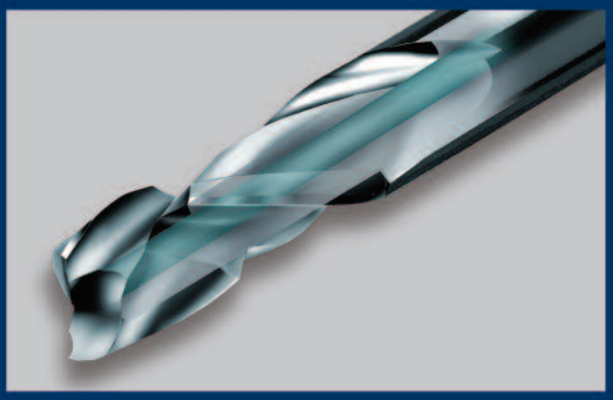
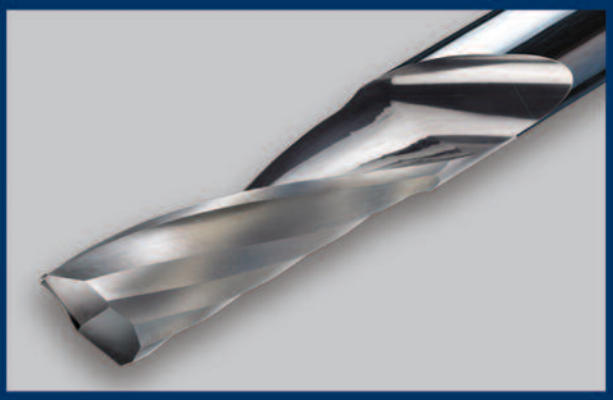
ONSRUD

Production Routing Tools

for Wood, Plastic, Composites and Metal

www.onsrud.com

LMT

comprehensive training

Increased productivity equals lower cost, improved profitability, and ultimately, survival of your business in today's competitive environment. **The Onsrud Performance Team** will work with all levels of your operation to increase your productivity. All levels of training, general to production-specific on the shop floor, are only a call away!

factory technical support

Onsrud Cutter provides your business with access to our staff of highly trained professional factory technicians. We can assist you wtih those difficult production routing problems while increasing your performance and productivity.

on-site trouble shooting

Correct tool selection, proper hold-down techniques, faster feed rates, fewer and quicker set ups are all pieces to the producivity puzzle. **The Onsrud Performance Team** offers tailored solutions for problem solving and productivity gains.

custom tool design

Not only does Onsrud Cutter offer the largest selection of router bits for day to day operations, but we will also design a tool for your specific application or material. We will take your tool requirements from the drawing board, to sophisticated computer-aided design, to in-house testing on our CNC router. Custom made to meet your productivity goals.

the ONSRUD advantage

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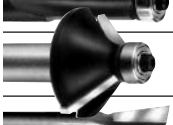	**29-50** CT 2F Straight Chamfer	19
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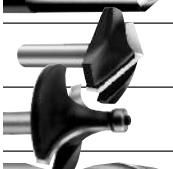	**37-80** CT 2F Lettering Bits	21
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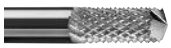	**67-000*** SC Fiberglass Burr Bits	53

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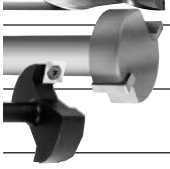	**91-000** CT Spoilboard Cutter	65
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* Available In Metric

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* Available In Metric

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* Available In Metric

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* Available In Metric

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* Available In Metric

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* Available In Metric

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* Available In Metric

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* Available In Metric

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* Available In Metric

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* Available In Metric

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* Available in Metric

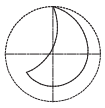
Single Flute - High Speed Steel O Flute Straight

10-00

Combines an open flute design with single flute geometry to provide optimum chip removal at fast feed rates. Excellent for hand-fed operations.

Usage ABS, polycarbonate, polyethylene, PVC, PVC, polypropylene, polystyrene, extruded acrylic, HDPE, UHMW, and natural wood

Material SW SP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
10-00	1/16	3/16	1/4	2
10-01	3/32	3/8	1/4	2
10-02	1/8	3/8	1/4	2
10-20	1/8	1/2	1/4	2
10-22	3/16	3/4	1/4	2
10-06	1/4	3/4	1/4	2-1/8
10-07	1/4	1	1/4	2-3/8
10-78	1/4	1-1/4	1/4	2-5/8
10-11	3/8	1	1/2	2-1/2

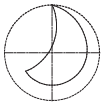
Single & Double Flute - High Speed Steel O Flute Straight

11-00

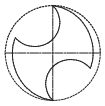
Designed for cutting softer more flexible plastics. Single flute for faster feed rates. Double flute for smoother finish. Excellent for hand-fed operations.

Usage ABS, polycarbonate, polyethylene, polystyrene, PVC, polypropylene extruded acrylic, HDPE, UHMW

Material SP HP See Selection Guide - pg. 2 - 12



Single Flute



Double Flute

SINGLE FLUTE

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
11-01	1/8	1/2	1/4	2
11-75*	1/8	5/8	1/4	3-1/4
11-03	3/16	5/8	1/4	3-1/4
11-77*	3/16	3/4	1/4	3-1/4
11-05	1/4	3/4	1/4	2-1/8
11-71*	1/4	3/4	1/4	3-1/4
11-07	1/4	1	1/4	2-3/8
11-09	3/8	1	3/8	2-1/2

DOUBLE FLUTE

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
11-00	3/16	5/8	1/4	2
11-02	1/4	3/4	1/4	2-1/8
11-72*	1/4	3/4	1/4	3-1/4
11-76*	1/4	3/4	1/4	3-3/4
11-04	1/4	1	1/4	2-3/8
11-78*	1/4	2	1/4	3-1/4
11-06	3/8	1	3/8	2-1/2
11-74*	3/8	1	3/8	3-1/2

*These tools are designed and toleranced for Air Routers with guide bushing.

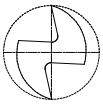
12-00

Double Flute - High Speed Steel V Flute Straight

These V flutes are often selected when a balanced tool is critical for smooth finish. A universal tool used in many environments. Excellent for hand-fed applications.

Usage Foam and natural wood

Material HW FP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
12-00	1/4	3/4	1/4	2-1/8
12-79*	1/4	1	1/4	3-1/4
12-35	1/4	1	1/2	2-1/2
12-05	3/8	1	3/8	2-1/2
12-10	1/2	1-1/4	1/2	2-3/4
12-16	7/8	1-1/4	1/2	2-3/4

* These tools are designed and toleranced for Air Routers with guide bushing.

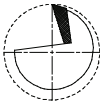
13-50

Single Flute - Carbide Tipped Opposite Shear

Opposite shearing action tools designed to minimize chipping or tear out on both sides of laminated or veneered stock. Excellent for sink cutouts.

Usage Wood composites, laminate, veneer & foam

Material CW FP LW See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
13-53	1/2	1-1/4	1/2	2-3/4
13-54	1/2	1-1/2	1/2	3
13-50	1/2	2	1/2	4
13-52	1/2	2-1/4	1/2	4-1/4
13-55	3/4	2	3/4	4

SHEER ANGLE ≈ 3° - 6°

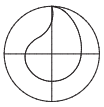
15-00

Single Flute - High Speed Steel Downcut Spiral

Designed to rout thick laminated stock of aluminum and wood and to make straight through cuts in thick stock of either material.

Usage Natural wood and aluminum

Material SW A See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
15-03	1/2	2-1/4	1/2	5-1/4
15-05	1/2	2-1/2	1/2	5-1/2

HELIX ANGLE ≈ 18° - 32°

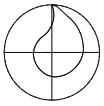
Single Flute - High Speed Steel Dor-Bits

15-50

Designed to rout steel doors.

Usage Metal clad doors
(15-50 and TIN15-50)
Fiberglass doors (TIN15-50)

Material D See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Door Machine
15-52	1/2	2-1/4	1/2	5-1/4	RUVO
15-53	1/2	2-1/2	1/2	5-1/2	RUVO
15-54	1/2	2-1/2	1/2	5	ACE
15-55*	1/2	2-1/2	1/2	5-1/2	FALCON
15-57*	1/2	2-1/2	1/2	5-1/2	NORFIELD
15-60	1/2	2-1/2	1/2	5-1/2	RUVO
15-61*	1/2	2-1/2	1/2	5-1/2	

HELIX ANGLE ≈ 18° - 32°

*Have Flats

TITANIUM COATED

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Door Machine
TIN15-52	1/2	2-1/4	1/2	5-1/4	RUVO
TIN15-53	1/2	2-1/2	1/2	5-1/2	RUVO
TIN15-54	1/2	2-1/2	1/2	5	ACE
TIN15-55*	1/2	2-1/2	1/2	5-1/2	FALCON
TIN15-57*	1/2	2-1/2	1/2	5-1/2	NORFIELD
TIN15-60	1/2	2-1/2	1/2	5-1/2	RUVO
TIN15-61*	1/2	2-1/2	1/2	5-1/2	

*HAVE FLATS

Three Flute - High Speed Steel TIN Coated CNC Dor-Bits

15-75

Downcut tools designed specifically for machining metal clad doors in a CNC environment. The tool geometry facilitates piercing steel and produces a superior cut for door lites and hardware openings.

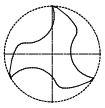
Usage Metal clad or fiberglass doors

Material D See Selection Guide - pg. 2 - 12

TITANIUM COATED

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Door Machine
TIN15-75	1/2	3	1/2	6	KVAL

HELIX ANGLE ≈ 18°



Single Flute - High Speed Steel Straight Pilot

18-00

Straight flute tools with boring points and pilots are the workhorse of the mobile home, modular home and RV industries.

Usage Wood panels, vinyl coated panels, wall board and aluminum layered materials

Material CM DW See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
18-00	1/4	3/4	1/4	2-3/4
18-02	3/8	7/8	3/8	2-7/8
18-03	1/2	1	1/2	3-1/2

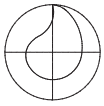
20-00

Single Flute - High Speed Steel Downcut Spiral Pilot

Spiral tools designed to push chips away from the operator in mobile home and RV manufacturing plants.

Usage Aluminum and plywood sandwich panels, vinyl coated panels, wall board, drywall and layered material

Material CM DW See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
20-00	1/4	3/4	1/4	3
20-02	3/8	1	3/8	3-7/16
20-03	1/2	1-1/4	1/2	4

HELIX ANGLE ≈ 21° - 38°

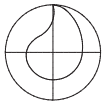
20-10

Single Flute - High Speed Steel Drywall Bit

Spiral flute tools designed to make cut outs in drywall. Used in manufactured housing and on site construction.

Usage Drywall cut outs

Material CM DW See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
20-10	3/16	1	1/4	3-1/4
20-11	1/8	3/4	1/8	2-1/2
20-15	1/8	1	1/8	2-1/2

HELIX ANGLE ≈ 30° - 41°

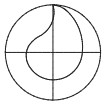
27-00

Single Flute - Solid Carbide Laminate Trim

Designed to trim counter tops. The pilot bears on the finished surface and acts as a guide to trim flush or with a bevel. Available with boring point if necessary to plunge and rout.

Usage Trimming laminate counter tops and trimming plastic parts

Material LW See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Style
27-00	1/4	1/4	1/4	1-1/2	Flush
27-01	1/4	1/4	1/4	1-1/2	7° Bevel
27-03	1/4	3/8	1/4	2	Flush

Double Flute - Solid Carbide Laminate Trim

27-50

Tools with a pilot designed to give a satin smooth finish when trimming laminate counter tops.

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Style
27-50	1/4	7/16	1/4	1-5/8	Flush

Usage Trimming laminate counter tops and trimming plastic parts

Material LW See Selection Guide - pg. 2 - 12

Solid Carbide Double-Bearing Plastic Trim

28-20

Spirals designed to trim stacked sheets of plastic in hand-fed applications. They use a double bearing guide to ensure smooth cutting action around a template.

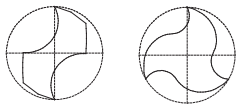
Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Flute
28-20	1/4	3/4	1/4	3	2
28-25	1/2	1-1/8	1/2	4	2

HELIX ANGLE ≈ 11° - 30°

Usage Trimming stacked sheets plastic & laminates

Material SP HP See Selection Guide - pg. 2 - 12

REPLACEMENT BEARING KITS FOR SERIES 28-20 *Solid Carbide Double Bearing Plastic Trim Tool Kits*	
28-89	KIT for 28-20 Tool
28-88	KIT for 28-25 Tool



Double Flute Three Flute

Carbide Tipped Flush Trim

28-50

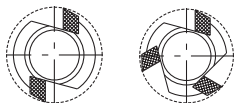
Designed to provide a smooth finished edge on dense, abrasive and laminated materials. A ball bearing guide assists free cutting action. Excellent for hand-fed applications.

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Flute
28-55	1/4	1	1/4	2-1/2	2
28-51	3/8	1/2	1/4	2-1/4	2
28-50	3/8	1	1/4	2-3/4	2
28-53	1/2	1/2	1/4	2	2
28-57	1/2	1	1/4	2-3/4	3
28-54	1/2	1	1/2	3-1/4	2
28-59	1/2	1-1/2	1/2	4-1/4	3
28-63	1/2	1-1/2	1/2	4-1/4	2
28-64	1/2	2	1/2	4-1/4	2

Usage Natural wood, wood composites, laminated and veneered

Material SW HW CW LW SP

See Selection Guide - pg. 2 - 12



Double Flute Three Flute

28-75

Bearings Kits For Bearing Tools

Bearing kits which include bearing, washer and locknut or screw as required.

Kit Number	Bearing Size	Description
28-78	1/2”O.D. x 3/16”I.D.	Bearing, Washer & Screw
28-80	5/8”O.D. x 1/8”I.D.	Bearing & Screw
28-79	3/8”O.D. x 3/16”I.D.	Bearing, Washer & Screw
28-86	21/2”O.D	2 Bearings w/Hardware

29-50

Double Flute - Carbide Tipped Chamfer

Provides a beveled or decorative edge on finished parts.

Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12

Part Number	Bevel	Flute LGTH	SHK DIA	OAL
29-51	45°	1/2	1/4	2
29-52	45°	1/2	1/2	2-1/2
29-53	25°	3/8	1/4	1-7/8

36-00

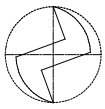
Double Flute - Carbide Tipped Dovetail

The best mechanical all wood method of joining two right angle members, a dovetail joint.

Usage Natural wood and wood composites

Material SW HW CW MT DT

See Selection Guide - pg. 2 - 12



Right Hand

Part Number	Large DIA	Small DIA	Flute LGTH	Angle Per Side	SHK DIA	OAL
36-03	3/8	3/16	3/8	14°2’	1/4	1-3/4
36-05	3/8	1/4	3/8	9°28’	1/2	1-7/8
36-07	1/2	1/4	1/2	14°2’	1/2	2-1/8
36-12	3/4	1/2	3/4	9°28’	1/2	2-1/4

HELIX ANGLE ≈ 5° - 10° Shear

Single Flute - Solid Carbide Engraving Tools

37-00
37-20

The half round engraving tools are offered with a wide range of tip sizes and angles to accommodate many engraving styles.

Usage Wood, plastic, aluminum and solid surface

Material SW HW SP HP A SSP

See Selection Guide - pg. 2 - 12

Part Number	TIP	Angle	SHK DIA	OAL
37-21	0.005	30	1/4	2
37-23	0.010	30	1/4	2
37-25	0.020	30	1/4	2
37-27	0.030	30	1/4	2
37-29	0.040	30	1/4	2
37-31	0.060	30	1/4	2
37-35	0.090	30	1/4	2
37-39	30 Degree Kit			

Part Number	TIP	Angle	SHK DIA	OAL
37-01	0.005	60	1/4	2
37-03	0.010	60	1/4	2
37-05	0.020	60	1/4	2
37-07	0.030	60	1/4	2
37-09	0.040	60	1/4	2
37-11	0.060	60	1/4	2
37-15	0.090	60	1/4	2
37-19	60 Degree Kit			

Double Flute - V Bottom

37-50
37-60

Designed for V grooving or beveling 90°.

Usage Plastic and solid surface, composites, laminated and veneer

Material SW HW CW SP HP SSP LW

See Selection Guide - pg. 2 - 12

SOLID CARBIDE

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
37-50	3/16	5/8	1/4	2
37-51	1/4	3/4	1/4	2
37-52	3/8	3/4	3/8	2-1/2

HELIX ANGLE ≈ 3° - 5° Shear

CARBIDE TIPPED

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
37-61	1/2	13/32	1/4	1-25/32
37-62	3/4	1/2	1/2	2-1/8
37-63	1	27/32	1/2	2-27/32

Double Flute - Carbide Tipped Folding Tool for Dibond/Alucobond

37-70

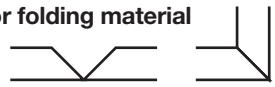
Designed for cutting aluminum/plastic sandwich materials with 90° angle and flat bottom.

Usage Aluminum/plastic sandwich materials

Material A See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
37-71	1/2	3/8	1/4	2
37-72	1/2	3/8	1/2	2

90° angle and .090 flat for folding material



37-80

Double Flute - Carbide Tipped Lettering Bits

Designed for V grooving or beveling edges of parts. The tools are designed to cut a wide variety of wood products and produce a clean edge.

Usage Wood

Material SW HW CW See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	ANGLE
37-82	1	0.856	1/2	3-1/2	60°
37-87	1-1/2	0.750	1/2	3	90°
37-92	2	0.577	1/2	3	120°
37-97	2	0.363	1/2	2-5/8	140°

40-50

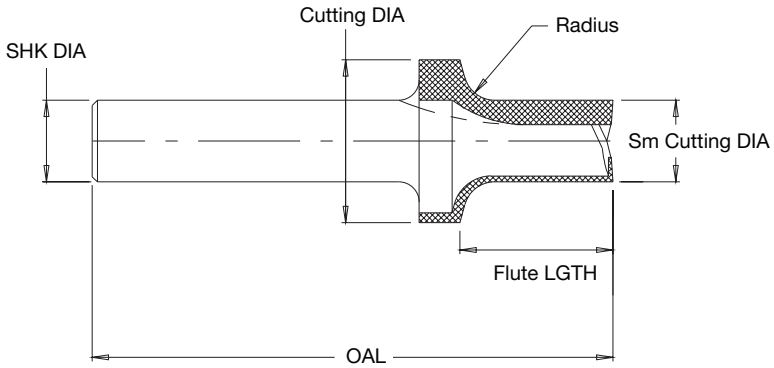
Double Flute - Carbide Tipped Round & Rout

Designed to put a radius on the edge and dress the stock. They will provide a smooth finish.

Usage Natural wood, wood composites, plastic and solid surface

Material SW HW CW SP HP SSP See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Sm Cutting DIA	Flute LGTH	SHK DIA	OAL	RAD	Material Thickness
40-50	1	1/2	.938	1/2	3-3/16	3/16	3/4
40-51	1	1/2	1.437	1/2	3-11/16	3/16	1-1/4, 1-3/8
40-52	1-1/8	1/2	.937	1/2	3-3/16	1/4	3/4
40-53	1-1/8	1/2	1.437	1/2	3-11/16	1/4	1-3/8
40-54	1-3/8	1/2	.938	1/2	3-3/16	3/8	3/4
40-55	1-3/8	1/2	1.437	1/2	3-11/16	3/8	1-3/8



42-00

Double Flute - Carbide Tipped Corner Round

Quarter round profile tools feature up shear geometry for better finishes.

Usage Natural wood, wood composites and solid surface

Material SW HW CW SSP See Selection Guide - pg. 2 - 12

Part Number	Radius	Cutting DIA	Flute LGTH	SHK DIA	OAL
42-10	1/8	3/4	3/8	1/4	2-1/8
42-03	5/32	13/16	15/32	1/4	2-3/32
42-01	3/16	7/8	1/2	1/4	2
42-02	1/4	1	7/16	1/4	1-29/32
42-04	5/16	1-1/8	9/16	1/4	2-1/4
42-05	3/8	1-1/4	5/8	1/4	2-1/32
42-06	1/2	1-1/2	3/4	1/4	2-5/32
42-07	1/2	1-1/2	3/4	1/2	2-11/16
42-08	3/4	2	1-1/32	1/2	3

47-00

Double Flute - Carbide Tipped MDF Panel Tools

These cutters can create 12 cabinet combinations by combining different stile and panel cutters to get the desired shape in MDF material.

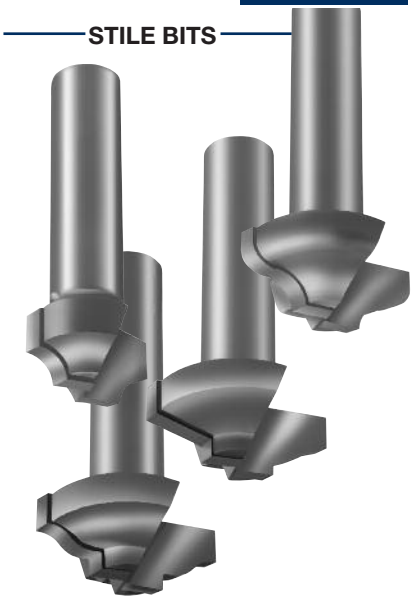
Usage MDF

Material CW See Selection Guide - pg. 2 - 12

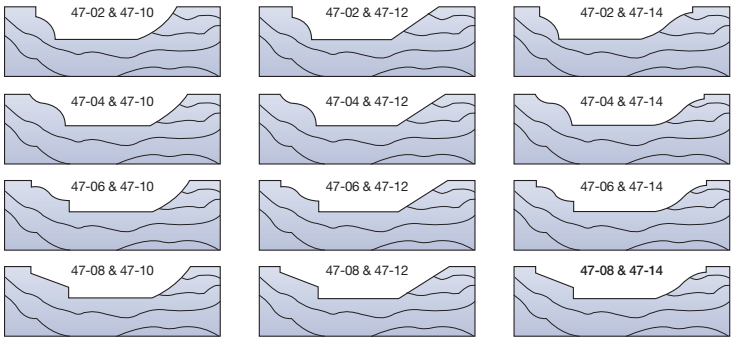
Part Number	Cutting DIA	SHK DIA	OAL	Description
47-02	7/8	1/2	2-1/2	Bead Profile - Stile Bits
47-04	1-1/4	1/2	2-1/2	Traditional Profile - Stile Bits
47-06	1-1/4	1/2	2-1/2	Ogee Profile - Stile Bits
47-08	1-1/4	1/2	2-1/2	Straight Profile - Stile Bits
47-10	1-1/2	1/2	2-1/2	Cove Profile - Panel Bits
47-12	1-1/2	1/2	2-1/2	Straight Profile - Panel Bits
47-14	1-1/2	1/2	2-1/2	Ogee Profile - Panel Bits

PANEL BITS

STILE BITS



TOOL COMBINATIONS



90-00

T Slot

Designed to bore a hole and rout a T shape slot for plaques and frames to provide for built in wall mounting capabilities.

Usage Natural wood, wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12

SOLID CARBIDE

Part Number	Cutting DIA	Flute LGTH	Neck	SHK DIA	OAL	Flutes
90-06	3/8	3/8	3/16	1/4	1-5/8	2

40-000

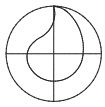
Single Flute - High Speed Steel Upcut Spiral

Designed for routing applications where speed and chip removal are primary considerations. They are also recommended when grooving, slotting or blind routing.

Usage Natural wood, sheet and stacked aluminum

Material SW HW A

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
40-001	1/8	3/8	1/4	2-5/8
40-003	3/16	5/8	1/4	2-7/8
40-005	1/4	5/8	1/4	2-3/4
40-007	1/4	3/4	1/4	2-3/4
40-009	1/4	3/4	1/2	3-1/4
40-011*	1/4	1	1/4	3
40-015	5/16	1	5/16	3
40-021	5/16	3/4	1/2	3-1/4
40-023	5/16	1	1/2	3-1/2
40-025	21/64	3/4	1/2	3-1/4
40-031	3/8	1	3/8	3
40-033	3/8	1	1/2	3-1/2
40-035	3/8	1-1/4	1/2	3-3/4
40-037	1/2	1-1/4	1/2	3-1/4

HELIX ANGLE ≈19° - 32° Shear

* These tools are designed and toleranced for air routers with guide bushings.

40-000

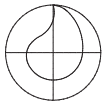
Single Flute - High Speed Steel Downcut Spiral

Designed for through cut routing operations where speed is the primary concern and fixturing is such that both chips and material are better off forced down.

Usage Natural wood and sheet aluminum

Material SW HW A

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
40-004	3/16	5/8	1/4	2-7/8
40-008	1/4	3/4	1/4	2-3/4
40-010	1/4	3/4	1/2	3-1/4
40-012	1/4	1	1/4	3
40-022	5/16	3/4	1/2	3-1/4
40-024	5/16	1	1/2	3-1/2
40-034	3/8	1	1/2	3-1/2
40-040	1/2	1-1/2	1/2	3-1/2

HELIX ANGLE ≈ 19° - 32° Shear

* These tools are designed and toleranced for air routers with guide bushings.

Double Flute - High Speed Steel Upcut Spiral

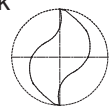
40-100

Provides a smoother finish when grooving, slotting or blind routing than do single flute tools. Recommended when fixturing requires upward chip removal.

Usage Natural wood sheet, block & plate aluminum

Material SW HW A

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
40-101	1/8	3/8	1/4	2-5/8
40-103	3/16	5/8	1/4	2-7/8
40-153	7/32	7/8	1/4	3
40-105	1/4	5/8	1/4	2-3/4
40-107	1/4	3/4	1/4	2-3/4
40-109	1/4	3/4	1/2	3-1/4
40-111*	1/4	1	1/4	3
40-121	5/16	3/4	1/2	3-1/4
40-117	5/16	3/4	3/8	3
40-115	5/16	1	5/16	3
40-123	5/16	1	1/2	3-1/2
40-131*	3/8	1	3/8	3
40-133	3/8	1	1/2	3-1/2
40-135	3/8	1-1/4	1/2	3-3/4
40-137	1/2	1-1/4	1/2	3-1/4
40-139	1/2	1-1/2	1/2	3-1/2
40-141	3/4	1-1/4	1/2	3-1/4

HELIX ANGLE ≈ 19° - 32° Shear

* These tools are designed and toleranced for air routers with guide bushings.

Double Flute - High Speed Steel Downcut Spiral

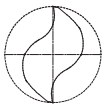
40-100

Provides a smoother finish than single flute in trimming and sizing. Recommended when chip flow should be directed down to protect the finish on the top of the material being cut.

Usage Natural wood sheet & aluminum extrusions

Material SW HW A

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
40-102	1/8	5/16	1/4	2-5/8
40-104	3/16	5/8	1/4	2-7/8
40-106	1/4	5/8	1/4	2-3/4
40-108	1/4	3/4	1/4	2-3/4
40-110	1/4	3/4	1/2	3-1/4
40-112*	1/4	1	1/4	3
40-158*	1/4	1	1/4	3-1/4
40-122	5/16	3/4	1/2	3-1/4
40-116	5/16	1	5/16	3
40-124	5/16	1	1/2	3-1/2
40-134	3/8	1	1/2	3-1/2
40-138	1/2	1-1/4	1/2	3-1/4
40-140	1/2	1-1/2	1/2	3-1/2
40-142	3/4	1-1/4	1/2	3-1/4

HELIX ANGLE ≈ 19° - 32° Shear

* These tools are designed and toleranced for air routers with guide bushings.

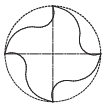
40-550

Four Flute - High Speed Steel Upcut Spiral Foam Cutters

Designed to cut thick foam with upward chipflow.

Usage Foam

Material FP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
40-562	1/2	3-5/8	1/2	6
40-564	1/2	4-1/8	1/2	6-1/2

HELIX ANGLE ≈ 25°

48-000

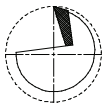
Single Flute - Carbide Tipped Straight

Designed for general usage where faster feed rates, free cutting action and long tool life are essential.

Usage Natural wood, wood composites, composite plastic and foam

Material HW CW CP FP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
48-005	1/4	7/8	1/4	2-3/8
48-007	1/4	1	1/4	2-3/8
48-079*	1/4	1	1/4	3-1/4
48-056	3/8	1-1/4	1/2	2-3/4
48-069	1/2	1-1/2	1/2	3

* These tools are designed and toleranced for Air Routers with guide bushings.

48-000

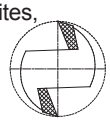
Double Flute - Carbide Tipped Straight

Designed for general usage where superior balance and vibration free cutting provides a smoother finish along with long tool life.

Usage Natural wood, wood composites, composite plastic and foam

Material HW CW CP FP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
48-008+	1/8	5/16	1/4	2
48-000	3/16	1/2	1/4	2
48-004	1/4	5/8	1/4	2-1/8
48-006	1/4	7/8	1/4	2-3/8
48-018	1/4	7/8	1/2	2-1/2
48-106	1/4	1	1/4	2-3/8
48-179*	1/4	1	1/4	3-1/4
48-017	5/16	3/4	1/2	2-1/4
48-010	5/16	1	1/4	2-1/2
48-012	3/8	3/4	1/4	2-1/4
48-013	3/8	1	1/4	2-3/8
48-036*	3/8	1	3/8	2-1/2
48-057	3/8	1	1/2	2-1/2
48-058*	3/8	1-1/4	3/8	3
48-158	3/8	1-1/4	1/2	2-3/4
48-014	1/2	3/4	1/4	2-1/8
48-072	1/2	1	1/2	2-1/2
48-044	1/2	1-1/4	3/8	2-3/4
48-076	1/2	1-1/4	1/2	2-3/4
48-080	1/2	1-1/2	1/2	3
48-081	1/2	2	1/2	4
48-183	1/2	2-1/2	1/2	4-1/2
48-015	5/8	1	1/4	2-1/4
48-086	5/8	1-1/4	1/2	2-3/4
48-016	3/4	1	1/4	2-1/4
48-088	3/4	1-1/4	1/2	3
48-215	3/4	2	3/4	4
48-096	7/8	1-1/4	1/2	2-3/4
48-100	1	1-1/4	1/2	2-3/4
48-200	2	1-1/4	1/2	2-3/4

+ Solid Carbide

*These tools are designed and toleranced for Air Routers with guide bushings.

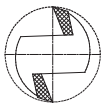
48-700

Double Flute - Carbide Tipped CNC & MDF

Designed with special carbide, stiffer tool bodies and superior edge geometry to withstand the rigor of CNC routing of MDF materials.

Usage Wood composites

Material CW See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
48-700	1/4	7/8	1/4	3-1/4
48-707	1/2	1	1/2	3-1/4
48-714	1/2	1-1/4	1/2	2-3/4
48-702	1/2	1-1/4	1/2	3-1/2
48-709	5/8	2	5/8	4-1/4
48-711	3/4	3	3/4	5-3/8
48-713	1	3	3/4	5-1/8

52-000

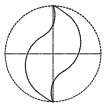
Double Flute - Solid Carbide Upcut Spiral

Designed as a general purpose spiral with several times the life of their high speed steel counterparts. They are used when upward chip flow is preferred.

Usage Fiberglass, phenolic, acetal, solid surface and aluminum slab

Material CP A SSP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
52-040	1/8	1/2	1/4	2
52-050	5/32	9/16	1/4	2
52-060	3/16	5/8	1/4	2
52-080	1/4	3/4	1/4	2-1/2
52-090	9/32	3/4	3/8	2-1/2
52-100	5/16	13/16	3/8	2-1/2
52-120	3/8	7/8	3/8	2-1/2
52-160	1/2	1	1/2	3

HELIX ANGLE ≈ 30°

52-200

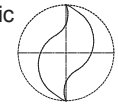
Double Flute - Solid Carbide Upcut Spiral Wood Rout

Designed for routing where upward chip removal, tool rigidity, long life and high quality finish is desired.

Usage Natural wood, wood composites solid surface, and some plastic

Material SW HW CW SP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
52-244	1/8	1/2	1/8	2
52-240	1/8	1/2	1/4	2
52-240L	1/8	1/2	1/4	2
52-250	5/32	5/8	1/4	2
52-260	3/16	3/4	1/4	2
52-260L	3/16	3/4	1/4	2
52-261	3/16	3/4	1/4	2-1/2
52-270	7/32	3/4	1/4	2-1/2
52-271	7/32	1	1/4	2-1/2
52-280	1/4	7/8	1/4	2-1/2
52-285	1/4	1	1/4	2-1/2
52-285L	1/4	1	1/4	2-1/2
52-287	1/4	1-1/8	1/4	3
52-290	9/32	1	5/16	2-1/2
52-300	5/16	1-1/8	5/16	3
52-310	5/16	1-1/8	1/2	3
52-310L	5/16	1-1/8	1/2	3
52-318*	3/8	1	3/8	3
52-320	3/8	1-1/8	3/8	3

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
52-325	3/8	1-1/4	3/8	3
52-325L	3/8	1-1/4	3/8	3
52-330	3/8	1-1/4	1/2	3
52-340	7/16	1	1/2	3
52-360	1/2	1-1/8	1/2	3
52-362	1/2	1-1/4	1/2	3-1/2
52-365	1/2	1-5/8	1/2	3-1/2
52-365L	1/2	1-5/8	1/2	3-1/2
52-367	1/2	2-1/8	1/2	4
52-370	17/32	1-1/8	1/2	3
52-380	5/8	1-5/8	5/8	3-1/2
52-385	5/8	2-1/8	5/8	4
52-385L	5/8	2-1/8	5/8	4
52-390	3/4	1-5/8	3/4	4
52-395	3/4	2-1/8	3/4	4
52-395L	3/4	2-1/8	3/4	4

HELIX ANGLE ≈ 30°

L = Left Hand Rotation

* Special Point

(S) = Soft Wood Geometry

52-200B/BL

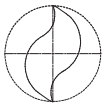
Double Flute - Solid Carbide Upcut Spiral Ball Nose

Designed for carving and modeling operations. Their improved tip geometry gives a superior cut compared to most ballnose endmills.

Usage Plastic, solid surface, block & plate aluminum natural wood and wood composite

Material SW HW CW SP HP A SSP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
52-235B	1/16	1/4	1/8	2
52-244B	1/8	1/2	1/8	2
52-240B	1/8	1/2	1/4	2
52-260B	3/16	3/4	1/4	2
52-280B	1/4	7/8	1/4	2-1/2
52-320B	3/8	1-1/8	3/8	3
52-360B	1/2	1-1/8	1/2	3
52-386B	5/8	2-1/4	5/8	4
52-397B	3/4	2-1/2	3/4	5

EXTENDED LENGTH

Part Number	Cutting DIA	Flute LGTH	ERL	SHK DIA	OAL
52-235BL	1/16	1/4	-	1/8	3
52-244BL	1/8	1/2	1-5/8	1/8	3
52-240BL	1/8	1/2	1-5/8	1/4	3
52-260BL	3/16	3/4	1-5/8	1/4	3
52-280BL	1/4	1	2-5/8	1/4	4
52-320BL	3/8	1-1/4	2-5/8	3/8	4
52-360BL	1/2	1-1/2	3-5/8	1/2	5
52-386BL	5/8	2-1/2	3-5/8	5/8	5
52-397BL	3/4	3	4-5/8	3/4	6

52-400

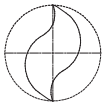
Double Flute - Solid Carbide Upcut Spiral Wood Rout

Designed for routing where upward chip removal, tool rigidity, long life and high quality finish is desired.

Usage Natural wood, wood composites, plastic and solid surface

Material SW HW CW SP

See Selection Guide - pg. 2 - 12



METRIC

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
52-410	4 mm	16 mm	6 mm	64 mm
52-411	5 mm	20 mm	6 mm	64 mm
52-412	6 mm	25 mm	6 mm	64 mm
52-414	8 mm	25 mm	8 mm	64 mm
52-416	10 mm	35 mm	10 mm	76 mm
52-418	12 mm	35 mm	12 mm	76 mm

HELIX ANGLE ≈ 30°

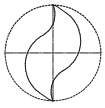
52-550

Double Flute - Solid Carbide Upcut Foam Cutters

Foam cutters for thick material with upward chip flow.

Usage Foam

Material FP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
52-554	1/8	1-1/8	1/4	2-1/2
52-558	3/16	1-1/8	3/16	2-1/2
52-560	3/16	1-5/8	3/16	3
52-564	1/4	2-1/4	1/4	4
52-570	5/16	3-1/8	5/16	4-1/2
52-574	3/8	3-1/2	3/8	5

HELIX ANGLE ≈ 25°

52-600

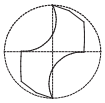
Double Flute - Solid Carbide Upcut Spiral O Flute

Low helix geometry designed to cut soft and hard plastic with a smooth finish and upward chip flow.

Usage Soft and hard plastic, acrylic, nylon, ABS, PE, acetal, PET, HDPE, UHMW, polycarbonate and solid surface

Material SP HP SSP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
52-622	1/4	3/8	1/4	2-1/2
52-624	1/4	3/4	1/4	2-1/2
52-638	3/8	1	3/8	3
52-650	1/2	1-1/8	1/2	3-1/2
52-652	1/2	1-5/8	1/2	3-1/2
52-655	1/2	2-1/8	1/2	4-1/2
52-660	5/8	2-1/8	5/8	5
52-664	3/4	3-1/8	3/4	6

HELIX ANGLE ≈ 11°

52-700

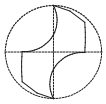
Double Flute - Solid Carbide Upcut Spiral O Flute

High helix geometry designed to cut soft plastic with a smooth finish and upward chip flow. Special point geometry for improved bottom finish.

Usage Soft plastic, extruded acrylic, nylon, ABS, PE, acetal, PET, HDPE, UHMW, polycarbonate, solid surface and foam.

Material SP SSP FP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
52-703	1/8	1/2	1/4	2
52-707	1/4	7/8	1/4	3
52-708	3/16	3/8	3/16	2-1/2
52-700	1/4	1-1/4	1/4	3
52-709	3/8	1	3/8	3
52-710	3/16	5/8	1/4	2-1/2
52-701	3/8	1-1/2	3/8	4
52-702	1/2	1-1/4	1/2	4
52-704	1/2	1-3/4	1/2	4
52-706	1/2	2-1/8	1/2	4
52-712	5/8	1-3/4	5/8	5
52-714	5/8	2-1/4	5/8	5
52-726	3/4	1-3/4	3/4	5
52-724	3/4	2-1/2	3/4	5
52-728	3/4	4	3/4	6-1/2
52-734	1	4	1	6-1/2

HELIX ANGLE ≈ 22°

METRIC

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
52-742	12mm	35mm	12mm	100mm
52-744	12mm	45mm	12mm	100mm
52-746	12mm	55mm	12mm	100mm
52-752	16mm	45mm	16 mm	120mm
52-754	16mm	55mm	16mm	120mm
52-764	20mm	65mm	20mm	125mm

Double Flute - Solid Carbide Upcut Extreme Heavy Duty Standard

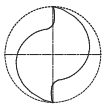
52-900

Developed for demanding applications where upward chip removal, tool rigidity and long life are essential to success.

Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
52-910	1/4	7/8	1/4	2-1/2
52-914	1/4	1-1/4	1/4	3
52-923	3/8	1-1/8	3/8	3
52-936	1/2	1-1/4	1/2	3

HELIX ANGLE ≈ 30°

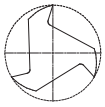
Three Flute - Solid Carbide Straight

53-000

Designed for routing extremely hard materials or when spindle RPM is lower than normal for routing.

Usage Composites

Material CP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
53-080	1/4	3/4	1/4	2-1/2

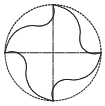
Four Flute - Solid Carbide Downcut Spiral

54-300

Designed to be equally adaptable to low or high spindle speed applications in any CNC machining environment. The free cutting action of the tools provides for better finishes.

Usage Fiberglass

Material CP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
54-320	3/8	5/8	3/8	3
54-325	3/8	1-1/8	3/8	3
54-360	1/2	5/8	1/2	3-1/2
54-365	1/2	1-1/8	1/2	3-1/2

HELIX ANGLE ≈ 30°

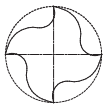
55-300

Four Flute - Solid Carbide Upcut Spiral

Designed to be equally adaptable to low or high spindle speed applications in any CNC machining environment. The free cutting action of the tools provides for better finishes.

Usage Fiberglass and composite

Material CP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
55-320	3/8	5/8	3/8	3
55-325	3/8	1-1/8	3/8	3
55-360	1/2	5/8	1/2	3-1/2

HELIX ANGLE ≈ 30°

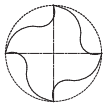
54-000
55-000

Four Flute - Solid Carbide Spiral

Equally adaptable to low or high spindle speed applications in any CNC machining environment. The free cutting action of the tools provides for better finishes.

Usage Fiberglass and composite

Material CP See Selection Guide - pg. 2 - 12



UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
55-040	1/8	1/2	1/4	2
55-050	5/32	9/16	1/4	2
55-080	1/4	3/4	1/4	2-1/2

HELIX ANGLE ≈ 15°

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
54-040	1/8	1/2	1/4	2
54-080	1/4	3/4	1/4	2-1/2

HELIX ANGLE ≈ 30°

56-000

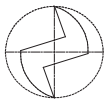
Double Flute - Solid Carbide Straight

Designed to rout composite plastic.

Usage Composite plastic

Material HP CP SSP FP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
56-040	1/8	1/2	1/4	2
56-060	3/16	5/8	1/4	2
56-080	1/4	3/4	1/4	2-1/2
56-084*	1/4	3/4	1/4	3-1/4
56-100	5/16	13/16	3/8	2-1/2
56-160	1/2	1	1/2	3

* These tools are designed and toleranced for air routers with guide bushings.

Double Flute - Solid Carbide Straight

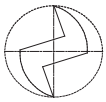
56-000P

Designed specifically to rout harder, more rigid plastics.

Usage Foam, fiberglass, phenolic, acrylic, nylon, PVC, ABS, acetal and solid surface

Material HP CP SSP FP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
56-041	1/8	1/4	1/4	2
56-061	3/16	3/8	1/4	2
56-062	3/16	5/8	1/4	2
56-062L	3/16	5/8	1/4	2
56-063*	3/16	5/8	1/4	4
56-081	1/4	3/8	1/4	2-1/2
56-082	1/4	3/4	1/4	2-1/2
56-082L	1/4	3/4	1/4	2-1/2
56-086*	1/4	1-1/4	1/4	4
56-121	3/8	5/8	3/8	2-1/2
56-122	3/8	7/8	3/8	2-1/2
56-122L	3/8	7/8	3/8	2-1/2
56-124*	3/8	1-5/8	3/8	6
56-162	1/2	1	1/2	3
56-162L	1/2	1	1/2	3
56-164*	1/2	2-1/8	1/2	6

* These tools are designed and toleranced for Air Routers with guide

L = Left Hand Rotation

Double Flute - Solid Carbide Straight Wood Rout

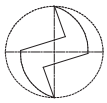
56-200

Provides a superior finish in a variety of wood materials and optimum cutter life.

Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
56-240	1/8	1/2	1/4	2
56-250	5/32	5/8	1/4	2
56-260	3/16	3/4	1/4	2
56-270	7/32	3/4	1/4	2-1/2
56-280	1/4	7/8	1/4	2-1/2
56-285	1/4	1	1/4	2-1/2
56-287	1/4	1-1/8	1/4	3
56-300	5/16	1-1/8	5/16	3
56-310	5/16	1-1/8	1/2	3
56-320	3/8	1-1/8	3/8	3
56-330	3/8	1-1/4	1/2	3
56-360	1/2	1-1/8	1/2	3
56-365	1/2	1-5/8	1/2	3-1/2
56-390	3/4	1-5/8	3/4	4

(S) For Soft Woods

56-430

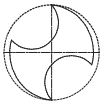
Double Flute - Solid Carbide Straight O Flute

Designed with free cutting O flute geometry along with a double flute design for smooth finish.

Usage Polycarbonate, ABS, HIPS, HDPE, PET, acrylic, polystyrene, polypropylene, PE, PVC, acetal, UHMW

Material SP HP

See Selection Guide - pg. 2 - 12



METRIC

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
56-430	4 mm	16 mm	6 mm	64 mm
56-431	5 mm	20 mm	6 mm	64 mm
56-432	6 mm	25 mm	6 mm	64 mm
56-434	8 mm	25 mm	8 mm	76 mm
56-436	10 mm	35 mm	10 mm	88 mm
56-438	12 mm	35 mm	12 mm	88 mm

56-450

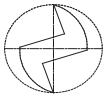
Double Flute - Solid Carbide Straight

Designed specifically to rout harder, more rigid plastics

Usage Phenolic, acrylic, nylon, PVC, ABS, acetal and solid surface

Material HP CP SSP

See Selection Guide - pg. 2 - 12



METRIC

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
56-450	4 mm	16 mm	6 mm	64 mm
56-451	5 mm	20 mm	6 mm	64 mm
56-452	6 mm	25 mm	6 mm	64 mm
56-454	8 mm	25 mm	8 mm	76 mm
56-456	10 mm	35 mm	10 mm	88 mm
56-458	12 mm	35 mm	12 mm	88 mm

* These tools are designed and toleranced for Air Routers with guide

56-600

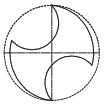
Double Flute - Solid Carbide O Flute Straight

Designed with free cutting O flute geometry along with a double flute design for smooth finish.

Usage Polycarbonate, ABS, HIPS, HDPE, PET, acrylic, polystyrene, polypropylene, PE, PVC, acetal, UHMW

Material SP HP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
56-610	1/8	5/16	1/4	2
56-612	1/8	1/2	1/4	2
56-614	1/8	5/8	1/4	4
56-616	3/16	3/8	1/4	2
56-618	3/16	5/8	1/4	2
56-620	3/16	1	1/4	4
56-624	1/4	3/8	1/4	2-1/2
56-625	1/4	1	1/4	2-1/2
56-625L	1/4	1	1/4	2-1/2
56-626	1/4	1	1/4	3-1/4
56-628	1/4	1-1/4	1/4	4
56-638	3/8	7/8	3/8	2-1/2
56-639	3/8	1	3/8	4
56-650	1/2	1	1/2	3
56-652	1/2	1	1/2	4
56-654	1/2	1-3/4	1/2	4
56-655	1/2	2-1/8	1/2	6

L = Left Hand Rotation

Double Flute - Solid Carbide Downcut Spiral

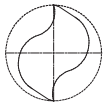
57-000

Designed as a general purpose spiral with several times the life of their high speed counterparts. They are used when a downward chipflow action is preferred.

Usage Aluminum and composite plastic

Material CP A

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
57-040	1/8	1/2	1/4	2
57-060	3/16	5/8	1/4	2
57-080	1/4	3/4	1/4	2-1/2
57-090	9/32	3/4	3/8	2-1/2
57-120	3/8	7/8	3/8	2-1/2
57-160	1/2	1	1/2	3

HELIX ANGLE ≈ 30°

Double Flute - Solid Carbide Downcut Spiral Wood Rout

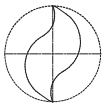
57-200

Designed for routing where downward chip removal, tool rigidity, long life, and high quality finish is desired.

Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
57-244	1/8	1/2	1/8	2
57-240	1/8	1/2	1/4	2
57-240L	1/8	1/2	1/4	2
57-251	5/32	1/2	1/4	2-1/2
57-250	5/32	5/8	1/4	2
57-260	3/16	3/4	1/4	2
57-260L	3/16	3/4	1/4	2
57-261	3/16	3/4	1/4	2-1/2
57-270	7/32	3/4	1/4	2-1/2
57-271	7/32	1	1/4	2-1/2
57-280	1/4	7/8	1/4	2-1/2
57-285	1/4	1	1/4	2-1/2
57-285L	1/4	1	1/4	2-1/2
57-287	1/4	1-1/8	1/4	3
57-290	9/32	1	5/16	2-1/2
57-300	5/16	1-1/8	5/16	3
57-310	5/16	1-1/8	1/2	3
57-310L	5/16	1-1/8	1/2	3
57-318*	3/8	1	3/8	3

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
57-320	3/8	1-1/8	3/8	3
57-325	3/8	1-1/4	3/8	3
57-325L	3/8	1-1/4	3/8	3
57-330	3/8	1-1/4	1/2	3
57-340	7/16	1	1/2	3
57-360	1/2	1-1/8	1/2	3
57-362	1/2	1-1/4	1/2	3-1/2
57-365	1/2	1-5/8	1/2	3-1/2
57-365L	1/2	1-5/8	1/2	3-1/2
57-366(S)	1/2	1-5/8	1/2	3-1/2
57-367	1/2	2-1/8	1/2	4
57-370	17/32	1-1/8	1/2	3
57-380	5/8	1-5/8	5/8	3-1/2
57-385	5/8	2-1/8	5/8	4
57-385L	5/8	2-1/8	5/8	4
57-390	3/4	1-5/8	3/4	4
57-395	3/4	2-1/8	3/4	4
57-395L	3/4	2-1/8	3/4	4

HELIX ANGLE ≈ 30°

* Special Point

L = Left Hand Rotation

(S) = Soft Wood Geometry

Double Flute - Solid Carbide Downcut Spiral Wood Rout

57-400

Designed for routing where downward chip removal, tool rigidity, long life, and high quality finish is desired.

Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12

METRIC

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
57-410	4 mm	16 mm	6 mm	64 mm
57-411	5 mm	20 mm	6 mm	64 mm
57-412	6 mm	25 mm	6 mm	64 mm
57-414	8 mm	25 mm	8 mm	64 mm
57-416	10 mm	35 mm	10 mm	76 mm

HELIX ANGLE ≈ 30°

57-600

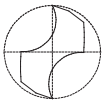
Double Flute - Solid Carbide Downcut Spiral O Flute

Designed to cut plastic with a smooth finish and downward chip flow.

Usage Acrylic, nylon, ABS, PE, acetal, PET, HDPE, UHMW, polycarbonate and solid surface

Material SP HP SSP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
57-623	1/4	3/8	1/4	2-1/2
57-625	1/4	3/4	1/4	2-1/2
57-637	3/8	1	3/8	3
57-651	1/2	1-1/8	1/2	3-1/2

HELIX ANGLE ≈ 10-11°

METRIC

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
57-627	6mm	25mm	6mm	64mm
57-639	8mm	25mm	8mm	76mm

57-900

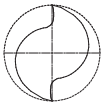
Double Flute - Solid Carbide Downcut Extreme Heavy Duty Standard

Designed for routing where extreme loads are placed upon the cutting tools and when extra part hold down is required.

Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
57-910	1/4	7/8	1/4	2-1/2
57-921	3/8	7/8	3/8	3
57-923	3/8	1-1/8	3/8	3
57-924	3/8	1-1/4	3/8	3
57-936	1/2	1-1/4	1/2	3
57-940	1/2	1-5/8	1/2	3-1/2

HELIX ANGLE ≈ 30°

58-000
59-000

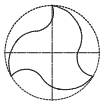
Three Flute - Solid Carbide Spiral

Designed to rout difficult to cut material when horsepower or spindle speed may be a problem. They employ upcut router geometry rather than end mill geometry for better chip removal and smoother finish.

Usage Composites, fiberglass and phenolic

Material CP

See Selection Guide - pg. 2 - 12



UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
58-040	1/8	1/2	1/4	2
58-060	3/16	5/8	1/4	2
58-080	1/4	3/4	1/4	2-1/2

HELIX ANGLE ≈ 30°

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
59-040	1/8	1/2	1/4	2
59-060	3/16	5/8	1/4	2
59-080	1/4	3/4	1/4	2-1/2

HELIX ANGLE ≈ 30°

Three Flute - Solid Carbide High Helix Hogger

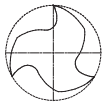
60-000

Designed with unique scalloped cutting edge design for extremely fast machining and roughing. Faster chip removal with upcuts. Better hold down with downcuts.

Usage Natural wood & wood composites, hard & soft plastic and plastic composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-001	3/8	1-1/8	3/8	3-1/2
60-005	1/2	1-1/8	1/2	3-1/2
60-007	1/2	1-5/8	1/2	4
60-009	5/8	1-5/8	5/8	4
60-011	5/8	2-1/8	5/8	5
60-017	3/4	1-5/8	3/4	4
60-019	3/4	2-1/8	3/4	5

HELIX ANGLE ≈ 30°

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-002	3/8	1-1/8	3/8	3-1/2
60-006	1/2	1-1/8	1/2	3-1/2
60-008	1/2	1-5/8	1/2	4
60-012	5/8	2-1/8	5/8	5
60-018	3/4	1-5/8	3/4	4
60-020	3/4	2-1/8	3/4	5

Three Flute - Solid Carbide Low Helix Hogger

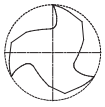
60-000

Designed with unique scalloped cutting geometry which provides extremely fast roughing, lower horsepower requirements, longer tool life, and reduced chipping in solid wood materials.

Usage Natural wood & wood composites, hard & soft plastic and plastic composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-037	3/8	1-1/8	3/8	3-1/2
60-053	1/2	1-1/8	1/2	3-1/2
60-051	1/2	1-5/8	1/2	4
60-061	5/8	2-1/8	5/8	5
60-073	3/4	1-5/8	3/4	4
60-071	3/4	2-1/8	3/4	5

HELIX ANGLE ≈ 10°

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-038	3/8	1-1/8	3/8	3-1/2
60-054	1/2	1-1/8	1/2	3-1/2
60-052	1/2	1-5/8	1/2	4
60-062	5/8	2-1/8	5/8	5
60-074	3/4	1-5/8	3/4	5
60-072	3/4	2-1/8	3/4	5

60-090

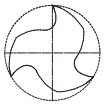
Three Flute - Solid Carbide Upcut Lock Mortise

The scalloped upcut cutting edge design and extra spinback provide fast material removal in deep cuts for horizontal and vertical lock mortise routing.

Usage Natural wood and wood composites

Material SW HW CW MT/DT

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	Max DOC	SHK DIA	OAL
60-090	5/8	2	4-1/2	5/8	6-1/2

HELIX ANGLE ≈ 30°

METRIC

Part Number	Cutting DIA	Flute LGTH	Max DOC	SHK DIA	OAL
60-091	16 mm	50 mm	114 mm	16 mm	170 mm

HELIX ANGLE ≈ 30°

60-100SE

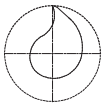
Single Flute - Solid Carbide Compression Spiral

Compression design for optimum edge finish on both sides of laminated materials. Designed for low speed applications.

Usage Double sided laminated, veneered, natural wood and wood composites

Material LW HW CW

See Selection Guide - pg. 2 - 12



METRIC

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-132	6mm	25mm	8mm	6mm	64mm

60-122 = Hard surface double laminate geometry.
60-162 = Hard surface double laminate geometry.

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-102	1/8	3/8	.205	1/4	2-1/2
60-106	3/16	5/8	.300	1/4	2-1/2
60-110	1/4	7/8	.531	1/4	2-1/2
60-120	3/8	1-1/8	.500	3/8	3
60-120L	3/8	1-1/8	.500	3/8	3
60-160	1/2	1	.406	1/2	3
60-162*	1/2	1	.594	1/2	3
60-165	1/2	1-5/8	.781	1/2	3-1/2
60-165L	1/2	1-5/8	.781	1/2	3-1/2
60-185	5/8	2-1/4	1.031	5/8	4

HELIX ANGLE ≈ 30° *HELIX ANGLE ≈ 20°

60-100DE

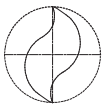
Double Flute - Solid Carbide Compression Spiral

Compression design for fast feed rates and optimum edge finish on both sides of laminated materials.

Usage Double sided laminated, veneered, natural wood and wood composites

Material LW HW CW

See Selection Guide - pg. 2 - 12



METRIC

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-135	8mm	25mm	8mm	8mm	64mm
60-137	10mm	35mm	10mm	10mm	76mm

HELIX ANGLE ≈ 30°
L = Left Hand Rotation

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-112	1/4	7/8	.531	1/4	2-1/2
60-124	3/8	1-1/8	.406	3/8	3
60-164	1/2	1	.594	1/2	3
60-171	1/2	1-3/8	.625	1/2	3-1/2
60-169	1/2	1-1/8	.562	1/2	3
60-172	1/2	1-5/8	.750	1/2	4
60-172L	1/2	1-5/8	.750	1/2	4
60-186	5/8	2-1/4	1	5/8	5
60-196	3/4	1-7/8	.750	3/4	4
60-198	3/4	2-1/2	1.125	3/4	5
60-198L	3/4	2-1/2	1.125	3/4	5

Double Flute - Solid Carbide Chipbreaker/Finisher Compression Spiral

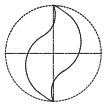
60-100C

Designed to give the optimum edge finish of the compression spiral bits along with the increased feed rates of the chipbreaker/finisher design.

Usage Double sided laminated, veneered, natural wood and wood composites

Material HW CW LW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-123C	3/8	7/8	.188	3/8	3
60-124C	3/8	1-1/8	.406	3/8	3
60-163C*	1/2	7/8	.200	1/2	3
60-164C	1/2	1	.594	1/2	3
60-169C	1/2	1-1/8	.562	1/2	3
60-171C	1/2	1-3/8	.625	1/2	3-1/2
60-172C	1/2	1-5/8	.750	1/2	4
60-186C	5/8	2-1/4	1	5/8	5
60-196C	3/4	1-7/8	.758	3/4	4

HELIX ANGLE ≈ 30°

*Mortise Compression

Three Flute - Solid Carbide Compression Spiral

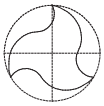
60-100TE

Compression design for ultra high feed rates and optimum edge finish on both sides of laminated material.

Usage Double sided laminated, veneered, natural wood and wood composites

Material HW CW LW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-125	3/8	1-1/8	.500	3/8	3
60-174	1/2	1-1/8	.500	1/2	3
60-175	1/2	1-5/8	.750	1/2	3-1/2

HELIX ANGLE ≈ 30°

Single, Double & Three Flute - Solid Carbide Mortise Compression Spiral

60-100M

Compression design for excellent finish with short upcut to allow mortise cut with downcut action.

Usage Double sided laminated, veneered, natural wood and wood composites

Material HW CW MT DT LW See Selection Guide - pg. 2 - 12

SINGLE FLUTE

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-111	1/4	7/8	0.175	1/4	2-1/2
60-121	3/8	7/8	0.188	3/8	3
60-161	1/2	7/8	0.200	1/2	3
60-166	1/2	1-5/8	0.200	1/2	3-1/2

HELIX ANGLE ≈ 30°

L = Left Hand Rotation

DOUBLE FLUTE

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-113	1/4	7/8	0.188	1/4	2-1/2
60-123	3/8	7/8	0.188	3/8	3
60-127	3/8	1-1/8	0.188	3/8	3
60-127L	3/8	1-1/8	0.188	3/8	3
60-163	1/2	7/8	0.200	1/2	3
60-173	1/2	1-3/8	0.200	1/2	3-1/2
60-173L	1/2	1-3/8	0.200	1/2	3-1/2

SINGLE FLUTE — METRIC

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-152	6mm	22mm	4mm	6mm	64mm

HELIX ANGLE ≈ 30°

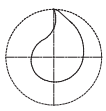
L = Left Hand Rotation

DOUBLE FLUTE — METRIC

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-155	10mm	22mm	4mm	10mm	76mm

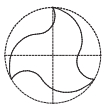
THREE FLUTE

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-126	3/8	7/8	0.200	3/8	3
60-176	1/2	7/8	0.200	1/2	3
60-177	1/2	1-3/8	0.200	1/2	3-1/2
60-199	3/4	2	0.200	3/4	4



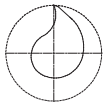
Single Flute

Double Flute

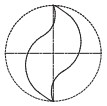


Three Flute

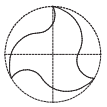
60-100MW



Single Flute



Double Flute



Three Flute

Single, Double & Three Flute - Solid Carbide *Max Life* Compression Spiral

Designed for maximum life when cutting in high-wear applications. Unique geometries and carbides improve the wear characteristics of the tool under abrasive applications with superior part finish.

Usage Double sided laminated and vaneered materials

Material LW See Selection Guide - pg. 2 - 12

DOUBLE FLUTE

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-123MW*	3/8	7/8	.188	3/8	3
60-124MW	3/8	1-1/8	.406	3/8	3
60-127MW*	3/8	1-1/8	.188	3/8	3
60-163MW*	1/2	7/8	.200	1/2	3
60-169MW	1/2	1-1/8	.562	1/2	3
60-171MW	1/2	1-3/8	.625	1/2	3-1/2
60-172MW	1/2	1-5/8	.750	1/2	4
60-173MW*	1/2	1-3/8	.200	1/2	3-1/2
60-181MW	1/2	2-1/8	1	1/2	5
60-196MW	3/4	1-7/8	.750	3/4	4
60-194MW	3/4	2-1/4	1	3/4	5

HELIX ANGLE ≈ 30° *MORTISE COMPRESSION

SINGLE FLUTE

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-120MW*	3/8	1-1/8	.200	3/8	3
60-167MW*	1/2	1-1/8	.200	1/2	3

HELIX ANGLE ≈ 30° *MORTISE COMPRESSION

THREE FLUTE

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-126MW*	3/8	7/8	.200	3/8	3

*MORTISE COMPRESSION

60-100DC

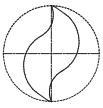
NEW

Double Flute - Solid Carbide Compression Spiral

The Tuff Core is an innovative line of solid carbide compression spirals that utilize unique dual grade carbide. The harder outer shell is reinforced by a tough inner core which makes the tool stronger and reduces tool breakage.

Usage Double sided laminated, and veneered materials

Material CW See Selection Guide - pg. 2 - 12



Double Flute

Three Flute

DOUBLE FLUTE

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-123DC*	3/8	7/8	.188	3/8	3
60-124DC	3/8	1-1/8	.406	3/8	3
60-129DC	3/8	1-1/4	.451	3/8	3
60-130DC	1/2	1-5/8	.750	1/2	4
60-131DC	1/2	2-1/2	1	1/2	5

THREE FLUTE

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-126DC*	3/8	7/8	.200	3/8	3
60-128DC	3/8	1-1/4	.563	3/8	3
60-141DC	1/2	1-5/8	.750	1/2	4

* Mortise compression

60-200

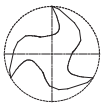
Three Flute - Solid Carbide Low Helix Finisher

Designed for perfect balance and ultra smooth finish over a wide speed range.

Usage Natural wood, plastic, composite plastic and solid surface

Material SW HW CW HP SSP

See Selection Guide - pg. 2 - 12



UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-239	1/4	3/8	1/4	3
60-241	1/4	7/8	1/4	3
60-243	3/8	5/8	3/8	3
60-245	3/8	1-1/8	3/8	3
60-249	1/2	1-1/8	1/2	3-1/2
60-253	1/2	1-5/8	1/2	4
60-251	1/2	2-1/8	1/2	4-1/2
60-269	3/4	1-5/8	3/4	4
60-271	3/4	2-1/8	3/4	5
60-277	3/4	3-1/8	3/4	6

HELIX ANGLE ≈ 10°

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-240	1/4	3/8	1/4	3
60-242	1/4	7/8	1/4	3
60-244	3/8	5/8	3/8	3
60-246	3/8	1-1/8	3/8	3
60-250	1/2	1-1/8	1/2	3-1/2
60-254	1/2	1-5/8	1/2	4
60-252	1/2	2-1/8	1/2	4-1/2
60-270	3/4	1-5/8	3/4	5
60-272	3/4	2-1/8	3/4	5
60-278	3/4	3-1/8	3/4	6

HELIX ANGLE ≈ 10°

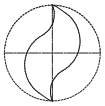
60-300

Double Flute - Solid Carbide Chipbreaker Finisher

For faster feed rates than a conventional two flute with a smooth finish.

Usage Natural wood and wood composites

Material HW CW See Selection Guide - pg. 2 - 12



UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-307	3/8	1-1/8	3/8	3
60-311	1/2	1-1/8	1/2	3
60-313	1/2	1-5/8	1/2	3-1/2
60-317	1/2	1-7/8	1/2	3-1/2
60-315	1/2	2-1/8	1/2	4
60-321	5/8	2-1/8	5/8	4
60-325	3/4	2-1/8	3/4	4

HELIX ANGLE ≈ 30°

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-308	3/8	1-1/8	3/8	3
60-312	1/2	1-1/8	1/2	3
60-314	1/2	1-5/8	1/2	3-1/2
60-318	1/2	1-7/8	1/2	3-1/2
60-316	1/2	2-1/8	1/2	4
60-322	5/8	2-1/8	5/8	4
60-326	3/4	2-1/8	3/4	4

60-350

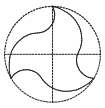
Three Flute - Solid Carbide Chipbreaker Finisher

For additional balance at fast feed rates with a smooth finish.

Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-337	3/8	1-1/8	3/8	3
60-351	1/2	1-1/8	1/2	3
60-353	1/2	1-5/8	1/2	3-1/2
60-361	5/8	1-5/8	5/8	4
60-371	3/4	1-5/8	3/4	4
60-375	3/4	3-1/8	3/4	6

HELIX ANGLE ≈ 30°

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-338	3/8	1-1/8	3/8	3
60-350	1/2	1-1/8	1/2	3
60-354	1/2	1-3/8	1/2	3-1/2
60-352	1/2	1-5/8	1/2	3-1/2
60-360	5/8	1-5/8	5/8	4
60-370	3/4	1-5/8	3/4	4
60-372	3/4	2-1/4	3/4	5
60-374	3/4	3-1/8	3/4	6

60-500

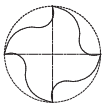
Four Flute - Solid Carbide Compression Spiral

The ultimate in compression spiral tooling, these tools are designed to run on the newest generation CNC routers. They produce extremely fine finishes at high feed rates.

Usage Double sided laminated and veneered, natural wood and wood composites

Material SW HW CW LW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-564	1/2	1	1/2	3
60-569	1/2	1-1/8	1/2	3
60-571	1/2	1-3/8	1/2	3-1/2
60-572	1/2	1-5/8	1/2	4
60-586	5/8	2-1/4	5/8	5
60-598	3/4	2-1/2	3/4	5

HELIX ANGLE ≈ 30°

60-500M

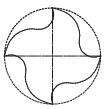
Four Flute - Solid Carbide Mortise Compression Spiral

The ultimate in compression spiral tooling, these tools are designed to run on the newest generation CNC routers. They produce extremely fine finishes at high feed rates. Compression design for fast feed and excellent finish with short upcut to allow mortise cuts with downcut action.

Usage Double sided laminated and veneered, natural wood and wood composites

Material SW HW CW MT/DT LW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL
60-563	1/2	7/8	0.200	1/2	3
60-573	1/2	1-3/8	0.200	1/2	3-1/2

HELIX ANGLE ≈ 30°

Four Flute - Solid Carbide High Velocity Compression Spiral

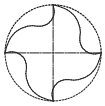
60-600

Combine a roughing and finishing cut in one tool for rapid feed rates with a good finish.

Usage High velocity routing of double sided laminated and veneered, natural wood and wood composites

Material SW HW CW LW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-664	1/2	1	1/2	3
60-669	1/2	1-1/8	1/2	3
60-671	1/2	1-3/8	1/2	3-1/2
60-672	1/2	1-5/8	1/2	4
60-698	3/4	2-1/2	3/4	5

HELIX ANGLE ≈ 30°

Four Flute - Solid Carbide High Velocity Upcut Spiral

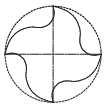
60-700

Combine a roughing and finishing cut with upcut cutting action in one tool for rapid feed rates with a good finish.

Usage High velocity routing of double sided laminated and veneered, natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-711	1/2	1-1/8	1/2	3-1/2
60-715	1/2	1-5/8	1/2	4
60-719	1/2	2-1/8	1/2	4-1/2
60-731	3/4	2-1/8	3/4	5

HELIX ANGLE ≈ 30°

Four Flute - Solid Carbide High Velocity Downcut Spiral

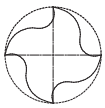
60-700

Combine a roughing and finishing cut with downcut cutting action in one tool for rapid feed rates with a good finish.

Usage High velocity routing of natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-710	1/2	1-1/8	1/2	3-1/2
60-714	1/2	1-5/8	1/2	4
60-718	1/2	2-1/8	1/2	4-1/2
60-720	5/8	2-1/8	5/8	5
60-730	3/4	2-1/8	3/4	5

HELIX ANGLE ≈ 30°

60-800

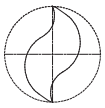
Double Flute - Solid Carbide Rougher

Designed for use when faster feed rates cannot be achieved, or on low horsepower machines.

Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-815	3/8	1-3/8	3/8	3-1/2
60-825	1/2	1-3/8	1/2	3-1/2
60-829	1/2	1-7/8	1/2	4
60-841	5/8	2-5/8	5/8	5
60-847	3/4	2-7/8	3/4	6

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-816	3/8	1-3/8	3/8	3-1/2
60-826	1/2	1-3/8	1/2	3-1/2
60-830	1/2	1-7/8	1/2	4
60-842	5/8	2-5/8	5/8	5
60-848	3/4	2-7/8	3/4	6

HELIX ANGLE ≈ 20°

60-900

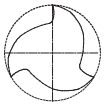
Three Flute - Solid Carbide Extreme Heavy Duty Hogger

Designed for heavy material removal operations where the cutter is subject to excessive cutting forces and finish is not a primary concern.

Usage Natural wood and wood composites, plastic composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-901	3/8	1-1/8	3/8	3
60-905	1/2	1-1/8	1/2	3
60-907	1/2	1-5/8	1/2	3-1/2
60-909	1/2	2-1/8	1/2	4
60-915	3/4	2-1/8	3/4	5

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-902	3/8	1-1/8	3/8	3
60-906	1/2	1-1/8	1/2	3
60-908	1/2	1-5/8	1/2	3-1/2
60-910	1/2	2-1/8	1/2	4
60-916	3/4	2-1/8	3/4	5

HELIX ANGLE ≈ 30°

60-950

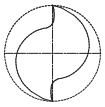
Double Flute - Solid Carbide Extreme Heavy Duty Chipbreaker/Finisher

Designed to be fed very fast while withstanding excessive cutting forces and at the same time leaving a smooth finish.

Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-951	3/8	1-1/8	3/8	3
60-955	1/2	1-1/8	1/2	3
60-957	1/2	1-5/8	1/2	3-1/2
60-959	1/2	2-1/8	1/2	4
60-965	3/4	2-1/8	3/4	5

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
60-950	3/8	1-1/8	3/8	3
60-954	1/2	1-1/8	1/2	3
60-956	1/2	1-5/8	1/2	3-1/2
60-958	1/2	2-1/8	1/2	4

HELIX ANGLE ≈ 30°

Single Flute - Solid Carbide Straight

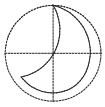
61-000

Designed to combine the fast free cutting of O flute geometry with the tool life available from solid carbide particularly in small diameters.

Usage Natural wood and aluminum

Material SW A

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
61-040	1/8	1/2	1/4	2
61-050	5/32	9/16	1/4	2
61-060	3/16	5/8	1/4	2
61-070	7/32	5/8	1/4	2-1/2
61-080	1/4	3/4	1/4	2-1/2
61-090	9/32	3/4	3/8	2-1/2
61-100	5/16	13/16	3/8	2-1/2
61-120	3/8	7/8	3/8	2-1/2
61-140	7/16	1	1/2	3
61-160	1/2	1	1/2	3

Single Flute - Solid Carbide Straight

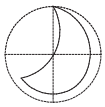
61-000P

Designed to combine the fast free cutting of O flute geometry with the tool life available from solid carbide particularly in small diameters.

Usage Polycarbonate, polyethylene, polypropylene, polystyrene, PVC, extruded acrylic, HDPE, UHMW and hard plastic

Material SP HP

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
61-041	1/8	5/16	1/4	2
61-044	1/8	1/2	1/8	2
61-042	1/8	1/2	1/4	2
61-042L	1/8	1/2	1/4	2
61-045	1/8	5/8	1/8	3
61-043	1/8	5/8	1/4	4
61-052	5/32	9/16	1/4	2
61-061	3/16	3/8	1/4	2
61-064	3/16	5/8	3/16	2-1/2
61-062	3/16	5/8	1/4	2
61-062L	3/16	5/8	1/4	2
61-063*	3/16	1	1/4	4
61-072	7/32	5/8	1/4	2-1/2
61-081	1/4	3/8	1/4	2-1/2
61-082	1/4	3/4	1/4	2-1/2
61-082L	1/4	3/4	1/4	2-1/2
61-083*	1/4	3/4	1/4	3-1/4
61-083L*	1/4	3/4	1/4	3-1/4
61-085*	1/4	1	1/4	3-1/4
61-084*	1/4	1-1/4	1/4	4
61-121	3/8	5/8	3/8	2-1/2
61-122	3/8	7/8	3/8	2-1/2
61-123*	3/8	1-5/8	3/8	6
61-162	1/2	1	1/2	3
61-164	1/2	1-5/8	1/2	4
61-166	1/2	2-1/8	1/2	6

*These tools are designed and toleranced for air routers with guide bushings.
L= left hand rotation

61-200

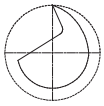
Single Flute - Solid Carbide Straight Wood Rout

Designed to enhance operations where the benefits of spiral action are not needed. The single flute provides fast, free cutting with optimum cutter life.

Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
61-240	1/8	1/2	1/4	2
61-280	1/4	7/8	1/4	2-1/2
61-285	1/4	1	1/4	2-1/2
61-320	3/8	1-1/8	3/8	3

61-400

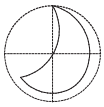
Single Flute - Solid Carbide Straight

Designed to combine the fast free cutting of O flute geometry with the tool life available from solid carbide particularly in small diameters.

Usage Polycarbonate, polyethylene, polypropylene, polystyrene, PVC, extruded acrylic, HDPE, UHMW and hard plastic

Material SP HP

See Selection Guide - pg. 2 - 12



METRIC

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
61-410	4 mm	16 mm	6 mm	64 mm
61-411	5 mm	20 mm	6 mm	64 mm
61-412	6 mm	25 mm	6 mm	64 mm
61-414	8 mm	25 mm	8 mm	64 mm
61-418	12 mm	35 mm	12 mm	88 mm

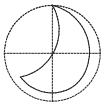
62-600

Single Flute - Solid Carbide Downcut Spiral O Flute

High speed cutters for machining aluminum sheet material. These tools are optimized for use on high-speed CNC mills, high speed machining centers and CNC routers.

Usage Aluminum, plate, single & multi sheet

Material A See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
62-602	1/16	1/4	1/8	1-1/2
62-604	1/8	1/4	1/8	1-1/2
62-606	1/8	1/4	1/4	2
62-610	1/8	1/2	1/4	2
62-612	3/16	3/8	3/16	1-1/2
62-614	3/16	3/8	1/4	2
62-618	3/16	5/8	1/4	2
62-620	1/4	3/8	1/4	2
62-622	1/4	3/4	1/4	2-1/2
62-624	1/4	1-1/4	1/4	3
62-630	5/16	3/4	1/2	3
62-625	3/8	3/4	3/8	3
62-626	3/8	1-1/8	3/8	3
62-631	1/2	1-1/8	1/2	3-1/2

HELIX ANGLE ≈ 22°

Single Flute - Solid Carbide Downcut Spiral O Flute

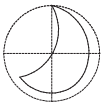
62-700
62-750
62-800
62-850

(HP) Designed to provide a smooth finish in hard plastics with downward chip removal.

(SP) Designed to provide provide a smooth finish in soft plastic with downward chip removal.

Usage **(HP):** Acrylic, nylon, PVC, polycarbonate and solid surface
(SP): HDPE, HIPS, UHMW, ABS, polycarbonate, PE, polystyrene, polypropylene, acetal, acrylic, PET and solid surface

Material 62-700 HP SSP 62-750 SP HP SSP
62-800 HP SSP 62-850 SP HP SSP



HARD PLASTIC	SOFT PLASTIC				
Part Number	Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
62-713	62-763	1/8	1/2	1/8	2
62-712	62-762	1/8	1/2	1/4	2
62-715		5/32	9/16	1/4	2
62-719	62-769	3/16	5/8	3/16	2
62-718	62-768	3/16	5/8	1/4	2
		7/32	3/4	1/4	2-1/2
62-725	62-775	1/4	3/4	1/4	2-1/2
62-726	62-776	1/4	1-1/4	1/4	3
62-727		1/4	1-1/2	1/4	3
62-733	62-783	3/8	1-1/8	3/8	3
		3/8	1-5/8	3/8	3-1/2
62-740	62-790	1/2	1-5/8	1/2	3-1/2

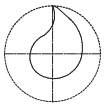
HARD PLASTIC	SOFT PLASTIC				METRIC
Part Number	Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
62-816	62-866	3mm	12mm	6mm	64mm
62-824	62-874	4mm	20mm	6mm	64mm
62-830	62-880	5mm	16mm	6mm	64mm
62-840		6mm	30mm	6mm	76mm
62-842		6mm	38mm	6mm	76mm
62-844		8mm	25mm	8mm	64mm
62-846	62-896	8mm	38mm	8mm	76mm

HELIX ANGLE ≈ 21°

63-000

Single Flute - Solid Carbide Upcut Spiral

Designed for routing where upward chip removal, tool rigidity, long life, and high quality finish is desired.



Usage Fiberglass, phenolic and aluminum

Material CP A See Selection Guide - pg. 2 - 12

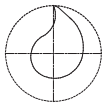
Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
63-040	1/8	1/2	1/4	2
63-050	5/32	9/16	1/4	2
63-060	3/16	5/8	1/4	2
63-080	1/4	3/4	1/4	2-1/2
63-100	5/16	13/16	3/8	2-1/2
63-160	1/2	1	1/2	3

HELIX ANGLE ≈ 30°

63-200

Single Flute - Solid Carbide Upcut Spiral Wood Rout

Designed for routing where aggressive upward chip removal is necessary in hand-fed or CNC applications. Tool rigidity, long life, and high quality finish are characteristic of these tools.



Usage Natural wood and wood composites

Material SW HW CW

See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
63-240	1/8	1/2	1/4	2
63-280	1/4	7/8	1/4	2-1/2
63-300	5/16	1-1/8	5/16	3

HELIX ANGLE ≈ 30°

Single Flute - Solid Carbide Upcut Spiral O Flute for Acrylic

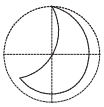
63-500

NEW

These tools are designed to cut acrylics and achieve long tool life. Our unique cutting geometry produces a smooth edge finish regardless if it is cast or extruded acrylic.

Usage Acrylic

Material SP HP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
63-505	1/16	1/4	1/4	2
63-510	1/8	1/4	1/4	2
63-515	1/8	1/2	1/4	2
63-520	3/16	5/8	1/4	2
63-525	1/4	3/8	1/4	2-1/2
63-530	1/4	3/4	1/4	2-1/2
63-535	3/8	1-1/8	3/8	3

Single Flute - Solid Carbide Upcut Spiral O Flute

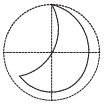
63-600

High speed cutters for machining aluminum sheet and block material. These tools are optimized for use on high-speed CNC mills, high speed machining centers and CNC routers.

Usage Aluminum plate and single/multi sheet aluminum

Material A

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
63-602	1/16	1/4	1/8	1-1/2
63-603	3/32	1/4	1/8	2
63-604	1/8	1/4	1/8	1-1/2
63-606	1/8	1/4	1/4	2
63-610	1/8	1/2	1/4	2
63-611	5/32	5/16	3/16	2
63-612	3/16	3/8	3/16	1-1/2
63-614	3/16	3/8	1/4	2
63-618	3/16	5/8	1/4	2
63-619	7/32	7/16	1/4	2-1/2
63-620	1/4	3/8	1/4	2
63-622	1/4	3/4	1/4	2-1/2

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
63-624	1/4	11/4	1/4	3
63-628	9/32	7/16	5/16	2-1/2
63-629	5/16	9/16	5/16	2-1/2
63-630	5/16	3/4	1/2	3
63-634	21/64	3/4	1/2	3
63-637	11/32	9/16	3/8	2-1/2
63-625	3/8	3/4	3/8	3
63-626	3/8	1-1/8	3/8	3
63-627	3/8	1-3/8	3/8	3-1/2
63-631	1/2	1-1/8	1/2	3-1/2
63-632	1/2	1-3/8	1/2	3-1/2

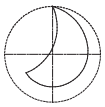
HELIX ANGLE ≈ 22°

63-700
63-750
63-800
63-850

Single Flute - Solid Carbide Upcut Spiral O Flute

(HP) Designed to provide a smooth finish in hard plastics with upward chip removal.

(SP) Designed to provide a smooth finish in soft plastic with upward chip removal.



Usage **(HP):** Acrylic, nylon, PVC, polycarbonate and solid surface
(SP): HDPE, HIPS, UHMW, ABS, polycarbonate, PE, polystyrene, polypropylene, acetal, acrylic, PET and solid surface

Material 63-700 HP SSP 63-750 SP HP SSP
63-800 HP SSP 63-850 SP HP SSP

HARD PLASTIC	SOFT PLASTIC				
Part Number	Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
63-701	63-751	1/16	1/4	1/8	2
63-700	63-750	1/16	1/4	1/4	2
63-706		1/8	5/8	1/4	2-1/2
63-707		1/8	3/4	1/4	2-1/2
63-711	63-761	1/8	1/4	1/8	2
63-710	63-760	1/8	1/4	1/4	2
63-713	63-763	1/8	1/2	1/8	2
63-712	63-762	1/8	1/2	1/4	2
63-743*	63-793*	1/8	1/2	1/4	2
63-715		5/32	9/16	1/4	2
63-716	63-766	3/16	3/8	3/16	2
63-717	63-767	3/16	3/8	1/4	2
63-719	63-769	3/16	5/8	3/16	2
63-718	63-768	3/16	5/8	1/4	2
63-720		7/32	3/4	1/4	2-1/2
63-724	63-774	1/4	3/8	1/4	2
63-744*	63-794*	1/4	3/4	1/4	2-1/2
63-725	63-775	1/4	3/4	1/4	2-1/2
63-726	63-776	1/4	1-1/4	1/4	3
63-727	63-777	1/4	1-1/2	1/4	3
63-730	63-780	3/8	5/8	3/8	2-1/2
63-731	63-781	3/8	3/4	3/8	3
63-733	63-783	3/8	1-1/8	3/8	3
63-735	63-785	3/8	1-5/8	3/8	3-1/2
63-745*	63-795*	3/8	1-5/8	3/8	3-1/2
63-740	63-790	1/2	1-5/8	1/2	3-1/2
63-746*	63-796*	1/2	1-5/8	1/2	3-1/2

HELIX ANGLE ≈ 21°

* Special Point for Improved Bottom Finish

METRIC

HARD PLASTIC	SOFT PLASTIC				
Part Number	Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
63-802		2mm	8mm	2mm	50mm
63-804	63-854	2mm	8mm	6mm	64mm
63-806		2.5 mm	8mm	2.5mm	50mm
63-808		2.5 mm	8mm	6mm	64mm
63-810	63-860	3mm	8mm	3mm	50mm
63-812	63-862	3mm	8mm	6mm	64mm
63-814	63-864	3mm	12mm	3mm	64mm
63-816	63-866	3mm	12mm	6mm	64mm
63-818		4mm	8mm	4mm	64mm
63-820	63-870	4mm	12mm	4mm	64mm
63-822		4mm	20mm	4mm	64mm
63-824	63-874	4mm	20mm	6mm	64mm
63-826		4mm	30mm	4mm	64mm
63-828	63-878	5mm	16mm	5mm	64mm
63-830	63-880	5mm	16mm	6mm	64mm
63-832		5mm	30mm	5mm	64mm
63-834		6mm	8mm	6mm	64mm
63-836	63-886	6mm	12mm	6mm	64mm
63-838	63-888	6mm	20mm	6mm	64mm
63-840		6mm	30mm	6mm	76mm
63-842	63-892	6mm	38mm	6mm	76mm
63-844	63-894	8mm	25mm	8mm	64mm
63-846	63-896	8mm	38mm	8mm	76mm
63-848	63-898	10mm	30mm	10mm	76mm
63-849		10mm	35mm	10mm	76mm
63-847	63-897	12mm	38mm	12mm	76mm

HELIX ANGLE ≈ 21°

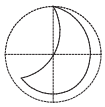
Single Flute - Solid Carbide Upcut Spiral O Flute

63-900

High speed cutters for machining aluminum sheet and block material. These tools are optimized for use on high-speed CNC mills, high speed machining centers and CNC routers.

Usage Aluminum plate and single/multi sheet aluminum

Material A See Selection Guide - pg. 2 - 12



METRIC

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
63-904	2mm	6mm	6mm	64mm
63-908	2.5mm	6mm	6mm	64mm
63-912	3mm	8mm	6mm	64mm
63-916	3mm	12mm	6mm	64mm
63-918	4mm	8mm	4mm	64mm
63-924	4mm	20mm	6mm	64mm
63-928	5mm	16mm	5mm	64mm
63-930	5mm	16mm	6mm	64mm
63-934	6mm	8mm	6mm	64mm
63-938	6mm	20mm	6mm	64mm
63-944	8mm	25mm	8mm	64mm
63-946	8mm	38mm	8mm	76mm
63-948	10mm	30mm	10mm	76mm
63-950	12mm	38mm	12mm	76mm

HELIX ANGLE ≈ 22°

Single Flute - Solid Carbide Downcut Spiral O Flute

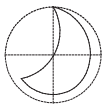
64-000

The polished flute allows for razor sharp cutting edge and easy chip evacuation. The tool is available in a down cut spiral for improved part holding.

Usage Plastic, wood, aluminum and solid surface

Material SW HW CW SP HP SSP A

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
64-000	1/16	1/4	1/8	2
64-012	1/8	1/2	1/4	2
64-016	3/16	3/8	3/16	2
64-018	3/16	5/8	1/4	2
64-024	1/4	3/8	1/4	2
64-025	1/4	3/4	1/4	2
64-026	1/4	1-1/4	1/4	3
64-031	3/8	3/4	3/8	3
64-033	3/8	1-1/8	3/8	3

HELIX ANGLE ≈ 21°

Single Flute - Solid Carbide Upcut Spiral O Flute

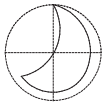
65-000

The polished flute allows for razor sharp cutting edge and easy chip evacuation. The tool is available in a upcut spiral for improved chip evacuation.

Usage Plastic, wood, aluminum and solid surface

Material SW HW CW SP HP SSP A

See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
65-000	1/16	1/4	1/8	2
65-010	1/8	1/4	1/4	2
65-013	1/8	1/2	1/8	2
65-012	1/8	1/2	1/4	2
65-019	3/16	5/8	3/16	2
65-018	3/16	5/8	1/4	2

HELIX ANGLE ≈ 21°

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
65-020	3/16	1-1/4	1/4	3
65-021	3/16	7/8	1/4	2-1/2
65-023	1/4	5/8	1/4	2
65-025	1/4	7/8	1/4	2-1/2
65-026	1/4	1-1/4	1/4	3
65-027	1/4	1-1/2	1/4	3
65-033	3/8	1-1/8	3/8	3

66-000

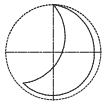
Solid Carbide Edge Rounding

Designed for rounding the edge of sheets or parts. They come in both single flute and double flute.

Usage Edge rounding of parts

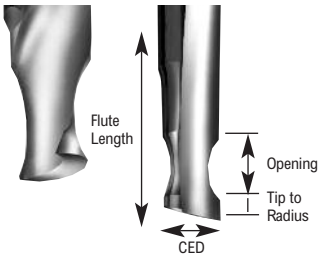
Material SP HP SSP See Selection Guide - pg. 2 - 12

SINGLE FLUTE STRAIGHT O-FLUTE



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Opening	Radius	Small Flute LGTH	Tip To RAD	Plastic Size
66-082	1/4	3/8	1/4	2-1/2	5/32	1/8	.195	1/16	1/8
66-083	1/4	3/8	1/4	2-1/2	7/32	3/16	.180	1/16	3/16
66-084	1/4	3/8	1/4	2-1/2	9/32	1/4	.163	1/16	1/4

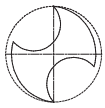
SINGLE FLUTE SPIRAL O-FLUTE



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Opening	Radius	Small Flute LGTH	Tip To RAD	Plastic Size
66-085	1/4	3/8	1/4	2-1/2	5/32	1/8	.195	1/16	1/8
66-086	1/4	3/8	1/4	2-1/2	7/32	3/16	.180	1/16	3/16
66-087	1/4	3/8	1/4	2-1/2	9/32	1/4	.163	1/16	1/4

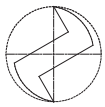
HELIX ANGLE ≈ 22°

DOUBLE FLUTE STRAIGHT O-FLUTE



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Opening	Radius	Small Flute LGTH	Tip To RAD	Plastic Size
66-092	1/4	3/8	1/4	2-1/2	5/32	1/8	.195	1/16	1/8
66-093	1/4	3/8	1/4	2-1/2	7/32	3/16	.180	1/16	3/16
66-094	1/4	3/8	1/4	2-1/2	9/32	1/4	.163	1/16	1/4

DOUBLE FLUTE STRAIGHT V-FLUTE



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Opening	Radius	Small Flute LGTH	Tip To RAD	Plastic Size
66-120	3/8	3/8	3/8	2-1/2	5/32	1/8	.320	1/16	1/8
66-121	3/8	3/8	3/8	2-1/2	7/32	3/16	.305	1/16	3/16
66-122	3/8	3/8	3/8	2-1/2	9/32	1/4	.288	1/16	1/4
66-123	3/8	1/2	3/8	2-1/2	13/32	3/8	.255	1/16	3/8
66-160	1/2	3/8	1/2	3	5/32	1/8	.445	1/16	1/8
66-161	1/2	3/8	1/2	3	7/32	3/16	.430	1/16	3/16
66-162	1/2	3/8	1/2	3	9/32	1/4	.413	1/16	1/4
66-163	1/2	5/8	1/2	3	17/32	1/2	.347	1/16	1/2

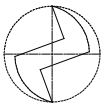
Double Flute - Solid Carbide Rout and Chamfer

66-200

Designed to provide up to a 1/16” top face chamfer and a finished side edge on plastic sheets or parts.

Usage Rout and chamfer in plastic

Material SP HP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Material Thickness
66-200	1/4	3/16	3/8	2-1/4	1/8
66-204	1/4	1/4	3/8	2-1/4	3/16
66-210	3/8	5/16	1/2	3	1/4

HELIX ANGLE ≈ 0°

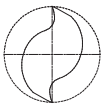
Double Flute - Solid Carbide Upcut Bottom Surfacing

66-300
66-350

Designed for pocketing applications where the bottom of the pocket must be smooth.

Usage Bottom surfacing for plastic and aluminum

Material SP HP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Corner Radius	Flute LGTH	SHK DIA	OAL
66-308	1/8	.020	1/4	1/4	2
66-309	1/8	.002	1/4	1/4	2
66-314	1/4	.030	3/8	1/4	2
66-315	1/4	.002	3/8	1/4	2
66-320	3/8	.030	5/8	3/8	2-1/2
66-321	3/8	.002	5/8	3/8	2-1/2
66-326	1/2	.030	7/8	1/2	3
66-327	1/2	.002	7/8	1/2	3
66-328	3/4	.040	1-1/8	3/4	4

HELIX ANGLE ≈ 30°

67-000
67-250

Solid Carbide Fiberglass Router

Designed as fiberglass routers. Their upcut/downcut diamond design effectively shears fibrous materials. Certain tools in the line have been further developed to cut aramid fiber composites.

Usage Fiberglass and phenolic

Material CP See Selection Guide - pg. 2 - 12

MEDIUM BURR W/END MILL POINT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Diamond Coated Part Number
67-003	1/8	1	1/8	2	67-003DFC
67-010	1/4	3/4	1/4	2-1/2	67-010DFC
67-011	1/4	1-1/8	1/4	3	67-011DFC
67-012	1/4	1-1/4	1/4	3	67-012DFC
67-014	1/4	1-1/2	1/4	3	67-014DFC
67-017	1/4	2-1/8	1/4	4	67-017DFC
67-030	3/8	7/8	3/8	2-1/2	67-030DFC

MEDIUM BURR W/END MILL POINT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Diamond Coated Part Number
67-023	3/8	1-5/8	3/8	3	67-023DFC
67-027	3/8	2-1/8	3/8	4	67-027DFC
67-031	1/2	1-1/8	1/2	3	67-031DFC
67-033	1/2	1-5/8	1/2	4	67-033DFC
67-037	1/2	2-1/8	1/2	4	67-037DFC
67-039	1/2	3-1/8	1/2	5	-
67-065	3/4	4-1/8	3/4	6	-

MEDIUM BURR W/DRILL POINT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Diamond Coated Part Number
67-080	1/4	3/4	1/4	2-1/2	67-080DFC
67-120	3/8	7/8	3/8	2-1/2	67-120DFC
67-160	1/2	1	1/2	3	67-160DFC

MEDIUM BURR W/DRILL POINT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Diamond Coated Part Number
67-090	4mm	16mm	6mm	50mm	67-090DFC
67-091	6mm	19mm	6mm	63mm	67-091DFC
67-092	6mm	25mm	6mm	75mm	67-092DFC
67-093	8mm	25mm	8mm	63mm	67-093DFC
67-094	10mm	25mm	10mm	75mm	67-094DFC
67-095	12mm	25mm	12mm	75mm	67-095DFC

2 FLUTE BURR

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Diamond Coated Part Number
67-082	1/4	3/4	1/4	2-1/2	67-082DFC
67-122	3/8	7/8	3/8	2-1/2	67-122DFC

2 FLUTE BURR

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Diamond Coated Part Number
67-162	1/2	1	1/2	3	67-162DFC

ARAMID TOOL

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-084	1/4	3/4	1/4	2-1/2
67-124	3/8	7/8	3/8	2-1/2

ARAMID TOOL

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-164	1/2	1	1/2	3

3 FLUTE DOWNCUT DIAMOND GRIT TOOL

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-254	1/4	1-1/8	1/4	3

3 FLUTE DOWNCUT DIAMOND GRIT TOOL

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-256	1/4	1-3/8	1/4	3
67-258	3/8	1-3/8	3/8	3

Three Flute - Solid Carbide Phenolic Cutter

67-200

Equally adaptable to low or high spindle speed applications in any CNC machining environment. The free cutting action of the tools provides for better finishes and significantly lower noise levels.

Usage Phenolic

Material CP See Selection Guide - pg. 2 - 12

UPCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-205	3/8	7/8	3/8	3
67-211	1/2	1-1/8	1/2	3
67-215	1/2	2-1/8	1/2	4

HELIX ANGLE ≈ 10°

DOWNCUT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-206	3/8	7/8	3/8	3
67-212	1/2	1-1/8	1/2	3-1/2
67-216	1/2	2-1/8	1/2	4-1/2

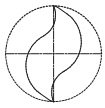
Double Flute - Solid Carbide Compression Spiral

67-300

Compression design for fast feed and excellent finish on both sides of the material.

Usage Composite panels and honeycomb core

Material CP See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Diamond Coated Part Number
67-305	1/4	7/8	1/4	2-1/2	-
67-314	3/8	1-1/8	3/8	3	67-314DFC
67-320*	1/2	7/8	1/2	3	-
67-322	1/2	1-1/8	1/2	3	67-322DFC

* = Mortise Compression

HELIX ANGLE ≈ 30°

Solid Carbide Un-Ruffer™ PATENTED

67-400

The unique design allows for the cutting performance of a burr while achieving a good surface finish.

Usage Composite panels

Material CP See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-410	1/8	1/2	1/8	1-1/2
67-423	1/4	3/4	1/4	2
67-426	1/4	1	1/4	2-1/2
67-428	1/4	1	1/4	3
67-435	3/8	1	3/8	3
67-445	1/2	1	1/2	3

Tools can be diamond coated upon request

67-500

Solid Carbide CG Tool (Carbon Graphite)

The geometry of these tools increases the amount of effective cutting flutes resulting in superior performance over a standard burr.

Usage Carbon graphite and carbon fiber panels

Material CP See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-505	1/8	1/2	1/8	2
67-508	3/16	5/8	3/16	2
67-511	1/4	3/4	1/4	3
67-514	1/4	1-1/2	1/4	3
67-520	3/8	1-1/8	3/8	3-1/2
67-523	1/2	1-1/8	1/2	3-1/2
67-526	1/2	2-1/8	1/2	4

67-600

Solid Carbide FMR (Fiber Metal Router)

Similar to the CG Tool, but the enhanced tooth design allows the tool to cut fiber metals and other abrasive materials quickly and easily. The special clean out flutes allows the material to be quickly removed from the cutting area improving the surface finish.

Usage Carbon graphite, aramid, composite sheets

Material CP See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-605	1/8	1/2	1/8	2
67-608	3/16	5/8	3/16	2
67-611	1/4	3/4	1/4	3
67-614	1/4	1-1/2	1/4	3
67-620	3/8	1-1/8	3/8	3-1/2
67-623	1/2	1-1/8	1/2	3-1/2
67-626	1/2	2-1/8	1/2	4

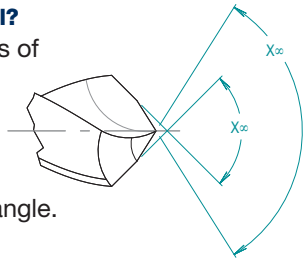
Solid Carbide 8 Facet Drill

Designed to reduce cutting forces and eliminating delamination when exiting the material.

Usage Composites, Carbon fiber, mechanical plastics, and fiber reinforced plastics

Material CP SP See Selection Guide - pg. 2 - 12

What is an 8 Facet Drill?
An 8 facet drill consists of 4 cutting edges with 2 facets per cutting edge. These facets consist of the lip relief and the lip clearance angle.



FRACTIONAL DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-807	1/8 (0.125)	1-1/4	0.125	2-1/4
67-808	9/64 (0.140)	1-3/8	0.140	2-1/2
67-809	5/32 (0.156)	1-3/8	0.156	2-1/2
67-810	11/64 (0.172)	1-5/8	0.172	2-3/4
67-811	3/16 (0.188)	1-5/8	0.188	2-3/4
67-812	13/64 (0.203)	1-3/4	0.203	3
67-813	7/32 (0.219)	1-3/4	0.219	3
67-814	15/64 (0.234)	2	0.234	3-1/4
67-815	1/4 (0.250)	2	0.250	3-1/4
67-816	17/64 (0.266)	2-1/8	0.266	3-1/2
67-817	9/32 (0.281)	2-1/8	0.281	3-1/2
67-818	19/64 (0.297)	2-3/8	0.297	3-3/4
67-819	5/16 (0.313)	2-3/8	0.313	3-3/4
67-820	21/64 (0.328)	2-1/2	0.328	4
67-821	11/32 (0.344)	2-1/2	0.344	4
67-822	23/64 (0.359)	2-1/2	0.359	4
67-823	3/8 (0.375)	2-3/4	0.375	4-1/4
67-824	25/64 (0.391)	2-7/8	0.391	4-1/2
67-825	13/32 (0.406)	2-7/8	0.406	4-1/2
67-826	27/64 (0.422)	2-7/8	0.422	4-1/2
67-827	7/16 (0.438)	2-7/8	0.438	4-1/2
67-828	29/64 (0.453)	3	0.453	4-3/4
67-829	15/32 (0.469)	3	0.469	4-3/4
67-830	31/64 (0.484)	3	0.484	4-3/4
67-831	1/2 (0.500)	3	0.500	4-3/4

LETTER DRILLS (CONT.)

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-850	A (0.234)	2	0.234	3-1/4
67-851	B (0.238)	2	0.238	3-1/4
67-852	C (0.242)	2	0.242	3-1/4
67-853	D (0.246)	2	0.246	3-1/4
67-854	E (0.250)	2	0.250	3-1/4
67-855	F (0.257)	2	0.257	3-1/4
67-856	G (0.261)	2-1/8	0.261	3-1/2
67-857	H (0.266)	2-1/8	0.266	3-1/2
67-858	I (0.272)	2-1/8	0.272	3-1/2

LETTER DRILLS (CONT.)

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-859	J (0.277)	2-1/8	0.277	3-1/2
67-860	K (0.281)	2-1/8	0.281	3-1/2
67-861	L (0.291)	2-1/8	0.291	3-1/2
67-862	M (0.295)	2-3/8	0.295	3-3/4
67-863	N (0.302)	2-3/8	0.302	3-3/4
67-864	O (0.316)	2-3/8	0.316	3-3/4
67-865	P (0.323)	2-3/8	0.323	3-3/4
67-866	Q (0.332)	2-1/2	0.332	4
67-867	R (0.339)	2-1/2	0.339	4
67-868	S (0.348)	2-1/2	0.348	4
67-869	T (0.358)	2-1/2	0.358	4
67-870	U (0.368)	2-3/4	0.368	4-1/4
67-871	V (0.377)	2-3/4	0.377	4-1/4
67-872	W (0.386)	2-7/8	0.386	4-1/2
67-873	X (0.397)	2-7/8	0.397	4-1/2
67-874	Y (0.404)	2-7/8	0.404	4-1/2
67-875	Z (0.413)	2-7/8	0.413	4-1/2

NUMBER DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-876	1 (0.228)	1-3/4	0.228	3
67-877	2 (0.221)	1-3/4	0.221	3
67-878	3 (0.213)	1-3/4	0.213	3
67-879	4 (0.209)	1-3/4	0.209	3
67-880	5 (0.206)	1-3/4	0.206	3
67-881	6 (0.204)	1-3/4	0.204	3
67-882	7 (0.201)	1-3/4	0.201	3
67-883	8 (0.199)	1-3/4	0.199	3
67-884	9 (0.196)	1-3/4	0.196	3
67-885	10 (0.194)	1-5/8	0.194	2-3/4
67-886	11 (0.191)	1-5/8	0.191	2-3/4
67-887	12 (0.189)	1-5/8	0.189	2-3/4
67-888	13 (0.185)	1-5/8	0.185	2-3/4
67-889	14 (0.182)	1-5/8	0.182	2-3/4
67-890	15 (0.180)	1-5/8	0.180	2-3/4
67-891	16 (0.177)	1-5/8	0.177	2-3/4
67-892	17 (0.173)	1-5/8	0.173	2-3/4

NUMBER DRILLS (CONT.)

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-893	18 (0.170)	1-5/8	0.170	2-3/4
67-894	19 (0.166)	1-5/8	0.166	2-3/4
67-895	20 (0.161)	1-3/8	0.161	2-1/2
67-896	21 (0.159)	1-3/8	0.159	2-1/2
67-897	22 (0.157)	1-3/8	0.157	2-1/2
67-898	23 (0.154)	1-3/8	0.154	2-1/2
67-899	24 (0.152)	1-3/8	0.152	2-1/2
67-900	25 (0.150)	1-3/8	0.150	2-1/2
67-901	26 (0.147)	1-3/8	0.147	2-1/2
67-902	27 (0.144)	1-3/8	0.144	2-1/2
67-903	28 (0.141)	1-3/8	0.141	2-1/2
67-904	29 (0.136)	1-3/8	0.136	2-1/2
67-905	30 (0.129)	1-1/4	0.129	2-1/4
67-906	31 (0.120)	1-1/4	0.120	2-1/4

METRIC DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
67-961	3.00 (0.118)	32	3.00	57
67-962	3.50 (0.138)	35	3.50	64
67-963	4.00 (0.157)	35	4.00	64
67-964	4.50 (0.177)	41	4.50	70
67-965	5.00 (0.197)	44	5.00	76
67-966	5.50 (0.217)	44	5.50	76
67-967	6.00 (0.236)	51	6.00	83
67-968	6.50 (0.256)	51	6.50	83
67-969	7.00 (0.276)	57	7.00	89
67-970	7.50 (0.295)	60	7.50	95
67-971	8.00 (0.315)	60	8.00	95
67-972	8.50 (0.335)	64	8.50	102
67-973	9.00 (0.354)	64	9.00	102
67-974	9.50 (0.374)	70	9.50	108
67-975	10.00 (0.394)	73	10.00	114
67-976	10.50 (0.413)	73	10.50	114
67-977	11.00 (0.433)	73	11.00	114
67-978	11.50 (0.453)	76	11.50	121
67-979	12.00 (0.472)	76	12.00	121

68-000

Double Flute - PCD Tipped Tooling

Designed for use in abrasive materials where cut quality and tool life are important.

Usage Composite panels and fiberglass

Material CP See Selection Guide - pg. 2 - 12

PCD Tipped

PCD Full Face
with Plunge Point

PCD FULL FACE

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
68-005	1/4	3/4	1/4	3
68-010	3/8	3/4	3/8	3
68-020	1/2	3/4	1/2	4
68-030	3/4	1	3/4	4

HELIX ANGLE ≈ 0-3°

PCD FULL FACE with PLUNGE POINT

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
68-050	1/4	3/4	1/4	3
68-055	3/8	7/8	3/8	3
68-062	1/2	1-1/4	1/2	4
68-070	3/4	1-1/4	3/4	4
68-072	3/4 Down Shear	1-1/4	3/4	4

68-100

Single Flute - PCD Compression Tool

This economical PCD compression tool will provide long tool life in abrasive wood products. Mortise tip allowing for through cuts and dado's to be produced using one tool. The compression design ensures chip free edges on the top and bottom.

Usage Composite wood

Material CW See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL	Flutes
68-101	3/8	1	0.188	3/8	3	1
68-101L	3/8	1	0.188	3/8	3	1
68-100	3/8	1	0.188	1/2	3	1
68-100L	3/8	1	0.188	1/2	3	1
68-102	1/2	1	0.200	1/2	3	1
68-102L	1/2	1	0.200	1/2	3	1
68-103	1/2	1-1/4	0.200	1/2	3	1
68-104	5/8	1	0.200	5/8	3-1/2	1

Part Number	Cutting DIA	Flute LGTH	Upcut Flute LGTH	SHK DIA	OAL	Flutes
68-104L*	5/8	1	0.200	5/8	3-1/2	1
68-110	5/8	1-5/8	0.200	5/8	4	1
68-110L*	5/8	1-5/8	0.200	5/8	4	1
68-106	3/4	1	0.200	3/4	4	1
68-106L*	3/4	1	0.200	3/4	4	1
68-112	3/4	1-5/8	0.200	3/4	4	1
68-112L*	3/4	1-5/8	0.200	3/4	4	1

L = Left Hand Rotation

* = Tools are not stocked and must be special ordered. Approx. 4 week lead time.

68-200

Double Flute - PCD SERF™ Cutter

This tool is designed to act like a rougher and finishing tool in one. The unique geometry reduces the cutting forces resulting in longer tool life, higher feed rates and reduced noise.

Usage Composites

Material CP See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
68-210	1/4	3/8	1/4	3
68-213	1/4	3/4	1/4	3
68-216	1/4	1	1/4	3-1/2
68-220	3/8	3/8	3/8	3
68-223	3/8	3/4	3/8	3
68-226	3/8	1	3/8	3-1/2
68-230	1/2	3/4	1/2	4
68-233	1/2	1	1/2	4
68-236	1/2	1-1/4	1/2	4

PCD 8 Facet Drills

68-900

The PCD 8 facet drill works well in composite material where long tool life and a delamination free hole is required. The drill diameters are oversize allowing for aircraft fasteners to extend through the holes.

Usage Composites

Material CP See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
68-902	0.100	1	1/4	3
68-904	0.129	1	1/4	3
68-908	0.147	1	1/4	3
68-910	0.192	1	1/4	3
68-914	0.251	1	1/4	3
68-918	0.313	1	5/16	3
68-922	0.376	1	3/8	3
68-926	0.502	1	1/2	3

Carbide Tipped Trim Blade and Arbor

70-100

Designed to trim and groove both hard and soft plastics. These blades run in conjunction with the blade arbors. Blades are reversible for right or left hand rotation cutting.

Usage Hard and soft plastic

Material SP HP

See Selection Guide - pg. 2 - 12

SOFT PLASTIC - SLOW FEED

Part Number	Cutting DIA	Teeth	Rake	Kerf	Grind
70-100	2	10	0°	.095	TCG
70-102	2-1/2	10	0°	.095	TCG
70-104	3	10	0°	.095	TCG
70-108	4	10	0°	.095	TCG

SOFT PLASTIC - FAST FEED

Part Number	Cutting DIA	Teeth	Rake	Kerf	Grind
70-120	2	16	0°	.095	TCG
70-122	2-1/2	20	0°	.095	TCG
70-124	3	20	0°	.095	TCG
70-126	3-1/2	20	0°	.095	TCG
70-128	4	20	0°	.095	TCG

HARD PLASTIC - FAST FEED

Part Number	Cutting DIA	Teeth	Rake	Kerf	Grind
70-160	2	16	-5°	.095	TCG
70-162	2-1/2	20	-5°	.095	TCG
70-164	3	20	-5°	.095	TCG
70-166	3-1/2	20	-5°	.095	TCG
70-168	4	20	-5°	.095	TCG

TCG = Triple Chip Grind

SAW ARBOR – These saw arbors are designed to hold the carbide tipped saws.

Part Number	Cutting DIA	OAL
70-180	1/2	3-1/4
70-181	1/2	4-1/2

*SEE FEED & SPEED CHART ON PAGE 59.

Solid Carbide Trim Blade Flush Mount

70-200

These small diameter solid carbide arbor mounted blades are designed for trimming and slotting plastics. Blades are permanently attached to arbors and are not reversible.

Usage Hard and soft plastic

Material SP HP

See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Collar	SHK DIA	Kerf	OAL	Rotation
70-204	1	9/16	1/2	.062	4	Right
70-224	1-1/4	5/8	1/2	.062	4	Right

*SEE FEED & SPEED CHART ON PAGE 59.

70-300

Carbide Tipped Trim Blade Flush Mount

Designed for flush trimming and slotting of both hard and soft plastics. Blades are permanently attached to arbors and are not reversible.

Usage Hard and soft plastic

Material SP HP See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Teeth	Rake	SHK DIA	Kerf	OAL	Grind	Rotation	Plastic	Feed
70-300	2	10	0°	1/2	.095	4	TCG	RH	Soft	Slow
70-302	2	10	0°	1/2	.095	4	TCG	LH	Soft	Slow
70-320	2	16	0°	1/2	.095	4	TCG	RH	Soft	Fast
70-322	2	16	0°	1/2	.095	4	TCG	LH	Soft	Fast
70-340	2	10	-5°	1/2	.095	4	TCG	RH	Hard	Slow
70-342	2	10	-5°	1/2	.095	4	TCG	LH	Hard	Slow
70-360	2	16	-5°	1/2	.095	4	TCG	RH	Hard	Fast
70-362	2	16	-5°	1/2	.095	4	TCG	LH	Hard	Fast

*SEE FEED & SPEED CHART BELOW
TCG = Triple Chip Grind

Feeds & Speeds for Blades

INCHES PER MINUTE

Tool Series	Cutting DIA	Max RPM	Soft Plastic	Hard Plastic	Fibrous Reinfrc
70-100	2”	18,000	150	150	150
70-100	2-1/2”	16,000	150	150	150
70-100	3”	14,000	150	150	150
70-100	3-1/2”	12,000	150	150	150
70-100	4”	10,000	150	150	150
70-200	1-1/2” & Smaller	14,000	150	150	150
70-300	2”	16,000	150	150	150

HSS Plastic Drill

Designed to produce holes in hard and soft plastic while eliminating edge chipping and chip wrapping.

NO Wrapping
NO Cleaning
NO Melting
NO Surface Marring
NO Interrupted Operation

Usage Hard and soft plastic

Material SP HP See Selection Guide - pg. 2 - 12

FRACTIONAL DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
70-502	1/8 (0.125)	1-1/2	1/8	2-3/4
70-503	9/64 (0.141)	1-3/4	9/64	2-7/8
70-506	5/32 (0.156)	1-15/16	5/32	3-1/8
70-509	11/64 (0.172)	1-3/4	11/64	3-1/4
70-510	3/16 (0.188)	2-1/8	3/16	3-1/2
70-511	13/64 (0.203)	2-7/16	13/64	3-5/8
70-512	7/32 (0.219)	2-1/2	7/32	3-3/4
70-513	15/64 (0.234)	2-5/8	15/64	3-7/8
70-514	1/4 (0.250)	2-7/16	1/4	4
70-515	17/64 (0.266)	2-7/8	17/64	4-1/8
70-516	9/32 (0.281)	2-15/16	9/32	4-1/4
70-517	19/64 (0.297)	3-1/16	19/64	4-3/8
70-520	5/16 (0.313)	1-3/4	1/4	3-1/8
70-521	21/64 (0.328)	3-5/16	21/64	4-5/8
70-522	11/32 (0.344)	3-7/16	11/32	4-3/4
70-523	23/64 (0.359)	3-1/2	23/64	4-7/8
70-524	3/8 (0.375)	2-1/4	1/4	4-3/8
70-525	25/64 (0.391)	3-3/4	25/64	5-1/8
70-526	13/32 (0.406)	3-7/8	13/32	5-1/8
70-527	27/64 (0.422)	3-15/16	27/64	5-3/8
70-528	7/16 (0.438)	2-1/2	1/4	4-3/4
70-529	29/64 (0.453)	4-3/16	29/64	5-5/8
70-530	15/32 (0.469)	4-5/16	15/32	5-3/4
70-531	31/64 (0.484)	4-3/8	31/64	5-7/8
70-532	1/2 (0.500)	2-5/8	1/4	5-1/8
70-533	33/64 (0.516)	3-1/8	1/2	6
70-534	17/32 (0.531)	3-1/8	1/2	6
70-535	35/64 (0.547)	3-1/8	1/2	6
70-536	9/16 (0.563)	3-1/8	1/2	6
70-537	37/64 (0.578)	3-1/8	1/2	6
70-538	19/32 (0.594)	3-1/8	1/2	6
70-539	39/64 (0.609)	3-1/8	1/2	6
70-540	5/8 (0.625)	3-1/8	1/2	6
70-541	41/64 (0.641)	3-1/8	1/2	6
70-542	21/32 (0.656)	3-1/8	1/2	6
70-543	43/64 (0.672)	3-1/8	1/2	6
70-544	11/16 (0.688)	3-1/8	1/2	6
70-545	45/64 (0.703)	3-1/8	1/2	6
70-546	23/32 (0.719)	3-1/8	1/2	6
70-547	47/64 (0.734)	3-1/8	1/2	6
70-548	3/4 (0.750)	3-1/8	1/2	6
70-549	49/64 (0.766)	3-1/8	1/2	6
70-550	25/32 (0.781)	3-1/8	1/2	6
70-551	51/64 (0.797)	3-1/8	1/2	6
70-552	13/16 (0.813)	3-1/8	1/2	6
70-553	53/64 (0.828)	3-1/8	1/2	6
70-554	27/32 (0.844)	3-1/8	1/2	6
70-555	55/64 (0.859)	3-1/8	1/2	6
70-556	7/8 (0.875)	3-1/8	1/2	6
70-557	57/64 (0.891)	3-1/8	1/2	6
70-558	29/32 (0.906)	3-1/8	1/2	6
70-559	59/64 (0.922)	3-1/8	1/2	6
70-560	15/16 (0.938)	3-1/8	1/2	6

FRACTIONAL DRILLS (CONT.)

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
70-561	61/64 (0.953)	3-1/8	1/2	6
70-562	31/32 (0.969)	3-1/8	1/2	6
70-563	63/64 (0.984)	3-1/8	1/2	6

LETTER DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
70-600	A (0.234)	2-5/8	0.234	3-7/8
70-601	B (0.238)	2-3/4	0.238	4
70-602	C (0.242)	2-3/4	0.242	4
70-603	D (0.246)	2-3/4	0.246	4
70-604	E (0.250)	2-3/4	0.250	4
70-605	F (0.257)	2-7/8	0.257	4-1/8
70-606	G (0.261)	2-7/8	0.261	4-1/8
70-607	H (0.266)	2-7/8	0.266	4-1/8
70-608	I (0.272)	2-7/8	0.272	4-1/8
70-609	J (0.277)	2-7/8	0.277	4-1/8
70-610	K (0.281)	2-15/16	0.281	4-1/4
70-611	L (0.291)	2-15/16	0.291	4-1/4
70-612	M (0.295)	3-1/16	0.295	4-3/8
70-613	N (0.302)	3-1/16	0.302	4-3/8
70-614	O (0.316)	3-3/16	0.316	4-1/2
70-615	P (0.323)	3-5/16	0.323	4-5/8
70-616	Q (0.332)	3-7/16	0.332	4-3/4
70-617	R (0.339)	3-7/16	0.339	4-3/4
70-618	S (0.348)	3-1/2	0.348	4-7/8
70-619	T (0.358)	3-1/2	0.358	4-7/8
70-620	U (0.368)	3-5/8	0.368	5
70-621	V (0.377)	3-5/8	0.377	5
70-622	W (0.386)	3-3/4	0.386	5-1/8
70-623	X (0.397)	3-3/4	0.397	5-1/8
70-624	Y (0.404)	3-7/8	0.404	5-1/4
70-625	Z (0.413)	3-15/16	0.413	5-1/4

WIRE DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
70-630	1 (0.228)	2-5/8	0.228	3-7/8
70-631	2 (0.221)	2-5/8	0.221	3-7/8
70-632	3 (0.213)	2-1/2	0.213	3-3/4
70-633	4 (0.209)	2-1/2	0.209	3-3/4
70-634	5 (0.206)	2-1/2	0.206	3-3/4
70-635	6 (0.204)	2-1/2	0.204	3-3/4
70-636	7 (0.201)	2-7/16	0.201	3-5/8
70-637	8 (0.199)	2-7/16	0.199	3-5/8
70-638	9 (0.196)	2-7/16	0.196	3-5/8
70-639	10 (0.194)	2-7/16	0.194	3-5/8
70-640	11 (0.191)	2-5/16	0.191	3-1/2
70-641	12 (0.189)	2-5/16	0.189	3-1/2
70-642	13 (0.185)	2-5/16	0.185	3-1/2

METRIC DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
70-643	14 (0.182)	2-3/16	0.182	3-3/8
70-644	15 (0.180)	2-3/16	0.180	3-3/8
70-645	16 (0.177)	2-3/16	0.177	3-3/8
70-646	17 (0.173)	2-3/16	0.173	3-3/8
70-647	18 (0.170)	2-1/8	0.170	3-1/4
70-648	19 (0.166)	2-1/8	0.166	3-1/4
70-649	20 (0.161)	2-1/8	0.161	3-1/4
70-650	21 (0.159)	2-1/8	0.159	3-1/4
70-651	22 (0.157)	2	0.157	3-1/8
70-652	23 (0.154)	2	0.154	3-1/8
70-653	24 (0.152)	2	0.152	3-1/8
70-654	25 (0.150)	1-7/8	0.150	3
70-655	26 (0.147)	1-7/8	0.147	3
70-656	27 (0.144)	1-7/8	0.144	3
70-657	28 (0.141)	1-3/4	0.141	2-7/8
70-658	29 (0.136)	1-3/4	0.136	2-7/8
70-659	30 (0.129)	1-5/8	0.129	2-3/4
70-660	31 (0.120)	1-5/8	0.120	2-3/4

METRIC DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
70-714	3.00 (0.118)	41	3.00	70
70-715	3.50 (0.138)	44	3.50	73
70-716	4.00 (0.157)	54	4.00	83
70-717	4.50 (0.177)	56	4.50	86
70-718	5.00 (0.197)	62	5.00	92
70-719	5.50 (0.217)	64	5.50	95
70-720	6.00 (0.236)	70	6.00	102
70-721	6.50 (0.256)	73	6.50	105
70-722	7.00 (0.276)	73	7.00	105
70-723	7.50 (0.295)	78	7.50	111
70-724	8.00 (0.315)	81	8.00	114
70-725	8.50 (0.335)	87	8.50	121
70-726	9.00 (0.354)	89	9.00	124
70-727	9.50 (0.374)	92	9.50	127
70-728	10.00 (0.394)	95	10.00	130
70-729	10.50 (0.413)	98	10.50	133
70-730	11.00 (0.433)	103	11.00	140
70-731	11.50 (0.453)	106	11.50	143
70-732	12.00 (0.472)	111	12.00	149
70-733	12.50 (0.492)	114	12.50	152
70-734	13.00 (0.512)	114	13.00	152
70-735	13.50 (0.531)	122	13.50	168
70-736	14.00 (0.551)	122	14.00	168
70-737	14.50 (0.571)	122	14.50	168
70-738	15.00 (0.591)	132	15.00	181
70-739	15.50 (0.610)	132	15.50	181
70-740	16.00 (0.630)	132	16.00	181
70-741	16.50 (0.650)	132	16.50	181
70-742	17.00 (0.669)	143	17.00	194
70-743	17.50 (0.689)	143	17.50	194

72-000

Through Hole | Brad Point

Solid Carbide Boring Bits

Two style of tools are available in this series. The brad point drill is designed to cut blind holes and produce a clean edge on the top surface. The 60° through drill is designed to produce through holes while providing clean edges on both sides.

Usage Wood

Material SW HW CW

See Selection Guide - pg. 2 - 12

Hinge

BRAD POINT - designed to produce a blind hole while preventing fraying on the top edge.

RIGHT HAND ROTATION

Part Number	Cutting DIA	SHK DIA	OAL	Part Number	Cutting DIA	SHK DIA	OAL
72-001	3	10	57	72-021	3	10	70
72-005	5	10	57	72-025	5	10	70
72-009	6	10	57	72-029	6	10	70
72-013	8	10	57	72-033	8	10	70

LEFT HAND ROTATION

Part Number	Cutting DIA	SHK DIA	OAL	Part Number	Cutting DIA	SHK DIA	OAL
72-002	3	10	57	72-022	3	10	70
72-006	5	10	57	72-026	5	10	70
72-010	6	10	57	72-030	6	10	70
72-014	8	10	57	72-034	8	10	70

HINGE BIT - This 35mm carbide tipped bit is designed to produce a flat bottom hole with clean edges for hinge mounting.

Part Number	Cutting DIA	SHK DIA	OAL
72-097	35	10	70

THROUGH HOLE (60° POINT) - produces a through hole and reduces fraying on the entry and exit edges.

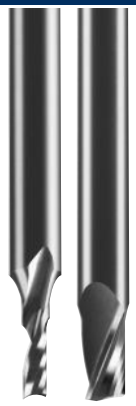
RIGHT HAND ROTATION

Part Number	Cutting DIA	SHK DIA	OAL	Part Number	Cutting DIA	SHK DIA	OAL
72-053	3	10	57	72-075	3	10	70
72-057	5	10	57	72-079	5	10	70
72-061	6	10	57	72-083	6	10	70
72-065	8	10	57	72-087	8	10	70

LEFT HAND ROTATION

Part Number	Cutting DIA	SHK DIA	OAL	Part Number	Cutting DIA	SHK DIA	OAL
72-054	3	10	57	72-076	3	10	70
72-058	5	10	57	72-080	5	10	70
72-062	6	10	57	72-084	6	10	70
72-066	8	10	57	72-088	8	10	70

77-000



Single Flute - Solid Carbide Top Loading Router Bit

Designed to produce fast, clean cuts in plastic and aluminum.

Usage Plastic and aluminum

Material SP HP A

See Selection Guide - pg. 2 - 12

77-000 SERIES - PLASTIC

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
77-002	1/16	5/16	11/64	6-1/2
77-004	1/8	5/16	11/64	6-1/2
77-012	1/16	5/16	1/4	6-1/2
77-014	1/8	5/16	1/4	6-1/2
77-016	3/16	3/8	1/4	6-1/2
77-018	1/4	3/8	1/4	6-1/2

1/8" shank tools need to be custom ordered

77-025 SERIES - ALUMINUM

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
77-025	1/16	5/16	11/64	6-1/2
77-027	1/8	5/16	11/64	6-1/2
77-033	1/16	5/16	1/4	6-1/2
77-035	1/8	5/16	1/4	6-1/2
77-037	3/16	3/8	1/4	6-1/2
77-039	1/4	3/8	1/4	6-1/2

77-100

Double or Three Flute Solid Carbide Taper Tools

The taper tools are available with a variety of taper angles and come standard with a ball nose point. The tools are designed to produce a good edge finish in a wide variety of materials.

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL	Angle Per Side	Radius	Flutes
77-102	1/8	1-1/2	1/4	3	1°	1/16	3
77-104	1/8	1	1/4	3	3°	1/16	3
77-106	1/8	3/4	1/4	3	5°	1/16	3
77-108	1/8	1/2	1/4	3	7°	1/16	3
77-112	1/4	2	1/2	4	3°	1/8	2
77-114	1/4	1-3/8	1/2	4	5°	1/8	2
77-116	1/4	1	1/2	4	7°	1/8	2

Custom tools can be made upon request

Usage Wood, plastic and aluminum

Material SW HW SP HP A

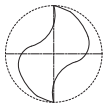
See Selection Guide - pg. 2 - 12

81-100

Double Flute - Solid Carbide Spiral Extrusion Cutters

Designed for reduced vibration producing smoother finish cuts. Extended reach during side thinning and gage reduction. Longer tool life to reduce tool changes.

Usage Extrusion and sheet aluminum. Optimized for use on multi-head extrusion mills CNC mills and routers



Material A See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	ERL	SHK DIA	OAL	Helix & DIR	Flutes	CNR RAD Chamfer	Aluminum Condition	Machining Environment
Tolerance	+.002	±.03		+.0000 -.0005	±.03					
81-103	5/16	13/16	-	1/2	3	10°RH	2	.02 x 45°	C	Wet
81-111	21/64	3/4	-	1/2	3	10°RH	2	.02 x 45°	C	Wet
81-104	3/8	13/16	-	1/2	3	10°RH	2	.02 x 45°	O	Wet

83-100

Solid Carbide Drills

Designed as a general purpose drill capable of cutting low tensile strength materials. The 118° point allows for easy penetration into the work piece. We do not recommend using these drills in steel.

Usage Aluminum, Brass, Bronze, Cast Iron

Material A See Selection Guide - pg. 2 - 12

FRACTIONAL DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
83-100	1/64 (.016)	1/4	.016	1
83-101	1/32 (.031)	3/8	.031	1-1/8
83-102	3/64 (.047)	3/4	.047	1-1/2
83-103	1/16 (.063)	3/4	.063	1-1/2
83-104	5/64 (.078)	7/8	.078	1-3/4
83-105	3/32 (.094)	1	.094	2
83-106	7/64 (.109)	1-1/4	.109	2-1/4
83-107	1/8 (.125)	1-1/4	.125	2-1/4
83-108	9/64 (.141)	1-3/8	.141	2-1/2
83-109	5/32 (.156)	1-3/8	.156	2-1/2
83-110	11/64 (.172)	1-5/8	.172	2-3/4
83-111	3/16 (.188)	1-5/8	.188	2-3/4
83-112	13/64 (.203)	1-3/4	.203	3
83-113	7/32 (.219)	1-3/4	.219	3
83-114	15/64 (.234)	2	.234	3-1/4
83-115	1/4 (.250)	2	.250	3-1/4
83-116	17/64 (.266)	2-1/8	.266	3-1/2
83-117	9/32 (.281)	2-1/8	.281	3-1/2
83-118	19/64 (.297)	2-3/8	.297	3-3/4
83-119	5/16 (.313)	2-3/8	.313	3-3/4
83-120	21/64 (.328)	2-1/2	.328	4
83-121	11/32 (.344)	2-1/2	.344	4
83-122	23/64 (.359)	2-1/2	.359	4
83-123	3/8 (.375)	2-3/4	.375	4-1/4
83-124	25/64 (.391)	2-7/8	.391	4-1/2
83-125	13/32 (.406)	2-7/8	.406	4-1/2
83-126	27/64 (.422)	2-7/8	.422	4-1/2
83-127	7/16 (.438)	2-7/8	.438	4-1/2
83-128	29/64 (.453)	3	.453	4-3/4
83-129	15/32 (.469)	3	.469	4-3/4
83-130	31/64 (.484)	3	.484	4-3/4
83-131	1/2 (.500)	3	.500	4-3/4

LETTER DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
83-155	F (.257)	2	.257	3-1/4
83-156	G (.261)	2-1/8	.261	3-1/2
83-157	H (.266)	2-1/8	.266	3-1/2
83-158	I (.272)	2-1/8	.272	3-1/2
83-159	J (.277)	2-1/8	.277	3-1/2
83-160	K (.281)	2-1/8	.281	3-1/2
83-161	L (.291)	2-1/8	.291	3-1/2
83-162	M (.295)	2-3/8	.295	3-3/4
83-163	N (.302)	2-3/8	.302	3-3/4
83-164	O (.316)	2-3/8	.316	3-3/4
83-165	P (.323)	2-3/8	.323	3-3/4
83-166	Q (.332)	2-1/2	.332	4

LETTER DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
83-167	R (.339)	2-1/2	.339	4
83-168	S (.348)	2-1/2	.348	4
83-169	T (.358)	2-1/2	.358	4
83-170	U (.368)	2-3/8	.368	4-1/4
83-171	V (.377)	2-3/8	.377	4-1/4
83-172	W (.386)	2-7/8	.386	4-1/2
83-173	X (.397)	2-7/8	.397	4-1/2
83-174	Y (.404)	2-7/8	.404	4-1/2
83-175	Z (.413)	2-7/8	.413	4-1/2

NUMBER DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
83-176	1 (.228)	1-3/4	.228	3
83-177	2 (.221)	1-3/4	.221	3
83-178	3 (.213)	1-3/4	.213	3
83-179	4 (.209)	1-3/4	.209	3
83-180	5 (.206)	1-3/4	.206	3
83-181	6 (.204)	1-3/4	.204	3
83-182	7 (.201)	1-3/4	.201	3
83-183	8 (.199)	1-3/4	.199	3
83-184	9 (.196)	1-3/4	.196	3
83-185	10 (.194)	1-5/8	.194	2-3/4
83-186	11 (.191)	1-5/8	.191	2-3/4
83-187	12 (.189)	1-5/8	.189	2-3/4
83-188	13 (.185)	1-5/8	.185	2-3/4
83-189	14 (.182)	1-5/8	.182	2-3/4
83-190	15 (.180)	1-5/8	.180	2-3/4
83-191	16 (.177)	1-5/8	.177	2-3/4
83-192	17 (.173)	1-5/8	.173	3/4
83-193	18 (.170)	1-5/8	.170	2-3/4
83-194	19 (.166)	1-5/8	.166	2-3/4
83-195	20 (.161)	1-5/8	.161	2-1/2
83-196	21 (.159)	1-3/8	.159	2-1/2
83-197	22 (.157)	1-3/8	.157	2-1/2
83-198	23 (.154)	1-3/8	.154	2-1/2
83-199	24 (.152)	1-3/8	.152	2-1/2
83-200	25 (.150)	1-3/8	.150	2-1/2
83-201	26 (.147)	1-3/8	.147	2-1/2
83-202	27 (.144)	1-3/8	.144	2-1/2
83-203	28 (.141)	1-3/8	.141	2-1/2
83-204	29 (.136)	1-3/8	.136	2-1/2
83-205	30 (.129)	1-1/4	.129	2-1/4
83-206	31 (.120)	1-1/4	.120	2-1/4
83-207	32 (.116)	1-1/4	.116	2-1/4
83-208	33 (.113)	1-1/4	.113	2-1/4
83-209	34 (.111)	1-1/4	.111	2-1/4
83-210	35 (.110)	1-1/4	.110	2-1/4

NUMBER DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
83-211	36 (.107)	1-1/4	.107	2-1/4
83-212	37 (.104)	1-1/4	.104	2-1/4
83-213	38 (.102)	1-1/4	.102	2-1/4
83-214	39 (.100)	1-1/4	.100	2-1/4
83-215	40 (.098)	1	.098	2
83-216	41 (.096)	1	.096	2
83-217	42 (.094)	1	.094	2
83-218	43 (.089)	1	.089	2
83-219	44 (.086)	1	.086	2
83-220	45 (.082)	7/8	.082	1-3/4
83-221	46 (.081)	7/8	.081	1-3/4
83-222	47 (.079)	7/8	.079	1-3/4
83-223	48 (.076)	7/8	.076	1-3/4
83-224	49 (.073)	7/8	.073	1-3/4
83-225	50 (.070)	7/8	.070	1-3/4
83-226	51 (.067)	3/4	.067	1-1/2
83-227	52 (.064)	3/4	.064	1-1/2
83-228	53 (.060)	3/4	.060	1-1/2
83-229	54 (.055)	3/4	.055	1-1/2
83-230	55 (.052)	3/4	.052	1-1/2
83-231	56 (.047)	3/4	.047	1-1/2
83-232	57 (.043)	3/4	.043	1-1/2
83-233	58 (.042)	3/4	.042	1-1/2
83-234	59 (.041)	3/4	.041	1-1/2
83-235	60 (.040)	3/4	.040	1-1/2
83-236	61 (.039)	1/2	.039	1-1/4
83-237	62 (.038)	1/2	.038	1-1/4
83-238	63 (.037)	1/2	.037	1-1/4
83-239	64 (.036)	1/2	.036	1-1/4
83-240	65 (.035)	3/8	.035	1-1/8
83-241	66 (.033)	3/8	.033	1-1/8
83-242	67 (.032)	3/8	.032	1-1/8
83-243	68 (.031)	3/8	.031	1-1/8
83-244	69 (.029)	5/16	.029	1
83-245	70 (.028)	5/16	.028	1

METRIC DRILLS

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
83-258	1.50 (.059)	3/4	1.50	1-1/2
83-259	2.00 (.079)	7/8	2.00	1-3/4
83-260	2.50 (.098)	1	2.50	2
83-261	3.00 (.118)	1-1/4	3.00	2-1/4
83-262	3.50 (.138)	1-3/8	3.50	2-1/2
83-263	4.00 (.157)	1-3/8	4.00	2-1/2
83-264	4.50 (.177)	1-5/8	4.50	2-3/4
83-265	5.00 (.197)	1-3/4	5.00	3
83-266	5.50 (.217)	1-3/4	5.50	3
83-267	6.00 (.236)	2	6.00	3-1/4
83-268	6.50 (.256)	2	6.50	3-1/4
83-269	7.00 (.276)	2-1/8	7.00	3-1/2
83-270	7.50 (.295)	2-3/8	7.50	3-3/4
83-271	8.00 (.315)	2-3/8	8.00	3-3/4
83-272	8.50 (.335)	2-1/2	8.50	4
83-273	9.00 (.354)	2-1/2	9.00	4
83-274	9.50 (.374)	2-3/4	9.50	4-1/4
83-275	10.00 (.394)	2-7/8	10.00	4-1/2
83-276	10.50 (.413)	2-7/8	10.50	4-1/2
83-277	11.00 (.433)	2-7/8	11.00	4-1/2
83-278	11.50 (.453)	3	11.50	4-3/4
83-279	12.00 (.472)	3	12.00	4-3/4

Double Flute - Solid Carbide AlTiN Coated Upcut Spiral for Stainless Steel

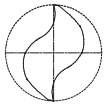
83-300

NEW

Special cutting geometry is required to cut stainless steel and achieve decent tool life. Onsrud has developed a line of cutters which are capable of cutting stainless steel.

Usage Stainless Steel

Material M See Selection Guide - pg. 2 - 12



Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
83-305AlTiN	1/8	1/4	1/8	2
83-310AlTiN	3/16	3/8	3/16	2-1/2
83-315AlTiN	1/4	3/8	1/4	2-1/2
83-320AlTiN	3/8	1/2	3/8	3

CUTTING PARAMETERS

Part Number	RPM	Feedrate	Depth of Cut
83-305AlTiN	18,000	18 IPM	.012
83-310AlTiN	12,000	20 IPM	.020
83-315AlTiN	9,000	25 IPM	.030
83-320AlTiN	6,010	27 IPM	.045

Solid Carbide Kevlar Drill

86-000

This tool is designed to drill Aramid materials and produce a clean hole. The specific point design shears the aramid fibers eliminating whiskers or delamination.

Usage Aramid materials

Material CP See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
86-002	#39 (.0995)	1-1/4	0.099	2-1/4
86-004	1/8	1-1/4	1/8	2-1/4
86-006	#30 (.129)	1-1/4	0.129	2-1/4
86-008	#26 (.147)	1-3/8	0.147	2-1/2
86-010	3/16	1-5/8	3/16	2-3/4
86-012	1/4	2	1/4	3-1/4
86-014	5/16	2-3/8	5/16	3-3/4
86-016	3/8	2-3/4	3/8	4-1/4
86-018	7/16	2-7/8	7/16	4-1/2
86-020	1/2	3	1/2	4-3/4

Diamond Film Coated Solid Carbide Parabolic Drill

86-100

NEW

Designed to produce a clean, delamination free hole in composite materials. The diamond film coated parabolic drill is an ecenomical solution to PCD composite drills.

Usage Carbon fiber and other composite materials

Material CP See Selection Guide - pg. 2 - 12

Part Number	Cutting DIA	Flute LGTH	SHK DIA	OAL
86-102	0.100	1	1/4	3
86-106	0.129	1	1/4	3
86-110	0.147	1	1/4	3
86-114	0.192	1	1/4	3
86-118	0.251	1	1/4	3
86-122	0.313	1	5/16	3
86-126	0.376	1	3/8	3
86-130	0.502	1	1/2	3

91-000
91-100

Spoilboard Surfacing Cutters

Insert Style

Carbide Tipped

Designed for surfacing MDF, particalboard and balsa core where “flow through” or “high flow” fixturing is employed using large capacity vacuum pumps. This method of surfacing spoilboards allows for much faster table planing.

Usage Aluminum, plastics and composite wood

Material SP HP A CW

See Selection Guide - pg. 2 - 12

STRAIGHT

Part Number	Cutting DIA	SHK DIA	SHK LGTH	# of Wings
91-000*	1-1/4	1/2	1-1/2	2
91-102	2-1/2	1/2	2	2
91-106	4	3/4	2-1/4	3

* = Carbide Tipped
Note: 90-002, 90-004, 90-006 & 90-008 use 91-125 insert and 91-130 screw
90-014 use 91-127 insert and 91-130 screw

UP-SHEAR

Part Number	Cutting DIA	SHK DIA	SHK LGTH	# of Wings
91-104	2-1/2	1/2	2	2
91-108	4	3/4	2-1/4	3
91-112*	2-1/2	1/2	2	3
91-114*	4	3/4	2-1/4	3

* Radius edges excellent for plastic and aluminum surfacing.

These tools are dynamically balanced and approved for use on CNC routers. Max RPM 18,000 1/8” Depth of cut MAX.
** DOC = Maximum Depth of Cut Proper running speed for*

Spoilboard Surfaces: 2-1/2” diameter tools should be fed at 200-600 IPM at 12,000-16,000 RPM. 4” diameter tools should be fed at 200-600 IPM at 12,000-14,000 RPM.
** Do Not Exceed 1/8” Depth Per Pass*

Part Number	Description
91-125	Insert 10/pk
91-127	Radius Insert 10/pk
91-130	Screw M4 (Old Version)
91-133	Screw M5
91-136	Wrench

ROUTER SELECTION GUIDE

The selection guide on pages 2 - 12 is a place to start making a bit selection or a place to check your current bit selection. You should try several tools and more than one tool geometry before you settle on the best tool for you specific router, set-up, fixturing and other environmental conditions.

How To Order – Onsrud Cutter products are sold solely through industrial distribution. You may place an order through the authorized distributor in you market area. Should you wish the name of that distributor, please call Onsrud Cutter.

Guarantee – Onsrud Cutter products are guaranteed against defects in material and quality of manufacture when used in the proper manner. Onsrud Cutter will repair or replace tools, which have been authorized for return, if upon inspection such tools are found to be defective due to material or manufacture.

Router Laboratory – Customers, as a routine, send us panels (2’ x 2’) with router and feed specifications several weeks prior to the start of a new run. (We are able to duplicate most production environments in the Router Laboratory.) Armed with material, router type, spindle speed, feed rate, set up and type of cut to be made, Onsrud Cutter can make a specific tool recommendation for test and evaluation in your operational environment. Should you have difficult-to-cut material or should you wish to verify your current tool selection, call the Onsrud Cutter Engineering Department and arrange for a Router Laboratory test.

Technical Data

TOOL SELECTION

TOOL MATERIAL

- Solid Carbide: Primarily used in CNC operations. Material provides best rigidity and long tool life.
- Carbide Tipped: Incorporates the wear resistance of carbide and the toughness of a HSS body-mainly hand held.
- HSS: Primarily used in hand routing. Material provides a tough body and sharper cutting edge. Good in CNC.

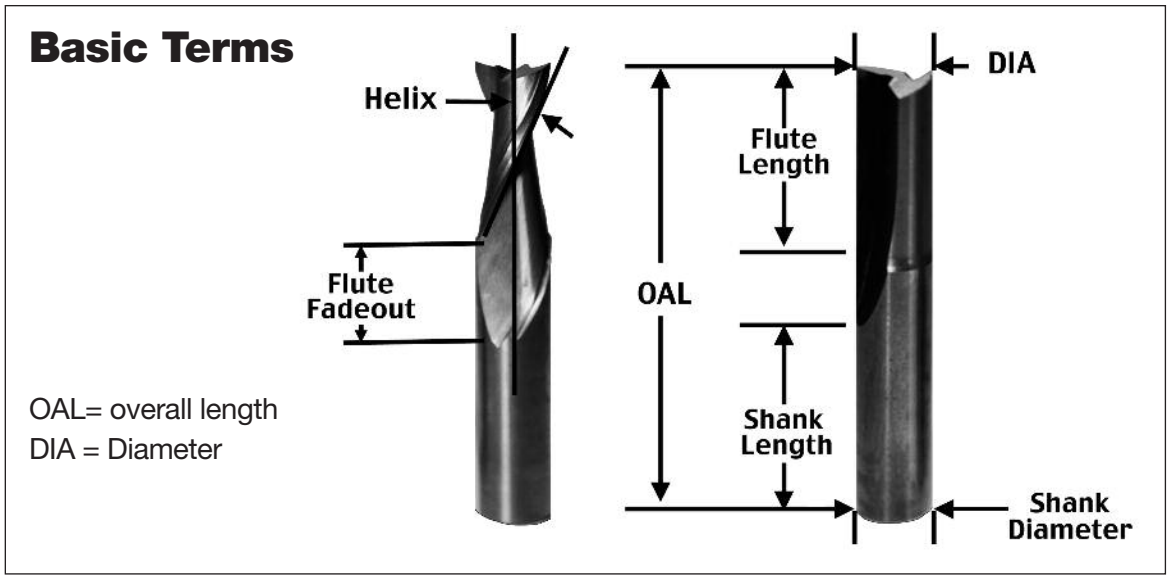
FLUTE GEOMETRY

- Straight flute: Offers a neutral cutting action - highest force
- Upcut flute: Provides the best surface finish and allows for good chip extraction. May cause part lifting if vacuum or fixturing is not sufficient.
- Downcut flute: Provides a downward force which helps eliminate part lifting. Chip rewelding MAY occur if there is no space below the part for chip expansion.
- Compression: Used for laminated materials, produces a good top and bottom finish on the part.

NUMBER OF FLUTES

- Single Flute: Allows for larger chiploads in softer materials
- Double Flute: Allows for better part finish in harder materials.
- Multiple Flutes: Allows for an even better part finish in harder materials.

Note: As the number of cutting edges increase, your feed rate should increase to prevent burning and premature tool dulling.



OPTIMIZING SPEED AND FEEDS

1. Start off using the recommended chipload and RPM for the material you are cutting.
2. Increase the feedrate until the part finish starts to decrease or you risk moving the part off the vacuum. Decrease the feed by 10%.
3. Next decrease your RPM by a set increment until your surface finish deteriorates again. Once this happens increase your RPM until the finish is acceptable.
4. You have now optimized your speed and feed by taking the largest chip possible.

Note: This should be done in the first sheet of material to prevent tool dulling due to excessive heat.

TOOL HEAT

If a feed rate is too low, heat will be generated causing the cutting edge to break down and dull quickly. To check this, run a nest of parts and stop the spindle. When the spindle has stopped rotating, carefully feel the tool's temperature. It should be at or near room temperature. If the tool is hot, review "Optimizing Speed and Feeds".

Technical Data

FIXTURING METHODS

FLOW THROUGH VACUUM

This style uses LDF (Low Density Fiberboard) or MDF (Medium Density Fiberboard) as a sacrificial surface for sheet material to be cut on. The porous nature of LDF or MDF allows vacuum to pass through allowing the material to be held in place for machining. As parts are cut out of the sheet material, vacuum loss starts to occur from the slot produced by the cutting tool. This can lead to part lifting or movement especially in small parts. Cutter diameter will also influence part movement. A 1/2 diameter tool will exert 25% more lateral pressure than a 3/8 diameter tool.

When cutting small parts in sheet material, one may want to consider tab or skin cutting to prevent part movement.

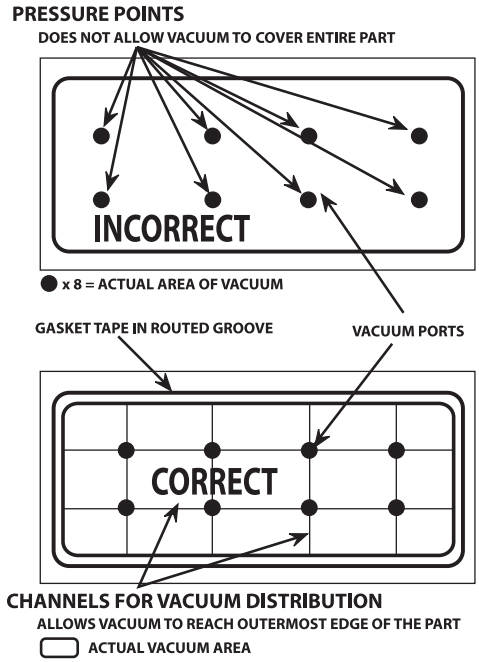
DEDICATED SPOILBOARD

Dedicated spoilboards are used for reoccurring production runs where optimal cycle times are needed. This work holding method creates vacuum chambers in the sacrificial board specifically to the shape of the parts being cut. This elimination of vacuum loss relates to improved cycle times and part finish.

STEPS TO CREATE A DEDICATED SPOILBOARD:

1. Surface both sides of your MDF board
2. Lay out the part pattern on the MDF and determine quantity that will fit.
3. Cut the part profile into the MDF board using a larger diameter tool than would normally cut the part. Make your slot depth 1 to 1.5 times the cutter diameter.
4. A gasket groove must be cut next inside the part profile to create a vacuum seal. The groove should be 1/2 the gasket material thickness to allow for proper compression.
5. A grid pattern must then be cut inside the gasket groove to distribute the vacuum evenly through out the vacuum area.
6. Drill holes through out the pattern in the intersections of the vacuum grid until there is no resistance on your vacuum gage on the machine table.
7. Seal the board using rubberized coatings, polyurethane sealers or a sanding sealer to prevent vacuum from passing through the board in unwanted areas.
8. Apply the gasket tape.

Proper Spoilboard Techniques



This operations sounds time consuming. It will be for your first board. Once you become familiar making these fixtures, you will make up for it in your cycle time reductions and part finish. A lot of headaches and problems can be resolved by using the proper work holding.

RAISED SPOILBOARD

This is generally used where secondary operations are needed and the spoilboard will interfere with the secondary tool.
Raised spoilboards are another type of fixturing that works well for routing parts such as circles from squares where the scrap or off-fall is of such a size to be potentially harmful to the tool and or operator when it is cut free. A raised spoilboard should make sure the off-fall would not interfere with the first and second tool and that the off-fall would be free and clear of the tool path.

SURFACING SPOILBOARDS

When creating new fixtures or using a new MDF sheet, the spoilboard must be surfaced to level the board to the machine table. This consists using a large diameter cutter (OC 91-100 series) to quickly level the entire surface.

The following benefits will be achieved by surfacing your spoilboard:

- Leveling material to get consistent cuts.
- Remove grooves caused by routing.
- Reduce vacuum loss due to clogged pores at the material surface due to dust and chips.
- Preventing material warpage caused by humidity in summer time.

Technical Data

COLLETING

COLLET LIFE SPAN

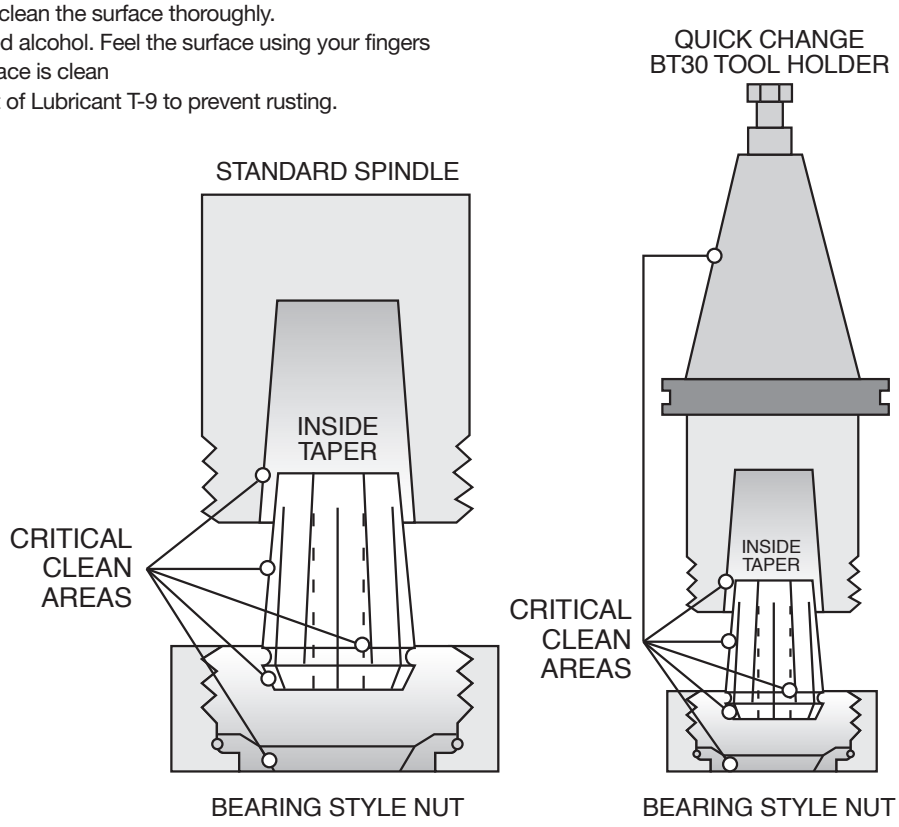
Collets have a life span of 3 months if used 8 hours a day. Replacing the collets will ensure your operation runs consistently and prevents tool breakage. When inserting a tool into the collet make sure the flute fadeout does not enter the collet. This will cause run out and potentially lead to tool breakage. To ensure proper clamping the tool shank should fill, at the minimum, 80% of the depth of the collet. If this can not be achieved, use a collet life plug to ensure a proper clamping effect.

COLLET MAINTENANCE

Cleaning is an essential part of collet maintenance. As material is cut it causes the collet, tool holder, collet nut and spindle to become dirty. This causes your tool to cut in an elliptical fashion which will decrease tool life and cause inconsistency in your operation. Collets, tool holder, and collet nut should be cleaned daily using the Rust Free solvent and a brass brush (OC series 33-21 and 33-10). Refer to the critical areas diagram to see which surfaces must be clean.

CLEANING INSTRUCTIONS

1. Spray the cleaner on the surface and allow it to soak for a minute
2. Use a brass brush to clean the surface thoroughly.
3. Rinse off using distilled alcohol. Feel the surface using your fingers to make sure the surface is clean
4. Apply a small amount of Lubricant T-9 to prevent rusting.



TOOL BREAKAGE

If a condition arises where multiple tools should break, follow these steps to solve your problem:

1. Are you using the proper tool for the job?
2. Make sure your collets and tool holders are clean and the tool is colleted properly.
3. Check your speed and feed (is your tool hot?)
4. Is your depth of cut too excessive for the material you're cutting?
5. Do you have any part movement?
6. Do you have ample part hold down?
7. Stop running parts and check with your distributor or Onsrud's Technical Support.

If you have to contact your distributor or Technical Support, have the following information:

1. Machine being used.
2. Material being cut.
3. Part number of tool along with the batch number which is below the part number.
4. Speed / Feed / Depth of cut.
5. Where did the tool break (flute, shank, or in the collet)?
6. How long did the tool work before it broke?
7. Have you done this operation in the past using this tool?

SW Soft Wood Cutting Data

APPLICATION	GOOD	BETTER	BEST
Single Pass	82-200	60-100	52-200/57-200
Roughing	52-700	60-000	60-850
Finishing		52-200/57-200	60-200

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter

Series	Cut	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
10-00	1 x D	.004-.006	.004-.006	.005-.007				.007-.009		.008-.010												
15-00	2											.017-.019										
37-50/60	1/2 CED					.001-.003		.002-.004		.003-.005		.003-.005			.005-.007		.007-.009					
37-80	1 x D																.004-.006			.004-.006*		.004-.006**
40-50	1 1/2											.003-.005										
40-000	1 x D			.002-.004	.002-.004	.003-.005		.004-.006	.004-.006	.005-.007												
40-100	1 x D			.005-.007		.005-.007	.005-.007	.006-.008	.006-.008	.007-.009		.008-.010			.010-.012							
52-200/ 57-200	1 x D			.006-.008	.006-.008	.006-.008	.006-.008	.007-.009	.007-.009	.008-.010	.008-.010	.009-.011	.009-.011	.010-.012	.011-.013							
52-400/ 57-400	1 x D				.006-.008	.006-.008		.007-.009	.007-.009	.008-.010		.009-.011										
52-900	1 x D							.007-.009		.008-.010		.009-.011										
56-200	1 x D			.004-.006	.004-.006	.005-.007	.005-.007	.006-.008	.006-.008	.007-.009		.008-.010			.010-.012							
57-900	1 x D							.007-.009		.008-.010		.009-.011										
60-000 (LH)	1 x D									.013-.015		.015-.017		.017-.019	.019-.021							
60-000 (HH)	1 x D									.016-.018		.018-.020		.020-.022	.022-.024							
60-090	1 x D													.005-.007								
60-100	1 x D			.011-.013		.013-.015		.015-.017		.017-.019		.019-.021		.021-.023								
60-100DE	1 x D							.018-.020		.020-.022		.022-.024		.024-.026	.026-.028							
60-1003E	1 x D									.017-.019		.019-.021										
60-100C	1 x D									.024-.026		.026-.028		.028-.030	.030-.032							
60-200	1 x D							.005-.007		.006-.008		.007-.009			.008-.010							
60-300	1 x D									.024-.026		.026-.028		.028-.030	.030-.032							
60-350	1 x D									.017-.019		.019-.021			.021-.023							
60-500/ 500M	1 x D											.015-.017		.017-.019	.019-.021							
60-600	1 x D											.019-.021			.023-.025							
60-700	1 x D											.019-.021		.021-.023	.023-.025							
60-800	1 x D									.017-.019		.019-.021		.021-.023	.023-.025							
60-900	1 x D									.017-.019		.018-.020										
60-950	1 x D									.024-.026		.026-.028										
61-000	1 x D			.008-.010	.008-.010	.009-.011	.009-.011	.010-.012	.010-.012	.011-.013	.011-.013	.012-.014										
61-200	1 x D			.008-.010				.010-.012	.010-.012	.011-.013		.012-.014										
64-000/ 65-000	1 x D	.001-.003		.002-.004		.003-.006		.004-.006		.005-.007												
77-100 (DE)	1 x D			.003-.005																		
77-100 (3E)	1 x D							.005-.007														

* = 16,000 RPM
** = 15,000 RPM

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

HW Hard Wood Cutting Data

APPLICATION	GOOD	BETTER	BEST
Single Pass	52-700	52-200/57-200	60-300/60-350
Roughing	52-700	60-000	60-850
Finishing		60-300/60-350	60-200

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter

Series	Cut	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
12-00	1 x D			.002-.004	.002-.004		.003-.005	.003-.005		.004-.006	.005-.007	.005-.007				.010-.012						
37-50/60	1/2 CED					.002-.004		.002-.004		.002-.004		.003-.005			.005-.007		.007-.009					
37-80	1 x D																.004-.006			.004-.006*		.004-.006**
40-50	1 1/2											.003-.005										
40-000	1 x D			.006-.008	.006-.008	.007-.009		.008-.010	.008-.010	.009-.007		.010-.012										
40-100	1 x D			.004-.006		.005-.007	.005-.007	.005-.007	.006-.008	.006-.008		.007-.009			.009-.011							
48-000	1 x D					.004-.006		.005-.007	.005-.007	.005-.007		.006-.008		.007-.009	.008-.010	.009-.011	.010-.012	.011-.013	.012-.014	.013-.015	.014-.016	.015-.017
52-200/ 57-200	1 x D			.003-.005	.003-.005	.004-.006	.004-.006	.005-.007	.005-.007	.006-.008	.006-.008	.007-.009	.007-.008	.008-.010	.009-.011							
52-400/ 57-400	1 x D				.004-.006	.004-.006		.005-.007	.005-.007	.006-.008		.007-.009										
52-900	1 x D							.006-.008		.007-.009		.007-.009										
56-200	1 x D			.003-.005	.003-.005	.004-.006	.004-.006	.005-.007	.005-.007	.006-.008		.007-.009			.009-.011							
57-900	1 x D							.005-.007		.006-.008		.007-.009										
60-000 (LH)	1 x D									.013-.015		.014-.016		.016-.018	.017-.019							
60-000 (HH)	1 x D									.015-.017		.017-.019		.019-.021	.021-.023							
60-090	1 x D													.005-.007								
60-100	1 x D			.010-.012		.012-.014		.014-.016		.016-.018		.018-.020		.020-.022	.022-.024							
60-100DE	1 x D							.014-.016		.016-.018		.018-.020		.020-.022	.022-.024							
60-1003E	1 x D									.016-.018		.018-.020										
60-100C	1 x D									.019-.021		.021-.023		.023-.025	.025-.027							
60-500/ 500M	1 x D											.013-.015		.015-.017	.016-.018							
60-600	1 x D											.018-.020			.022-.024							
60-700	1 x D											.018-.020		.020-.022	.022-.024							
60-800	1 x D									.017-.019		.019-.021		.021-.023	.023-.025							
60-900	1 x D									.015-.017		.017-.019			.019-.021							
60-950	1 x D									.019-.021		.021-.023										
61-200	1 x D			.007-.009				.009-.011	.009-.011	.010-.012												
64-000/ 65-000	1 x D	.001-.003		.002-.004		.003-.005		.004-.006		.005-.007												
77-100 (DE)	1 x D			.003-.005																		
77-100 (3E)	1 x D							.005-.007														

* = 16,000 RPM
** = 15,000 RPM

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

CW | MDF Cutting Data

APPLICATION	GOOD	BETTER	BEST
Single Pass	52-200/57-200	60-300/60-350	60-100
Roughing		60-000	60-850
Finishing		60-300/60-350	60-200

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter

Series	Cut	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
13-50	1 x D											.013-.015			.016-.018							
37-50/60	1/2 CED					.001-.003		.001-.003		.002-.004		.003-.005			.005-.007		.007-.009					
37-80	1 x D																.004-.006			.004-.006*		.004-.006**
40-50	1 1/2											.003-.005										
47-00	1 x D															.004-.006			.004-.006	.004-.006		
48-000	1 x D					.004-.006		.005-.007	.005-.007	.005-.007		.006-.008		.006-.008	.007-.009	.008-.010	.009-.011					
48-700	1 x D							.005-.007		.005-.007		.006-.008		.006-.008	.007-.009		.009-.011					
52-200/ 57-200	1 x D			.005-.007	.005-.007	.006-.008	.006-.008	.006-.008	.006-.008	.007-.009	.007-.009	.008-.010	.008-.010	.009-.011	.009-.011							
52-400/ 57-400	1 x D				.003-.005	.004-.006		.005-.007	.005-.007	.006-.008		.008-.010	.009-.011	.010-.012	.011-.013	.012-.014						
52-900	1 x D							.006-.008		.007-.009		.008-.010										
56-200	1 x D			.003-.005	.003-.005	.004-.006	.004-.006	.005-.007	.005-.007	.006-.008		.007-.009			.009-.011							
57-900	1 x D							.006-.008		.007-.009		.008-.010										
60-000 (LH)	1 x D									.012-.014		.013-.015		.014-.016	.016-.018							
60-000 (HH)	1 x D									.017-.019		.018-.020		.020-.022	.023-.025							
60-090	1 x D													.004-.006								
60-100	1 x D			.010-.012		.010-.012		.013-.015		.014-.016		.016-.018		.017-.019	.019-.021							
60-100DE	1 x D							.013-.015		.014-.016		.016-.018		.018-.020	.019-.021							
60-1003E	1 x D									.014-.016		.016-.018			.018-.020							
60-100C	1 x D									.017-.019		.018-.020		.020-.022	.023-.025							
60-200	1 x D							.004-.006		.005-.007		.005-.007			.006-.008							
60-300	1 x D									.017-.019		.018-.020		.020-.022	.023-.025							
60-350	1 x D									.014-.016		.016-.018		.017-.019	.019-.021							
60-500/ 500M	1 x D											.014-.016		.016-.018	.018-.020							
60-600	1 x D											.020-.022		.022-.024	.024-.026							
60-700	1 x D											.020-.022		.022-.024	.024-.026							
60-800	1 x D									.017-.019		.019-.021		.021-.023	.023-.025							
60-900	1 x D									.017-.019		.019-.021										
60-950	1 x D									.017-.019		.018-.020										
61-200	1 x D			.007-.009		.008-.010		.009-.011	.009-.011	.010-.012		.011-.013										
62-200	1 x D			.010-.012		.011-.013		.012-.014	.012-.014	.013-.015		.014-.016										
64-000/ 65-000	1 x D	.001-.003		.002-.004		.003-.005		.004-.006		.005-.007												
68-100	1 x D									.008-.010		.012-.014		.015-.017	.018-.020							
77-100 (DE)	1 x D			.003-.005																		
77-100 (3E)	1 x D							.005-.007														

* = 16,000 RPM
** = 15,000 RPM

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

CW | Soft Plywood Cutting Data

APPLICATION	GOOD	BETTER	BEST
Single Pass	60-300/60-350	60-100	60-100C
Roughing	60-800	60-000	60-850
Finishing		60-300/60-350	60-200

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter																			
Series	Cut	1/16	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1-1/8	1-1/4	1-1/2	2
13-50	1 x D										.016-.018			.018-.020						
37-50/60	1/2 CED				.001-.003		.002-.004		.002-.004		.003-.005			.004-.006		.006-.008				
37-80	1 x D															.004-.006			.004-.006*	.004-.006**
40-50	1 1/2										.003-.005									
48-000	1 x D				.005-.007		.005-.007	.006-.008	.006-.008		.007-.009		.008-.010	.009-.011	.010-.012	.011-.013	.012-.014	.013 - .015		
48-700	1 x D						.005-.007				.007-.009			.009-.011		.011-.013				
56-200	1 x D		.003-.005	.003-.005	.004-.006	.004-.006	.005-.007	.005-.007	.006-.008		.007-.009			.009-.011						
60-000 (LH)	1 x D								.014-.016		.016-.018		.018-.020	.020-.022						
60-000 (HH)	1 x D								.017-.019		.019-.021		.021-.023	.023-.025						
60-090	1 x D												.003-.005							
60-100	1 x D		.013-.015		.014-.016		.015-.017		.016-.018		.018-.020		.020-.022	.022-.024						
60-100DE	1 x D						.017-.019		.019-.021		.021-.023		.023-.025	.025-.027						
60-1003E	1 x D								.020-.022		.022-.024			.024-026						
60-100C	1 x D								.022-.024		.024-.026		.026-.028	.028-.030						
60-300	1 x D								.022-.024		.024-.026		.026-.028	.028-.030						
60-350	1 x D								.020-.022		.022-.024		.024-.026	.026-.028						
60-500/ 500M	1 x D										.021-.023		.023-.025	.025-.027						
60-600	1 x D										.028-.030		.030-.032	.032-.034						
60-700	1 x D										.028-.030		.030-.032	.032-.034						
60-800	1 x D								.017-.019		.019-.021		.021-.023	.023-.025						
60-900	1 x D								.017-.019		.019-.021									
60-950	1 x D								.022-.024		.024-.026									
61-200	1 x D		.006-.008		.007-.009		.008-.010	.008-.010	.009-.011		.010-.012									
64-000/ 65-000	1 x D	.001-.003	.002-.004		.003-.005		.004-.006		.005-.007											
68-100									.010-.012		.012-.014		.017-.019	.018-.020						

* = 16,000 RPM
** = 15,000 RPM

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

CW | Hard Plywood Cutting Data

APPLICATION	GOOD	BETTER	BEST
Single Pass	60-300/60-350	60-100	60-100C
Roughing	60-800	60-000	60-850
Finishing		60-300/60-350	60-200

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter

Series	Cut	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
13-50	1 x D											.016-.018			.018-.020							
37-50/60	1/2 CED					.001-.003		.001-.003		.002-.004		.003-.005			.005-.007		.007-.009					
37-80	1 x D																.004-.006			.004-.006*		.004-.006**
40-50	1 1/2											.003-.005										
48-000	1 x D					.004-.006		.005-.007	.005-.007	.006-.008		.007-.009		.008-.010	.009-.011	.010-.012	.011-.013	.012-.014	.013-.015			
48-700	1 x D							.005-.007				.007-.009			.009-.011		.011-.013					
56-200	1 x D			.003-.005	.003-.005	.004-.006	.004-.006	.005-.007	.005-.007	.006-.008		.007-.009			.009-.011							
60-000 (LH)	1 x D									.014-.016		.016-.018		.018-.020	.020-.022							
60-000 (HH)	1 x D									.017-.019		.019-.021		.021-.023	.023-.025							
60-090	1 x D													.003-.005								
60-100	1 x D			.012-.018		.012-.018		.014-.016		.016-.018		.018-.020		.020-.022	.022-.024							
60-100DE	1 x D							.014-.016		.016-.018		.018-.020		.020-.022	.022-.024							
60-1003E	1 x D									.020-.022		.022-.024			.026-.028							
60-100C	1 x D									.019-.021		.021-.023		.023-.025	.025-.027							
60-300	1 x D									.019-.021		.021-.023		.023-.025	.025-.027							
60-350	1 x D									.018-.020		.020-.022		.022-.025	.024-.026							
60-500/ 500M	1 x D											.039-.041		.043-.045	.047-.049							
60-600	1 x D											.027-.029		.030-.032	.032-.034							
60-700	1 x D											.027-.029		.029-.031	.032-.034							
60-800	1 x D									.017-.019		.019-.021		.021-.023	.023-.025							
60-900	1 x D									.017-.019		.019-.021										
60-950	1 x D									.019-.021		.021-.023										
61-200	1 x D			.005-.007				.007-.009	.007-.009	.008-.010		.009-.011										
64-000/ 65-000	1 x D	.001-.003		.002-.004		.003-.005		.004-.006		.005-.007												
68-100	1 x D									.010-.012		.012-.014		.017-.019	.018-.020							

* = 16,000 RPM
** = 15,000 RPM

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

LW | Laminated Chipboard Cutting Data

APPLICATION	GOOD	BETTER	BEST
Single Pass	60-100	60-100MW	60-100C
Roughing			60-850

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter																	
Series	Cut	1/8	3/16	7/32	1/4	5/16	3/8	1/2	9/16	5/8	3/4	7/8	1	1-1/8	1-1/4	1-1/2	2
13-50	1 x D							.017-.019			.019-.021						
37-80	1 x D												.004-.006			.004-.006*	.004-.006**
48-000	1 x D		.005-.007	.005-.007	.006-.008	.006-.008	.007-.009	.008-.010		.009-.011	.010-.012	.011-.013	.012-.014	.013-.015	.014-.016		
60-100	1 x D	.013-.015	.014-.016		.015-.017		.016-.018	.018-.020		.019-.021	.021-.023						
60-100 (DE)	1 x D				.017-.019		.019-.021	.021-.023		.025-.027	.027-.029						
60-100 (3E)	1 x D						.020-.022	.022-.024			.024-.026						
60-100C	1 x D						.022-.024	.024-.026		.026-.028	.028-.030						
60-500/500M	1 x D							.021-.023		.023-.025	.025-.027						
60-600	1 x D							.028-.030		.030-.032	.032-.034						
68-100	1 x D						.008-.010	.012-.014		.016-.018	.019-.021						

* = 16,000 RPM
** = 15,000 RPM

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

LW | Laminated Plywood Cutting Data

APPLICATION	GOOD	BETTER	BEST
Single Pass	60-100	60-100MW	60-100C
Roughing			60-850

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter

Series	Cut	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
13-50	1 x D											.014-.016			.018-.020							
37-80	1 x D																.004-.006			.004-.006*		.004-.006**
48-000	1 x D					.004-.006	.005-.007	.005-.007	.006-.008	.006-.008		.007-.009		.009-.011	.010-.012	.011-.013	.012-.014	.013-.015	.014-.016			
60-100	1 x D			.013-.015		.014-.016		.015-.017		.016-.018		.018-.020		.019-.021	.021-.023							
60-100DE	1 x D							.015-.017		.016-.018		.018-.020		.019-.021	.021-.023							
60-1003E	1 x D									.018-.020		.020-.022			.022-.024							
60-100C	1 x D									.019-.021		.021-.023		.023-.025	.025-.027							
60-500/ 500M	1 x D											.019-.021		.021-.023	.023-.025							
60-600	1 x D											.027-.029		.030-.032	.032-.034							
68-100	1 x D									.008-.010		.012-.014		.016-.018	.019-.021							
77-100 (DE)	1 x D			.003-.005																		
77-100 (3E)	1 x D							.005-.007														

* = 16,000 RPM
** = 15,000 RPM

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

Soft Plastic Cutting Data

< 1/2" DIAMETER TOOL

APPLICATION	GOOD	BETTER	BEST
Single Pass	61-000P	65-000	63-750
Roughing			60-000

> 1/2" DIAMETER TOOL

APPLICATION	GOOD	BETTER	BEST
Single Pass	56-600	52-700	52-600
Roughing			60-000

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter

Series	Cut	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
10-00	1 x D	.002 - .004		.004 - .006		.006 - .008		.006 - .008		.007 - .009		.008 - .010										
38-50/ 38-60	1 x D			.001 - .003		.002 - .004		.003 - .005		.004 - .006		.005 - .007		.006 - .008	.007 - .009							
52-200B/BL	1 x D	.002 - .004		.002 - .004		.004 - .006		.004 - .006		.004 - .006		.006 - .008		.010 - .012	.012 - .014							
52-400	1 x D			.002 - .004		.003 - .005		.004 - .008		.005 - .007		.006 - .008		.007 - .009								
52-600	1 x D							.008 - .010		.010 - .012		.012 - .014		.014 - .016	.016 - .018							
52-700	1 x D											.012 - .014		.014 - .016	.016 - .018							
56-430	1 x D			.006 - .008		.006 - .008		.007 - .009		.008 - .010		.009 - .011										
56-600	1 x D			.004 - .006		.006 - .008		.008 - .010		.010 - .012		.012 - .014										
57-600	1 x D							.008 - .010		.010 - .012		.012 - .014		.014 - .016	.016 - .018							
60-000	1 x D									.004 - .006		.006 - .008		.008 - .012	.012 - .016							
60-200	1 x D							.004 - .006		.004 - .006		.006 - .010			.012 - .016							
60-900	1 x D									.004 - .006		.006 - .008										
61-000P	1 x D			.004 - .006		.006 - .008		.008 - .012		.014 - .018		.018 - .022										
61-400	1 x D			.017 - .019		.017 - .019		.018 - .020		.019 - .021		.020 - .021										
62-750	1 x D			.004 - .006		.006 - .008		.008 - .012		.008 - .012		.010 - .014										
62-850	1 x D			.004 - .006		.006 - .008		.008 - .012		.008 - .012		.010 - .014										
63-500	1 x D	.002 - .004		.004 - .006		.005 - .007		.006 - .008		.007 - .009												
63-750	1 x D	.002 - .004		.004 - .006		.006 - .008		.008 - .012		.008 - .012		.010 - .014										
63-850	1 x D	.002 - .004		.004 - .006		.006 - .008		.008 - .012		.008 - .012		.010 - .014										
64-000/ 65-000	1 x D	.002 - .004		.004 - .006		.006 - .008		.008 - .012		.008 - .012												
77-100 (DE)	1 x D			.005 - .007																		
77-100 (3E)	1 x D							.008 - .010														

* = 12,500 RPM

NOTE: To eliminate rewelding increase the feedrate or change to a single edge tool
If using a downcut spiral and chip rewelding occurs, cut a slot in your spoilboard to allow the chips a place to expand
Incorrect chiploads can lead to knife marks occurring

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

Hard Plastic Cutting Data

< 1/2" DIAMETER TOOL

APPLICATION	GOOD	BETTER	BEST
Single Pass	65-000	63-700	56-000P
Roughing			60-000
Finishing			60-200

> 1/2" DIAMETER TOOL

APPLICATION	GOOD	BETTER	BEST
Single Pass	52-700	52-600	56-000P
Roughing			60-000
Finishing		60-200	75-000

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter

Series	Cut	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
52-200B/BL	1 x D	.002 - .004		.002 - .004		.004 - .006		.004 - .006		.004 - .006		.006 - .008		.008 - .010	.010 - .012							
52-600	1 x D							.006 - .008		.008 - .010		.010 - .012		.012 - .014	.014 - .016							
56-000P	1 x D			.002 - .004		.004 - 006		.004 - .006		.006 - .008		.008 - .010										
56-430	1 x D			.005 - .007		.005 - .007		.006 - .008		.007 - .009		.008 - .010										
56-450	1 x D					.005 - .007		.006 - .008		.007 - .009		.008 - .010										
56-600	1 x D			.003 - .005		.005 - .007		.007 - .009		.009- .011		.011 - .013										
57-600	1 x D							.006 - .008		.008 - .010		.010 - .012		.012 - .014	.014 - .016							
60-000	1 x D									.004 - .006		.006 - .008		.008 - .012	.012 - .016							
60-200	1 x D							.004 - .006		.004 - .006		.006 - .010			.012 - .016							
60-900	1 x D									.004 - .006		.006 - .008										
61-000P	1 x D			.003 - .005		.005 - .007		.007 - .011		.013 - .017		.017 - .021										
61-400	1 x D			.014 - .016		.014 - .016		.015 - .017		.016 - .018		.017 - .019										
62-700	1 x D			.006 - .008		.008 - .010		.010 - .012		.010 - .012		.012 - .016										
62-750	1 x D			.004 - .006		.006 - .008		.008 - .012		.008 - .012		.010 - .014										
62-800	1 x D			.006 - .008		.008 - .010		.010 - .012		.010 - .012		.012 - .016										
62-850	1 x D			.004 - .006		.006 - .008		.008 - .012		.008 - .012		.010 - .014										
63-500	1 x D	.002 - .004		.003 - .005		.003 - .005		.004 - .006		.005 - .007												
63-700	1 x D	.002 - .004		.006 - .008		.008 - .010		.010 - .012		.010 - .012		.012 - .016										
63-750	1 x D	.002 - .004		.004 - .006		.006 - .008		.008 - .012		.008 - .012		.010 - .014										
63-800	1 x D	.002 - .004		.006 - .008		.008 - .010		.010 - .012		.010 - .012		.012 - .016										
63-850	1 x D	.002 - .004		.004 - .006		.006 - .008		.008 - .012		.008 - .012		.010 - .014										
64-000/ 65-000	1 x D	.002 - .004		.006 - .008		.008 - .010		.010 - .012		.010 - .012												
77-000	1 x D	.002 - .004		.002 - .004		.006 - .008		.008 - .012														
77-100 (DE)	1 x D			.005 - .007																		
77-100 (3E)	1 x D							.008 - .010														

NOTE: When chip rewelding occurs while cutting soft plastic, increase feedrate or go to a single edge tool. Incorrect chiploads can result in cratering

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

Composite Cutting Data

APPLICATION	GOOD	BETTER	BEST
Finishing			55-000/58-000
Honeycomb	67-300	32-000	30-300
G10/G11 Fiberglass	56-000P	67-000	54-300/55-300
Fiberglass	67-000	67-400	67-200
Phenolic	53-000	56-000P	67-200
Single Pass	56-000P	67-250	68-000

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter																					
Series	Cut	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
48-000	1 x D			.006 - .008		.006 - .008		.007 - .009	.007 - .009	.008 - .010		.009 - .011		.010 - .012	.011 - .013		.012 - .014		.013 - .015	.014 - .016	.015 - .017	.016 - .018
48-000DE	1 x D			.002 - .004		.002 - .004		.003 - .005	.003 - .005	.004 - .006		.005 - .007		.006 - .008	.007 - .009		.008 - .010		.009 - .011	.010 - .012	.011 - .013	.012 - .014
52-000	1 x D			.003 - .005		.003 - .005		.004 - .006		.006 - .008		.010 - .012										
54-000 / 59-000	1 x D			.002 - .004		.002 - .004		.002 - .004		.003 - .006		.005 - .010										
54-300	1 x D									.007 - .009		.008 - .010										
55-000 / 58-000	1 x D			.002 - .004		.002 - .004		.002 - .004		.003 - .006		.007 - .009										
55-300	1 x D									.007 - .009		.008 - .010										
56-000P	1 x D			.002 - .004		.002 - .004		.004 - .006		.004 - .006		.004 - .006										
56-450	1 x D					.002 - .005		.003 - .005	.003 - .006	.004 - .006		.005 - .007										
57-000	1 x D			.003 - .005		.003 - .005		.004 - .006		.006 - .008		.010 - .012										
63-000	1 x D			.003 - .005		.003 - .005		.003 - .005	.004 - .006			.005 - .007										
67-000	1 x D							.004 - .006		.004 - .006		.004 - .006										
67-200	1 x D									.002 - .010		.002 - .010										
67-250	1 x D			.002 - .004				.004 - .006		.004 - .006												
67-300	1 x D							.004 - .006		.006 - .008		.010 - .012										
67-400	1 x D			.002 - .004				.004 - .006		.004 - .006		.004 - .006										
67-500	1 x D			.001 - .003		.001 - .003		.002 - .004	.002 - .004	.003 - .005		.004 - .006										
67-600	1 x D			.002 - .004		.002 - .004		.003 - .005	.003 - .005	.004 - .006		.005 - .007										
68-000	1 x D							.004 - .006		.004 - .006		.004 - .006			.008 - .010							
68-200	1 x D							.0005 - .001		.001 - .002		.001 - .002										

* = 10,000 RPM

NOTE: Spindle RPM's generally range from 9,000 - 12,000 when cutting composite materials

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

Aluminum Cutting Data

APPLICATION	GOOD	BETTER	BEST
BLOCK			
Single Pass	63-600	52-000	AMC
Roughing	40-000	52-000	AMC
Finishing		66-300	AMC
Slotting	63-600	52-000	AMC
Profile/Shape			52-200B
SHEET			
Single Pass	40-000	65-000	63-600
EXTRUSION			
Single Pass		81-100	81-000

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

To view our complete line of **AMC Tools**, reference our **Milling Tools Catalog** which is available at www.onsrud.com

CHIP LOAD PER TOOTH

Cutting Edge Diameter

Series	Cut	1/16	3/32	1/8	5/32	3/16	7/32	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
15-00**	1 x D											.004 - .006					
40-000*	1 x D			.005 - .007		.005 - .007		.006 - .008	.006 - .008	.007 - .009		.008 - .010					
40-100	1 x D			.001 - .003		.001 - .003		.002 - .004	.002 - .004	.003 - .005		.004 - .008			.006 - .008		
52-000	1 x D			.003 - .005		.003 - .005		.004 - .006		.006 - .008		.010 - .012					
52-200B/BL	1 x D	.002 - .004		.003 - .005		.003 - .005		.004 - .006		.006 - .008		.010 - .012		.012 - .014	.014 - .016		
57-000*	1 x D			.003 - .005		.003 - .005		.004 - .006		.006 - .008		.010 - .012					
61-000	1 x D			.001 - .003		.002 - .005		.002 - .005		.003 - .007		.007 - .009					
62-600	1 x D	.002 - .004		.002 - .004		.003 - .006		.003 - .006	.003 - .006	.004 - .008		.008 - .010					
63-000	1 x D			.006 - .008		.006 - .008		.007 - .009	.007 - .009	.008 - .010		.009 - .011					
63-600	1 x D	.002 - .004		.002 - .004		.003 - .006		.003 - .006	.003 - .006	.004 - .008		.008 - .010					
63-900	1 x D	.002 - .004		.002 - .004		.003 - .006		.003 - .006	.003 - .006	.004 - .008		.008 - .010					
64-000/ 65-000	1 x D	.002 - .004		.002 - .004		.003 - .006		.003 - .006		.004 - .008							
77-100(DE)				.002 - .004													
77-100(3E)								.003 - .005									
81-100	1 x D								.002 - .005	.003 - .008		.003 - .008					

* 16,000 RPM

** Aluminum Extrusion or Aluminum UAD Doors/Windows

NOTE: When cutting soft aluminum a squirt of cutting fluid every now and then will help to eliminate chip rewelding and improve surface finish

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

Specialty Tool Chiploads

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Material: Foam

Cutting Edge Diameter																					
Series	**Cut**	**1/16**	**3/32**	**1/8**	**5/32**	**3/16**	**7/32**	**1/4**	**5/16**	**3/8**	**7/16**	**1/2**	**9/16**	**5/8**	**3/4**	**7/8**	**1**	**1 1/8**	**1 1/4**	**1 1/2**	**1 3/4**	**2**
12-00	1 x D			.0005 - .002		.0005 - .002		.001 - .003	.001 - .003	.002 - .004		.003 - .005		.004 - .006	.005 - .007		.006 - .008		.007 - .009			
13-50	1"											.015 - .017			.017 - .019							
40-550	1 x D											.004 - .006										
48-000	1 x D			.002 - .004		.002 - .004		.003 - .005	.003 - .005	.004 - .006		.005 - .007		.006 - .008	.007 - .009		.010					.010 - .012
52-550	1 x D			.002 - .004		.002 - .004		.004 - .006	.004 - .006	.004 - .006												
52-700	1 x D			.002 - .004		.002 - .004		.004 - .006	.004 - .006	.004 - .006		.005 - .007		.006 - .008	.007 - .009		.010					

Material: Wood

Cutting Edge Diameter																					
Series	**Cut**	**1/16**	**3/32**	**1/8**	**5/32**	**3/16**	**7/32**	**1/4**	**5/16**	**3/8**	**7/16**	**1/2**	**9/16**	**5/8**	**3/4**	**7/8**	**1**	**1 1/8**	**1 1/4**	**1 1/2**	**1 3/4**	**2**
37-00/ 37-20	Varies							.004-.006														
37-50	1/2 CED					.003 - .006		.003 - .006		.003 - .006												
37-60	1/2 CED									.004 - .006		.004 - .006			.006 - .008		.008 - .010					
37-80	Varies																.001 - .003		.001 - .003			.001 - .003

Material: Plastic

Cutting Edge Diameter																					
Series	**Cut**	**1/16**	**3/32**	**1/8**	**5/32**	**3/16**	**7/32**	**1/4**	**5/16**	**3/8**	**7/16**	**1/2**	**9/16**	**5/8**	**3/4**	**7/8**	**1**	**1 1/8**	**1 1/4**	**1 1/2**	**1 3/4**	**2**
37-00/ 37-20	Varies							.004-.006														
37-50*	1 x D					.003 - .006		.003 - .006		.003 - .006												
37-60*	1 x D									.004 - .006		.004 - .006			.006 - .008		.008 - .010					
37-80	Varies																.001 - .003		.001 - .003			.001 - .003
66-000	1 x D							.004 - .008		.004 - .008		.004 - .008										
66-200	1 x D							.004 - .006		.006 - .008												
66-300	1 x D			.002 - .004				.004 - .006		.006 - .008		.006 - .008										
66-350	1 x D			.002 - .004				.004 - .006		.006 - .008		.006 - .008										
75-000	1 x D									.001 - .002		.0005 - .002			.001 - .002		.001 - .002					
77-000	1 x D	.002 - .004		.002 - .004		.006 - .008		.008 - .012														

Material: Aluminum

Cutting Edge Diameter																					
Series	**Cut**	**1/16**	**3/32**	**1/8**	**5/32**	**3/16**	**7/32**	**1/4**	**5/16**	**3/8**	**7/16**	**1/2**	**9/16**	**5/8**	**3/4**	**7/8**	**1**	**1 1/8**	**1 1/4**	**1 1/2**	**1 3/4**	**2**
37-00/ 37-20	Varies							.004-.006														
37-80	Varies																.001 - .003		.001 - .003			.001 - .003
66-200	1 x D							.004 - .006		.006 - .008												
66-300	1 x D			.002 - .004				.004 - .006		.006 - .008		.006 - .008										
66-350	1 x D			.002 - .004				.004 - .006		.006 - .008		.006 - .008										
77-025	1 x D	.002 - .004		.002 - .004		.003 - .006		.003 - .006														

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS: IPM = Inches Per Minute
IPR = Inches Per Revolution

Solid Surface Cutting Data

DEPTH OF CUT: 1 x D Use recommended chip load
2 x D Reduce chip load by 25%
3 x D Reduce chip load by 50%

CHIP LOAD PER TOOTH

Cutting Edge Diameter																	
Series	**Cut**	**1/16**	**3/32**	**1/8**	**5/32**	**3/16**	**7/32**	**1/4**	**5/16**	**3/8**	**7/16**	**1/2**	**9/16**	**5/8**	**3/4**	**7/8**	**1**
37-50	1 x D					.003 - .006		.003 - .006		.003 - .006							
37-60	1 x D									.004 - .006		.004 - .006			.006 - .008		.008 - .010
52-000	1 x D			.003 - .006		.003 - .006		.004 - .006		.008 - .010		.012 - .014					
52-200B/BL	1 x D	.002 - .004		.002 - .004		.002 - .004		.004 - .006		.004 - .006		.006 - .008		.008 - .010	.010 - .012		
52-400	1 x D			.002 - .004		.002 - .004		.003 - .005		.004 - .006		.005 - .007					
52-600	1 x D							.004 - .006		.006 - .008		.008 - .010		.008 - .010	.010 - .012		
56-000P	1 x D			.002 - .004		.002 - .004		.004 - .006		.006 - .008		.008 - .010					
56-450	1 x D			.002 - .004		.002 - .004		.003 - .005		.004 - .006		.005 - .007					
57-000	1 x D			.002 - .004		.002 - .004		.003 - .005		.004 - .006		.005 - .007					
57-200	1 x D			.002 - .004		.002 - .004		.003 - .005		.004 - .006		.005 - .007		.006 - .008	.007 - .009		
57-400	1 x D			.002 - .004		.002 - .004		.003 - .005		.004 - .006		.005 - .007		.006 - .008	.007 - .009		
57-600	1 x D							.004 - .006		.006 - .008		.008 - .010		.008 - .010	.010 - .012		
60-200	1 x D							.002 - .004		.002 - .006		.002 - .006		.004 - .008			
62-700	1 x D			.002 - .004		.004 - .006		.006 - .010		.006 - .010		.010 - .012					
62-750	1 x D			.002 - .004		.004 - .006		.006 - .010		.006 - .010		.010 - .012					
62-800	1 x D			.002 - .004		.004 - .006		.006 - .010		.006 - .010		.010 - .012					
62-850	1 x D			.002 - .004		.004 - .006		.006 - .010		.006 - .010		.010 - .012					
63-700	1 x D	.002 - .003		.002 - .004		.004 - .006		.006 - .010		.006 - .010		.010 - .012					
63-750	1 x D	.002 - .003		.002 - .004		.004 - .006		.006 - .010		.006 - .010		.010 - .012					
63-800	1 x D	.002 - .003		.002 - .004		.004 - .006		.006 - .010		.006 - .010		.010 - .012					
63-850	1 x D	.002 - .003		.002 - .004		.004 - .006		.006 - .010		.006 - .010		.010 - .012					
64-000/ 65-000	1 x D	.002 - .004		.006 - .008		.008 - .010	.010 - .012	.010 - .012		.010 - .012							
66-000	1 x D							.002 - .004		.003 - .005		.004 - .006					

FORMULAS: Chip Load = Feed Rate / (RPM x # of cutting edges)
Feed Rate (IPM) = RPM x # of cutting edges x chip load
Speed (RPM) = Feed Rate / (# of cutting edges x chip load)

DEFINITIONS:
IPM = Inches Per Minute
IPR = Inches Per Revolution

Drilling Cutting Data

Drill Diameter																	
Series		**SFM**	**3**	**1/8**	**3/16**	**5**	**6**	**1/4**	**5/16**	**8**	**3/8**	**7/16**	**1/2**	**5/8**	**3/4**	**7/8**	**1**
67-800	Composites	230		.001 - .003	.001 - .003			.002 - .004	.002 - .004		.003 - .005	.003 - .005	.003 - .005				
68-900	Composites	230		0.001				0.0015			0.0015		0.0015				
70-500	Plastic	200		.019 - .021				.021 - .023			.023 - .025		.025 - .027	.027 - .029	.029 - .031	.031 - .033	.033 - .035
72-000*	Wood		.009 - .011			.011 - .013	.013 - .015			.015 - .017							
86-000	Kevlar	230		0.0005	0.0005			0.001	0.001		0.001	0.001	0.001				
86-100	Composites	165		0.001				0.0015			0.0015		0.0015				

* Gang drills run at 4,500 RPM and 150 IPM

FORMULAS: RPM = (3.82 x SFM) / tool dia.
Feedrate (IPM) = RPM x IPR

DEFINITIONS:
IPM = Inches Per Minute
IPR = Inches Per Revolution

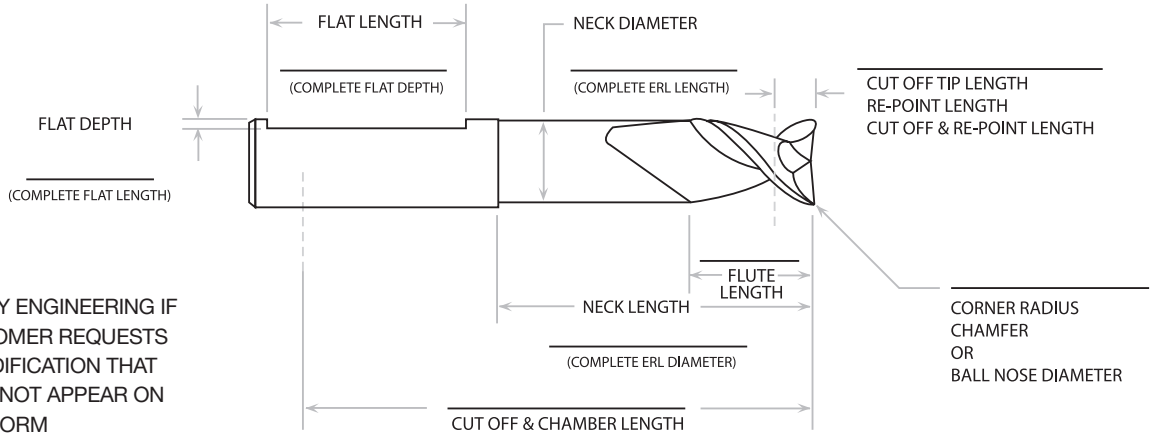
RESHARPENING MODIFICATIONS

DISTRIBUTOR _____ DATE _____

DISTRIBUTOR NUMBER _____ TOOL TO BE MODIFIED (PART NUMBER) _____

DISTRIBUTOR PO NUMBER _____ QUANTITY _____

SALES ORDER NUMBER _____



NOTE: NOTIFY ENGINEERING IF CUSTOMER REQUESTS A MODIFICATION THAT DOES NOT APPEAR ON THIS FORM

INSIDE SALES SIGNATURE _____ DATE & TIME _____

OPERATOR SIGNATURE _____ DATE & TIME _____

INSPECTION SIGNATURE _____ DATE & TIME _____

NOTES: _____

_____

_____

Tool Modification Instructions

- Complete form
- Fax to Onsrud with purchase order number.
- Orders must be received before 2:30 PM (Central time) in order to ship the following day.
- You will receive a confirmation fax

TOOL MODIFICATION

Part Number	Description
BALLNOSE	RADIUS: _____
RADIUS	DIAMETER: _____
CHAMFER	CUT OFF AND CHAMFER
CUT-REPOINT	CUT OFF TIP AND REPOINT
CUT-TIP	CUT OFF TIP UNDER 1/8
*SPINBACK	LENGTH: _____ DIA: _____
FLAT	FLATS ON SHANK
REPOINT-1/8	REPOINT LESS THAN 1/8"

- Note: Spinback price is based on one inch length. Actual Neck length = Neck length - Flute Length

ONSRUD CUTTER LP
800 Liberty Drive - Libertyville, Illinois 60048
Phone (847) 362-1560 - Fax (847) 362-5028
www.onsrud.com

QUOTE REQUEST FORM

Distributor _____ Quote # _____

Contact _____ Part # _____

Phone _____ Date _____

Fax _____ Quote needed by _____

End User _____ Tools required by _____

Contact _____ Annual usage _____

Phone _____ One time need? _____

Qty breaks (minimum qty 6) _____

Special Etch Required? _____ Etch # _____

Competitive pricing/Required pricing _____

Competitive Part # _____

TOOL DESCRIPTION DIA: _____ Cutting edge length: _____

Shank DIA: _____ Overall length: _____

MATERIAL ❑ solid carbide ❑ carbide tip ❑ high speed steel

FLUTE STYLE ❑ spiral upcut ❑ spiral downcut ❑ straight "O" flute ❑ straight "V" flute

 # OF EDGES ❑ single edge ❑ double edge ❑ 3-flute

GEOMETRY SIMILAR TO OC SERIES #/PART # _____

Other _____ Tool provided by enduser ❑ Yes ❑ No

Coating _____ Approval print required ❑ Yes ❑ No

Application _____ What type of material is being cut? _____

Machine type ❑ CNC ❑ Manual/Pin ❑ Portable/Hand-fed

Spindle Speed _____

Depth of cut _____ Feed Rate: Max _____ Min _____

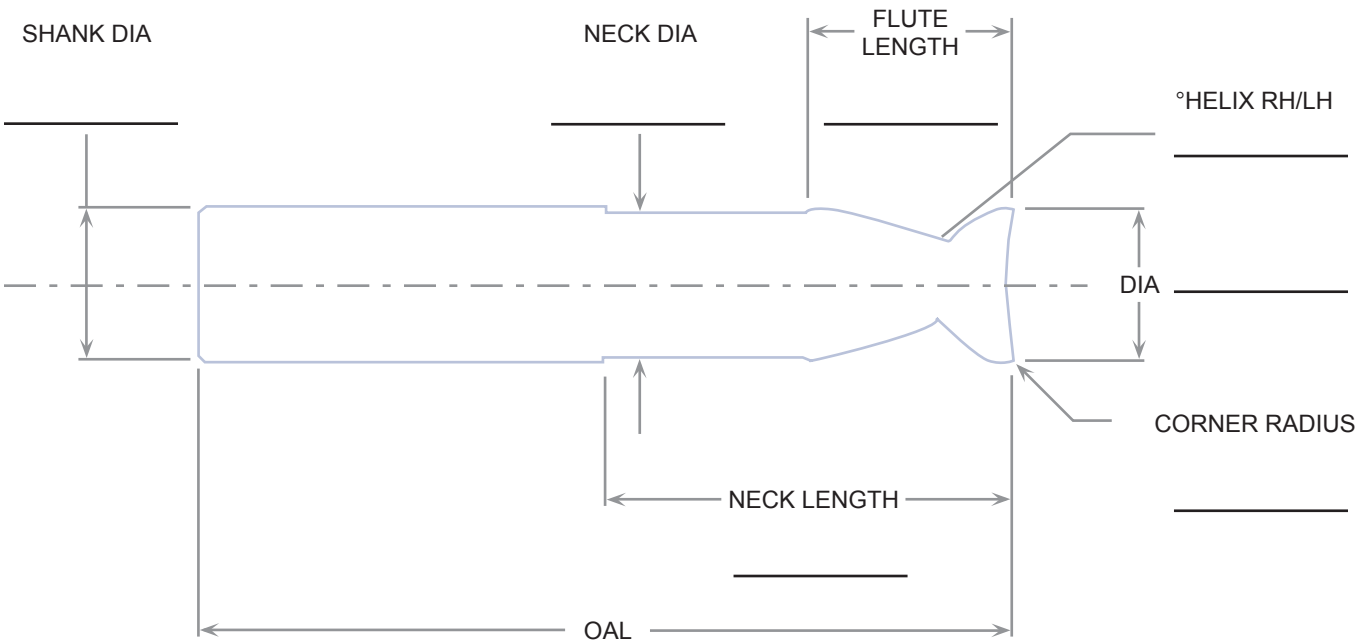
Application ❑ Hard Plastic ❑ Soft Plastic ❑ Natural Wood ❑ Composite Wood

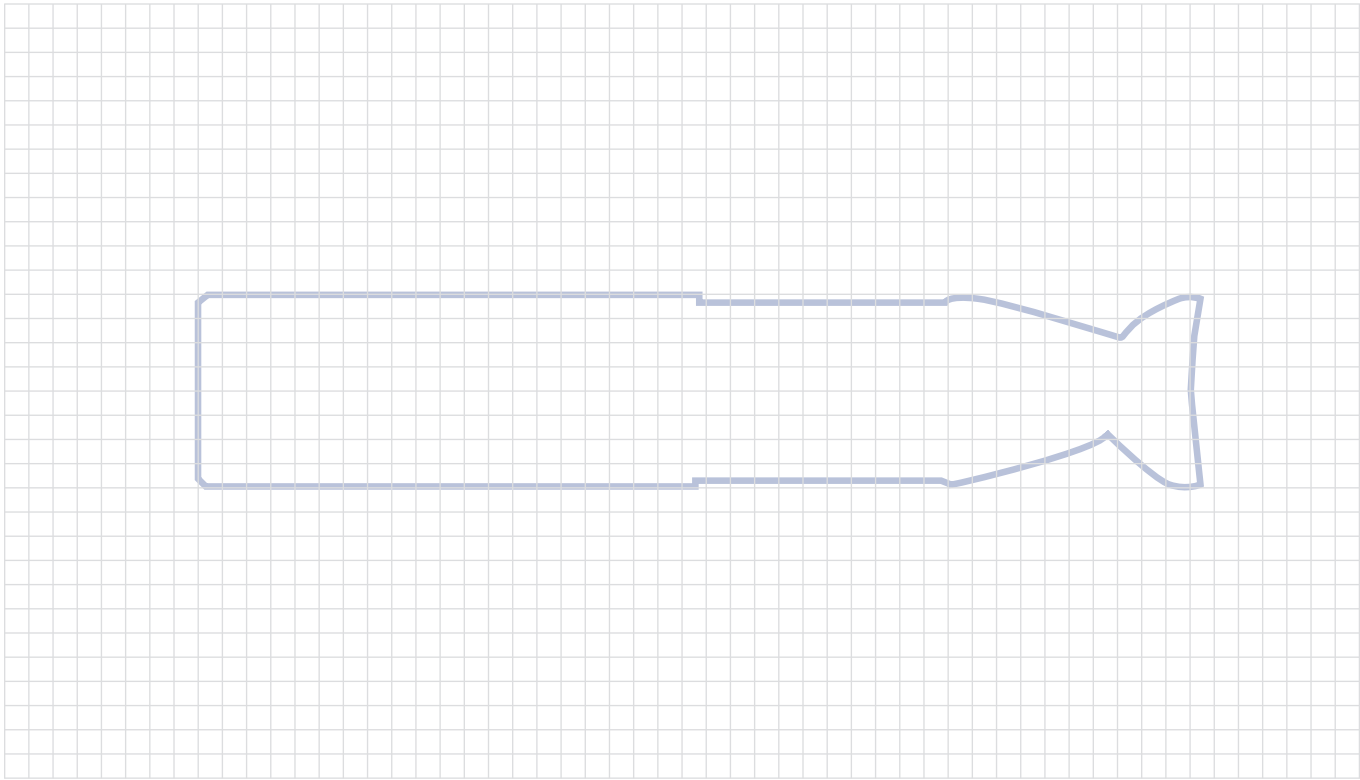
❑ Plywood ❑ Aluminum ❑ Other

Specific Material Information _____

COMMENTS _____

Cutting Tool Design





NOTES

Onsrud Cutter, LP Terms & Conditions

Terms - Net 30

Shipping - F.O.B. Libertyville, IL. All shipments ground unless otherwise specified. For standard catalog product orders must be in by 3:00 p.m. Central Time Zone for same day shipment. This time is extended to 4:00 p.m. Central Time Zone for orders place through Onsrud's B2B e-commerce site.

Claims – Any claims for shortage, damage or loss must be made within 30 days of invoice date. United Parcel Service is a preferred method of shipment because of reliability and ease of tracing problem shipments.

Guarantee - Our products are guaranteed against defects in material and quality of manufacture when used in the proper manner. If tools are returned and found to be defective, we will repair or replace the tools. Continued tool breakage caused by improper tool usage without the knowledge of Onsrud Cutter's technical staff is not a condition for return and replacement of such tools.

Errors - Onsrud Cutter, LP cannot be held responsible for incorrect parts made with our products due to mislabeling or defect.

Return Goods Policy – No merchandise can be returned without prior authorization. Credit will not be issued for merchandise returned without a return authorization number. Product must be a current revision catalog item in new and saleable condition. All returns subject to a 15% restocking fee or offsetting order of equal value.

Specials - Onsrud Cutter, LP has the right to over or under ship by 10% all specials. Special orders less than 10 pieces are subject to +/- 1 piece. Specials and modified tools are not returnable for credit. Specials cancelled will be assessed an in-process charge based on the status of the order and expenses incurred at the time of cancellation. If a special tool has been completed, the tool will be shipped and the price quoted will be billed.

Safety Precautions – Cutting tools should only be used to perform operations that are compatible with the original tool design. Safety glasses and other appropriate safety equipment should be worn by all people in the vicinity of tool use.

Prices & Terms - All prices and terms are subject to change without notice. All orders are subject to acceptance at Onsrud Cutter.

ONSRUD

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