

ROBB JACK
CORPORATION
Manufacturers of Premium Rotary Cutting Tools



Tools for

AEROSPACE




2008



Aerospace Machining Problem?

RobbJack's got the Solution.

Need Maximum Removal Rates?	A1 Series 		Page 4
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Chatter Problems?

Mirror Edge™

The edge preparation that dampens the cut to help eliminate chatter.



Mirror Edge



Non-Mirror Edge

Applications

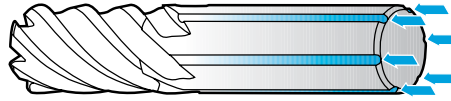
- Deep pocket and thin wall aluminum
- Long reaches more than 3:1 length-to-diameter ratio
- Plunging corners in titanium, steels, stainless, aluminum, etc.
- High end valves used with Feather Blend and T-Process

Must Use Coolant

Available on **A1-303 Tools** (Page 3) and **FM Tools** (Page 6)

Coolant Issues?

Add coolant grooves to any tool.

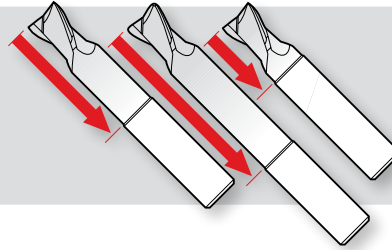


Available on **All Tools**

Reach Problems?

Modify any standard tool with a neck to get the job done quickly.

A neck will increase rigidity, reduce tool deflection and last longer than a long length of cut tool. Necking can be added to most standard tools in 1–2 days.



Available on **All Tools**, Standard on **FM Tools** (Page 6)

Steps on Part?

Feather Blend™

A smooth transition from the cutting diameter to the neck diameter.



Feather Blend



Standard Neck

Applications

- Any necked tool
- Eliminates swirl lines during plunging
- Eliminates stress risers in parts

Available on **FM Tools** (Page 6)

Deep, Tight Slots?

Chip Channels™

Normal flute depth

Chip channels stronger larger core

Feather blend reduces ledging; necked to reduce surface contact



Available on Request



Need Maximum Removal Rates?

New A1 Series!

Features

Stub Cutting Lengths
Application Specific Geometries
Small Corner Chamfer
Tuffly Grade Carbide

Applications

Designed to maximize material removal rates, reduce horsepower requirements and still achieve superior part finishes.
Best tool for aluminum removal.



A1-201 2 Flute Stub Length

Tool Number	Cutting Diameter d _g	Shank Diameter d _g	Flute Length L ₁	Corner Chamfer	L
A1-201-04	1/8"	1/8"	3/16"	.005"	1-1/2"
A1-201-06	3/16"	3/16"	9/32"	.005"	2"
A1-201-08	1/4"	1/4"	3/8"	.005"	2"
A1-201-10	5/16"	5/16"	15/32"	.005"	2"
A1-201-12	3/8"	3/8"	9/16"	.010"	2"
A1-201-16	1/2"	1/2"	3/4"	.010"	3"
A1-201-20	5/8"	5/8"	15/16"	.010"	3-1/2"
A1-201-24	3/4"	3/4"	1-1/8"	.010"	4"
A1-201-32	1"	1"	1-1/2"	.015"	4"

Features

Standard Cutting Lengths
Mirror Edge™ Geometries
Small Corner Chamfer
Center Cutting
Tuffly Grade Carbide
Polished Flutes

Applications

Machine deeper parts, slots and walls in a single pass with minimal chatter and vibration.



A1-303 3 Flute Standard Length

Tool Number	Cutting Diameter d _g	Shank Diameter d _g	Flute Length L ₁	Corner Chamfer	L
A1-303-04	1/8"	1/8"	3/8"	.005"	1-1/2"
A1-303-06	3/16"	3/16"	9/16"	.005"	2"
A1-303-08	1/4"	1/4"	3/4"	.005"	2-1/2"
A1-303-10	5/16"	5/16"	7/8"	.005"	2-1/2"
A1-303-12	3/8"	3/8"	1"	.010"	2-1/2"
A1-303-16	1/2"	1/2"	1-1/8"	.010"	3"
A1-303-20	5/8"	5/8"	1-1/4"	.010"	3-1/2"
A1-303-24	3/4"	3/4"	1-5/8"	.010"	4"
A1-303-32	1"	1"	2"	.015"	4"

A1 Series Speed and Feed

Tool Dia.	Aluminum 6061-T6, 7075, 2024		Brass		Copper		Plastic		Magnesium	
	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
1/8"	Max	0.0032"	22900	0.0016"	18300	0.0016"	39700	0.0032"	Max	0.0032"
3/16"	Max	0.0048"	15300	0.0024"	12200	0.0024"	26500	0.0048"	Max	0.0048"
1/4"	Max	0.0064"	11500	0.0032"	9200	0.0032"	19900	0.0064"	Max	0.0064"
5/16"	Max	0.0080"	9200	0.0040"	7300	0.0040"	15900	0.0080"	Max	0.0080"
3/8"	Max	0.0096"	7600	0.0048"	6100	0.0048"	13200	0.0096"	Max	0.0096"
1/2"	Max	0.0128"	5700	0.0064"	4600	0.0064"	9900	0.0128"	Max	0.0128"
5/8"	Max	0.0160"	4600	0.0080"	3700	0.0080"	7900	0.0160"	Max	0.0160"
3/4"	Max	0.0192"	3800	0.0096"	3100	0.0096"	6600	0.0192"	Max	0.0192"
1"	Max	0.0256"	2900	0.0128"	2300	0.0128"	5000	0.0256"	Max	0.0256"

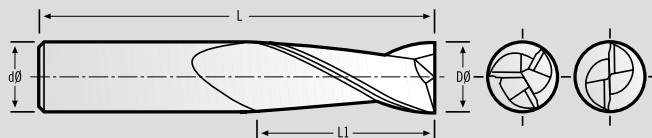
Axial depth of cut up to 1 x diameter

Tool Dia.	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
	RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
1/8"	Max	0.0020"	Max	0.0018"	Max	0.0020"	Max	0.0020"
3/16"	Max	0.0030"	Max	0.0026"	Max	0.0030"	Max	0.0030"
1/4"	Max	0.0040"	Max	0.0035"	Max	0.0040"	Max	0.0040"
5/16"	Max	0.0050"	Max	0.0044"	Max	0.0050"	Max	0.0050"
3/8"	Max	0.0060"	Max	0.0053"	Max	0.0060"	Max	0.0060"
1/2"	Max	0.0080"	Max	0.0070"	Max	0.0080"	Max	0.0080"
5/8"	Max	0.0100"	Max	0.0088"	Max	0.0100"	Max	0.0100"
3/4"	Max	0.0120"	Max	0.0105"	Max	0.0120"	Max	0.0120"
1"	Max	0.0160"	Max	0.0140"	Max	0.0160"	Max	0.0160"

Axial depth .5 x diameter of the tool

A1 Series Tolerances

D_g = -.001/-0.0015
L₁ = +.060/-0.000
d_g = -.0001/-0.0002
L = +/- .060



Routing Aluminum Skins?

Features

Stub and Standard Cutting Lengths

Nominal Minus Diameter Tolerances

Polished Flute Face for Smooth Chip Evacuation

Applications

Recommended for most plastics and thin sheet aluminum.



PM Series Single Flute Tuffly Grade Router Bit

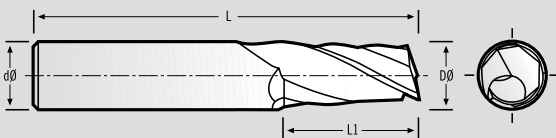
Tool Number	Cutting Diameter $d\phi$	Shank Diameter $d\phi$	Flute Length L1	OAL
Up Shear				
PM-104-04	1/8"	1/8"	1/2"	2"
PM-108-04	1/8"	1/4"	1/2"	2"
PM-106-06	3/16"	3/16"	5/8"	2"
PM-108-06	3/16"	1/4"	5/8"	2"
PM-108-06L	3/16"	1/4"	1-1/4"	3"
PM-108-08	1/4"	1/4"	3/4"	2"
PM-108-08L	1/4"	1/4"	1-1/2"	3"
PM-112-12	3/8"	3/8"	1-1/4"	3"
PM-116-16	1/2"	1/2"	1-1/2"	4"

Down Shear

PMD-108-04	1/8"	1/4"	1/2"	2"
PMD-108-06	3/16"	1/4"	5/8"	2"
PMD-108-08	1/4"	1/4"	3/4"	2"

PM Tolerances

$D\phi = +.000"/-.002"$ $d\phi = -.0001"/-.0002"$
 $L1 = +.060"/-.000"$ $L = \pm .060"$



Features

Long Cutting Length

Minimal Lift to part

Tuffly Grade Carbide

Applications

For cutting aircraft skins with minimal support.

Ability to cut skins at different elevations without support.



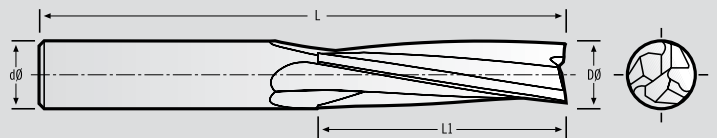
WU1-310 3 Flute Standard Length

Tool Number	Cutting Diameter $d\phi$	Shank Diameter $d\phi$	Flute Length L1	OAL	No. Flutes
10° Helix – Up Shear					
WU1-310-16	1/2"	1/2"	1-3/4"	4"	3
WU1-310-20	5/8"	5/8"	2"	4-5/8"	3
WU1-310-24	3/4"	3/4"	2-1/2"	5-1/4"	3
10° Helix – Down Shear					
WD1-310-16	1/2"	1/2"	1-3/4"	4"	3
WD1-310-20	5/8"	5/8"	2"	4-5/8"	3
WD1-310-24	3/4"	3/4"	2-1/2"	5-1/4"	3



WU1 Tolerances

$D\phi = -.001"/-.002"$ $d\phi = -.0001"/-.0002"$
 $L1 (<5/16") = +.020/+0.030$ $L = \pm .060"$
 $(>5/16") = +.030/+0.060$



Deep Pockets in Aluminum?

New FM Series!



Tackle deep pockets, thin walls and other severe aluminum applications! These tools reduce or eliminate chatter, ledging and, in many cases, eliminate the need for secondary finishing operations.

Features

- Stub Cutting Lengths
- Mirror Edge™ Geometries
- Square End or Corner Radius
- Different Neck Lengths
- Feather Blend™
- Tuffly Grade Carbide

FM-201 2 Flute Short Reach

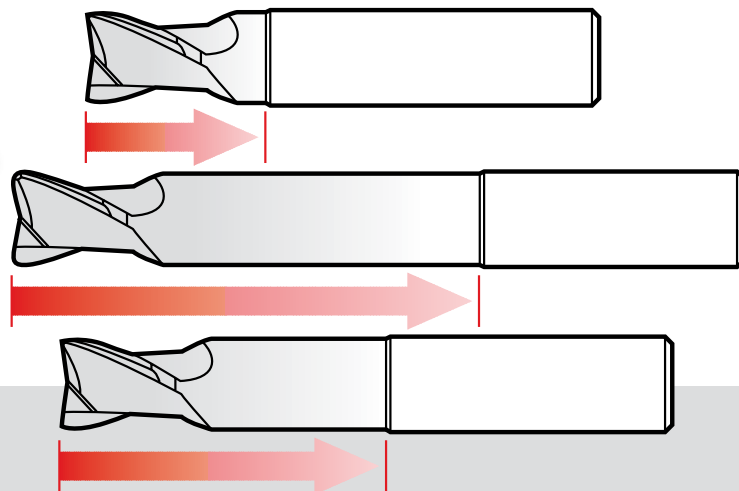
Tool Number	Cutting Diameter D _Ø	Shank Diameter d _Ø	Flute Length L ₁	R	L ₂ *	L
FM-201-08	1/4"	1/4"	1/4"	Sq. End	0.625"	3"
FM-201-08-030	1/4"	1/4"	1/4"	0.03"	0.625"	3"
FM-201-08-060	1/4"	1/4"	1/4"	0.06"	0.625"	3"
FM-201-08-090	1/4"	1/4"	1/4"	0.09"	0.625"	3"
FM-201-10	5/16"	5/16"	5/16"	Sq. End	0.875"	3-1/8"
FM-201-10-030	5/16"	5/16"	5/16"	0.03"	0.875"	3-1/8"
FM-201-10-060	5/16"	5/16"	5/16"	0.06"	0.875"	3-1/8"
FM-201-10-090	5/16"	5/16"	5/16"	0.09"	0.875"	3-1/8"
FM-201-10-120	5/16"	5/16"	5/16"	0.12"	0.875"	3-1/8"
FM-201-12	3/8"	3/8"	3/8"	Sq. End	1.000"	4"
FM-201-12-030	3/8"	3/8"	3/8"	0.03"	1.000"	4"
FM-201-12-060	3/8"	3/8"	3/8"	0.06"	1.000"	4"
FM-201-12-090	3/8"	3/8"	3/8"	0.09"	1.000"	4"
FM-201-12-120	3/8"	3/8"	3/8"	0.12"	1.000"	4"
FM-201-16	1/2"	1/2"	1/2"	Sq. End	1.250"	5"
FM-201-16-030	1/2"	1/2"	1/2"	0.03"	1.250"	5"
FM-201-16-060	1/2"	1/2"	1/2"	0.06"	1.250"	5"

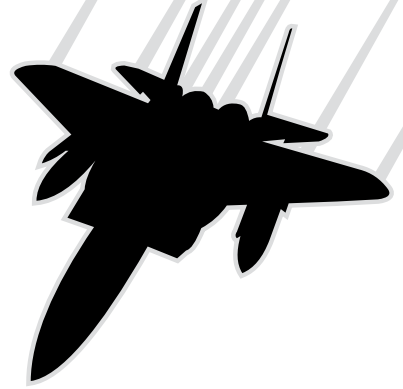
Tool Number	Cutting Diameter D _Ø	Shank Diameter d _Ø	Flute Length L ₁	R	L ₂ *	L
FM-201-16-090	1/2"	1/2"	1/2"	0.09"	1.250"	5"
FM-201-16-120	1/2"	1/2"	1/2"	0.12"	1.250"	5"
FM-201-20	5/8"	5/8"	5/8"	Sq. End	1.500"	6"
FM-201-20-030	5/8"	5/8"	5/8"	0.03"	1.500"	6"
FM-201-20-060	5/8"	5/8"	5/8"	0.06"	1.500"	6"
FM-201-20-090	5/8"	5/8"	5/8"	0.09"	1.500"	6"
FM-201-20-120	5/8"	5/8"	5/8"	0.12"	1.500"	6"
FM-201-24	3/4"	3/4"	3/4"	Sq. End	2.000"	6"
FM-201-24-030	3/4"	3/4"	3/4"	0.03"	2.000"	6"
FM-201-24-060	3/4"	3/4"	3/4"	0.06"	2.000"	6"
FM-201-24-090	3/4"	3/4"	3/4"	0.09"	2.000"	6"
FM-201-24-120	3/4"	3/4"	3/4"	0.12"	2.000"	6"
FM-201-32	1"	1"	1"	Sq. End	2.000"	6"
FM-201-32-030	1"	1"	1"	0.03"	2.000"	6"
FM-201-32-060	1"	1"	1"	0.06"	2.000"	6"
FM-201-32-090	1"	1"	1"	0.09"	2.000"	6"
FM-201-32-120	1"	1"	1"	0.12"	2.000"	6"

Metric sizes available. *Other L₂ reach lengths available on request.

Need a Different Reach?

Any neck length available at same price as the FM-204 tool!





FM-204 2 Flute Long Reach

Tool Number	Cutting Diameter D ϕ	Shank Diameter d ϕ	Flute Length L1	R	L2 *	L
FM-204-08	1/4"	1/4"	1/4"	Sq. End	1.063"	3"
FM-204-08-030	1/4"	1/4"	1/4"	0.03"	1.063"	3"
FM-204-08-060	1/4"	1/4"	1/4"	0.06"	1.063"	3"
FM-204-08-090	1/4"	1/4"	1/4"	0.09"	1.063"	3"
FM-204-10	5/16"	5/16"	5/16"	Sq. End	1.313"	3-1/8"
FM-204-10-030	5/16"	5/16"	5/16"	0.03"	1.313"	3-1/8"
FM-204-10-060	5/16"	5/16"	5/16"	0.06"	1.313"	3-1/8"
FM-204-10-090	5/16"	5/16"	5/16"	0.09"	1.313"	3-1/8"
FM-204-10-120	5/16"	5/16"	5/16"	0.12"	1.313"	3-1/8"
FM-204-12	3/8"	3/8"	3/8"	Sq. End	1.563"	4"
FM-204-12-030	3/8"	3/8"	3/8"	0.03"	1.563"	4"
FM-204-12-060	3/8"	3/8"	3/8"	0.06"	1.563"	4"
FM-204-12-090	3/8"	3/8"	3/8"	0.09"	1.563"	4"
FM-204-12-120	3/8"	3/8"	3/8"	0.12"	1.563"	4"
FM-204-16	1/2"	1/2"	1/2"	Sq. End	2.125"	5"
FM-204-16-030	1/2"	1/2"	1/2"	0.03"	2.125"	5"
FM-204-16-060	1/2"	1/2"	1/2"	0.06"	2.125"	5"

Tool Number	Cutting Diameter D ϕ	Shank Diameter d ϕ	Flute Length L1	R	L2 *	L
FM-204-16-090	1/2"	1/2"	1/2"	0.09"	2.125"	5"
FM-204-16-120	1/2"	1/2"	1/2"	0.12"	2.125"	5"
FM-204-20	5/8"	5/8"	5/8"	Sq. End	2.625"	6"
FM-204-20-030	5/8"	5/8"	5/8"	0.03"	2.625"	6"
FM-204-20-060	5/8"	5/8"	5/8"	0.06"	2.625"	6"
FM-204-20-090	5/8"	5/8"	5/8"	0.09"	2.625"	6"
FM-204-20-120	5/8"	5/8"	5/8"	0.12"	2.625"	6"
FM-204-24	3/4"	3/4"	3/4"	Sq. End	3.125"	6"
FM-204-24-030	3/4"	3/4"	3/4"	0.03"	3.125"	6"
FM-204-24-060	3/4"	3/4"	3/4"	0.06"	3.125"	6"
FM-204-24-090	3/4"	3/4"	3/4"	0.09"	3.125"	6"
FM-204-24-120	3/4"	3/4"	3/4"	0.12"	3.125"	6"
FM-204-32	1"	1"	1"	Sq. End	4.000"	6"
FM-204-32-030	1"	1"	1"	0.03"	4.000"	6"
FM-204-32-060	1"	1"	1"	0.06"	4.000"	6"
FM-204-32-090	1"	1"	1"	0.09"	4.000"	6"
FM-204-32-120	1"	1"	1"	0.12"	4.000"	6"

Metric sizes available. *Other L2 reach lengths available on request.

FM Series Speed and Feed

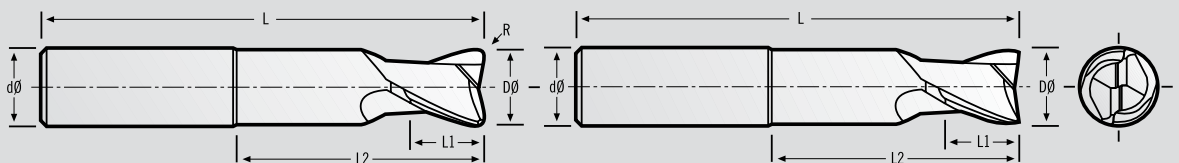
FM-201 and FM-204

Tool Diameter	Typical Z-Depth	Aluminum 6061-T6		Aluminum 6061-T3		Aluminum 7075		Aluminum 2024	
		RPM	CLPT	RPM	CLPT	RPM	CLPT	RPM	CLPT
1/4"	0.1500"	Max	0.0040"	Max	0.0035"	Max	0.0040"	Max	0.0040"
5/16"	0.1500"	Max	0.0050"	Max	0.0044"	Max	0.0050"	Max	0.0050"
3/8"	0.1875"	Max	0.0060"	Max	0.0053"	Max	0.0060"	Max	0.0060"
1/2"	0.2000"	Max	0.0080"	Max	0.0070"	Max	0.0080"	Max	0.0080"
5/8"	0.2000"	Max	0.0100"	Max	0.0088"	Max	0.0100"	Max	0.0100"
3/4"	0.2500"	Max	0.0120"	Max	0.0105"	Max	0.0120"	Max	0.0120"
1"	0.2500"	Max	0.0160"	Max	0.0140"	Max	0.0160"	Max	0.0160"

Z-depth of cut per pass should be deeper than the corner radius to help reduce chatter

FM Series Tolerances

D ϕ = $-0.001/-0.0015$
 L1 = $+0.060/-0.000$
 d ϕ = $-0.001/-0.0002$
 L = ± 0.060



Machining X Series! High-Temp Alloy

The X-Series End Mills significantly increases material removal rates in stainless steels, high-temp alloys and titanium, while seriously decreasing your cost per part.

These tools are engineered using application-specific carbide grades, geometries, and coatings. These patent-pending tools are available in stub and standard lengths, with corner radii or full ball ends.



XG-400 4 Flute Stub Length

Tool Number	Cutter Diameter D ϕ	Corner Radius	Shank Diameter d ϕ	Flute Length L1	Overall Length L
XG-400-08	1/4"	.017-.019	1/4"	3/8"	2-1/2"
XG-400-10	5/16"	.020-.022	5/16"	7/16"	2-1/2"
XG-400-12	3/8"	.023-.025	3/8"	1/2"	2-1/2"
XG-400-16	1/2"	.025-.027	1/2"	5/8"	3"
XG-400-20	5/8"	.027-.029	5/8"	3/4"	3-1/2"
XG-400-24	3/4"	.028-.030	3/4"	1"	4"
XG-400-32	1"	.028-.030	1"	1-1/8"	5"

XG-402 4 Flute Standard Length

Tool Number	Cutter Diameter D ϕ	Corner Radius	Shank Diameter d ϕ	Flute Length L1	Overall Length L
XG-402-08	1/4"	.017-.019	1/4"	3/4"	2-1/2"
XG-402-10	5/16"	.020-.022	5/16"	13/16"	2-1/2"
XG-402-12	3/8"	.023-.025	3/8"	7/8"	2-1/2"
XG-402-16	1/2"	.025-.027	1/2"	1"	3"
XG-402-20	5/8"	.027-.029	5/8"	1-1/4"	3-1/2"
XG-402-24	3/4"	.028-.030	3/4"	1-1/2"	4"
XG-402-32	1"	.028-.030	1"	2"	5"



XG-402BN 4 Flute Ball End Standard Length

Tool Number	Cutter Diameter D ϕ	Corner Radius	Shank Diameter d ϕ	Flute Length L1	Overall Length L
XG-402-08BN	1/4"	-	1/4"	3/4"	2-1/2"
XG-402-10BN	5/16"	-	5/16"	13/16"	2-1/2"
XG-402-12BN	3/8"	-	3/8"	7/8"	2-1/2"
XG-402-16BN	1/2"	-	1/2"	1"	3"
XG-402-20BN	5/8"	-	5/8"	1-1/4"	3-1/2"
XG-402-24BN	3/4"	-	3/4"	1-1/2"	4"
XG-402-32BN	1"	-	1"	2"	5"

Features

- Application Specific Carbide Grades and Geometries
- Infinium A Coated
- Tightest Tolerances for Consistent Performance
- 4 Flute for Roughing Operations
- 6/8 Flute for Finishing Operations

Advantages

- Reduce Cycle Times
- Increase Part Output
- Reduces Vibration
- Improve Part Accuracy
- Reduce Scrap
- Run at Faster Feeds and Speeds



XF-602 6 Flute Standard Length

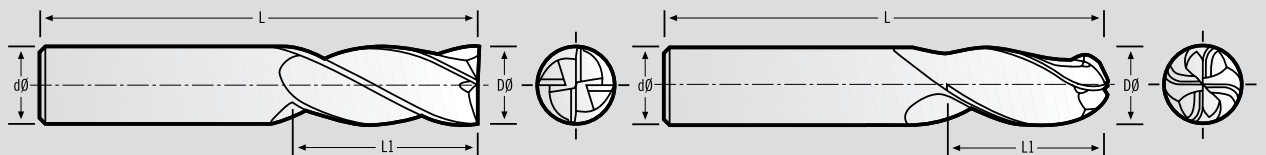
Tool Number	Cutter Diameter D ϕ	Corner Radius	Shank Diameter d ϕ	Flute Length L1	Overall Length L
XF-602-12-030	3/8"	0.030	3/8"	7/8"	2-1/2"
XF-602-12-060	3/8"	0.060	3/8"	7/8"	2-1/2"
XF-602-12-090	3/8"	0.090	3/8"	7/8"	2-1/2"
XF-602-16-030	1/2"	0.030	1/2"	1"	3"
XF-602-16-060	1/2"	0.060	1/2"	1"	3"
XF-602-16-090	1/2"	0.090	1/2"	1"	3"
XF-602-16-120	1/2"	0.120	1/2"	1"	3"
XF-602-20-030	5/8"	0.030	5/8"	1-1/4"	3-1/2"
XF-602-20-060	5/8"	0.060	5/8"	1-1/4"	3-1/2"
XF-602-20-090	5/8"	0.090	5/8"	1-1/4"	3-1/2"
XF-602-20-120	5/8"	0.120	5/8"	1-1/4"	3-1/2"



XF-802 8 Flute Standard Length

Tool Number	Cutter Diameter D ϕ	Corner Radius	Shank Diameter d ϕ	Flute Length L1	Overall Length L
XF-802-24-060	3/4"	0.060	3/4"	1-1/2"	4"
XF-802-24-090	3/4"	0.090	3/4"	1-1/2"	4"
XF-802-24-120	3/4"	0.120	3/4"	1-1/2"	4"
XF-802-32-060	1"	0.060	1"	2"	5"
XF-802-32-090	1"	0.090	1"	2"	5"
XF-802-32-120	1"	0.120	1"	2"	5"

XG/XF Tolerances
 D ϕ = $\pm .001"/\pm .002"$
 L1 = $\pm .060"/\pm .000"$
 d ϕ = $\pm .0001"/\pm .0002"$
 L = $\pm .060"$





XG-Series Speed and Feed

Material	Surface Footage	1/4		5/16		3/8		1/2		5/8		3/4		1	
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
Cast Iron															
Ductile	400	6112	28	4890	34	4075	39	3056	43	2445	39	2037	34	1528	30
Gray	525	8022	42	6418	51	5348	58	4011	64	3209	58	2674	51	2006	45
Inconel															
625/718	100	1528	4	1222	5	1019	6	764	7	611	6	509	5	382	5
Steel															
1018/1020	500	7640	32	6112	39	5093	44	3820	49	3056	44	2547	39	1910	34
4130	400	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
4140	400	6112	20	4890	24	4075	28	3056	31	2445	28	2037	24	1528	21
4340	415	6341	21	5073	25	4227	29	3171	32	2536	29	2114	25	1585	22
Stainless Steel															
303	550	8404	31	6723	38	5603	43	4202	48	3362	43	2801	38	2101	34
304	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
316	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
15-5/17-4	300	4584	13	3667	16	3056	18	2292	20	1834	18	1528	16	1146	14
13-8	300	4584	13	3667	16	3056	18	2292	20	1834	18	1528	16	1146	14
440C	300	4584	13	3667	16	3056	18	2292	20	1834	18	1528	16	1146	14
Tool Steel (Annealed)															
A2	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
D2	360	5501	16	4401	19	3667	22	2750	24	2200	22	1834	19	1375	17
H13	400	6112	17	4890	22	4075	24	3056	27	2445	24	2037	22	1528	19
P20	400	6112	23	4890	28	4075	31	3056	35	2445	31	2037	28	1528	24
Titanium															
Com. pure	300	4584	17	3667	21	3056	24	2292	26	1834	24	1528	21	1146	18
6AL-4V	200	3056	9	2445	11	2037	12	1528	13	1222	12	1019	11	764	9
6AL-6V	175	2674	8	2139	9	1783	11	1337	12	1070	11	891	9	669	8

XF-Series Speed and Feeds

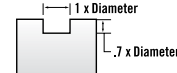
Material	Surface Footage	3/8		1/2		5/8		3/4		1	
		RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
Cast Iron											
Ductile	400	4075	29	3056	32	2445	29	2037	34	1528	30
Gray	525	5348	43	4011	48	3209	43	2674	51	2006	45
Inconel											
625/718	150	1528	6	1146	7	917	6	764	8	573	7
Steel											
1018/1020	500	5093	31	3820	34	3056	31	2547	37	1910	32
4130	400	4075	21	3056	23	2445	21	2037	24	1528	21
4140	400	4075	21	3056	23	2445	21	2037	24	1528	21
4340	415	4227	21	3171	24	2536	21	2114	25	1585	22
Stainless Steel											
303	550	5603	31	4202	34	3362	31	2801	36	2101	32
304	400	4075	18	3056	20	2445	18	2037	22	1528	19
316	400	4075	18	3056	20	2445	18	2037	22	1528	19
15-5/17-4	300	3056	14	2292	15	1834	14	1528	16	1146	14
13-8	300	3056	14	2292	15	1834	14	1528	16	1146	14
440C	300	3056	14	2292	15	1834	14	1528	16	1146	14
Tool Steel (Annealed)											
A2	400	4075	18	3056	20	2445	18	2037	22	1528	19
D2	360	3667	16	2750	18	2200	16	1834	19	1375	17
H13	400	4075	18	3056	20	2445	18	2037	22	1528	19
P20	400	4075	22	3056	25	2445	22	2037	26	1528	23
Titanium											
Com. pure	300	3056	17	2292	19	1834	17	1528	20	1146	17
6AL-4V	380	3871	21	2903	24	2323	21	1935	25	1452	22
6AL-6V	175	1783	10	1337	11	1070	10	891	12	669	10

General Guidelines

- Speed and feeds are based on applications with very rigid machine tools, toolholders, and fixturing. Speeds and feeds will vary dramatically depending on the application. Extreme forces can be generated and can cause damage, if not appropriate for the cutting conditions.
- Helical interpolation or ramping should be used to enter pockets.
- For the highest material removal rates and longest tool life profile milling is preferred over slotting (See diagrams below).
- Climb milling is recommended.
- For ball end tools reduce feed rate by 10%.

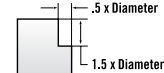
Slotting

For XG and MXG only



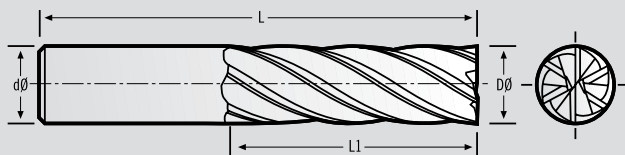
Profiling

For XG and MXG only



Finish Profiling

.02 x Diameter



Routing Composites?

Features

Square End

2 Flute
Standard Cutting Lengths
Non-Center Cutting PCD with Center Cutting Carbide
Special Sizes and Configurations Available

Ball End

2 Flute
Stub Cutting Length
Center Cutting
Special Sizes and Configurations Available

Applications

Recommended for non-ferrous and highly abrasive materials.

Features

6 Flutes
Compression Up and Down Shear
Diamond, DLC, or Uncoated

Applications

6 Flute compression.
Great for trimming composite material, minimizes delamination.



PCD-203 2 Flute Standard Length

Tool Number	Cutter Diameter D ϕ	Shank Diameter d ϕ	Flute Length L1	Overall Length L
PCD-203-04	1/8"	1/8"	3/8"	1-1/2"
PCD-203-06	3/16"	3/16"	1/2"	2"
PCD-203-08	1/4"	1/4"	5/8"	2"
PCD-203-12	3/8"	3/8"	3/4"	2-1/2"
PCD-203-16	1/2"	1/2"	1"	3"
PCD-203-20	5/8"	5/8"	1"	3-1/4"
PCD-203-24	3/4"	3/4"	1"	4"



PCD-201BN 2 Flute Ball End Stub Length

Tool Number	Cutter Diameter D ϕ	Shank Diameter d ϕ	Flute Length L1	Overall Length L
PCD-201-04BN	1/8"	1/8"	1/4"	1-1/2"
PCD-201-06BN	3/16"	3/16"	5/16"	2"
PCD-201-08BN	1/4"	1/4"	3/8"	2"
PCD-201-12BN	3/8"	3/8"	1/2"	2-1/2"
PCD-201-16BN	1/2"	1/2"	5/8"	3"
PCD-201-20BN	5/8"	5/8"	7/8"	3-1/4"
PCD-201-24BN	3/4"	3/4"	1"	4"

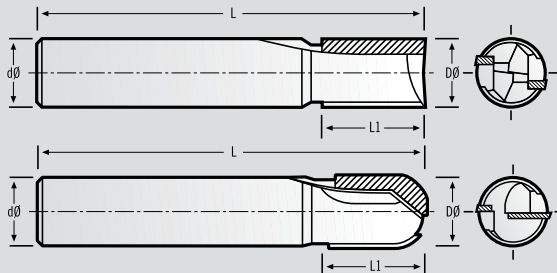


CR-602 6 Flute Standard Length

Tool Number	D ϕ	No. of Flutes	Upshear Length	LOC	Shank	OAL	Coating
CR-402-08	1/4"	4	3/16"	3/4"	1/4"	2-1/2"	Uncoated
CR-402-08BW	1/4"	4	3/16"	3/4"	1/4"	2-1/2"	DLC
CR-402-08D	1/4"	4	3/16"	3/4"	1/4"	2-1/2"	Diamond
CR-602-12	3/8"	6	1/4"	1"	3/8"	2-1/2"	Uncoated
CR-602-12BW	3/8"	6	1/4"	1"	3/8"	2-1/2"	DLC
CR-602-12D	3/8"	6	1/4"	1"	3/8"	2-1/2"	Diamond
CR-602-16	1/2"	6	1/4"	1-1/8"	1/2"	3"	Uncoated
CR-602-16BW	1/2"	6	1/4"	1-1/8"	1/2"	3"	DLC
CR-602-16D	1/2"	6	1/4"	1-1/8"	1/2"	3"	Diamond

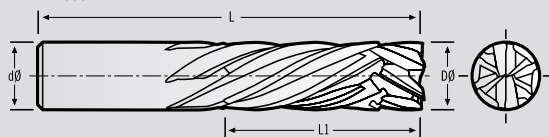
PCD Tolerances

D ϕ = ± 0.003 "
L1 = ± 0.030
d ϕ = -0.001 "/
 -0.0002 "
L = ± 0.060 "



CR Tolerances

D ϕ = -0.001 / -0.003 "
L1 (<5/16") = $+0.020$ / $+0.030$
(>5/16") = $+0.030$ / $+0.060$
d ϕ = -0.0001 "/ -0.0002 "
L = ± 0.060 "

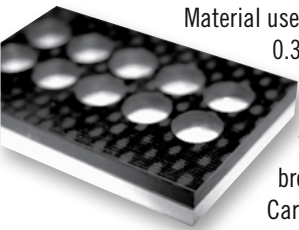


Drilling Holes in Composites?

RobbJack and Crystallume are proud to introduce our new expanded line of diamond-coated aircraft drills.



These tools were developed in a NIST (*National Institute of Science and Technology*) program that involved a research partnership with Boeing Aircraft and three other large manufacturing companies. Information from that program is presented in the chart below.



Material used in the study was 8-276 carbon fiber laminate, 0.30" thick. Test tools were .191 and .251 diameter drill countersinks. The graph compares the number of holes drilled vs. the thrust required.

The test was concluded at 50 lbs. of thrust when breakout and haloing became unacceptable.

Carbide lasted approximately 200 holes, PCD lasted

1,500 holes and Crystallume DCC lasted 2,700 holes. Also,

note that the sharper carbide tool started with the lowest thrust while the PCD and Crystallume DCC started with about the same thrust (even though the PCD is a ground edge and the Crystallume DCC is a coated, faceted edge). These test lab results were repeated on the production floor.

Features

Common Rivet Sizes Available from Stock

Standard Drills are Four Facet, 118°

Other Drill Points Available

Custom Tools Available

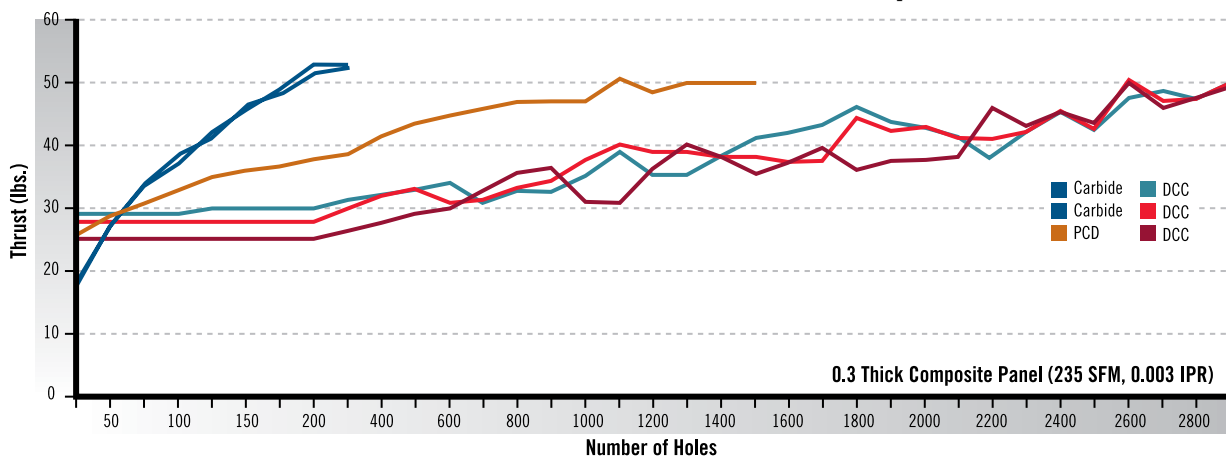
Applications

The most cost-effective and efficient way to drill holes in high-performance composite materials.

Diamond Coated Aircraft Drills

Part Number	Decimal Equivalent	Tolerance from Nominal Min	Max	Flute Length	OAL
P810-100345-1	0.0980	+0.000	-0.005	1.40	2.70
P810-100334-1	0.1285	+0.000	-0.005	1.40	2.70
P810-100402-1	0.1421	+0.000	-0.005	1.40	2.70
P810-100409-1	0.1560	+0.000	-0.005	1.40	2.70
P810-100335-1	0.1655	+0.000	-0.005	1.40	2.70
P810-100404-1	0.1734	+0.000	-0.005	1.40	2.70
P810-100400-1	0.1900	+0.000	-0.005	1.40	2.70
P810-100336-1	0.1915	+0.000	-0.005	1.40	2.70
P810-100411-1	0.1990	+0.000	-0.005	1.40	2.70
P810-100405-1	0.2055	+0.000	-0.005	1.40	2.70
P810-100346-1	0.2210	+0.000	-0.005	1.40	2.70
P810-100337-1	0.2515	+0.000	-0.005	1.40	2.70
P810-100406-1	0.2590	+0.000	-0.005	1.40	2.70
P810-100407-1	0.2710	+0.000	-0.005	1.40	2.70
P810-100412-1	0.2770	+0.000	-0.005	1.40	2.70
P810-100408-1	0.2800	+0.000	-0.005	1.40	2.70
P810-100410-1	0.2812	+0.000	-0.005	1.40	2.70
P810-100338-1	0.3135	+0.000	-0.005	1.50	2.70
P810-100341-1	0.3765	+0.000	-0.005	1.50	2.70

DCC Drill Test Results in Carbon Fiber Reinforced Composites



Need Something Special?

RobbJack manufactures a wide variety of tools in addition to those listed in this brochure.

We can make tools for your specific needs by modifying standard tools or through custom manufacture.

We can work directly from your prints to design and build the exact tool for your requirements.

Contact us if you need:

- Special Cutting and/or Shank Diameters
- Special Cutting Length and/or Overall Lengths
- Corner Radii, Full Ball or Corner Chamfer Configurations
- Chip Breakers or Roughing Cutters
- Special Tolerances
- Tapered End Mills, Constant Helix or Constant Lead.
- Special Coatings – DLC, AlTiN, TiCN, CrN, TiN, ZrN and others available.

To get a quote or more information about a custom tool, fax or call us with your specifications and any other pertinent information. If you are not sure of the best configuration for your application, we will be glad to help you.

For more information contact:

ROBB JACK
CORPORATION
Manufacturers of Premium Rotary Cutting Tools

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Lincoln, CA 95648
Toll Free: (800) 527-8883
Phone: (916) 645-6045
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www.robjack.com

Canada Toll-Free: (877) 527-8883
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The XG-402 tool with Mirror Edge™ added to reduce chatter and necked to reach deep into part.



3 Flute PCD cutter to increase feed rate in a CFRP trimming application.



CFRP trimming tool with a drill point.



Drill counter sink for titanium inconel stack up.



Hand reaming and countersinking for rivet preparation in CFRP aircraft skins.



Threaded XG tool to cut titanium.



A complete selection of saws are available, many in stock. Go to www.robjack.com for more info.