



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

TuffCut® XM

XM2S 2 flute square end mill

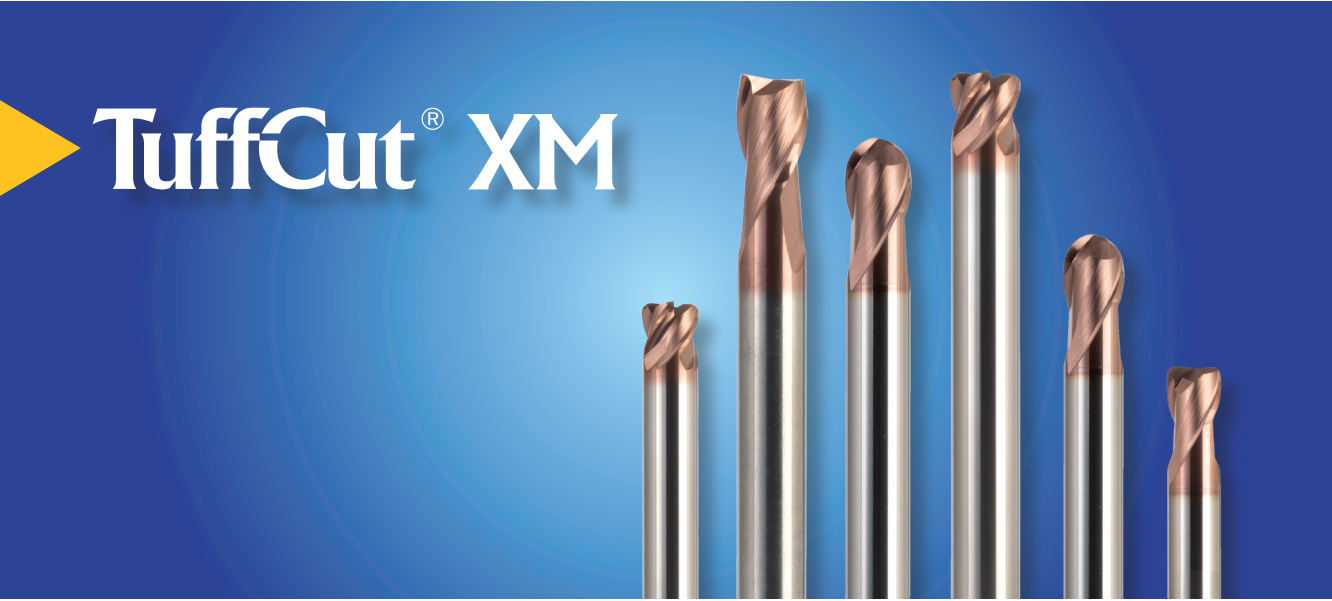
XM2R 2 flute radius end mill

XM2B 2 flute ball end mill

XM4R 4 flute square end mill



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TuffCut[®] XM

Series XM2S

2 Flute Square end mill

- Ideal for hardened steels up to 65 HRC, as well as a wide range of softer materials.
- Perfect for semi-finishing and finishing applications.
- High-precision diameter tolerance for exceptional consistency.
- Micro-grain carbide substrate combined with a high-performance coating for enhanced durability and efficiency.



Pages 3-5

TuffCut[®] XM

Series XM2R

2 Flute Radius end-mill

- High-precision radius type with corner radius tolerance of ± 0.005 mm.
- Ideal for hardened steels up to 65 HRC, as well as a wide range of softer materials.
- Perfect for semi-finishing and finishing applications.
- Micro-grain carbide substrate combined with a high-performance coating for enhanced durability and efficiency.



Pages 6-11

TuffCut[®] XM

Series XM2B

2 Flute Ball end mill

- High-precision radius type with corner radius tolerance of ± 0.005 mm.
- Ideal for hardened steels up to 65 HRC, as well as a wide range of softer materials.
- Perfect for semi-finishing and finishing applications.
- Micro-grain carbide substrate combined with a high-performance coating for enhanced durability and efficiency.



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TuffCut[®] XM

Series XM4R

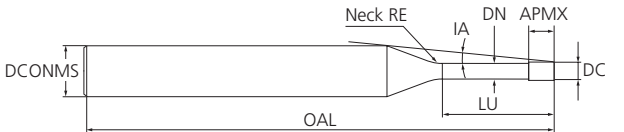
4 Flute Radius end mill

- High-precision radius type with corner radius tolerance of ± 0.005 mm.
- Four-flute design increases feed rates, improves stability, and provides smoother cutting action.
- Ideal for hardened steels up to 65 HRC, as well as a wide range of softer materials.
- Perfect for semi-finishing and finishing applications.
- Micro-grain carbide substrate combined with a high-performance coating for enhanced durability and efficiency.



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TuffCut[®] XM Series XM2S



Tool No.	DC	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA
XM2S-001N0.3X	0.1	0.3	0.15	0.08	50.0	4.0	1.0	14.39°
XM2S-001N0.5X		0.5						14.03°
XM2S-001N1X		1.0						13.22°
XM2S-002N0.5X	0.2	0.5	0.3	0.17	50.0	4.0	1.0	14.03°
XM2S-002N1X		1.0						13.2°
XM2S-002N1.5X		1.5						12.45°
XM2S-002N2X	0.3	2.0	0.45	0.27	50.0	4.0	2.0	11.79°
XM2S-002N3X		3.0						10.65°
XM2S-003N1X		1.0						13.06°
XM2S-003N1.5X	0.4	1.5	0.6	0.37	50.0	4.0	2.0	12.31°
XM2S-003N2X		2.0						11.65°
XM2S-003N2.5X		2.5						11.05°
XM2S-003N3X	0.5	3.0	0.75	0.47	50.0	4.0	2.0	10.51°
XM2S-004N1X		1.0						13.01°
XM2S-004N1.5X		1.5						12.25°
XM2S-004N2X	0.6	2.0	0.9	0.57	50.0	4.0	4.0	11.57°
XM2S-004N2.5X		2.5						10.97°
XM2S-004N3X		3.0						10.42°
XM2S-004N3.5X	0.7	3.5	1.05	0.67	50.0	4.0	4.0	9.92°
XM2S-004N4X		4.0						9.47°
XM2S-004N5X		5.0						8.68°
XM2S-004N6X	0.8	6.0	1.2	0.8	50.0	4.0	4.0	8.01°
XM2S-004N8X		8.0						6.94°
XM2S-004N10X		10.0						6.12°
XM2S-005N1X	0.9	1.0	1.5	1.0	50.0	4.0	4.0	12.96°
XM2S-005N1.5X		1.5						12.19°
XM2S-005N2X		2.0						11.5°
XM2S-005N2.5X	1.0	2.5	2.0	1.2	50.0	4.0	4.0	10.88°
XM2S-005N3X		3.0						10.33°
XM2S-005N4X		4.0						9.37°
XM2S-005N5X	1.2	5.0	2.5	1.5	50.0	4.0	4.0	8.58°
XM2S-005N6X		6.0						7.91°
XM2S-005N8X		8.0						6.84°
XM2S-005N10X	1.5	10.0	3.0	2.0	50.0	4.0	4.0	6.02°
XM2S-006N2X		2.0						11.21°
XM2S-006N3X		3.0						10.07°
XM2S-006N4X	1.8	4.0	3.5	2.5	50.0	4.0	4.0	9.13°
XM2S-006N5X		5.0						8.36°
XM2S-006N6X		6.0						14.39°
XM2S-006N7X	2.0	7.0	4.0	3.0	50.0	4.0	4.0	14.03°
XM2S-006N8X		8.0						13.22°
XM2S-006N9X		9.0						14.03°
XM2S-006N10X	2.5	10.0	5.0	4.0	50.0	4.0	4.0	13.2°
XM2S-007N2X		2.0						12.45°
XM2S-007N4X		4.0						11.79°
XM2S-007N6X	3.0	6.0	6.0	5.0	50.0	4.0	4.0	10.65°

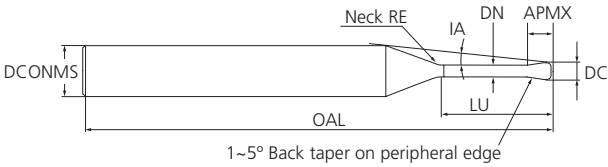
Series XM2S

Tool No.	DC	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA		
XM2S-007N8X	0.7	8.0	1.05	0.67	50.0	4.0	4.0	13.06°		
XM2S-007N10X		10.0						12.31°		
XM2S-008N4X	0.8	4.0	1.20	0.76	50.0	4.0	4.0	11.65°		
XM2S-008N6X		6.0						11.05°		
XM2S-008N8X		8.0						10.51°		
XM2S-008N10X		10.0						13.01°		
XM2S-008N12X		12.0			55.0	12.25°				
XM2S-009N6X	0.9	6.0	1.35	0.86	50.0	4.0	4.0	11.57°		
XM2S-009N8X		8.0						10.97°		
XM2S-009N10X		10.0						10.42°		
XM2S-009N12X		12.0			55.0	9.92°				
XM2S-010N2X	1.0	2.0	1.5	0.96	50.0	4.0	4.0	9.47°		
XM2S-010N3X		3.0						8.68°		
XM2S-010N4X		4.0						8.01°		
XM2S-010N5X		5.0						6.94°		
XM2S-010N6X		6.0						6.12°		
XM2S-010N7X		7.0						12.96°		
XM2S-010N8X		8.0						12.19°		
XM2S-010N9X		9.0						11.5°		
XM2S-010N10X		10.0						10.88°		
XM2S-010N12X		12.0			10.33°					
XM2S-010N14X		14.0			55.0			9.37°		
XM2S-010N16X		16.0			8.58°					
XM2S-010N20X		20.0			60.0			7.91°		
XM2S-010N25X		25.0			65.0			-		
XM2S-012N6X	1.2	6.0	1.8	1.15	50.0	4.0	4.0	14.39°		
XM2S-012N8X		8.0						14.03°		
XM2S-012N10X		10.0						13.22°		
XM2S-012N12X		12.0						14.03°		
XM2S-012N16X		16.0			55.0			13.2°		
XM2S-014N6X	1.4	6.0	2.1	1.34	50.0	4.0	4.0	12.45°		
XM2S-014N12X		12.0			55.0			11.79°		
XM2S-015N4X	1.5	4.0	2.25	1.44	50.0	4.0	4.0	10.65°		
XM2S-015N6X		6.0						13.06°		
XM2S-015N8X		8.0						12.31°		
XM2S-015N10X		10.0						11.65°		
XM2S-015N12X		12.0			55.0			11.05°		
XM2S-015N14X		14.0						10.51°		
XM2S-015N16X		16.0						13.01°		
XM2S-015N18X		18.0			60.0			4°		
XM2S-015N20X		20.0						11.57°		
XM2S-015N25X		25.0						10.97°		
XM2S-015N30X		30.0						10.42°		
XM2S-015N35X		35.0			75.0			9.92°		
XM2S-015N40X		40.0			80.0			9.47°		
XM2S-016N6X	1.6	6.0	2.4	1.54	50.0	4.0	4.0	8.68°		
XM2S-016N8X		8.0						8.01°		
XM2S-018N6X	1.8	6.0	2.7	1.73	50.0	4.0	4.0	6.94°		
XM2S-018N8X		8.0						6.12°		
XM2S-020N4X	2.0	4.0	3.0	1.92	50.0	4.0	4.0	12.96°		
XM2S-020N6X		6.0						12.19°		
XM2S-020N8X		8.0						11.5°		
XM2S-020N10X		10.0						10.88°		
XM2S-020N12X		12.0			55.0			10.33°		
XM2S-020N14X		14.0						9.37°		
XM2S-020N16X		16.0						8.58°		

Series XM2S

Tool No.	DC	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA
XM2S-020N18X	2.0	18.0	3.0	1.92	60.0	4.0	4.0	7.91°
XM2S-020N20X		20.0			6.84°			
XM2S-020N25X		25.0			6.02°			
XM2S-020N30X		30.0			70.0			11.21°
XM2S-020N35X		35.0			75.0			10.07°
XM2S-020N40X		40.0			80.0			9.13°
XM2S-020N50X		50.0			90.0			8.36°
XM2S-025N8X	2.5	8.0	3.75	2.4	50.0	4.0	4.0	14.39°
XM2S-025N12X		12.0			55.0			14.03°
XM2S-025N16X		16.0						13.22°
XM2S-025N20X		20.0			60.0			14.03°
XM2S-025N30X		30.0			70.0			13.2°
XM2S-025N40X		40.0			80.0			12.45°
XM2S-025N50X		50.0			90.0			11.79°
XM2S-030N8X	3.0	8.0	4.5	2.88	55.0	6.0	4.0	10.65°
XM2S-030N12X		12.0			60.0			13.06°
XM2S-030N16X		16.0						12.31°
XM2S-030N20X		20.0			65.0			11.65°
XM2S-030N25X		25.0			70.0			11.05°
XM2S-030N30X		30.0			75.0			10.51°
XM2S-030N40X		40.0			90.0			13.01°
XM2S-030N50X	50.0	100.0	4°					
XM2S-040N12X	4.0	12.0	6.0	3.86	60.0	6.0	4.0	11.57°
XM2S-040N16X		16.0			70.0			10.97°
XM2S-040N20X		20.0						10.42°
XM2S-040N25X		25.0			80.0			9.92°
XM2S-040N30X		30.0						9.47°
XM2S-040N35X		35.0			80.0			8.68°
XM2S-040N40X		40.0			90.0			8.01°
XM2S-040N50X	50.0	100.0	6.94°					
XM2S-050N20X	5.0	20.0	7.5	4.85	70.0	6.0	4.0	6.12°
XM2S-050N25X		25.0			80.0			12.96°
XM2S-050N30X		30.0						12.19°
XM2S-050N40X		40.0			90.0			11.5°
XM2S-050N50X		50.0			100.0			10.88°
XM2S-060N20X	6.0	20.0	9.0	5.85	70.0	6.0	-	10.33°
XM2S-060N30X		30.0			80.0			9.37°
XM2S-060N40X		40.0			90.0			8.58°
XM2S-060N50X		50.0			100.0			7.91°

TuffCut® XM Series XM2R



Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA
XM2R-002N0.5-0.02RX	0.2	0.02	0.5	0.16	0.17	50.0	4.0	1.0	14.07°
XM2R-002N1-0.02RX			1.0						13.23°
XM2R-002N2-0.02RX			2.0						11.82°
XM2R-002N0.5-0.05RX		0.05	0.5						14.12°
XM2R-002N1-0.05RX			1.0						13.28°
XM2R-002N1.5-0.05RX			1.5						12.53°
XM2R-002N2-0.05RX			2.0						11.85°
XM2R-003N1-0.02RX	0.3	0.02	1.0	0.24	0.27	50.0	4.0	2.0	13.09°
XM2R-003N2-0.02RX			2.0						11.67°
XM2R-003N3-0.02RX			3.0						10.53°
XM2R-003N1-0.05RX		0.05	1.0						13.14°
XM2R-003N1.5-0.05RX			1.5						12.38°
XM2R-003N2-0.05RX			2.0						11.71°
XM2R-003N2.5-0.05RX			2.5						11.11°
XM2R-003N3-0.05RX	3.0	10.56°							
XM2R-004N1-0.02RX	0.4	0.02	1.0	0.32	0.37	50.0	4.0	2.0	13.04°
XM2R-004N2-0.02RX			2.0						11.6°
XM2R-004N3-0.02RX			3.0						10.44°
XM2R-004N4-0.02RX			4.0						9.49°
XM2R-004N1-0.05RX		0.05	1.0						13.09°
XM2R-004N1.5-0.05RX			1.5						12.32°
XM2R-004N2-0.05RX			2.0						11.64°
XM2R-004N2.5-0.05RX			2.5						11.03°
XM2R-004N3-0.05RX			3.0						10.47°
XM2R-004N3.5-0.05RX			3.5						9.97°
XM2R-004N4-0.05RX			4.0						9.52°
XM2R-004N1-0.1RX		0.1	1.0						13.17°
XM2R-004N2-0.1RX			2.0						11.7°
XM2R-004N3-0.1RX			3.0						10.53°
XM2R-004N4-0.1RX			4.0						9.56°
XM2R-005N1-0.02RX	0.5	0.02	1.0	0.4	0.47	50.0	4.0	2.0	13°
XM2R-005N2-0.02RX			2.0						11.53°
XM2R-005N3-0.02RX			3.0						10.35°
XM2R-005N4-0.02RX			4.0						9.39°
XM2R-005N6-0.02RX			6.0						7.92°
XM2R-005N1-0.05RX		0.05	1.0						13.05°
XM2R-005N2-0.05RX			2.0						11.56°
XM2R-005N3-0.05RX			3.0						10.38°
XM2R-005N4-0.05RX			4.0						9.42°
XM2R-005N5-0.05RX			5.0						8.62°
XM2R-005N6-0.05RX			6.0						7.94°
XM2R-005N1-0.1RX		0.1	1.0						13.13°
XM2R-005N2-0.1RX			2.0						11.63°
XM2R-005N3-0.1RX			3.0						10.44°
XM2R-005N4-0.1RX			4.0						9.46°
XM2R-005N5-0.1RX			5.0						8.65°
XM2R-005N6-0.1RX			6.0						7.97°

Series XM2R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA					
XM2R-006N2-0.02RX	0.6	0.02	2.0	0.48	0.57	50.0	4.0	4.0	11.24°					
XM2R-006N4-0.02RX			4.0						9.15°					
XM2R-006N6-0.02RX			6.0						7.71°					
XM2R-006N2-0.05RX		0.05	2.0						11.27°					
XM2R-006N4-0.05RX			4.0						9.18°					
XM2R-006N6-0.05RX			6.0						7.73°					
XM2R-006N8-0.05RX			8.0						6.68°					
XM2R-006N10-0.05RX			10.0						5.88°					
XM2R-006N2-0.1RX			0.1						2.0	11.34°				
XM2R-006N4-0.1RX		4.0							9.22°					
XM2R-006N6-0.1RX		6.0							7.76°					
XM2R-006N8-0.1RX		8.0							6.7°					
XM2R-006N10-0.1RX	10.0	5.89°												
XM2R-007N4-0.05RX	0.7	0.05	4.0	0.56	0.67	50.0	4.0	4.0	9.07°					
XM2R-007N6-0.05RX			6.0						7.62°					
XM2R-007N4-0.1RX		0.1	4.0						9.11°					
XM2R-007N6-0.1RX			6.0						7.65°					
XM2R-008N4-0.02RX	0.8	0.02	4.0	0.64	0.76	50.0	4.0	4.0	8.96°					
XM2R-008N6-0.02RX			6.0						7.51°					
XM2R-008N4-0.05RX		0.05	4.0						8.99°					
XM2R-008N6-0.05RX			6.0						7.52°					
XM2R-008N8-0.05RX			8.0						6.47°					
XM2R-008N12-0.05RX		0.1	12.0			55.0			5.05°					
XM2R-008N4-0.1RX			4.0			50.0			9.03°					
XM2R-008N6-0.1RX			6.0			7.55°								
XM2R-008N8-0.1RX		0.8	0.1			8.0			0.64	0.76	50.0	4.0	4.0	6.49°
XM2R-008N12-0.1RX						12.0								5.06°
XM2R-008N4-0.2RX	0.2		4.0	9.12°										
XM2R-008N6-0.2RX			6.0	7.62°										
XM2R-008N8-0.2RX			8.0	6.54°										
XM2R-008N12-0.2RX			12.0	5.09°										
XM2R-010N2-0.02RX	1.0	0.02	2.0	0.80	0.96	50.0	4.0	4.0	10.92°					
XM2R-010N4-0.02RX			4.0						8.72°					
XM2R-010N6-0.02RX			6.0						7.26°					
XM2R-010N8-0.02RX			8.0						6.22°					
XM2R-010N10-0.02RX			10.0						5.44°					
XM2R-010N12-0.02RX			12.0						4.83°					
XM2R-010N2-0.05RX		0.05	2.0			50.0			4.0	4.0	10.96°			
XM2R-010N3-0.05RX			3.0								9.73°			
XM2R-010N4-0.05RX			4.0								8.75°			
XM2R-010N5-0.05RX			5.0								7.95°			
XM2R-010N6-0.05RX			6.0								7.28°			
XM2R-010N8-0.05RX			8.0								6.23°			
XM2R-010N10-0.05RX			10.0								5.45°			
XM2R-010N12-0.05RX			12.0								4.84°			
XM2R-010N16-0.05RX			0.1								16.0	3.95°		
XM2R-010N20-0.05RX											20.0	3.34°		
XM2R-010N2-0.1RX											2.0	11.03°		
XM2R-010N3-0.1RX											3.0	9.79°		
XM2R-010N4-0.1RX		4.0				8.8°								
XM2R-010N5-0.1RX		5.0				7.99°								
XM2R-010N6-0.1RX		6.0				7.31°								
XM2R-010N8-0.1RX		8.0				6.25°								
XM2R-010N10-0.1RX		10.0				5.46°								
XM2R-010N12-0.1RX		12.0				4.85°								
XM2R-010N16-0.1RX		16.0	3.96°											
XM2R-010N20-0.1RX		20.0	3.35°											

Series XM2R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA			
XM2R-010N2-0.2RX	1.0	0.2	2.0	0.80	0.96		4.0	4.0	11.17°			
XM2R-010N3-0.2RX			3.0						9.9°			
XM2R-010N4-0.2RX			4.0						8.89°			
XM2R-010N5-0.2RX			5.0						8.06°			
XM2R-010N6-0.2RX			6.0						7.37°			
XM2R-010N8-0.2RX			8.0						6.3°			
XM2R-010N10-0.2RX			10.0						5.5°			
XM2R-010N12-0.2RX			12.0						4.88°			
XM2R-010N16-0.2RX			16.0						3.98°			
XM2R-010N20-0.2RX			20.0						3.36°			
XM2R-010N2-0.3RX		0.3	2.0						55.0	11.32°		
XM2R-010N3-0.3RX			3.0							10.01°		
XM2R-010N4-0.3RX			4.0							8.98°		
XM2R-010N5-0.3RX			5.0							8.14°		
XM2R-010N6-0.3RX			6.0							7.44°		
XM2R-010N8-0.3RX			8.0							6.35°		
XM2R-010N10-0.3RX			10.0							5.53°		
XM2R-010N12-0.3RX			12.0							4.9°		
XM2R-010N16-0.3RX			16.0							4°		
XM2R-010N20-0.3RX			20.0							3.37°		
XM2R-0125N5-0.1RX	1.25	0.1	5.0	1.0	1.2	50.0	4.0	4.0	7.68°			
XM2R-0125N10-0.1RX			10.0						5.17°			
XM2R-0125N15-0.1RX			15.0						3.9°			
XM2R-0125N20-0.1RX			20.0						3.13°			
XM2R-0125N5-0.2RX		0.2	5.0						50.0	55.0	3.92°	
XM2R-0125N10-0.2RX			10.0									5.21°
XM2R-0125N15-0.2RX			15.0									3.92°
XM2R-0125N20-0.2RX			20.0									3.14°
XM2R-0125N5-0.3RX		0.3	5.0						50.0	55.0	7.83°	
XM2R-0125N10-0.3RX			10.0									5.24°
XM2R-0125N15-0.3RX			15.0									3.94°
XM2R-0125N20-0.3RX			20.0									3.15°
XM2R-015N4-0.1RX	1.5	0.1	4.0	1.2	1.44	50.0	4.0	4.0	8.17°			
XM2R-015N6-0.1RX			6.0						6.66°			
XM2R-015N8-0.1RX			8.0						5.62°			
XM2R-015N12-0.1RX			12.0						4.28°			
XM2R-015N15-0.1RX			15.0						3.63°			
XM2R-015N20-0.1RX			20.0						2.9°			
XM2R-015N4-0.2RX		0.2	4.0			50.0			55.0	6.72°		
XM2R-015N6-0.2RX			6.0								6.72°	
XM2R-015N8-0.2RX			8.0								5.66°	
XM2R-015N12-0.2RX			12.0								4.31°	
XM2R-015N15-0.2RX			15.0								3.65°	
XM2R-015N20-0.2RX			20.0								2.91°	
XM2R-015N4-0.3RX		0.3	4.0			50.0			55.0	6.78°		
XM2R-015N6-0.3RX			6.0								6.78°	
XM2R-015N8-0.3RX			8.0								5.71°	
XM2R-015N12-0.3RX			12.0								4.33°	
XM2R-015N15-0.3RX			15.0								3.67°	
XM2R-015N20-0.3RX			20.0								2.92°	
XM2R-015N4-0.5RX		0.5	4.0			50.0			55.0	8.55°		
XM2R-015N6-0.5RX			6.0								6.91°	
XM2R-015N8-0.5RX			8.0								5.8°	
XM2R-015N12-0.5RX			12.0								4.39°	
XM2R-015N15-0.5RX			15.0								3.71°	
XM2R-015N20-0.5RX			20.0								2.95°	

Series XM2R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA
XM2R-0175N5-0.1RX	1.75	0.1	5.0	1.4	1.68	50.0	4.0	4.0	6.96°
XM2R-0175N10-0.1RX			10.0			4.53°			
XM2R-0175N15-0.1RX			15.0			3.35°			
XM2R-0175N20-0.1RX			20.0			2.66°			
XM2R-0175N5-0.2RX		0.2	5.0			50.0			7.03°
XM2R-0175N10-0.2RX			10.0			4.56°			
XM2R-0175N15-0.2RX			15.0			3.37°			
XM2R-0175N20-0.2RX			20.0			2.67°			
XM2R-0175N5-0.3RX		0.3	5.0			50.0			7.11°
XM2R-0175N10-0.3RX			10.0			4.59°			
XM2R-0175N15-0.3RX			15.0			3.39°			
XM2R-0175N20-0.3RX			20.0			2.69°			
XM2R-020N4-0.1RX	2.0	0.1	4.0	1.60	1.92	50.0	4.0	4.0	7.36°
XM2R-020N6-0.1RX			6.0			5.86°			
XM2R-020N8-0.1RX			8.0			4.87°			
XM2R-020N12-0.1RX			12.0			3.64°			
XM2R-020N16-0.1RX			16.0			2.9°			
XM2R-020N20-0.1RX			20.0			2.42°			
XM2R-020N25-0.1RX			25.0			2°			
XM2R-020N30-0.1RX			30.0			1.7°			
XM2R-020N4-0.2RX		0.2	4.0			50.0			7.46°
XM2R-020N6-0.2RX			6.0			5.93°			
XM2R-020N8-0.2RX			8.0			4.91°			
XM2R-020N12-0.2RX			12.0			3.66°			
XM2R-020N16-0.2RX			16.0			2.92°			
XM2R-020N20-0.2RX			20.0			2.43°			
XM2R-020N25-0.2RX			25.0			2°			
XM2R-020N30-0.2RX			30.0			1.71°			
XM2R-020N4-0.3RX		0.3	4.0			50.0			7.56°
XM2R-020N6-0.3RX			6.0			5.99°			
XM2R-020N8-0.3RX			8.0			4.96°			
XM2R-020N12-0.3RX			12.0			3.69°			
XM2R-020N16-0.3RX			16.0			2.93°			
XM2R-020N20-0.3RX			20.0			2.44°			
XM2R-020N25-0.3RX			25.0			2.01°			
XM2R-020N30-0.3RX			30.0			1.71°			
XM2R-020N6-0.5RX		0.5	6.0			50.0			6.11°
XM2R-020N8-0.5RX			8.0			5.04°			
XM2R-020N12-0.5RX			12.0			3.73°			
XM2R-020N16-0.5RX			16.0			2.96°			
XM2R-020N20-0.5RX			20.0			2.46°			
XM2R-020N25-0.5RX			25.0			2.03°			
XM2R-020N30-0.5RX			30.0			1.72°			
XM2R-020N6-0.8RX			0.8			6.0			50.0
XM2R-020N8-0.8RX		8.0				5.18°			
XM2R-020N12-0.8RX		12.0				3.81°			
XM2R-020N16-0.8RX		16.0				3.01°			
XM2R-020N20-0.8RX		20.0				2.49°			
XM2R-020N25-0.8RX	25.0	2.05°							
XM2R-020N30-0.8RX	30.0	1.74°							
XM2R-025N10-0.1RX	2.5	0.1		10.0	2.0	2.4	50.0	4.0	4.0
XM2R-025N20-0.1RX			20.0	60.0			1.89°		
XM2R-025N30-0.1RX			30.0	70.0			1.32°		
XM2R-025N10-0.2RX		0.2	10.0	50.0			3.39°		
XM2R-025N20-0.2RX			20.0	60.0			1.9°		
XM2R-025N30-0.2RX			30.0	70.0			1.32°		

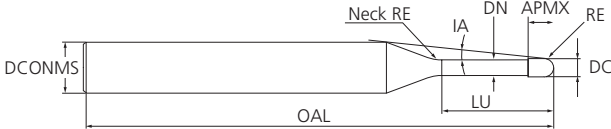
Series XM2R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA
XM2R-025N10-0.3RX	2.5	0.3	10.0	2.0	2.40	50.0	4.0	4.0	3.42°
XM2R-025N20-0.3RX			20.0			60.0			1.91°
XM2R-025N30-0.3RX			30.0			70.0			1.32°
XM2R-025N10-0.5RX		0.5	10.0			50.0			3.47°
XM2R-025N20-0.5RX			20.0			60.0			1.92°
XM2R-025N30-0.5RX			30.0			70.0			1.33°
XM2R-030N6-0.1RX	3.0	0.1	6.0	2.4	2.88	50.0	6.0	4.0	7.4°
XM2R-030N8-0.1RX			8.0			55.0			6.32°
XM2R-030N12-0.1RX			12.0			60.0			4.89°
XM2R-030N16-0.1RX			16.0			65.0			3.99°
XM2R-030N18-0.1RX			18.0						3.65°
XM2R-030N20-0.1RX			20.0						3.36°
XM2R-030N30-0.1RX			30.0			75.0			2.42°
XM2R-030N35-0.1RX			35.0			80.0			2.12°
XM2R-030N6-0.2RX		0.2	6.0			50.0			7.46°
XM2R-030N8-0.2RX			8.0			55.0			6.36°
XM2R-030N12-0.2RX			12.0			60.0			4.92°
XM2R-030N16-0.2RX			16.0						4°
XM2R-030N18-0.2RX			18.0						3.66°
XM2R-030N20-0.2RX			20.0			65.0			3.38°
XM2R-030N30-0.2RX			30.0			75.0			2.43°
XM2R-030N35-0.2RX			35.0			80.0			2.13°
XM2R-030N6-0.3RX		0.3	6.0			50.0			7.53°
XM2R-030N8-0.3RX			8.0			55.0			6.41°
XM2R-030N12-0.3RX			12.0			60.0			4.94°
XM2R-030N16-0.3RX			16.0						4.02°
XM2R-030N18-0.3RX			18.0						3.68°
XM2R-030N20-0.3RX			20.0			65.0			3.39°
XM2R-030N30-0.3RX			30.0			75.0			2.43°
XM2R-030N35-0.3RX			35.0			80.0			2.13°
XM2R-030N8-0.5RX		0.5	8.0			55.0			6.51°
XM2R-030N12-0.5RX			12.0			60.0			5°
XM2R-030N16-0.5RX			16.0						4.06°
XM2R-030N18-0.5RX			18.0						65.0
XM2R-030N20-0.5RX			20.0			75.0			3.42°
XM2R-030N30-0.5RX			30.0						2.45°
XM2R-030N35-0.5RX			35.0						80.0
XM2R-030N8-1.0RX			1.0			8.0			55.0
XM2R-030N12-1.0RX		12.0				60.0			5.15°
XM2R-030N16-1.0RX		16.0							4.16°
XM2R-030N18-1.0RX		18.0							3.79°
XM2R-030N20-1.0RX		20.0				65.0			3.49°
XM2R-030N30-1.0RX		30.0				75.0			2.48°
XM2R-030N35-1.0RX		35.0				80.0			2.17°
XM2R-040N8-0.1RX	4.0	0.1		8.0	3.2	3.86	55.0	6.0	4.0
XM2R-040N12-0.1RX			12.0	60.0			3.66°		
XM2R-040N16-0.1RX			16.0				2.91°		
XM2R-040N20-0.1RX			20.0				2.42°		
XM2R-040N30-0.1RX			30.0	75.0			1.71°		
XM2R-040N35-0.1RX			35.0	80.0			1.49°		
XM2R-040N45-0.1RX		45.0	90.0	1.18°					
XM2R-040N8-0.2RX		0.2	8.0	55.0			4.94°		
XM2R-040N12-0.2RX			12.0	60.0			3.68°		
XM2R-040N16-0.2RX			16.0				2.93°		
XM2R-040N20-0.2RX			20.0				65.0		
XM2R-040N30-0.2RX			30.0	75.0			1.71°		

Series XM2R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	
XM2R-040N35-0.2RX	4.0	0.2	35.0	3.2	3.86	80.0	6.0	4.0	1.49°	
XM2R-040N45-0.2RX			45.0			90.0			1.18°	
XM2R-040N8-0.3RX		0.3	8.0			55.0			4.99°	
XM2R-040N12-0.3RX			12.0			60.0			3.7°	
XM2R-040N16-0.3RX			16.0						2.94°	
XM2R-040N20-0.3RX			20.0						65.0	2.44°
XM2R-040N30-0.3RX			30.0			75.0			1.72°	
XM2R-040N35-0.3RX			35.0			80.0			1.49°	
XM2R-040N45-0.3RX			45.0			90.0			1.19°	
XM2R-040N12-0.5RX			0.5			12.0			60.0	3.75°
XM2R-040N16-0.5RX		16.0				2.97°				
XM2R-040N20-0.5RX		20.0				65.0				2.47°
XM2R-040N30-0.5RX		30.0				75.0			1.73°	
XM2R-040N35-0.5RX		35.0				80.0			1.5°	
XM2R-040N45-0.5RX		45.0				90.0			1.19°	
XM2R-040N12-1.0RX		1.0				12.0			60.0	3.88°
XM2R-040N16-1.0RX						16.0				3.05°
XM2R-040N20-1.0RX			20.0			65.0				2.52°
XM2R-040N30-1.0RX			30.0			75.0			1.75°	
XM2R-040N35-1.0RX			35.0			80.0			1.52°	
XM2R-040N45-1.0RX	45.0		90.0	1.2°						
XM2R-050N20-0.1RX	5.0		0.1	20.0	4.0	4.85	6.0	4.0	1.32°	
XM2R-050N40-0.1RX				40.0					85.0	0.69°
XM2R-050N20-0.2RX		0.2	20.0	65.0					1.32°	
XM2R-050N40-0.2RX			40.0	85.0					0.69°	
XM2R-050N20-0.3RX		0.3	20.0	65.0					1.33°	
XM2R-050N40-0.3RX			40.0	85.0					0.69°	
XM2R-050N20-0.5RX		0.5	20.0	65.0					1.34°	
XM2R-050N40-0.5RX			40.0	85.0					0.7°	
XM2R-050N20-1.0RX		1.0	20.0	65.0					1.38°	
XM2R-050N40-1.0RX			40.0	85.0					0.71°	
XM2R-060N12-0.1RX	6.0	0.1	12.0	4.8	5.85	6.0	-	-		
XM2R-060N18-0.1RX			18.0					60.0	-	
XM2R-060N24-0.1RX			24.0					70.0	-	
XM2R-060N35-0.1RX			35.0					80.0	-	
XM2R-060N55-0.1RX			55.0					100.0	-	
XM2R-060N12-0.2RX		0.2	12.0					50.0	-	
XM2R-060N18-0.2RX			18.0					60.0	-	
XM2R-060N24-0.2RX			24.0					70.0	-	
XM2R-060N35-0.2RX			35.0					80.0	-	
XM2R-060N55-0.2RX			55.0					100.0	-	
XM2R-060N12-0.3RX		0.3	12.0					50.0	-	
XM2R-060N18-0.3RX			18.0					60.0	-	
XM2R-060N24-0.3RX			24.0					70.0	-	
XM2R-060N35-0.3RX			35.0					80.0	-	
XM2R-060N55-0.3RX			55.0					100.0	-	
XM2R-060N18-0.5RX		0.5	18.0					60.0	-	
XM2R-060N24-0.5RX			24.0					70.0	-	
XM2R-060N35-0.5RX			35.0					80.0	-	
XM2R-060N55-0.5RX			55.0					100.0	-	
XM2R-060N18-1.0RX			1.0					18.0	60.0	-
XM2R-060N24-1.0RX	24.0	70.0		-						
XM2R-060N35-1.0RX	35.0	80.0		-						
XM2R-060N55-1.0RX	55.0	100.0		-						

TuffCut® XM Series XM2B



Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA
XM2B-001N0.2X	0.1	0.05	0.2	0.08	0.08	50.0	4.0	1.0	14.66°
XM2B-001N0.3X			0.3						14.48°
XM2B-001N0.5X			0.5						14.12°
XM2B-002N0.5X	0.2	0.1	0.5	0.16	0.17	50.0	4.0	1.0	14.21°
XM2B-002N0.75X			0.75						13.77°
XM2B-002N1X			1.0						13.36°
XM2B-002N1.25X			1.25						12.97°
XM2B-002N1.5X			1.5						12.6°
XM2B-002N2X			2.0						11.92°
XM2B-002N2.5X	0.3	0.15	2.5	0.24	0.27	50.0	4.0	2.0	11.31°
XM2B-002N3X			3.0						10.76°
XM2B-003N0.5X			0.5						14.17°
XM2B-003N0.75X			0.75						13.72°
XM2B-003N1X			1.0						13.3°
XM2B-003N1.25X			1.25						12.9°
XM2B-003N1.5X	0.4	0.2	1.5	0.32	0.37	50.0	4.0	2.0	12.53°
XM2B-003N2X			2.0						11.84°
XM2B-003N2.5X			2.5						11.22°
XM2B-003N3X			3.0						10.66°
XM2B-004N0.75X			0.75						13.78°
XM2B-004N1X			1.0						13.34°
XM2B-004N1.5X	0.5	0.25	1.5	0.4	0.47	50.0	4.0	2.0	12.55°
XM2B-004N2X			2.0						11.84°
XM2B-004N2.5X			2.5						11.2°
XM2B-004N3X			3.0						10.63°
XM2B-004N3.5X			3.5						10.12°
XM2B-004N4X			4.0						9.65°
XM2B-004N4.5X	0.6	0.3	4.5	0.48	0.57	50.0	4.0	4.0	9.22°
XM2B-005N1X			1.0						13.39°
XM2B-005N1.5X			1.5						12.56°
XM2B-005N2X			2.0						11.83°
XM2B-005N2.5X			2.5						11.18°
XM2B-005N3X			3.0						10.6°
XM2B-005N4X	0.7	0.35	4.0	0.56	0.67	50.0	4.0	4.0	9.6°
XM2B-005N5X			5.0						8.77°
XM2B-005N5.5X			5.5						8.4°
XM2B-005N6X			6.0						8.07°
XM2B-005N8X			8.0						6.96°
XM2B-006N1X			1.0						13.15°
XM2B-006N2X	0.8	0.4	2.0	0.64	0.76	50.0	4.0	4.0	11.61°
XM2B-006N2.5X			2.5						10.96°
XM2B-006N3X			3.0						10.38°
XM2B-006N3.5X			3.5						9.86°
XM2B-006N4X			4.0						9.39°
XM2B-006N4.5X			4.5						8.97°

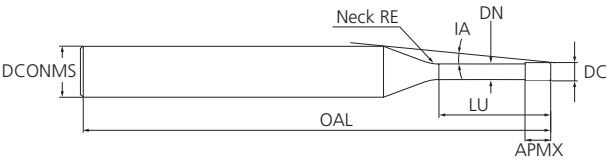
Series XM2B

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA
XM2B-006N5X	0.6	0.3	5.0	0.48	0.57	50.0	4.0	4.0	8.57°
XM2B-006N5.5X			5.5						8.22°
XM2B-006N6X			6.0						7.89°
XM2B-006N7X			7.0						7.3°
XM2B-006N8X			8.0						6.79°
XM2B-006N9X			9.0						6.35°
XM2B-006N10X			10.0						5.97°
XM2B-006N12X			12.0						5.32°
XM2B-007N2X	0.7	0.35	2.0	0.56	0.67	50.0	4.0	4.0	11.6°
XM2B-007N4X			4.0						9.33°
XM2B-007N6X			6.0						7.81°
XM2B-007N8X			8.0						6.71°
XM2B-008N2X	0.8	0.4	2.0	0.64	0.76	50.0	4.0	4.0	11.64°
XM2B-008N4X			4.0						9.3°
XM2B-008N5X			5.0						8.45°
XM2B-008N6X			6.0						7.74°
XM2B-008N8X			8.0						6.63°
XM2B-008N10X			10.0						5.8°
XM2B-009N2X	0.9	0.45	2.0	0.72	0.86	50.0	4.0	4.0	11.63°
XM2B-009N4X			4.0						9.24°
XM2B-009N6X			6.0						7.66°
XM2B-009N8X			8.0						6.54°
XM2B-010N2X	1.0	0.5	2.0	0.8	0.96	50.0	4.0	4.0	11.62°
XM2B-010N3X			3.0						10.25°
XM2B-010N4X			4.0						9.17°
XM2B-010N5X			5.0						8.29°
XM2B-010N6X			6.0						7.57°
XM2B-010N7X			7.0						6.96°
XM2B-010N8X			8.0			6.44°			
XM2B-010N9X			9.0			5.99°			
XM2B-010N10X			10.0			5.6°			
XM2B-010N12X			12.0			4.96°			
XM2B-010N13X			13.0			4.69°			
XM2B-010N14X			14.0			4.45°			
XM2B-010N16X			16.0			4.03°			
XM2B-010N18X			18.0			3.69°			
XM2B-010N20X			20.0			3.4°			
XM2B-011N2X	1.1	0.55	2.0	0.88	1.06	50.0	4.0	4.0	11.61°
XM2B-011N4X			4.0						9.09°
XM2B-011N6X			6.0						7.47°
XM2B-011N8X			8.0						6.34°
XM2B-011N10X			10.0						5.5°
XM2B-012N4X	1.2	0.6	4.0	0.96	1.15	50.0	4.0	4.0	9.05°
XM2B-012N8X			8.0						6.25°
XM2B-012N10X			10.0						5.41°
XM2B-012N12X			12.0			4.77°			
XM2B-014N8X	1.4	0.7	8.0	1.12	1.34	50.0	4.0	4.0	6.04°
XM2B-014N12X			12.0			4.56°			
XM2B-014N16X			16.0			3.67°			
XM2B-015N4X	1.5	0.75	4.0	1.2	1.44	50.0	4.0	4.0	8.82°
XM2B-015N6X			6.0						7.08°
XM2B-015N8X			8.0						5.92°
XM2B-015N10X			10.0						5.08°
XM2B-015N12X			12.0			4.45°			
XM2B-015N14X			14.0			3.96°			
XM2B-015N16X			16.0			3.57°			
XM2B-015N18X			18.0			3.25°			
XM2B-015N20X			20.0			60.0			2.98°

Series XM2B

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA
XM2B-016N8X	1.6	0.8	8.0	1.28	1.54	50.0	4.0	4.0	5.8°
XM2B-016N12X			12.0			55.0			4.34°
XM2B-016N16X			16.0			60.0			3.47°
XM2B-016N20X			20.0			60.0			2.89°
XM2B-018N8X	1.8	0.90	8.0	1.44	1.73	50.0	4.0	4.0	5.55°
XM2B-018N12X			12.0			55.0			4.11°
XM2B-018N16X			16.0			60.0			3.26°
XM2B-018N20X			20.0			60.0			2.7°
XM2B-020N3X	2.0	1.0	3.0	1.6	1.92	50.0	4.0	4.0	9.72°
XM2B-020N4X			4.0						8.32°
XM2B-020N6X			6.0						6.46°
XM2B-020N8X			8.0						5.27°
XM2B-020N10X			10.0			4.46°			
XM2B-020N12X			12.0			3.86°			
XM2B-020N13X			13.0			3.62°			
XM2B-020N14X			14.0			3.4°			
XM2B-020N16X			16.0			3.04°			
XM2B-020N18X			18.0			2.75°			
XM2B-020N20X			20.0			2.51°			
XM2B-020N22X			22.0			2.31°			
XM2B-020N25X			25.0			2.06°			
XM2B-020N30X			30.0			1.75°			
XM2B-020N35X			35.0			1.52°			
XM2B-020N40X			40.0			1.34°			
XM2B-025N6X	2.5	1.25	6.0	2.0	2.4	50.0	4.0	4.0	5.62°
XM2B-025N10X			10.0			55.0			3.69°
XM2B-025N15X			15.0			60.0			2.59°
XM2B-025N20X			20.0			65.0			1.99°
XM2B-025N25X	3.0	1.5	25.0	2.4	2.88	70.0	6.0	4.0	1.62°
XM2B-025N30X			30.0			75.0			1.36°
XM2B-030N8X			8.0			55.0			7.04°
XM2B-030N10X			10.0			60.0			6.05°
XM2B-030N13X	3.0	1.5	13.0	2.4	2.88	60.0	6.0	4.0	5°
XM2B-030N16X			16.0			65.0			4.26°
XM2B-030N20X			20.0			70.0			3.56°
XM2B-030N25X			25.0			75.0			2.95°
XM2B-030N30X	3.5	1.75	30.0	2.8	3.36	80.0	6.0	4.0	2.52°
XM2B-030N35X			35.0			80.0			2.2°
XM2B-035N15X			15.0			60.0			3.99°
XM2B-035N25X			25.0			70.0			2.56°
XM2B-035N35X	4.0	2.0	35.0	3.2	3.86	80.0	6.0	4.0	1.89°
XM2B-035N45X			45.0			90.0			1.5°
XM2B-040N10X			10.0			55.0			4.86°
XM2B-040N13X			13.0			60.0			3.88°
XM2B-040N16X	4.0	2.0	16.0	3.2	3.86	65.0	6.0	4.0	3.23°
XM2B-040N20X			20.0			70.0			2.63°
XM2B-040N25X			25.0			75.0			2.14°
XM2B-040N30X			30.0			75.0			1.81°
XM2B-040N35X	4.0	2.0	35.0	3.2	3.86	80.0	6.0	4.0	1.56°
XM2B-040N40X			40.0			90.0			1.38°
XM2B-040N45X			45.0			100.0			1.23°
XM2B-040N50X			50.0			65.0			1.11°
XM2B-050N20X	5.0	2.5	20.0	4.0	4.85	65.0	6.0	4.0	1.48°
XM2B-050N25X			25.0			70.0			1.18°
XM2B-050N30X			30.0			75.0			0.98°
XM2B-050N40X			40.0			80.0			0.73°
XM2B-060N12X	6.0	3.0	12.0	6.0	5.85	60.0	6.0	-	-
XM2B-060N20X			20.0			65.0			-
XM2B-060N30X			30.0			75.0			-
XM2B-060N50X			50.0			100.0			-

TuffCut® XM Series XM4R



Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA		
XM4R-010N4-0.05RX	1.0	0.05	4.0	0.8	0.96	50.0	4.0	4.0	8.75°		
XM4R-010N6-0.05RX			6.0						7.28°		
XM4R-010N8-0.05RX			8.0						6.23°		
XM4R-010N10-0.05RX			10.0						5.45°		
XM4R-010N12-0.05RX			12.0			4.84°					
XM4R-010N16-0.05RX			16.0			3.95°					
XM4R-010N20-0.05RX		0.1	20.0			60.0			3.34°		
XM4R-010N4-0.1RX			4.0						50.0	8.8°	
XM4R-010N6-0.1RX			6.0							7.31°	
XM4R-010N8-0.1RX			8.0							6.25°	
XM4R-010N10-0.1RX			10.0			5.46°					
XM4R-010N12-0.1RX			12.0			4.85°					
XM4R-010N16-0.1RX			60.0			16.0			3.96°		
XM4R-010N20-0.1RX						20.0			3.35°		
XM4R-015N4-0.05RX	1.5	0.05	4.0	1.2	1.44	50.0	4.0	4.0	8.12°		
XM4R-015N8-0.05RX			8.0						5.6°		
XM4R-015N12-0.05RX			12.0						60.0	4.27°	
XM4R-015N15-0.05RX			15.0							3.62°	
XM4R-015N20-0.05RX		20.0	50.0			2.89°					
XM4R-015N4-0.1RX		0.1				4.0			8.17°		
XM4R-015N8-0.1RX			8.0			5.62°					
XM4R-015N12-0.1RX			12.0			60.0			4.28°		
XM4R-015N15-0.1RX			15.0						3.63°		
XM4R-015N20-0.1RX			20.0						2.9°		
XM4R-020N4-0.05RX	2.0		0.05	4.0	1.6		1.92	50.0	4.0	4.0	8.75°
XM4R-020N6-0.05RX		6.0		7.28°							
XM4R-020N8-0.05RX		8.0		60.0		6.23°					
XM4R-020N12-0.05RX		12.0				5.45°					
XM4R-020N16-0.05RX		16.0				4.84°					
XM4R-020N20-0.05RX		20.0				3.95°					
XM4R-020N4-0.1RX		0.1	4.0	50.0		3.34°					
XM4R-020N6-0.1RX			6.0			8.8°					
XM4R-020N8-0.1RX			8.0			7.31°					
XM4R-020N12-0.1RX			12.0			6.25°					
XM4R-020N16-0.1RX			60.0	16.0		5.46°					
XM4R-020N20-0.1RX				20.0		4.85°					
XM4R-020N4-0.2RX				0.2		4.0		50.0			3.96°
XM4R-020N6-0.2RX						6.0					3.35°
XM4R-020N8-0.2RX		8.0	8.12°								
XM4R-020N12-0.2RX		12.0	5.6°								
XM4R-020N16-0.2RX		60.0	16.0			4.27°					
XM4R-020N20-0.2RX			20.0			3.62°					
XM4R-020N25-0.2RX			70.0	25.0		2.89°					
XM4R-020N30-0.2RX				30.0		8.17°					
XM4R-020N4-0.3RX		0.3	4.0	50.0		5.62°					
XM4R-020N8-0.3RX			8.0			4.28°					

Series XM4R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	
XM4R-020N12-0.3RX	2.0	0.3	12.0	1.6	1.92	60.0	4.0	4.0	3.63°	
XM4R-020N16-0.3RX			16.0						2.9°	
XM4R-020N20-0.3RX			20.0						2.44°	
XM4R-020N4-0.5RX		0.5	4.0			50.0			7.76°	
XM4R-020N6-0.5RX			6.0						6.11°	
XM4R-020N8-0.5RX			8.0						5.04°	
XM4R-020N12-0.5RX			12.0			3.73°				
XM4R-020N16-0.5RX			16.0			2.96°				
XM4R-020N20-0.5RX			20.0			2.46°				
XM4R-020N25-0.5RX			25.0			2.03°				
XM4R-020N30-0.5RX			30.0			1.72°				
XM4R-025N8-0.1RX	2.50	0.1	8.0	2.0	2.4	50.0	4.0	4.0	3.98°	
XM4R-025N16-0.1RX			16.0						2.29°	
XM4R-025N20-0.1RX			20.0						1.89°	
XM4R-025N8-0.2RX		0.2	8.0			60.0			4.02°	
XM4R-025N16-0.2RX			16.0						2.3°	
XM4R-025N20-0.2RX			20.0						1.9°	
XM4R-025N12-0.3RX		0.3	12.0			50.0			2.95°	
XM4R-025N20-0.3RX			20.0						1.91°	
XM4R-025N12-0.5RX		0.5	12.0			60.0			2.99°	
XM4R-025N20-0.5RX			20.0						1.92°	
XM4R-030N8-0.1RX		3.0	0.1			8.0			2.44	2.88
XM4R-030N16-0.1RX	16.0			3.99°						
XM4R-030N25-0.1RX	25.0			2.82°						
XM4R-030N30-0.1RX	30.0			2.42°						
XM4R-030N8-0.2RX	0.2		8.0	50.0	6.36°					
XM4R-030N12-0.2RX			12.0		4.92°					
XM4R-030N16-0.2RX			16.0		4°					
XM4R-030N20-0.2RX			20.0	3.38°						
XM4R-030N25-0.2RX			25.0	2.82°						
XM4R-030N30-0.2RX			30.0	2.43°						
XM4R-030N8-0.3RX			0.3	8.0	60.0	6.41°				
XM4R-030N16-0.3RX	16.0			4.02°						
XM4R-030N20-0.3RX	20.0			3.39°						
XM4R-030N25-0.3RX	25.0			2.83°						
XM4R-030N30-0.3RX	30.0			2.43°						
XM4R-030N8-0.5RX	0.5			8.0	60.0	6.51°				
XM4R-030N12-0.5RX				12.0		5°				
XM4R-030N16-0.5RX				16.0		4.06°				
XM4R-030N20-0.5RX				20.0	3.42°					
XM4R-030N25-0.5RX				25.0	2.85°					
XM4R-030N30-0.5RX				30.0	2.45°					
XM4R-030N35-0.5RX			35.0	2.14°						
XM4R-040N12-0.1RX		4.0	0.1	12.0	3.2	3.86	60.0	6.0	4.0	3.66°
XM4R-040N20-0.1RX	20.0			2.42°						
XM4R-040N30-0.1RX	30.0			1.71°						
XM4R-040N40-0.1RX	40.0			1.32°						
XM4R-040N12-0.2RX	0.2		12.0	60.0			3.68°			
XM4R-040N20-0.2RX			20.0				2.43°			
XM4R-040N30-0.2RX			30.0				1.71°			
XM4R-040N40-0.2RX			40.0	1.32°						
XM4R-040N12-0.3RX	0.3		12.0	60.0			3.7°			
XM4R-040N20-0.3RX			20.0				2.44°			
XM4R-040N30-0.3RX			30.0				1.72°			
XM4R-040N40-0.3RX			40.0	1.32°						
XM4R-040N12-0.5RX	0.5		12.0	60.0			3.75°			

Series XM4R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA
XM4R-040N20-0.5RX	4.0	0.5	20.0	3.2	3.86	60.0	6.0	4.0	2.47°
XM4R-040N30-0.5RX			30.0			80.0			1.73°
XM4R-040N40-0.5RX			40.0						1.33°
XM4R-050N20-0.1RX	5.0	0.1	20.0	4.0	4.85	70.0	6.0	4.0	1.32°
XM4R-050N40-0.1RX			40.0			90.0			0.69°
XM4R-050N20-0.2RX		0.2	20.0			70.0			1.32°
XM4R-050N40-0.2RX			40.0			90.0			0.69°
XM4R-050N20-0.3RX		0.3	20.0			70.0			1.33°
XM4R-050N40-0.3RX			40.0			90.0			0.69°
XM4R-050N20-0.5RX		0.5	20.0			70.0			1.34°
XM4R-050N40-0.5RX			40.0			90.0			0.7°
XM4R-050N20-1.0RX		1.0	20.0			70.0			1.38°
XM4R-050N40-1.0RX			40.0			90.0			0.71°
XM4R-060N30-0.2RX	6.0	0.2	30.0	4.8	5.85	80.0	6.0	4.0	-
XM4R-060N54-0.2RX			54.0			100.0			-
XM4R-060N72-0.2RX			72.0			120.0			-
XM4R-060N30-0.3RX		0.3	30.0			80.0			-
XM4R-060N54-0.3RX			54.0			100.0			-
XM4R-060N72-0.3RX			72.0			120.0			-
XM4R-060N30-0.5RX		0.5	30.0			80.0			-
XM4R-060N54-0.5RX			54.0			100.0			-
XM4R-060N72-0.5RX			72.0			120.0			-
XM4R-060N30-1.0RX		1.0	30.0			80.0			-
XM4R-060N54-1.0RX			54.0			100.0			-
XM4R-060N72-1.0RX			72.0			120.0			-

TuffCut[®] XM Series XM2S High Speed Cutting

Recommended cutting data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

3xD Neck Length																3xD Neck Length													
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)													
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6			0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0				
						Multiply tool Ø by this factor to calculate depths of cut					fz - mm/tooth							fz - mm/tooth											
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.085	0.45	95	0.0048	0.0072	0.0096	0.0120	0.0144			0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.0960	0.1200	0.1440		
Die / Tool Steels		●	●	○	2D/3D HSC	0.077	0.40	85	0.0042	0.0063	0.0084	0.0105	0.0126			0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260		
Austenitic Stainless Steels	M	●	x	○	2D/3D HSC	0.077	0.40	85	0.0042	0.0063	0.0084	0.0105	0.0126			0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260		
High Temp Alloys	S	●	x	x	2D/3D HSC	0.034	0.20	50	0.0032	0.0048	0.0064	0.0080	0.0096			0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960		
Titanium Alloys		●	x	x	2D/3D HSC	0.055	0.30	85	0.0037	0.0056	0.0074	0.0093	0.0111			0.0130	0.0148	0.0185	0.0231	0.0278	0.0324	0.0370	0.0463	0.0555	0.0740	0.0925	0.1110		
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.060	0.35	80	0.0042	0.0063	0.0084	0.0105	0.0126			0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260		
Hardened Steel 45-55 HRC		x	●	●	2D/3D HSC	0.043	0.30	70	0.0040	0.0060	0.0080	0.0100	0.0120			0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.0800	0.1000	0.1200		
Hardened Steel 55-65 HRC		x	●	●	2D/3D HSC	0.038	0.20	65	0.0038	0.0057	0.0076	0.0095	0.0114			0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140		

5xD Neck Length															5xD Neck Length												
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)											
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6			0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0		
						Multiply tool Ø by this factor to calculate depths of cut							fz - mm/tooth														
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.055	0.45	95	0.0046	0.0069	0.0092	0.0115	0.0138			0.0161	0.0184	0.0230	0.0288	0.0345	0.0403	0.0460	0.0575	0.0690	0.09200	0.11500	0.13800
Die / Tool Steels		●	●	○	2D/3D HSC	0.050	0.40	85	0.0040	0.0060	0.0080	0.0100	0.0120			0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.08000	0.10000	0.12000
Austenitic Stainless Steels	M	●	x	○	2D/3D HSC	0.050	0.40	85	0.0040	0.0060	0.0080	0.0100	0.0120			0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.0800	0.1000	0.1200
High Temp Alloys	S	●	x	x	2D/3D HSC	0.022	0.20	50	0.0030	0.0045	0.0060	0.0075	0.0090			0.0105	0.0120	0.0150	0.0188	0.0225	0.0263	0.0300	0.0375	0.0450	0.0600	0.0750	0.0900
Titanium Alloys		●	x	x	2D/3D HSC	0.036	0.30	85	0.0036	0.0054	0.0072	0.0090	0.0108			0.0126	0.0144	0.0180	0.0225	0.0270	0.0315	0.0360	0.0450	0.0540	0.0720	0.0900	0.1080
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.039	0.35	80	0.0040	0.0060	0.0080	0.0100	0.0120			0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.0800	0.1000	0.1200
Hardened Steel 45-55 HRC		x	●	●	2D/3D HSC	0.028	0.30	70	0.0038	0.0057	0.0076	0.0095	0.0114			0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140
Hardened Steel 55-65 HRC		x	●	●	2D/3D HSC	0.025	0.20	65	0.0036	0.0054	0.0072	0.0090	0.0108			0.0126	0.0144	0.0180	0.0225	0.0270	0.0315	0.0360	0.0450	0.0540	0.0720	0.0900	0.1080

8xD Neck Length																8xD Neck Length													
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)													
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6			0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0				
						Multiply tool Ø by this factor to calculate depths of cut					fz - mm/tooth							fz - mm/tooth											
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.040	0.35	85	0.0044	0.0066	0.0088	0.0110	0.0132			0.0154	0.0176	0.0220	0.0275	0.0330	0.0385	0.0440	0.0550	0.0660	0.08800	0.11000	0.13200		
Die / Tool Steels		●	●	○	2D/3D HSC	0.036	0.35	75	0.0038	0.0057	0.0076	0.0095	0.0114			0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.07600	0.09500	0.11400		
Austenitic Stainless Steels	M	●	x	○	2D/3D HSC	0.036	0.35	75	0.0038	0.0057	0.0076	0.0095	0.0114			0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140		
High Temp Alloys	S	●	x	x	2D/3D HSC	0.016	0.15	45	0.0030	0.0045	0.0060	0.0075	0.0090			0.0105	0.0120	0.0150	0.0188	0.0225	0.0263	0.0300	0.0375	0.0450	0.0600	0.0750	0.0900		
Titanium Alloys		●	x	x	2D/3D HSC	0.026	0.25	75	0.0034	0.0051	0.0068	0.0085	0.0102			0.0119	0.0136	0.0170	0.0213	0.0255	0.0298	0.0340	0.0425	0.0510	0.0680	0.0850	0.1020		
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.028	0.35	70	0.0038	0.0057	0.0076	0.0095	0.0114			0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140		
Hardened Steel 45-55 HRC		x	●	●	2D/3D HSC	0.020	0.30	60	0.0038	0.0057	0.0076	0.0095	0.0114			0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140		
Hardened Steel 55-65 HRC		x	●	●	2D/3D HSC	0.018	0.15	60	0.0036	0.0054	0.0072	0.0090	0.0108			0.0126	0.0144	0.0180	0.0225	0.0270	0.0315	0.0360	0.0450	0.0540	0.0720	0.0900	0.1080		

Notes

- If the required RPM for the specified Vc is not achievable due to machine limitations, use the machine's maximum RPM and calculate feed using:
Feed = Max RPM × Fz × number of teeth
- The above cutting conditions are for roughing. For semi-finishing, reduce both Ap (axial depth of cut) and Ae (radial width of cut) accordingly.
- For finishing operations, adjust Ap to material stock allowance or 0.05 to 0.01 x tool Ø, depending on neck length. Reduce Vc by 10-15% and Fz by 15-20%.
- Ae should be adjusted surface finish requirements. As a guide, 0.02 to 0.03 x tool Ø is a good starting point.

- Always use helical or straight ramping for entry. Avoid direct plunge in-feed to minimise tool stress and potential damage.
- Use the shortest overhang possible and minimise tool runout by utilising an accurate chucking system.
- **Please note that these cutting conditions are for guidance only and may need to be adjusted depending on the application, specific material, and surface finish requirements.**

TuffCut[®] XM Series XM2S High Speed Cutting

Recommended cutting data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

10xD Neck Length																10xD Neck Length													
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)													
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6			0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0				
						Multiply tool Ø by this factor to calculate depths of cut					fz - mm/tooth							fz - mm/tooth											
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.026	0.35	85	0.0036	0.0054	0.0072	0.0090	0.0108			0.0126	0.0144	0.0180	0.0225	0.0270	0.0315	0.0360	0.0450	0.0540	0.07200	0.09000	0.10800		
Die / Tool Steels		●	●	○	2D/3D HSC	0.023	0.30	75	0.0032	0.0048	0.0064	0.0080	0.0096			0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.06400	0.08000	0.09600		
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.023	0.30	75	0.0032	0.0048	0.0064	0.0080	0.0096			0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960		
High Temp Alloys	S	●	X	X	2D/3D HSC	0.010	0.15	45	0.0024	0.0036	0.0048	0.0060	0.0072			0.0084	0.0096	0.0120	0.0150	0.0180	0.0210	0.0240	0.0300	0.0360	0.0480	0.0600	0.0720		
Titanium Alloys		●	X	X	2D/3D HSC	0.017	0.25	75	0.0028	0.0042	0.0056	0.0070	0.0084			0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.0560	0.0700	0.0840		
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.018	0.25	70	0.0032	0.0048	0.0064	0.0080	0.0096			0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960		
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.013	0.25	60	0.0030	0.0045	0.0060	0.0075	0.0090			0.0105	0.0120	0.0150	0.0188	0.0225	0.0263	0.0300	0.0375	0.0450	0.0600	0.0750	0.0900		
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.011	0.15	60	0.0028	0.0042	0.0056	0.0070	0.0084			0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.0560	0.0700	0.0840		

12xD Neck Length																12xD Neck Length													
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)													
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6			0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0				
						Multiply tool Ø by this factor to calculate depths of cut					fz - mm/tooth							fz - mm/tooth											
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.026	0.25	75	0.0032	0.0048	0.0064	0.0080	0.0096			0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.06400	0.08000	0.09600		
Die / Tool Steels		●	●	○	2D/3D HSC	0.023	0.25	65	0.0028	0.0042	0.0056	0.0070	0.0084			0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.05600	0.07000	0.08400		
Austentic Stainless Steels	M	●	X	○	2D/3D HSC	0.023	0.25	65	0.0028	0.0042	0.0056	0.0070	0.0084			0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.0560	0.0700	0.0840		
High Temp Alloys	S	●	X	X	2D/3D HSC	0.010	0.10	40	0.0020	0.0030	0.0040	0.0050	0.0060			0.0070	0.0080	0.0100	0.0125	0.0150	0.0175	0.0200	0.0250	0.0300	0.0400	0.0500	0.0600		
Titanium Alloys		●	X	X	2D/3D HSC	0.017	0.20	65	0.0024	0.0036	0.0048	0.0060	0.0072			0.0084	0.0096	0.0120	0.0150	0.0180	0.0210	0.0240	0.0300	0.0360	0.0480	0.0600	0.0720		
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.018	0.20	60	0.0028	0.0042	0.0056	0.0070	0.0084			0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.0560	0.0700	0.0840		
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.013	0.20	55	0.0026	0.0039	0.0052	0.0065	0.0078			0.0091	0.0104	0.0130	0.0163	0.0195	0.0228	0.0260	0.0325	0.0390	0.0520	0.0650	0.0780		
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.011	0.10	50	0.0024	0.0036	0.0048	0.0060	0.0072			0.0084	0.0096	0.0120	0.0150	0.0180	0.0210	0.0240	0.0300	0.0360	0.0480	0.0600	0.0720		

15xD Neck Length																15xD Neck Length													
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)													
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6			0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0				
						Multiply tool Ø by this factor to calculate depths of cut					fz - mm/tooth							fz - mm/tooth											
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.015	0.25	75	0.0028	0.0042	0.0056	0.0070	0.0084			0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.05600	0.07000	0.08400		
Die / Tool Steels		●	●	○	2D/3D HSC	0.014	0.20	65	0.0026	0.0039	0.0052	0.0065	0.0078			0.0091	0.0104	0.0130	0.0163	0.0195	0.0228	0.0260	0.0325	0.0390	0.05200	0.06500	0.07800		
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.014	0.20	65	0.0026	0.0039	0.0052	0.0065	0.0078			0.0091	0.0104	0.0130	0.0163	0.0195	0.0228	0.0260	0.0325	0.0390	0.0520	0.0650	0.0780		
High Temp Alloys	S	●	X	X	2D/3D HSC	0.006	0.10	40	0.0020	0.0030	0.0040	0.0050	0.0060			0.0070	0.0080	0.0100	0.0125	0.0150	0.0175	0.0200	0.0250	0.0300	0.0400	0.0500	0.0600		
Titanium Alloys		●	X	X	2D/3D HSC	0.010	0.15	65	0.0022	0.0033	0.0044	0.0055	0.0066			0.0077	0.0088	0.0110	0.0138	0.0165	0.0193	0.0220	0.0275	0.0330	0.0440	0.0550	0.0660		
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.011	0.20	60	0.0026	0.0039	0.0052	0.0065	0.0078			0.0091	0.0104	0.0130	0.0163	0.0195	0.0228	0.0260	0.0325	0.0390	0.0520	0.0650	0.0780		
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.008	0.15	55	0.0024	0.0036	0.0048	0.0060	0.0072			0.0084	0.0096	0.0120	0.0150	0.0180	0.0210	0.0240	0.0300	0.0360	0.0480	0.0600	0.0720		
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.007	0.10	50	0.0022	0.0033	0.0044	0.0055	0.0066			0.0077	0.0088	0.0110	0.0138	0.0165	0.0193	0.0220	0.0275	0.0330	0.0440	0.0550	0.0660		

Notes

- If the required RPM for the specified Vc is not achievable due to machine limitations, use the machine's maximum RPM and calculate feed using:
Feed = Max RPM × Fz × number of teeth
- The above cutting conditions are for roughing. For semi-finishing, reduce both Ap (axial depth of cut) and Ae (radial width of cut) accordingly.
- For finishing operations, adjust Ap to material stock allowance or 0.05 to 0.01 x tool Ø, depending on neck length. Reduce Vc by 10-15% and Fz by 15-20%.
- Ae should be adjusted surface finish requirements. As a guide, 0.02 to 0.03 x tool Ø is a good starting point.

- Always use helical or straight ramping for entry. Avoid direct plunge in-feed to minimise tool stress and potential damage.
- Use the shortest overhang possible and minimise tool runout by utilising an accurate chucking system.
- **Please note that these cutting conditions are for guidance only and may need to be adjusted depending on the application, specific material, and surface finish requirements.**



TuffCut[®] XM Series XM2R & XM4R High Speed Cutting

Recommended cutting data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

3xD Neck Length													
Workpiece Material Group	ISO	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)				
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6		
						fz - mm/tooth							
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.050	0.45	130	0.0048	0.0072	0.0096	0.0120	0.0144
Die / Tool Steels		●	●	○	2D/3D HSC	0.045	0.40	110	0.0042	0.0063	0.0084	0.0105	0.0126
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.045	0.40	110	0.0042	0.0063	0.0084	0.0105	0.0126
High Temp Alloys	S	●	X	X	2D/3D HSC	0.030	0.20	50	0.0032	0.0048	0.0064	0.0080	0.0096
Titanium Alloys		●	X	X	2D/3D HSC	0.033	0.30	110	0.0037	0.0056	0.0074	0.0093	0.0111
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.040	0.35	105	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.033	0.30	95	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.030	0.20	90	0.0038	0.0057	0.0076	0.0095	0.0114

5xD Neck Length													
Workpiece Material Group	ISO	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)				
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6		
						fz - mm/tooth							
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.030	0.45	105	0.0048	0.0072	0.0096	0.0120	0.0144
Die / Tool Steels		●	●	○	2D/3D HSC	0.027	0.40	90	0.0042	0.0063	0.0084	0.0105	0.0126
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.027	0.40	90	0.0042	0.0063	0.0084	0.0105	0.0126
High Temp Alloys	S	●	X	X	2D/3D HSC	0.018	0.20	40	0.0032	0.0048	0.0064	0.0080	0.0096
Titanium Alloys		●	X	X	2D/3D HSC	0.020	0.30	90	0.0038	0.0057	0.0076	0.0095	0.0114
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.024	0.35	85	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.020	0.30	80	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.018	0.20	75	0.0038	0.0057	0.0076	0.0095	0.0114

8xD Neck Length													
Workpiece Material Group	ISO	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)				
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6		
						fz - mm/tooth							
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.024	0.35	85	0.0048	0.0072	0.0096	0.0120	0.0144
Die / Tool Steels		●	●	○	2D/3D HSC	0.022	0.30	75	0.0042	0.0063	0.0084	0.0105	0.0126
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.022	0.30	75	0.0042	0.0063	0.0084	0.0105	0.0126
High Temp Alloys	S	●	X	X	2D/3D HSC	0.014	0.15	35	0.0032	0.0048	0.0064	0.0080	0.0096
Titanium Alloys		●	X	X	2D/3D HSC	0.016	0.25	75	0.0038	0.0057	0.0076	0.0095	0.0114
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.019	0.25	70	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.016	0.25	65	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.014	0.15	60	0.0038	0.0057	0.0076	0.0095	0.0114

Notes

- If the required RPM for the specified Vc is not achievable due to machine limitations, use the machine's maximum RPM and calculate feed using:
Feed = Max RPM × Fz × number of teeth
- The above cutting conditions are for roughing. For semi-finishing, reduce both Ap (axial depth of cut) and Ae (radial width of cut) accordingly.
- For finishing operations, adjust Ap to material stock allowance or 0.05 to 0.01 x tool Ø, depending on neck length. Reduce Vc by 10-15% and Fz by 15-20%.
- Ae should be adjusted surface finish requirements. As a guide, 0.02 to 0.03 x tool Ø is a good starting point.



3xD Neck Length											
End Mill Diameter (mm)											
0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0
fz - mm/tooth											
0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.0960	0.1200	0.1440
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960
0.0130	0.0148	0.0185	0.0231	0.0278	0.0324	0.0370	0.0463	0.0555	0.0740	0.0925	0.1110
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.0800	0.1000	0.1200
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140

5xD Neck Length											
End Mill Diameter (mm)											
0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0
fz - mm/tooth											
0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.09600	0.12000	0.14400
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.08400	0.10500	0.12600
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.0800	0.1000	0.1200
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140

8xD Neck Length											
End Mill Diameter (mm)											
0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0
fz - mm/tooth											
0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.09600	0.12000	0.14400
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.08400	0.10500	0.12600
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.0800	0.1000	0.1200
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140



TuffCut[®] XM Series XM2R & XM4R High Speed Cutting

Recommended cutting data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

10xD Neck Length													
Workpiece Material Group	ISO	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)				
		Emulsion	Air	MQL									
						fz - mm/tooth							
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.015	0.35	80	0.0048	0.0072	0.0096	0.0120	0.0144
Die / Tool Steels		●	●	○	2D/3D HSC	0.014	0.30	70	0.0042	0.0063	0.0084	0.0105	0.0126
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.014	0.30	70	0.0042	0.0063	0.0084	0.0105	0.0126
High Temp Alloys	S	●	X	X	2D/3D HSC	0.009	0.15	30	0.0032	0.0048	0.0064	0.0080	0.0096
Titanium Alloys		●	X	X	2D/3D HSC	0.010	0.25	70	0.0038	0.0057	0.0076	0.0095	0.0114
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.012	0.25	65	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.010	0.25	60	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.009	0.15	55	0.0038	0.0057	0.0076	0.0095	0.0114

12xD Neck Length													
Workpiece Material Group	ISO	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)				
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6		
						fz - mm/tooth							
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.015	0.25	65	0.0040	0.0060	0.0080	0.0100	0.0120
Die / Tool Steels		●	●	○	2D/3D HSC	0.014	0.25	55	0.0036	0.0054	0.0072	0.0090	0.0108
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.014	0.25	55	0.0036	0.0054	0.0072	0.0090	0.0108
High Temp Alloys	S	●	X	X	2D/3D HSC	0.009	0.10	25	0.0028	0.0042	0.0056	0.0070	0.0084
Titanium Alloys		●	X	X	2D/3D HSC	0.010	0.20	55	0.0032	0.0048	0.0064	0.0080	0.0096
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.012	0.20	55	0.0036	0.0054	0.0072	0.0090	0.0108
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.010	0.20	50	0.0034	0.0051	0.0068	0.0085	0.0102
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.009	0.10	45	0.0032	0.0048	0.0064	0.0080	0.0096

15xD Neck Length													
Workpiece Material Group	ISO	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)				
		Emulsion	Air	MQL		ADOC (Ap)	RWOC (Ae)		0.2	0.3	0.4	0.5	0.6
						Multiply tool Ø by this factor to calculate depths of cut							
						fz - mm/tooth							
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.009	0.25	65	0.0034	0.0051	0.0068	0.0085	0.0102
Die / Tool Steels		●	●	○	2D/3D HSC	0.008	0.20	55	0.0030	0.0045	0.0060	0.0075	0.0090
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.008	0.20	55	0.0030	0.0045	0.0060	0.0075	0.0090
High Temp Alloys	S	●	X	X	2D/3D HSC	0.005	0.10	25	0.0022	0.0033	0.0044	0.0055	0.0066
Titanium Alloys		●	X	X	2D/3D HSC	0.006	0.15	55	0.0026	0.0039	0.0052	0.0065	0.0078
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.007	0.20	55	0.0030	0.0045	0.0060	0.0075	0.0090
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.006	0.15	50	0.0028	0.0042	0.0056	0.0070	0.0084
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.005	0.10	45	0.0026	0.0039	0.0052	0.0065	0.0078

Notes

- If the required RPM for the specified Vc is not achievable due to machine limitations, use the machine's maximum RPM and calculate feed using:
Feed = Max RPM × Fz × number of teeth
- The above cutting conditions are for roughing. For semi-finishing, reduce both Ap (axial depth of cut) and Ae (radial width of cut) accordingly.
- For finishing operations, adjust Ap to material stock allowance or 0.05 to 0.01 x tool Ø, depending on neck length. Reduce Vc by 10-15% and Fz by 15-20%.
- Ae should be adjusted surface finish requirements. As a guide, 0.02 to 0.03 x tool Ø is a good starting point.



10xD Neck Length											
End Mill Diameter (mm)											
0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0
fz - mm/tooth											
0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.09600	0.12000	0.14400
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.08400	0.10500	0.12600
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.0800	0.1000	0.1200
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140

12xD Neck Length											
End Mill Diameter (mm)											
0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0
fz - mm/tooth											
0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.08000	0.10000	0.12000
0.0126	0.0144	0.0180	0.0225	0.0270	0.0315	0.0360	0.0450	0.0540	0.07200	0.09000	0.10800
0.0126	0.0144	0.0180	0.0225	0.0270	0.0315	0.0360	0.0450	0.0540	0.0720	0.0900	0.1080
0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.0560	0.0700	0.0840
0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960
0.0126	0.0144	0.0180	0.0225	0.0270	0.0315	0.0360	0.0450	0.0540	0.0720	0.0900	0.1080
0.0119	0.0136	0.0170	0.0213	0.0255	0.0298	0.0340	0.0425	0.0510	0.0680	0.0850	0.1020
0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960

TuffCut[®] XM Series XM2B High Speed Cutting

Recommended cutting data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

3xD Neck Length																3xD Neck Length													
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)													
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6			0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0				
						Multiply tool Ø by this factor to calculate depths of cut							fz - mm/tooth																
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.100	0.30	155	0.0070	0.0105	0.0140	0.0175	0.0210			0.0245	0.0280	0.0350	0.0438	0.0525	0.0613	0.0700	0.0875	0.1050	0.1400	0.1750	0.2100		
Die / Tool Steels		●	●	○	2D/3D HSC	0.090	0.30	150	0.0064	0.0096	0.0128	0.0160	0.0192			0.0224	0.0256	0.0320	0.0400	0.0480	0.0560	0.0640	0.0800	0.0960	0.1280	0.1600	0.1920		
Austenitic Stainless Steels	M	●	x	○	2D/3D HSC	0.090	0.30	150	0.0064	0.0096	0.0128	0.0160	0.0192			0.0224	0.0256	0.0320	0.0400	0.0480	0.0560	0.0640	0.0800	0.0960	0.1280	0.1600	0.1920		
High Temp Alloys	S	●	x	x	2D/3D HSC	0.060	0.20	50	0.0050	0.0075	0.0100	0.0125	0.0150			0.0175	0.0200	0.0250	0.0313	0.0375	0.0438	0.0500	0.0625	0.0750	0.1000	0.1250	0.1500		
Titanium Alloys		●	x	x	2D/3D HSC	0.065	0.25	130	0.0060	0.0090	0.0120	0.0150	0.0180			0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800		
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.080	0.30	145	0.0064	0.0096	0.0128	0.0160	0.0192			0.0224	0.0256	0.0320	0.0400	0.0480	0.0560	0.0640	0.0800	0.0960	0.1280	0.1600	0.1920		
Hardened Steel 45-55 HRC		x	●	●	2D/3D HSC	0.065	0.30	135	0.0060	0.0090	0.0120	0.0150	0.0180			0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800		
Hardened Steel 55-65 HRC		x	●	●	2D/3D HSC	0.060	0.20	110	0.0050	0.0075	0.0100	0.0125	0.0150			0.0175	0.0200	0.0250	0.0313	0.0375	0.0438	0.0500	0.0625	0.0750	0.1000	0.1250	0.1500		

5xD Neck Length															5xD Neck Length												
Workpiece Material Group	I S O	Coolant			Application	 ADOC (Ap)	 ADOC (Ae)	Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)											
		Emulsion	Air	MQL		0.2	0.3		0.4	0.5	0.6			0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0		
						fz - mm/tooth							fz - mm/tooth														
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.060	0.18	135	0.0066	0.0099	0.0132	0.0165	0.0198			0.0231	0.0264	0.0330	0.0413	0.0495	0.0578	0.0660	0.0825	0.0990	0.13200	0.16500	0.19800
Die / Tool Steels		●	●	○	2D/3D HSC	0.054	0.18	130	0.0060	0.0090	0.0120	0.0150	0.0180			0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.12000	0.15000	0.18000
Austenitic Stainless Steels	M	●	x	○	2D/3D HSC	0.054	0.18	130	0.0060	0.0090	0.0120	0.0150	0.0180			0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800
High Temp Alloys	S	●	x	x	2D/3D HSC	0.036	0.12	45	0.0048	0.0072	0.0096	0.0120	0.0144			0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.0960	0.1200	0.1440
Titanium Alloys		●	x	x	2D/3D HSC	0.039	0.15	115	0.0058	0.0087	0.0116	0.0145	0.0174			0.0203	0.0232	0.0290	0.0363	0.0435	0.0508	0.0580	0.0725	0.0870	0.1160	0.1450	0.1740
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.048	0.18	125	0.0060	0.0090	0.0120	0.0150	0.0180			0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800
Hardened Steel 45-55 HRC		x	●	●	2D/3D HSC	0.039	0.18	115	0.0058	0.0087	0.0116	0.0145	0.0174			0.0203	0.0232	0.0290	0.0363	0.0435	0.0508	0.0580	0.0725	0.0870	0.1160	0.1450	0.1740
Hardened Steel 55-65 HRC		x	●	●	2D/3D HSC	0.036	0.12	95	0.0048	0.0072	0.0096	0.0120	0.0144			0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.0960	0.1200	0.1440

8xD Neck Length															8xD Neck Length												
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)											
		Emulsion	Air	MQL		ADOC (Ap)	RWOC (Ae)		0.2	0.3	0.4	0.5	0.6			0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.040	0.12	120	0.0064	0.0096	0.0128	0.0160	0.0192			0.0224	0.0256	0.0320	0.0400	0.0480	0.0560	0.0640	0.0800	0.0960	0.12800	0.16000	0.19200
Die / Tool Steels		●	●	○	2D/3D HSC	0.036	0.12	115	0.0060	0.0090	0.0120	0.0150	0.0180			0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.12000	0.15000	0.18000
Austenitic Stainless Steels	M	●	x	○	2D/3D HSC	0.036	0.12	115	0.0060	0.0090	0.0120	0.0150	0.0180			0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800
High Temp Alloys	S	●	x	x	2D/3D HSC	0.024	0.08	40	0.0046	0.0069	0.0092	0.0115	0.0138			0.0161	0.0184	0.0230	0.0288	0.0345	0.0403	0.0460	0.0575	0.0690	0.0920	0.1150	0.1380
Titanium Alloys		●	x	x	2D/3D HSC	0.026	0.10	100	0.0056	0.0084	0.0112	0.0140	0.0168			0.0196	0.0224	0.0280	0.0350	0.0420	0.0490	0.0560	0.0700	0.0840	0.1120	0.1400	0.1680
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.032	0.12	110	0.0060	0.0090	0.0120	0.0150	0.0180			0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800
Hardened Steel 45-55 HRC		x	●	●	2D/3D HSC	0.026	0.12	105	0.0056	0.0084	0.0112	0.0140	0.0168			0.0196	0.0224	0.0280	0.0350	0.0420	0.0490	0.0560	0.0700	0.0840	0.1120	0.1400	0.1680
Hardened Steel 55-65 HRC		x	●	●	2D/3D HSC	0.024	0.08	85	0.0046	0.0069	0.0092	0.0115	0.0138			0.0161	0.0184	0.0230	0.0288	0.0345	0.0403	0.0460	0.0575	0.0690	0.0920	0.1150	0.1380

Notes

- If the required RPM for the specified Vc is not achievable due to machine limitations, use the machine's maximum RPM and calculate feed using:
Feed = Max RPM × Fz × number of teeth
- The above cutting conditions are for roughing. For semi-finishing, reduce both Ap (axial depth of cut) and Ae (radial width of cut) accordingly.
- For finishing operations, adjust Ap to material stock allowance or 0.05 to 0.01 x tool Ø, depending on neck length. Reduce Vc by 10-15% and Fz by 15-20%.
- Ae should be adjusted surface finish requirements. As a guide, 0.02 to 0.03 x tool Ø is a good starting point.

- Always use helical or straight ramping for entry. Avoid direct plunge in-feed to minimise tool stress and potential damage.
- Use the shortest overhang possible and minimise tool runout by utilising an accurate chucking system.
- **Please note that these cutting conditions are for guidance only and may need to be adjusted depending on the application, specific material, and surface finish requirements.**

TuffCut[®] XM Series XM2B High Speed Cutting

Recommended cutting data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

10xD Neck Length													
Workpiece Material Group	ISO	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)				
		Emulsion	Air	MQL		ADOC (Ap)	RWOC (Ae)		0.2	0.3	0.4	0.5	0.6
						Multiply tool Ø by this factor to calculate depths of cut					fz - mm/tooth		
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.025	0.08	120	0.0052	0.0078	0.0104	0.0130	0.0156
Die / Tool Steels		●	●	○	2D/3D HSC	0.023	0.08	115	0.0048	0.0072	0.0096	0.0120	0.0144
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.023	0.08	115	0.0048	0.0072	0.0096	0.0120	0.0144
High Temp Alloys	S	●	X	X	2D/3D HSC	0.015	0.05	40	0.0038	0.0057	0.0076	0.0095	0.0114
Titanium Alloys		●	X	X	2D/3D HSC	0.016	0.06	100	0.0046	0.0069	0.0092	0.0115	0.0138
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.020	0.08	110	0.0048	0.0072	0.0096	0.0120	0.0144
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.016	0.08	105	0.0046	0.0069	0.0092	0.0115	0.0138
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.015	0.05	85	0.0038	0.0057	0.0076	0.0095	0.0114

12xD Neck Length													
Workpiece Material Group	ISO	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)				
		Emulsion	Air	MQL		ADOC (Ap)	RWOC (Ae)		0.2	0.3	0.4	0.5	0.6
						Multiply tool Ø by this factor to calculate depths of cut					fz - mm/tooth		
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.025	0.08	90	0.0046	0.0069	0.0092	0.0115	0.0138
Die / Tool Steels		●	●	○	2D/3D HSC	0.023	0.08	85	0.0042	0.0063	0.0084	0.0105	0.0126
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.023	0.08	85	0.0042	0.0063	0.0084	0.0105	0.0126
High Temp Alloys	S	●	X	X	2D/3D HSC	0.015	0.05	30	0.0032	0.0048	0.0064	0.0080	0.0096
Titanium Alloys		●	X	X	2D/3D HSC	0.016	0.06	75	0.0040	0.0060	0.0080	0.0100	0.0120
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.020	0.08	80	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.016	0.08	75	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.015	0.05	65	0.0032	0.0048	0.0064	0.0080	0.0096

15xD Neck Length													
Workpiece Material Group	ISO	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)				
		Emulsion	Air	MQL		ADOC (Ap)	RWOC (Ae)		0.2	0.3	0.4	0.5	0.6
						Multiply tool Ø by this factor to calculate depths of cut					fz - mm/tooth		
Medium Carbon Steels	P	●	●	○	2D/3D HSC	0.015	0.05	90	0.0042	0.0063	0.0084	0.0105	0.0126
Die / Tool Steels		●	●	○	2D/3D HSC	0.014	0.05	85	0.0038	0.0057	0.0076	0.0095	0.0114
Austenitic Stainless Steels	M	●	X	○	2D/3D HSC	0.014	0.05	85	0.0038	0.0057	0.0076	0.0095	0.0114
High Temp Alloys	S	●	X	X	2D/3D HSC	0.009	0.03	30	0.0030	0.0045	0.0060	0.0075	0.0090
Titanium Alloys		●	X	X	2D/3D HSC	0.010	0.04	75	0.0036	0.0054	0.0072	0.0090	0.0108
Pre-Hardened Steel 35-45 HRC	H	○	●	●	2D/3D HSC	0.012	0.05	80	0.0038	0.0057	0.0076	0.0095	0.0114
Hardened Steel 45-55 HRC		X	●	●	2D/3D HSC	0.010	0.05	75	0.0036	0.0054	0.0072	0.0090	0.0108
Hardened Steel 55-65 HRC		X	●	●	2D/3D HSC	0.009	0.03	65	0.0030	0.0045	0.0060	0.0075	0.0090

Notes

- If the required RPM for the specified Vc is not achievable due to machine limitations, use the machine's maximum RPM and calculate feed using:
Feed = Max RPM × Fz × number of teeth
- The above cutting conditions are for roughing. For semi-finishing, reduce both Ap (axial depth of cut) and Ae (radial width of cut) accordingly.
- For finishing operations, adjust Ap to material stock allowance or 0.05 to 0.01 x tool Ø, depending on neck length. Reduce Vc by 10-15% and Fz by 15-20%.
- Ae should be adjusted surface finish requirements. As a guide, 0.02 to 0.03 x tool Ø is a good starting point.



10xD Neck Length											
End Mill Diameter (mm)											
0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0
fz - mm/tooth											
0.0182	0.0208	0.0260	0.0325	0.0390	0.0455	0.0520	0.0650	0.0780	0.10400	0.13000	0.15600
0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.09600	0.12000	0.14400
0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.0960	0.1200	0.1440
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140
0.0161	0.0184	0.0230	0.0288	0.0345	0.0403	0.0460	0.0575	0.0690	0.0920	0.1150	0.1380
0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.0960	0.1200	0.1440
0.0161	0.0184	0.0230	0.0288	0.0345	0.0403	0.0460	0.0575	0.0690	0.0920	0.1150	0.1380
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140

12xD Neck Length											
End Mill Diameter (mm)											
0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0
fz - mm/tooth											
0.0161	0.0184	0.0230	0.0288	0.0345	0.0403	0.0460	0.0575	0.0690	0.09200	0.11500	0.13800
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.08400	0.10500	0.12600
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960
0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.0800	0.1000	0.1200
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.0840	0.1050	0.1260
0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.0800	0.1000	0.1200
0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960

15xD Neck Length											
End Mill Diameter (mm)											
0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0	6.0
fz - mm/tooth											
0.0147	0.0168	0.0210	0.0263	0.0315	0.0368	0.0420	0.0525	0.0630	0.08400	0.10500	0.12600
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.07600	0.09500	0.11400
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140
0.0105	0.0120	0.0150	0.0188	0.0225	0.0263	0.0300	0.0375	0.0450	0.0600	0.0750	0.0900
0.0126	0.0144	0.0180	0.0225	0.0270	0.0315	0.0360	0.0450	0.0540	0.0720	0.0900	0.1080
0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140
0.0126	0.0144	0.0180	0.0225	0.0270	0.0315	0.0360	0.0450	0.0540	0.0720	0.0900	0.1080
0.0105	0.0120	0.0150	0.0188	0.0225	0.0263	0.0300	0.0375	0.0450	0.0600	0.0750	0.0900

TuffCut[®] XM Series XM2S, XM2R & XM4R General Cutting

Recommended cutting data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

3xD Neck Length															3xD Neck Length												
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)											
		Emulsion	Air	MQL		0.1	0.2		0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0				
																								Multiply tool Ø by this factor to calculate depths of cut			
Medium Carbon Steels	P	•	•	o	Slotting	0.5	-	95	0.0002	0.0005	0.0007	0.0010	0.0012			0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.00960	0.01200	0.01440
Die / Tool Steels		•	•	o	Profiling	1.0	0.1	200	0.0007	0.0013	0.0020	0.0026	0.0033			0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.02640	0.03300	0.03960
Austenitic Stainless Steels	M	•	x	o	Slotting	0.5	-	75	0.0002	0.0005	0.0007	0.0010	0.0012			0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144
					Profiling	1.0	0.1	150	0.0007	0.0013	0.0020	0.0026	0.0033			0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.0264	0.0330	0.0396
•		x	o	Slotting	0.5	-	65	0.0002	0.0005	0.0007	0.0010	0.0012			0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144	
				Profiling	1.0	0.1	100	0.0007	0.0013	0.0020	0.0026	0.0033			0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.0264	0.0330	0.0396	
High Temp Alloys	S	•	x	x	Slotting	0.5	-	30	0.0002	0.0004	0.0006	0.0008	0.0010			0.0012	0.0014	0.0016	0.0018	0.0020	0.0030	0.0040	0.0050	0.0060	0.0080	0.0100	0.0120
Profiling					1.0	0.05	45	0.0006	0.0011	0.0017	0.0022	0.0028			0.0034	0.0039	0.0045	0.0050	0.0056	0.0084	0.0112	0.0140	0.0168	0.0224	0.0280	0.0336	
Titanium Alloys		•	x	x	Slotting	0.5	-	75	0.0002	0.0005	0.0007	0.0010	0.0012			0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144
					Profiling	1.0	0.1	107	0.0004	0.0008	0.0012	0.0016	0.0020			0.0024	0.0028	0.0032	0.0036	0.0040	0.0060	0.0080	0.0100	0.0120	0.0160	0.0200	0.0240
5xD Neck Length															5xD Neck Length												
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)											
		Emulsion	Air	MQL		0.1	0.2		0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0				
																								Multiply tool Ø by this factor to calculate depths of cut			
Medium Carbon Steels	P	•	•	o	Slotting	0.3	-	95	0.0002	0.0005	0.0007	0.0010	0.0012			0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.00960	0.01200	0.01440
Die / Tool Steels		•	•	o	Profiling	1.0	0.08	200	0.0007	0.0013	0.0020	0.0026	0.0033			0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.02640	0.03300	0.03960
Austenitic Stainless Steels	M	•	x	o	Slotting	0.3	-	75	0.0002	0.0005	0.0007	0.0010	0.0012			0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144
					Profiling	1.0	0.08	150	0.0007	0.0013	0.0020	0.0026	0.0033			0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.0264	0.0330	0.0396
•		x	o	Slotting	0.3	-	65	0.0002	0.0005	0.0007	0.0010	0.0012			0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144	
				Profiling	1.0	0.08	100	0.0007	0.0013	0.0020	0.0026	0.0033			0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.0264	0.0330	0.0396	
High Temp Alloys	S	•	x	x	Slotting	0.3	-	30	0.0002	0.0004	0.0006	0.0008	0.0010			0.0012	0.0014	0.0016	0.0018	0.0020	0.0030	0.0040	0.0050	0.0060	0.0080	0.0100	0.0120
Profiling					1.0	0.05	45	0.0006	0.0011	0.0017	0.0022	0.0028			0.0034	0.0039	0.0045	0.0050	0.0056	0.0084	0.0112	0.0140	0.0168	0.0224	0.0280	0.0336	
Titanium Alloys		•	x	x	Slotting	0.3	-	75	0.0002	0.0005	0.0007	0.0010	0.0012			0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144
					Profiling	1.0	0.08	110	0.0004	0.0008	0.0012	0.0016	0.0020			0.0024	0.0028	0.0032	0.0036	0.0040	0.0060	0.0080	0.0100	0.0120	0.0160	0.0200	0.0240
8xD Neck Length															8xD Neck Length												
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)											
		Emulsion	Air	MQL		0.1	0.2		0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0				
																								Multiply tool Ø by this factor to calculate depths of cut			
Medium Carbon Steels	P	•	•	o	Slotting	0.2	-	85	0.0002	0.0004	0.0007	0.0009	0.0011			0.0013	0.0015	0.0018	0.0020	0.0022	0.0033	0.0044	0.0055	0.0066	0.00880	0.01100	0.01320
Die / Tool Steels		•	•	o	Profiling	0.75	0.05	180	0.0006	0.0012	0.0018	0.0024	0.0030			0.0035	0.0041	0.0047	0.0053	0.0059	0.0089	0.0118	0.0148	0.0177	0.02360	0.02950	0.03540
Austenitic Stainless Steels	M	•	x	o	Slotting	0.2	-	70	0.0002	0.0004	0.0007	0.0009	0.0011			0.0013	0.0015	0.0018	0.0020	0.0022	0.0033	0.0044	0.0055	0.0066	0.0088	0.0110	0.0132
					Profiling	0.75	0.05	135	0.0006	0.0012	0.0018	0.0024	0.0030			0.0035	0.0041	0.0047	0.0053	0.0059	0.0089	0.0118	0.0148	0.0177	0.0236	0.0295	0.0354
•		x	o	Slotting	0.2	-	60	0.0002	0.0004	0.0007	0.0009	0.0011			0.0013	0.0015	0.0018	0.0020	0.0022	0.0033	0.0044	0.0055	0.0066	0.0088	0.0110	0.0132	
				Profiling	0.75	0.05	90	0.0006	0.0012	0.0018	0.0024	0.0030			0.0035	0.0041	0.0047	0.0053	0.0059	0.0089	0.0118	0.0148	0.0177	0.0236	0.0295	0.0354	
High Temp Alloys	S	•	x	x	Slotting	0.2	-	28	0.0002	0.0004	0.0005	0.0007	0.0009			0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
Profiling					0.75	0.05	40	0.0005	0.0010	0.0015	0.0020	0.0025			0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.0200	0.0250	0.0300	
Titanium Alloys	•	x	x	Slotting	0.2	-	68	0.0002	0.0004	0.0007	0.0009	0.0011			0.0013	0.0015	0.0018	0.0020	0.0022	0.0033	0.0044	0.0055	0.0066	0.0088	0.0110	0.0132	
					Profiling	0.75	0.05	95	0.0004	0.0007	0.0011	0.0014	0.0018			0.0022	0.0025	0.0029	0.0032	0.0036	0.0054	0.0072	0.0090	0.0108	0.0144	0.0180	0.0216

TuffCut® XM Series XM2S, XM2R & XM4R General Cutting

Recommended cutting data : Conditions de coupe recommandées : Empfohlene Schnittdaten : Dati di taglio Raccomandati : Zalecane Parametry

10xD Neck Length															10xD Neck Length												
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)											
		Emulsion	Air	MQL		0.1	0.2		0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0				
																								Multiply tool Ø by this factor to calculate depths of cut			
Medium Carbon Steels	P	•	•	o	Slotting	0.15	-	75	0.0002	0.0004	0.0005	0.0007	0.0009			0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.00720	0.00900	0.01080
Die / Tool Steels		•	•	o	Profiling	0.5	0.035	160	0.0005	0.0010	0.0015	0.0020	0.0025			0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.02000	0.02500	0.03000
Austentic Stainless Steels	M	•	x	o	Slotting	0.15	-	60	0.0002	0.0004	0.0005	0.0007	0.0009			0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
Duplex & Super Duplex		•	x	o	Profiling	0.5	0.035	120	0.0005	0.0010	0.0015	0.0020	0.0025			0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.0200	0.0250	0.0300
High Temp Alloys	S	•	x	x	Slotting	0.15	-	25	0.0002	0.0003	0.0005	0.0006	0.0008			0.0009	0.0011	0.0012	0.0014	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090
Titanium Alloys		•	x	x	Profiling	0.5	0.035	35	0.0004	0.0008	0.0013	0.0017	0.0021			0.0025	0.0029	0.0034	0.0038	0.0042	0.0063	0.0084	0.0105	0.0126	0.0168	0.0210	0.0252
		•	x	x	Slotting	0.15	-	60	0.0002	0.0004	0.0005	0.0007	0.0009			0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
					Profiling	0.5	0.035	85	0.0003	0.0006	0.0009	0.0012	0.0015			0.0018	0.0021	0.0024	0.0027	0.0030	0.0045	0.0060	0.0075	0.0090	0.0120	0.0150	0.0180
12xD Neck Length															12xD Neck Length												
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)											
		Emulsion	Air	MQL		0.1	0.2		0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0				
																								Multiply tool Ø by this factor to calculate depths of cut			
Medium Carbon Steels	P	•	•	o	Slotting	0.125	-	70	0.0002	0.0004	0.0005	0.0007	0.0009			0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.00720	0.00900	0.01080
Die / Tool Steels		•	•	o	Profiling	0.4	0.03	150	0.0005	0.0010	0.0015	0.0020	0.0025			0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.02000	0.02500	0.03000
Austentic Stainless Steels	M	•	x	o	Slotting	0.125	-	55	0.0002	0.0004	0.0005	0.0007	0.0009			0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
Duplex & Super Duplex		•	x	o	Profiling	0.4	0.03	110	0.0005	0.0010	0.0015	0.0020	0.0025			0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.0200	0.0250	0.0300
High Temp Alloys	S	•	x	x	Slotting	0.125	-	22	0.0002	0.0003	0.0005	0.0006	0.0008			0.0009	0.0011	0.0012	0.0014	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090
Titanium Alloys		•	x	x	Profiling	0.4	0.03	32	0.0004	0.0008	0.0013	0.0017	0.0021			0.0025	0.0029	0.0034	0.0038	0.0042	0.0063	0.0084	0.0105	0.0126	0.0168	0.0210	0.0252
		•	x	x	Slotting	0.125	-	55	0.0002	0.0004	0.0005	0.0007	0.0009			0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
					Profiling	0.4	0.03	75	0.0003	0.0006	0.0009	0.0012	0.0015			0.0018	0.0021	0.0024	0.0027	0.0030	0.0045	0.0060	0.0075	0.0090	0.0120	0.0150	0.0180
15xD Neck Length															15xD Neck Length												
Workpiece Material Group	I S O	Coolant			Application			Vc - M/Min	End Mill Diameter (mm)							End Mill Diameter (mm)											
		Emulsion	Air	MQL		0.1	0.2		0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0				
																								Multiply tool Ø by this factor to calculate depths of cut			
Medium Carbon Steels	P	•	•	o	Slotting	0.1	-	60	0.0002	0.0003	0.0005	0.0007	0.0009			0.0010	0.0012	0.0014	0.0015	0.0017	0.0026	0.0034	0.0043	0.0051	0.00680	0.00850	0.01020
Die / Tool Steels		•	•	o	Profiling	0.3	0.025	125	0.0005	0.0009	0.0014	0.0018	0.0023			0.0028	0.0032	0.0037	0.0041	0.0046	0.0069	0.0092	0.0115	0.0138	0.01840	0.02300	0.02760
Austentic Stainless Steels	M	•	x	o	Slotting	0.1	-	50	0.0002	0.0003	0.0005	0.0007	0.0009			0.0010	0.0012	0.0014	0.0015	0.0017	0.0026	0.0034	0.0043	0.0051	0.00680	0.00850	0.01020
Duplex & Super Duplex		•	x	o	Profiling	0.3	0.025	110	0.0005	0.0009	0.0014	0.0018	0.0023			0.0028	0.0032	0.0037	0.0041	0.0046	0.0069	0.0092	0.0115	0.0138	0.01840	0.02300	0.02760
High Temp Alloys	S	•	x	x	Slotting	0.1	-	20	0.0001	0.0003	0.0004	0.0006	0.0007			0.0008	0.0010	0.0011	0.0013	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084
Titanium Alloys		•	x	x	Profiling	0.3	0.025	30	0.0004	0.0008	0.0012	0.0016	0.0020			0.0023	0.0027	0.0031	0.0035	0.0039	0.0059	0.0078	0.0098	0.0117	0.0156	0.0195	0.0234
		•	x	x	Slotting	0.1	-	50	0.0002	0.0003	0.0005	0.0007	0.0009			0.0010	0.0012	0.0014	0.0015	0.0017	0.0026	0.0034	0.0043	0.0051	0.0068	0.0085	0.0102
					Profiling	0.3	0.025	65	0.0003	0.0006	0.0008	0.0011	0.0014			0.0017	0.0020	0.0022	0.0025	0.0028	0.0042	0.0056	0.0070	0.0084	0.0112	0.0140	0.0168

Notes

- If the required RPM for the specified Vc is not achievable due to machine limitations, use the machine's maximum RPM and calculate feed using:
Feed = Max RPM × Fz × number of teeth.
- The above cutting conditions are for roughing. For semi-finishing, reduce both Ap (axial depth of cut) and Ae (radial width of cut) accordingly.
- For finishing operations, adjust Ap to material stock allowance, depending on neck length. Reduce Vc by 10-15% and Fz by 15-20%.
- Always use helical or straight ramping for entry. Avoid direct plunge in-feed to minimise tool stress and potential damage.

- Use the shortest overhang possible and minimise tool runout by utilising an accurate chucking system.
- It is recommended to use radius tools for roughing and square-end tools for finishing.
- **Please note that these cutting conditions are for guidance only and may need to be adjusted depending on the application, specific material, and surface finish requirements.**



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