

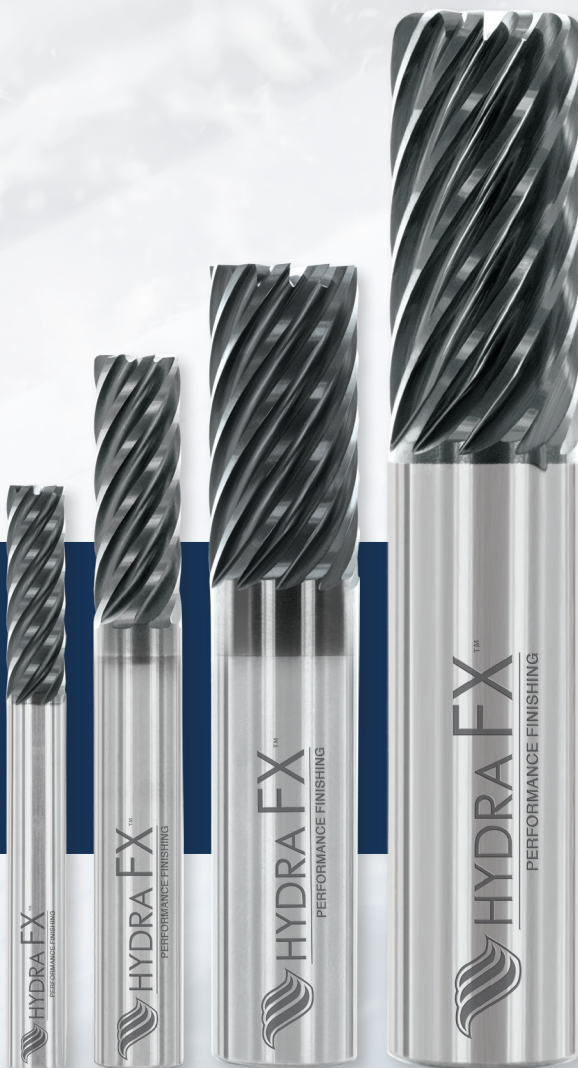
NEW PREMIUM TOOL LINE!



HYDRA FX™

PERFORMANCE FINISHING

AMERICAN
MADE



GLOBALLY
RENOWNED

HIGH PERFORMANCE END MILLS
FOR TIGHT TOLERANCE FINISHING OF FERROUS MATERIALS





HYDRA FX™

PERFORMANCE FINISHING

TIGHT TOLERANCE FINISHING

OF FERROUS MATERIALS

FEATURES & BENEFITS

Welcome to the 21st century of metalworking and the Hydra FX line of high performance finishing end mills. Imagine high speed, tight tolerance milling that produces a remarkable surface finish. Our HydraFX line is offered in 5, 7, 9 and 11 flute configurations to meet any and all of your surface finish challenges. The odd number of flutes design is engineered for strength and endurance, as well as to resist many common machining problems. Consistent and smooth tool engagement was the motivation behind our engineering philosophy.

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GLOBAL™
CUTTING TOOLS

SERIES: HFX

For high feed finishing and tight tolerance milling of most ferrous materials where excellent surface finishes are critical. Higher flute counts promote smoother cutting actions, increased tool life, improved productivity and performance; wet or dry; low carbon steel to titanium up to 65 HRC.

Square end option to create sharp corners in finishing operations

Coated for heat resistance, wear resistance and increased lubricity

Improved tool stability through multi-flute flute design keeps more cutting edges engaged, creating a superior surface finish

High strength flutes reduce edge chipping, built up edge and extends tool life

Large core design for increased stability; higher speeds & feeds; and reduced tool deflection in difficult to machine materials

Corner radius option protects corners in difficult to machine materials by preventing corner chipping and tool failure

Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds

Helix angle allows for proper chip management and longer tool life

Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges

Engineered flute relief allows for superior chip evacuation without compromising flute integrity

Edge prep drag finishing increases tool life by improving the surface quality in the flute and radiusing the cutting edge of the tool, reducing the potential for premature failure

Post polishing is performed after the tools are coated to remove surface inconsistencies and increase lubricity. This also increases feed rates and allows for smoother operations. The tool runs cooler and performs longer

5 Flute 1/8" - 3/16" 7 Flute 1/4" - 3/8" 9 Flute 7/16" - 5/8" 11 Flute 3/4" - 1"

TIP & END



SHANK & LENGTH



FLUTE CONFIGURATION



MATERIAL



COATING



RESULTS

The Hydra FX is designed with a 35 degree constant helix, that is coated for heat resistance and added lubricity. Available in 5, 7, 9 & 11 flute designs, the odd number of flutes create quiet machining, while more cutting edges engaged enables superior stability and chip management.

The Hydra FX end mill is available in square end and corner radius options, to make sharp corners in finishing operations, or protect corners in difficult to machine materials. Every HydraFX end mill will leave your work piece with a near polished shine, while ensuring your future in the industry does the same.

Series HFX: Micro-Grain Carbide, Multi-Flute Configuration, Vibration Dampening Geometry, AlCrN/Si3N4 Coated
Subseries: HFXSR, HFXCR

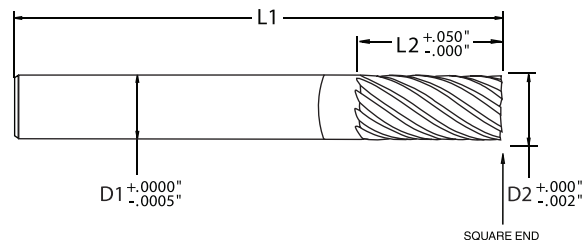
Configuration: Varying Diameters; Regular Lengths; 35° Constant Helix; 5 Flutes (1/8" - 3/16"); 7 Flutes (1/4" - 3/8"); 9 Flutes (7/16" - 5/8"); 11 Flutes (3/4" - 1"); Square End & Corner Radius

SERIES HFX - CARBIDE, 5, 7, 9, & 11 FLUTE, 35° CONSTANT HELIX

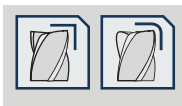
TIGHT TOLERANCE FINISHING

The Hydra FX keeps the tight tolerance finishing of ferrous materials under control. This high performance end mill is fashioned from micro-grain carbide, with a multilayer AlTiN/Si3N4 coating.

- Square end option to create sharp corners in finishing operations
- Improved tool stability through multi-flute flute design keeps more cutting edges engaged, creating a superior surface finish
- High strength flutes reduce edge chipping, built up edge and extends tool life
- Helix angle allows for proper chip management and longer tool life



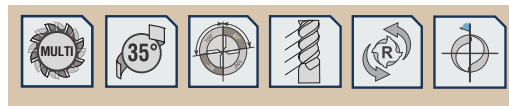
TIP & END



SHANK & LENGTH



FLUTE CONFIGURATION



MATERIAL



COATING



SERIES HFXSR - SQUARE END, REGULAR LENGTH



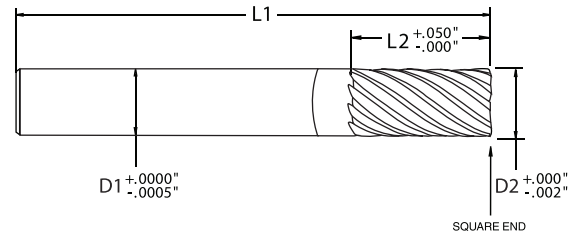
SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		# OF FLUTES	PLAIN SHANK	
									PART #	EDP #
1/8	0.125	1/8	0.125	5/8	0.625	2	2.000	5	HFX-0210-SQ	H201S
3/16	0.188	3/16	0.188	5/8	0.625	2	2.000		HFX-0310-SQ	H202S
1/4	0.250	1/4	0.250	7/8	0.875	2 1/2	2.500	7	HFX-0414-SQ	H203S
5/16	0.313	5/16	0.313	7/8	0.875	2 1/2	2.500		HFX-0514-SQ	H204S
3/8	0.375	3/8	0.375	1 1/8	1.125	3	3.000		HFX-0618-SQ	H205S
7/16	0.438	7/16	0.438	1 1/8	1.125	3	3.000	9	HFX-0718-SQ	H206S
1/2	0.500	1/2	0.500	1 3/8	1.375	3	3.000		HFX-0822-SQ	H207S
5/8	0.625	5/8	0.625	1 5/8	1.625	3 1/2	3.500		HFX-1026-SQ	H208S
3/4	0.750	3/4	0.750	1 5/8	1.625	4	4.000	11	HFX-1226-SQ	H209S
1	1.000	1	1.000	2 1/8	2.125	5	5.000		HFX-1634-SQ	H210S

SERIES HFX - CARBIDE, 5, 7, 9, & 11 FLUTE, 35° CONSTANT HELIX

IMPRESSIVE RESULTS

The staged multi-flute design maximizes core diameter and keeps the highest number of flutes engaged possible. When flawless surface finishes are critical; this end mill delivers impressive results, wet or dry.

- Corner radius option protects corners in difficult to machine materials by preventing corner chipping and tool failure
- Large core design for increased stability; higher speeds & feeds; and reduced tool deflection in difficult to machine materials
- Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges
- Superior chip evacuation without compromising flute integrity



SERIES HFXCR - CORNER RADIUS, REGULAR LENGTH

SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		# OF FLUTES	CORNER RADIUS (R)	PLAIN SHANK	
										PART #	EDP #
1/8	0.125	1/8	0.125	5/8	0.625	2	2.000	5	0.015	HFX-0210-R1	H2011
3/16	0.188	3/16	0.188	5/8	0.625	2	2.000		0.015	HFX-0310-R1	H2021
1/4	0.250	1/4	0.250	7/8	0.875	2 1/2	2.500	7	0.020	HFX-0414-R2	H2032
5/16	0.313	5/16	0.313	7/8	0.875	2 1/2	2.500		0.030	HFX-0514-R3	H2043
3/8	0.375	3/8	0.375	1 1/8	1.125	3	3.000		0.030	HFX-0618-R3	H2053
7/16	0.438	7/16	0.438	1 1/8	1.125	3	3.000	9	0.030	HFX-0718-R3	H2063
1/2	0.500	1/2	0.500	1 3/8	1.375	3	3.000		0.030	HFX-0822-R3	H2073
				1 3/8	1.375	3	3.000		0.090	HFX-0822-R9	H2087
				1 3/8	1.375	3	3.000		0.120	HFX-0822-R12	H2098
5/8	0.625	5/8	0.625	1 5/8	1.625	3 1/2	3.500		0.030	HFX-1026-R3	H2103
				1 5/8	1.625	3 1/2	3.500		0.090	HFX-1026-R9	H2117
				1 5/8	1.625	3 1/2	3.500		0.120	HFX-1026-R12	H2128
3/4	0.750	3/4	0.750	1 5/8	1.625	4	4.000	11	0.030	HFX-1226-R3	H2133
				1 5/8	1.625	4	4.000		0.090	HFX-1226-R9	H2147
				1 5/8	1.625	4	4.000		0.120	HFX-1226-R12	H2158
1	1.000	1	1.000	2 1/8	2.125	5	5.000		0.030	HFX-1634-R3	H2163
				2 1/8	2.125	5	5.000		0.090	HFX-1634-R9	H2177
				2 1/8	2.125	5	5.000		0.120	HFX-1634-R12	H2188

HFX APPLICATION GUIDE • SPEED & FEED

	WORK MATERIAL	TYPE OF CUT	AXIAL DOC	RADIAL DOC	NO. OF FLUTES	SPEED (SFM)	FEED (INCHES PER TOOTH)						
							1/8" (5 FL)	1/4" (7 FL)	3/8" (7 FL)	1/2" (9 FL)	5/8" (9 FL)	3/4" (11 FL)	1" (11 FL)
CARBON STEEL	LOW CARBON STEELS ≤ 38 HRc	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	535 - 595	0.0005 - 0.0007	0.0009 - 0.0011	0.0015 - 0.0018	0.0021 - 0.0025	0.0022 - 0.0026	0.0027 - 0.0033	0.0030 - 0.0038
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	680 - 745	0.0006 - 0.0009	0.0011 - 0.0015	0.0020 - 0.0024	0.0027 - 0.0033	0.0031 - 0.0038	0.0035 - 0.0044	0.0040 - 0.0051
	MEDIUM CARBON STEELS ≤ 38 HRc	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	465 - 520	0.0005 - 0.0007	0.0009 - 0.0011	0.0015 - 0.0018	0.0021 - 0.0025	0.0022 - 0.0026	0.0027 - 0.0033	0.0030 - 0.0038
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	595 - 650	0.0006 - 0.0009	0.0011 - 0.0015	0.0020 - 0.0024	0.0027 - 0.0033	0.0031 - 0.0038	0.0035 - 0.0044	0.0040 - 0.0051
TOOL STEEL	TOOL & DIE STEELS ≤ 38 HRc	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	395 - 440	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	500 - 550	0.0005 - 0.0008	0.0008 - 0.0012	0.0014 - 0.0019	0.0020 - 0.0026	0.0023 - 0.0030	0.0025 - 0.0034	0.0029 - 0.0041
	TOOL & DIE STEELS 39 to 48 HRc	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	355 - 395	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	445 - 485	0.0004 - 0.0007	0.0007 - 0.0010	0.0012 - 0.0016	0.0016 - 0.0022	0.0019 - 0.0026	0.0021 - 0.0030	0.0024 - 0.0035
HARDENED STEEL	HARDENED STEELS 48 to 57 HRc	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	275 - 310	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	340 - 370	0.0005 - 0.0008	0.0008 - 0.0012	0.0014 - 0.0019	0.0020 - 0.0026	0.0023 - 0.0030	0.0025 - 0.0034	0.0029 - 0.0041
	HARDENED STEELS 58 to 65 HRc	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	225 - 255	0.0002 - 0.0004	0.0004 - 0.0007	0.0007 - 0.0010	0.0010 - 0.0014	0.0009 - 0.0014	0.0013 - 0.0019	0.0014 - 0.0022
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	275 - 300	0.0003 - 0.0006	0.0005 - 0.0009	0.0009 - 0.0014	0.0013 - 0.0019	0.0015 - 0.0022	0.0016 - 0.0025	0.0019 - 0.0030
STAINLESS STEEL	EASY TO MACHINE 72 - 85 HRb	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	405 - 455	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	530 - 580	0.0005 - 0.0008	0.0008 - 0.0012	0.0014 - 0.0019	0.0020 - 0.0026	0.0023 - 0.0030	0.0025 - 0.0034	0.0029 - 0.0041
	MODERATELY DIFFICULT 79 - 85 HRb; 25 - 41 HRc	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	295 - 330	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	365 - 400	0.0004 - 0.0007	0.0007 - 0.0010	0.0012 - 0.0016	0.0016 - 0.0022	0.0019 - 0.0026	0.0021 - 0.0030	0.0024 - 0.0035
	DIFFICULT TO MACHINE 31 - 50 HRc	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	270 - 305	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	335 - 365	0.0004 - 0.0007	0.0007 - 0.0010	0.0012 - 0.0016	0.0016 - 0.0022	0.0019 - 0.0026	0.0021 - 0.0030	0.0024 - 0.0035
CAST IRON	GRAY 100 - 200 HRb	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	535 - 595	0.0005 - 0.0007	0.0009 - 0.0011	0.0015 - 0.0018	0.0021 - 0.0025	0.0022 - 0.0026	0.0027 - 0.0033	0.0030 - 0.0038
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	680 - 745	0.0006 - 0.0009	0.0011 - 0.0015	0.0020 - 0.0024	0.0027 - 0.0033	0.0031 - 0.0038	0.0035 - 0.0044	0.0040 - 0.0051
	DUCTILE 150 - 300 HRb	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	520 - 580	0.0005 - 0.0007	0.0009 - 0.0011	0.0015 - 0.0018	0.0021 - 0.0025	0.0022 - 0.0026	0.0027 - 0.0033	0.0030 - 0.0038
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	665 - 730	0.0006 - 0.0009	0.0011 - 0.0015	0.0020 - 0.0024	0.0027 - 0.0033	0.0031 - 0.0038	0.0035 - 0.0044	0.0040 - 0.0051
	MALLEABLE 150 - 310 HRb	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	395 - 440	0.0005 - 0.0007	0.0009 - 0.0011	0.0015 - 0.0018	0.0021 - 0.0025	0.0022 - 0.0026	0.0027 - 0.0033	0.0030 - 0.0038
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	495 - 540	0.0006 - 0.0009	0.0011 - 0.0015	0.0020 - 0.0024	0.0027 - 0.0033	0.0031 - 0.0038	0.0035 - 0.0044	0.0040 - 0.0051
ALLOYS	TITANIUM ALLOYS 70 - 100 HRb; 25 - 36 HRc	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	295 - 330	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	370 - 405	0.0004 - 0.0007	0.0007 - 0.0010	0.0012 - 0.0016	0.0016 - 0.0022	0.0019 - 0.0026	0.0021 - 0.0030	0.0024 - 0.0035
	HIGH TEMP ALLOYS 83 - 99 HRb; 30 - 52 HRc	Profiling	1 x D	.1 x D	5 / 7 / 9 / 11	95 - 110	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
		Finishing	1 x D	.05 x D	5 / 7 / 9 / 11	95 - 100	0.0004 - 0.0007	0.0007 - 0.0010	0.0012 - 0.0016	0.0016 - 0.0022	0.0019 - 0.0026	0.0021 - 0.0030	0.0024 - 0.0035

D = tool diameter • Reduce feed rates by 20% when using long length tools • Use reduced neck tooling for long reach slotting • Starting parameters shown

**UNRIVALED QUALITY**

The Hydra FX keeps the tight tolerance finishing of ferrous materials under control. This high performance end mill is fashioned from micro-grain carbide, with a multilayer AlCrN/Si3N4 coating.

The staged multi-flute design maximizes core diameter and keeps the highest number of flutes engaged possible. When flawless surface finishes are critical; this end mill delivers impressive results, wet or dry.

Smooth, chatterless cutting and high feed finishing is only possible with a stable, engaged tool.

There are many inferior solutions, but when finish quality is critical, the Hydra FX is the only choice. Its advanced variable geometry staggers the entry and exit of the flutes reducing vibration and creates a fluid machining environment.

EXPERIENCE THAT COUNTS

We spend thousands of hours each year creating custom, complex geometries and additional time testing and refining those designs based on customer feedback. That experience is poured right back into every new tool line we design. Multiple designs are tested in a multitude of materials, in a never ending quest for the highest performing end mills in the industry.

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