

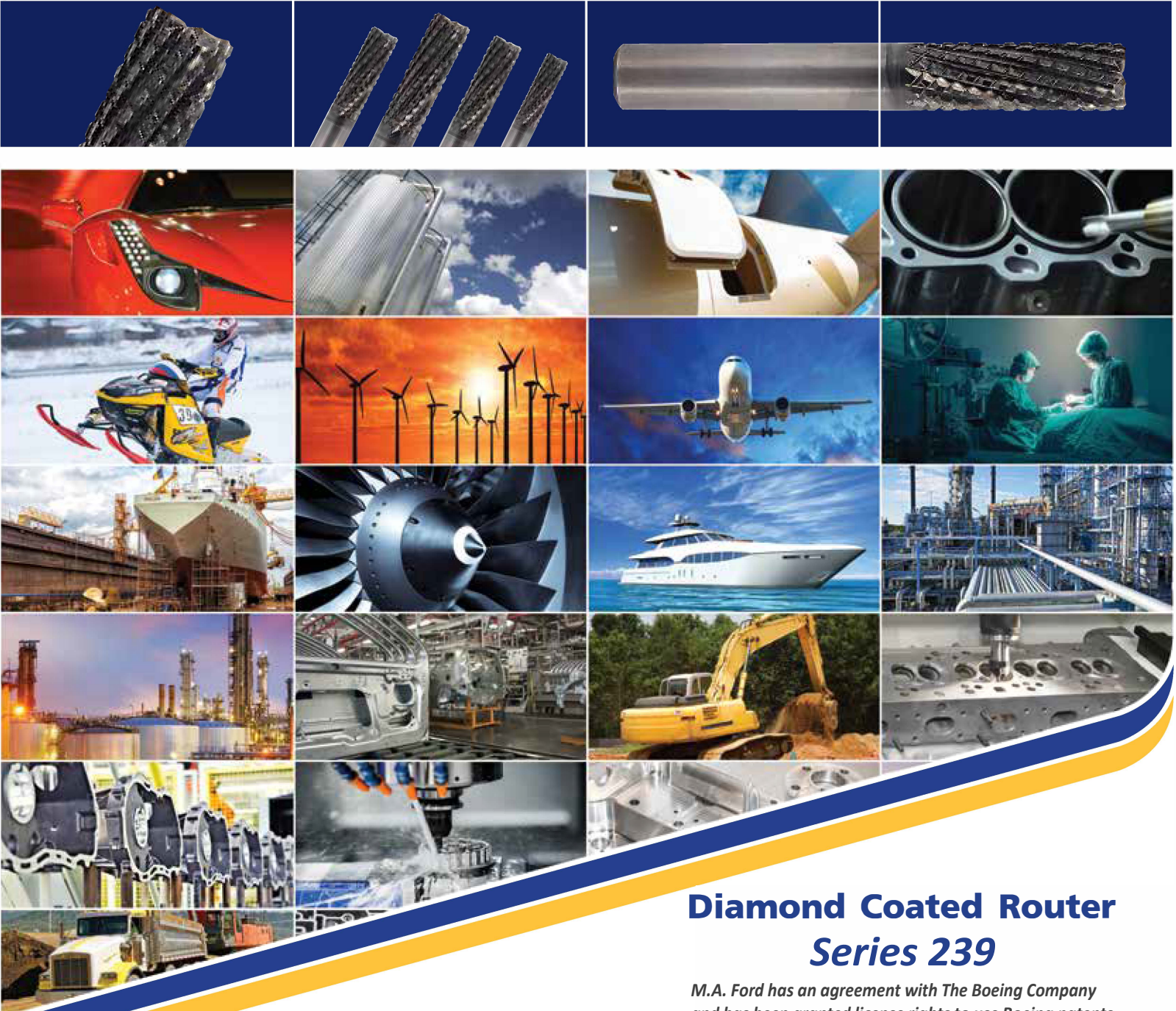


ADVANCED PRODUCT GROUP



Where **high performance** is the **standard**

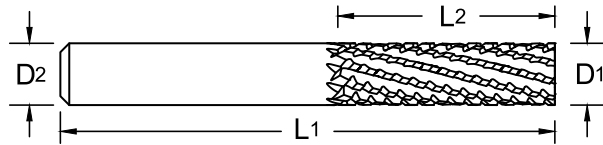
Integrated Manufacturing Solutions



Diamond Coated Router Series 239

M.A. Ford has an agreement with The Boeing Company and has been granted license rights to use Boeing patents and proprietary data.

Diamond Grind Routers Series 239



Diamond grind with the **"Black Diamond"** - GemX coating or uncoated

Benefits

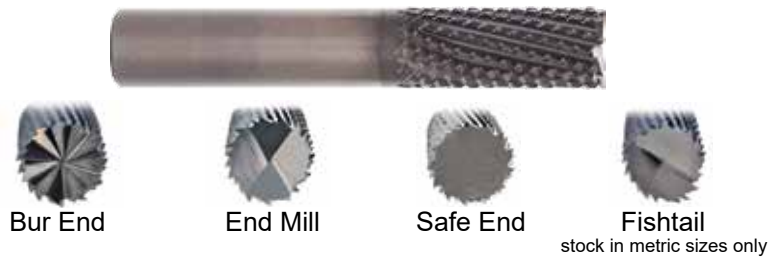
- Excellent for composite materials and fiberglass applications
- Long Tool life
- Cut more linear inches
- Faster cycle times
- High routing rate
- Delivers great edge quality
- No delamination or flaking
- Licensed for Boeing U.S. Patent 7,090,442

Features

- Rake angles specially designed to reduce cutting forces
- Cutting edges specially treated for optimized tool life
- Carbide substrate uniquely compatible to GemX coating
- GemX coating specifically designed for maximum tool life in composites

Applications

- Trimming
- Routing
- Pocketing
- Interpolation of holes
- Low plastic content CFRP



Uncoated		GemX		Diameter			Shank		OAL		Flute Length		# Flutes (RHC)	End Cut
Tool Number	EDP	Tool Number	EDP	D1			D2		L1		L2			
				Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm		
239M0300	24039				3.0	.1181		3.0		38		12.0	6	Safe
239M0300B	23945	239M0300BGX	23969		3.0	.1181		3.0		38		12.0	6	Bur
239M0300E	23946	239M0300EGX	23970		3.0	.1181		3.0		38		12.0	6	End Mill
239M0300F	23947	239M0300FGX	23971		3.0	.1181		3.0		38		12.0	6	Fishtail
23912500	23994			1/8		.1250	1/8		1-1/2		1/4		6	Safe
23912500B	23901	23912500BGX	23900	1/8		.1250	1/8		1-1/2		1/4		6	Bur
23912510	23996			1/8		.1250	1/8		1-1/2		3/8		6	Safe
23912510E	23903	23912510EGX	23902	1/8		.1250	1/8		1-1/2		3/8		6	End Mill
23912520	23997			1/8		.1250	1/8		1-1/2		1/2		8	Safe
23912520E	23905	23912520EGX	23904	1/8		.1250	1/8		1-1/2		1/2		8	End Mill
239M0400	24021				4.0	.1575		4.0		50		15.0	6	Safe
239M0400B	23948	239M0400BGX	23972		4.0	.1575		4.0		50		15.0	6	Bur
239M0400E	23949	239M0400EGX	23973		4.0	.1575		4.0		50		15.0	6	End Mill
239M0400F	23950	239M0400FGX	23974		4.0	.1575		4.0		50		15.0	6	Fishtail
23918700	23998			3/16		.1875	3/16		2		3/8		6	Safe
23918700B	23907	23918700BGX	23906	3/16		.1875	3/16		2		3/8		6	Bur
23918710	23999			3/16		.1875	3/16		2		9/16		6	Safe
23918710E	23909	23918710EGX	23908	3/16		.1875	3/16		2		9/16		6	End Mill
23918720	24000			3/16		.1875	3/16		2		3/4		8	Safe
23918720E	23911	23918720EGX	23910	3/16		.1875	3/16		2		3/4		8	End Mill
239M0500	24041				5.0	.1968		5.0		50		20.0	6	Safe
239M0500B	23951	239M0500BGX	23975		5.0	.1968		5.0		50		20.0	6	Bur

*Stock available for desired end features with a quicker turnaround than most manufacturing suppliers!

GemX Diamond Coating



M.A. Ford® Coating	M.A. Ford® Tool Number Designation	Microhardness (HV)	Maximum Service Temp.	Friction Coefficient
GemX	GX	10,000	600° C / 1100° F	0.10

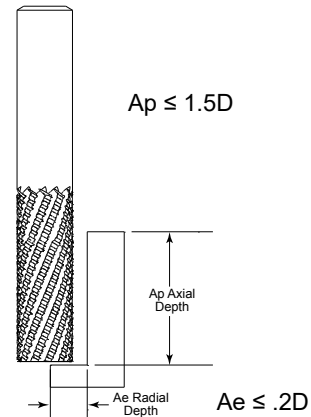
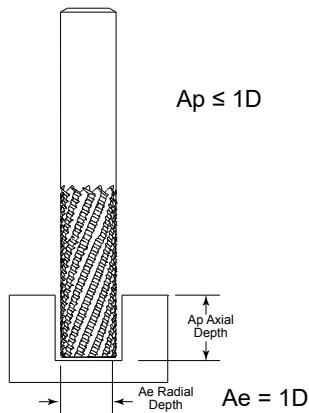


Series 239 Continued

Uncoated		GemX		Diameter			Shank		OAL		Flute Length		# Flutes (RHC)	End Cut
Tool Number	EDP	Tool Number	EDP	D1			D2		L1		L2			
				Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm		
239M0500E	23952	239M0500EGX	23976		5.0	.1968		5.0		50		20.0	6	End Mill
239M0500F	23953	239M0500FGX	23977		5.0	.1968		5.0		50		20.0	6	Fishtail
239M0600	24043				6.0	.2362		6.0		63		20.0	10	Safe
239M0600B	23954	239M0600BGX	23978		6.0	.2362		6.0		63		20.0	10	Bur
239M0600E	23955	239M0600EGX	23979		6.0	.2362		6.0		63		20.0	10	End Mill
239M0600F	23956	239M0600FGX	23980		6.0	.2362		6.0		63		20.0	10	Fishtail
239M0601	24027				6.0	.2362		6.0		75		25.0	10	Safe
239M0601B	23957	239M0601BGX	23981		6.0	.2362		6.0		75		25.0	10	Bur
239M0601E	23958	239M0601EGX	23982		6.0	.2362		6.0		75		25.0	10	End Mill
239M0601F	23959	239M0601FGX	23983		6.0	.2362		6.0		75		25.0	10	Fishtail
23925000	24001			1/4		.2500	1/4		2-1/2		1/2		8	Safe
23925000B	23913	23925000BGX	23912	1/4		.2500	1/4		2-1/2		1/2		8	Bur
23925010	24003			1/4		.2500	1/4		2-1/2		3/4		10	Safe
23925010B	23915	23925010BGX	23914	1/4		.2500	1/4		2-1/2		3/4		10	Bur
23925010E	23917	23925010EGX	23916	1/4		.2500	1/4		2-1/2		3/4		10	End Mill
23925020	24005			1/4		.2500	1/4		3		1		10	Safe
23925020B	23919	23925020BGX	23918	1/4		.2500	1/4		3		1		10	Bur
23925020E	23921	23925020EGX	23920	1/4		.2500	1/4		3		1		10	End Mill
23925030	23923	23925030GX	23922	1/4		.2500	1/4		4		1-1/4		12	Safe
23931200	24009			5/16		.3125	5/16		2-1/2		1		10	Safe
23931200E	23925	23931200EGX	23924	5/16		.3125	5/16		2-1/2		1		10	End Mill
239M0800	24045				8.0	.3150		8.0		75		25.0	10	Safe
239M0800B	23960	239M0800BGX	23984		8.0	.3150		8.0		75		25.0	10	Bur
239M0800E	23961	239M0800EGX	23985		8.0	.3150		8.0		75		25.0	10	End Mill
239M0800F	23962	239M0800FGX	23986		8.0	.3150		8.0		75		25.0	10	Fishtail
23937500	24011			3/8		.3750	3/8		2-1/2		3/4		12	Safe
23937500B	23927	23937500BGX	23926	3/8		.3750	3/8		2-1/2		3/4		12	Bur
23937510	24035			3/8		.3750	3/8		3		1-1/8		12	Safe
23937510B	23929	23937510BGX	23928	3/8		.3750	3/8		3		1-1/8		12	Bur
23937510E	23931	23937510EGX	23930	3/8		.3750	3/8		3		1-1/8		12	End Mill
23937520	24015			3/8		.3750	3/8		4		1-1/2		12	Safe
23937520B	23933	23937520BGX	23932	3/8		.3750	3/8		4		1-1/2		12	Bur
23937520E	23935	23937520EGX	23934	3/8		.3750	3/8		4		1-1/2		12	End Mill
23937530	23937	23937530GX	23936	3/8		.3750	3/8		4		2		12	Safe
239M1000	24047				10.0	.3937		10.0		90		30.0	12	Safe
239M1000B	23963	239M1000BGX	23987		10.0	.3937		10.0		90		30.0	12	Bur
239M1000E	23964	239M1000EGX	23988		10.0	.3937		10.0		90		30.0	12	End Mill
239M1000F	23965	239M1000FGX	23989		10.0	.3937		10.0		90		30.0	12	Fishtail
239M1200	24033				12.0	.4724		12.0		100		40.0	14	Safe
239M1200B	23966	239M1200BGX	23990		12.0	.4724		12.0		100		40.0	14	Bur
239M1200E	23967	239M1200EGX	23991		12.0	.4724		12.0		100		40.0	14	End Mill
239M1200F	23968	239M1200FGX	23992		12.0	.4724		12.0		100		40.0	14	Fishtail
23950000	24037			1/2		.5000	1/2		3		1		14	Safe
23950000B	23939	23950000BGX	23938	1/2		.5000	1/2		3		1		14	Bur
23950000E	23941	23950000EGX	23940	1/2		.5000	1/2		3		1		14	End Mill
23950010	23943	23950010GX	23942	1/2		.5000	1/2		4		2		16	Safe
23950010B	23993	23950010BGX	23944	1/2		.5000	1/2		4		2		16	Bur

*Stock available for desired end features with a quicker turnaround than most manufacturing suppliers!

Recommended Cutting Data 239 Series



Inch

Finishing Slotting 300 (Sfm)		
Tool Diameter	RPM	IPM
1/8	9000	10
3/16	6000	12
1/4	5000	15
5/16	4000	18
3/8	3000	20
1/2	2000	25

Roughing Slotting 600 (Sfm)		
Tool Diameter	RPM	IPM
1/8	18000	20
3/16	12000	25
1/4	9000	30
5/16	7000	35
3/8	6000	40
1/2	5000	50

Feed adjustment to part thickness	
$\leq 0.5D$	x 150%
$0.5D - 1D$	x 120%
$1D - 2D$	x 80%
$3D - 4D$	x 50%

Finishing Side Milling 400 (Sfm)		
Tool Diameter	RPM	IPM
1/8	12000	20
3/16	8000	25
1/4	6000	30
5/16	5000	35
3/8	4000	40
1/2	3000	50

Roughing Side Milling 800 (Sfm)		
Tool Diameter	RPM	IPM
1/8	24000	40
3/16	16000	50
1/4	12000	60
5/16	10000	70
3/8	8000	80
1/2	6000	100

Metric

Finishing Slotting 90 (m/min)		
Tool Diameter	RPM	mm/min
3	9000	254
5	6000	304
6	5000	381
8	4000	457
10	3000	508
12	2000	635

Roughing Slotting 180 (m/min)		
Tool Diameter	RPM	mm/min
3	18000	508
5	12000	635
6	9000	762
8	7000	889
10	6000	1016
12	5000	1270

Feed adjustment to part thickness	
$\leq 0.5D$	x 150%
$0.5D - 1D$	x 120%
$1D - 2D$	x 80%
$3D - 4D$	x 50%

Finishing Side Milling 120(m/min)		
Tool Diameter	RPM	mm/min
3	12000	508
5	8000	635
6	6000	762
8	5000	889
10	4000	1016
12	3000	1270

Roughing Side Milling 240 (m/min)		
Tool Diameter	RPM	mm/min
3	24000	1016
5	16000	1270
6	12000	1524
8	10000	1778
10	8000	2032
12	6000	2540

** Tool must have end grind to slot.

Note: The parameters in this table are for common material thickness of 1/4" (6mm). You must use the Radial Depth (A_e) of 20% or less for Side Milling. For best surface finish conventional mill is recommended. Higher feed rates are possible but surface finish may change.

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.



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