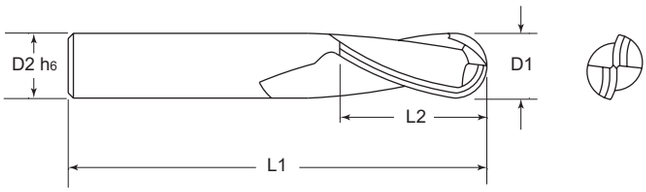
TuffCut® 3D Series 250

2 Flute Ball Nose End Mills



Features
- High performance geometry
- Radius tolerance ± 0.010mm
- ALtima® Blaze coating
- Economical price level

Benefits
- Roughing and finishing applications
- Accurate finishing in 3D shapes
- Hardened steels <50HRC - alloy steel - stainless steel - titanium
- Reduced tooling costs

Tool Number	EDP	D1	R	D2	L1	L2
250M01041B	25900	1.0	0.5	4.0	50.0	2.0
250M015041B	25901	1.5	0.75	4.0	50.0	3.0
250M02041B	25902	2.0	1.0	4.0	50.0	4.0
250M03041B	25903	3.0	1.5	4.0	50.0	6.0
250M04041B	25904	4.0	2.0	4.0	50.0	6.0
250M04061B	25905	4.0	2.0	6.0	50.0	6.0
250M05061B	25906	5.0	2.5	6.0	50.0	7.5
250M06061B	25907	6.0	3.0	6.0	50.0	9.0
250M06062B	25908	6.0	3.0	6.0	75.0	9.0
250M06063B	25909	6.0	3.0	6.0	100.0	12.0
250M08081B	25910	8.0	4.0	8.0	63.0	12.0
250M08082B	25911	8.0	4.0	8.0	75.0	12.0
250M08083B	25912	8.0	4.0	8.0	100.0	16.0
250M10101B	25913	10.0	5.0	10.0	75.0	15.0
250M10102B	25914	10.0	5.0	10.0	100.0	20.0
250M12121B	25915	12.0	6.0	12.0	75.0	18.0
250M12122B	25916	12.0	6.0	12.0	100.0	24.0
250M16161B	25917	16.0	8.0	16.0	75.0	24.0
250M16162B	25918	16.0	8.0	16.0	100.0	32.0

MADE IN USA

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ISO 9001:2015 Certified

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TuffCut® 3D Series 250

Recommended Speeds and Depths of Cut by Material Group - Inch

Workpiece Material Group		Material Type	Ap / Ae / Coolant: Max	Air	MMS	Roughing: 0.05 - 0.10 x D / 0.2 - 0.3 x D — Vc-SFM	Finishing: 0.02 - 0.05 x D / 0.02 - 0.05 x D — Vc-SFM
Steels	P	Low Carbon Steels ≤180HB	○	●	●	820	920
		Med Carbon / Alloy Steels 180-350HB	○	●	●	660	720
		Pre-Hardened Steels 35-45HRC	○	●	●	590	660
Stainless Steels	M	Free Machining Stainless	●	○	○	520	590
		Austenitic Stainless	●	○	○	430	490
		Difficult Stainless	●	○	○	330	360
Special Alloys	S	High Temp Alloys	●	X	X	160	180
		Titanium Alloys	●	X	X	360	390
Cast Irons	K	Grey Cast Iron	○	●	X	720	820
		Ductile Cast Iron	○	●	X	590	660
Hardened Steels	H	Hardened Steels 45 - 50HRC	○	●	○	520	560
Non-Ferrous	N	Aluminum Alloys	●	X	○	980	1640
		Brass / Bronze / Copper	●	X	○	820	1310

● Preferred ○ Possible X Not Possible

Recommended Feed per Tooth by Material Group - Inch

Workpiece Material Group		Material Type	Tool Diameter & Radius (mm): 1 / 0.5		1.5 / 0.75		2 / 1		3 / 1.5		4 / 2		5 / 2.5	
			Rough	Finish	Rough	Finish	Rough	Finish	Rough	Finish	Rough	Finish	Rough	Finish
			Fz - in/tooth											
Steels	P	Low Carbon Steels ≤180HB	.0008	.0006	.0012	.0009	.0016	.0012	.0024	.0018	.0032	.0024	.0040	.0030
		Med Carbon / Alloy Steels 180-350HB	.0008	.0006	.0012	.0009	.0016	.0012	.0024	.0018	.0032	.0024	.0040	.0030
		Pre-Hardened Steels 35-45HRC	.0007	.0006	.0011	.0009	.0014	.0012	.0021	.0018	.0028	.0024	.0035	.0030
Stainless Steels	M	Free Machining Stainless	.0007	.0006	.0011	.0009	.0014	.0012	.0021	.0018	.0028	.0024	.0035	.0030
		Austenitic Stainless	.0006	.0006	.0009	.0009	.0012	.0012	.0018	.0018	.0024	.0024	.0030	.0030
		Difficult Stainless	.0006	.0006	.0009	.0009	.0012	.0012	.0018	.0018	.0024	.0024	.0030	.0030
Special Alloys	S	High Temp Alloys	.0003	.0004	.0005	.0006	.0006	.0008	.0009	.0012	.0012	.0016	.0015	.0020
		Titanium Alloys	.0005	.0004	.0008	.0006	.0010	.0008	.0015	.0012	.0020	.0016	.0025	.0020
Cast Irons	K	Grey Cast Iron	.0008	.0006	.0012	.0009	.0016	.0012	.0024	.0018	.0032	.0024	.0040	.0030
		Ductile Cast Iron	.0007	.0006	.0011	.0009	.0014	.0012	.0021	.0018	.0028	.0024	.0035	.0030
Hardened Steels	H	Hardened Steels 45 - 50HRC	.0005	.0005	.0008	.0008	.0010	.0010	.0015	.0015	.0020	.0020	.0025	.0025
Non-Ferrous	N	Aluminum Alloys	.0010	.0006	.0015	.0009	.0020	.0012	.0030	.0018	.0040	.0024	.0050	.0030
		Brass / Bronze / Copper	.0008	.0006	.0012	.0009	.0016	.0012	.0024	.0018	.0032	.0024	.0040	.0030

Workpiece Material Group		Material Type	Tool Diameter & Radius (mm): 6 / 3		8 / 4		10 / 5		12 / 6		16 / 8	
			Rough	Finish	Rough	Finish	Rough	Finish	Rough	Finish	Rough	Finish
			Fz - in/tooth									
Steels	P	Low Carbon Steels ≤180HB	.0048	.0036	.0064	.0048	.0080	.0060	.0096	.0072	.0128	.0096
		Med Carbon / Alloy Steels 180-350HB	.0048	.0036	.0064	.0048	.0080	.0060	.0096	.0072	.0128	.0096
		Pre-Hardened Steels 35-45HRC	.0042	.0036	.0056	.0048	.0070	.0060	.0084	.0072	.0112	.0096
Stainless Steels	M	Free Machining Stainless	.0042	.0036	.0056	.0048	.0070	.0060	.0084	.0072	.0112	.0096
		Austenitic Stainless	.0036	.0036	.0048	.0048	.0060	.0060	.0072	.0072	.0096	.0096
		Difficult Stainless	.0036	.0036	.0048	.0048	.0060	.0060	.0072	.0072	.0096	.0096
Special Alloys	S	High Temp Alloys	.0018	.0024	.0024	.0032	.0030	.0040	.0036	.0048	.0048	.0064
		Titanium Alloys	.0030	.0024	.0040	.0032	.0050	.0040	.0060	.0048	.0080	.0064
Cast Irons	K	Grey Cast Iron	.0048	.0036	.0064	.0048	.0080	.0060	.0096	.0072	.0128	.0096
		Ductile Cast Iron	.0042	.0036	.0056	.0048	.0070	.0060	.0084	.0072	.0112	.0096
Hardened Steels	H	Hardened Steels 45 - 50HRC	.0030	.0030	.0040	.0040	.0050	.0050	.0060	.0060	.0080	.0080
Non-Ferrous	N	Aluminum Alloys	.0060	.0036	.0080	.0048	.0100	.0060	.0120	.0072	.0160	.0096
		Brass / Bronze / Copper	.0048	.0036	.0064	.0048	.0080	.0060	.0096	.0072	.0128	.0096

TuffCut® 3D Series 250

Recommended Speeds and Depths of Cut by Material Group - Metric

Workpiece Material Group		Material Type	Ap / Ae / Coolant			Roughing	Finishing
			Ap			0.05 - 0.10 x D	0.02 - 0.05 x D
			Ae			0.2 - 0.3 x D	0.02 - 0.05 x D
			Max	Air	MMS	Vc-m/min	
Steels	P	Low Carbon Steels ≤180HB	○	●	●	250	280
		Med Carbon / Alloy Steels 180-350HB	○	●	●	200	220
		Pre-Hardened Steels 35-45HRC	○	●	●	180	200
Stainless Steels	M	Free Machining Stainless	●	○	○	160	180
		Austenitic Stainless	●	○	○	130	150
		Difficult Stainless	●	○	○	100	110
Special Alloys	S	High Temp Alloys	●	X	X	50	55
		Titanium Alloys	●	X	X	110	120
Cast Irons	K	Grey Cast Iron	○	●	X	220	250
		Ductile Cast Iron	○	●	X	180	200
Hardened Steels	H	Hardened Steels 45 - 50HRC	○	●	○	160	170
Non-Ferrous	N	Aluminum Alloys	●	X	○	300	500
		Brass / Bronze / Copper	●	X	○	250	400

● Preferred ○ Possible X Not Possible

Recommended Feed per Tooth by Material Group - Metric

Workpiece Material Group		Material Type	Tool Diameter & Radius (mm)											
			1		1.5		2		3		4		5	
			0.5		0.75		1		1.5		2		2.5	
			Rough	Finish	Rough	Finish	Rough	Finish	Rough	Finish	Rough	Finish	Rough	Finish
			Fz - mm/tooth											
Steels	P	Low Carbon Steels ≤180HB	0.020	0.015	0.030	0.023	0.040	0.030	0.060	0.045	0.080	0.060	0.100	0.075
		Med Carbon / Alloy Steels 180-350HB	0.020	0.015	0.030	0.023	0.040	0.030	0.060	0.045	0.080	0.060	0.100	0.075
		Pre-Hardened Steels 35-45HRC	0.018	0.015	0.027	0.023	0.036	0.030	0.054	0.045	0.072	0.060	0.090	0.075
Stainless Steels	M	Free Machining Stainless	0.018	0.015	0.027	0.023	0.036	0.030	0.054	0.045	0.072	0.060	0.090	0.075
		Austenitic Stainless	0.015	0.015	0.023	0.023	0.030	0.030	0.045	0.045	0.060	0.060	0.075	0.075
		Difficult Stainless	0.015	0.015	0.023	0.023	0.030	0.030	0.045	0.045	0.060	0.060	0.075	0.075
Special Alloys	S	High Temp Alloys	0.008	0.010	0.012	0.015	0.016	0.020	0.024	0.030	0.032	0.040	0.040	0.050
		Titanium Alloys	0.012	0.010	0.018	0.015	0.024	0.020	0.036	0.030	0.048	0.040	0.060	0.050
Cast Irons	K	Grey Cast Iron	0.020	0.015	0.030	0.023	0.040	0.030	0.060	0.045	0.080	0.060	0.100	0.075
		Ductile Cast Iron	0.018	0.015	0.027	0.023	0.036	0.030	0.054	0.045	0.072	0.060	0.090	0.075
Hardened Steels	H	Hardened Steels 45 - 50HRC	0.013	0.013	0.020	0.019	0.026	0.025	0.039	0.038	0.052	0.050	0.065	0.063
Non-Ferrous	N	Aluminum Alloys	0.025	0.015	0.038	0.023	0.050	0.030	0.075	0.045	0.100	0.060	0.125	0.075
		Brass / Bronze / Copper	0.020	0.015	0.030	0.023	0.040	0.030	0.060	0.045	0.080	0.060	0.100	0.075

Workpiece Material Group		Material Type	Tool Diameter & Radius (mm)									
			6		8		10		12		16	
			3		4		5		6		8	
			Rough	Finish	Rough	Finish	Rough	Finish	Rough	Finish	Rough	Finish
			Fz - mm/tooth									
Steels	P	Low Carbon Steels ≤180HB	0.120	0.090	0.160	0.120	0.200	0.150	0.240	0.180	0.320	0.240
		Med Carbon / Alloy Steels 180-350HB	0.120	0.090	0.160	0.120	0.200	0.150	0.240	0.180	0.320	0.240
		Pre-Hardened Steels 35-45HRC	0.108	0.090	0.144	0.120	0.180	0.150	0.216	0.180	0.288	0.240
Stainless Steels	M	Free Machining Stainless	0.108	0.090	0.144	0.120	0.180	0.150	0.216	0.180	0.288	0.240
		Austenitic Stainless	0.090	0.090	0.120	0.120	0.150	0.150	0.180	0.180	0.240	0.240
		Difficult Stainless	0.090	0.090	0.120	0.120	0.150	0.150	0.180	0.180	0.240	0.240
Special Alloys	S	High Temp Alloys	0.048	0.060	0.064	0.080	0.080	0.100	0.096	0.120	0.128	0.160
		Titanium Alloys	0.072	0.060	0.096	0.080	0.120	0.100	0.144	0.120	0.192	0.160
Cast Irons	K	Grey Cast Iron	0.120	0.090	0.160	0.120	0.200	0.150	0.240	0.180	0.320	0.240
		Ductile Cast Iron	0.108	0.090	0.144	0.120	0.180	0.150	0.216	0.180	0.288	0.240
Hardened Steels	H	Hardened Steels 45 - 50HRC	0.078	0.075	0.104	0.100	0.130	0.125	0.156	0.150	0.208	0.200
Non-Ferrous	N	Aluminum Alloys	0.150	0.090	0.200	0.120	0.250	0.150	0.300	0.180	0.400	0.240
		Brass / Bronze / Copper	0.120	0.090	0.160	0.120	0.200	0.150	0.240	0.180	0.320	0.240

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