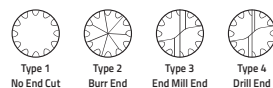
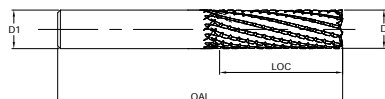


INCH **URT5P1AF, URT5P1AG, URT5P1AH, URT5P1AI** SERIES
METRIC **URT5P2AF, URT5P2AG, URT5P2AH, URT5P2AI** SERIES

SOLID CARBIDE, CFRP ROUTERS WITH CHIP BREAKER HELICAL FLUTES

High performance machining of CFRP, using as rougher or finisher
YG-1 special CVD coating for extended tool life and better abrasion resistance



INCH SIZES

(Unit : inch)

EDP				Mill Diameter D		Shank Diameter D1	Length of Cut LOC	Overall Length OAL	No. of Flutes
TYPE 1	TYPE 2	TYPE 3	TYPE 4	Fractional	Decimal				
URT5P1AF0125	URT5P1AG0125	URT5P1AH0125	URT5P1AI0125	1/8	.1250	1/8	1/2	3	Multi Flute
URT5P1AF0250	URT5P1AG0250	URT5P1AH0250	URT5P1AI0250	1/4	.2500	1/4	1	3	Multi Flute
URT5P1AF0375	URT5P1AG0375	URT5P1AH0375	URT5P1AI0375	3/8	.3750	3/8	1	3	Multi Flute
URT5P1AF0500	URT5P1AG0500	URT5P1AH0500	URT5P1AI0500	1/2	.5000	1/2	1-1/2	4	Multi Flute

METRIC SIZES

(Unit : mm)

EDP				Mill Diameter D		Shank Diameter D1	Length of Cut LOC	Overall Length OAL	No. of Flutes
TYPE 1	TYPE 2	TYPE 3	TYPE 4						
URT5P2AF0300	URT5P2AG0300	URT5P2AH0300	URT5P2AI0300	3		3	9	50	Multi Flute
URT5P2AF0600	URT5P2AG0600	URT5P2AH0600	URT5P2AI0600	6		6	18	65	Multi Flute
URT5P2AF0800	URT5P2AG0800	URT5P2AH0800	URT5P2AI0800	8		8	24	70	Multi Flute
URT5P2AF1000	URT5P2AG1000	URT5P2AH1000	URT5P2AI1000	10		10	30	80	Multi Flute
URT5P2AF1200	URT5P2AG1200	URT5P2AH1200	URT5P2AI1200	12		12	36	100	Multi Flute

► Available as made to order

SOLID CARBIDE, CFRP COMPRESSION ROUTERS WITH / WITHOUT CHIP BREAKERS

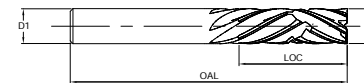
CFRP & GFRP compression routers for delamination free cut
YG-1 special CVD coating for extended tool life and better abrasion resistance



► TYPE 1
(without chipbreakers)



► TYPE 2
(with chipbreakers)



INCH SIZES

(Unit : inch)

EDP		Mill Diameter D		Shank Diameter D1	Length of Cut LOC	Overall Length OAL	No. of Flutes
Type 1 (without Chipbreakers)	Type 2 (with Chipbreakers)	Fractional	Decimal				
URT5P1AN0250	URT5P1AO0250	1/4	.2500	1/4	1	3	6
URT5P1AN0375	URT5P1AO0375	3/8	.3750	3/8	1	3	6
URT5P1AN0500	URT5P1AO0500	1/2	.5000	1/2	1-1/2	4	6

METRIC SIZES

(Unit : mm)

EDP		Mill Diameter D		Shank Diameter D1	Length of Cut LOC	Overall Length OAL	No. of Flutes
Type 1 (without Chipbreakers)	Type 2 (with Chipbreakers)						
URT5P2AN0600	URT5P2AO0600	6		6	18	65	6
URT5P2AN0800	URT5P2AO0800	8		8	24	70	6
URT5P2AN1000	URT5P2AO1000	10		10	30	80	6
URT5P2AN1200	URT5P2AO1200	12		12	36	100	6

► Available as made to order

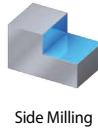
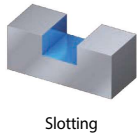
Diamond Coated Compression Routers



Features

- The unique flute structure provides good surface finish, longer tool life and requires less cutting force
- Reduces delamination and fibers pullout
- Roughing and finish process
- Multiple flutes end mills
- Diamond coating with excellent abrasion resistance

Application



CFRP Panel

- Material : T700 12K (Size : 400x300x14mm)
- Material : T300 (Size : 400x300x14mm)

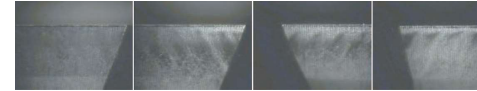
Cutting Condition

MATERIAL (CFRP) THICKNESS	OPERATION	SPINDLE SPEED	TABLE FEED	DEPTH OF CUT
0.5 - 0.75"	Side Milling (Profiling)	4500 RPM	40 IPM	HALF OF TOOL DIAMETER
0.5 - 0.75"	SLOTTING	3500 RPM	30 IPM	Dual Helix's crossing point in CFRP THICKNESS
0.5 - 0.75"	Trimming	3500 RPM	30 IPM	

YG-1 New design Test Result (Side Milling Evaluation)

Diameter	LOC	OAL	Flute No.	Helix	Coating
0.5"	1"	3"	6	30	CVD
MATERIAL (CFRP) THICKNESS	OPERATION	SPINDLE SPEED	TABLE FEED	DEPTH OF CUT	
0.5 - 0.75"	SIDE MILLING	4500 RPM	40 IPM	HALF OF TOOL DIAMETER	

1. Tooling pictures after Side Milling testing



2. CFRP Panel pictures

- Smooth surface finish
- No edge breakout on Side Milling part



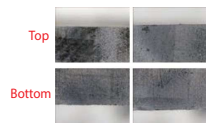
YG-1 New design Test Result (Trimming Evaluation)

Diameter	LOC	OAL	Flute No.	Helix	Coating
0.5"	1"	3"	6	30	CVD
MATERIAL (CFRP) THICKNESS	OPERATION	SPINDLE SPEED	TABLE FEED	DEPTH OF CUT	
0.5 - 0.75"	Trimming	3500 RPM	30 IPM	Full	

1. Tooling pictures after Trimming cutting testing



2. CFRP Panel pictures



• No edge breakout on trimmed part

YG-1 New design Test Result (Slotting Evaluation)

Diameter	LOC	OAL	Flute No.	Helix	Coating
0.5"	1"	3"	6	30	CVD
MATERIAL (CFRP) THICKNESS	OPERATION	SPINDLE SPEED	TABLE FEED	DEPTH OF CUT	
0.5 - 0.75"	SLOTTING	3500 RPM	30 IPM	0.295"	

1. Tooling pictures after Slotting testing



CUTTING CONDITIONS LIST

MILLING

MATERIAL	OPERATION	Tool Diameter in(mm)											
		1/8" (3.175mm)			1/4" (6.35mm)			3/8" (9.53mm)			1/2" (12.7mm)		
		RPM	FEED (IPM)	FEED (mm/min.)	RPM	FEED (IPM)	FEED (mm/min.)	RPM	FEED (IPM)	FEED (mm/min.)	RPM	FEED (IPM)	FEED (mm/min.)
CFRP	SLOTING	12000	30	762	6000	30	762	4500	30	762	4000	30	762
	SIDE MILLING (PROFILING)	15000	50	1270	8000	45	1143	5000	45	1143	4000	40	1016
GFRP	SLOTING	10000	25	635	5000	25	635	4000	25	635	3500	25	635
	SIDE MILLING (PROFILING)	12000	35	889	7000	35	889	5500	35	889	4500	35	889
HONEY COMB	SLOTING	25000	100	2540	20000	100	2540	18000	100	2540	15000	400	10160
	SIDE MILLING (PROFILING)	25000	100	2540	25000	100	2540	25000	100	2540	25000	400	10160

DRILLING

WORK MATERIAL	SPEED (SFM)	Tool Diameter (inch)			SPEED (m/min.)	Tool Diameter (mm)		
		1/4-3/8	3/8-1/2	1/2-1.00		6.35-9.525	9.525-12.7	12.7-25.4
		FEED (IPR)				FEED (mm/rev.)		
CFRP, GFRP	300 - 400	.006 - .008	.008 - .015	.015 - .025	91.4 - 121.9	.1524 - .2032	.2032 - .381	.381 - 0.635
CFRP/AL	300 - 400	.006 - .008	.008 - .015	.015 - .025	91.4 - 121.9	.1524 - .2032	.2032 - .381	.381 - 0.635
CFRP/Ti	30 - 70	.006 - .010	.010 - .015	.015 - .020	9.1 - 21.3	.1524 - .254	.1524 - .381	.381 - 0.508

REAMERS

WORK MATERIAL	SPEED (SFM)	Tool Diameter (inch)			SPEED (m/min.)	Tool Diameter (mm)		
		1/4-3/8	3/8-1/2	1/2-1.00		6.35-9.525	9.525-12.7	12.7-25.4
		FEED (IPR)				FEED (mm/rev.)		
CFRP, GFRP	300 - 400	.006 - .008	.008 - .015	.015 - .025	91.4 - 121.9	.1524 - .2032	.2032 - .381	.381 - 0.635
CFRP/AL	300 - 400	.006 - .008	.008 - .015	.015 - .025	91.4 - 121.9	.1524 - .2032	.2032 - .381	.381 - 0.635
CFRP/Ti	30 - 70	.006 - .010	.010 - .015	.015 - .020	9.1 - 21.3	.1524 - .254	.1524 - .381	.381 - 0.508

ICON GUIDE LIST

ICON	Contents	ICON	Contents
	Micro Grain Carbide		Cutting Condition
	Polycrystalline Diamond		CFRP (Carbon Fiber Reinforced Plastics)
	Diamond Coating		GFRP (Glass Fiber Reinforced Plastics)
	Point Angle		KFRP (Kevlar Fiber Reinforced Plastics)
	No. of Flutes		CFRP / Aluminum
			CFRP / Titanium
	Type of Shank		Honeycomb
	Helix Angle		Gantry Machine
	Chamfer Angle		Robot Machine
	O.D Tolerance of Reamer (DIN 1420 for H7)		Hand Held Hand Held(Micro-Stop)
	Internal Coolant Holes		Type of End Teeth

COMPOSITE MILLING TOOLS INDEX

INCH METRIC	MODEL	NO. OF FLUTES	HELIX ANGLE	DESCRIPTION	SIZE		PAGE
					INCH	METRIC	
URT5P1AA URT5P2AA		4 Flute	15°	Solid Carbide, CFRP Routers with Low Spiral Flute with CVD Coating for Graphite, Plastics, Bakelite and wood	1/8 ~ 1/2	3.0 ~ 12.0	20
URT5P1AB URT5P2AB		4-8 Flute	0°	Solid Carbide, CFRP Routers with Chip Breaker Straight Flutes with CVD Coating for CFRP roughing and one shot operation (Type 1-No End Cut)	1/8 ~ 1/2	3.0 ~ 12.0	21
URT5P1AC URT5P2AC		4-8 Flute	0°	Solid Carbide, CFRP Routers with Chip Breaker Straight Flutes with CVD Coating for CFRP roughing and one shot operation (Type 2-Burr End)	1/8 ~ 1/2	3.0 ~ 12.0	21
URT5P1AD URT5P2AD		4-8 Flute	0°	Solid Carbide, CFRP Routers with Chip Breaker Straight Flutes with CVD Coating for CFRP roughing and one shot operation (Type 3-End Mill End)	1/8 ~ 1/2	3.0 ~ 12.0	21
URT5P1AE URT5P2AE		4-8 Flute	0°	Solid Carbide, CFRP Routers with Chip Breaker Straight Flutes with CVD Coating for CFRP roughing and one shot operation (Type 4-Drill End)	1/8 ~ 1/2	3.0 ~ 12.0	21
URT5P1AF URT5P2AF		Multi Flute	15°	Solid carbide, CFRP Routers with Chip Breaker Helical Flutes with CVD Coating for CFRP roughing and one shot operation (Type 1-No End Cut)	1/8 ~ 1/2	3.0 ~ 12.0	22
URT5P1AG URT5P2AG		Multi Flute	15°	Solid carbide, CFRP Routers with Chip Breaker Helical Flutes with CVD Coating for CFRP roughing and one shot operation (Type 2-Burr End)	1/8 ~ 1/2	3.0 ~ 12.0	22
URT5P1AH URT5P2AH		Multi Flute	15°	Solid carbide, CFRP Routers with Chip Breaker Helical Flutes with CVD Coating for CFRP roughing and one shot operation (Type 3-End Mill End)	1/8 ~ 1/2	3.0 ~ 12.0	22
URT5P1AI URT5P2AI		Multi Flute	15°	Solid carbide, CFRP Routers with Chip Breaker Helical Flutes with CVD Coating for CFRP roughing and one shot operation (Type 4-Drill End)	1/8 ~ 1/2	3.0 ~ 12.0	22
URT5P1AN URT5P2AN		6 Flute	30° /30°	Solid Carbide, CFRP Compression Routers with CVD Coating for CFRP	1/4 ~ 1/2	6.0 ~ 12.0	23
URT5P1AO URT5P2AO		6 Flute	30° /30°	Solid Carbide, CFRP Compression Routers with chip breakers with CVD coating for CFRP	1/4 ~ 1/2	6.0 ~ 12.0	23
URT5P1AP URT5P2AP		8 Flute	15°	Solid Carbide, CFRP Finishing Routers with CVD Coating for CFRP	1/4 ~ 1/2	6.0 ~ 12.0	24
URT5A1AJ URT5A2AJ		Multi Flute	-	Solid Carbide, Fiberglass Routers For GFRP roughing and one shot operation (Type 1-No End Cut)	1/8 ~ 1/2	3.0 ~ 12.0	25
URT5A1AK URT5A2AK		Multi Flute	-	Solid Carbide, Fiberglass Routers For GFRP roughing and one shot operation (Type 2-Burr End)	1/8 ~ 1/2	3.0 ~ 12.0	25
URT5A1AL URT5A2AL		Multi Flute	-	Solid Carbide, Fiberglass Routers For GFRP roughing and one shot operation (Type 3-End Mill End)	1/8 ~ 1/2	3.0 ~ 12.0	25
URT5A1AM URT5A2AM		Multi Flute	-	Solid Carbide, Fiberglass Routers For GFRP roughing and one shot operation (Type 4-Drill End)	1/8 ~ 1/2	3.0 ~ 12.0	25
URT5A1AQ URT5A2AQ		2 Flute	-	Solid Carbide, Kevlar Routers for Kevlar composites	1/4 ~ 1/2	6.0 ~ 12.0	26
URT5A1AR URT5A2AR		Multi Flute	-	Solid Carbide, Honeycomb Routers for honeycomb core	1/4 ~ 1/2	6.0 ~ 12.0	27

⊙ : Excellent ○ : Good

Working Material				Application				Machine Type	
CFRP	GFRP	Kevlar	HoneyComb	Roughing	Slotting	Full Cutting	Finishing	Gantry	Robot
⊙	○			⊙	○	⊙	○	⊙	○
⊙				⊙	⊙	⊙	○	⊙	○
○				⊙	○	⊙	○	⊙	○
⊙				⊙	⊙	⊙	○	⊙	○
○				⊙	○	⊙	○	⊙	○
⊙				⊙	⊙	⊙		⊙	○
○				⊙	○	⊙		⊙	○
⊙				⊙	⊙	⊙		⊙	○
○				⊙	○	⊙		⊙	○
⊙	○			⊙	⊙	⊙	○	⊙	○
○	○			⊙	○	⊙		⊙	○
⊙	○			○	○	○	○	⊙	○
○	○			⊙	○	⊙	○	⊙	○
○	○			○	○	○		⊙	○
		○		○	○	○		○	○
			○	⊙	⊙	⊙	○	⊙	○