


TuffCut® 3D

XFO Series Recommended Cutting Data - Speeds - Inch

Recommended Speeds by Material Group					Finishing	Semi-Finishing	
Workpiece Material Group		Material Type	Stock Allowance 			.01-.03 x D	.05-.07 x D
			Coolant			Vc-SFM	
			Emulsion	Compressed Air	MQL		
Steels	P	Low Carbon	●	●	●	1480	1150
		Medium Carbon	●	●	●	1130	900
		Alloy Steels	●	●	●	1030	840
		Die / Tool Steels (≤ 45 HRC)	●	●	●	900	720
Stainless Steels	M	Free Machining	●	X	○	670	540
		Austenitic	●	X	○	520	430
		Difficult Stainless	●	X	○	410	330
		PH Stainless (≤ 45 HRC)	●	X	○	520	430
		Cobalt Chrome Alloys	●	X	○	410	330
		Duplex (22%)	●	X	○	250	200
		Super Duplex (25%)	●	X	○	200	160
Special Alloys	S	High Temp Alloys	●	X	X	150	100
		Titanium Alloys	●	X	X	360	300

● Preferred ○ Possible X Not Possible

XFO Series Recommended Cutting Data - Feeds - Inch

Recommended Feeds by Material Group		Tool Diameter (inch)								
Workpiece Material Group	Material Type	.2362		.3150		.3937		.4724		
		Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish	
		Fz - in/tooth								
Steels	P	Low Carbon	.0019	.0012	.0025	.0016	.0031	.0020	.0038	.0024
		Medium Carbon	.0019	.0012	.0025	.0016	.0031	.0020	.0038	.0024
		Alloy Steels	.0019	.0012	.0025	.0016	.0031	.0020	.0038	.0024
		Die / Tool Steels (≤ 45 HRC)	.0014	.0009	.0019	.0013	.0024	.0016	.0028	.0019
Stainless Steels	M	Free Machining	.0019	.0012	.0025	.0016	.0031	.0020	.0038	.0024
		Austenitic	.0019	.0012	.0025	.0016	.0031	.0020	.0038	.0024
		Difficult Stainless	.0019	.0012	.0025	.0016	.0031	.0020	.0038	.0024
		PH Stainless (≤ 45 HRC)	.0014	.0009	.0019	.0013	.0024	.0016	.0028	.0019
		Cobalt Chrome Alloys	.0014	.0009	.0019	.0013	.0024	.0016	.0028	.0019
		Duplex (22%)	.0014	.0009	.0019	.0013	.0024	.0016	.0028	.0019
		Super Duplex (25%)	.0014	.0009	.0019	.0013	.0024	.0016	.0028	.0019
Special Alloys	S	High Temp Alloys	.0014	.0009	.0019	.0013	.0024	.0016	.0028	.0019
		Titanium Alloys	.0017	.0012	.0022	.0016	.0028	.0020	.0033	.0024


Notes:

- To prevent chip evacuation issues, utilize 4-flute tools for semi-finishing operations & avoid cutting with the tip of the tool wherever possible.
- Reduced feeds required when cutting with the tip of the tool.

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

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XFO Series Recommended Cutting Data - Speeds - Metric

Recommended Speeds by Material Group					Finishing	Semi-Finishing	
Workpiece Material Group		Material Type	Stock Allowance 			.01-.03 x D	.05-.07 x D
			Coolant			Vc - M/Min	
			Emulsion	Compressed Air	MQL		
Steels	P	Low Carbon	●	●	●	450	350
		Medium Carbon	●	●	●	345	275
		Alloy Steels	●	●	●	315	255
		Die / Tool Steels (≤ 45 HRC)	●	●	●	275	220
Stainless Steels	M	Free Machining	●	X	○	205	165
		Austenitic	●	X	○	160	130
		Difficult Stainless	●	X	○	125	100
		PH Stainless (≤ 45 HRC)	●	X	○	160	130
		Cobalt Chrome Alloys	●	X	○	125	100
		Duplex (22%)	●	X	○	75	60
		Super Duplex (25%)	●	X	○	60	50
Special Alloys	S	High Temp Alloys	●	X	X	45	30
		Titanium Alloys	●	X	X	110	90

● Preferred ○ Possible X Not Possible

XFO Series Recommended Cutting Data - Feeds - Metric

Recommended Feeds by Material Group		Tool Diameter (mm)							
Workpiece Material Group	Material Type	6		8		10		12	
		Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish
		Fz - mm/tooth							
Steels	P	Low Carbon	.048	.030	.064	.040	.080	.050	.096
		Medium Carbon	.048	.030	.064	.040	.080	.050	.096
		Alloy Steels	.048	.030	.064	.040	.080	.050	.096
		Die / Tool Steels (≤ 45 HRC)	.036	.024	.048	.032	.060	.040	.072
Stainless Steels	M	Free Machining	.048	.030	.064	.040	.080	.050	.096
		Austenitic	.048	.030	.064	.040	.080	.050	.096
		Difficult Stainless	.048	.030	.064	.040	.080	.050	.096
		PH Stainless (≤ 45 HRC)	.036	.024	.048	.032	.060	.040	.072
		Cobalt Chrome Alloys	.036	.024	.048	.032	.060	.040	.072
		Duplex (22%)	.036	.024	.048	.032	.060	.040	.072
		Super Duplex (25%)	.036	.024	.048	.032	.060	.040	.072
Special Alloys	S	High Temp Alloys	.036	.024	.048	.032	.060	.040	.072
		Titanium Alloys	.042	.030	.056	.040	.070	.050	.084


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XFO-AL Series Recommended Cutting Data - Speeds - Inch

Recommended Speeds by Material Group						Finishing	Semi-Finishing
Workpiece Material Group	Material Type	Stock Allowance 			.01-.03 x D	.05-.07 x D	
		Coolant			Vc-SFM		
		Emulsion	Compressed Air	MQL			
Aluminum	N	Wrought (≤ 10% Si)	●	X	○	2000	1900
		Cast (> 10% Si)	●	X	○	1710	1610

● Preferred ○ Possible X Not Possible

XFO-AL Series Recommended Cutting Data - Feeds - Inch

Recommended Feeds by Material Group			Tool Diameter (inch)							
Workpiece Material Group		Material Type	.2362		.3150		.3937		.4724	
			Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish
			Fz - in/tooth							
Aluminum	N	Wrought (≤ 10% Si)	.0024	.0015	.0032	.0020	.0039	.0026	.0047	.0031
		Cast (> 10% Si)	.0024	.0015	.0032	.0020	.0039	.0026	.0047	.0031


Notes:

- To prevent chip evacuation issues, avoid cutting with the tip of the tool wherever possible.
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XFO-AL Series Recommended Cutting Data - Speeds - Metric

Recommended Speeds by Material Group						Finishing	Semi-Finishing
Workpiece Material Group	Material Type	Stock Allowance 				.01-.03 x D	.05-.07 x D
		Coolant			Vc - M/Min		
		Emulsion	Compressed Air	MQL			
Aluminum	N	Wrought (≤ 10% Si)	●	X	○	610	580
		Cast (> 10% Si)	●	X	○	520	490

● Preferred ○ Possible X Not Possible

XFO-AL Series Recommended Cutting Data - Feeds - Metric

Recommended Feeds by Material Group			Tool Diameter (mm)							
Workpiece Material Group		Material Type	6		8		10		12	
			Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish
			Fz - mm/tooth							
Aluminum	N	Wrought (≤ 10% Si)	.060	.039	.080	.052	.100	.065	.120	.078
		Cast (> 10% Si)	.060	.039	.080	.052	.100	.065	.120	.078

Notes:

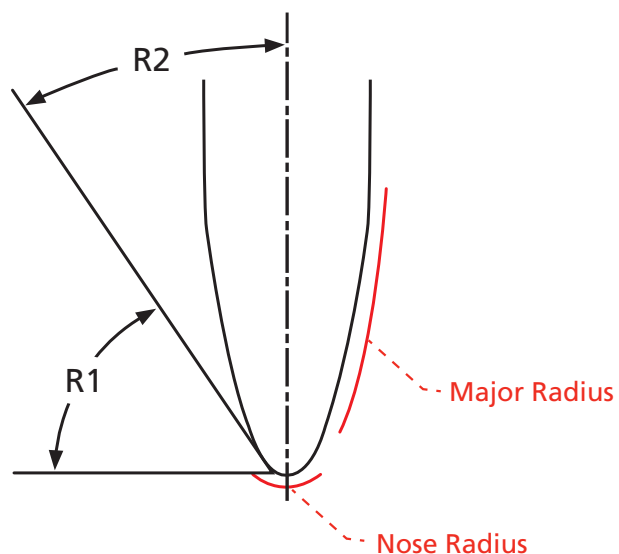
- To prevent chip evacuation issues, avoid cutting with the tip of the tool wherever possible.
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XFO / XFO-AL Series



Effective Angles

Tool Ø	Nose Radius		Major Radius	
DC	R1	Effective Angle (Max.)	R2	Effective Angle (Max.)
6	1	78.2°	95	11.8°
8	1	75.1°	90	14.9°
10	2	74.6°	85	15.4°
12	2	71.6°	80	18.4°

*Numbers above represent maximum angle values.

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XFO / XFO-AL Series

Stepover Distance by Cusp Height - **Inch**

Tool Ø (mm)		Cusp Height (Inch)	.0001	.0002	.0003	.0004	.0005
DC	R2						
6	95	Stepover (Inch)	.059	.077	.097	.109	.124
8	90		.058	.075	.094	.106	.120
10	85		.056	.072	.092	.103	.117
12	80		.054	.070	.089	.100	.113

Stepover Distance by Cusp Height - **Metric**

Tool Ø (mm)		Cusp Height (mm)	0.003	0.005	0.008	0.010	0.013
DC	R2						
6	95	Stepover (mm)	1.50	1.95	2.46	2.76	3.14
8	90		1.47	1.90	2.40	2.69	3.06
10	85		1.43	1.84	2.33	2.61	2.97
12	80		1.38	1.79	2.26	2.53	2.88

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