 0.012	0.15 0.30	29.3 73.4	745 1863	
						1				
	0.5000	12.700	800 1000	244 305	6113 7641	0.004 0.0080	0.10 0.20	24.5 61.1	621 1553	
PCD 3 Fllute	0.7500	19.050	800 1000	244 305	4075 5094	0.006 0.012	0.15 0.30	24.5 61.1	621 1553	
	1.0000	25.400	800 1000	244 305	3057 3821	0.008 0.016	0.20 0.41	24.5 61.1	621 1553	

Aluminum

Stock Standard Drills









RT150GG straight-flute carbide drills - Series 768, 769, 5513

Self-centering point geometry has 120° cone relief point. Rigid. straight flute design allows for aggressive feed rates while maintaining excellent hole concentricity and straightness in high silicon aluminum (>10% Si) or other short-chipping material. Bright finish, reinforced shank. Available from 0.118- 0.787" (3.0- 20.0 mm) dia.

GS200 3-flute carbide drills - Series 1452 and 5518

Reamer class finish is possible with the GS200 style drill. Three flutes for aggressive material removal and added stability in the cut. This 5xD drill is also excellent for uneven entry or exit, as well as interrupted cuts. Available from 0.118-0.787" (3.0-20.0 mm) dia.

RT800WP/HT800WP indexable insert drill

Ultra-fine grain carbide inserts feature an aggressive 140° SF point which reduces axial thrust loading and is freer cutting. The self-centering point geometry produces a narrow, easily evacuated chip. One body can be used with multiple inserts, providing flexibility and cost savings. Inserts available in dia. from 0.452-1.594" (11.5 - 40.5 mm).

Stock Standard End Mills





RF 100 A/WF variable helix roughing end mills for aluminum and aluminum alloys - Series 3468 and 3470

Three flute end mills designed for maximum metal removal rates. The 29°/30°/31° variable helix angles considerably reduce vibration and improve performance in roughing applications. Available in metric diameters from 6mm to 20mm, bright finish.







GH 100 U Finish-Tech 50 multi flute end mill with corner radius -Series 3112

Micro-corner protection geometry combined with a reinforced and corrected minor cutting edge greatly reduces wear, and extends tool life. Corner radii options add to the versatility of this design. Available in diameters from 6mm to 20mm, bright finish.

Rough-Tech ALU Mills with and without coolant through Series 3364 (Series 3184 and 3884 have external coolant)

Three flute, center-cutting, square-end mills with a 30° right hand helix. Coolant fed for maximum coolant removal. The extra course tooth design provides superior material removal rates. Available in metric diameters from 6mm to 20mm, bright finish.

Stock Standard Taps



Guhring premium grade cobalt taps are available for forming and cut thread applications. DIN and ANSI style designs available in UNC, UNF, and Metric thread specifications. An easy to use color ring designation system allows machinists to quickly identify the correct tap for their application. Coolant fed and STI taps are also available from stock.

Form (fluteless) taps are also available from stock. Thread forming through pressure deformation has multiple benefits; see the fullline High Performance Tap catalog for details.

Stainless Steel, Titanium and Nickel Alloys







Stock Standard Drills

RT 100 VA drills, designed for stainless steels and titanium alloys Series 8510 (3xD), 8511 (5xD)

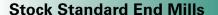
Specialized facet-style self-centering point geometry promotes free cutting action, and the unique cutting edge and flute form aid in controlled chip formation. Coolant fed, and nano-A™ micro thin-film coated for extended tool life. Available from 0.118-0.787" (3.-20mm) dia.

Coolant fed micro-precision drills - Series 60648 (8xD), 6412 (15xD)

Exclusive Line Micro Drills feature a precision ground hone for improved repeatability and extended tool life. The drills have a 135° 4-facet point, and are made from Guhrings own ultra-fine grain carbide. TiAIN coating increases the tool surface hardness to over 100 Rc, while providing added heat resistance. Available from 0.055-0.1188" (0.8-3.0mm) dia.

RT800WP/HT800WP indexable insert drill for Aerospace alloys

Ultra-fine grain carbide inserts feature an aggressive 140° U point which reduces axial thrust loading and increases metal removal rates. The point geometry is self-centering and produces a narrow, easily evacuated chip. Coolant fed body can be used with multiple inserts. Inserts available in dia. from 0.452-1.594" (11.5 - 40.5 mm).



RF 100 VA/NF variable helix rougher/finisher for stainless steels Series 3081, 3696, 3718

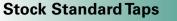
Four flute, center-cutting end mills with a 36°/38° helix. Variable helix angles reduce vibration and allow higher feed rates. Specialied NF tooth profile greatly improves tool life and surface finish. Available in inch diameters from 1/4 to 1", and metric sizes from 6mm to 25mm, in heat-resistant nano-ATM coating.

RF 100 VA variable helix end mills for stainless steels -Series 3080, 3804, 3805

Variable 36°/ 38° helix end mills designed specifically for the challenges of stainless steels. Micro edge protection adds to tool life, and Guhring's high-performance nano-A™ coating provides exceptional heat and wear resistance. Available in inch diameters from 3/16 to 1", and metric sizes from 4mm to 20mm.

RF 100 Ti variable helix end mills for Titanium and Nickel Alloys with Corner Radius - Series 3876

Standard corner radius designs are available as stocked items in both fractional and metric sizes. Variable 35°/ 38° helix end mills designed for aerospace alloys; nano-ATM coating provides exceptional heat and wear resistance. Available in inch diameters from 1/4 to 1", and metric sizes from 6mm to 25mm.



Powdered metal cobalt taps for Titanium and Nickel Alloys -Series 2922, 2912, 2918, 2919

Newly redesigned cut taps excel in both nickel and titanium alloys; TiCN and TiAIN coatings provide extended tool life. Available in through hole and blind hole styles. UNC. UNF. Metric and Metric Fine series.

Powdered metal cobalt taps for Stainless Steel - Series 3907-3911

Blue ring powdered metal cobalt taps are designed specifically for stainless steel, and are available in spiral point and spiral flute designs. These TiN coated taps provide superior thread quality and tool life.









Specials

Special Tools for Composite Materials

Guhring designs and manufactures special PCD and carbide tooling for composite and other aerospace materials in Brookfield, Wisconsin. We have the capacity to manufacture to customer specifications or we can utilize our highly experienced engineering staff to design tooling to meet customer requirements. Guhring not only manufactures new tools but also offers re-tip and recondition service for rejuvenating worn tools guickly and efficiently in our state-of-the-art manufacturing facility.



PCD Specials - Multi-flute routers, drills, oneshot drill/countersinks, piloted countersinks, countersinks and reamers



Carbide Specials - Drills, step drills, FK drills, reamers and core drills one-shot hand drills, tools for one-shot drilling with air motors

Special Tools for Aluminum Applications

Guhring offers a complete line of stocked standard as well as specialized tool designs for aluminum applications. Many of the worlds leading aerospace manufacturers use Guhring tools including NAS styles for high volume production drilling, along with threaded and quick change shank designs. Guhring manufactures a wide range of high speed steel, M2, M35 and M42 grade cobalt drills as well as carbide tools with and without coolant holes for precision manufacturing.



HSS, Carbide and PCD Specials - NAS drills, double margin step drills, reamers, core drills, spacematics, nutplate, threaded and quick change drills, drill/countersinks

One-shot tooling with the capability of holding 0.001" hole tolerance



Special Tools for Stainless, Titanium or Nickel Applications

As one of the largest manufacturers of special design cutting tools in North America, Guhring has the capacity and expertise to handle all your blueprint special requirements. Production facilities in Brookfield, WI and New Hudson, MI are equipped with the most modern CNC grinding equipment, many of which are designed and built by Guhring to our unique and exacting specifications. Whether your requirements call for drills, reamers, end mills, taps, countersinks or counterbores, Guhring has the capability to meet your needs.



HSS and Carbide specials - NAS drills, double margin step drills, reamers, core drills, spacematics, nutplate, threaded and quick change drills, drill/countersinks

One-shot tooling with the capability of holding 0.001" hole tolerance



Special Tools for Stacked Material Drilling

Guhring offers specialized tool designs for drilling stacked materials. This includes variations in layers of composite, aluminum, stainless and titanium. Guhring has developed one-shot tooling for applications that typically require reaming operations in CNC and air motor applications.

Research and Testing Capabilities



Guhring's commitment to constantly develop and improve our tooling designs is enhanced by our in-house ability to run test cuts on equipment dedicated solely to research and to training. Customers may send in material, along with part requirements, allowing Guhring to develop and test cutting tools to best suit their needs.

