

# High Performance End Mills

## TuffCut® XR

High Performance End Mills



**NEW  
XR7**

for Titanium  
and Similar Materials

Pg. 12

 **M.A. FORD**  
High Performance Cutting Tools

# TuffCut® XR

## Xtreme High Performance End Mills



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	Series	Page	# of Flutes	Square End	Ball Nose	Corner Radius	Neck Relief	Coating	Low Carbon Steel	Steel - Mild (.4-.5 Carbon)	Tool Steels (1.2 Carbon) Forgings	Austenitic Stainless Steel	High Temp Alloys	Precipitation Hardened Stainless/Stainless Steels	Titanium	Cast Iron (Soft/Medium/Hard Chilled)	Iron (Malleable)	Non-Ferrous	Hardened Materials	Plastics	Glass/Ceramic
TuffCut® XR	177	2-5	4	X		X		ALtima®													
TuffCut® XR	177S	6	4	X		X	X	ALtima®													
TuffCut® XR	178	7-10	5	X		X	X	ALtima®													
TuffCut® XR	179	11	4		X			ALtima®													
TuffCut® XR7	180	12-13	7	X		X	X	ALtima® Blaze													
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Celebrating

90 Years  
1919 - 2009

M.A. Ford®

**Safety Note**

Always wear the appropriate personal protective equipment such as safety glasses and protective clothing when using solid carbide or HSS cutting tools. Machines should be fully guarded. Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

# TuffCut® XR

Series 177, 178, 179 and 180

## Xtreme Roughing End Mills

### Features

- Unique M.A. Ford® Heli-Pitch Geometry.
- Proprietary Carbide Substrate.
- Eccentric Primary Relief Angle.
- Industry Standard Corner radii
- ALtima® / ALtima® Blaze coating.

### Benefits

- Higher Feeds and Speeds for Increased Productivity. Reduced Vibration Harmonics.
- Maintains Cutting Edge Strength & Sharpness for Improved Tool Life.
- Strong Cutting Edges Allowing for Increased depths of Cut at Elevated Cutting Speeds & Feeds.
- State-of-the-Art ALtima® PVD Coating for Superior Tool Life in Virtually All Materials.

Use Roughing Speeds

and

Achieve Your  
Finishing Needs!

NEW

# TuffCut® XR7

40% Productivity Increase  
Over 5 Flute Tools.

Designed Specifically  
for Titanium.

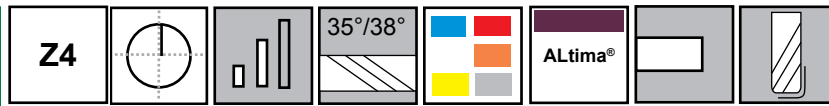
ALtima® Blaze Coating for  
Increased Performance!

### ALtima® Blaze

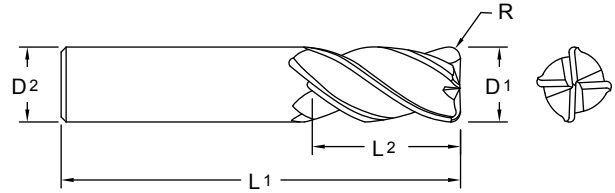
features high temperature hardness and oxidation resistance that provides extreme wear resistance under all machining conditions.

# NEW Sizes

**TuffCut® XR**  
Series 177



Designed for EXTREME Productivity.



ALtima®		Diameter			Shank		OAL		Flute Length		Corner Radius	
		D1			D2		L1		L2		R	
Tool No.	EDP	Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm
17705900A	17680		1.5	.0591		3		38		3		
17706250A	17692	1/16		.0625	1/8		1-1/2		1/8			
17707810A	17694	5/64		.0781	1/8		1-1/2		5/32			
17707870A	17682		2.0	.0787		3		38		4		
17709370A	17696	3/32		.0937	1/8		1-1/2		3/16			
17709840A	17684		2.5	.0984		3		38		5		
17711800A	17928		3.0	.1181		6		57		8		
17711801A	17783		3.0	.1181		6		57		8		0.50
17711803A	17686		3.0	.1181		3		38		6		
17711808A	17929		3.0	.1181		6		57		8		0.25
17712500A	17700	1/8		.1250	1/8		1-1/2		1/8			
17712502A	17729	1/8		.1250	1/8		1-1/2		1/8		0.015	
17712510A	17701	1/8		.1250	1/8		1-1/2		3/8			
17712512A	17730	1/8		.1250	1/8		1-1/2		3/8		0.015	
17713700A	17688		3.5	.1378		6		63		7		
17715600A	17702	5/32		.1562	3/16		2		3/16			
17715602A	17731	5/32		.1562	3/16		2		3/16		0.015	
17715610A	17703	5/32		.1562	3/16		2		7/16			
17715612A	17732	5/32		.1562	3/16		2		7/16		0.015	
17715700A	17930		4.0	.1575		6		57		11		
17715701A	17784		4.0	.1575		6		57		11		0.50
17715708A	17931		4.0	.1575		6		57		11		0.25
17717700A	17690		4.5	.1772		6		63		9		
17718700A	17704	3/16		.1875	3/16		2		3/16			
17718702A	17733	3/16		.1875	3/16		2		3/16		0.015	
17718704A	17734	3/16		.1875	3/16		2		3/16		0.030	
17718710A	17705	3/16		.1875	3/16		2		7/16			
17718712A	17735	3/16		.1875	3/16		2		7/16		0.015	
17718714A	17736	3/16		.1875	3/16		2		7/16		0.030	
17719600A	17932		5.0	.1968		6		57		13		
17719601A	17785		5.0	.1968		6		57		13		0.50
17719608A	17933		5.0	.1968		6		57		13		0.25
17721800A	17706	7/32		.2187	1/4		2		1/4			
17721802A	17737	7/32		.2187	1/4		2		1/4		0.015	
17721804A	17738	7/32		.2187	1/4		2		1/4		0.030	
17721810A	17707	7/32		.2187	1/4		2-1/2		7/16			
17721812A	17739	7/32		.2187	1/4		2-1/2		7/16		0.015	
17721814A	17740	7/32		.2187	1/4		2-1/2		7/16		0.030	
17723600A	17934		6.0	.2362		6		57		13		
17723601A	17935		6.0	.2362		6		57		13		0.50
17723603A	17787		6.0	.2362		6		57		13		1.00
17723604A	17788		6.0	.2362		6		57		13		1.50

Inch	
D1	Tolerance
1/16-1/4	+0.000/-0.002
> 1/4-1.0	+0.000/-0.003

Metric (mm)	
D1	Tolerance h10
1.50-3.00	+0.000/-0.040
>3.00-6.00	+0.000/-0.048
>6.00-10.00	+0.000/-0.058
>10.00-18.00	+0.000/-0.070
>18.00-25.00	+0.000/-0.084

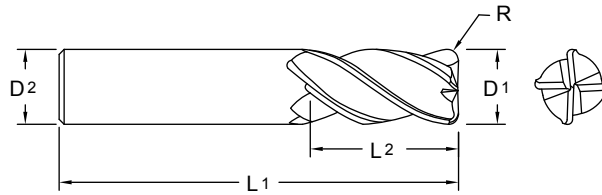
Technical information on pages 14-16.

Series 177 continued

ALtima®		Diameter			Shank		OAL		Flute Length		Corner Radius	
		D1			D2		L1		L2		R	
Tool No.	EDP	Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm
17723605A	18070		6.0	.2362		6		57		13		2.00
17723608A	17786		6.0	.2362		6		57		13		0.25
17725000A	17708	1/4		.2500	1/4		2		1/4			
17725002A	17741	1/4		.2500	1/4		2		1/4		0.015	
17725004A	17742	1/4		.2500	1/4		2		1/4		0.030	
17725010A	17709	1/4		.2500	1/4		2-1/2		1/2			
17725012A	17743	1/4		.2500	1/4		2-1/2		1/2		0.015	
17725014A	17744	1/4		.2500	1/4		2-1/2		1/2		0.030	
17728100A	17710	9/32		.2812	5/16		2-1/2		5/8			
17728102A	17745	9/32		.2812	5/16		2-1/2		5/8		0.015	
17728104A	17746	9/32		.2812	5/16		2-1/2		5/8		0.030	
17731200A	17711	5/16		.3125	5/16		2		5/16			
17731202A	17747	5/16		.3125	5/16		2		5/16		0.015	
17731204A	17748	5/16		.3125	5/16		2		5/16		0.030	
17731210A	17712	5/16		.3125	5/16		2-1/2		13/16			
17731212A	17749	5/16		.3125	5/16		2-1/2		13/16		0.015	
17731214A	17750	5/16		.3125	5/16		2-1/2		13/16		0.030	
17731500A	17937		8.0	.3150		8		63		19		
17731501A	17938		8.0	.3150		8		63		19		0.50
17731503A	17789		8.0	.3150		8		63		19		1.00
17731504A	17790		8.0	.3150		8		63		19		1.50
17731505A	17791		8.0	.3150		8		63		19		2.00
17731507A	18072		8.0	.3150		8		63		19		3.00
17734300A	17713	11/32		.3438	3/8		2-1/2		13/16			
17734302A	17751	11/32		.3438	3/8		2-1/2		13/16		0.015	
17734304A	17752	11/32		.3438	3/8		2-1/2		13/16		0.030	
17737500A	17714	3/8		.3750	3/8		2		3/8			
17737502A	17753	3/8		.3750	3/8		2		3/8		0.015	
17737504A	17754	3/8		.3750	3/8		2		3/8		0.030	
17737510A	17715	3/8		.3750	3/8		2-1/2		7/8			
17737512A	17755	3/8		.3750	3/8		2-1/2		7/8		0.015	
17737514A	17756	3/8		.3750	3/8		2-1/2		7/8		0.030	
17739300A	17940		10.0	.3937		10		72		22		
17739301A	17941		10.0	.3937		10		72		22		0.50
17739303A	17792		10.0	.3937		10		72		22		1.00
17739304A	17793		10.0	.3937		10		72		22		1.50
17739305A	17794		10.0	.3937		10		72		22		2.00
17739307A	96603		10.0	.3937		10		72		22		3.00
17740600A	17716	13/32		.4062	7/16		2-3/4		15/16			
17740602A	17757	13/32		.4062	7/16		2-3/4		15/16		0.015	
17740604A	17758	13/32		.4062	7/16		2-3/4		15/16		0.030	
17743700A	17717	7/16		.4375	7/16		2-1/2		7/16			
17743702A	17759	7/16		.4375	7/16		2-1/2		7/16		0.015	
17743704A	17760	7/16		.4375	7/16		2-1/2		7/16		0.030	
17743710A	17718	7/16		.4375	7/16		2-3/4		1			
17743712A	17761	7/16		.4375	7/16		2-3/4		1		0.015	
17743714A	17762	7/16		.4375	7/16		2-3/4		1		0.030	
17746800A	17719	15/32		.4688	1/2		3		1			

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Series 177 continued



ALtima®		Diameter			Shank		OAL		Flute Length		Corner Radius	
		D1			D2		L1		L2		R	
Tool No.	EDP	Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm
17746802A	17763	15/32		.4688	1/2		3		1		0.015	
17746804A	17764	15/32		.4688	1/2		3		1		0.030	
17747200A	17943		12.0	.4724		12		83		26		
17747201A	17795		12.0	.4724		12		83		26		0.50
17747202A	17944		12.0	.4724		12		83		26		0.75
17747203A	17796		12.0	.4724		12		83		26		1.00
17747204A	17797		12.0	.4724		12		83		26		1.50
17747205A	17798		12.0	.4724		12		83		26		2.00
17747206A	18074		12.0	.4724		12		83		26		2.50
17747207A	96506		12.0	.4724		12		83		26		3.00
17747209A	18076		12.0	.4724		12		83		26		4.00
17750000A	17720	1/2		.5000	1/2		2-1/2		1/2			
17750002A	17765	1/2		.5000	1/2		2-1/2		1/2		0.015	
17750004A	17766	1/2		.5000	1/2		2-1/2		1/2		0.030	
17750010A	17721	1/2		.5000	1/2		3		1			
17750012A	17767	1/2		.5000	1/2		3		1		0.015	
17750014A	17768	1/2		.5000	1/2		3		1		0.030	
17750016A	17901	1/2		.5000	1/2		3		1		0.060	
17750017A	17902	1/2		.5000	1/2		3		1		0.090	
17750018A	17903	1/2		.5000	1/2		3		1		0.125	
17750020A	18094	1/2		.5000	1/2		3		1-1/4			
17750022A	18095	1/2		.5000	1/2		3		1-1/4		.015	
17750024A	18096	1/2		.5000	1/2		3		1-1/4		.030	
17750026A	18097	1/2		.5000	1/2		3		1-1/4		.060	
17750027A	18098	1/2		.5000	1/2		3		1-1/4		.090	
17750028A	18099	1/2		.5000	1/2		3		1-1/4		.125	
17755100A	17946		14.0	.5512		14		83		26		
17755102A	17947		14.0	.5512		14		83		26		0.75
17755112A	17948		14.0	.5512		16		92		26		0.75
17756200A	17722	9/16		.5625	9/16		3-1/2		1-1/8			
17756202A	17769	9/16		.5625	9/16		3-1/2		1-1/8		0.015	
17756204A	17770	9/16		.5625	9/16		3-1/2		1-1/8		0.030	
17762500A	17723	5/8		.6250	5/8		3		5/8			
17762502A	18000	5/8		.6250	5/8		3		5/8		0.015	
17762504A	17771	5/8		.6250	5/8		3		5/8		0.030	
17762505A	17772	5/8		.6250	5/8		3		5/8		0.045	
17762510A	17724	5/8		.6250	5/8		3-1/2		1-1/4			
17762512A	18001	5/8		.6250	5/8		3-1/2		1-1/4		0.015	
17762514A	17773	5/8		.6250	5/8		3-1/2		1-1/4		0.030	
17762515A	17774	5/8		.6250	5/8		3-1/2		1-1/4		0.045	
17762516A	17904	5/8		.6250	5/8		3-1/2		1-1/4		0.060	
17762517A	17905	5/8		.6250	5/8		3-1/2		1-1/4		0.090	
17762518A	17906	5/8		.6250	5/8		3-1/2		1-1/4		0.125	
17762900A	17950		16.0	.6299		16		92		32		
17762901A	18078		16.0	.6299		16		92		32		0.50
17762903A	17951		16.0	.6299		16		92		32		1.00
17762904A	17799		16.0	.6299		16		92		32		1.50
17762905A	17673		16.0	.6299		16		92		32		2.00

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Series 177 continued

ALtima®		Diameter			Shank		OAL		Flute Length		Corner Radius	
		D1			D2		L1		L2		R	
Tool No.	EDP	Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm
17762906A	18080		16.0	.6299		16		92		32		2.50
17762907A	17674		16.0	.6299		16		92		32		3.00
17762909A	18082		16.0	.6299		16		92		32		4.00
17770800A	17952		18.0	.7087		18		92		32		
17770803A	17953		18.0	.7087		18		92		32		1.00
17770813A	17954		18.0	.7087		20		104		32		1.00
17775000A	17725	3/4		.7500	3/4		3		3/4			
17775002A	18002	3/4		.7500	3/4		3		3/4		0.015	
17775004A	17775	3/4		.7500	3/4		3		3/4		0.030	
17775005A	17776	3/4		.7500	3/4		3		3/4		0.045	
17775010A	17726	3/4		.7500	3/4		4		1-1/2			
17775012A	18003	3/4		.7500	3/4		4		1-1/2		0.015	
17775014A	17777	3/4		.7500	3/4		4		1-1/2		0.030	
17775015A	17778	3/4		.7500	3/4		4		1-1/2		0.045	
17775016A	17907	3/4		.7500	3/4		4		1-1/2		0.060	
17775017A	17908	3/4		.7500	3/4		4		1-1/2		0.090	
17775018A	17909	3/4		.7500	3/4		4		1-1/2		0.125	
17778700A	17955		20.0	.7874		20		104		38		
177787011A	18090		20.0	.7874		20		104		38		5.00
177787012A	18092		20.0	.7874		20		104		38		6.00
17778703A	17956		20.0	.7874		20		104		38		1.00
17778704A	18091		20.0	.7874		20		104		38		1.50
17778705A	18084		20.0	.7874		20		104		38		2.00
17778707A	18086		20.0	.7874		20		104		38		3.00
17778709A	18088		20.0	.7874		20		104		38		4.00
17798400A	17957		25.0	.9843		25		104		38		
17798403A	17958		25.0	.9843		25		104		38		1.00
17710000A	17727	1		1.0000	1		4		1			
17710002A	18004	1		1.0000	1		4		1		0.015	
17710004A	17779	1		1.0000	1		4		1		0.030	
17710005A	17780	1		1.0000	1		4		1		0.045	
17710010A	17728	1		1.0000	1		4		1-1/2			
17710012A	18005	1		1.0000	1		4		1-1/2		0.015	
17710014A	17781	1		1.0000	1		4		1-1/2		0.030	
17710015A	17782	1		1.0000	1		4		1-1/2		0.045	
17710016A	17910	1		1.0000	1		4		1-1/2		0.060	
17710017A	17911	1		1.0000	1		4		1-1/2		0.090	
17710018A	17912	1		1.0000	1		4		1-1/2		0.125	

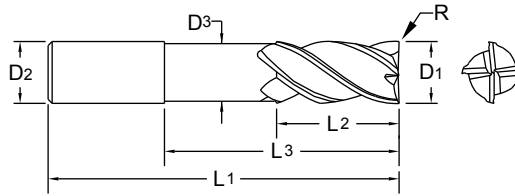
Technical information on pages 14-16.



**TuffCut® XR**  
Series 177S



Millimeter sizes with shank relief.



ALtima®		Diameter		Shank D2	Neck Diameter D3	OAL L1	Flute Length L2	Neck Length L3	Corner Radius R
		mm	Decimal						
<b>Tool No.</b>	<b>EDP</b>								
177S1181A	18218	3	.1181	6	2.9	50	5	11	
177S1181AW	18254	3	.1181	6	2.9	50	5	11	
177S1181R008A	18200	3	.1181	6	2.9	50	5	11	0.2
177S1181R008AW	18236	3	.1181	6	2.9	50	5	11	0.2
177S1575A	18220	4	.1575	6	3.9	50	6	14	
177S1575AW	18256	4	.1575	6	3.9	50	6	14	
177S1575R008A	18202	4	.1575	6	3.9	50	6	14	0.2
177S1575R008AW	18238	4	.1575	6	3.9	50	6	14	0.2
177S1969A	18222	5	.1968	6	4.9	57	8	17	
177S1969AW	18258	5	.1968	6	4.9	57	8	17	
177S1969R008A	18204	5	.1968	6	4.9	57	8	17	0.2
177S1969R008AW	18240	5	.1968	6	4.9	57	8	17	0.2
177S2362A	18224	6	.2362	6	5.8	57	9	20	
177S2362AW	18260	6	.2362	6	5.8	57	9	20	
177S2362R012A	18206	6	.2362	6	5.8	57	9	20	0.3
177S2362R012AW	18242	6	.2362	6	5.8	57	9	20	0.3
177S3150A	18226	8	.3150	8	7.6	63	12	26	
177S3150AW	18262	8	.3150	8	7.6	63	12	26	
177S3150R020A	18208	8	.3150	8	7.6	63	12	26	0.5
177S3150R020AW	18244	8	.3150	8	7.6	63	12	26	0.5
177S3937A	18228	10	.3937	10	9.6	72	15	32	
177S3937AW	18264	10	.3937	10	9.6	72	15	32	
177S3937R020A	18210	10	.3937	10	9.6	72	15	32	0.5
177S3937R020AW	18246	10	.3937	10	9.6	72	15	32	0.5
177S4724A	18230	12	.4724	12	11.4	83	18	38	
177S4724AW	18266	12	.4724	12	11.4	83	18	38	
177S4724R020A	18212	12	.4724	12	11.4	83	18	38	0.5
177S4724R020AW	18248	12	.4724	12	11.4	83	18	38	0.5
177S6299A	18232	16	.6299	16	15.2	98	24	50	
177S6299AW	18268	16	.6299	16	15.2	98	24	50	
177S6299R039A	18214	16	.6299	16	15.2	98	24	50	1.0
177S6299R039AW	18250	16	.6299	16	15.2	98	24	50	1.0
177S7874A	18234	20	.7874	20	19.2	112	30	62	
177S7874AW	18270	20	.7874	20	19.2	112	30	62	
177S7874R039A	18216	20	.7874	20	19.2	112	30	62	1.0
177S7874R039AW	18252	20	.7874	20	19.2	112	30	62	1.0

Metric (mm)	
D1	Tolerance h10
3.00	+0.00/-0.040
>3.00-6.00	+0.00/-0.048
>6.00-10.00	+0.00/-0.058
>10.00-18.00	+0.00/-0.070
>18.00-20.00	+0.00/-0.084

Technical information on pages 14-16.

**NEW  
Sizes**

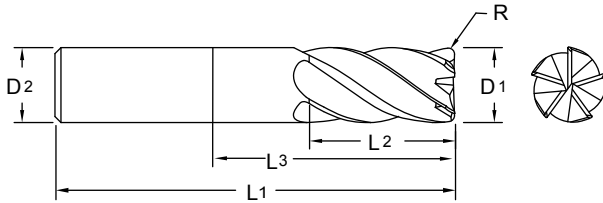
**TuffCut® XR  
Series 178**



Designed for EXTREME Productivity.



Technical information on pages 14-16.



Inch	
D1	Tolerance
1/8-1/4	+ .000/- .002
> 1/4-1.0	+ .000/- .003

Metric (mm)	
D1	Tolerance h10
3.00	+ .000/- .040
>3.00-6.00	+ .000/- .048
>6.00-10.00	+ .000/- .058
>10.00-18.00	+ .000/- .070
>18.00-25.00	+ .000/- .084

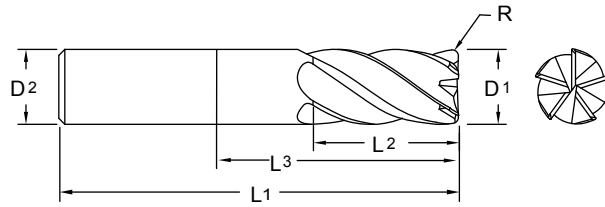
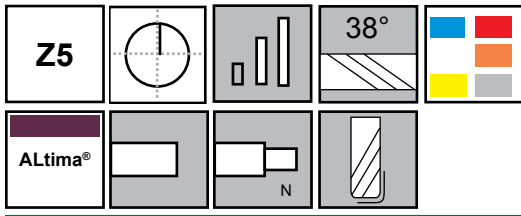
ALtima®		Diameter			Shank		OAL		Flute Length		Neck Length		Corner Radius	
Tool No.	EDP	Fraction	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
17811800A	17959		3	.1181		6		57		8				
17811810A	17998		3	.1181		3		75		25				
17812500A	17800	1/8		.1250	1/8		1-1/2		1/8					
17812510A	17801	1/8		.1250	1/8		1-1/2		3/8					
17815600A	17802	5/32		.1562	3/16		2		3/16					
17815610A	17803	5/32		.1562	3/16		2		7/16					
17815700A	17961		4	.1575		6		57		11				
17815710A	17999		4	.1575		4		75		25				
17818700A	17804	3/16		.1875	3/16		2		3/16					
17818710A	17805	3/16		.1875	3/16		2		7/16					
17819600A	17963		5	.1968		6		57		13				
17819610A	18026		5	.1968		5		75		25				
17821800A	17806	7/32		.2187	1/4		2		1/4					
17821810A	17807	7/32		.2187	1/4		2-1/2		7/16					
17823600A	17965		6	.2362		6		57		13				
17823601A	17966		6	.2362		6		57		13				0.500
17823610A	18027		6	.2362		6		75		25				
17825000A	17808	1/4		.2500	1/4		2		3/8					
17825002A	17829	1/4		.2500	1/4		2		3/8					0.015
17825004A	17830	1/4		.2500	1/4		2		3/8					0.030
17825010A	17809	1/4		.2500	1/4		2-1/2		5/8					
17825012A	17831	1/4		.2500	1/4		2-1/2		5/8					0.015
17825014A	17832	1/4		.2500	1/4		2-1/2		5/8					0.030
17825022NA	17833	1/4		.2500	1/4		4		3/4		2-1/8			0.015
17825024NA	17834	1/4		.2500	1/4		4		3/4		2-1/8			0.030
17828100A	17810	9/32		.2812	5/16		2-1/2		5/8					
17828102A	17835	9/32		.2812	5/16		2-1/2		5/8					0.015
17828104A	17836	9/32		.2812	5/16		2-1/2		5/8					0.030
17831200A	17811	5/16		.3125	5/16		2		7/16					
17831202A	17837	5/16		.3125	5/16		2		7/16					0.015
17831204A	17838	5/16		.3125	5/16		2		7/16					0.030
17831210A	17812	5/16		.3125	5/16		2-1/2		13/16					

For product information, call your local distributor.

Series 178

TuffCut® XR

Series 178 continued



ALtima®		Diameter			Shank		OAL		Flute Length		Neck Length		Corner Radius	
		D1			D2		L1		L2		L3		R	
Tool No.	EDP	Fraction	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
17831212A	17839	5/16		.3125	5/16		2-1/2		13/16				0.015	
17831214A	17840	5/16		.3125	5/16		2-1/2		13/16				0.030	
17831222NA	17841	5/16		.3125	5/16		4		1		2-1/8		0.015	
17831224NA	17842	5/16		.3125	5/16		4		1		2-1/8		0.030	
17831500A	17968		8	.3150		8		63		19				
17831501A	17969		8	.3150		8		63		19				0.500
17831510A	18028		8	.3150		8		75		30				
17834300A	17813	11/32		.3438	3/8		2-1/2		13/16					
17834302A	17843	11/32		.3438	3/8		2-1/2		13/16				0.015	
17834304A	17844	11/32		.3438	3/8		2-1/2		13/16				0.030	
17837500A	17814	3/8		.3750	3/8		2		1/2					
17837502A	17845	3/8		.3750	3/8		2		1/2				0.015	
17837504A	17846	3/8		.3750	3/8		2		1/2				0.030	
17837510A	17815	3/8		.3750	3/8		2-1/2		7/8					
17837512A	17847	3/8		.3750	3/8		2-1/2		7/8				0.015	
17837514A	17848	3/8		.3750	3/8		2-1/2		7/8				0.030	
17837522NA	17849	3/8		.3750	3/8		4		1		2-1/8		0.015	
17837524NA	17850	3/8		.3750	3/8		4		1		2-1/8		0.030	
17837532NA	17851	3/8		.3750	3/8		6		1-1/4		3-3/8		0.015	
17837534NA	17852	3/8		.3750	3/8		6		1-1/4		3-3/8		0.030	
17839300A	17971		10	.3937		10		72		22				
17839301A	17972		10	.3937		10		72		22				0.500
17839310A	18029		10	.3937		10		100		45				
17840600A	17816	13/32		.4062	7/16		2-3/4		7/8					
17840602A	17853	13/32		.4062	7/16		2-3/4		7/8				0.015	
17840604A	17854	13/32		.4062	7/16		2-3/4		7/8				0.030	
17843700A	17817	7/16		.4375	7/16		2-1/2		9/16					
17843702A	17855	7/16		.4375	7/16		2-1/2		9/16				0.015	
17843704A	17856	7/16		.4375	7/16		2-1/2		9/16				0.030	
17843710A	17818	7/16		.4375	7/16		2-3/4		1					
17843712A	17857	7/16		.4375	7/16		2-3/4		1				0.015	
17843714A	17858	7/16		.4375	7/16		2-3/4		1				0.030	
17843722NA	17859	7/16		.4375	7/16		4		1-1/4		2-1/8		0.015	
17843724NA	17860	7/16		.4375	7/16		4		1-1/4		2-1/8		0.030	
17843732NA	17861	7/16		.4375	7/16		6		1-1/2		3-3/8		0.015	
17843734NA	17862	7/16		.4375	7/16		6		1-1/2		3-3/8		0.030	
17846800A	17819	15/32		.4688	1/2		3		1					
17846802A	17863	15/32		.4688	1/2		3		1				0.015	

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Series 178 continued

ALtima®		Diameter			Shank		OAL		Flute Length		Neck Length		Corner Radius	
		D1			D2		L1		L2		L3		R	
Tool No.	EDP	Fraction	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
17846804A	17864	15/32		.4688	1/2		3		1				0.030	
17847200A	17974		12	.4724		12		83		26				
17847202A	17975		12	.4724		12		83		26				0.750
17847210A	18030		12	.4724		12		150		75				
17850000A	17820	1/2		.5000	1/2		2-1/2		5/8					
17850002A	17865	1/2		.5000	1/2		2-1/2		5/8				0.015	
17850004A	17866	1/2		.5000	1/2		2-1/2		5/8				0.030	
17850010A	17821	1/2		.5000	1/2		3		1					
17850012A	17867	1/2		.5000	1/2		3		1				0.015	
17850014A	17868	1/2		.5000	1/2		3		1				0.030	
17850015A	17869	1/2		.5000	1/2		3		1				0.045	
17850016A	17913	1/2		.5000	1/2		3		1				0.060	
17850017A	17914	1/2		.5000	1/2		3		1				0.090	
17850018A	17915	1/2		.5000	1/2		3		1				0.125	
17850022NA	17925	1/2		.5000	1/2		4		1-1/4		2-1/8		0.015	
17850024NA	17870	1/2		.5000	1/2		4		1-1/4		2-1/8		0.030	
17850032NA	17871	1/2		.5000	1/2		5		1-3/8		3-1/8		0.015	
17850034NA	17872	1/2		.5000	1/2		5		1-3/8		3-1/8		0.030	
17850042NA	17873	1/2		.5000	1/2		6		1-1/2		4-1/8		0.015	
17850044NA	17874	1/2		.5000	1/2		6		1-1/2		4-1/8		0.030	
17855100A	17977		14	.5512		14		83		26				
17855102A	17978		14	.5512		14		83		26				0.750
17855112A	17979		14	.5512		16		92		26				0.750
17856200A	17822	9/16		.5625	9/16		3-1/2		1-1/8					
17856202A	17875	9/16		.5625	9/16		3-1/2		1-1/8				0.015	
17856204A	17876	9/16		.5625	9/16		3-1/2		1-1/8				0.030	
17862500A	17823	5/8		.6250	5/8		3		3/4					
17862502A	18006	5/8		.6250	5/8		3		3/4				0.015	
17862504A	17877	5/8		.6250	5/8		3		3/4				0.030	
17862505A	17878	5/8		.6250	5/8		3		3/4				0.045	
17862510A	17824	5/8		.6250	5/8		3-1/2		1-1/4					
17862512A	18007	5/8		.6250	5/8		3-1/2		1-1/4				0.015	
17862514A	17879	5/8		.6250	5/8		3-1/2		1-1/4				0.030	
17862515A	17880	5/8		.6250	5/8		3-1/2		1-1/4				0.045	
17862516A	17916	5/8		.6250	5/8		3-1/2		1-1/4				0.060	
17862517A	17917	5/8		.6250	5/8		3-1/2		1-1/4				0.090	
17862518A	17918	5/8		.6250	5/8		3-1/2		1-1/4				0.125	
17862522NA	18008	5/8		.6250	5/8		4		1-1/2		2-1/8		0.015	
17862524NA	17881	5/8		.6250	5/8		4		1-1/2		2-1/8		0.030	
17862525NA	17882	5/8		.6250	5/8		4		1-1/2		2-1/8		0.045	
17862532NA	18009	5/8		.6250	5/8		5		1-3/4		3-1/8		0.015	
17862534NA	17883	5/8		.6250	5/8		5		1-3/4		3-1/8		0.030	
17862535NA	17884	5/8		.6250	5/8		5		1-3/4		3-1/8		0.045	
17862542NA	18010	5/8		.6250	5/8		6		2		4		0.015	

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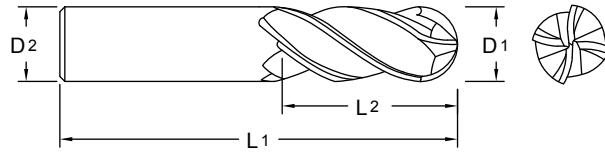
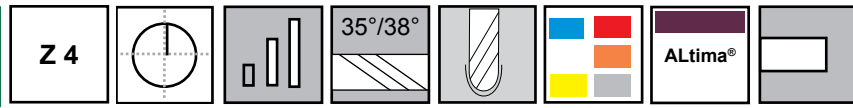
For product information, call your local distributor.

Series 178 continued

ALtima®		Diameter			Shank		OAL		Flute Length		Neck Length		Corner Radius	
		D1			D2		L1		L2		L3		R	
Tool No.	EDP	Fraction	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
17862544NA	17885	5/8		.6250	5/8		6		2		4		0.030	
17862545NA	17886	5/8		.6250	5/8		6		2		4		0.045	
17862900A	17981		16	.6299		16		92		32				
17862903A	17982		16	.6299		16		92		32				1.000
17862910A	18031		16	.6299		16		150		75				
17870800A	17983		18	.7087		18		92		32				
17870803A	17984		18	.7087		18		92		32				1.000
17870813A	17985		18	.7087		20		104		32				1.000
17875000A	17825	3/4		.7500	3/4		3		1					
17875002A	18011	3/4		.7500	3/4		3		1				0.015	
17875004A	17887	3/4		.7500	3/4		3		1				0.030	
17875005A	17888	3/4		.7500	3/4		3		1				0.045	
17875010A	17826	3/4		.7500	3/4		4		1-1/2					
17875012A	18012	3/4		.7500	3/4		4		1-1/2				0.015	
17875014A	17889	3/4		.7500	3/4		4		1-1/2				0.030	
17875015A	17890	3/4		.7500	3/4		4		1-1/2				0.045	
17875016A	17919	3/4		.7500	3/4		4		1-1/2				0.060	
17875017A	17920	3/4		.7500	3/4		4		1-1/2				0.090	
17875018A	17921	3/4		.7500	3/4		4		1-1/2				0.125	
17875022NA	18013	3/4		.7500	3/4		5		1-7/8		3		0.015	
17875024NA	17891	3/4		.7500	3/4		5		1-7/8		3		0.030	
17875025NA	17892	3/4		.7500	3/4		5		1-7/8		3		0.045	
17875032NA	18014	3/4		.7500	3/4		6		2-1/4		4		0.015	
17875034NA	17893	3/4		.7500	3/4		6		2-1/4		4		0.030	
17875035NA	17894	3/4		.7500	3/4		6		2-1/4		4		0.045	
17878700A	17986		20	.7874		20		104		38				
17878703A	17987		20	.7874		20		104		38				1.000
17878710A	18032		20	.7874		20		150		75				
17898400A	17988		25	.9843		25		104		38				
17898403A	17989		25	.9843		25		104		38				1.000
17810000A	17827	1		1.0000	1		4		1					
17810010A	17828	1		1.0000	1		4		1-1/2					
17810012A	18015	1		1.0000	1		4		1-1/2				0.015	
17810014A	17895	1		1.0000	1		4		1-1/2				0.030	
17810015A	17896	1		1.0000	1		4		1-1/2				0.045	
17810016A	17922	1		1.0000	1		4		1-1/2				0.060	
17810017A	17923	1		1.0000	1		4		1-1/2				0.090	
17810018A	17924	1		1.0000	1		4		1-1/2				0.125	
17810022NA	18016	1		1.0000	1		5		2-1/4		3		0.015	
17810024NA	17897	1		1.0000	1		5		2-1/4		3		0.030	
17810025NA	17898	1		1.0000	1		5		2-1/4		3		0.045	
17810032NA	18017	1		1.0000	1		6		3		4		0.015	
17810034NA	17899	1		1.0000	1		6		3		4		0.030	
17810035NA	17900	1		1.0000	1		6		3		4		0.045	

Technical information on pages 14-16.

**TuffCut® XR**  
Series 179



ALtima®		Diameter			Shank		OAL		Flute Length	
		D1			D2		L1		L2	
Tool No.	EDP	Fraction	mm	Decimal	Inch	mm	Inch	mm	Inch	mm
17905900A	18272		1.5	.0591		3		38		3.0
17906250A	18284	1/16		.0625	1/8		1-1/2		1/8	
17907810A	18286	5/64		.0781	1/8		1-1/2		5/32	
17907870A	18274		2.0	.0787		3		38		4.0
17909370A	18288	3/32		.0937	1/8		1-1/2		3/16	
17909840A	18276		2.5	.0984		3		38		5.0
17911800A	18018		3.0	.1181		6		57		8.0
17911803A	18278		3.0	.1181		3		38		6.0
17912500A	18034	1/8		.1250	1/8		1-1/2		1/4	
17912510A	18035	1/8		.1250	1/8		1-1/2		3/8	
17913700A	18280		3.5	.1378		6		63		7.0
17915700A	18019		4.0	.1575		6		57		11.0
17917700A	18282		4.5	.1772		6		63		9.0
17918700A	18038	3/16		.1875	3/16		2		3/8	
17918710A	18039	3/16		.1875	3/16		2		5/8	
17919600A	18020		5.0	.1968		6		57		13.0
17923600A	18021		6.0	.2362		6		57		13.0
17925000A	18042	1/4		.2500	1/4		2		3/8	
17925010A	18043	1/4		.2500	1/4		2-1/2		3/4	
17925020A	18063	1/4		.2500	1/4		4		1/2	
17931200A	18045	5/16		.3125	5/16		2		1/2	
17931210A	18046	5/16		.3125	5/16		2-1/2		13/16	
17931500A	18022		8.0	.3150		8		63		19.0
17937500A	18048	3/8		.3125	3/8		2		1/2	
17937510A	18049	3/8		.3750	3/8		2-1/2		7/8	
17937520A	18064	3/8		.3750	3/8		4		9/16	
17939300A	18023		10.0	.3937		10		72		22.0
17947200A	18024		12.0	.4724		12		83		26.0
17950000A	18054	1/2		.5000	1/2		2-1/2		5/8	
17950010A	18055	1/2		.5000	1/2		3		1-1/4	
17950020A	18065	1/2		.5000	1/2		5		5/8	
17962510A	18058	5/8		.6250	5/8		3-1/2		1-1/4	
17962520A	18066	5/8		.6250	5/8		6		3/4	
17962900A	18059		16.0	.6299		16		92		32.0
17975010A	18060	3/4		.7500	3/4		4		1-1/2	
17975020A	18067	3/4		.7500	3/4		6		1	
17910010A	18062	1		1.0000	1		4		1-1/2	
17910020A	18068	1		1.0000	1		6		1-1/4	

Inch	
D1	Tolerance
1/16-1/4	+ .000/- .002
> 1/4-1.0	+ .000/- .003

Metric (mm)	
D1	Tolerance h10
1.50-3.00	+ .000/- .040
> 3.00-6.00	+ .000/- .048
> 6.00-10.00	+ .000/- .058
> 10.00-16.00	+ .000/- .070

Technical information on pages 14-16.

**NEW**

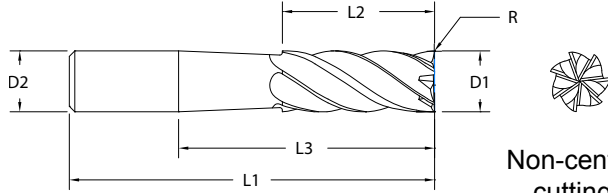
**Available in Fall 2008**

**TuffCut® XR7**

**Series 180**



40% increase in productivity over a 5 flute tool.



- Designed specifically for Titanium.
- ALtima® Blaze coating for increased performance.

ALtima® Blaze		Diameter			Shank		OAL		Flute Length		Neck Length		Corner Radius	
Tool No.	EDP	D1			D2		L1		L2		L3		R	
		Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
18047203NB	18500		12.0	.4724		12.0		120		30		60		1.0
18047205NB	18502		12.0	.4724		12.0		120		30		60		2.0
18047207NB	18504		12.0	.4724		12.0		120		30		60		3.0
18047209NB	18506		12.0	.4724		12.0		120		30		60		4.0
18050000B	18512	1/2		.5000	1/2		3		5/8					
18050002B	18515	1/2		.5000	1/2		3		5/8				.015	
18050004B	18517	1/2		.5000	1/2		3		5/8				.030	
18050006B	18519	1/2		.5000	1/2		3		5/8				.060	
18050007B	18521	1/2		.5000	1/2		3		5/8				.090	
18050008B	18523	1/2		.5000	1/2		3		5/8				.125	
18050010B	18514	1/2		.5000	1/2		3		1-1/4					
18050012B	18516	1/2		.5000	1/2		3		1-1/4				.015	
18050014B	18518	1/2		.5000	1/2		3		1-1/4				.030	
18050016B	18520	1/2		.5000	1/2		3		1-1/4				.060	
18050017B	18522	1/2		.5000	1/2		3		1-1/4				.090	
18050018B	18524	1/2		.5000	1/2		3		1-1/4				.125	
18050024NB	18526	1/2		.5000	1/2		4		1-1/4		2-1/8		.030	
18062500B	18532	5/8		.6250	5/8		3-1/2		3/4					
18062502B	18535	5/8		.6250	5/8		3-1/2		3/4				.015	
18062504B	18537	5/8		.6250	5/8		3-1/2		3/4				.030	
18062506B	18539	5/8		.6250	5/8		3-1/2		3/4				.060	
18062507B	18541	5/8		.6250	5/8		3-1/2		3/4				.090	
18062508B	18543	5/8		.6250	5/8		3-1/2		3/4				.125	
18062510B	18534	5/8		.6250	5/8		3-1/2		1-1/4					
18062512B	18536	5/8		.6250	5/8		3-1/2		1-1/4				.015	
18062514B	18538	5/8		.6250	5/8		3-1/2		1-1/4				.030	
18062516B	18540	5/8		.6250	5/8		3-1/2		1-1/4				.060	
18062517B	18542	5/8		.6250	5/8		3-1/2		1-1/4				.090	
18062518B	18544	5/8		.6250	5/8		3-1/2		1-1/4				.125	
18062524NB	18546	5/8		.6250	5/8		4		1-1/4		2-1/8		.030	
18062903NB	18548		16.0	.6299		16.0		150		40		80		1.0
18062905NB	18550		16.0	.6299		16.0		150		40		80		2.0
18062907NB	18552		16.0	.6299		16.0		150		40		80		3.0
18062909NB	18554		16.0	.6299		16.0		150		40		80		4.0
18075000B	18570	3/4		.7500	3/4		4		1					

Inch	
D1	Tolerance
1/2-1.0	+.000/- .0011

Metric (mm)	
D1	Tolerance
12.00-20.00	+.000/- .028

Technical information on pages 14-16.

Series 180

TuffCut® XR7

Series 180 continued

ALtima® Blaze		Diameter			Shank		OAL		Flute Length		Neck Length		Corner Radius	
		D1			D2		L1		L2		L3		R	
Tool No.	EDP	Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
180750012B	18585	3/4		.7500	3/4		4		1				.250	
18075002B	18573	3/4		.7500	3/4		4		1				.015	
18075004B	18575	3/4		.7500	3/4		4		1				.030	
18075006B	18577	3/4		.7500	3/4		4		1				.060	
18075007B	18579	3/4		.7500	3/4		4		1				.090	
18075008B	18581	3/4		.7500	3/4		4		1				.125	
18075009B	18583	3/4		.7500	3/4		4		1				.190	
18075010B	18572	3/4		.7500	3/4		4		1-1/2					
180750112B	18586	3/4		.7500	3/4		4		1-1/2				.250	
18075012B	18574	3/4		.7500	3/4		4		1-1/2				.015	
18075014B	18576	3/4		.7500	3/4		4		1-1/2				.030	
18075016B	18578	3/4		.7500	3/4		4		1-1/2				.060	
18075017B	18580	3/4		.7500	3/4		4		1-1/2				.090	
18075018B	18582	3/4		.7500	3/4		4		1-1/2				.125	
18075019B	18584	3/4		.7500	3/4		4		1-1/2				.190	
18075024NB	18588	3/4		.7500	3/4		5		1-7/8		3		.030	
18078713NB	18590		20.0	.7874		20.0		150		50		100		1.0
18078715NB	18592		20.0	.7874		20.0		150		50		100		2.0
18078717NB	18594		20.0	.7874		20.0		150		50		100		3.0
18078719NB	18596		20.0	.7874		20.0		150		50		100		4.0
18010000B	18597	1		1.0000	1		4		1					
180100012B	18611	1		1.0000	1		4		1				.250	
18010002B	18599	1		1.0000	1		4		1				.015	
18010004B	18601	1		1.0000	1		4		1				.030	
18010006B	18603	1		1.0000	1		4		1				.060	
18010007B	18615	1		1.0000	1		4		1				.090	
18010008B	18607	1		1.0000	1		4		1				.125	
18010009B	18609	1		1.0000	1		4		1				.190	
18010010B	18598	1		1.0000	1		4		1-1/2					
180100112B	18612	1		1.0000	1		4		1-1/2				.250	
18010012B	18613	1		1.0000	1		4		1-1/2				.015	
18010014B	18602	1		1.0000	1		4		1-1/2				.030	
18010016B	18604	1		1.0000	1		4		1-1/2				.060	
18010017B	18606	1		1.0000	1		4		1-1/2				.090	
18010018B	18608	1		1.0000	1		4		1-1/2				.125	
18010019B	18616	1		1.0000	1		4		1-1/2				.190	
180100205NB	18614	1		1.0000	1		6		3		4		.045	

**ALtima® Blaze**

features high temperature hardness and oxidation resistance that provides extreme wear resistance under all machining conditions.

**Coating Properties**

	ALtima® Blaze
Micro Hardness (HV)	3200
Max. Working Temperature	1100°C 2012°F
Color	Blue Gray

Technical information on pages 14-16.

## Series 177/178/179/180

Inch

Material	Low Carbon Steel		Steel - Mild (.4-.5 Carbon)		Tool Steels (1.2 carbon)		Forgings	
Examples	1018		4140		A2 / D2 / H13 / P20			
Diameter	SFM	inches/tooth	SFM	inches/tooth	SFM	inches/tooth	SFM	inches/tooth
1/8	350-500	.0005-.0008	250-350	.0005-.0008	200-250	.0003-.0005	125-250	.0003-.0005
3/16	350-500	.0010-.0012	250-350	.0010-.0012	200-250	.0008-.0010	125-250	.0008-.0010
1/4	350-500	.0015-.0020	250-350	.0015-.0020	200-250	.0012-.0015	125-250	.0012-.0015
5/16	350-500	.0015-.0025	250-350	.0015-.0025	200-250	.0014-.0018	125-250	.0014-.0018
3/8	350-500	.0021-.0030	250-350	.0021-.0030	200-250	.0018-.0020	125-250	.0018-.0020
1/2	350-500	.0020-.0035	250-350	.0020-.0035	200-250	.0020-.0023	125-250	.0020-.0023
5/8	350-500	.0023-.0040	250-350	.0023-.0040	200-250	.0023-.0030	125-250	.0023-.0030
3/4	350-500	.0022-.0043	250-350	.0022-.0043	200-250	.0024-.0032	125-250	.0024-.0032
1	350-500	.0032-.0050	250-350	.0032-.0050	200-250	.0024-.0032	125-250	.0024-.0032

Material	Iron - Cast (Soft)		Iron - Cast (Medium Hard)		Iron - Cast (Hard Chilled)		Iron (Malleable)	
Examples								
Diameter	SFM	inches/tooth	SFM	inches/tooth	SFM	inches/tooth	SFM	inches/tooth
1/8	450-600	.0005-.0008	300-400	.0005-.0008	250-300	.0005-.0008	225-300	.0005-.0008
3/16	450-600	.0010-.0012	300-400	.0010-.0012	250-300	.0010-.0012	225-300	.0010-.0012
1/4	450-600	.0015-.0020	300-400	.0015-.0020	250-300	.0015-.0020	225-300	.0015-.0020
5/16	450-600	.0015-.0025	300-400	.0015-.0025	250-300	.0015-.0025	225-300	.0015-.0025
3/8	450-600	.0021-.0030	300-400	.0021-.0030	250-300	.0021-.0030	225-300	.0021-.0030
1/2	450-600	.0020-.0035	300-400	.0020-.0035	250-300	.0020-.0035	225-300	.0020-.0035
5/8	450-600	.0023-.0040	300-400	.0023-.0040	250-300	.0023-.0040	225-300	.0023-.0040
3/4	450-600	.0022-.0043	300-400	.0022-.0043	250-300	.0022-.0043	225-300	.0022-.0043
1	450-600	.0032-.0050	300-400	.0032-.0050	250-300	.0032-.0050	225-300	.0032-.0050

Material	Stainless Steel		Austenitic Stainless		Ferritic		Martensitic		Ph Stainless	
Examples	Free Machining		304 / 316		404		403/405		17-4 Ph	
Diameter	SFM	inches/tooth	SFM	inches/tooth	SFM	inches/tooth	SFM	inches/tooth	SFM	inches/tooth
1/8	300-400	.0005-.0008	180-225	.0003-.0005	200-275	.0005-.0008	150-200	.0003-.0005	125-200	.0003-.0005
3/16	300-400	.0010-.0012	180-225	.0008-.0010	200-275	.0010-.0012	150-200	.0008-.0010	125-200	.0008-.0010
1/4	300-400	.0015-.0020	180-225	.0012-.0015	200-275	.0015-.0020	150-200	.0012-.0015	125-200	.0012-.0015
5/16	300-400	.0015-.0025	180-225	.0014-.0018	200-275	.0015-.0025	150-200	.0014-.0018	125-200	.0014-.0018
3/8	300-400	.0021-.0030	180-225	.0018-.0020	200-275	.0021-.0030	150-200	.0018-.0020	125-200	.0018-.0020
1/2	300-400	.0020-.0035	180-225	.0020-.0023	200-275	.0020-.0035	150-200	.0020-.0023	125-200	.0020-.0023
5/8	300-400	.0023-.0040	180-225	.0023-.0030	200-275	.0023-.0040	150-200	.0023-.0030	125-200	.0023-.0030
3/4	300-400	.0022-.0043	180-225	.0024-.0032	200-275	.0022-.0043	150-200	.0024-.0032	125-200	.0024-.0032
1	300-400	.0032-.0050	180-225	.0024-.0032	200-275	.0032-.0050	150-200	.0024-.0032	125-200	.0024-.0032

These are general speed and feed recommendations that may need to be adjusted. For application questions, contact M.A. Ford.

**Series 177/178/179/180**  
**Inch continued**

Material	Titanium		Cobalt/Nickel/Iron Based Alloys	
Examples	6Al-4V		Stellite/Inconel 625, 718/Incoloy 800-802	
Diameter	SFM	inches/tooth	SFM	inches/tooth
1/8	175-375	.0003-.0004	80-125	.0003-.0005
3/16	175-375	.0004-.0006	80-125	.0005-.0015
1/4	175-375	.0006-.0008	80-125	.0005-.0015
5/16	175-375	.0008-.0012	80-125	.0010-.0020
3/8	175-375	.0008-.0012	80-125	.0010-.0020
1/2	175-375	.0012-.0016	80-125	.0010-.0030
5/8	175-375	.0016-.0018	80-125	.0020-.0030
3/4	175-375	.0018-.0020	80-125	.0025-.0035
1	175-375	.0020-.0030	80-125	.0025-.0035

Material	Hardened Steels		Hardened Steels		Hardened Steels	
Examples	35-45 Rc		45-55 Rc		55-65 Rc	
Diameter	SFM	inches/tooth	SFM	inches/tooth	SFM	inches/tooth
1/8	200-250	.0003-.0005	150-200	.0003-.0005	50-100	.0003-.0005
3/16	200-250	.0005-.0015	150-200	.0005-.0015	50-100	.0005-.0015
1/4	200-250	.0005-.0015	150-200	.0005-.0015	50-100	.0005-.0015
5/16	200-250	.0010-.0020	150-200	.0010-.0020	50-100	.0010-.0020
3/8	200-250	.0010-.0020	150-200	.0010-.0020	50-100	.0010-.0020
1/2	200-250	.0010-.0030	150-200	.0010-.0030	50-100	.0010-.0030
5/8	200-250	.0020-.0030	150-200	.0020-.0030	50-100	.0020-.0030
3/4	200-250	.0025-.0035	150-200	.0025-.0035	50-100	.0025-.0035
1	200-250	.0025-.0035	150-200	.0025-.0035	50-100	.0025-.0035

**Series 177/178/179/180**  
**Metric**

Material	Low Carbon Steel		Steel - Mild (.4-.5 Carbon)		Tool Steels (1.2 carbon)		Forgings	
Examples	1018		4140		A2 / D2 / H13 / P20			
Diameter	m/min	mm/tooth	m/min	mm/tooth	m/min	mm/tooth	m/min	mm/tooth
3	105-150	.013-.020	75-105	.013-.020	60-75	.008-.013	40-75	.008-.013
5	105-150	.025-.030	75-105	.025-.030	60-75	.020-.025	40-75	.020-.025
6	105-150	.038-.051	75-105	.038-.051	60-75	.030-.038	40-75	.030-.038
8	105-150	.038-.064	75-105	.038-.064	60-75	.036-.046	40-75	.036-.046
10	105-150	.053-.076	75-105	.053-.076	60-75	.046-.051	40-75	.046-.051
12	105-150	.051-.089	75-105	.051-.089	60-75	.051-.058	40-75	.051-.058
16	105-150	.058-.102	75-105	.058-.102	60-75	.058-.076	40-75	.058-.076
20	105-150	.056-.109	75-105	.056-.109	60-75	.060-.081	40-75	.060-.081
25	105-150	.081-.127	75-105	.081-.127	60-75	.060-.081	40-75	.060-.081

These are general speed and feed recommendations that may need to be adjusted. For application questions, contact M.A. Ford.

# Speeds and Feeds

## Series 177/178/179/180

### Metric continued

Material	Iron - Cast (Soft)		Iron - Cast (Medium Hard)		Iron - Cast (Hard Chilled)		Iron (Malleable)	
Examples								
Diameter	m/min	mm/tooth	m/min	mm/tooth	m/min	mm/tooth	m/min	mm/tooth
3	135-185	.013-.020	90-120	.013-.020	75-90	.013-.020	70-90	.013-.020
5	135-185	.025-.030	90-120	.025-.030	75-90	.025-.030	70-90	.025-.030
6	135-185	.038-.051	90-120	.038-.051	75-90	.038-.051	70-90	.038-.051
8	135-185	.038-.064	90-120	.038-.064	75-90	.038-.064	70-90	.038-.064
10	135-185	.053-.076	90-120	.053-.076	75-90	.053-.076	70-90	.053-.076
12	135-185	.051-.089	90-120	.051-.089	75-90	.051-.089	70-90	.051-.089
16	135-185	.058-.102	90-120	.058-.102	75-90	.058-.102	70-90	.058-.102
20	135-185	.056-.109	90-120	.056-.109	75-90	.056-.109	70-90	.056-.109
25	135-185	.081-.127	90-120	.081-.127	75-90	.081-.127	70-90	.081-.127

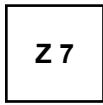
Material	Stainless Steel		Austenetic Stainless		Ferritic		Martensitic		Ph Stainless	
Examples	Free Machining		304 / 316		404		403/404		17-4 Ph	
Diameter	m/min	mm/tooth	m/min	mm/tooth	m/min	mm/tooth	m/min	mm/tooth	m/min	mm/tooth
3	90-120	.013-.020	55-70	.008-.013	60-85	.013-.020	45-60	.008-.013	40-60	.008-.013
5	90-120	.025-.030	55-70	.020-.025	60-85	.025-.030	45-60	.020-.025	40-60	.020-.025
6	90-120	.038-.051	55-70	.030-.038	60-85	.038-.051	45-60	.030-.038	40-60	.030-.038
8	90-120	.038-.064	55-70	.036-.046	60-85	.038-.064	45-60	.036-.046	40-60	.036-.046
10	90-120	.053-.076	55-70	.046-.051	60-85	.053-.076	45-60	.046-.051	40-60	.046-.051
12	90-120	.051-.089	55-70	.051-.058	60-85	.051-.089	45-60	.051-.058	40-60	.051-.058
16	90-120	.058-.102	55-70	.058-.076	60-85	.058-.102	45-60	.058-.076	40-60	.058-.076
20	90-120	.056-.109	55-70	.060-.081	60-85	.056-.109	45-60	.060-.081	40-60	.060-.081
25	90-120	.081-.127	55-70	.060-.081	60-85	.081-.127	45-60	.060-.081	40-60	.060-.081

Material	Titanium		Cobalt/Nickel/Iron Based Alloys	
Examples	6Al-4V		Stellite/Inconel 625, 718/ Incoloy 800-802	
Diameter	m/min	mm/tooth	m/min	mm/tooth
3	55-115	.008-.010	25-40	.008-.013
5	55-115	.010-.015	25-40	.013-.038
6	55-115	.015-.020	25-40	.013-.038
8	55-115	.020-.030	25-40	.025-.051
10	55-115	.020-.030	25-40	.025-.051
12	55-115	.030-.041	25-40	.025-.076
16	55-115	.041-.046	25-40	.025-.076
20	55-115	.046-.051	25-40	.064-.089
25	55-115	.051-.076	25-40	.064-.089

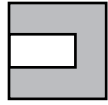
Material	Hardened Steels		Hardened Steels		Hardened Steels	
Examples	35-45 Rc		45-55 Rc		55-65 Rc	
Diameter	m/min	mm/tooth	m/min	mm/tooth	m/min	mm/tooth
3	60-75	.008-.013	45-60	.008-.013	15-30	.008-.013
5	60-75	.013-.038	45-60	.013-.038	15-30	.013-.038
6	60-75	.013-.038	45-60	.013-.038	15-30	.013-.038
8	60-75	.025-.051	45-60	.025-.051	15-30	.025-.051
10	60-75	.025-.051	45-60	.025-.051	15-30	.025-.051
12	60-75	.025-.076	45-60	.025-.076	15-30	.025-.076
16	60-75	.025-.076	45-60	.025-.076	15-30	.025-.076
20	60-75	.064-.089	45-60	.064-.089	15-30	.064-.089
25	60-75	.064-.089	45-60	.064-.089	15-30	.064-.089

These are general speed and feed recommendations that may need to be adjusted. For application questions, contact M.A. Ford.

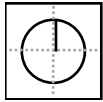
## Icon Glossary



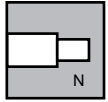
# of Flutes



Shank



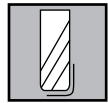
Center Cutting



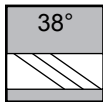
Neck Relief



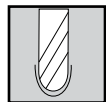
Lengths



Corner Radius



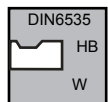
Helix Angle



Ball Nose







Coating



DIN Specs  
Weldon Flat



Workpiece  
Material Group

	Low Carbon Steel Steel-Mild/Tool Steels Stainless Steels
	Austenetic Stainless Steel
	Cast Iron (Soft/Medium/Hard Chilled) Iron (Malleable)
	Titanium Hi-Temp Alloys
	Hardened Steel (35-65Rc)

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