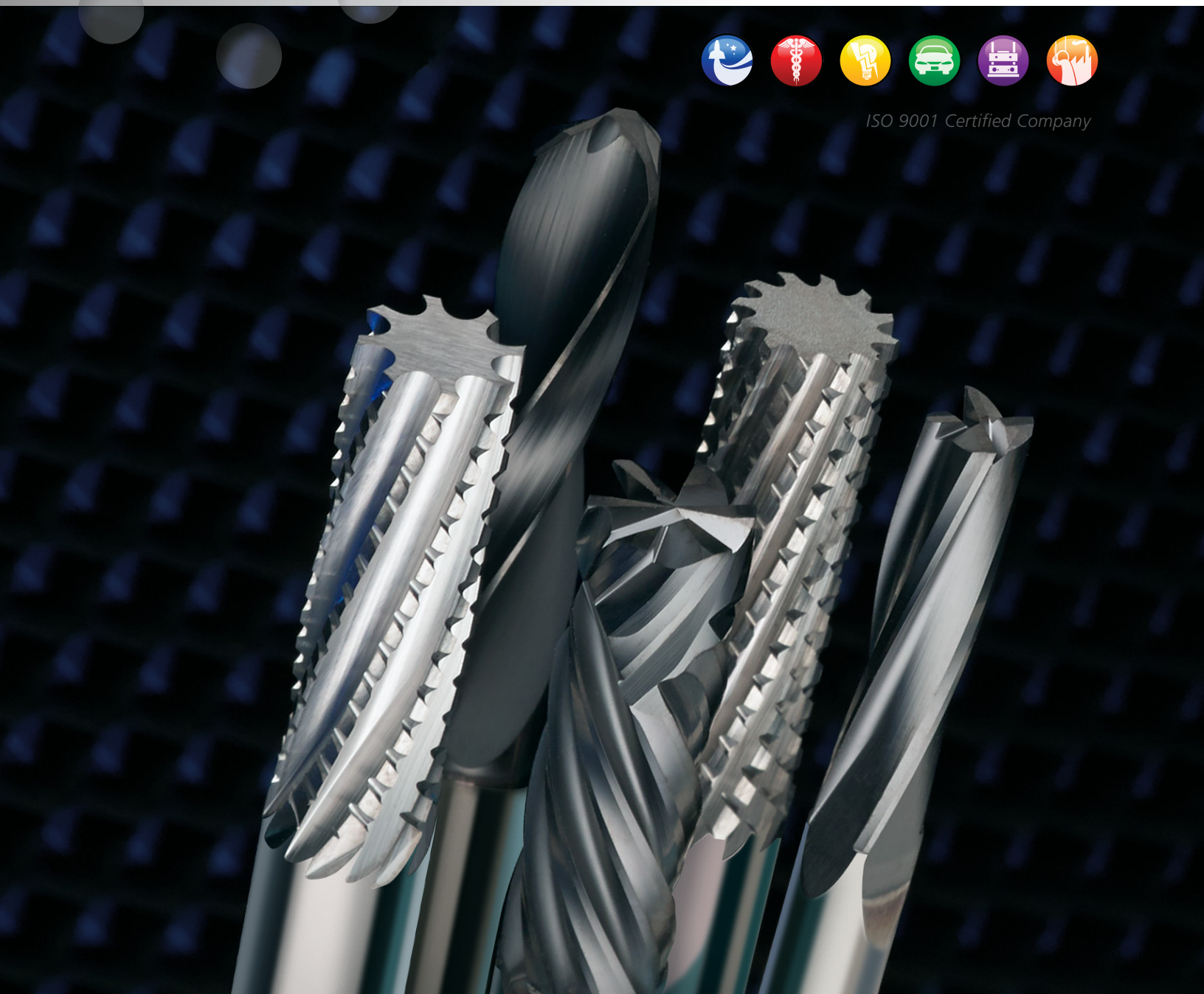
SGS

Solid Carbide Tools

Composite Tools | *Performance by Design*

ISO 9001 Certified Company

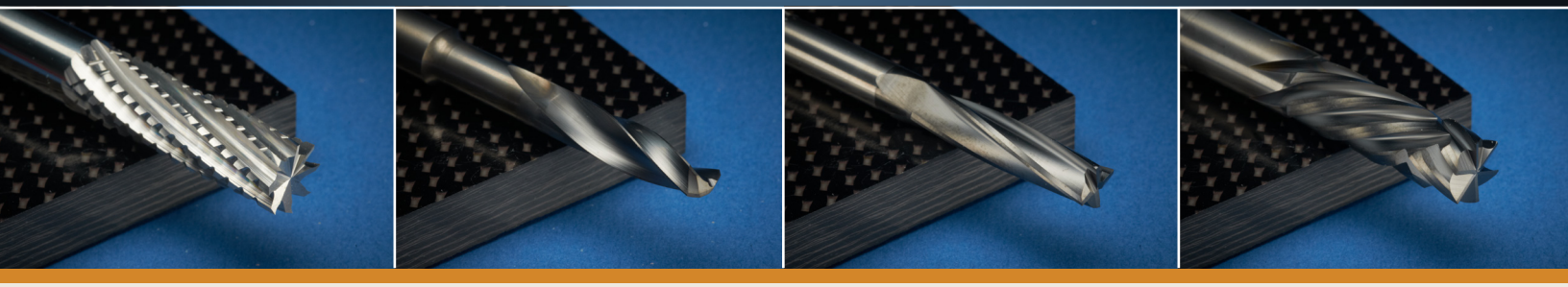


As one of the world's largest manufacturers of solid carbide rotary cutting tools, SGS Tool Company has pioneered some of the most advanced cutting technologies specializing in specific challenges and extreme applications. We have developed a dedicated team to focus on the advancement of technology within the growing Composites segment and address the unique challenges and opportunities of cutting Composite materials.

The unique qualities of Composites combines light weight with high strength and resistance to fatigue, corrosion, impact, wear and thermal issues, making it attractive to a wide variety of part manufacturers and fabricators. This carbon fiber material is comprised of a layered resin structure with a variety of complex fiber configurations embedded within the resin giving the material its physical shape while the fibers determine the material properties.

SGS has continued to develop industry-leading solutions with the launch of a product series unique to Composite. We have given special consideration to the substrate, geometry, coating, edge conditions and manufacturing techniques that conventional cutting tools have a difficult time addressing.

THE **MOST ADVANCED** CUTTING TECHNOLOGIES **SOLUTIONS** FOR THE UNIQUE QUALITIES OF **COMPOSITES**



Improved Surface Conditions of Work Piece

Eliminate Delamination

Minimize Fiber Breakout

Lower Cutting Forces

Increased Tool Life

Greater Process Efficiencies

Minimize Cutting Temperatures

Decreased Production Costs

Composites in Aerospace

- CFRP excels in fatigue performance compared to aluminium
- Structurally durable yet lightweight for primary and secondary aircraft structures
- Widely used throughout aircraft interiors

Composites in Automotive

- Carbon fiber is lightweight, durable and easily molded
- Leading manufacturers targeting Composite for future production cars
- Multi-layered material resists breakage

Composites in Power Generation

- Primarily used in wind turbines
- Blades must be low weight, possess rotational inertia and have resistance to fatigue and wear
- CFRP withstands environmental erosion and degradation

Raw Material

- High Performance substrate engineered specifically for the machining of Composite materials
- Evaluated and designed to complement Di-NAMITE coating
- Lab inspected to verify consistency and quality

Di-NAMITE Coating

- Pure Crystalline Diamond for high demanding abrasive applications
- Engineered application process for maximum adhesion and smooth coating structure
- Coating held to tight tolerances for consistent batch to batch results

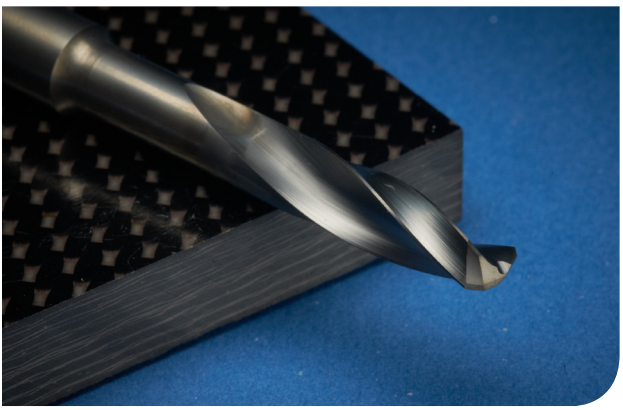
Di-NAMITE®
CRYSTALLINE DIAMOND COATING

- Diamond is the longest wearing surface of any material allowing for improved cutting edge performance and improved surface finishes
- Extremely high thermal properties protects the cutting edge from excessive heat to help extend tool life
- The features of Di-NAMITE coatings allow for improved operating parameters through better edge protection

SERIES 120 COMPOSITE DRILL

The key features of the 8 Facet Double Angle Hi-Per Carb drill design offers application benefits beyond that of other high performance drills in its category. Each feature of this 8 facet design was engineered as a solution towards addressing the issues commonly encountered during Composite drilling. This unique High Performance design successfully creates an accurate hole without splintering or delamination, ultimately optimizing the Composite drilling process.

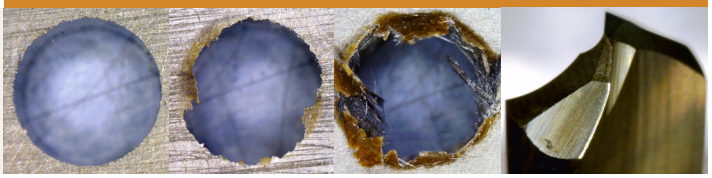
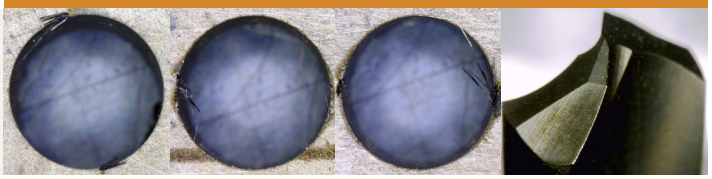
- Double margin construction design stabilizes the drill for greater hole accuracy and improved surface finish in final hole
- The compound angle creates 4 cutting edges along the drill point
- Minimized Delamination at hole entry/exit
- Engineered drill point evenly distributes material, spreading load across 2 different angles and 4 different cutting edges
- Distinct double angle prevents abrasiveness of the Composite from localizing along the point and diminishing tool life
- Manufactured exclusively with Di-NAMITE coating for even wear, extended tool life and improved finishes



Performance by Design

Engineered drill point evenly distributes material, spreading load across 2 different angles and 4 different cutting edges.

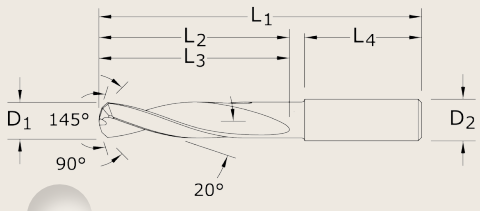
SPEED	FEED	RADIAL WIDTH	AXIAL DEPTH	WORKPIECE HARDNESS	MACHINE TYPE	COOLANT
5,000 rpm	5.0 ipm	.190"	.240"	CFRP	Vertical Machining Center	none

TOOL NO.	TYPE DESCRIPTION	TIR IN MACHINE	USAGE	INSPECTION NOTES
1	.190" CFRP drill, uncoated	.0001"	50 holes	Good hole quality for 1st 3 holes – fraying starting by 3rd hole, .0021" wear 1st hole / 3rd hole / 50th hole / After 50 holes 
2	.190" CFRP drill, diamond	.0002"	50 holes	Good hole quality all 50 holes – slight fraying, .0013" wear 1st hole / 25th hole / 50th hole / After 50 holes 

PERFORMANCE VALIDATION

A test was conducted of our CFRP drill to determine the necessity of coating when drilling Carbon Fiber material. Fifty holes were drilled using a special size .190" CFRP drill. The tool's design produces acceptable quality holes; but as shown in the photos, early edge wear on the uncoated drill resulted in holes with frayed edges. The diamond coated drill produced all 50 holes with little to no fraying and edge wear was 38% less than the uncoated drills.

The geometry of the 8 Facet drill with the Di-NAMITE coating is a necessity for additional tool life and productivity when manufacturing Carbon Fiber material.



Tolerances (inch)

Diameter	D_1	D_2
All	+.0000 / -.0005	h6

Tolerances (mm)

Diameter	D_1	D_2
All	+0,000 / -0,013	h6

Size D_1	Decimal Equivalent	Shank Diameter D_2	Overall Length L_1	Flute Length L_2/L_3	L_4	Di-NAMITE (TD) EDP No.
#40	0.098	1/8	2	9/16	1-1/4	50000
2,7 mm	0.106	6,0	63,0	20,0	32,0	50001
3,0 mm	0.118	6,0	63,0	20,0	36,0	50002
1/8	0.125	1/4	2-1/2	3/4	1-7/16	50003
3,2 mm	0.126	6,0	66,0	20	36,0	50004
#30	0.129	1/4	2-1/2	3/4	1-7/16	50005
#28	0.141	1/4	2-1/2	3/4	1-7/16	50006
#22	0.157	1/4	2-5/8	7/8	1-7/16	50007
#21	0.159	1/4	2-5/8	7/8	1-7/16	50008
4,1 mm	0.161	6,0	66,0	24,0	36,0	50009
#19	0.166	1/4	2-5/8	7/8	1-7/16	50010
11/64	0.172	1/4	2-5/8	7/8	1-7/16	50011
3/16	0.188	1/4	2-5/8	1	1-7/16	50012
#11	0.191	1/4	2-5/8	1	1-7/16	50013
#8	0.199	1/4	2-5/8	1	1-7/16	50014
#7	0.201	1/4	2-5/8	1	1-7/16	50015
#2	0.221	1/4	2-5/8	1	1-7/16	50016
6,0 mm	0.236	6,0	66,0	28,0	36,0	50017
1/4	0.250	1/4	3-1/8	1-5/16	1-7/16	50018
.2510	0.251	5/16	3-1/8	1-5/16	1-7/16	50019
F	0.257	5/16	3-1/8	1-5/16	1-7/16	50020
I	0.272	5/16	3-1/8	1-5/16	1-7/16	50021
J	0.277	5/16	3-1/8	1-5/16	1-7/16	50022
K	0.281	5/16	3-1/8	1-9/16	1-7/16	50023
5/16	0.313	5/16	3-1/8	1-9/16	1-7/16	50024
8,0 mm	0.315	8,0	79,0	41,0	36,0	50025
3/8	0.375	3/8	3-1/2	1-27/32	1-9/16	50026
V	0.377	1/2	3-1/2	1-27/32	1-9/16	50027
10,0 mm	0.394	10,0	89,0	47,0	40,0	50028
7/16	0.438	1/2	4-1/16	2-3/16	1-9/16	50029
12,0 mm	0.472	12,0	102,0	55,0	45,0	50030
1/2	0.500	1/2	4-1/4	2-5/16	1-3/4	50031

120 (FRACTIONAL)	Speed (sfm)	Feed (inch/rev)						
	CVD	1/8	3/16	1/4	5/16	3/8	7/16	1/2
● **CFRP, AFRP (Carbon Fiber, Aramid Fiber)**	320	0.0006	0.0008	0.0012	0.0015	0.0018	0.0021	0.0024
● **GFRP (Fiberglass)**	240	0.0006	0.0008	0.0012	0.0015	0.0018	0.0021	0.0024
● **CARBON, GRAPHITE**	400	0.0008	0.0012	0.0016	0.0020	0.0024	0.0028	0.0032

Adjust speed and/or feed based upon resin type and/or fiber structure	rpm = sfm x 3.82 / D1 ipm = (inch/rev) x rpm	Refer to the SGS Tool Wizard for more complete technical information (available at www.sgstool.com)

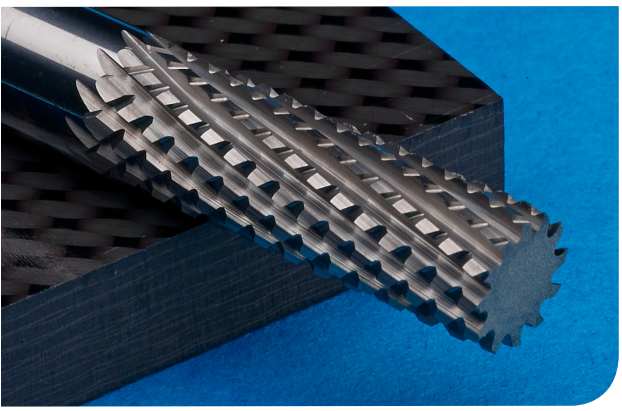
120-M (METRIC)	Speed (sfm)	Feed (mm/rev)						
	CVD	2.5	3	4.1	6	8	10	12
● **CFRP, AFRP (Carbon Fiber, Aramid Fiber)**	100	0.015	0.018	0.020	0.030	0.038	0.046	0.053
● **GFRP (Fiberglass)**	75	0.015	0.018	0.020	0.030	0.038	0.046	0.053
● **CARBON, GRAPHITE**	120	0.020	0.024	0.030	0.041	0.051	0.061	0.071

Adjust speed and/or feed based upon resin type and/or fiber structure	rpm = (1000 x m/min) / (3.14 x D1) mm/min = (mm/rev) x rpm	Refer to the SGS Tool Wizard for more complete technical information (available at www.sgstool.com)

SERIES 20 CARBON COMPOSITE ROUTER

SGS Carbon Composite Routers were designed for maximum performance in CFRP materials. We partnered with a leading Aerospace company to launch the original Series 20, a design focused on trimming and finishing in demanding applications requiring minimal fiber breakout and delamination.

- The multi-flute design and positive geometry cleanly shear through the material with minimal pressure without delamination issues
- The unique clearance grind minimizes the contact between the tool diameter and workpiece, eliminating friction and pressure concerns
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Greater edge finish with longer tool life
- Available with and without end cut
- Now available with Di-NAMITE coating option



Performance by Design

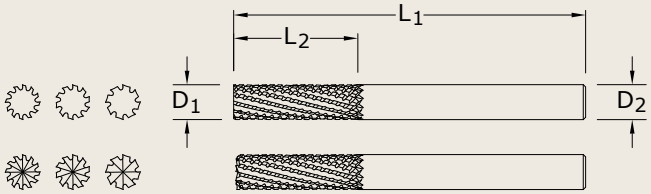
The Original CCR is now available in a diamond coated option for maximum abrasion resistance and increased tool life.

Tolerances (inch)

Diameter	D_1	D_2
All	+.000 / -.005	h6

Tolerances (mm)

Diameter	D_1	D_2
All	+0,00 / -0,13	h6



SERIES 20 CCR (FRACTIONAL)

Cutting Diameter D_1	Flute Length L_2	Overall Length L_1	Shank Diameter D_2	Number of Flutes	End Style	Uncoated EDP No.	Di-NAMITE (TD) EDP No.
1/4	1	2-1/2	1/4	8	No End Cutting	72930	73013
1/4	1	2-1/2	1/4	8	End Cutting	72947	73012
5/16	1	2-1/2	5/16	10	No End Cutting	72948	73026
5/16	1	2-1/2	5/16	10	End Cutting	72949	73014
3/8	1-1/8	2-1/2	3/8	12	No End Cutting	72950	73028
3/8	1-1/8	2-1/2	3/8	12	End Cutting	72951	73027
1/2	1-1/2	3-1/2	1/2	12	No End Cutting	72952	73041
1/2	1-1/2	3-1/2	1/2	12	End Cutting	72953	73029

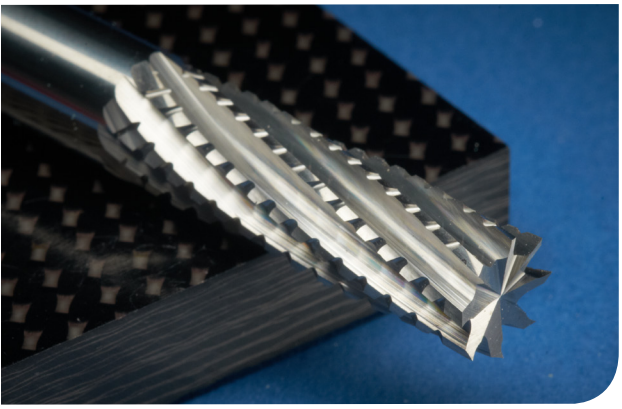
SERIES 20-M CCR (METRIC)

Cutting Diameter D_1	Flute Length L_2	Overall Length L_1	Shank Diameter D_2	Number of Flutes	End Style	Uncoated EDP No.	Di-NAMITE (TD) EDP No.
6,0	25,0	63,0	6,0	8	No End Cutting	82966	83027
6,0	25,0	63,0	6,0	8	End Cutting	82967	83026
8,0	25,0	63,0	8,0	10	No End Cutting	82968	83029
8,0	25,0	63,0	8,0	10	End Cutting	82969	83028
10,0	28,0	63,0	10,0	12	No End Cutting	82970	83042
10,0	28,0	63,0	10,0	12	End Cutting	82971	83041
12,0	38,0	89,0	12,0	12	No End Cutting	82972	83044
12,0	38,0	89,0	12,0	12	End Cutting	82973	83043

SERIES 31 COURSE CUT CARBON COMPOSITE ROUTER

The addition of the Series 31 geometry adds the benefit of fewer and deeper flutes than the original Series 20 CCR to avoid clogging during heavy routing CFRP applications.

- The multi-flute design and positive geometry cleanly shear through the material with minimal pressure without delamination issues
- The unique clearance grind minimizes the contact between the tool diameter and workpiece, eliminating friction and pressure concerns
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Fewer flutes to avoid potential clogging in demanding applications
- Available with and without end cut
- Optional Di-NAMITE coating option available for greater edge finish and longer tool life



Performance by Design

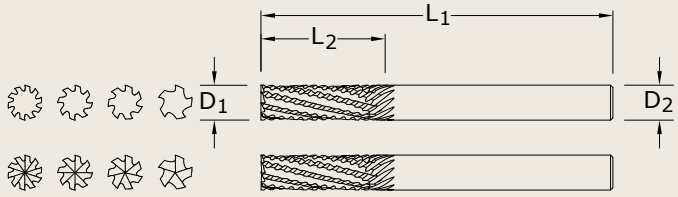
Cleanly shear through the material with minimal pressure without delamination issues.

Tolerances (inch)

Diameter	D_1	D_2
All	+.000 / -.005	h6

Tolerances (mm)

Diameter	D_1	D_2
All	+0,00 / -0,13	h6



	Cutting Diameter D_1	Flute Length L_2	Overall Length L_1	Shank Diameter D_2	Number of Flutes	End Style	Uncoated EDP No.	Di-NAMITE (TD) EDP No.
SERIES 31 (FRACTIONAL)	1/4	1	2-1/2	1/4	5	End Cutting	72954	72955
	1/4	1	2-1/2	1/4	5	No End Cutting	72956	72957
	5/16	1	2-1/2	5/16	7	End Cutting	72958	72959
	5/16	1	2-1/2	5/16	7	No End Cutting	72960	72961
	3/8	1-1/8	2-1/2	3/8	8	End Cutting	72962	72963
	3/8	1-1/8	2-1/2	3/8	8	No End Cutting	72964	72965
	1/2	1-1/2	3-1/2	1/2	10	End Cutting	72966	72967
	1/2	1-1/2	3-1/2	1/2	10	No End Cutting	72968	72969

	Cutting Diameter D_1	Flute Length L_2	Overall Length L_1	Shank Diameter D_2	Number of Flutes	End Style	Uncoated EDP No.	Di-NAMITE (TD) EDP No.
SERIES 31M (METRIC)	6,0	25,0	63,0	6,0	5	End Cutting	82974	82982
	6,0	25,0	63,0	6,0	5	No End Cutting	82975	82983
	8,0	25,0	63,0	8,0	7	End Cutting	82976	82984
	8,0	25,0	63,0	8,0	7	No End Cutting	82977	82985
	10,0	28,0	63,0	10,0	8	End Cutting	82978	82986
	10,0	28,0	63,0	10,0	8	No End Cutting	82979	82987
	12,0	38,0	89,0	12,0	10	End Cutting	82980	82988
	12,0	38,0	89,0	12,0	10	No End Cutting	82981	82989

20, 31 (FRACTIONAL)	Cut	Speed	Feed (inch/rev)				
	Type	sfm	1/16	1/8	1/4	3/8	1/2
CFRP, AFRP (Carbon Fiber, Aramid Fiber)	Slot	400	0.0012	0.0024	0.0048	0.0090	0.0120
	Profile	500	0.0012	0.0024	0.0048	0.0090	0.0120
	Light	825	0.0028	0.0056	0.0111	0.0207	0.0276
GFRP (Fiberglass)	Slot	320	0.0012	0.0024	0.0048	0.0090	0.0120
	Profile	400	0.0012	0.0024	0.0048	0.0090	0.0120
	Light	660	0.0028	0.0056	0.0111	0.0207	0.0276
CARBON, GRAPHITE	Slot	480	0.0015	0.0030	0.0060	0.0114	0.0150
	Profile	600	0.0015	0.0030	0.0060	0.0114	0.0150
	Light	990	0.0035	0.0069	0.0138	0.0258	0.0345
PLASTIC	Slot	800	0.0015	0.0030	0.0060	0.0114	0.0150
	Profile	1000	0.0015	0.0030	0.0060	0.0114	0.0150
	Light	1650	0.0035	0.0069	0.0138	0.0258	0.0345
MACHINABLE CERAMIC, MACHINABLE GLASS	Slot	40	0.0006	0.0012	0.0024	0.0045	0.0060
	Profile	50	0.0006	0.0012	0.0024	0.0045	0.0060
	Light	85	0.0014	0.0027	0.0054	0.0102	0.0138

Cut Type

Slot	Profile	Light
31	31	20, 31
$Rw = D_1$	$Rw = .5 \times D_1$	$Rw = .05 \times D_1$
$Ad = D_1$	$Ad = 1.5 \times D_1$	$Ad = L_2$

$rpm = sfm \times 3.82 / D_1$
$ipm = (inch/rev) \times rpm$

- maximum recommended depths shown
- adjust speed and feed based upon resin type and/or fiber structure
- reduce speed when overheating causes melting or damage to resin
- reduce feed if delamination or fraying occurs
- finish cuts typically require reduced feed and cutting depths
- rates shown are for use without coolant; rates may be increased with coolant use
- dust collection is vital when machining dry
- diamond coating will increase tool life in graphite and composite materials
- refer to the SGS Tool Wizard for more complete technical information (available at www.sgstool.com)

20M, 31M (METRIC)	Cut	Speed	Feed (mm/rev)				
	Type	m/min	1.6	3	6	10	12
CFRP, AFRP (Carbon Fiber, Aramid Fiber)	Slot	120	0.030	0.060	0.120	0.230	0.305
	Profile	150	0.030	0.060	0.120	0.230	0.305
	Light	250	0.070	0.140	0.280	0.525	0.700
GFRP (Fiberglass)	Slot	100	0.030	0.060	0.120	0.230	0.305
	Profile	120	0.030	0.060	0.120	0.230	0.305
	Light	200	0.070	0.140	0.280	0.525	0.700
CARBON, GRAPHITE	Slot	145	0.040	0.075	0.150	0.290	0.380
	Profile	185	0.040	0.075	0.150	0.290	0.380
	Light	300	0.090	0.175	0.350	0.655	0.875
PLASTIC	Slot	245	0.040	0.075	0.150	0.290	0.380
	Profile	305	0.040	0.075	0.150	0.290	0.380
	Light	505	0.090	0.175	0.350	0.655	0.875
MACHINABLE CERAMIC, MACHINABLE GLASS	Slot	10	0.015	0.030	0.060	0.115	0.150
	Profile	15	0.015	0.030	0.060	0.115	0.150
	Light	25	0.035	0.070	0.135	0.260	0.350

Cut Type

Slot	Profile	Light
31M Rw = D_1 Ad = D_1	31M Rw = .5 x D_1 Ad = 1.5 x D_1	20M, 31M Rw = .05 x D_1 Ad = L_2

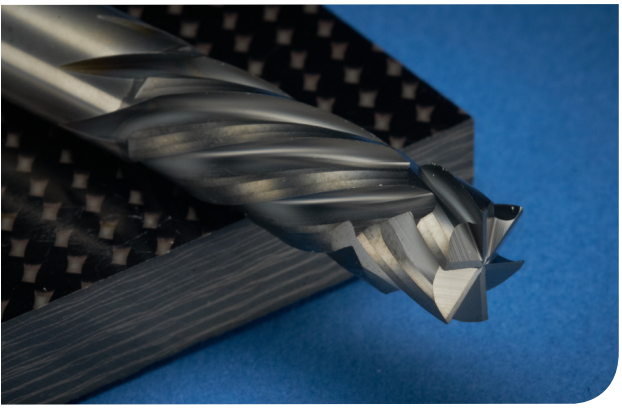
rpm = (1000 x m/min) / (3.14 x D_1)
mm/min = (mm/rev) x rpm

- maximum recommended depths shown
- adjust speed and feed based upon resin type and/or fiber structure
- reduce speed when overheating causes melting or damage to resin
- reduce feed if delamination or fraying occurs
- finish cuts typically require reduced feed and cutting depths
- rates shown are for use without coolant; rates may be increased with coolant use
- dust collection is vital when machining dry
- diamond coating will increase tool life in graphite and composite materials
- refer to the SGS Tool Wizard for more complete technical information (available at www.sgstool.com)

SERIES 25 COMPRESSION ROUTER – FOR FINISH MILLING OF CFRP

A major challenge in machining with Composite material is preventing separation of material layers during the machining process. By incorporating both a left and right hand helix, the cutting pressure to the center of the work piece is compressed, eliminating the fraying of the material.

- A left handed helix directs cutting forces downward in a pushing action, great for holding parts securely against a fixture.
- A right handed helix directs cutting forces upward in a pulling action, great for chip evacuation.
- The lower portion of the flute directs loads upward and the upper portion of the flute directs loads downward, minimizing the forces which cause delamination and fraying.
- Available with Di-NAMITE coating for longer, cleaner performance
- Specialized geometry for maximum load reduction



Performance by Design

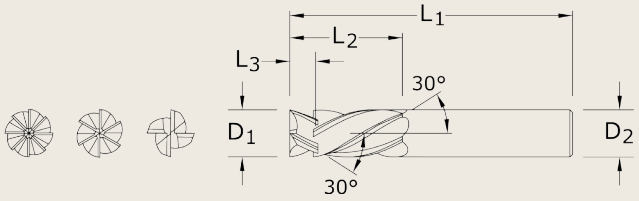
Incorporates both a left and right hand helix, eliminating the fraying of material.

Tolerances (inch)

Diameter	D_1	D_2
All	+.000 / -.003	h6

Tolerances (mm)

Diameter	D_1	D_2
All	+0,00 / -0,8	h6

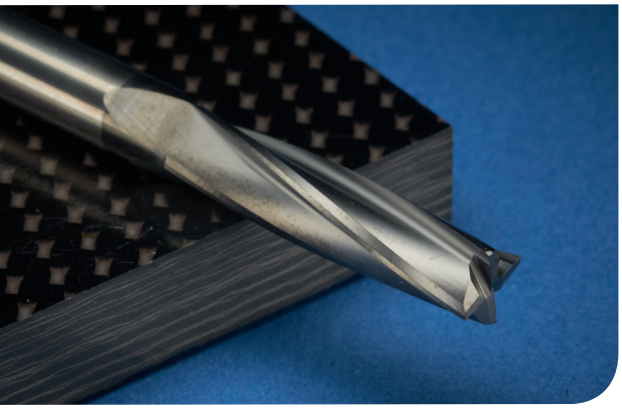


	Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	L_3	Shank Diameter D_2	Number of Flutes	Uncoated EDP No.	Di-NAMITE (TD) EDP No.
SERIES 25 (FRACTIONAL)	1/4	1	2-1/2	.175	1/4	4	72970	72971
	5/16	1	2-1/2	.220	5/16	4	72972	72973
	3/8	1-1/8	2-1/2	.265	3/8	6	72974	72975
	1/2	1-1/2	3-1/2	.360	1/2	8	72976	72977

	Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	L_3	Shank Diameter D_2	Number of Flutes	Uncoated EDP No.	Di-NAMITE (TD) EDP No.
SERIES 25-M (METRIC)	6,0	25,0	63,0	4,10	6,0	4	82990	82991
	8,0	25,0	63,0	5,58	8,0	4	82992	82993
	10,0	28,0	63,0	7,05	10,0	6	82994	82995
	12,0	38,0	89,0	8,60	12,0	8	82996	82997

SERIES 27 SLOW HELIX END MILL

- The slow helix design adds strength to the edge making the tool more capable of milling of highly abrasive materials
- The stable configuration and full cutting edge leads to improved surface finishes
- This rigid design of a slow helix is complimented with a variable helix to help to reduce vibration and deflection
- The slow helix provides shear without delamination or damage
- Design creates a short path for material evacuation during machining
- Balanced geometry reacts positively to address complexity of Composite fiber matrix
- Optional Di-NAMITE Coating for ultimate protection and extended tool life



Performance by Design

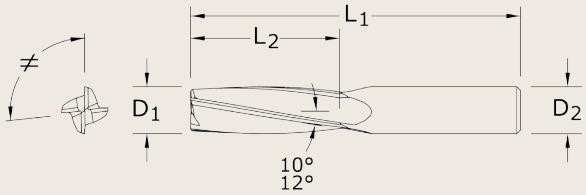
Stable configuration and full cutting edge leads to improved surface finishes.

Tolerances (inch)

Diameter	D_1	D_2
All	+.000 / -.003	h6

Tolerances (mm)

Diameter	D_1	D_2
All	+0,00 / -0,8	h6



SERIES 27 (FRACTIONAL)

Cutting Diameter D_1	Flute Length L_2	Overall Length L_1	Shank Diameter D_2	Uncoated EDP No.	Di-NAMITE (TD) EDP No.
1/4	1	2-1/2	1/4	72978	72979
3/8	1-1/8	2-1/2	3/8	72980	72981
1/2	1-1/2	3-1/2	1/2	72982	72983
3/4	1-3/4	4	3/4	72984	72985

SERIES 27-M (METRIC)

Cutting Diameter D_1	Flute Length L_2	Overall Length L_1	Shank Diameter D_2	Uncoated EDP No.	Di-NAMITE (TD) EDP No.
6,0	25,0	63,0	6,0	83056	83057
8,0	25,0	63,0	8,0	83058	83059
10,0	28,0	63,0	10,0	83060	83061
12,0	38,0	89,0	12,0	83062	83063
16,0	48,0	115,0	16,0	83064	83065

25, 27 (FRACTIONAL)	Cut Type	Speed sfm	Feed (inch/flute) 1/4	5/16	3/8	1/2	3/4
● CFRP, AFRP (Carbon Fiber, Aramid Fiber)	Slot	400	0.0016	0.0025	0.0030	0.0040	0.0048
	Profile	500	0.0016	0.0025	0.0030	0.0040	0.0048
	Light	825	0.0037	0.0057	0.0069	0.0092	0.0110
● GFRP (Fiberglass)	Slot	320	0.0016	0.0025	0.0030	0.0040	0.0048
	Profile	400	0.0016	0.0025	0.0030	0.0040	0.0048
	Light	660	0.0037	0.0057	0.0069	0.0092	0.0110
● CARBON, GRAPHITE	Slot	480	0.0020	0.0031	0.0038	0.0050	0.0060
	Profile	600	0.0020	0.0031	0.0038	0.0050	0.0060
	Light	990	0.0046	0.0072	0.0086	0.0115	0.0138
● PLASTIC	Slot	800	0.0020	0.0031	0.0038	0.0050	0.0060
	Profile	1000	0.0020	0.0031	0.0038	0.0050	0.0060
	Light	1650	0.0046	0.0072	0.0086	0.0115	0.0138
MACHINABLE CERAMIC, MACHINABLE GLASS	Slot	40	0.0008	0.0013	0.0015	0.0020	0.0024
	Profile	50	0.0008	0.0013	0.0015	0.0020	0.0024
	Light	85	0.0018	0.0029	0.0034	0.0046	0.0055

Cut Type

Slot	Profile	Light
27	25, 27	25, 27
Rw = D_1	Rw = .5 x D_1	Rw = .05 x D_1
Ad = D_1	Ad = 1.5 x D_1	Ad = L_2

rpm = sfm x 3.82 / D_1
ipm = (inch/flute) x no. of flutes x rpm

- maximum recommended depths shown
- adjust speed and feed based upon resin type and/or fiber structure
- reduce speed when overheating causes melting or damage to resin
- reduce feed if delamination or fraying occurs
- finish cuts typically require reduced feed and cutting depths
- rates shown are for use without coolant; rates may be increased with coolant use
- dust collection is vital when machining dry
- diamond coating will increase tool life in graphite and composite materials
- refer to the SGS Tool Wizard for more complete technical information (available at www.sgstool.com)

25M, 27M (METRIC)	Cut	Speed	Feed (mm/flute)				
	Type	m/min	6	8	10	12	16
● CFRP, AFRP (Carbon Fiber, Aramid Fiber)	Slot	120	0.040	0.065	0.075	0.100	0.120
	Profile	150	0.040	0.065	0.075	0.100	0.120
	Light	250	0.095	0.145	0.175	0.235	0.280
● GFRP (Fiberglass)	Slot	100	0.040	0.065	0.075	0.100	0.120
	Profile	120	0.040	0.065	0.075	0.100	0.120
	Light	200	0.095	0.145	0.175	0.235	0.280
● CARBON, GRAPHITE	Slot	145	0.050	0.080	0.095	0.125	0.150
	Profile	185	0.050	0.080	0.095	0.125	0.150
	Light	300	0.115	0.185	0.220	0.290	0.350
● PLASTIC	Slot	245	0.050	0.080	0.095	0.125	0.150
	Profile	305	0.050	0.080	0.095	0.125	0.150
	Light	505	0.115	0.185	0.220	0.290	0.350
MACHINABLE CERAMIC, MACHINABLE GLASS	Slot	10	0.020	0.035	0.040	0.050	0.060
	Profile	15	0.020	0.035	0.040	0.050	0.060
	Light	25	0.045	0.075	0.085	0.115	0.140

Cut Type

Slot	Profile	Light
27M Rw = D_1 Ad = D_1	25M, 27M Rw = .5 x D_1 Ad = 1.5 x D_1	25M, 27M Rw = .05 x D_1 Ad = L_2

rpm = (1000 x m/min) / (3.14 x D_1)
mm/min = (mm/flute) x no. of flutes x rpm

- maximum recommended depths shown
- adjust speed and feed based upon resin type and/or fiber structure
- reduce speed when overheating causes melting or damage to resin
- reduce feed if delamination or fraying occurs
- finish cuts typically require reduced feed and cutting depths
- rates shown are for use without coolant; rates may be increased with coolant use
- dust collection is vital when machining dry
- diamond coating will increase tool life in graphite and composite materials
- refer to the SGS Tool Wizard for more complete technical information (available at www.sgstool.com)

Solid Carbide Tools

Performance by Design

Solutions Around The Globe
SGS Tool Company is a privately-held, ISO-certified leader of round solid carbide cutting tool technology for the aerospace, metalworking, and automotive industries with manufacturing sites in the United States and United Kingdom. Our global network of Sales Representatives, Industrial Distributors, and Agents blanket the world selling into more than 60 countries.

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