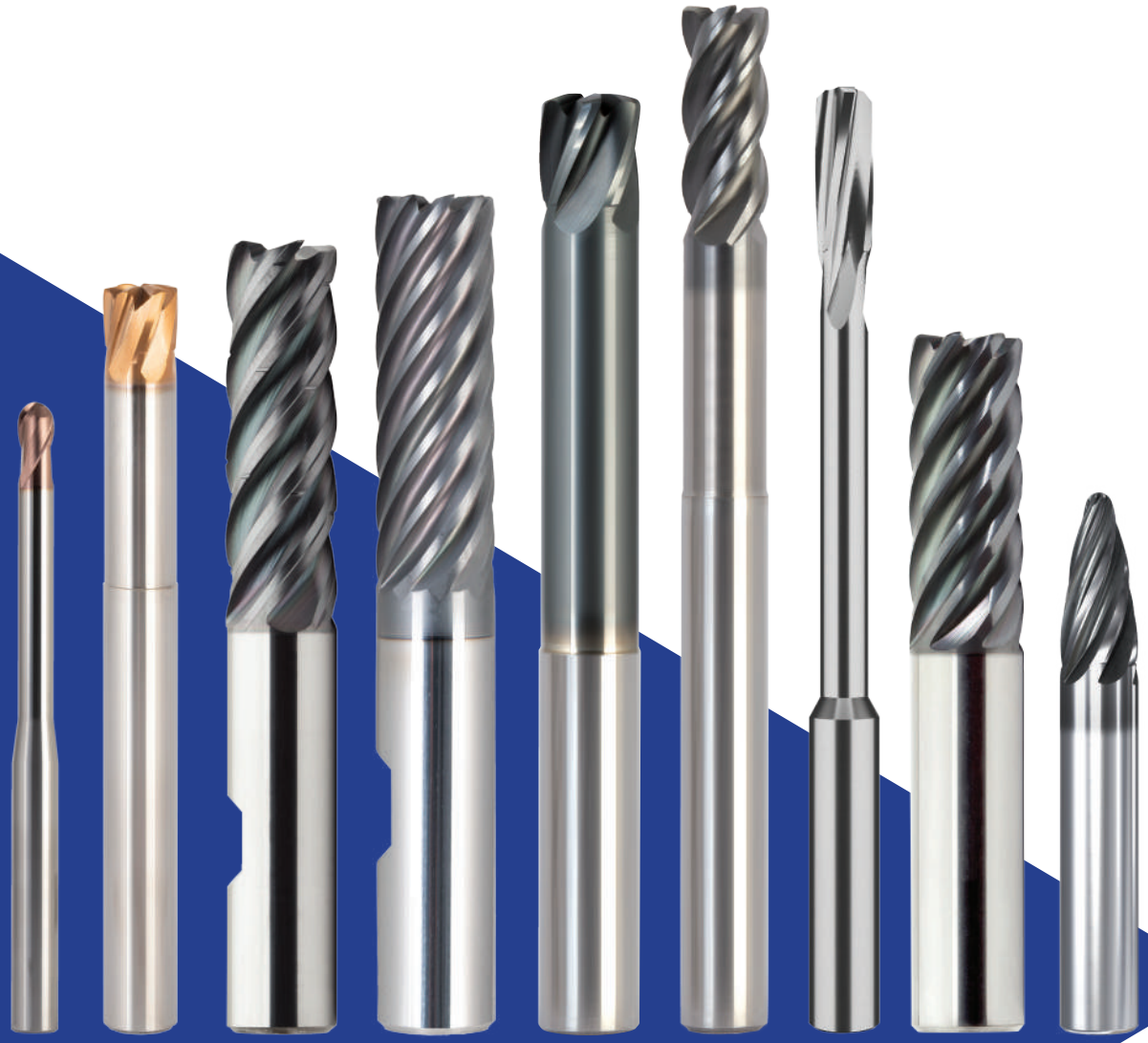
EMO HANNOVER EDITION

M.A. FORD
High Performance Cutting Tools

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

New Product Supplement

2025 - 2026



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TuffCut® X-AL

Page NP4

Series 137V5R
5 flute end mills
Aluminium rougher

- Ripper-style roughing geometry for exceptional chip control and heavy stock removal.
- Engineered to reduce power requirements at high metal removal rates.
- Designed to reduce cutting noise compared to standard end mill types.
- Through-coolant design improves chip evacuation in deep pockets.
- Capable of finishing by reducing feed per tooth.
- Fordlube coating extends tool life in aluminium alloys.
- Special geometry ensures stability in long-reach applications.
- Weldon shank option prevents tool pull-out.

TuffCut® X-AL

Page NP8

Series 137TWF
5 flute end mills
Aluminium thin wall finisher

- Special geometry reduces part deflection when machining thin-wall aluminium parts, minimising taper and maintaining accuracy.
- Suitable for aerospace structure machining and other precision thin-walled components.
- 5-flute anti-vibration design enables finishing at full flute length.
- Available in both sharp or corner-radius versions to improve edge strength and maintain precise component dimensions.
- Fordlube coating extends tool life in aluminium alloys.
- Through-coolant design improves chip evacuation in deep pockets.

TuffCut® XT

Page NP10

Series 278 3xD
5 flute square & radius end mills

- 5-flute design optimised for roughing and finishing operations
- 3xD cutting length for deeper axial engagement
- Variable helix and flute spacing to improve machining harmonics
- Universal application range for heavy roughing and dynamic tool paths
- ALtima® Blaze coating for higher heat resistance than TiAlN
- Centre cutting for ramping, slotting, and plunging
- Optimised flute geometry for efficient chip evacuation

M.A. FORDMAX RANGE

Page NP12

Series CGFR
Carbon & glass fibre routers

- Specially engineered for carbon, glass, and other fibre-reinforced materials.
- Optimised carbide substrate delivers extended tool life in abrasive composites.
- Chip-breaker geometry relieves cutting pressure and produces smaller dust and fibres.
- Positive rake design enhances surface finish and reduces delamination risk.
- End-cut geometry enables efficient plunging, ramping, and slotting.

TuffCut® 3D

Page NP14

Series XFO & XFO-AL
Oval finishing end mills

- Engineered to improve 5-Axis finishing operations by reducing cycle times and delivering superior surface finishes.
- Specialised geometries for stainless steels and titanium.
- Variable helix and rake angles ensure smooth, vibration-free performance during finishing operations.
- Featuring ALtima® Q and Fordlube coatings for exceptional wear and heat resistance.

TuffCut® XV

Page NP17

Series XV5CB
5 Flute radius end mills

- Featuring ALtima® Q coating for outstanding wear and heat resistance, extending tool life.
- Optimised substrate grade enhances toughness, ideal for dynamic roughing applications.
- Thick-core design provides superior strength for long milling operations.
- Staggered chipbreaker ensures efficient chip evacuation and reduces cutting forces.
- Innovative open-end geometry supports aggressive entry angles, perfect for pocket milling.

TuffCut® XT

Page NP21

Series 277R N4, N5 & N6

4 Flute radius end mills

- Advanced geometry optimised for machining steels, stainless steels, titanium, and cast irons.
- Enhanced corner protection for improved durability and performance.
- Variable helix geometry ensures smooth cutting and reduced vibrations.
- Expanded lineup of neck lengths to accommodate deep milling applications beyond standard length tools.

TuffCut® HF

Page NP24

Series FHFN N3 & N4

High hardness high-feed end mills

- Specifically designed for high-feed roughing in hardened steels of 50 HRC and above.
- High-hardness coating combined with a fine grain carbide substrate ensures exceptional wear and heat resistance.
- Excellent thermal shock resistance reduces chipping during operations.

TuffCut® HF

Page NP26

Series FHFP N3, N5 & N8

High-feed end mills

- Ideal for high-feed roughing of 3D shapes, long-reach applications, and shallow forms.
- ALtima® Q coating paired with a tough substrate ensures excellent performance on standard steels, stainless steels, titanium, and high temperature alloys like Inconel® 718.
- Available in three variant lengths, providing versatility for a range of machining depths.
- Through-coolant design enhances chip evacuation in deep applications, improving tool life under high-heat conditions.

TuffCut® XV

Page NP31

Series XV7

7 flute radius end mills

- Centre-cutting geometry enables higher ramp angles and delivers improved floor finishes.
- 38° helix with variable pitch geometry ensures smooth cutting and reduces harmonics.
- Thick-core design provides added strength for machining difficult materials.
- Available in standard and chipbreaker versions, suitable for both roughing and finishing operations.
- ALtima® Q coating offers exceptional wear and heat resistance, extending tool life across a wide range of materials.
- Available in multiple length variants, offering versatility for machining at various depths.

TuffCut® XT9

Page NP38

Series 380 3xD

9 flute radius end mills

- Uneven 9-flute design enables high feed rates while reducing harmonics for stable machining.
- ALtima® Q coating provides exceptional wear and heat resistance, extending tool life across a wide range of materials.
- Available in standard and chipbreaker versions, suitable for both roughing and finishing operations.
- Staggered chipbreaker technology reduces cutting forces and improves chip management.
- Available in 3xD flute length for enhanced depth-of-cut capabilities.

TuffCut® XM

Page NP41

Series XM2S

2 flute square end mills

- 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.

TuffCut® XM

Page NP44

Series XM2R
2 flute radius end mills

- 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.

TuffCut® XM

Page NP50

Series XM2B
2 flute ball end mills

- 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.

TuffCut® XM

Page NP53

Series XM4R
4 flute radius end mills

- 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.

TuffCut® XM

Page NP56

Series XM2BH
2 flute high hardness ball nose end mills

- High-hard ball nose end mills designed for machining hardened steels up to 70 HRC.
- Short length ideal for roughing, semi-finishing, and finishing applications.
- Perfect for shrink-fit applications requiring short shank lengths.
- Micro-grain carbide substrate combined with a high-performance coating for superior durability and efficiency.

TuffCut® XM

Page NP56

Series XM4SH
4 flute high hardness square end mills

- 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.

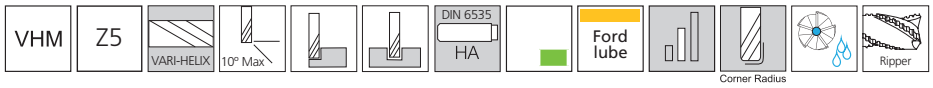
TrueSize® NC

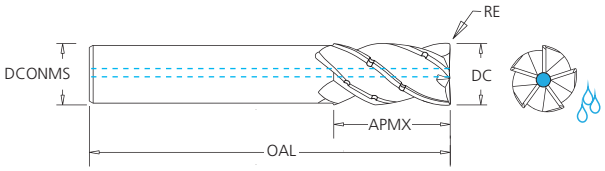
Page NP73

Series 275
Common shank machine reamers

- Solid Carbide
- Recommended for CNC reaming applications.
- Common metric shanks for high-accuracy clamping.
- Extended reach for increased hole depths.
- RH Spiral / RH Cut design for both blind and through hole applications.
- Suitable for most materials.

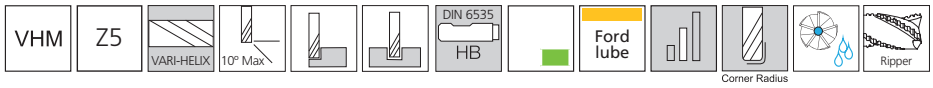
TuffCut® X-AL Series 137V5R

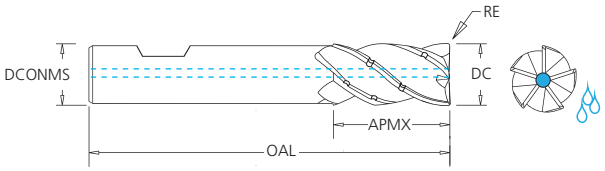




Tool No.	DC	DCONMS	OAL	APMX	RE
137V5R 1203-1.0RALC	12.0	12.0	87.0	38.0	1.0
137V5R 1203-3.0RALC	12.0	12.0	87.0	38.0	3.0
137V5R 1603-1.0RALC	16.0	16.0	104.0	50.0	1.0
137V5R 1603-3.0RALC	16.0	16.0	104.0	50.0	3.0

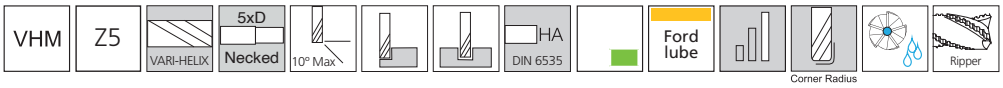
TuffCut® X-AL Series 137V5R-W

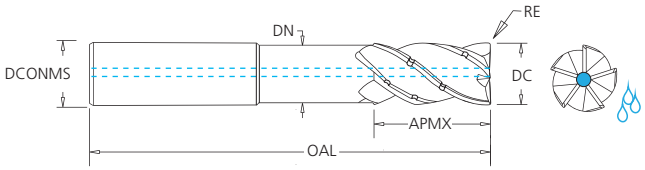




Tool No.	DC	DCONMS	OAL	APMX	RE
137V5R 1203-1.0RALCW	12.0	12.0	87.0	38.0	1.0
137V5R 1603-1.0RALCW	16.0	16.0	104.0	50.0	1.0

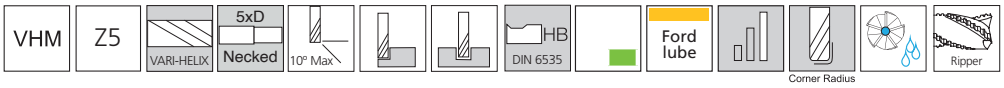
TuffCut® X-AL Series 137V5R N5

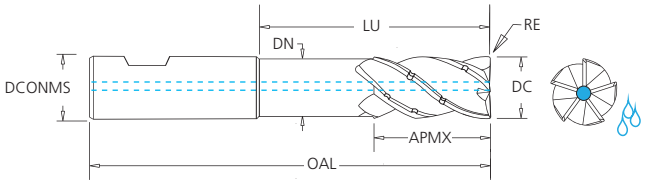




Tool No.	DC	DCONMS	OAL	APMX	LU	DN	RE
137V5R 12N5-1.0RALC	12.0	12.0	108.0	32.0	62.0	11.6	1.0
137V5R 16N5-1.0RALC	16.0	16.0	133.0	42.0	82.0	15.6	1.0

TuffCut® X-AL Series 137V5R N5-W





Tool No.	DC	DCONMS	OAL	APMX	LU	DN	RE
137V5R 12N5-1.0RALCW	12.0	12.0	108.0	32.0	62.0	11.6	1.0
137V5R 16N5-1.0RALCW	16.0	16.0	133.0	42.0	82.0	15.6	1.0

TuffCut® X-AL Series 137V5R - Slotting with 3xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			ADOC (Ap)			End Mill Diameter (mm)	
								12	16
		Emulsion	Air	MQL	50%	100%	200%	← Consideration should be given to the axial depth of cut (ADOC) to avoid exceeding machine power limitations.	
					Vc - M/Min			fz - mm/tooth	
Aluminium (≤ 10 Si)	N	•	x	○	300 - 2000			0.100	0.134
Aluminium (> 10 Si)		•	x	○	250 - 750			0.100	0.134
Aluminium Lithium		•	x	○	300 - 1500			0.100	0.134

• Preferred ○ Possible x Not Possible

TuffCut® X-AL Series 137V5R - Profile Milling with 3xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			RWOC (Ae)				End Mill Diameter (mm)	
									12	16
		Emulsion	Air	MQL	10%	20%	30%	40-60%	← Multiply fz by this factor based on ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.	
					1.67	1.2	1.1	N/A		
					Vc - M/Min				fz - mm/tooth	
Aluminium (≤ 10 Si)	N	•	○	•	300 - 2000				0.140	0.187
Aluminium (> 10 Si)		•	○	•	250 - 750				0.140	0.187
Aluminium Lithium		•	○	•	300 - 1500				0.140	0.187

• Preferred ○ Possible x Not Possible

Notes

- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application, workpiece rigidity, machine tool, etc.
- The 137V5R should only be used in accurate tool holders with high gripping power. ER collet type holders are not recommended.

Helical interpolation recommendations:

- Under optimal conditions, with proper through coolant flow, up to 10° helical ramp angles are achievable with the 137V5R.
  Without through coolant max 5° to 2 x D depth
- A reduction of 30-50% in feed per tooth (fz) is recommended
- Recommended hole diameter = 1.9 x D
- To achieve a flat bottom, use a ramping diameter at least equal to tool diameter minus 2 × corner radius.

RWOC (ae)	Chip Thicknesss Compensation Factor
1%	5.00
2%	3.57
3%	2.93
5%	2.30
7%	1.96
8%	1.84

RWOC (ae)	Chip Thicknesss Compensation Factor
10%	1.67
13%	1.49
15%	1.40
20%	1.2
30%	1.1

During profile milling with a radial width of less than 50% of the cutter diameter, the actual chip thickness at the cutting edge is less than the programmed feed per tooth (fz). The accompanying table shows the increase in fz by given radial width percentage to adjust for chip thinning. Multiply your recommended fz by the appropriate feed factor to establish the correct feed rate.

TuffCut® X-AL Series 137V5R N5 - Slotting with 2.5xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			ADOC (Ap)			End Mill Diameter (mm)	
								12	16
		Emulsion	Air	MQL	50%	100%	150%	← Consideration should be given to the axial depth of cut (ADOC) to avoid exceeding machine power limitations.	
					Vc - M/Min			fz - mm/tooth	
Aluminium (≤ 10 Si)	N	•	x	○	300 - 2000			0.100	0.134
Aluminium (> 10 Si)		•	x	○	250 - 750			0.100	0.134
Aluminium Lithium		•	x	○	300 - 1500			0.100	0.134

• Preferred ○ Possible x Not Possible

TuffCut® X-AL Series 137V5R N5 - Profile Milling with 2.5xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			RWOC (Ae)				End Mill Diameter (mm)	
									12	16
		Emulsion	Air	MQL	10%	20%	30%	40-50%	← Multiply fz by this factor based on ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.	
					1.67	1.2	1.1	N/A		
					Vc - M/Min				fz - mm/tooth	
Aluminium (≤ 10 Si)	N	•	○	•	300 - 2000				0.140	0.187
Aluminium (> 10 Si)		•	○	•	250 - 750				0.140	0.187
Aluminium Lithium		•	○	•	300 - 1500				0.140	0.187

• Preferred ○ Possible x Not Possible

Notes

- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application, workpiece rigidity, machine tool, etc.
- The 137V5R should only be used in accurate tool holders with high gripping power. ER collet type holders are not recommended.

Helical interpolation recommendations:

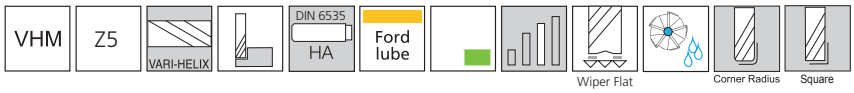
- Under optimal conditions, with proper through coolant flow, up to 10° helical ramp angles are achievable with the 137V5R.
  Without through coolant max 5° to 2 x D depth
- A reduction of 30-50% in feed per tooth (fz) is recommended
- Recommended hole diameter = 1.9 x D
- To achieve a flat bottom, use a ramping diameter at least equal to tool diameter minus 2 × corner radius.

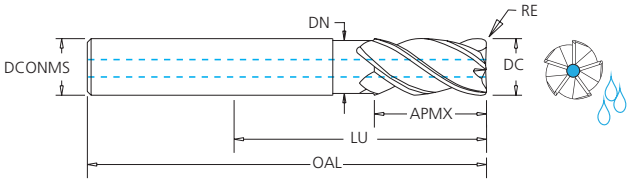
RWOC (ae)	Chip Thicknesss Compensation Factor
1%	5.00
2%	3.57
3%	2.93
5%	2.30
7%	1.96
8%	1.84

RWOC (ae)	Chip Thicknesss Compensation Factor
10%	1.67
13%	1.49
15%	1.40
20%	1.2
30%	1.1

During profile milling with a radial width of less than 50% of the cutter diameter, the actual chip thickness at the cutting edge is less than the programmed feed per tooth (fz). The accompanying table shows the increase in fz by given radial width percentage to adjust for chip thinning. Multiply your recommended fz by the appropriate feed factor to establish the correct feed rate.

TuffCut® X-AL Series 137TWF





Tool No.	DC	DCONMS	OAL	APMX	LU	DN	RE
137TWF 0604-ALCC	6.0	6.0	64.0	24.0	30.0	5.8	-
137TWF 0804-ALCC	8.0	8.0	80.0	32.0	40.0	7.8	-
137TWF 0804-2.0RALCC	8.0	8.0	80.0	32.0	40.0	7.8	2.0
137TWF 1004-ALCC	10.0	10.0	95.0	40.0	50.0	9.8	-
137TWF 1004-3.0RALCC	10.0	10.0	95.0	40.0	50.0	9.8	3.0
137TWF 1204-ALCC	12.0	12.0	108.0	48.0	54.0	11.6	-
137TWF 1204-3.0RALCC	12.0	12.0	108.0	48.0	54.0	11.6	3.0
137TWF 1604-ALCC	16.0	16.0	125.0	64.0	70.0	15.6	-
137TWF 1604-3.0RALCC	16.0	16.0	125.0	64.0	70.0	15.6	3.0
137TWF 1604-4.0RALCC	16.0	16.0	125.0	64.0	70.0	15.6	4.0

TuffCut® X-AL Series 137TWF - Profile Milling with 4xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			RWOC (Ae)			End Mill Diameter (mm)				
								6	8	10	12	16
		Emulsion	Air	MQL	Finishing	5%	10%	← Multiply fz by this factor based on ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.				
					N/A	2.3	1.67					
					Vc - M/Min			fz - mm/tooth				
Aluminium (≤ 10 Si)	N	•	○	•	300 - 2000			0.030	0.040	0.050	0.060	0.080
Aluminium (> 10 Si)		•	○	•	250 - 1000			0.030	0.040	0.050	0.060	0.080
Aluminium Lithium		•	○	•	300 - 1500			0.030	0.040	0.050	0.060	0.080

• Preferred ○ Possible x Not Possible

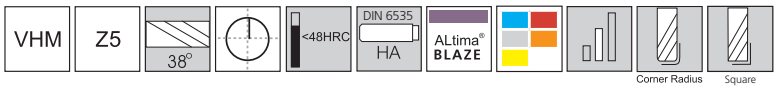
Notes

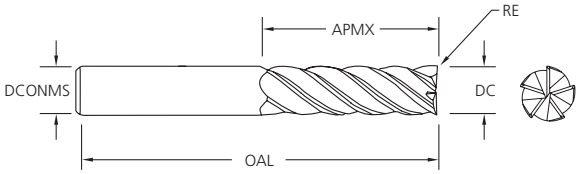
- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application, workpiece rigidity,
- The 137TWF should only be used in accurate tool holders with adequate gripping power. ER collet type holders are not recommended.
- When finishing at full feed rate into corners, care should be taken to ensure that the stock allowance is consistent, and the feature radius is at least 0.5mm larger than the tool radius to avoid over-engagement.
- Recommended stock allowance fo finishing is 0.1 to 0.2mm
- This tool can also be used for light roughing, semi-finishing, and corner reduction operations. For these applications, please use the chip correction factor in the table shown below.

RWOC (ae)	Chip Thicknesss Compensation Factor
1%	5.00
2%	3.57
3%	2.93
5%	2.30
7%	1.96
8%	1.84
10%	1.67

During profile milling with a radial width of less than 50% of the cutter diameter, the actual chip thickness at the cutting edge is less than the programmed feed per tooth (fz). The accompanying table shows the increase in fz by given radial width percentage to adjust for chip thinning. Multiply your recommended fz by the appropriate feed factor to establish the correct feed rate.

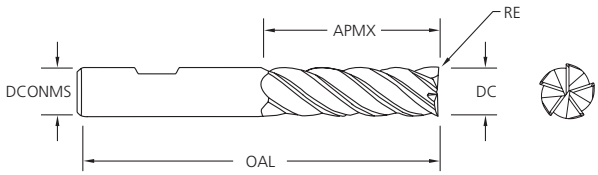
TuffCut® XT Series 278 3xD





Tool No.	DC	DCONMS	OAL	APMX	RE
278 0803-0.5RB	8.0	8.0	75.0	26.0	0.5
278 1003B	10.0	10.0	80.0	32.0	-
278 1003-1.0RB	10.0	10.0	80.0	32.0	1.0
278 1203B	12.0	12.0	89.0	38.0	-
278 1203-1.0RB	12.0	12.0	89.0	38.0	1.0
278 1603-1.0RB	16.0	16.0	105.0	50.0	1.0

TuffCut® XT Series 278 3xD-W



Tool No.	DC	DCONMS	OAL	APMX	RE
278 1203-1.0RBW	12.0	12.0	89.0	38.0	1.0
278 1203-3.0RBW	12.0	12.0	89.0	38.0	3.0
278 1603-1.0RBW	16.0	16.0	105.0	50.0	1.0
278 1603-3.0RBW	16.0	16.0	105.0	50.0	3.0

TuffCut® XT Series 278 - Profile Milling with 3xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			RWOC (Ae)			End Mill Diameter (mm)				
								8	10	12	16	20
		Emulsion	Air	MQL	5%	10%	15%	← Multiply fz by this factor based on ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.				
					2.3	1.67	1.4					
					Vc - M/Min			fz - mm/tooth				
Low Carbon Steels	P	o	•	o	380	350	300	0.048	0.060	0.072	0.096	0.120
Medium Carbon Steels		o	•	o	270	260	240	0.048	0.060	0.072	0.096	0.120
Alloy Steels		o	•	o	260	240	220	0.048	0.060	0.072	0.096	0.120
Die / Tool Steels		o	•	o	220	200	180	0.048	0.060	0.072	0.096	0.120
Free Machining Stainless Steels	M	•	•	o	205	180	150	0.048	0.060	0.072	0.096	0.120
Austenitic Stainless Steels		•	x	o	160	140	100	0.040	0.050	0.060	0.080	0.100
Difficult Stainless Steels		•	x	o	110	90	70	0.032	0.040	0.048	0.064	0.080
PH Stainless Steels		•	•	o	160	140	100	0.032	0.040	0.048	0.064	0.080
Cobalt Chrome Alloys		•	x	o	120	100	80	0.032	0.040	0.048	0.064	0.080
Duplex (22%)		•	x	o	75	65	60	0.032	0.040	0.048	0.064	0.080
Super Duplex (25%)		•	x	o	70	60	55	0.032	0.040	0.048	0.064	0.080
High Temp Alloys	S	•	x	x	45	38	-	0.032	0.040	0.048	0.064	0.080
Titanium Alloys		•	x	x	120	90	80	0.032	0.040	0.048	0.064	0.080
Gray Cast Irons	K	•	o	o	360	350	300	0.048	0.060	0.072	0.096	0.120
Ductile Cast Irons		•	o	o	270	260	240	0.048	0.060	0.072	0.096	0.120
Malleable Cast Irons		•	o	o	160	150	140	0.048	0.060	0.072	0.096	0.120
Hardened Steels 45-50 HRC	H	o	•	o	160	140	-	0.040	0.050	0.060	0.080	0.100
Hardened Steels 50-55 HRC		o	•	o	150	130	-	0.032	0.040	0.048	0.064	0.080

• **Preferred** o **Possible** x **Not Possible**

RWOC (ae)	Chip Thicknesss Compensation Factor
5%	2.30
7%	1.96
8%	1.84
10%	1.67
13%	1.49
15%	1.40
20%	1.2

During profile milling with a radial width of less than 50% of the cutter diameter, the actual chip thickness at the cutting edge is reduced relative to the programmed feed per tooth (fz). The accompanying table provides a factor that indicates how much the fz can be increased, depending on the radial width of the cut. To determine the correct feed rate, multiply the recommended fz from the table by the appropriate compensation factor.

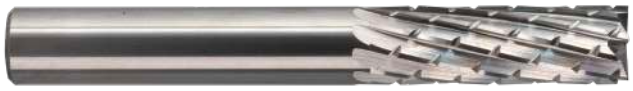
Notes

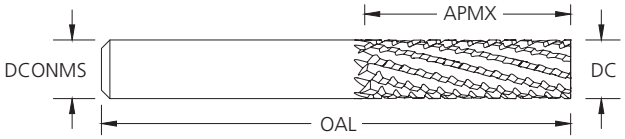
- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application, workpiece rigidity, machine tool, etc.
- The 278 3xD should only be used in accurate tool holders with high gripping power. ER collet type holders are not recommended.

Helical interpolation recommendations:

- Under optimal conditions, with proper coolant flow/air blast techniques, up to 2° helical ramp angles are achievable with the 278 3xD in most materials
- A reduction of 30-50% in feed per tooth (fz) is recommended
- Recommended hole diameter = 1.9 x D
- To achieve a flat bottom, use a ramping diameter at least equal to tool diameter - 2 x corner radius.

M.A. FORDMAX RANGE Series CGFR





Tool No.	DC	DCONMS	OAL	APMX	NOF
CGFR 0400	4.0	6.0	50.0	6.0	8
CGFR 0600	6.0	6.0	57.0	16.0	8
CGFR 0800	8.0	8.0	64.0	25.0	10
CGFR 1000	10.0	10.0	64.0	25.0	10
CGFR 1200	12.0	12.0	64.0	25.0	10
CGFR 1600	16.0	16.0	92.0	32.0	10
CGFR 2000	20.0	20.0	105.0	41.0	10

M.A. FORDMAX RANGE Series CGFR - Slotting with 2xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			ADOC (Ap)			End Mill Diameter (mm)						
								4	6	8	10	12	16	20
		Emulsion	Air	MQL	25%	50%	100%	← Multiply fz by this factor based on ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.						
					Vc - M/Min			fz - mm/tooth						
GFRP Soft	N	•	•	x	100	80	60	0.016	0.024	0.032	0.040	0.048	0.064	0.080
GFRP Hard		•	•	x	90	70	50	0.010	0.015	0.020	0.025	0.030	0.040	0.050
CFRP		•	•	x	140	120	100	0.016	0.024	0.032	0.040	0.048	0.064	0.080

• Preferred ○ Possible x Not Possible

M.A. FORDMAX RANGE Series CGFR - Profile Milling with 2xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			RWOC (Ae)			End Mill Diameter (mm)						
								4	6	8	10	12	16	20
		Emulsion	Air	MQL	10%	20%	30%	← Multiply fz by this factor based on ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.						
					1.67	1.2	1.1							
					Vc - M/Min			fz - mm/tooth						
GFRP Soft	N	•	•	x	100	80	60	0.016	0.024	0.032	0.040	0.048	0.064	0.080
GFRP Hard		•	•	x	90	70	50	0.010	0.015	0.020	0.025	0.030	0.040	0.050
CFRP		•	•	x	140	120	100	0.016	0.024	0.032	0.040	0.048	0.064	0.080

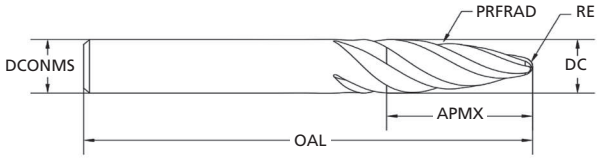
• Preferred ○ Possible x Not Possible

Notes
- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application, workpiece rigidity, machine tool, etc.
- The GFRP tool should only be used in precision tool holders with sufficient gripping force.
- Ensure adequate dust extraction is in place when dry machining.

RWOC (ae)	Chip Thicknesss Compensation Factor
10%	1.67
15%	1.40
20%	1.2
30%	1.1

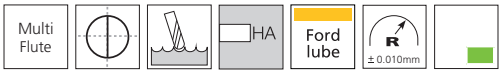
During profile milling with a radial width of less than 50% of the cutter diameter, the actual chip thickness at the cutting edge is less than the programmed feed per tooth (fz). The accompanying table shows the increase in fz by given radial width percentage to adjust for chip thinning. Multiply your recommended fz by the appropriate feed factor to establish the correct feed rate.

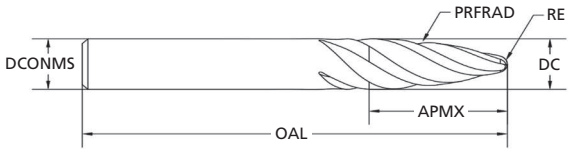
TuffCut® 3D Series XFO



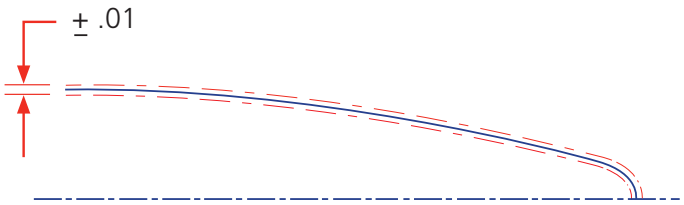
Tool No.	DC	DCONMS (h6)	OAL	APMX	RE	PRFRAD	No. of Flutes
XFO-4M06R95AQ	6.0	6.0	64.0	20.8	1.0	95.0	4
XFO-4M08R90AQ	8.0	8.0	64.0	24.5	1.0	90.0	4
XFO-4M10R85AQ	10.0	10.0	72.0	24.7	2.0	85.0	4
XFO-6M10R85AQ	10.0	10.0	72.0	24.7	2.0	85.0	6
XFO-4M12R80AQ	12.0	12.0	84.0	27.3	2.0	80.0	4
XFO-6M12R80AQ	12.0	12.0	84.0	27.3	2.0	80.0	6

TuffCut® 3D Series XFO-AL





Tool No.	DC	DCONMS (h6)	OAL	APMX	RE	PRFRAD	No. of Flutes
XFO-AL3M06R95F	6.0	6.0	64.0	20.8	1.0	95.0	3
XFO-AL3M08R90F	8.0	8.0	64.0	24.5	1.0	90.0	3
XFO-AL4M10R85F	10.0	10.0	72.0	24.7	2.0	85.0	4
XFO-AL4M12R80F	12.0	12.0	84.0	27.3	2.0	80.0	4



Radius form tolerance

The Series XFO and XFO-AL are held to a precision radius form tolerance of ±0.010mm to ensure high accuracy finishing, and prevention of mis-match on component surfaces.

TuffCut® 3D Series XFO - 3D Finishing

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

Series XFO						
Workpiece Material Group	ISO	Depths of Cut			Finishing	Semi-Finishing
					0.01-0.03 x D	0.05-0.07 x D
		Coolant			Vc - M/Min	
		Emulsion	Air	MQL		
Low Carbon	P	●	●	●	450	350
Medium Carbon		●	●	●	345	275
Alloy Steels		●	●	●	315	255
Die / Tool Steels (≤ 45 HRC)		●	●	●	275	220
Free Machining	M	●	X	○	205	165
Austenitic		●	X	○	160	130
Difficult Stainless		●	X	○	125	100
PH Stainless (≤ 45 HRC)		●	X	○	160	130
Cobalt Chrome Alloys		●	X	○	125	100
Duplex (22%)		●	X	○	75	60
Super Duplex (25%)		●	X	○	60	50
High Temp Alloys	S	●	X	X	45	30
Titanium Alloys		●	X	X	110	90

● Preferred ○ Possible X Not Possible

Series XFO									
Material Type	ISO	Tool Diameter (mm)							
		6		8		10		12	
		Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish
		Fz - mm/tooth							
Low Carbon Steels	P	0.048	0.030	0.064	0.040	0.080	0.050	0.096	0.060
Medium Carbon Steels		0.048	0.030	0.064	0.040	0.080	0.050	0.096	0.060
Alloy Steels		0.048	0.030	0.064	0.040	0.080	0.050	0.096	0.060
Die / Tool Steels		0.036	0.024	0.048	0.032	0.060	0.040	0.072	0.048
Free Machining Stainless Steels	M	0.048	0.030	0.064	0.040	0.080	0.050	0.096	0.060
Austenitic Stainless Steels		0.048	0.030	0.064	0.040	0.080	0.050	0.096	0.060
Difficult Stainless Steels		0.048	0.030	0.064	0.040	0.080	0.050	0.096	0.060
PH Stainless Steels		0.036	0.024	0.048	0.032	0.060	0.040	0.072	0.048
Cobalt Chrome Alloys		0.036	0.024	0.048	0.032	0.060	0.040	0.072	0.048
Duplex (22%)		0.036	0.024	0.048	0.032	0.060	0.040	0.072	0.048
Super Duplex (25%)		0.036	0.024	0.048	0.032	0.060	0.040	0.072	0.048
High Temp Alloys	S	0.036	0.024	0.048	0.032	0.060	0.040	0.072	0.048
Titanium Alloys		0.042	0.030	0.056	0.040	0.070	0.050	0.084	0.060

Notes

- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application.
- To prevent chip evcaution issues, utilise 4-flute tools for semi-finishing operations & avoid cutting with the tip of the tool wherever possible.
- Reduced feeds required when cutting with the tip of the tool.

TuffCut® 3D Series XFO-AL - 3D Finishing

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

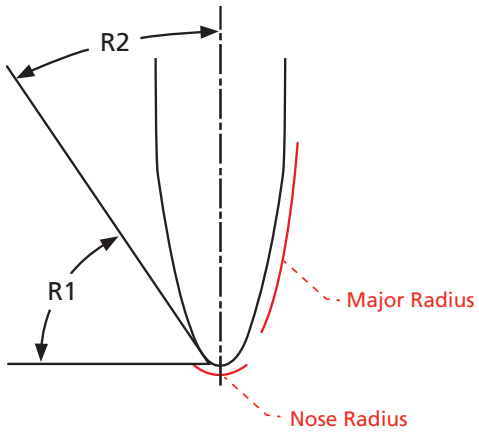
Series XFO-AL						
Workpiece Material Group	ISO	Depths of Cut			Finishing	Semi-Finishing
					0.01-0.03 x D	0.05-0.07 x D
		Coolant			Vc - M/Min	
		Emulsion	Air	MQL		
Aluminium Alloys	N	●	X	○	610	580

● Preferred ○ Possible X Not Possible

Series XFO-AL									
Workpiece Material Group	ISO	Tool Diameter							
		6		8		10		12	
		Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish	Semi Finish	Finish
		Fz - mm/tooth							
Aluminium Alloys	N	0.060	0.039	0.080	0.052	0.100	0.065	0.120	0.078

Notes

- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application.
- To prevent chip evcaution issues, avoid cutting with the tip of the tool wherever possible.
- Reduced feeds required when cutting with the tip of the tool.



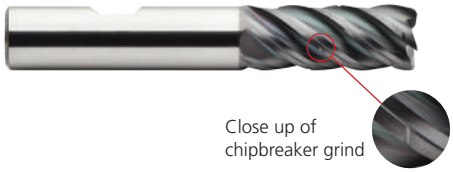
Tool Ø	Nose Radius		Major Radius	
D1	R1	Effective Angle (Max.)	R2	Effective Angle (Max.)
6	1	78.2°	95	11.8°
8	1	75.1°	90	14.9°
10	2	74.6°	85	15.4°
12	2	71.6°	80	18.4°

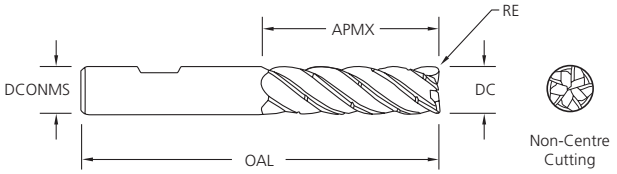
*Numbers above represent maximum angle values.

Stepover Distance by Cusp Height

Tool Ø (mm)		Cusp Height (mm)	0.003	0.005	0.008	0.010	0.013
D1	R2						
6	95	Stepover (mm)	1.50	1.95	2.46	2.76	3.14
8	90		1.47	1.90	2.40	2.69	3.06
10	85		1.43	1.84	2.33	2.61	2.97
12	80		1.38	1.79	2.26	2.53	2.88

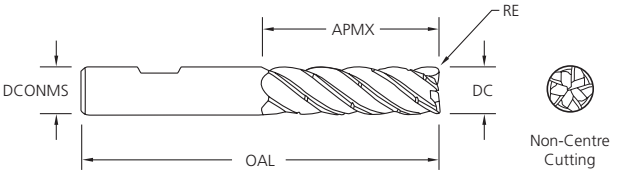
TuffCut® XV Series XV5CB 2.5xD





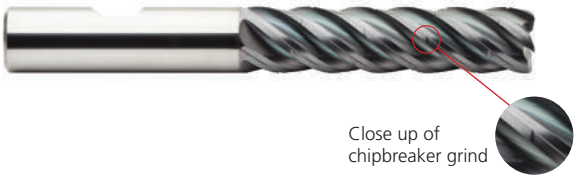
Tool No.	DC	DCONMS	OAL	APMX	RE
XV5CBM1002-R0.5AQW	10.0	10.0	74.0	27.0	0.5
XV5CBM1202-R0.5AQW	12.0	12.0	85.0	32.0	0.5
XV5CBM1602-R0.5AQW	16.0	16.0	98.0	42.0	0.5
XV5CBM2002-R0.5AQW	20.0	20.0	110.0	52.0	0.5

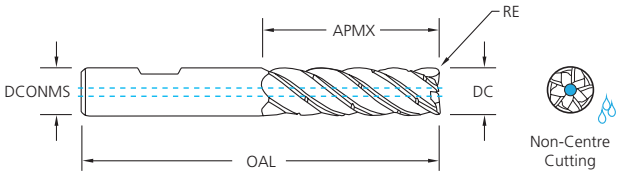
TuffCut® XV Series XV5CB 3xD



Tool No.	DC	DCONMS	OAL	APMX	RE
XV5CBM1003-R0.5AQW	10.0	10.0	80.0	33.0	0.5
XV5CBM1203-R0.5AQW	12.0	12.0	93.0	40.0	0.5
XV5CBM1603-R0.5AQW	16.0	16.0	110.0	54.0	0.5
XV5CBM2003-R0.5AQW	20.0	20.0	124.0	66.0	0.5

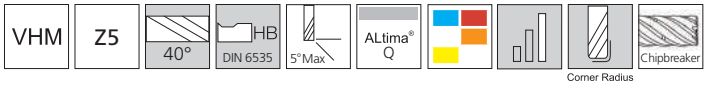
TuffCut® XV Series XV5CB 3xD-C

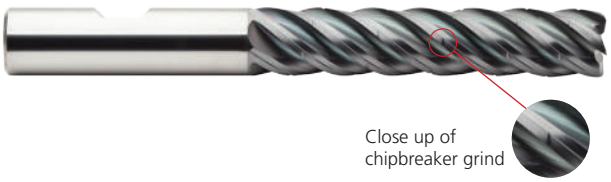


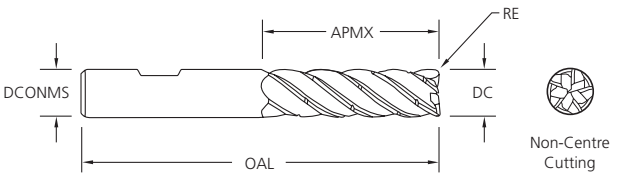


Tool No.	DC	DCONMS	OAL	APMX	RE
XV5CBM1003-R0.5AQW-C	10.0	10.0	80.0	33.0	0.5
XV5CBM1203-R0.5AQW-C	12.0	12.0	93.0	40.0	0.5
XV5CBM1603-R0.5AQW-C	16.0	16.0	110.0	54.0	0.5
XV5CBM2003-R0.5AQW-C	20.0	20.0	124.0	66.0	0.5

TuffCut® XV Series XV5CB 4xD







Tool No.	DC	DCONMS	OAL	APMX	RE
XV5CBM1004-R0.5AQW	10.0	10.0	90.0	43.0	0.5
XV5CBM1204-R0.5AQW	12.0	12.0	104.0	51.0	0.5
XV5CBM1604-R0.5AQW	16.0	16.0	123.0	67.0	0.5
XV5CBM2004-R0.5AQW	20.0	20.0	141.0	83.0	0.5

TuffCut® XV Series XV5CB - Profile Milling with 2.5xD, 3xD, 3xD-C, 4xD

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

Series XV5CB - 2.5xD

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Radial (Ae) 10%	15%	20%	Tool Diameter (mm) 10	12	16	20
					1.67	1.4	1.2	← Multiply fz by this Factor based on ae. When finishing, use the standard fz per chart below. Only use this calculation when roughing or semi-finishing.			
					Vc - M/Min			fz - mm/tooth			
Low Carbon Steels	P	•	•	•	350	300	250	0.060	0.072	0.096	0.120
Medium Carbon Steels	P	•	•	•	260	240	220	0.060	0.072	0.096	0.120
Alloy Steels	P	•	•	•	240	220	200	0.060	0.072	0.096	0.120
Die / Tool Steels	P	•	•	•	220	200	180	0.060	0.072	0.096	0.120
Free Machining Stainless Steels	M	•	•	o	205	180	150	0.060	0.072	0.096	0.120
Austenitic Stainless Steels	M	•	x	o	160	140	100	0.048	0.058	0.077	0.096
Difficult Stainless Steels	M	•	x	o	110	90	70	0.040	0.048	0.064	0.080
PH Stainless Steels	M	•	•	o	160	140	100	0.048	0.058	0.077	0.096
Titanium Alloys	S	•	x	x	120	100	80	0.040	0.048	0.064	0.080

Series XV5CB - 3xD

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Radial (Ae) 5%	10%	15%	Tool Diameter (mm) 10	12	16	20
					2.3	1.67	1.4	← Multiply fz by this Factor based on ae. When finishing, use the standard fz per chart below. Only use this calculation when roughing or semi-finishing.			
					Vc - M/Min			fz - mm/tooth			
Low Carbon Steels	P	•	•	•	350	300	250	0.060	0.072	0.096	0.120
Medium Carbon Steels	P	•	•	•	260	240	220	0.060	0.072	0.096	0.120
Alloy Steels	P	•	•	•	240	220	200	0.060	0.072	0.096	0.120
Die / Tool Steels	P	•	•	•	220	200	180	0.060	0.072	0.096	0.120
Free Machining Stainless Steels	M	•	•	o	205	180	150	0.060	0.072	0.096	0.120
Austenitic Stainless Steels	M	•	x	o	160	140	100	0.048	0.058	0.077	0.096
Difficult Stainless Steels	M	•	x	o	110	90	70	0.040	0.048	0.064	0.080
PH Stainless Steels	M	•	•	o	160	140	100	0.048	0.058	0.077	0.096
Titanium Alloys	S	•	x	x	120	100	80	0.040	0.048	0.064	0.080

Series XV5CB - 4xD

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Radial (Ae) 5%	7%	10%	Tool Diameter (mm) 10	12	16	20
					2.3	2.0	1.67	← Multiply fz by this Factor based on ae. When finishing, use the standard fz per chart below. Only use this calculation when roughing or semi-finishing.			
					Vc - M/Min			fz - mm/tooth			
Low Carbon Steels	P	•	•	•	300	275	250	0.040	0.048	0.064	0.080
Medium Carbon Steels	P	•	•	•	240	230	220	0.040	0.048	0.064	0.080
Alloy Steels	P	•	•	•	220	210	200	0.040	0.048	0.064	0.080
Die / Tool Steels	P	•	•	•	200	190	180	0.040	0.048	0.064	0.080
Free Machining Stainless Steels	M	•	•	o	180	165	150	0.040	0.048	0.064	0.080
Austenitic Stainless Steels	M	•	x	o	160	150	140	0.028	0.034	0.045	0.056
Difficult Stainless Steels	M	•	x	o	90	80	70	0.024	0.029	0.038	0.048
PH Stainless Steels	M	•	•	o	160	150	140	0.028	0.034	0.045	0.056
Titanium Alloys	S	•	x	x	100	90	80	0.024	0.029	0.038	0.048

• Preferred o Possible x Not Possible

Notes

Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application, workpiece rigidity, machine tool, etc. The XV5CB should only be used in accurate tool holders with high gripping power. ER collet type holders are not recommended.
For optimal performance in ISO S materials, ae = ≤ 0.1 x D

TuffCut® XV Series XV5CB - Profile Milling with 2.5xD, 3xD, 3xD-C, 4xD

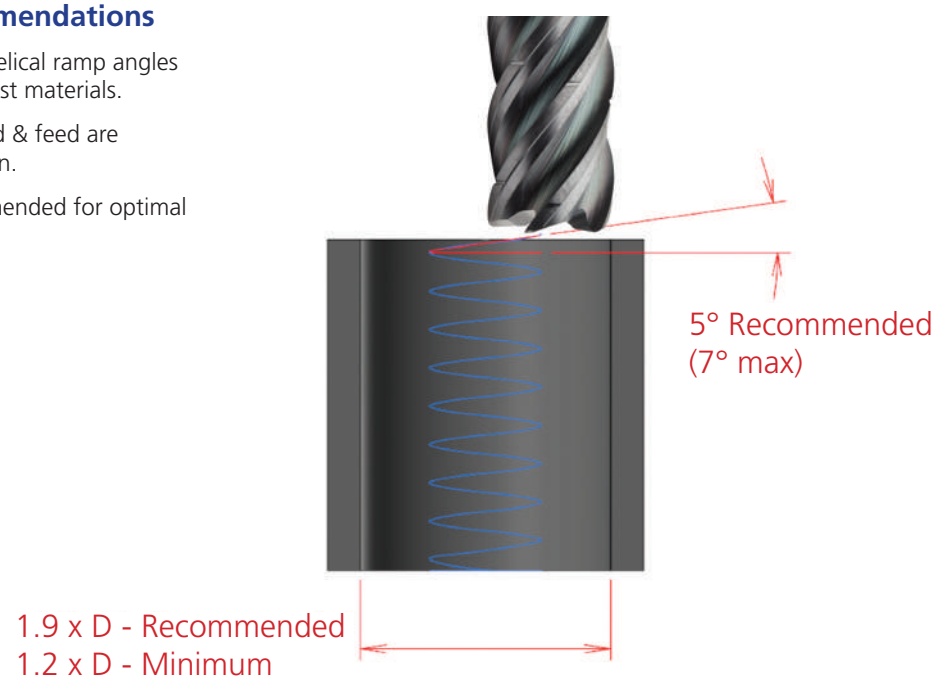
Helical interpolation recommendations

Under optimal conditions, up to 5° helical ramp angles are achievable with the XV5CB in most materials.

A reduction of 30-50% in both speed & feed are recommended for helical interpolation.

A hole diameter of 1.9 x D is recommended for optimal helical interpolation performance.

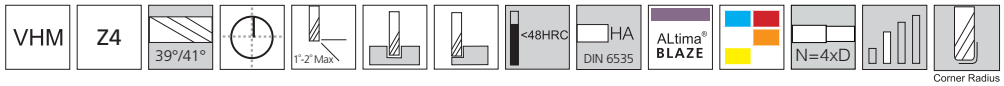
Minimum hole diameter = 1.2 x D

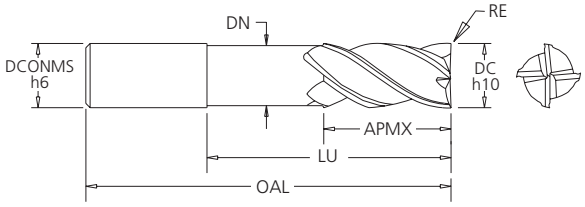


Radial Width of Cut (Ae)	Chip Thicknesss Compensation Factor
5%	2.30
7%	1.96
8%	1.84
10%	1.67
15%	1.40
20%	1.20

During profile milling less than 50% of the cutter diameter radial width, the actual chip thickness at the cutting edge is less than the programmed chipload. The accompanying table shows the increase in tooth load by given raidal percentage engagement. Multiply your feed per tooth by the factor before finalising your table feed.

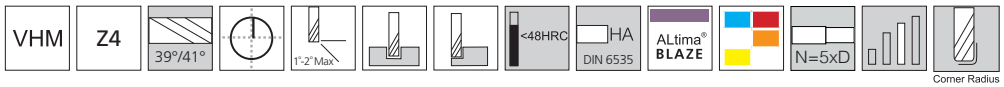
TuffCut® XT Series 277R N4

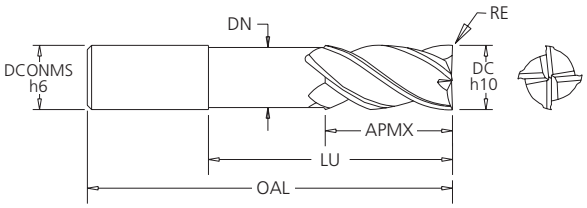




Tool No.	DC	DCONMS	DN	OAL	APMX	LU	RE
277 06N4-0.5RB	6.0	6.0	5.8	64.0	13.0	26.0	0.5
277 08N4-0.5RB	8.0	8.0	7.6	75.0	19.0	34.0	0.5
277 10N4-0.5RB	10.0	10.0	9.6	82.0	22.0	42.0	0.5
277 12N4-0.5RB	12.0	12.0	11.4	100.0	26.0	50.0	0.5
277 12N4-3.0RB	12.0	12.0	11.4	100.0	26.0	50.0	3.0
277 16N4-0.5RB	16.0	16.0	15.2	120.0	32.0	66.0	0.5
277 16N4-3.0RB	16.0	16.0	15.2	120.0	32.0	66.0	3.0

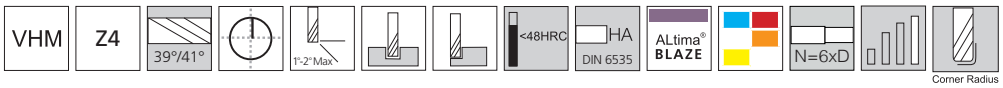
TuffCut® XV Series 277R N5

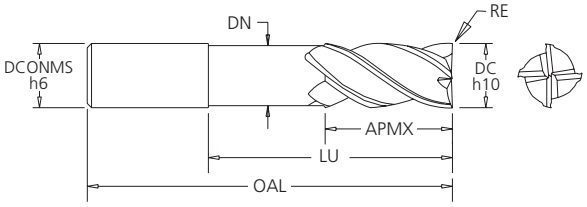




Tool No.	DC	DCONMS	DN	OAL	APMX	LU	RE
277 06N5-0.5RB	6.0	6.0	5.8	70.0	13.0	32.0	0.5
277 08N5-0.5RB	8.0	8.0	7.6	80.0	19.0	42.0	0.5
277 10N5-0.5RB	10.0	10.0	9.6	92.0	22.0	52.0	0.5
277 12N5-0.5RB	12.0	12.0	11.4	110.0	26.0	62.0	0.5
277 12N5-3.0RB	12.0	12.0	11.4	110.0	26.0	62.0	3.0
277 16N5-0.5RB	16.0	16.0	15.2	130.0	32.0	82.0	0.5
277 16N5-3.0RB	16.0	16.0	15.2	130.0	32.0	82.0	3.0

TuffCut® XT Series 277R N6





Tool No.	DC	DCONMS	DN	OAL	APMX	LU	RE
277 06N6-0.5RB	6.0	6.0	5.8	75.0	13.0	38.0	0.5
277 08N6-0.5RB	8.0	8.0	7.6	90.0	19.0	50.0	0.5
277 10N6-0.5RB	10.0	10.0	9.6	105.0	22.0	62.0	0.5
277 12N6-0.5RB	12.0	12.0	11.4	120.0	26.0	74.0	0.5
277 12N6-3.0RB	12.0	12.0	11.4	120.0	26.0	74.0	3.0
277 16N6-0.5RB	16.0	16.0	15.2	150.0	32.0	98.0	0.5
277 16N6-3.0RB	16.0	16.0	15.2	150.0	32.0	98.0	3.0

TuffCut® XT Series 277R N4, N5 & N6 - Slotting & Profile Milling

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

Series 277NR - 4xD

Workpiece Material Group	ISO	Coolant			Application	Depths of Cut		Vc- M/min	Tool Diameter (mm)				
		Emulsion	Air	MQL		Axial (Ap)	Radial (Ae)		6	8	10	12	16
									fz - mm/tooth by Cutter Diameter				
Low Carbon Steels	P	•	•	•	Profiling	1xD	0.4xD	300	0.06	0.08	0.1	0.12	0.16
					Slotting	0.5xD	-	200	0.03	0.04	0.05	0.06	0.08
Medium Carbon Steels		•	•	•	Profiling	1xD	0.4xD	230	0.06	0.08	0.1	0.12	0.16
					Slotting	0.5xD	-	155	0.03	0.04	0.05	0.06	0.08
Alloy Steels		•	•	•	Profiling	1xD	0.4xD	205	0.06	0.08	0.1	0.12	0.16
					Slotting	0.5xD	-	135	0.03	0.04	0.05	0.06	0.08
Die / Tool Steels		•	•	•	Profiling	1xD	0.4xD	170	0.06	0.08	0.1	0.12	0.16
					Slotting	0.5xD	-	115	0.03	0.04	0.05	0.06	0.08
Austenitic Stainless Steels	M	•	x	o	Profiling	1xD	0.4xD	120	0.06	0.08	0.1	0.12	0.16
					Slotting	0.5xD	-	80	0.03	0.04	0.05	0.06	0.08
Duplex (22%)		•	x	o	Profiling	1xD	0.4xD	80	0.06	0.08	0.1	0.12	0.16
					Slotting	0.5xD	-	55	0.03	0.04	0.05	0.06	0.08
Supper Duplex (25%)		•	x	o	Profiling	1xD	0.4xD	50	0.06	0.08	0.1	0.12	0.16
					Slotting	0.5xD	-	35	0.03	0.04	0.05	0.06	0.08
Titanium Alloys	S	•	x	x	Profiling	1xD	0.4xD	60	0.06	0.08	0.1	0.12	0.16
					Slotting	0.5xD	-	40	0.03	0.04	0.05	0.06	0.08

Series 277NR - 5xD

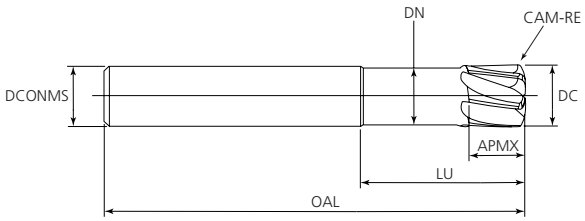
Workpiece Material Group	ISO	Coolant			Application	Depths of Cut		Vc- M/min	Tool Diameter (mm)				
		Emulsion	Air	MQL		Axial (Ap)	Radial (Ae)		6	8	10	12	16
									fz - mm/tooth by Cutter Diameter				
Low Carbon Steels	P	•	•	•	Profiling	1xD	0.25xD	270	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	180	0.03	0.04	0.05	0.06	0.08
Medium Carbon Steels		•	•	•	Profiling	1xD	0.25xD	205	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	135	0.03	0.04	0.05	0.06	0.08
Alloy Steels		•	•	•	Profiling	1xD	0.25xD	185	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	125	0.03	0.04	0.05	0.06	0.08
Die / Tool Steels		•	•	•	Profiling	1xD	0.25xD	153	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	105	0.03	0.04	0.05	0.06	0.08
Austenitic Stainless Steels	M	•	x	o	Profiling	1xD	0.25xD	80	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	55	0.03	0.04	0.05	0.06	0.08
Duplex (22%)		•	x	o	Profiling	1xD	0.25xD	70	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	45	0.03	0.04	0.05	0.06	0.08
Supper Duplex (25%)		•	x	o	Profiling	1xD	0.25xD	45	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	30	0.03	0.04	0.05	0.06	0.08
Titanium Alloys	S	•	x	x	Profiling	1xD	0.25xD	75	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	50	0.03	0.04	0.05	0.06	0.08

Series 277NR - 6xD

Workpiece Material Group	ISO	Coolant			Application	Depths of Cut		Vc- M/min	Tool Diameter (mm)				
		Emulsion	Air	MQL		Axial (Ap)	Radial (Ae)		6	8	10	12	16
									fz - mm/tooth by Cutter Diameter				
Low Carbon Steels	P	•	•	•	Profiling	1xD	0.25xD	240	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	160	0.03	0.04	0.05	0.06	0.08
Medium Carbon Steels		•	•	•	Profiling	1xD	0.25xD	184	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	125	0.03	0.04	0.05	0.06	0.08
Alloy Steels		•	•	•	Profiling	1xD	0.25xD	164	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	110	0.03	0.04	0.05	0.06	0.08
Die / Tool Steels		•	•	•	Profiling	1xD	0.25xD	136	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	90	0.03	0.04	0.05	0.06	0.08
Austenitic Stainless Steels	M	•	x	o	Profiling	1xD	0.25xD	75	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	50	0.03	0.04	0.05	0.06	0.08
Duplex (22%)		•	x	o	Profiling	1xD	0.25xD	65	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	45	0.03	0.04	0.05	0.06	0.08
Supper Duplex (25%)		•	x	o	Profiling	1xD	0.25xD	35	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	25	0.03	0.04	0.05	0.06	0.08
Titanium Alloys	S	•	x	x	Profiling	1xD	0.25xD	64	0.06	0.08	0.1	0.12	0.16
					Slotting	0.3xD	-	45	0.03	0.04	0.05	0.06	0.08

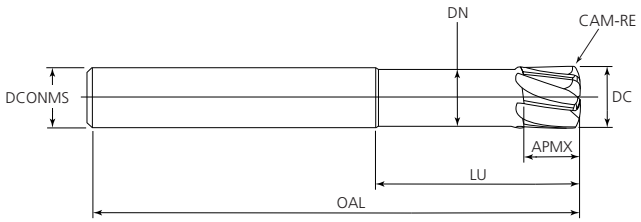
• Preferred o Possible x Not Possible

TuffCut® HF Series FHFN N3



Tool No.	DC	DCONMS	DN	OAL	APMX	LU	NOF	CAM-RE
FHFN 03N3-AX	3.0	6.0	2.9	60.0	3.0	9.0	4	0.25
FHFN 04N3-AX	4.0	6.0	3.9	60.0	4.0	12.0	4	0.3
FHFN 05N3-AX	5.0	6.0	4.7	60.0	5.0	15.0	4	0.35
FHFN 06N3-AX	6.0	6.0	5.5	60.0	5.0	18.0	6	0.45
FHFN 08N3-AX	8.0	8.0	7.5	75.0	7.0	24.0	6	0.6
FHFN 10N3-AX	10.0	10.0	9.5	90.0	8.0	30.0	6	0.75
FHFN 12N3-AX	12.0	12.0	11.5	100.0	10.0	36.0	6	0.9

TuffCut® HF Series FHFN N4



Tool No.	DC	DCONMS	DN	OAL	APMX	LU	NOF	CAM-RE
FHFN 06N4-AX	6.0	6.0	5.5	100.0	5.0	24.0	6	0.45
FHFN 08N4-AX	8.0	8.0	7.5	100.0	7.0	32.0	6	0.6
FHFN 10N4-AX	10.0	10.0	9.5	120.0	8.0	40.0	6	0.75
FHFN 12N4-AX	12.0	12.0	11.5	150.0	10.0	48.0	6	0.9

TuffCut® HF Series FHFN N3 & N4 - High-Feed Milling

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

Series FHFN - 3xD																	
Workpiece Material Group	ISO	Coolant			Vc- m/min	Tool Diameter & CAM-R											
						3mm x R0.25			4mm x R0.3			5mm x R0.35			6mm x R0.45		
		Emulsion	Air	MQL		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Pre-Hardened Steels 35-45HRC	P	○	●	●	100	0.1	1.7	0.09	0.15	2.2	0.12	0.18	2.8	0.15	0.300	3.3	0.180
Hardened Steels 50 - 55HRC	H	X	●	○	80	0.1	1.7	0.115	0.15	2.2	0.155	0.18	2.8	0.19	0.240	3.3	0.230
Hardened Steels 55 - 60HRC		X	●	○	60	0.07	1.7	0.075	0.095	2.2	0.1	0.115	2.8	0.12	0.140	3.3	0.145
Hardened Steels 60 - 65HRC		X	●	○	50	0.055	1.7	0.055	0.075	2.2	0.07	0.09	2.8	0.09	0.110	3.3	0.105
Hardened Steels 65 - 70HRC		X	●	○	40	0.04	1.5	0.04	0.055	2	0.05	0.065	2.5	0.065	0.080	3.0	0.075

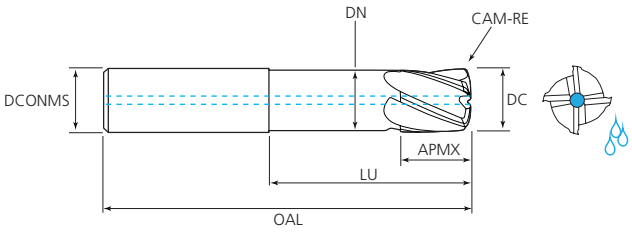
Series FHFN - 3xD														
Workpiece Material Group	ISO	Coolant			Vc- m/min	Tool Diameter & CAM-R								
						8mm x R0.6			10mm x R0.75			12mm x R0.9		
		Emulsion	Air	MQL		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Pre-Hardened Steels 35-45HRC	P	○	●	●	100	0.4	4.4	0.240	0.5	5.5	0.300	0.6	6.6	0.360
Hardened Steels 50 - 55HRC	H	X	●	○	80	0.32	4.4	0.305	0.4	5.5	0.380	0.48	6.6	0.460
Hardened Steels 55 - 60HRC		X	●	○	60	0.185	4.4	0.195	0.23	5.5	0.240	0.28	6.6	0.290
Hardened Steels 60 - 65HRC		X	●	○	50	0.145	4.4	0.140	0.18	5.5	0.175	0.22	6.6	0.210
Hardened Steels 65 - 70HRC		X	●	○	40	0.105	4.0	0.100	0.13	5.0	0.125	0.16	6.0	0.150

Series FHFN - 4xD																	
Workpiece Material Group	ISO	Coolant			Vc- m/min	Tool Diameter & CAM-R											
						6mm x R0.45			8mm x R0.6			10mm x R0.75			12mm x R0.9		
		Emulsion	Air	MQL		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Pre-Hardened Steels 35-45HRC	P	○	●	●	90	0.260	3.3	0.180	0.34	4.4	0.240	0.43	5.5	0.300	0.51	6.6	0.360
Hardened Steels 50 - 55HRC	H	X	●	○	75	0.200	3.3	0.230	0.27	4.4	0.305	0.34	5.5	0.380	0.41	6.6	0.460
Hardened Steels 55 - 60HRC		X	●	○	55	0.120	3.3	0.145	0.16	4.4	0.195	0.2	5.5	0.240	0.24	6.6	0.290
Hardened Steels 60 - 65HRC		X	●	○	45	0.090	3.3	0.105	0.12	4.4	0.140	0.15	5.5	0.175	0.19	6.6	0.210
Hardened Steels 65 - 70HRC		X	●	○	35	0.070	3.0	0.075	0.09	4.0	0.100	0.11	5.0	0.125	0.14	6.0	0.150

● Preferred ○ Possible X Not Possible

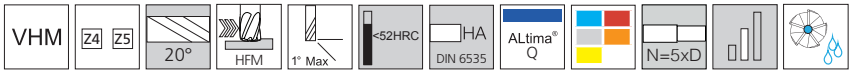
Notes
Ramp angle 0.5° or less
For roughing, area clearance, slotting and pocketing operations

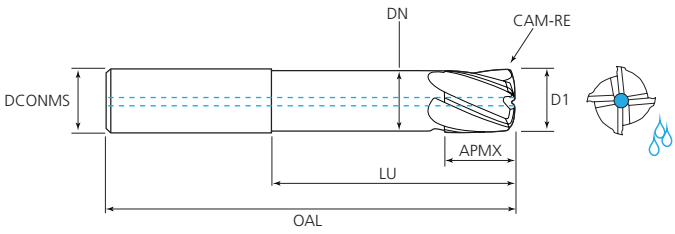
TuffCut® HF Series FHFP N3



Tool No.	DC	DCONMS	DN	OAL	APMX	LU	NOF	CAM-RE
FHFP 02N3-AQ	2.0	4.0	1.8	57.0	2.0	7.0	4	0.2
FHFP 03N3-AQ	3.0	6.0	2.8	57.0	3.0	10.0	4	0.3
FHFP 04N3-CCAQ	4.0	6.0	3.8	57.0	4.0	13.0	4	0.4
FHFP 05N3-CCAQ	5.0	6.0	4.8	57.0	5.0	16.0	4	0.5
FHFP 06N3-CCAQ	6.0	6.0	5.8	57.0	6.0	20.0	4	0.6
FHFP 08N3-CCAQ	8.0	8.0	7.8	63.0	8.0	26.0	4	0.8
FHFP 10N3-CCAQ	10.0	10.0	9.8	72.0	10.0	32.0	4	1.0
FHFP 12N3-CCAQ	12.0	12.0	11.8	83.0	12.0	38.0	5	1.2
FHFP 16N3-CCAQ	16.0	16.0	15.8	100.0	16.0	50.0	5	1.6

TuffCut® HF Series FHFP N5

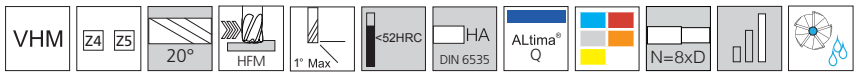


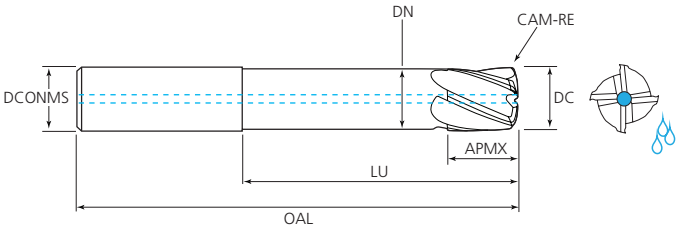


Tool No.	DC	DCONMS	DN	OAL	APMX	LU	NOF	CAM-RE
FHFP 02N5-AQ	2.0	4.0	1.8	57.0	2.0	11.0	4	0.2
FHFP 03N5-AQ	3.0	6.0	2.8	57.0	3.0	16.0	4	0.3
FHFP 04N5-CCAQ	4.0	6.0	3.8	57.0	4.0	21.0	4	0.4
FHFP 05N5-CCAQ	5.0	6.0	4.8	64.0	5.0	26.0	4	0.5
FHFP 06N5-CCAQ	6.0	6.0	5.8	75.0	6.0	32.0	4	0.6
FHFP 08N5-CCAQ	8.0	8.0	7.8	83.0	8.0	42.0	4	0.8
FHFP 10N5-CCAQ	10.0	10.0	9.8	100.0	10.0	52.0	4	1.0
FHFP 12N5-CCAQ	12.0	12.0	11.8	110.0	12.0	62.0	5	1.2
FHFP 16N5-CCAQ	16.0	16.0	15.8	133.0	16.0	82.0	5	1.6

Note: The 2.0 and 3.0 tool diameters do not include a through-coolant feature.

TuffCut® HF Series FHFP N8





Tool No.	DC	DCONMS	DN	OAL	APMX	LU	NOF	CAM-RE
FHFP 02N8-AQ	2.0	4.0	1.8	57.0	2.0	17.0	4	0.2
FHFP 03N8-AQ	3.0	6.0	2.8	57.0	5.0	25.0	4	0.3
FHFP 04N8-CCAQ	4.0	6.0	3.8	64.0	4.0	33.0	4	0.4
FHFP 05N8-CCAQ	5.0	6.0	4.8	75.0	5.0	41.0	4	0.5
FHFP 06N8-CCAQ	6.0	6.0	5.8	90.0	6.0	50.0	4	0.6
FHFP 08N8-CCAQ	8.0	8.0	7.8	110.0	8.0	66.0	4	0.8
FHFP 10N8-CCAQ	10.0	10.0	9.8	130.0	10.0	82.0	4	1.0
FHFP 12N8-CCAQ	12.0	12.0	11.8	150.0	12.0	98.0	5	1.2
FHFP 16N8-CCAQ	16.0	16.0	15.8	190.0	16.0	126.0	5	1.6

Note: The 2.0 and 3.0 tool diameters do not include a through-coolant feature.

TuffCut® HF Series FHFP N3 - High-Feed Milling

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

Series FHFP - 3xD																
Workpiece Material Group	ISO	Coolant			Vc- m/min	End Mill Diameter and CAM-R										
						2mm x R0.2			3mm x R0.3			4mm x R0.4		
		Max	Air	MMS		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Low Carbon Steels	P	●	●	●	300	0.10	1.5	0.13	0.15	2.3	0.20	0.20	3.0	0.26
Medium Carbon Steels	P	●	●	●	250	0.10	1.5	0.12	0.15	2.3	0.18	0.20	3.0	0.24
Alloy Steels	P	●	●	●	200	0.10	1.5	0.11	0.15	2.3	0.17	0.20	3.0	0.22
Die/Tool Steels	P	●	●	●	150	0.10	1.5	0.10	0.15	2.3	0.15	0.20	3.0	0.20
Austentic Stainless Steels	M	●	X	○	120	0.08	1.2	0.08	0.12	1.8	0.12	0.16	2.4	0.16
Duplex (22%)	M	●	X	○	90	0.07	1.2	0.08	0.11	1.8	0.12	0.14	2.4	0.16
Super Duplex (25%)	M	●	X	○	75	0.06	0.8	0.08	0.09	1.2	0.12	0.12	1.6	0.16
Titanium Alloys	S	●	X	X	100	0.06	0.8	0.08	0.09	1.2	0.12	0.12	1.6	0.16
High Temp Alloys	S	●	X	X	30	0.05	0.6	0.05	0.08	0.9	0.08	0.10	1.2	0.11
Hardened Steels 45 - 50HRC	H	●	X	X	90	0.09	1.5	0.09	0.14	2.3	0.14	0.18	3.0	0.18
Hardened Steels 50 - 55HRC	H	●	X	X	80	0.08	1.2	0.07	0.12	1.8	0.11	0.16	2.4	0.14

Series FHFP - 3xD																
Workpiece Material Group	ISO	Coolant			Vc- m/min	End Mill Diameter and CAM-R										
						5mm x R0.5			6mm x R0.6			8mm x R0.8		
		Max	Air	MMS		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Low Carbon Steels	P	●	●	●	300	0.25	3.8	0.33	0.30	4.5	0.39	0.40	6.0	0.52
Medium Carbon Steels	P	●	●	●	250	0.25	3.8	0.30	0.30	4.5	0.36	0.40	6.0	0.48
Alloy Steels	P	●	●	●	200	0.25	3.8	0.28	0.30	4.5	0.33	0.40	6.0	0.44
Die/Tool Steels	P	●	●	●	150	0.25	3.8	0.25	0.30	4.5	0.30	0.40	6.0	0.40
Austentic Stainless Steels	M	●	X	○	120	0.20	3.0	0.20	0.24	3.6	0.24	0.32	4.8	0.32
Duplex (22%)	M	●	X	○	90	0.18	3.0	0.20	0.21	3.6	0.24	0.28	4.8	0.32
Super Duplex (25%)	M	●	X	○	75	0.15	2.0	0.20	0.18	2.4	0.24	0.24	3.2	0.32
Titanium Alloys	S	●	X	X	100	0.15	2.0	0.20	0.18	2.4	0.24	0.24	3.2	0.32
High Temp Alloys	S	●	X	X	30	0.13	1.5	0.14	0.15	1.8	0.16	0.20	2.4	0.22
Hardened Steels 45 - 50HRC	H	●	X	X	90	0.23	3.8	0.23	0.27	4.5	0.27	0.36	6.0	0.36
Hardened Steels 50 - 55HRC	H	●	X	X	80	0.20	3.0	0.18	0.24	3.6	0.21	0.32	4.8	0.28

Series FHFP - 3xD																
Workpiece Material Group	ISO	Coolant			Vc- m/min	End Mill Diameter and CAM-R										
						10mm x R1.0			12mm x R1.2			16mm x R1.6		
		Max	Air	MMS		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Low Carbon Steels	P	●	●	●	300	0.50	7.5	0.65	0.60	9.0	0.78	0.70	12.0	1.04
Medium Carbon Steels	P	●	●	●	250	0.50	7.5	0.60	0.60	9.0	0.72	0.70	12.0	0.96
Alloy Steels	P	●	●	●	200	0.50	7.5	0.55	0.60	9.0	0.66	0.70	12.0	0.88
Die/Tool Steels	P	●	●	●	150	0.50	7.5	0.50	0.60	9.0	0.60	0.70	12.0	0.80
Austentic Stainless Steels	M	●	X	○	120	0.40	6.0	0.40	0.48	7.2	0.48	0.56	9.6	0.64
Duplex (22%)	M	●	X	○	90	0.35	6.0	0.40	0.42	7.2	0.48	0.49	9.6	0.64
Super Duplex (25%)	M	●	X	○	75	0.30	4.0	0.40	0.36	4.8	0.48	0.42	6.4	0.64
Titanium Alloys	S	●	X	X	100	0.30	4.0	0.40	0.36	4.8	0.48	0.42	6.4	0.64
High Temp Alloys	S	●	X	X	30	0.25	3.0	0.27	0.30	3.6	0.32	0.35	4.8	0.43
Hardened Steels 45 - 50HRC	H	●	X	X	90	0.45	7.5	0.45	0.54	9.0	0.54	0.63	12.0	0.72
Hardened Steels 50 - 55HRC	H	●	X	X	80	0.40	6.0	0.35	0.48	7.2	0.42	0.56	9.6	0.56

● Preferred ○ Possible X Not Possible

Note: If the calculated feed cannot be achieved due to limitations such as machine capability or component size, adjust the cutting speed (RPM) to acheive the required feed per tooth (fz). For full slotting a reduction in Ap may be required to maintain an effective cutting strategy.

TuffCut® HF Series FHFP N5 - High-Feed Milling

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

Series FHFP - 5xD															
Workpiece Material Group	ISO	Coolant			Vc- m/min	End Mill Diameter and CAM-R									
						2mm x R0.2			3mm x R0.3			4mm x R0.4		
		Max	Air	MMS		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Low Carbon Steels	P	●	●	●	270	0.08	1.5	0.13	0.12	2.3	0.20	0.16	3.0	0.26
Medium Carbon Steels	P	●	●	●	225	0.08	1.5	0.12	0.12	2.3	0.18	0.16	3.0	0.24
Alloy Steels	P	●	●	●	180	0.08	1.5	0.11	0.12	2.3	0.17	0.16	3.0	0.22
Die/Tool Steels	P	●	●	●	135	0.08	1.5	0.10	0.12	2.3	0.15	0.16	3.0	0.20
Austentic Stainless Steels	M	●	X	○	110	0.06	1.2	0.08	0.10	1.8	0.12	0.13	2.4	0.16
Duplex (22%)	M	●	X	○	80	0.06	1.2	0.08	0.09	1.8	0.12	0.11	2.4	0.16
Super Duplex (25%)	M	●	X	○	70	0.05	0.8	0.08	0.07	1.2	0.12	0.10	1.6	0.16
Titanium Alloys	S	●	X	X	90	0.05	0.8	0.08	0.07	1.2	0.12	0.10	1.6	0.16
High Temp Alloys	S	●	X	X	30	0.04	0.6	0.05	0.06	0.9	0.08	0.08	1.2	0.11
Hardened Steels 45 - 50HRC	H	●	X	X	80	0.07	1.5	0.09	0.11	2.3	0.14	0.15	3.0	0.18
Hardened Steels 50 - 55HRC	H	●	X	X	70	0.06	1.2	0.07	0.10	1.8	0.11	0.13	2.4	0.14

Series FHFP - 5xD															
Workpiece Material Group	ISO	Coolant			Vc- m/min	End Mill Diameter and CAM-R									
						5mm x R0.5			6mm x R0.6			8mm x R0.8		
		Max	Air	MMS		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Low Carbon Steels	P	●	●	●	270	0.20	0.3	0.33	0.24	4.5	0.39	0.32	6.0	0.52
Medium Carbon Steels	P	●	●	●	225	0.20	0.3	0.30	0.24	4.5	0.36	0.32	6.0	0.48
Alloy Steels	P	●	●	●	180	0.20	0.3	0.28	0.24	4.5	0.33	0.32	6.0	0.44
Die/Tool Steels	P	●	●	●	135	0.20	0.3	0.25	0.24	4.5	0.3	0.32	6.0	0.4
Austentic Stainless Steels	M	●	X	○	110	0.16	0.2	0.20	0.19	3.6	0.24	0.26	4.8	0.32
Duplex (22%)	M	●	X	○	80	0.14	0.2	0.20	0.17	3.6	0.24	0.22	4.8	0.32
Super Duplex (25%)	M	●	X	○	70	0.12	0.2	0.20	0.14	2.4	0.24	0.19	3.2	0.32
Titanium Alloys	S	●	X	X	90	0.12	0.2	0.20	0.14	2.4	0.24	0.19	3.2	0.32
High Temp Alloys	S	●	X	X	30	0.10	0.1	0.14	0.12	1.8	0.16	0.16	2.4	0.22
Hardened Steels 45 - 50HRC	H	●	X	X	80	0.18	0.2	0.23	0.22	4.5	0.27	0.29	6.0	0.36
Hardened Steels 50 - 55HRC	H	●	X	X	70	0.16	0.2	0.18	0.19	3.6	0.21	0.26	4.8	0.28

Series FHFP - 5xD															
Workpiece Material Group	ISO	Coolant			Vc- m/min	End Mill Diameter and CAM-R									
						10mm x R1.0			12mm x R1.2			16mm x R1.6		
		Max	Air	MMS		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Low Carbon Steels	P	●	●	●	270	0.4	7.5	0.65	0.48	9.0	0.78	0.56	12.0	1.04
Medium Carbon Steels	P	●	●	●	225	0.4	7.5	0.6	0.48	9.0	0.72	0.56	12.0	0.96
Alloy Steels	P	●	●	●	180	0.4	7.5	0.55	0.48	9.0	0.66	0.56	12.0	0.88
Die/Tool Steels	P	●	●	●	135	0.4	7.5	0.5	0.48	9.0	0.6	0.56	12.0	0.8
Austentic Stainless Steels	M	●	X	○	110	0.32	6.0	0.4	0.38	7.2	0.48	0.45	9.6	0.64
Duplex (22%)	M	●	X	○	80	0.28	6.0	0.4	0.34	7.2	0.48	0.39	9.6	0.64
Super Duplex (25%)	M	●	X	○	70	0.24	4.0	0.4	0.29	4.8	0.48	0.34	6.4	0.64
Titanium Alloys	S	●	X	X	90	0.24	4.0	0.4	0.29	4.8	0.48	0.34	6.4	0.64
High Temp Alloys	S	●	X	X	30	0.2	3.0	0.27	0.24	3.6	0.32	0.28	4.8	0.43
Hardened Steels 45 - 50HRC	H	●	X	X	80	0.36	7.5	0.45	0.43	9.0	0.54	0.5	12.0	0.72
Hardened Steels 50 - 55HRC	H	●	X	X	70	0.32	6.0	0.35	0.38	7.2	0.42	0.45	9.6	0.56

● Preferred ○ Possible X Not Possible

Note: If the calculated feed cannot be achieved due to limitations such as machine capability or component size, adjust the cutting speed (RPM) to acheive the required feed per tooth (fz). For full slotting a reduction in Ap may be required to maintain an effective cutting strategy.

TuffCut® HF Series FHFP N8 - High-Feed Milling

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

Series FHFP - 8xD																	
Workpiece Material Group	ISO	Coolant			Vc- m/min	End Mill Diameter and CAM-R											
						2mm x R0.2			3mm x R0.3			4mm x R0.4			5mm x R0.5		
		Max	Air	MMS		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Low Carbon Steels	P	●	●	●	245	0.06	1.2	0.13	0.09	1.8	0.20	0.12	2.4	0.26	0.15	3.0	0.33
Medium Carbon Steels	P	●	●	●	205	0.06	1.2	0.12	0.09	1.8	0.18	0.12	2.4	0.24	0.15	3.0	0.30
Alloy Steels	P	●	●	●	160	0.06	1.2	0.11	0.09	1.8	0.17	0.12	2.4	0.22	0.15	3.0	0.28
Die/Tool Steels	P	●	●	●	120	0.06	1.2	0.10	0.09	1.8	0.15	0.12	2.4	0.20	0.15	3.0	0.25
Austentic Stainless Steels	M	●	X	○	100	0.05	1.2	0.08	0.07	1.8	0.12	0.10	2.4	0.16	0.12	3.0	0.20
Duplex (22%)	M	●	X	○	70	0.04	0.8	0.08	0.07	1.2	0.12	0.09	1.6	0.16	0.11	2.0	0.20
Super Duplex (25%)	M	●	X	○	65	0.04	0.8	0.08	0.06	1.2	0.12	0.07	1.6	0.16	0.09	2.0	0.20
Titanium Alloys	S	●	X	X	80	0.04	0.8	0.08	0.06	1.2	0.12	0.07	1.6	0.16	0.09	2.0	0.20
High Temp Alloys	S	●	X	X	30	0.03	0.6	0.05	0.05	0.9	0.08	0.06	1.2	0.11	0.08	1.5	0.14
Hardened Steels 45 - 50HRC	H	●	X	X	70	0.05	1.2	0.09	0.08	1.8	0.14	0.11	2.4	0.18	0.14	3.0	0.23
Hardened Steels 50 - 55HRC	H	●	X	X	65	0.05	0.8	0.07	0.07	1.2	0.11	0.10	1.6	0.14	0.12	2.0	0.18

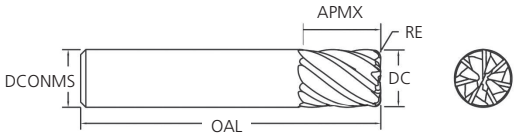
Series FHFP - 8xD														
Workpiece Material Group	ISO	Coolant			Vc- m/min	End Mill Diameter and CAM-R								
						6mm x R0.6			8mm x R0.8			10mm x R1.0		
		Max	Air	MMS		Ap	Ae	Fz	Ap	Ae	Fz	Ap	Ae	Fz
Low Carbon Steels	P	●	●	●	150	0.18	3.6	0.39	0.24	4.8	0.52	0.3	6.0	0.65
Medium Carbon Steels	P	●	●	●	120	0.18	3.6	0.36	0.24	4.8	0.48	0.3	6.0	0.6
Alloy Steels	P	●	●	●	100	0.18	3.6	0.33	0.24	4.8	0.44	0.3	6.0	0.55
Die/Tool Steels	P	●	●	●	100	0.18	3.6	0.3	0.24	4.8	0.4	0.3	6.0	0.5
Austentic Stainless Steels	M	●	X	○	80	0.14	3.6	0.24	0.19	4.8	0.32	0.24	6.0	0.4
Duplex (22%)	M	●	X	○	60	0.13	2.4	0.24	0.17	3.2	0.32	0.21	4.0	0.4
Super Duplex (25%)	M	●	X	○	50	0.11	2.4	0.24	0.14	3.2	0.32	0.18	4.0	0.4
Titanium Alloys	S	●	X	X	70	0.11	2.4	0.24	0.14	3.2	0.32	0.18	4.0	0.4
High Temp Alloys	S	●	X	X	20	0.09	1.8	0.16	0.12	2.4	0.22	0.15	3.0	0.27
Hardened Steels 45 - 50HRC	H	●	X	X	60	0.16	3.6	0.27	0.22	4.8	0.36	0.27	6.0	0.45
Hardened Steels 50 - 55HRC	H	●	X	X	50	0.14	2.4	0.21	0.19	3.2	0.28	0.24	4.0	0.35

Series FHFP - 8xD											
Workpiece Material Group	ISO	Coolant			Vc- m/min	End Mill Diameter and CAM-R					
						12mm x R1.2			16mm x R1.6		
		Max	Air	MMS		Ap	Ae	Fz	Ap	Ae	Fz
Low Carbon Steels	P	●	●	●	150	0.36	7.2	0.78	0.42	9.6	1.04
Medium Carbon Steels	P	●	●	●	120	0.36	7.2	0.72	0.42	9.6	0.96
Alloy Steels	P	●	●	●	100	0.36	7.2	0.66	0.42	9.6	0.88
Die/Tool Steels	P	●	●	●	100	0.36	7.2	0.6	0.42	9.6	0.8
Austentic Stainless Steels	M	●	X	○	80	0.29	7.2	0.48	0.34	9.6	0.64
Duplex (22%)	M	●	X	○	60	0.25	4.8	0.48	0.29	6.4	0.64
Super Duplex (25%)	M	●	X	○	50	0.22	4.8	0.48	0.25	6.4	0.64
Titanium Alloys	S	●	X	X	70	0.22	4.8	0.48	0.25	6.4	0.64
High Temp Alloys	S	●	X	X	20	0.18	3.6	0.32	0.21	4.8	0.43
Hardened Steels 45 - 50HRC	H	●	X	X	60	0.32	7.2	0.54	0.38	9.6	0.72
Hardened Steels 50 - 55HRC	H	●	X	X	50	0.29	4.8	0.42	0.34	6.4	0.56

● Preferred ○ Possible X Not Possible

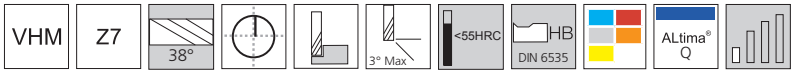
Note: If the calculated feed cannot be achieved due to limitations such as machine capability or component size, adjust the cutting speed (RPM) to acheive the required feed per tooth (fz). For full slotting a reduction in Ap may be required to maintain an effective cutting strategy.

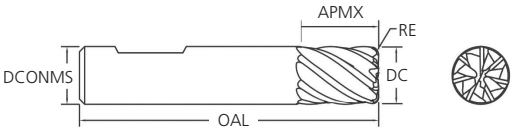
TuffCut® XV Series XV7 1xD



Tool No.	DC	DCONMS	OAL	APMX	RE
XV7M1001AQ	10.0	10.0	51.0	12.0	
XV7M1001-R0.5AQ	10.0	10.0	51.0	12.0	0.5

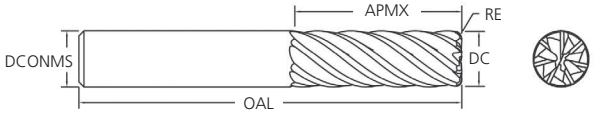
TuffCut® XV Series XV7 1xD-W





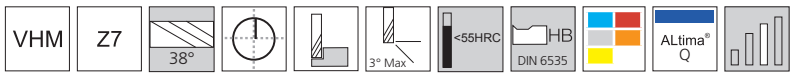
Tool No.	DC	DCONMS	OAL	APMX	RE
XV7M1201AQW	12.0	12.0	63.0	14.0	
XV7M1201-R0.5AQW	12.0	12.0	63.0	14.0	0.5
XV7M1601AQW	16.0	16.0	75.0	18.0	
XV7M1601-R0.5AQW	16.0	16.0	75.0	18.0	0.5

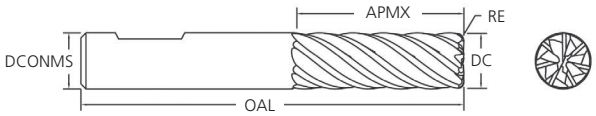
TuffCut® XV Series XV7 3xD



Tool No.	DC	DCONMS	OAL	APMX	RE
XV7M0603-R0.25AQ	6.0	6.0	63.0	21.0	0.25
XV7M0803-R0.5AQ	8.0	8.0	72.0	27.0	0.5
XV7M1003-R0.5AQ	10.0	10.0	80.0	33.0	0.5

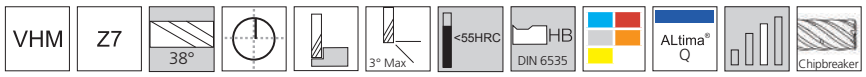
TuffCut® XV Series XV7 3xD-W

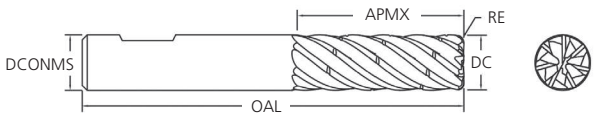




Tool No.	DC	DCONMS	OAL	APMX	RE
XV7M1203-R0.5AQW	12.0	12.0	93.0	40.0	0.5
XV7M1203-R1.0AQW	12.0	12.0	93.0	40.0	1.0
XV7M1203-R3.0AQW	12.0	12.0	93.0	40.0	3.0
XV7M1603-R1.0AQW	16.0	16.0	110.0	54.0	1.0
XV7M1603-R3.0AQW	16.0	16.0	110.0	54.0	3.0

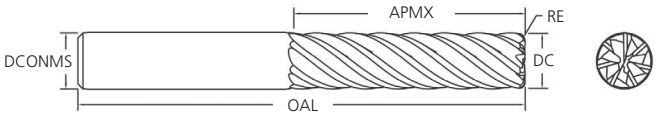
TuffCut® XV Series XV7CB 3xD-W





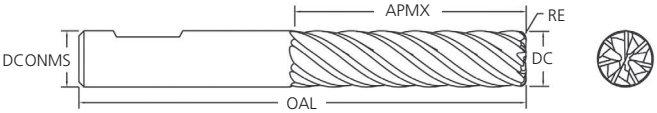
Tool No.	DC	DCONMS	OAL	APMX	RE
XV7CBM1003-R0.5AQW	10.0	10.0	80.0	33.0	0.5
XV7CBM1203-R0.5AQW	12.0	12.0	93.0	40.0	0.5
XV7CBM1603-R1.0AQW	16.0	16.0	110.0	54.0	1.0

TuffCut® XV Series XV7 4xD



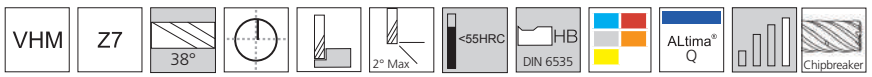
Tool No.	DC	DCONMS	OAL	APMX	RE
XV7M0604-R0.25AQ	6.0	6.0	63.0	25.0	0.25
XV7M0804-R0.5AQ	8.0	8.0	75.0	33.0	0.5
XV7M1004-R0.5AQ	10.0	10.0	90.0	43.0	0.5

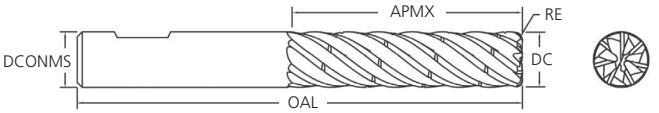
TuffCut® XV Series XV7 4xD-W



Tool No.	DC	DCONMS	OAL	APMX	RE
XV7M1204-R0.5AQW	12.0	12.0	104.0	51.0	0.5
XV7M1204-R3.0AQW	12.0	12.0	104.0	51.0	3.0
XV7M1604-R1.0AQW	16.0	16.0	123.0	67.0	1.0
XV7M1604-R3.0AQW	16.0	16.0	123.0	67.0	3.0

TuffCut® XV Series XV7CB 4xD-W






Close up of chipbreaker grind

Tool No.	DC	DCONMS	OAL	APMX	RE
XV7CBM1004-R0.5AQW	10.0	10.0	90.0	43.0	0.5
XV7CBM1204-R0.5AQW	12.0	12.0	104.0	51.0	0.5
XV7CBM1604-R1.0AQW	16.0	16.0	125 .0	67.0	1.0

TuffCut® XV XV7CB - Profile Milling with 1xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			RWOC (Ae)				End Mill Diameter (mm)					
									6	8	10	12	16	20
		Emulsion	Air	MQL	5%	10%	15%	20%	← Multiply fz by this Factor based on Ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.					
					2.3	1.67	1.4	1.2						
					Vc - M/Min				fz - mm/tooth					
Low Carbon Steels	P	o	•	o	380	350	300	290	0.036	0.048	0.060	0.072	0.096	0.120
Medium Carbon Steels		o	•	o	270	260	240	230	0.036	0.048	0.060	0.072	0.096	0.120
Alloy Steels		o	•	o	260	240	220	210	0.036	0.048	0.060	0.072	0.096	0.120
Die / Tool Steels		o	•	o	220	200	180	170	0.036	0.048	0.060	0.072	0.096	0.120
Free Machining Stainless Steels	M	•	•	o	205	180	150	140	0.036	0.048	0.060	0.072	0.096	0.120
Austenitic Stainless Steels		•	x	o	160	140	100	90	0.030	0.040	0.050	0.060	0.080	0.100
Difficult Stainless Steels		•	x	o	110	90	70	65	0.024	0.032	0.040	0.048	0.064	0.080
PH Stainless Steels		•	•	o	160	140	100	90	0.024	0.032	0.040	0.048	0.064	0.080
Cobalt Chrome Alloys		•	x	o	120	100	80	75	0.024	0.032	0.040	0.048	0.064	0.080
Duplex (22%)		•	x	o	75	65	60	55	0.024	0.032	0.040	0.048	0.064	0.080
Super Duplex (25%)		•	x	o	70	60	55	50	0.024	0.032	0.040	0.048	0.064	0.080
High Temp Alloys	S	•	x	x	50	40	-	-	0.024	0.032	0.040	0.048	0.064	0.080
Titanium Alloys		•	x	x	120	90	80	75	0.024	0.032	0.040	0.048	0.064	0.080
Gray Cast Irons	K	•	o	o	360	350	300	290	0.036	0.048	0.060	0.072	0.096	0.120
Ductile Cast Irons		•	o	o	270	260	240	230	0.036	0.048	0.060	0.072	0.096	0.120
Malleable Cast Irons		•	o	o	160	150	140	130	0.036	0.048	0.060	0.072	0.096	0.120
Hardened Steels 45-50 HRC	H	o	•	o	160	140	130	110	0.030	0.040	0.050	0.060	0.080	0.100
Hardened Steels 50-55 HRC		o	•	o	150	130	115	100	0.024	0.032	0.040	0.048	0.064	0.080

• **Preferred** o **Possible** x **Not Possible**

Notes

- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application, workpiece rigidity, machine tool, etc.
- The XV7 / XV7CB should only be used in accurate tool holders with high gripping power. ER collet type holders are not recommended.

Helical interpolation recommendations:

- Under optimal conditions, with proper coolant flow/air blast techniques, up to 3° helical ramp angles are achievable with the XV7 / XV7CB in most materials
- A reduction of 30-50% in feed per tooth (fz) are recommended
- Recommended hole diameter = 1.9 x D

TuffCut® XV XV7 & XV7CB - Profile Milling with 3xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			RWOC (Ae)		End Mill Diameter (mm)					
							6	8	10	12	16	20
		Emulsion	Air	MQL	5%	10%	← Multiply fz by this Factor based on Ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.					
					2.3	1.67						
					Vc - M/Min		fz - mm/tooth					
Low Carbon Steels	P	o	•	o	380	350	0.036	0.048	0.060	0.072	0.096	0.120
Medium Carbon Steels		o	•	o	270	260	0.036	0.048	0.060	0.072	0.096	0.120
Alloy Steels		o	•	o	260	240	0.036	0.048	0.060	0.072	0.096	0.120
Die / Tool Steels		o	•	o	220	200	0.036	0.048	0.060	0.072	0.096	0.120
Free Machining Stainless Steels	M	•	•	o	205	180	0.036	0.048	0.060	0.072	0.096	0.120
Austenitic Stainless Steels		•	x	o	160	140	0.030	0.040	0.050	0.060	0.080	0.100
Difficult Stainless Steels		•	x	o	110	90	0.024	0.032	0.040	0.048	0.064	0.080
PH Stainless Steels		•	•	o	160	140	0.024	0.032	0.040	0.048	0.064	0.080
Cobalt Chrome Alloys		•	x	o	120	100	0.024	0.032	0.040	0.048	0.064	0.080
Duplex (22%)		•	x	o	75	65	0.024	0.032	0.040	0.048	0.064	0.080
Super Duplex (25%)		•	x	o	70	60	0.024	0.032	0.040	0.048	0.064	0.080
High Temp Alloys	S	•	x	x	45	38	0.024	0.032	0.040	0.048	0.064	0.080
Titanium Alloys		•	x	x	120	90	0.024	0.032	0.040	0.048	0.064	0.080
Gray Cast Irons	K	•	o	o	360	350	0.036	0.048	0.060	0.072	0.096	0.120
Ductile Cast Irons		•	o	o	270	260	0.036	0.048	0.060	0.072	0.096	0.120
Malleable Cast Irons		•	o	o	160	150	0.036	0.048	0.060	0.072	0.096	0.120
Hardened Steels 45-50 HRC	H	o	•	o	160	140	0.030	0.040	0.050	0.060	0.080	0.100
Hardened Steels 50-55 HRC		o	•	o	150	130	0.024	0.032	0.040	0.048	0.064	0.080

• Preferred o Possible x Not Possible

Notes

- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application, workpiece rigidity, machine tool, etc.
- The XV7 / XV7CB should only be used in accurate tool holders with high gripping power. ER collet type holders are not recommended.

Helical interpolation recommendations:

- Under optimal conditions, with proper coolant flow/air blast techniques, up to 3° helical ramp angles are achievable with the XV7 / XV7CB in most materials
- A reduction of 30-50% in feed per tooth (fz) are recommended
- Recommended hole diameter = 1.9 x D

TuffCut® XV XV7 & XV7CB - Profile Milling with 4xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Coolant			RWOC (Ae)		End Mill Diameter (mm)					
							6	8	10	12	16	20
		Emulsion	Air	MQL	3%	5%	← Multiply fz by this Factor based on Ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.					
					2.93	2.3						
					Vc - M/Min		fz - mm/tooth					
Low Carbon Steels	P	o	•	o	320	300	0.024	0.032	0.040	0.048	0.064	0.080
Medium Carbon Steels		o	•	o	250	240	0.024	0.032	0.040	0.048	0.064	0.080
Alloy Steels		o	•	o	230	220	0.024	0.032	0.040	0.048	0.064	0.080
Die / Tool Steels		o	•	o	210	200	0.024	0.032	0.040	0.048	0.064	0.080
Free Machining Stainless Steels	M	•	•	o	200	180	0.024	0.032	0.040	0.048	0.064	0.080
Austenitic Stainless Steels		•	x	o	150	140	0.018	0.024	0.030	0.036	0.048	0.060
Difficult Stainless Steels		•	x	o	100	90	0.015	0.020	0.025	0.030	0.040	0.050
PH Stainless Steels		•	•	o	150	140	0.015	0.020	0.025	0.030	0.040	0.050
Cobalt Chrome Alloys		•	x	o	90	80	0.015	0.020	0.025	0.030	0.040	0.050
Duplex (22%)		•	x	o	75	65	0.015	0.020	0.025	0.030	0.040	0.050
Super Duplex (25%)		•	x	o	55	45	0.015	0.020	0.025	0.030	0.040	0.050
High Temp Alloys	S	•	x	x	40	35	0.012	0.016	0.020	0.024	0.032	0.040
Titanium Alloys		•	x	x	90	80	0.015	0.020	0.025	0.030	0.040	0.050
Gray Cast Irons	K	•	o	o	300	290	0.024	0.032	0.040	0.048	0.064	0.080
Ductile Cast Irons		•	o	o	230	215	0.024	0.032	0.040	0.048	0.064	0.080
Malleable Cast Irons		•	o	o	140	120	0.024	0.032	0.040	0.048	0.064	0.080
Hardened Steels 45-50 HRC	H	o	•	o	140	130	0.024	0.032	0.040	0.048	0.064	0.080
Hardened Steels 50-55 HRC		o	•	o	120	110	0.012	0.016	0.020	0.024	0.032	0.040

● **Preferred** o **Possible** x **Not Possible**

Notes

- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application, workpiece rigidity, machine tool, etc.
- The XV7 / XV7CB should only be used in accurate tool holders with high gripping power. ER collet type holders are not recommended.

Helical interpolation recommendations:

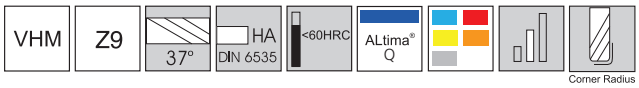
- Under optimal conditions, with proper coolant flow/air blast techniques, up to 3° helical ramp angles are achievable with the XV7 / XV7CB in most materials
- A reduction of 30-50% in feed per tooth (fz) are recommended
- Recommended hole diameter = 1.9 x D

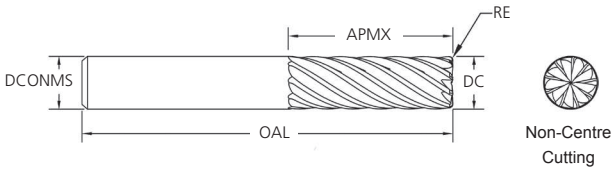
TuffCut® XV XV7 / XV7CB Series - Chip Thickness Compensation Factors - Metric

RWOC (Ae)	Chip Thicknesss Compensation Factor
5%	2.30
7%	1.96
8%	1.84
10%	1.67
13%	1.49
15%	1.40
20%	1.20

During profile milling with a radial width of less than 50% of the cutter diameter, the actual chip thickness at the cutting edge is reduced relative to the programmed feed per tooth (fz).
The accompanying table provides a factor that indicates how much the fz can be increased, depending on the radial width of the cut.
To determine the correct feed rate, multiply the recommended fz from the table by the appropriate compensation factor.

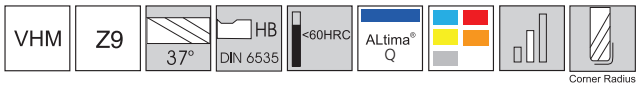
TuffCut® XT9 Series 380 3xD

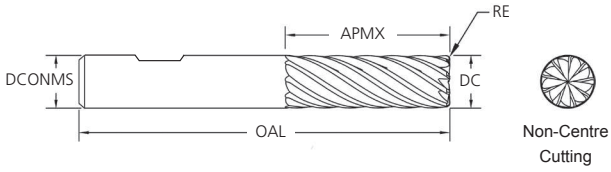




Tool No.	DC	DCONMS	OAL	APMX	RE
380M0803-0.5RAQ	8.0	8.0	75.0	26.0	0.5
380M1003-0.5RAQ	10.0	10.0	80.0	32.0	0.5
380M1003-1.0RAQ	10.0	10.0	80.0	32.0	1.0

TuffCut® XT9 Series 380 3xD-W

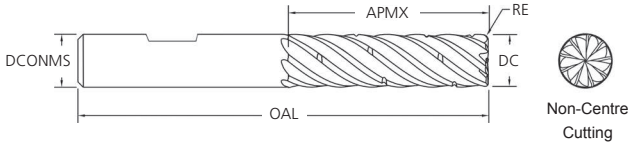




Tool No.	DC	DCONMS	OAL	APMX	RE
380M1003-0.5RAQW	10.0	10.0	80.0	32.0	0.5
380M1003-1.0RAQW	10.0	10.0	80.0	32.0	1.0
380M1203-0.5RAQW	12.0	12.0	84.0	38.0	0.5
380M1203-1.0RAQW	12.0	12.0	84.0	38.0	1.0
380M1603-0.5RAQW	16.0	16.0	105.0	50.0	0.5
380M1603-1.0RAQW	16.0	16.0	105.0	50.0	1.0
380M2003-0.5RAQW	20.0	20.0	120.0	62.0	0.5
380M2003-1.0RAQW	20.0	20.0	120.0	62.0	1.0

Please note: Due to manufacturing specification changes, the future OAL dimension of this tool will be subject to modification.

TuffCut® XT9 Series 380CB 3xD-W



Tool No.	DC	DCONMS	OAL	APMX	RE
380CBM1003-0.5RAQW	10.0	10.0	80.0	32.0	0.5
380CBM1003-1.0RAQW	10.0	10.0	80.0	32.0	1.0
380CBM1203-0.5RAQW	12.0	12.0	84.0	38.0	0.5
380CBM1203-1.0RAQW	12.0	12.0	84.0	38.0	1.0
380CBM1603-0.5RAQW	16.0	16.0	105.0	50.0	0.5
380CBM1603-1.0RAQW	16.0	16.0	105.0	50.0	1.0
380CBM2003-0.5RAQW	20.0	20.0	120.0	62.0	0.5
380CBM2003-1.0RAQW	20.0	20.0	120.0	62.0	1.0

Please note: Due to manufacturing specification changes, the future OAL dimension of this tool will be subject to modification.

TuffCut® XT9 Series 380 & 380CB 3xD - Profile Milling with 3xD APMX

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

380 & 380CB Series - Profile Milling with 3xD APMX

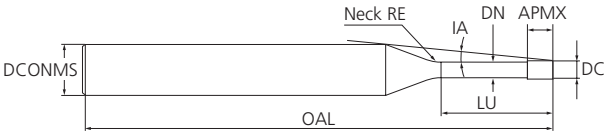
Workpiece Material Group	ISO	Coolant			RWOC (Ae)		End Mill Diameter (mm)			
							10	12	16	20
		Emulsion	Air	MQL	5%	10%	← Multiply fz by this Factor based on ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.			
					2.3	1.67				
					Vc - M/Min		fz - mm/tooth			
Low Carbon Steels	P	o	●	o	370	340	0.060	0.072	0.096	0.120
Medium Carbon Steels		o	●	o	260	250	0.060	0.072	0.096	0.120
Alloy Steels		o	●	o	250	230	0.060	0.072	0.096	0.120
Die / Tool Steels		o	●	o	210	190	0.060	0.072	0.096	0.120
Free Machining Stainless Steels	M	●	●	o	195	175	0.060	0.072	0.096	0.120
Austenitic Stainless Steels		●	x	o	155	135	0.050	0.060	0.080	0.100
Difficult Stainless Steels		●	x	o	105	90	0.040	0.048	0.064	0.080
PH Stainless Steels		●	●	o	155	135	0.040	0.048	0.064	0.080
Cobalt Chrome Alloys		●	x	o	115	95	0.040	0.048	0.064	0.080
Duplex (22%)		●	x	o	75	65	0.040	0.048	0.064	0.080
Super Duplex (25%)		●	x	o	70	60	0.040	0.048	0.064	0.080
High Temp Alloys	S	●	x	x	50	40	0.025	0.030	0.040	0.050
Titanium Alloys		●	x	x	115	90	0.040	0.048	0.064	0.080
Gray Cast Irons	K	●	o	o	345	335	0.060	0.072	0.096	0.120
Ductile Cast Irons		●	o	o	260	250	0.060	0.072	0.096	0.120
Hardened Steels 45-50 HRC	H	o	●	o	145	125	0.050	0.060	0.080	0.100
Hardened Steels 50-55 HRC		o	●	o	95	-	0.035	0.042	0.056	0.070
Hardened Steels 55-60 HRC		o	●	o	95	-	0.020	0.024	0.032	0.040

● Preferred ○ Possible X Not Possible

Notes

- Cutting data provided should be considered advisory only. Adjustments may be necessary depending on the application, workpiece rigidity, machine tool, etc.
- The 380 & 380CB should only be used in accurate tool holders with high gripping power. ER collet type holders are not recommended.
- For machining materials above 50 HRC, reduce stepover (Ae) to 2-3% of DC for optimal performance

TuffCut® XM Series XM2S



Tool No.	DC	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
									0.5°	1°	1.5°	2°	3°
XM2S-001N0.3X	0.1	0.3	0.15	0.08	50.0	4.0	1.0	14.39°	0.31	0.33	0.35	0.37	0.40
XM2S-001N0.5X		0.5						14.03°	0.52	0.55	0.58	0.60	0.65
XM2S-001N1X		1.0						13.22°	1.05	1.09	1.13	1.18	1.27
XM2S-002N0.5X	0.2	0.5	0.3	0.17	50.0	4.0	1.0	14.03°	0.52	0.54	0.57	0.59	0.64
XM2S-002N1X		1.0						13.2°	1.04	1.08	1.12	1.16	1.26
XM2S-002N1.5X		1.5						12.45°	1.56	1.62	1.67	1.74	1.88
XM2S-002N2X		2.0						11.79°	2.08	2.15	2.23	2.31	2.50
XM2S-002N3X		3.0						10.65°	3.11	3.22	3.34	3.46	3.74
XM2S-003N1X	0.3	1.0	0.45	0.27	50.0	4.0	2.0	13.06°	1.06	1.12	1.18	1.23	1.33
XM2S-003N1.5X		1.5						12.31°	1.59	1.67	1.74	1.81	1.95
XM2S-003N2X		2.0						11.65°	2.12	2.21	2.29	2.38	2.57
XM2S-003N2.5X		2.5						11.05°	2.64	2.75	2.85	2.96	3.20
XM2S-003N3X		3.0						10.51°	3.16	3.28	3.40	3.53	3.82
XM2S-004N1X	0.4	1.0	0.6	0.37	50.0	4.0	2.0	13.01°	1.06	1.12	1.18	1.23	1.33
XM2S-004N1.5X		1.5						12.25°	1.59	1.67	1.74	1.81	1.95
XM2S-004N2X		2.0						11.57°	2.12	2.21	2.29	2.38	2.57
XM2S-004N2.5X		2.5						10.97°	2.64	2.75	2.85	2.96	3.20
XM2S-004N3X		3.0						10.42°	3.16	3.28	3.40	3.53	3.82
XM2S-004N3.5X		3.5						9.92°	3.68	3.82	3.96	4.11	4.44
XM2S-004N4X		4.0						9.47°	4.20	4.35	4.51	4.68	5.06
XM2S-004N5X		5.0						8.68°	5.24	5.42	5.62	5.83	6.30
XM2S-004N6X		6.0						8.01°	6.27	6.49	6.73	6.98	7.55
XM2S-004N8X		8.0						6.94°	8.34	8.63	8.94	9.28	10.03
XM2S-004N10X		10.0						6.12°	10.41	10.77	11.16	11.58	12.52
XM2S-005N1X	0.5	1.0	0.75	0.47	50.0	4.0	2.0	12.96°	1.06	1.12	1.18	1.23	1.33
XM2S-005N1.5X		1.5						12.19°	1.59	1.67	1.74	1.81	1.95
XM2S-005N2X		2.0						11.5°	2.12	2.21	2.29	2.38	2.57
XM2S-005N2.5X		2.5						10.88°	2.64	2.75	2.85	2.96	3.20
XM2S-005N3X		3.0						10.33°	3.16	3.28	3.40	3.53	3.82
XM2S-005N4X		4.0						9.37°	4.20	4.35	4.51	4.68	5.06
XM2S-005N5X		5.0						8.58°	5.24	5.42	5.62	5.83	6.30
XM2S-005N6X		6.0						7.91°	6.27	6.49	6.73	6.98	7.55
XM2S-005N8X		8.0						6.84°	8.34	8.63	8.94	9.28	10.03
XM2S-005N10X		10.0						6.02°	10.41	10.77	11.16	11.58	12.52
XM2S-006N2X	0.6	2.0	0.9	0.57	50.0	4.0	4.0	11.21°	2.17	2.31	2.44	2.56	2.78
XM2S-006N3X		3.0						10.07°	3.24	3.42	3.58	3.72	4.02
XM2S-006N4X		4.0						9.13°	4.30	4.51	4.69	4.87	5.26
XM2S-006N5X		5.0						8.36°	5.35	5.59	5.80	6.02	6.50
XM2S-006N6X		6.0						14.39°	0.31	0.33	0.35	0.37	0.40
XM2S-006N7X		7.0						14.03°	0.52	0.55	0.58	0.60	0.65
XM2S-006N8X		8.0						13.22°	1.05	1.09	1.13	1.18	1.27
XM2S-006N9X		9.0						14.03°	0.52	0.54	0.57	0.59	0.64
XM2S-006N10X		10.0						13.2°	1.04	1.08	1.12	1.16	1.26
XM2S-007N2X	0.7	2.0	1.05	0.67	50.0	4.0	4.0	12.45°	1.56	1.62	1.67	1.74	1.88
XM2S-007N4X		4.0						11.79°	2.08	2.15	2.23	2.31	2.50
XM2S-007N6X		6.0						10.65°	3.11	3.22	3.34	3.46	3.74

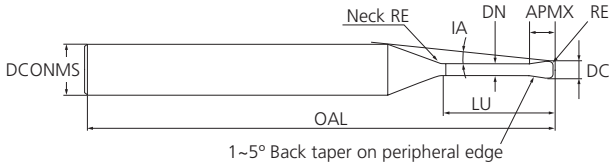
Series XM2S

Tool No.	DC	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
									0.5°	1°	1.5°	2°	3°
XM2S-007N8X	0.7	8.0	1.05	0.67	50.0	4.0	4.0	13.06°	1.06	1.12	1.18	1.23	1.33
XM2S-007N10X		10.0						12.31°	1.59	1.67	1.74	1.81	1.95
XM2S-008N4X	0.8	4.0	1.20	0.76	50.0	4.0	4.0	11.65°	2.12	2.21	2.29	2.38	2.57
XM2S-008N6X		6.0						11.05°	2.64	2.75	2.85	2.96	3.20
XM2S-008N8X		8.0						10.51°	3.16	3.28	3.40	3.53	3.82
XM2S-008N10X		10.0						13.01°	1.06	1.12	1.18	1.23	1.33
XM2S-008N12X		12.0			55.0			12.25°	1.59	1.67	1.74	1.81	1.95
XM2S-009N6X	0.9	6.0	1.35	0.86	50.0	4.0	4.0	11.57°	2.12	2.21	2.29	2.38	2.57
XM2S-009N8X		8.0						10.97°	2.64	2.75	2.85	2.96	3.20
XM2S-009N10X		10.0						10.42°	3.16	3.28	3.40	3.53	3.82
XM2S-009N12X		12.0			55.0			9.92°	3.68	3.82	3.96	4.11	4.44
XM2S-010N2X	1.0	2.0	1.5	0.96	50.0	4.0	4.0	9.47°	4.20	4.35	4.51	4.68	5.06
XM2S-010N3X		3.0						8.68°	5.24	5.42	5.62	5.83	6.30
XM2S-010N4X		4.0						8.01°	6.27	6.49	6.73	6.98	7.55
XM2S-010N5X		5.0						6.94°	8.34	8.63	8.94	9.28	10.03
XM2S-010N6X		6.0						6.12°	10.41	10.77	11.16	11.58	12.52
XM2S-010N7X		7.0						12.96°	1.06	1.12	1.18	1.23	1.33
XM2S-010N8X		8.0						12.19°	1.59	1.67	1.74	1.81	1.95
XM2S-010N9X		9.0						11.5°	2.12	2.21	2.29	2.38	2.57
XM2S-010N10X		10.0						10.88°	2.64	2.75	2.85	2.96	3.20
XM2S-010N12X		12.0			55.0			10.33°	3.16	3.28	3.40	3.53	3.82
XM2S-010N14X		14.0						9.37°	4.20	4.35	4.51	4.68	5.06
XM2S-010N16X		16.0						8.58°	5.24	5.42	5.62	5.83	6.30
XM2S-010N20X		20.0			60.0			7.91°	6.27	6.49	6.73	6.98	7.55
XM2S-010N25X		25.0			65.0			-	8.34	8.63	8.94	9.28	10.03
XM2S-012N6X	1.2	6.0	1.8	1.15	50.0	4.0	4.0	14.39°	0.31	0.33	0.35	0.37	0.40
XM2S-012N8X		8.0						14.03°	0.52	0.55	0.58	0.60	0.65
XM2S-012N10X		10.0						13.22°	1.05	1.09	1.13	1.18	1.27
XM2S-012N12X		12.0			55.0			14.03°	0.52	0.54	0.57	0.59	0.64
XM2S-012N16X		16.0						13.2°	1.04	1.08	1.12	1.16	1.26
XM2S-014N6X	1.4	6.0	2.1	1.34	50.0	4.0	4.0	12.45°	1.56	1.62	1.67	1.74	1.88
XM2S-014N12X		12.0			55.0			11.79°	2.08	2.15	2.23	2.31	2.50
XM2S-015N4X	1.5	4.0	2.25	1.44	50.0	4.0	4.0	10.65°	3.11	3.22	3.34	3.46	3.74
XM2S-015N6X		6.0						13.06°	1.06	1.12	1.18	1.23	1.33
XM2S-015N8X		8.0						12.31°	1.59	1.67	1.74	1.81	1.95
XM2S-015N10X		10.0						11.65°	2.12	2.21	2.29	2.38	2.57
XM2S-015N12X		12.0			55.0			11.05°	2.64	2.75	2.85	2.96	3.20
XM2S-015N14X		14.0						10.51°	3.16	3.28	3.40	3.53	3.82
XM2S-015N16X		16.0						13.01°	1.06	1.12	1.18	1.23	1.33
XM2S-015N18X		18.0			60.0			4°	4.00	1.67	1.74	1.81	1.95
XM2S-015N20X		20.0						11.57°	2.12	2.21	2.29	2.38	2.57
XM2S-015N25X		25.0			65.0			10.97°	2.64	2.75	2.85	2.96	3.20
XM2S-015N30X		30.0			70.0			10.42°	3.16	3.28	3.40	3.53	3.82
XM2S-015N35X		35.0			75.0			9.92°	3.68	3.82	3.96	4.11	4.44
XM2S-015N40X		40.0			80.0			9.47°	4.20	4.35	4.51	4.68	5.06
XM2S-016N6X	1.6	6.0	2.4	1.54	50.0	4.0	4.0	8.68°	5.24	5.42	5.62	5.83	6.30
XM2S-016N8X		8.0						8.01°	6.27	6.49	6.73	6.98	7.55
XM2S-018N6X	1.8	6.0	2.7	1.73	50.0	4.0	4.0	6.94°	8.34	8.63	8.94	9.28	10.03
XM2S-018N8X		8.0						6.12°	10.41	10.77	11.16	11.58	12.52
XM2S-020N4X	2.0	4.0	3.0	1.92	50.0	4.0	4.0	12.96°	1.06	1.12	1.18	1.23	1.33
XM2S-020N6X		6.0						12.19°	1.59	1.67	1.74	1.81	1.95
XM2S-020N8X		8.0						11.5°	2.12	2.21	2.29	2.38	2.57
XM2S-020N10X		10.0						10.88°	2.64	2.75	2.85	2.96	3.20
XM2S-020N12X		12.0			55.0			10.33°	3.16	3.28	3.40	3.53	3.82
XM2S-020N14X		14.0						9.37°	4.20	4.35	4.51	4.68	5.06
XM2S-020N16X		16.0						8.58°	5.24	5.42	5.62	5.83	6.30

Series XM2S

Tool No.	DC	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
									0.5°	1°	1.5°	2°	3°
XM2S-020N18X	2.0	18.0	3.0	1.92	60.0	4.0	4.0	7.91°	6.27	6.49	6.73	6.98	7.55
XM2S-020N20X		20.0						6.84°	8.34	8.63	8.94	9.28	10.03
XM2S-020N25X		25.0			65.0			6.02°	10.41	10.77	11.16	11.58	12.52
XM2S-020N30X		30.0			70.0			11.21°	2.17	2.31	2.44	2.56	2.78
XM2S-020N35X		35.0			75.0			10.07°	3.24	3.42	3.58	3.72	4.02
XM2S-020N40X		40.0			80.0			9.13°	4.30	4.51	4.69	4.87	5.26
XM2S-020N50X		50.0			90.0			8.36°	5.35	5.59	5.80	6.02	6.50
XM2S-025N8X	2.5	8.0	3.75	2.4	50.0	4.0	4.0	14.39°	0.31	0.33	0.35	0.37	0.40
XM2S-025N12X		12.0			55.0			14.03°	0.52	0.55	0.58	0.60	0.65
XM2S-025N16X		16.0						13.22°	1.05	1.09	1.13	1.18	1.27
XM2S-025N20X		20.0			60.0			14.03°	0.52	0.54	0.57	0.59	0.64
XM2S-025N30X		30.0			70.0			13.2°	1.04	1.08	1.12	1.16	1.26
XM2S-025N40X		40.0			80.0			12.45°	1.56	1.62	1.67	1.74	1.88
XM2S-025N50X		50.0			90.0			11.79°	2.08	2.15	2.23	2.31	2.50
XM2S-030N8X	3.0	8.0	4.5	2.88	55.0	6.0	4.0	10.65°	3.11	3.22	3.34	3.46	3.74
XM2S-030N12X		12.0			60.0			13.06°	1.06	1.12	1.18	1.23	1.33
XM2S-030N16X		16.0						12.31°	1.59	1.67	1.74	1.81	1.95
XM2S-030N20X		20.0			65.0			11.65°	2.12	2.21	2.29	2.38	2.57
XM2S-030N25X		25.0			70.0			11.05°	2.64	2.75	2.85	2.96	3.20
XM2S-030N30X		30.0			75.0			10.51°	3.16	3.28	3.40	3.53	3.82
XM2S-030N40X		40.0			90.0			13.01°	1.06	1.12	1.18	1.23	1.33
XM2S-030N50X		50.0			100.0			4°	4.00	1.67	1.74	1.81	1.95
XM2S-040N12X	4.0	12.0	6.0	3.86	60.0	6.0	4.0	11.57°	2.12	2.21	2.29	2.38	2.57
XM2S-040N16X		16.0						10.97°	2.64	2.75	2.85	2.96	3.20
XM2S-040N20X		20.0			70.0			10.42°	3.16	3.28	3.40	3.53	3.82
XM2S-040N25X		25.0						9.92°	3.68	3.82	3.96	4.11	4.44
XM2S-040N30X		30.0			80.0			9.47°	4.20	4.35	4.51	4.68	5.06
XM2S-040N35X		35.0						8.68°	5.24	5.42	5.62	5.83	6.30
XM2S-040N40X		40.0			90.0			8.01°	6.27	6.49	6.73	6.98	7.55
XM2S-040N50X		50.0			100.0			6.94°	8.34	8.63	8.94	9.28	10.03
XM2S-050N20X	5.0	20.0	7.5	4.85	70.0	6.0	4.0	6.12°	10.41	10.77	11.16	11.58	12.52
XM2S-050N25X		25.0						12.96°	1.06	1.12	1.18	1.23	1.33
XM2S-050N30X		30.0			80.0			12.19°	1.59	1.67	1.74	1.81	1.95
XM2S-050N40X		40.0			90.0			11.5°	2.12	2.21	2.29	2.38	2.57
XM2S-050N50X		50.0			100.0			10.88°	2.64	2.75	2.85	2.96	3.20
XM2S-060N20X	6.0	20.0	9.0	5.85	70.0	6.0	-	10.33°	3.16	3.28	3.40	3.53	3.82
XM2S-060N30X		30.0			80.0			9.37°	4.20	4.35	4.51	4.68	5.06
XM2S-060N40X		40.0			90.0			8.58°	5.24	5.42	5.62	5.83	6.30
XM2S-060N50X		50.0			100.0			7.91°	6.27	6.49	6.73	6.98	7.55

TuffCut® XM Series XM2R



Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM2R-002N0.5-0.02RX	0.2	0.02	0.5	0.16	0.17	50.0	4.0	1.0	14.07°	0.52	0.54	0.56	0.58	0.63
XM2R-002N1-0.02RX			1.0						13.23°	1.04	1.08	1.12	1.16	1.25
XM2R-002N2-0.02RX			2.0						11.82°	2.08	2.15	2.23	2.31	2.50
XM2R-002N0.5-0.05RX		0.05	0.5						14.12°	0.52	0.54	0.56	0.58	0.62
XM2R-002N1-0.05RX			1.0						13.28°	1.04	1.08	1.11	1.15	1.24
XM2R-002N1.5-0.05RX			1.5						12.53°	1.56	1.61	1.67	1.73	1.87
XM2R-002N2-0.05RX			2.0						11.85°	2.08	2.15	2.22	2.30	2.49
XM2R-003N1-0.02RX	0.3	0.02	1.0	0.24	0.27	50.0	4.0	2.0	13.09°	1.06	1.12	1.17	1.23	1.33
XM2R-003N2-0.02RX			2.0						11.67°	2.11	2.21	2.29	2.38	2.57
XM2R-003N3-0.02RX			3.0						10.53°	3.16	3.28	3.40	3.53	3.81
XM2R-003N1-0.05RX		0.05	1.0						13.14°	1.06	1.12	1.17	1.22	1.32
XM2R-003N1.5-0.05RX			1.5						12.38°	1.59	1.66	1.73	1.80	1.94
XM2R-003N2-0.05RX			2.0						11.71°	2.11	2.21	2.29	2.37	2.56
XM2R-003N2.5-0.05RX			2.5						11.11°	2.64	2.75	2.84	2.95	3.18
XM2R-003N3-0.05RX			3.0						10.56°	3.16	3.28	3.40	3.52	3.81
XM2R-004N1-0.02RX	0.4	0.02	1.0	0.32	0.37	50.0	4.0	2.0	13.04°	1.06	1.12	1.17	1.23	1.33
XM2R-004N2-0.02RX			2.0						11.6°	2.11	2.21	2.29	2.38	2.57
XM2R-004N3-0.02RX			3.0						10.44°	3.16	3.28	3.40	3.53	3.81
XM2R-004N4-0.02RX			4.0						9.49°	4.20	4.35	4.51	4.68	5.06
XM2R-004N1-0.05RX		0.05	1.0						13.09°	1.06	1.12	1.17	1.22	1.32
XM2R-004N1.5-0.05RX			1.5						12.32°	1.59	1.66	1.73	1.80	1.94
XM2R-004N2-0.05RX			2.0						11.64°	2.11	2.21	2.29	2.37	2.56
XM2R-004N2.5-0.05RX			2.5						11.03°	2.64	2.75	2.84	2.95	3.18
XM2R-004N3-0.05RX			3.0						10.47°	3.16	3.28	3.40	3.52	3.81
XM2R-004N3.5-0.05RX			3.5						9.97°	3.68	3.82	3.95	4.10	4.43
XM2R-004N4-0.05RX			4.0						9.52°	4.20	4.35	4.51	4.67	5.05
XM2R-004N1-0.1RX		0.1	1.0						13.17°	1.06	1.11	1.16	1.21	1.31
XM2R-004N2-0.1RX			2.0						11.7°	2.11	2.20	2.28	2.37	2.55
XM2R-004N3-0.1RX			3.0						10.53°	3.16	3.28	3.39	3.52	3.79
XM2R-004N4-0.1RX			4.0						9.56°	4.20	4.35	4.50	4.67	5.04
XM2R-005N1-0.02RX	0.5	0.02	1.0	0.4	0.47	50.0	4.0	2.0	13°	1.06	1.12	1.17	1.23	1.33
XM2R-005N2-0.02RX			2.0						11.53°	2.11	2.21	2.29	2.38	2.57
XM2R-005N3-0.02RX			3.0						10.35°	3.16	3.28	3.40	3.53	3.81
XM2R-005N4-0.02RX			4.0						9.39°	4.20	4.35	4.51	4.68	5.06
XM2R-005N6-0.02RX			6.0						7.92°	6.27	6.49	6.73	6.98	7.54
XM2R-005N1-0.05RX		0.05	1.0						13.05°	1.06	1.12	1.17	1.22	1.32
XM2R-005N2-0.05RX			2.0						11.56°	2.11	2.21	2.29	2.37	2.56
XM2R-005N3-0.05RX			3.0						10.38°	3.16	3.28	3.40	3.52	3.81
XM2R-005N4-0.05RX			4.0						9.42°	4.20	4.35	4.51	4.67	5.05
XM2R-005N5-0.05RX			5.0						8.62°	5.24	5.42	5.61	5.82	6.29
XM2R-005N6-0.05RX			6.0						7.94°	6.27	6.49	6.72	6.97	7.53
XM2R-005N1-0.1RX		0.1	1.0						13.13°	1.06	1.11	1.16	1.21	1.31
XM2R-005N2-0.1RX			2.0						11.63°	2.11	2.20	2.28	2.37	2.55
XM2R-005N3-0.1RX			3.0						10.44°	3.16	3.28	3.39	3.52	3.79
XM2R-005N4-0.1RX			4.0						9.46°	4.20	4.35	4.50	4.67	5.04
XM2R-005N5-0.1RX			5.0						8.65°	5.24	5.42	5.61	5.82	6.28
XM2R-005N6-0.1RX			6.0						7.97°	6.27	6.49	6.72	6.97	7.52

Series XM2R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM2R-006N2-0.02RX	0.6	0.02	2.0	0.48	0.57	50.0	4.0	4.0	11.24°	2.17	2.31	2.44	2.55	2.77
XM2R-006N4-0.02RX			4.0						9.15°	4.29	4.51	4.69	4.86	5.26
XM2R-006N6-0.02RX			6.0						7.71°	6.40	6.66	6.90	7.16	7.74
XM2R-006N2-0.05RX		0.05	2.0						11.27°	2.17	2.31	2.43	2.55	2.76
XM2R-006N4-0.05RX			4.0						9.18°	4.29	4.51	4.68	4.86	5.25
XM2R-006N6-0.05RX			6.0						7.73°	6.40	6.66	6.90	7.16	7.74
XM2R-006N8-0.05RX			8.0						6.68°	8.49	8.80	9.12	9.46	10.22
XM2R-006N10-0.05RX			10.0						5.88°	10.57	10.94	11.33	11.76	12.71
XM2R-006N2-0.1RX		0.1	2.0						11.34°	2.16	2.30	2.43	2.54	2.75
XM2R-006N4-0.1RX			4.0						9.22°	4.29	4.50	4.68	4.85	5.24
XM2R-006N6-0.1RX			6.0						7.76°	6.39	6.66	6.90	7.15	7.72
XM2R-006N8-0.1RX			8.0						6.7°	8.48	8.80	9.11	9.45	10.21
XM2R-006N10-0.1RX			10.0						5.89°	10.57	10.94	11.33	11.75	12.70
XM2R-007N4-0.05RX	0.7	0.05	4.0	0.56	0.67	50.0	4.0	4.0	9.07°	4.29	4.51	4.68	4.86	5.25
XM2R-007N6-0.05RX			6.0						7.62°	6.40	6.66	6.90	7.16	7.74
XM2R-007N4-0.1RX		0.1	4.0						9.11°	4.29	4.50	4.68	4.85	5.24
XM2R-007N6-0.1RX			6.0						7.65°	6.39	6.66	6.90	7.15	7.72
XM2R-008N4-0.02RX	0.8	0.02	4.0	0.64	0.76	50.0	4.0	4.0	8.96°	4.27	4.47	4.65	4.82	5.21
XM2R-008N6-0.02RX			6.0						7.51°	6.37	6.63	6.87	7.12	7.70
XM2R-008N4-0.05RX		0.05	4.0						8.99°	4.27	4.47	4.65	4.82	5.21
XM2R-008N6-0.05RX			6.0						7.52°	6.37	6.63	6.86	7.12	7.69
XM2R-008N8-0.05RX			8.0						6.47°	8.45	8.76	9.08	9.42	10.18
XM2R-008N12-0.05RX			12.0			55.0			5.05°	12.61	13.04	13.51	14.02	15.15
XM2R-008N4-0.1RX		0.1	4.0			50.0			9.03°	4.26	4.47	4.64	4.81	5.19
XM2R-008N6-0.1RX			6.0						7.55°	6.37	6.62	6.86	7.11	7.68
XM2R-008N8-0.1RX	0.8	0.1	8.0	0.64	0.76	50.0	4.0	4.0	6.49°	8.45	8.76	9.07	9.41	10.17
XM2R-008N12-0.1RX			12.0						5.06°	12.60	13.04	13.51	14.01	15.14
XM2R-008N4-0.2RX		0.2	4.0						9.12°	4.26	4.46	4.63	4.80	5.17
XM2R-008N6-0.2RX			6.0						7.62°	6.36	6.61	6.85	7.10	7.66
XM2R-008N8-0.2RX			8.0						6.54°	8.45	8.75	9.06	9.40	10.14
XM2R-008N12-0.2RX			12.0						5.09°	12.60	13.03	13.50	14.00	15.11
XM2R-010N2-0.02RX	1.0	0.02	2.0	0.80	0.96	50.0	4.0	4.0	10.92°	2.15	2.28	2.40	2.52	2.73
XM2R-010N4-0.02RX			4.0						8.72°	4.27	4.47	4.65	4.82	5.21
XM2R-010N6-0.02RX			6.0						7.26°	6.37	6.63	6.87	7.12	7.70
XM2R-010N8-0.02RX			8.0						6.22°	8.46	8.77	9.08	9.42	10.19
XM2R-010N10-0.02RX			10.0						5.44°	10.53	10.91	11.30	11.72	12.67
XM2R-010N12-0.02RX			12.0			55.0			4.83°	12.61	13.05	13.52	14.02	15.16
XM2R-010N2-0.05RX		0.05	2.0			50.0			10.96°	2.15	2.28	2.40	2.51	2.72
XM2R-010N3-0.05RX			3.0						9.73°	3.21	3.38	3.53	3.67	3.96
XM2R-010N4-0.05RX			4.0						8.75°	4.27	4.47	4.65	4.82	5.21
XM2R-010N5-0.05RX			5.0						7.95°	5.32	5.55	5.75	5.97	6.45
XM2R-010N6-0.05RX			6.0						7.28°	6.37	6.63	6.86	7.12	7.69
XM2R-010N8-0.05RX			8.0						6.23°	8.45	8.76	9.08	9.42	10.18
XM2R-010N10-0.05RX			10.0						5.45°	10.53	10.90	11.30	11.72	12.67
XM2R-010N12-0.05RX			12.0						4.84°	12.61	13.04	13.51	14.02	15.15
XM2R-010N16-0.05RX			16.0						3.95°	16.74	17.32	17.95	18.62	20.12
XM2R-010N20-0.05RX			20.0						3.34°	20.88	21.60	22.38	23.22	25.10
XM2R-010N2-0.1RX		0.1	2.0						11.03°	2.14	2.27	2.39	2.50	2.71
XM2R-010N3-0.1RX			3.0						9.79°	3.21	3.38	3.53	3.66	3.95
XM2R-010N4-0.1RX			4.0						8.8°	4.26	4.47	4.64	4.81	5.19
XM2R-010N5-0.1RX			5.0						7.99°	5.32	5.55	5.75	5.96	6.44
XM2R-010N6-0.1RX			6.0						7.31°	6.37	6.62	6.86	7.11	7.68
XM2R-010N8-0.1RX			8.0						6.25°	8.45	8.76	9.07	9.41	10.17
XM2R-010N10-0.1RX			10.0						5.46°	10.53	10.90	11.29	11.71	12.65
XM2R-010N12-0.1RX			12.0						4.85°	12.60	13.04	13.51	14.01	15.14
XM2R-010N16-0.1RX			16.0						3.96°	16.74	17.32	17.94	18.61	20.11
XM2R-010N20-0.1RX			20.0						3.35°	20.87	21.60	22.37	23.21	25.08

Series XM2R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM2R-010N2-0.2RX	1.0	0.2	2.0	0.80	0.96		4.0	4.0	11.17°	2.14	2.26	2.38	2.48	2.68
XM2R-010N3-0.2RX			3.0						9.9°	3.20	3.37	3.51	3.65	3.93
XM2R-010N4-0.2RX			4.0						8.89°	4.26	4.46	4.63	4.80	5.17
XM2R-010N5-0.2RX			5.0						8.06°	5.31	5.54	5.74	5.95	6.41
XM2R-010N6-0.2RX			6.0						7.37°	6.36	6.61	6.85	7.10	7.66
XM2R-010N8-0.2RX			8.0						6.3°	8.45	8.75	9.06	9.40	10.14
XM2R-010N10-0.2RX			10.0						5.5°	10.53	10.89	11.28	11.70	12.63
XM2R-010N12-0.2RX			12.0						4.88°	12.60	13.03	13.50	14.00	15.11
XM2R-010N16-0.2RX			16.0						3.98°	16.74	17.31	17.93	18.59	20.09
XM2R-010N20-0.2RX			20.0						3.36°	20.87	21.59	22.36	23.19	25.06
XM2R-010N2-0.3RX		0.3	2.0						11.32°	2.13	2.25	2.36	2.47	2.66
XM2R-010N3-0.3RX			3.0						10.01°	3.20	3.36	3.50	3.63	3.90
XM2R-010N4-0.3RX			4.0						8.98°	4.25	4.45	4.62	4.78	5.15
XM2R-010N5-0.3RX			5.0						8.14°	5.31	5.53	5.73	5.93	6.39
XM2R-010N6-0.3RX			6.0						7.44°	6.36	6.61	6.84	7.08	7.63
XM2R-010N8-0.3RX			8.0						6.35°	8.44	8.75	9.05	9.38	10.12
XM2R-010N10-0.3RX			10.0						5.53°	10.52	10.89	11.27	11.68	12.60
XM2R-010N12-0.3RX			12.0			55.0			4.9°	12.60	13.03	13.49	13.98	15.09
XM2R-010N16-0.3RX			16.0			60.0			4°	16.73	17.30	17.92	18.58	20.06
XM2R-010N20-0.3RX			20.0						3.37°	20.87	21.58	22.35	23.18	25.04
XM2R-0125N5-0.1RX	1.25	0.1	5.0	1.0	1.2	50.0	4.0	4.0	7.68°	5.30	5.52	5.72	5.93	6.40
XM2R-0125N10-0.1RX			10.0						5.17°	10.50	10.87	11.26	11.68	12.62
XM2R-0125N15-0.1RX			15.0			55.0			3.9°	15.68	16.22	16.80	17.43	18.83
XM2R-0125N20-0.1RX			20.0			60.0			3.13°	20.84	21.57	22.34	23.18	25.05
XM2R-0125N5-0.2RX		0.2	5.0			50.0			7.75°	5.29	5.51	5.71	5.91	6.38
XM2R-0125N10-0.2RX			10.0						5.21°	10.50	10.86	11.25	11.66	12.59
XM2R-0125N15-0.2RX			15.0			55.0			3.92°	15.67	16.21	16.79	17.41	18.81
XM2R-0125N20-0.2RX			20.0			60.0			3.14°	20.84	21.56	22.33	23.16	25.02
XM2R-0125N5-0.3RX		0.3	5.0			50.0			7.83°	5.29	5.50	5.70	5.90	6.35
XM2R-0125N10-0.3RX			10.0						5.24°	10.50	10.86	11.24	11.65	12.57
XM2R-0125N15-0.3RX			15.0			55.0			3.94°	15.67	16.20	16.78	17.40	18.78
XM2R-0125N20-0.3RX			20.0			60.0			3.15°	20.84	21.55	22.32	23.15	25.00
XM2R-015N4-0.1RX	1.5	0.1	4.0	1.2	1.44	50.0	4.0	4.0	8.17°	4.23	4.42	4.58	4.75	5.13
XM2R-015N6-0.1RX			6.0						6.66°	6.32	6.57	6.80	7.05	7.62
XM2R-015N8-0.1RX			8.0						5.62°	8.41	8.71	9.02	9.35	10.10
XM2R-015N12-0.1RX			12.0			55.0			4.28°	12.55	12.98	13.45	13.95	15.07
XM2R-015N15-0.1RX			15.0						3.63°	15.65	16.19	16.77	17.40	18.80
XM2R-015N20-0.1RX			20.0			60.0			2.9°	20.82	21.54	22.32	23.15	-
XM2R-015N4-0.2RX		0.2	4.0			50.0			8.26°	4.23	4.41	4.57	4.74	5.10
XM2R-015N6-0.2RX			6.0						6.72°	6.32	6.56	6.79	7.04	7.59
XM2R-015N8-0.2RX			8.0						5.66°	8.40	8.70	9.01	9.34	10.08
XM2R-015N12-0.2RX			12.0			55.0			4.31°	12.55	12.98	13.44	13.94	15.05
XM2R-015N15-0.2RX			15.0						3.65°	15.65	16.19	16.76	17.38	18.78
XM2R-015N20-0.2RX			20.0			60.0			2.91°	20.82	21.53	22.31	23.13	-
XM2R-015N4-0.3RX		0.3	4.0			50.0			8.36°	4.22	4.40	4.56	4.72	5.08
XM2R-015N6-0.3RX			6.0						6.78°	6.31	6.55	6.78	7.02	7.57
XM2R-015N8-0.3RX			8.0						5.71°	8.40	8.69	8.99	9.32	10.05
XM2R-015N12-0.3RX			12.0			55.0			4.33°	12.54	12.97	13.43	13.92	15.03
XM2R-015N15-0.3RX			15.0						3.67°	15.64	16.18	16.75	17.37	18.76
XM2R-015N20-0.3RX			20.0			60.0			2.92°	20.81	21.53	22.29	23.12	-
XM2R-015N4-0.5RX		0.5	4.0			50.0			8.55°	4.21	4.39	4.54	4.69	5.03
XM2R-015N6-0.5RX			6.0						6.91°	6.31	6.54	6.76	6.99	7.52
XM2R-015N8-0.5RX			8.0						5.8°	8.39	8.68	8.97	9.29	10.00
XM2R-015N12-0.5RX			12.0			55.0			4.39°	12.54	12.96	13.41	13.89	14.98
XM2R-015N15-0.5RX			15.0						3.71°	15.64	16.17	16.73	17.34	18.71
XM2R-015N20-0.5RX			20.0			60.0			2.95°	20.81	21.51	22.27	23.09	-

Series XM2R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM2R-0175N5-0.1RX	1.75	0.1	5.0	1.4	1.68	50.0	4.0	4.0	6.96°	5.26	5.47	5.67	5.88	6.35
XM2R-0175N10-0.1RX			10.0						4.53°	10.46	10.82	11.21	11.63	12.56
XM2R-0175N15-0.1RX			15.0			55.0			3.35°	15.63	16.17	16.75	17.38	18.78
XM2R-0175N20-0.1RX			20.0			60.0			2.66°	20.80	21.52	22.29	23.13	-
XM2R-0175N5-0.2RX		0.2	5.0			50.0			7.03°	5.26	5.47	5.66	5.86	6.32
XM2R-0175N10-0.2RX			10.0						4.56°	10.46	10.82	11.20	11.61	12.54
XM2R-0175N15-0.2RX			15.0			55.0			3.37°	15.63	16.16	16.74	17.36	18.75
XM2R-0175N20-0.2RX			20.0			60.0			2.67°	20.80	21.51	22.28	23.11	-
XM2R-0175N5-0.3RX		0.3	5.0			50.0			7.11°	5.25	5.46	5.65	5.85	6.30
XM2R-0175N10-0.3RX			10.0						4.59°	10.45	10.81	11.19	11.60	12.51
XM2R-0175N15-0.3RX			15.0			55.0			3.39°	15.62	16.16	16.73	17.35	18.73
XM2R-0175N20-0.3RX			20.0			60.0			2.69°	20.79	21.51	22.27	23.10	-
XM2R-020N4-0.1RX	2.0	0.1	4.0	1.60	1.92	50.0	4.0	4.0	7.36°	4.21	4.38	4.54	4.71	5.08
XM2R-020N6-0.1RX			6.0						5.86°	6.29	6.53	6.76	7.01	7.57
XM2R-020N8-0.1RX			8.0						4.87°	8.37	8.66	8.97	9.31	10.05
XM2R-020N12-0.1RX			12.0			55.0			3.64°	12.51	12.94	13.41	13.91	15.03
XM2R-020N16-0.1RX			16.0						2.9°	16.65	17.22	17.84	18.51	-
XM2R-020N20-0.1RX			20.0			60.0			2.42°	20.78	21.50	22.27	23.11	-
XM2R-020N25-0.1RX			25.0			65.0			2°	25.95	26.85	27.82	-	-
XM2R-020N30-0.1RX			30.0			70.0			1.7°	31.12	32.20	33.36	-	-
XM2R-020N4-0.2RX		0.2	4.0			50.0			7.46°	4.20	4.37	4.53	4.69	5.06
XM2R-020N6-0.2RX			6.0						5.93°	6.29	6.52	6.75	6.99	7.54
XM2R-020N8-0.2RX			8.0						4.91°	8.37	8.66	8.96	9.29	10.03
XM2R-020N12-0.2RX			12.0			55.0			3.66°	12.51	12.94	13.40	13.89	15.00
XM2R-020N16-0.2RX			16.0						2.92°	16.64	17.22	17.83	18.49	-
XM2R-020N20-0.2RX			20.0			60.0			2.43°	20.78	21.49	22.26	23.09	-
XM2R-020N25-0.2RX			25.0			65.0			2°	25.95	26.84	27.80	-	-
XM2R-020N30-0.2RX			30.0			70.0			1.71°	31.11	32.19	33.35	-	-
XM2R-020N4-0.3RX		0.3	4.0			50.0			7.56°	4.20	4.37	4.52	4.68	5.03
XM2R-020N6-0.3RX			6.0						5.99°	6.28	6.51	6.74	6.98	7.52
XM2R-020N8-0.3RX			8.0						4.96°	8.36	8.65	8.95	9.28	10.01
XM2R-020N12-0.3RX			12.0			55.0			3.69°	12.50	12.93	13.39	13.88	14.98
XM2R-020N16-0.3RX			16.0						2.93°	16.64	17.21	17.82	18.48	-
XM2R-020N20-0.3RX			20.0			60.0			2.44°	20.77	21.49	22.25	23.08	-
XM2R-020N25-0.3RX			25.0			65.0			2.01°	25.94	26.84	27.79	28.82	-
XM2R-020N30-0.3RX			30.0			70.0			1.71°	31.11	32.18	33.34	-	-
XM2R-020N6-0.5RX		0.5	6.0			50.0			6.11°	6.28	6.50	6.71	6.95	7.47
XM2R-020N8-0.5RX			8.0						5.04°	8.36	8.64	8.93	9.25	9.96
XM2R-020N12-0.5RX			12.0			55.0			3.73°	12.50	12.92	13.36	13.85	14.93
XM2R-020N16-0.5RX			16.0						2.96°	16.63	17.19	17.80	18.45	-
XM2R-020N20-0.5RX			20.0			60.0			2.46°	20.77	21.47	22.23	23.05	-
XM2R-020N25-0.5RX			25.0			65.0			2.03°	25.94	26.82	27.77	28.79	-
XM2R-020N30-0.5RX			30.0			70.0			1.72°	31.10	32.17	33.31	-	-
XM2R-020N6-0.8RX		0.8	6.0			50.0			6.31°	6.26	6.48	6.68	6.90	7.40
XM2R-020N8-0.8RX			8.0						5.18°	8.35	8.62	8.90	9.20	9.88
XM2R-020N12-0.8RX			12.0			55.0			3.81°	12.49	12.89	13.33	13.80	14.86
XM2R-020N16-0.8RX			16.0			55.0			3.01°	16.62	17.17	17.77	18.40	19.83
XM2R-020N20-0.8RX			20.0			60.0			2.49°	20.76	21.45	22.20	23.00	-
XM2R-020N25-0.8RX			25.0			65.0			2.05°	25.93	26.80	27.74	28.75	-
XM2R-020N30-0.8RX			30.0			70.0			1.74°	31.09	32.15	33.28	-	-
XM2R-025N10-0.1RX	2.5	0.1	10.0	2.0	2.4	50.0	4.0	4.0	3.36°	10.41	10.77	11.16	11.57	12.50
XM2R-025N20-0.1RX			20.0			60.0			1.89°	20.75	21.47	22.24	-	-
XM2R-025N30-0.1RX			30.0			70.0			1.32°	31.09	32.17	-	-	-
XM2R-025N10-0.2RX		0.2	10.0			50.0			3.39°	10.41	10.77	11.15	11.56	12.48
XM2R-025N20-0.2RX			20.0			60.0			1.9°	20.75	21.46	22.23	-	-
XM2R-025N30-0.2RX			30.0			70.0			1.32°	31.08	32.16	-	-	-

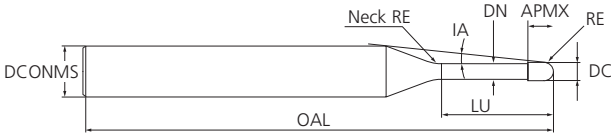
Series XM2R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM2R-025N10-0.3RX	2.5	0.3	10.0	2.0	2.40	50.0	4.0	4.0	3.42°	10.41	10.76	11.14	11.54	12.46
XM2R-025N20-0.3RX			20.0			60.0			1.91°	20.74	21.46	22.22	-	-
XM2R-025N30-0.3RX			30.0			70.0			1.32°	31.08	32.15	-	-	-
XM2R-025N10-0.5RX		0.5	10.0			50.0			3.47°	10.40	10.75	11.12	11.51	12.41
XM2R-025N20-0.5RX			20.0			60.0			1.92°	20.74	21.44	22.20	-	-
XM2R-025N30-0.5RX			30.0			70.0			1.33°	31.07	32.14	-	-	-
XM2R-030N6-0.1RX	3.0	0.1	6.0	2.4	2.88	50.0	6.0	4.0	7.4°	6.25	6.47	6.70	6.95	7.50
XM2R-030N8-0.1RX			8.0			55.0			6.32°	8.32	8.61	8.92	9.25	9.99
XM2R-030N12-0.1RX			12.0			60.0			4.89°	12.46	12.89	13.35	13.85	14.96
XM2R-030N16-0.1RX			16.0						3.99°	16.59	17.17	17.78	18.45	19.94
XM2R-030N18-0.1RX			18.0			65.0			3.65°	18.66	19.31	20.00	20.75	22.42
XM2R-030N20-0.1RX			20.0						3.36°	20.73	21.45	22.22	23.05	24.91
XM2R-030N30-0.1RX			30.0			75.0			2.42°	31.06	32.14	33.30	34.55	-
XM2R-030N35-0.1RX			35.0			80.0			2.12°	36.23	37.49	38.84	40.29	-
XM2R-030N6-0.2RX		0.2	6.0			50.0			7.46°	6.25	6.46	6.69	6.93	7.48
XM2R-030N8-0.2RX			8.0			55.0			6.36°	8.32	8.60	8.91	9.23	9.97
XM2R-030N12-0.2RX			12.0			60.0			4.92°	12.45	12.88	13.34	13.83	14.94
XM2R-030N16-0.2RX			16.0						4°	16.59	17.16	17.77	18.43	19.91
XM2R-030N18-0.2RX			18.0			65.0			3.66°	18.66	19.30	19.99	20.73	22.40
XM2R-030N20-0.2RX			20.0						3.38°	20.72	21.44	22.21	23.03	24.88
XM2R-030N30-0.2RX			30.0			75.0			2.43°	31.06	32.14	33.29	34.53	-
XM2R-030N35-0.2RX			35.0			80.0			2.13°	36.23	37.48	38.83	40.28	-
XM2R-030N6-0.3RX		0.3	6.0			50.0			7.53°	6.24	6.46	6.68	6.92	7.46
XM2R-030N8-0.3RX			8.0			55.0			6.41°	8.32	8.60	8.90	9.22	9.94
XM2R-030N12-0.3RX			12.0			60.0			4.94°	12.45	12.87	13.33	13.82	14.91
XM2R-030N16-0.3RX			16.0						4.02°	16.59	17.15	17.76	18.42	19.89
XM2R-030N18-0.3RX			18.0			65.0			3.68°	18.65	19.29	19.98	20.72	22.37
XM2R-030N20-0.3RX			20.0						3.39°	20.72	21.43	22.20	23.02	24.86
XM2R-030N30-0.3RX			30.0			75.0			2.43°	31.06	32.13	33.28	34.52	-
XM2R-030N35-0.3RX			35.0			80.0			2.13°	36.23	37.48	38.82	40.26	-
XM2R-030N8-0.5RX		0.5	8.0			55.0			6.51°	8.31	8.58	8.87	9.19	9.89
XM2R-030N12-0.5RX			12.0			60.0			5°	12.44	12.86	13.31	13.79	14.87
XM2R-030N16-0.5RX			16.0						4.06°	16.58	17.14	17.74	18.39	19.84
XM2R-030N18-0.5RX			18.0			65.0			3.71°	18.65	19.28	19.96	20.69	22.33
XM2R-030N20-0.5RX			20.0						3.42°	20.71	21.42	22.17	22.99	24.81
XM2R-030N30-0.5RX			30.0			75.0			2.45°	31.05	32.12	33.26	34.49	-
XM2R-030N35-0.5RX			35.0			80.0			2.14°	36.22	37.46	38.80	40.23	-
XM2R-030N8-1.0RX		1.0	8.0			55.0			6.76°	8.29	8.55	8.82	9.11	9.77
XM2R-030N12-1.0RX			12.0			60.0			5.15°	12.43	12.83	13.25	13.71	14.74
XM2R-030N16-1.0RX			16.0						4.16°	16.56	17.10	17.69	18.31	19.72
XM2R-030N18-1.0RX			18.0			65.0			3.79°	18.63	19.24	19.90	20.61	22.20
XM2R-030N20-1.0RX			20.0						3.49°	20.70	21.38	22.12	22.91	24.69
XM2R-030N30-1.0RX			30.0			75.0			2.48°	31.03	32.08	33.20	34.41	-
XM2R-030N35-1.0RX			35.0			80.0			2.17°	36.20	37.43	38.74	40.16	-
XM2R-040N8-0.1RX	4.0	0.1	8.0	3.2	3.86	55.0	6.0	4.0	4.9°	8.31	8.59	8.90	9.23	9.97
XM2R-040N12-0.1RX			12.0			60.0			3.66°	12.44	12.87	13.33	13.83	14.94
XM2R-040N16-0.1RX			16.0						2.91°	16.57	17.15	17.76	18.43	-
XM2R-040N20-0.1RX			20.0			65.0			2.42°	20.71	21.43	22.20	23.03	-
XM2R-040N30-0.1RX			30.0			75.0			1.71°	31.05	32.12	33.28	-	-
XM2R-040N35-0.1RX			35.0			80.0			1.49°	36.21	37.47	-	-	-
XM2R-040N45-0.1RX			45.0			90.0			1.18°	46.55	48.17	-	-	-
XM2R-040N8-0.2RX		0.2	8.0			55.0			4.94°	8.30	8.58	8.89	9.21	9.94
XM2R-040N12-0.2RX			12.0			60.0			3.68°	12.44	12.86	13.32	13.81	14.92
XM2R-040N16-0.2RX			16.0						2.93°	16.57	17.14	17.75	18.41	-
XM2R-040N20-0.2RX			20.0			65.0			2.43°	20.71	21.42	22.19	23.01	-
XM2R-040N30-0.2RX			30.0			75.0			1.71°	31.04	32.12	33.27	-	-

Series XM2R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM2R-040N35-0.2RX	4.0	0.2	35.0	3.2	3.86	80.0	6.0	4.0	1.49°	36.21	37.47	-	-	-
XM2R-040N45-0.2RX			45.0			90.0			1.18°	46.55	48.16	-	-	-
XM2R-040N8-0.3RX		0.3	8.0			55.0			4.99°	8.30	8.58	8.88	9.20	9.92
XM2R-040N12-0.3RX			12.0			60.0			3.7°	12.43	12.86	13.31	13.80	14.89
XM2R-040N16-0.3RX			16.0						2.94°	16.57	17.13	17.74	18.40	-
XM2R-040N20-0.3RX			20.0			65.0			2.44°	20.70	21.41	22.18	23.00	-
XM2R-040N30-0.3RX			30.0			75.0			1.72°	31.04	32.11	33.26	-	-
XM2R-040N35-0.3RX			35.0			80.0			1.49°	36.21	37.46	-	-	-
XM2R-040N45-0.3RX			45.0			90.0			1.19°	46.54	48.16	-	-	-
XM2R-040N12-0.5RX		0.5	12.0			60.0			3.75°	12.43	12.84	13.29	13.77	14.84
XM2R-040N16-0.5RX			16.0						2.97°	16.56	17.12	17.72	18.37	-
XM2R-040N20-0.5RX			20.0			65.0			2.47°	20.70	21.40	22.15	22.97	-
XM2R-040N30-0.5RX			30.0			75.0			1.73°	31.03	32.10	33.24	-	-
XM2R-040N35-0.5RX			35.0			80.0			1.5°	36.20	37.44	-	-	-
XM2R-040N45-0.5RX			45.0			90.0			1.19°	46.54	48.14	-	-	-
XM2R-040N12-1.0RX		1.0	12.0			60.0			3.88°	12.41	12.81	13.23	13.69	14.72
XM2R-040N16-1.0RX			16.0						3.05°	16.54	17.09	17.67	18.29	19.70
XM2R-040N20-1.0RX			20.0			65.0			2.52°	20.68	21.36	22.10	22.89	-
XM2R-040N30-1.0RX			30.0			75.0			1.75°	31.02	32.06	33.18	-	-
XM2R-040N35-1.0RX			35.0			80.0			1.52°	36.18	37.41	38.73	-	-
XM2R-040N45-1.0RX			45.0			90.0			1.2°	46.52	48.11	-	-	-
XM2R-050N20-0.1RX	5.0	0.1	20.0	4.0	4.85	65.0	6.0	4.0	1.32°	20.7	21.42	-	-	-
XM2R-050N40-0.1RX			40.0			85.0			0.69°	41.38	-	-	-	-
XM2R-050N20-0.2RX		0.2	20.0			65.0			1.32°	20.7	21.41	-	-	-
XM2R-050N40-0.2RX			40.0			85.0			0.69°	41.37	-	-	-	-
XM2R-050N20-0.3RX		0.3	20.0			65.0			1.33°	20.69	21.41	-	-	-
XM2R-050N40-0.3RX			40.0			85.0			0.69°	41.37	-	-	-	-
XM2R-050N20-0.5RX		0.5	20.0			65.0			1.34°	20.69	21.39	-	-	-
XM2R-050N40-0.5RX			40.0			85.0			0.7°	41.36	-	-	-	-
XM2R-050N20-1.0RX		1.0	20.0			65.0			1.38°	20.67	21.36	-	-	-
XM2R-050N40-1.0RX			40.0			85.0			0.71°	41.35	-	-	-	-
XM2R-060N12-0.1RX	6.0	0.1	12.0	4.8	5.85	50.0	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	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM2B-001N0.2X	0.1	0.05	0.2	0.08	0.08	50.0	4.0	1.0	14.66°	0.20	0.21	0.22	0.24	0.26
XM2B-001N0.3X			0.3						14.48°	0.31	0.33	0.34	0.36	0.39
XM2B-001N0.5X			0.5						14.12°	0.52	0.55	0.57	0.59	0.64
XM2B-002N0.5X	0.2	0.1	0.5	0.16	0.17	50.0	4.0	1.0	14.21°	0.51	0.53	0.55	0.57	0.61
XM2B-002N0.75X			0.75						13.77°	0.78	0.80	0.83	0.86	0.92
XM2B-002N1X			1.0						13.36°	1.04	1.07	1.11	1.15	1.23
XM2B-002N1.25X			1.25						12.97°	1.30	1.34	1.39	1.43	1.54
XM2B-002N1.5X			1.5						12.6°	1.56	1.61	1.66	1.72	1.85
XM2B-002N2X			2.0						11.92°	2.07	2.14	2.22	2.30	2.48
XM2B-002N2.5X			2.5						11.31°	2.59	2.68	2.77	2.87	3.10
XM2B-002N3X			3.0						10.76°	3.11	3.21	3.33	3.45	3.72
XM2B-003N0.5X	0.3	0.15	0.5	0.24	0.27	50.0	4.0	2.0	14.17°	0.52	0.55	0.57	0.60	0.66
XM2B-003N0.75X			0.75						13.72°	0.79	0.83	0.87	0.91	0.98
XM2B-003N1X			1.0						13.3°	1.05	1.11	1.16	1.20	1.29
XM2B-003N1.25X			1.25						12.9°	1.32	1.38	1.44	1.50	1.61
XM2B-003N1.5X			1.5						12.53°	1.58	1.66	1.72	1.78	1.92
XM2B-003N2X			2.0						11.84°	2.11	2.20	2.28	2.36	2.54
XM2B-003N2.5X			2.5						11.22°	2.63	2.74	2.83	2.93	3.16
XM2B-003N3X			3.0						10.66°	3.15	3.27	3.39	3.51	3.78
XM2B-004N0.75X	0.4	0.2	0.75	0.32	0.37	50.0	4.0	2.0	13.78°	0.78	0.82	0.86	0.90	0.97
XM2B-004N1X			1.0						13.34°	1.05	1.10	1.15	1.19	1.28
XM2B-004N1.5X			1.5						12.55°	1.58	1.65	1.72	1.78	1.90
XM2B-004N2X			2.0						11.84°	2.11	2.19	2.27	2.35	2.53
XM2B-004N2.5X			2.5						11.2°	2.63	2.73	2.83	2.93	3.15
XM2B-004N3X			3.0						10.63°	3.15	3.27	3.38	3.50	3.77
XM2B-004N3.5X			3.5						10.12°	3.67	3.80	3.94	4.08	4.39
XM2B-004N4X			4.0						9.65°	4.19	4.34	4.49	4.65	5.01
XM2B-004N4.5X			4.5						9.22°	4.71	4.87	5.04	5.23	5.63
XM2B-005N1X	0.5	0.25	1.0	0.4	0.47	50.0	4.0	2.0	13.39°	1.05	1.09	1.14	1.19	1.27
XM2B-005N1.5X			1.5						12.56°	1.58	1.65	1.71	1.77	1.89
XM2B-005N2X			2.0						11.83°	2.10	2.19	2.27	2.34	2.51
XM2B-005N2.5X			2.5						11.18°	2.63	2.73	2.82	2.92	3.14
XM2B-005N3X			3.0						10.6°	3.15	3.27	3.38	3.49	3.76
XM2B-005N4X			4.0						9.6°	4.19	4.34	4.48	4.64	5.00
XM2B-005N5X			5.0						8.77°	5.23	5.41	5.59	5.79	6.24
XM2B-005N5.5X			5.5						8.4°	5.75	5.94	6.15	6.37	6.86
XM2B-005N6X			6.0						8.07°	6.27	6.48	6.70	6.94	7.49
XM2B-005N8X			8.0						6.96°	8.33	8.62	8.92	9.24	9.97
XM2B-006N1X	0.6	0.3	1.0	0.48	0.57	50.0	4.0	4.0	13.15°	1.07	1.14	1.20	1.27	1.41
XM2B-006N2X			2.0						11.61°	2.15	2.28	2.39	2.50	2.70
XM2B-006N2.5X			2.5						10.96°	2.68	2.84	2.97	3.09	3.32
XM2B-006N3X			3.0						10.38°	3.22	3.39	3.54	3.67	3.95
XM2B-006N3.5X			3.5						9.86°	3.75	3.94	4.10	4.25	4.57
XM2B-006N4X			4.0						9.39°	4.28	4.48	4.66	4.82	5.19
XM2B-006N4.5X			4.5						8.97°	4.81	5.03	5.21	5.40	5.81

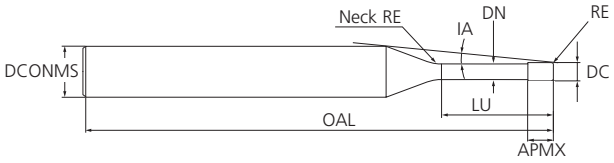
Series XM2B

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM2B-006N5X	0.6	0.3	5.0	0.48	0.57	50.0	4.0	4.0	8.57°	5.33	5.57	5.77	5.97	6.43
XM2B-006N5.5X			5.5						8.22°	5.86	6.11	6.32	6.55	7.05
XM2B-006N6X			6.0						7.89°	6.38	6.64	6.87	7.12	7.67
XM2B-006N7X			7.0						7.3°	7.43	7.71	7.98	8.27	8.92
XM2B-006N8X			8.0						6.79°	8.48	8.78	9.09	9.42	10.16
XM2B-006N9X			9.0						6.35°	9.52	9.85	10.20	10.57	11.40
XM2B-006N10X			10.0						5.97°	10.56	10.92	11.31	11.72	12.65
XM2B-006N12X			12.0						5.32°	12.63	13.06	13.52	14.02	15.13
XM2B-007N2X	0.7	0.35	2.0	0.56	0.67	50.0	4.0	4.0	11.6°	2.14	2.27	2.39	2.49	2.69
XM2B-007N4X			4.0						9.33°	4.27	4.48	4.65	4.81	5.18
XM2B-007N6X			6.0						7.81°	6.38	6.64	6.87	7.11	7.66
XM2B-007N8X			8.0						6.71°	8.47	8.78	9.09	9.41	10.15
XM2B-008N2X	0.8	0.4	2.0	0.64	0.76	50.0	4.0	4.0	11.64°	2.12	2.24	2.35	2.45	2.63
XM2B-008N4X			4.0						9.3°	4.25	4.44	4.61	4.77	5.12
XM2B-008N5X			5.0						8.45°	5.30	5.53	5.72	5.92	6.36
XM2B-008N6X			6.0						7.74°	6.35	6.60	6.83	7.07	7.61
XM2B-008N8X			8.0						6.63°	8.44	8.74	9.04	9.37	10.09
XM2B-008N10X			10.0						5.8°	10.52	10.88	11.26	11.67	12.58
XM2B-009N2X	0.9	0.45	2.0	0.72	0.86	50.0	4.0	4.0	11.63°	2.12	2.23	2.34	2.44	2.62
XM2B-009N4X			4.0						9.24°	4.25	4.44	4.60	4.76	5.11
XM2B-009N6X			6.0						7.66°	6.35	6.60	6.82	7.06	7.60
XM2B-009N8X			8.0						6.54°	8.44	8.74	9.04	9.36	10.08
XM2B-010N2X	1.0	0.5	2.0	0.8	0.96	50.0	4.0	4.0	11.62°	2.12	2.23	2.33	2.43	2.61
XM2B-010N3X			3.0						10.25°	3.18	3.34	3.48	3.60	3.85
XM2B-010N4X			4.0						9.17°	4.24	4.43	4.60	4.75	5.10
XM2B-010N5X			5.0						8.29°	5.30	5.52	5.71	5.90	6.34
XM2B-010N6X			6.0						7.57°	6.35	6.59	6.81	7.05	7.58
XM2B-010N7X			7.0						6.96°	7.39	7.66	7.92	8.20	8.83
XM2B-010N8X			8.0						6.44°	8.44	8.73	9.03	9.35	10.07
XM2B-010N9X			9.0						5.99°	9.48	9.80	10.14	10.50	11.31
XM2B-010N10X			10.0						5.6°	10.52	10.87	11.25	11.65	12.56
XM2B-010N12X			12.0			55.0			4.96°	12.59	13.01	13.46	13.95	15.04
XM2B-010N13X			13.0						4.69°	13.62	14.08	14.57	15.10	16.29
XM2B-010N14X			14.0						4.45°	14.66	15.15	15.68	16.25	17.53
XM2B-010N16X			16.0						4.03°	16.73	17.29	17.90	18.55	20.01
XM2B-010N18X			18.0			60.0			3.69°	18.79	19.43	20.11	20.85	22.50
XM2B-010N20X			20.0						3.4°	20.86	21.57	22.33	23.15	24.99
XM2B-011N2X	1.1	0.55	2.0	0.88	1.06	50.0	4.0	4.0	11.61°	2.11	2.22	2.32	2.42	2.60
XM2B-011N4X			4.0						9.09°	4.24	4.43	4.59	4.74	5.08
XM2B-011N6X			6.0						7.47°	6.34	6.59	6.81	7.04	7.57
XM2B-011N8X			8.0						6.34°	8.43	8.73	9.03	9.34	10.06
XM2B-011N10X			10.0						5.5°	10.51	10.87	11.24	11.64	12.54
XM2B-012N4X	1.2	0.6	4.0	0.96	1.15	50.0	4.0	4.0	9.05°	4.22	4.40	4.55	4.70	5.04
XM2B-012N8X			8.0						6.25°	8.41	8.70	8.99	9.30	10.01
XM2B-012N10X			10.0						5.41°	10.49	10.84	11.21	11.60	12.50
XM2B-012N12X			12.0			55.0			4.77°	12.56	12.97	13.42	13.90	14.98
XM2B-014N8X	1.4	0.7	8.0	1.12	1.34	50.0	4.0	4.0	6.04°	8.38	8.66	8.95	9.26	9.96
XM2B-014N12X			12.0			55.0			4.56°	12.53	12.94	13.38	13.86	14.93
XM2B-014N16X			16.0						3.67°	16.66	17.22	17.82	18.46	19.90
XM2B-015N4X	1.5	0.75	4.0	1.2	1.44	50.0	4.0	4.0	8.82°	4.20	4.36	4.51	4.65	4.97
XM2B-015N6X			6.0						7.08°	6.29	6.52	6.73	6.95	7.46
XM2B-015N8X			8.0						5.92°	8.38	8.66	8.95	9.25	9.94
XM2B-015N10X			10.0						5.08°	10.46	10.80	11.16	11.55	12.43
XM2B-015N12X			12.0			55.0			4.45°	12.53	12.94	13.38	13.85	14.92
XM2B-015N14X			14.0						3.96°	14.60	15.08	15.60	16.15	17.40
XM2B-015N16X			16.0						3.57°	16.66	17.22	17.81	18.45	19.89
XM2B-015N18X			18.0			60.0			3.25°	18.73	19.36	20.03	20.75	22.38
XM2B-015N20X			20.0						2.98°	20.80	21.50	22.25	23.05	-

Series XM2B

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM2B-016N8X	1.6	0.8	8.0	1.28	1.54	50.0	4.0	4.0	5.8°	8.38	8.66	8.94	9.25	9.93
XM2B-016N12X			12.0			55.0			4.34°	12.53	12.94	13.37	13.85	14.90
XM2B-016N16X			16.0						3.47°	16.66	17.21	17.81	18.44	19.88
XM2B-016N20X			20.0			60.0			2.89°	20.80	21.49	22.24	23.04	-
XM2B-018N8X	1.8	0.90	8.0	1.44	1.73	50.0	4.0	4.0	5.55°	8.36	8.63	8.91	9.21	9.88
XM2B-018N12X			8.0			55.0			4.11°	12.50	12.91	13.34	13.81	14.85
XM2B-018N16X			16.0						3.26°	16.64	17.19	17.77	18.41	19.83
XM2B-018N20X			20.0			60.0			2.7°	20.77	21.46	22.21	23.01	-
XM2B-020N3X	2.0	1.0	3.0	1.6	1.92	50.0	4.0	4.0	9.72°	3.11	3.22	3.32	3.42	3.62
XM2B-020N4X			4.0						8.32°	4.16	4.31	4.44	4.57	4.86
XM2B-020N6X			6.0						6.46°	6.26	6.46	6.66	6.87	7.35
XM2B-020N8X			8.0						5.27°	8.34	8.60	8.88	9.17	9.84
XM2B-020N10X			10.0						4.46°	10.41	10.74	11.09	11.47	12.32
XM2B-020N12X			12.0			55.0			3.86°	12.48	12.88	13.31	13.77	14.81
XM2B-020N13X			13.0						3.62°	13.51	13.95	14.42	14.92	16.05
XM2B-020N14X			14.0						3.4°	14.55	15.02	15.53	16.07	17.29
XM2B-020N16X			16.0						3.04°	16.62	17.16	17.74	18.37	19.78
XM2B-020N18X			18.0			60.0			2.75°	18.68	19.30	19.96	20.67	-
XM2B-020N20X			20.0						2.51°	20.75	21.44	22.18	22.97	-
XM2B-020N22X			22.0						2.31°	22.82	23.58	24.39	25.27	-
XM2B-020N25X			25.0			65.0			2.06°	25.92	26.79	27.72	28.72	-
XM2B-020N30X			30.0			70.0			1.75°	31.09	32.14	33.26	-	-
XM2B-020N35X			35.0			75.0			1.52°	36.26	37.48	38.80	-	-
XM2B-020N40X			40.0			80.0			1.34°	41.42	42.83	-	-	-
XM2B-025N6X	2.5	1.25	6.0	2.0	2.4	50.0	4.0	4.0	5.62°	6.22	6.41	6.60	6.80	7.25
XM2B-025N10X			10.0						3.69°	10.37	10.69	11.03	11.40	12.23
XM2B-025N15X			15.0			55.0			2.59°	15.54	16.04	16.58	17.15	-
XM2B-025N20X			20.0			60.0			1.99°	20.71	21.39	22.12	-	-
XM2B-025N25X			25.0			65.0			1.62°	25.88	26.74	27.66	-	-
XM2B-025N30X			30.0			70.0			1.36°	31.05	32.09	-	-	-
XM2B-030N8X	3.0	1.5	8.0	2.4	2.88	55.0	6.0	4.0	7.04°	8.27	8.51	8.77	9.04	9.65
XM2B-030N10X			10.0						6.05°	10.34	10.65	10.98	11.34	12.14
XM2B-030N13X			13.0			60.0			5°	13.44	13.86	14.31	14.79	15.87
XM2B-030N16X			16.0						4.26°	16.55	17.07	17.63	18.24	19.60
XM2B-030N20X			20.0			65.0			3.56°	20.68	21.35	22.07	22.84	24.57
XM2B-030N25X			25.0			70.0			2.95°	25.85	26.70	27.61	28.59	-
XM2B-030N30X			30.0			75.0			2.52°	31.02	32.05	33.15	34.34	-
XM2B-030N35X			35.0			80.0			2.2°	36.19	37.39	38.69	40.08	-
XM2B-035N15X	3.5	1.75	15.0	2.8	3.36	60.0	6.0	4.0	3.99°	15.49	15.96	16.48	17.03	18.27
XM2B-035N25X			25.0			70.0			2.56°	25.82	26.66	27.56	28.53	-
XM2B-035N35X			35.0			80.0			1.89°	36.16	37.36	38.64	-	-
XM2B-035N45X			45.0			90.0			1.5°	46.50	48.05	-	-	-
XM2B-040N10X	4.0	2.0	10.0	3.2	3.86	55.0	6.0	4.0	4.86°	10.31	10.60	10.91	11.24	11.99
XM2B-040N13X			13.0			60.0			3.88°	13.41	13.81	14.23	14.69	15.72
XM2B-040N16X			16.0						3.23°	16.51	17.02	17.56	18.14	19.45
XM2B-040N20X			20.0			65.0			2.63°	20.65	21.30	21.99	22.74	-
XM2B-040N25X			25.0			70.0			2.14°	25.81	26.64	27.53	28.49	-
XM2B-040N30X			30.0			75.0			1.81°	30.98	31.99	33.08	-	-
XM2B-040N35X	4.0	2.0	35.0	3.2	3.86	80.0	6.0	4.0	1.56°	36.15	37.34	38.62	-	-
XM2B-040N40X			40.0						1.38°	41.32	42.69	-	-	-
XM2B-040N45X			45.0			90.0			1.23°	46.49	48.04	-	-	-
XM2B-040N50X			50.0			100.0			1.11°	51.66	53.39	-	-	-
XM2B-050N20X	5.0	2.5	20.0	4.0	4.85	65.0	6.0	4.0	1.48°	20.62	21.25	-	-	-
XM2B-050N25X			25.0			70.0			1.18°	25.79	26.60	-	-	-
XM2B-050N30X			30.0			75.0			0.98°	30.96	-	-	-	-
XM2B-050N40X			40.0			80.0			0.73°	41.29	-	-	-	-
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	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM4R-010N4-0.05RX	1.0	0.05	4.0	0.8	0.96	50.0	4.0	4.0	8.75°	4.27	4.47	4.65	4.82	5.21
XM4R-010N6-0.05RX			6.0						7.28°	6.37	6.63	6.86	7.12	7.69
XM4R-010N8-0.05RX			8.0						6.23°	8.45	8.76	9.08	9.42	10.18
XM4R-010N10-0.05RX			10.0						5.45°	10.53	10.90	11.30	11.72	12.67
XM4R-010N12-0.05RX			12.0			60.0			4.84°	12.61	13.04	13.51	14.02	15.15
XM4R-010N16-0.05RX			16.0						3.95°	16.74	17.32	17.95	18.62	20.12
XM4R-010N20-0.05RX			20.0						3.34°	20.88	21.60	22.38	23.22	25.10
XM4R-010N4-0.1RX		0.1	4.0			50.0			8.8°	4.26	4.47	4.64	4.81	5.19
XM4R-010N6-0.1RX			6.0						7.31°	6.37	6.62	6.86	7.11	7.68
XM4R-010N8-0.1RX			8.0						6.25°	8.45	8.76	9.07	9.41	10.17
XM4R-010N10-0.1RX			10.0						5.46°	10.53	10.90	11.29	11.71	12.65
XM4R-010N12-0.1RX			12.0			60.0			4.85°	12.60	13.04	13.51	14.01	15.14
XM4R-010N16-0.1RX			16.0						3.96°	16.74	17.32	17.94	18.61	20.11
XM4R-010N20-0.1RX			20.0						3.35°	20.87	21.60	22.37	23.21	25.08
XM4R-015N4-0.05RX	1.5	0.05	4.0	1.2	1.44	50.0	4.0	4.0	8.12°	4.23	4.42	4.59	4.76	5.14
XM4R-015N8-0.05RX			8.0						5.6°	8.41	8.71	9.02	9.36	10.11
XM4R-015N12-0.05RX			12.0			60.0			4.27°	12.55	12.99	13.46	13.96	15.09
XM4R-015N15-0.05RX			15.0						3.62°	15.65	16.20	16.78	17.41	18.82
XM4R-015N20-0.05RX			20.0						2.89°	20.82	21.55	22.32	23.16	-
XM4R-015N4-0.1RX		0.1	4.0			50.0			8.17°	4.23	4.42	4.58	4.75	5.13
XM4R-015N8-0.1RX			8.0						5.62°	8.41	8.71	9.02	9.35	10.10
XM4R-015N12-0.1RX			12.0			60.0			4.28°	12.55	12.98	13.45	13.95	15.07
XM4R-015N15-0.1RX			15.0						3.63°	15.65	16.19	16.77	17.40	18.80
XM4R-015N20-0.1RX			20.0						2.9°	20.82	21.54	22.32	23.15	-
XM4R-020N4-0.05RX	2.0	0.05	4.0	1.6	1.92	50.0	4.0	4.0	8.75°	4.27	4.47	4.65	4.82	5.21
XM4R-020N6-0.05RX			6.0						7.28°	6.37	6.63	6.86	7.12	7.69
XM4R-020N8-0.05RX			8.0						6.23°	8.45	8.76	9.08	9.42	10.18
XM4R-020N12-0.05RX			12.0			60.0			5.45°	10.53	10.90	11.30	11.72	12.67
XM4R-020N16-0.05RX			16.0						4.84°	12.61	13.04	13.51	14.02	15.15
XM4R-020N20-0.05RX			20.0						3.95°	16.74	17.32	17.95	18.62	20.12
XM4R-020N4-0.1RX		0.1	4.0			50.0			3.34°	20.88	21.60	22.38	23.22	25.10
XM4R-020N6-0.1RX			6.0						8.8°	4.26	4.47	4.64	4.81	5.19
XM4R-020N8-0.1RX			8.0						7.31°	6.37	6.62	6.86	7.11	7.68
XM4R-020N12-0.1RX			12.0			60.0			6.25°	8.45	8.76	9.07	9.41	10.17
XM4R-020N16-0.1RX			16.0						5.46°	10.53	10.90	11.29	11.71	12.65
XM4R-020N20-0.1RX			20.0						4.85°	12.60	13.04	13.51	14.01	15.14
XM4R-020N4-0.2RX		0.2	4.0			50.0			3.96°	16.74	17.32	17.94	18.61	20.11
XM4R-020N6-0.2RX			6.0						3.35°	20.87	21.60	22.37	23.21	25.08
XM4R-020N8-0.2RX			8.0						8.12°	4.23	4.42	4.59	4.76	5.14
XM4R-020N12-0.2RX			12.0			60.0			5.6°	8.41	8.71	9.02	9.36	10.11
XM4R-020N16-0.2RX			16.0						4.27°	12.55	12.99	13.46	13.96	15.09
XM4R-020N20-0.2RX			20.0						3.62°	15.65	16.20	16.78	17.41	18.82
XM4R-020N25-0.2RX			25.0			70.0			2.89°	20.82	21.55	22.32	23.16	-
XM4R-020N30-0.2RX			30.0						8.17°	4.23	4.42	4.58	4.75	5.13
XM4R-020N4-0.3RX		0.3	4.0			50.0			5.62°	8.41	8.71	9.02	9.35	10.10
XM4R-020N8-0.3RX			8.0						4.28°	12.55	12.98	13.45	13.95	15.07

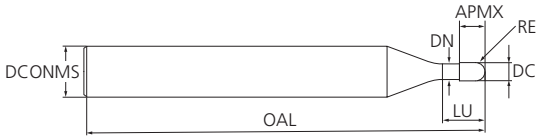
Series XM4R

Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM4R-020N12-0.3RX	2.0	0.3	12.0	1.6	1.92	60.0	4.0	4.0	3.63°	15.65	16.19	16.77	17.40	18.80
XM4R-020N16-0.3RX			16.0						2.9°	20.82	21.54	22.32	23.15	-
XM4R-020N20-0.3RX			20.0						2.44°	20.77	21.49	22.25	23.08	-
XM4R-020N4-0.5RX		0.5	4.0			50.0			7.76°	4.19	4.35	4.50	4.65	4.98
XM4R-020N6-0.5RX			6.0						6.11°	6.28	6.50	6.71	6.95	7.47
XM4R-020N8-0.5RX			8.0						5.04°	8.36	8.64	8.93	9.25	9.96
XM4R-020N12-0.5RX			12.0						3.73°	12.50	12.92	13.36	13.85	14.93
XM4R-020N16-0.5RX			16.0			60.0			2.96°	16.63	17.19	17.80	18.45	-
XM4R-020N20-0.5RX			20.0						2.46°	20.77	21.47	22.23	23.05	-
XM4R-020N25-0.5RX			25.0						2.03°	25.94	26.82	27.77	28.79	-
XM4R-020N30-0.5RX			30.0			50.0			1.72°	31.10	32.17	33.31	-	-
XM4R-025N8-0.1RX	2.50	0.1	8.0	2.0	2.4	50.0	4.0	4.0	3.98°	8.34	8.63	8.94	9.27	10.02
XM4R-025N16-0.1RX			16.0						2.29°	16.62	17.19	17.81	18.47	-
XM4R-025N20-0.1RX			20.0						1.89°	20.75	21.47	22.24	-	-
XM4R-025N8-0.2RX		0.2	8.0			60.0			4.02°	8.34	8.63	8.93	9.26	9.99
XM4R-025N16-0.2RX			16.0						2.3°	16.61	17.18	17.80	18.46	-
XM4R-025N20-0.2RX			20.0						1.9°	20.75	21.46	22.23	-	-
XM4R-025N12-0.3RX		0.3	12.0			50.0			2.95°	12.47	12.90	13.35	13.84	-
XM4R-025N20-0.3RX			20.0						1.91°	20.74	21.46	22.22	-	-
XM4R-025N12-0.5RX		0.5	12.0			60.0			2.99°	12.47	12.88	13.33	13.81	-
XM4R-025N20-0.5RX			20.0						1.92°	20.74	21.44	22.20	-	-
XM4R-030N8-0.1RX	3.0	0.1	8.0	2.44	2.88	50.0	6.0	4.0	6.32°	8.32	8.61	8.92	9.25	9.99
XM4R-030N16-0.1RX			16.0						3.99°	16.59	17.17	17.78	18.45	19.94
XM4R-030N25-0.1RX			25.0						2.82°	25.90	26.79	27.76	28.80	-
XM4R-030N30-0.1RX			30.0			60.0			2.42°	31.06	32.14	33.30	34.55	-
XM4R-030N8-0.2RX		0.2	8.0			50.0			6.36°	8.32	8.60	8.91	9.23	9.97
XM4R-030N12-0.2RX			12.0			60.0			4.92°	12.45	12.88	13.34	13.83	14.94
XM4R-030N16-0.2RX			16.0						4°	16.59	17.16	17.77	18.43	19.91
XM4R-030N20-0.2RX			20.0			70.0			3.38°	20.72	21.44	22.21	23.03	24.88
XM4R-030N25-0.2RX			25.0						2.82°	25.89	26.79	27.75	28.78	-
XM4R-030N30-0.2RX			30.0			80.0			2.43°	31.06	32.14	33.29	34.53	-
XM4R-030N8-0.3RX		0.3	8.0			60.0			6.41°	8.32	8.60	8.90	9.22	9.94
XM4R-030N16-0.3RX			16.0						4.02°	16.59	17.15	17.76	18.42	19.89
XM4R-030N20-0.3RX			20.0			70.0			3.39°	20.72	21.43	22.20	23.02	24.86
XM4R-030N25-0.3RX			25.0						2.83°	25.89	26.78	27.74	28.77	-
XM4R-030N30-0.3RX			30.0			80.0			2.43°	31.06	32.13	33.28	34.52	-
XM4R-030N8-0.5RX		0.5	8.0			60.0			6.51°	8.31	8.58	8.87	9.19	9.89
XM4R-030N12-0.5RX			12.0						5°	12.44	12.86	13.31	13.79	14.87
XM4R-030N16-0.5RX			16.0						4.06°	16.58	17.14	17.74	18.39	19.84
XM4R-030N20-0.5RX			20.0			70.0			3.42°	20.71	21.42	22.17	22.99	24.81
XM4R-030N25-0.5RX			25.0						2.85°	25.88	26.77	27.72	28.74	-
XM4R-030N30-0.5RX			30.0			80.0			2.45°	31.05	32.12	33.26	34.49	-
XM4R-030N35-0.5RX			35.0						2.14°	36.22	37.46	38.80	40.23	-
XM4R-040N12-0.1RX	4.0	0.1	12.0	3.2	3.86	60.0	6.0	4.0	3.66°	12.44	12.87	13.33	13.83	14.94
XM4R-040N20-0.1RX			20.0						2.42°	20.71	21.43	22.20	23.03	-
XM4R-040N30-0.1RX			30.0			80.0			1.71°	31.05	32.12	33.28	-	-
XM4R-040N40-0.1RX			40.0						1.32°	41.38	42.82	-	-	-
XM4R-040N12-0.2RX		0.2	12.0			60.0			3.68°	12.44	12.86	13.32	13.81	14.92
XM4R-040N20-0.2RX			20.0						2.43°	20.71	21.42	22.19	23.01	-
XM4R-040N30-0.2RX			30.0			80.0			1.71°	31.04	32.12	33.27	-	-
XM4R-040N40-0.2RX			40.0						1.32°	41.38	42.81	-	-	-
XM4R-040N12-0.3RX		0.3	12.0			60.0			3.7°	12.43	12.86	13.31	13.80	14.89
XM4R-040N20-0.3RX			20.0						2.44°	20.70	21.41	22.18	23.00	-
XM4R-040N30-0.3RX			30.0			80.0			1.72°	31.04	32.11	33.26	-	-
XM4R-040N40-0.3RX			40.0						1.32°	41.38	42.81	-	-	-
XM4R-040N12-0.5RX		0.5	12.0			60.0			3.75°	12.43	12.84	13.29	13.77	14.84

Series XM4R

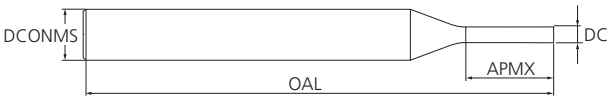
Tool No.	DC	RE	LU	APMX	DN	OAL	DCONMS	Neck RE	Interference Angle IA	Effective Under-Neck Length (LU) For Inclined Angle				
										0.5°	1°	1.5°	2°	3°
XM4R-040N20-0.5RX	4.0	0.5	20.0	3.2	3.86	60.0	6.0	4.0	2.47°	20.70	21.40	22.15	22.97	-
XM4R-040N30-0.5RX			30.0			80.0			1.73°	31.03	32.10	33.24	-	-
XM4R-040N40-0.5RX			40.0						1.33°	41.37	42.79	-	-	-
XM4R-050N20-0.1RX	5.0	0.1	20.0	4.0	4.85	70.0	6.0	4.0	1.32°	20.70	21.42	-	-	-
XM4R-050N40-0.1RX			40.0			90.0			0.69°	41.38	-	-	-	-
XM4R-050N20-0.2RX		0.2	20.0			70.0			1.32°	20.70	21.41	-	-	-
XM4R-050N40-0.2RX			40.0			90.0			0.69°	41.37	-	-	-	-
XM4R-050N20-0.3RX		0.3	20.0			70.0			1.33°	20.69	21.41	-	-	-
XM4R-050N40-0.3RX			40.0			90.0			0.69°	41.37	-	-	-	-
XM4R-050N20-0.5RX		0.5	20.0			70.0			1.34°	20.69	21.39	-	-	-
XM4R-050N40-0.5RX			40.0			90.0			0.7°	41.36	-	-	-	-
XM4R-050N20-1.0RX		1.0	20.0			70.0			1.38°	20.67	21.36	-	-	-
XM4R-050N40-1.0RX			40.0			90.0			0.71°	41.34	-	-	-	-
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 XM2BH



Tool No.	DC	DCONMS	DN	OAL	APMX	LU	RE	NOF
XM2BH-01061X	1.0	6.0	0.95	50.0	1.0	2.5	0.5	2
XM2BH-02061X	2.0		1.95		2.0	5.0	1.0	2
XM2BH-03061X	3.0		2.9		3.0	7.5	1.5	2
XM2BH-04061X	4.0		3.9		4.0	10.0	2.0	2
XM2BH-05061X	5.0		4.9		5.0	12.5	2.5	2
XM2BH-06061X	6.0		5.9		6.0	15.0	3.0	2

TuffCut® XM Series XM4SH



Tool Number	DC	DCONMS	OAL	APMX	NOF
XM4SH-01061X	1.0	6.0	60.0	3.5	4
XM4SH-02061X	2.0			7.0	4
XM4SH-025061X	2.5			8.0	4
XM4SH-03061X	3.0			10.0	4
XM4SH-04061X	4.0			12.0	4
XM4SH-05061X	5.0			15.0	4

TuffCut® XM Series XM2S High-Speed Milling

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

3xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm) 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	●	●	o	2D/3D HSC	0.085	0.45	95	0.0048	0.0072	0.0096	0.0120	0.0144
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.077	0.40	85	0.0042	0.0063	0.0084	0.0105	0.0126
Austentic Stainless Steels	M	●	X	o	2D/3D HSC	0.077	0.40	85	0.0042	0.0063	0.0084	0.0105	0.0126
High Temp Alloys	S	●	X	X	2D/3D HSC	0.034	0.20	50	0.0032	0.0048	0.0064	0.0080	0.0096
Titanium Alloys	S	●	X	X	2D/3D HSC	0.055	0.30	85	0.0037	0.0056	0.0074	0.0093	0.0111
Pre-Hardened Steel 35-45 HRC	H	o	●	●	2D/3D HSC	0.060	0.35	80	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.043	0.30	70	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC	H	X	●	●	2D/3D HSC	0.038	0.20	65	0.0038	0.0057	0.0076	0.0095	0.0114

5xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm) 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	●	●	o	2D/3D HSC	0.055	0.45	95	0.0046	0.0069	0.0092	0.0115	0.0138
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.050	0.40	85	0.0040	0.0060	0.0080	0.0100	0.0120
Austentic Stainless Steels	M	●	X	o	2D/3D HSC	0.050	0.40	85	0.0040	0.0060	0.0080	0.0100	0.0120
High Temp Alloys	S	●	X	X	2D/3D HSC	0.022	0.20	50	0.0030	0.0045	0.0060	0.0075	0.0090
Titanium Alloys	S	●	X	X	2D/3D HSC	0.036	0.30	85	0.0036	0.0054	0.0072	0.0090	0.0108
Pre-Hardened Steel 35-45 HRC	H	o	●	●	2D/3D HSC	0.039	0.35	80	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.028	0.30	70	0.0038	0.0057	0.0076	0.0095	0.0114
Hardened Steel 55-65 HRC	H	X	●	●	2D/3D HSC	0.025	0.20	65	0.0036	0.0054	0.0072	0.0090	0.0108

8xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm) 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	●	●	o	2D/3D HSC	0.040	0.35	85	0.0044	0.0066	0.0088	0.0110	0.0132
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.036	0.35	75	0.0038	0.0057	0.0076	0.0095	0.0114
Austentic Stainless Steels	M	●	X	o	2D/3D HSC	0.036	0.35	75	0.0038	0.0057	0.0076	0.0095	0.0114
High Temp Alloys	S	●	X	X	2D/3D HSC	0.016	0.15	45	0.0030	0.0045	0.0060	0.0075	0.0090
Titanium Alloys	S	●	X	X	2D/3D HSC	0.026	0.25	75	0.0034	0.0051	0.0068	0.0085	0.0102
Pre-Hardened Steel 35-45 HRC	H	o	●	●	2D/3D HSC	0.028	0.35	70	0.0038	0.0057	0.0076	0.0095	0.0114
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.020	0.30	60	0.0038	0.0057	0.0076	0.0095	0.0114
Hardened Steel 55-65 HRC	H	X	●	●	2D/3D HSC	0.018	0.15	60	0.0036	0.0054	0.0072	0.0090	0.0108

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											
	0.0161	0.0184	0.0230	0.0288	0.0345	0.0403	0.0460	0.0575	0.0690	0.09200	0.11500	0.13800
	0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.08000	0.10000	0.12000
	0.0140	0.0160	0.0200	0.0250	0.0300	0.0350	0.0400	0.0500	0.0600	0.0800	0.1000	0.1200
	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
	0.0140	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
	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											
	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											
	0.0154	0.0176	0.0220	0.0275	0.0330	0.0385	0.0440	0.0550	0.0660	0.08800	0.11000	0.13200
	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
	0.0119	0.0136	0.0170	0.0213	0.0255	0.0298	0.0340	0.0425	0.0510	0.0680	0.0850	0.1020
	0.0133	0.0152	0.0190	0.0238	0.0285	0.0333	0.0380	0.0475	0.0570	0.0760	0.0950	0.1140
	0.0133	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

- 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 Milling

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

10xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.026	0.35	85	0.0036	0.0054	0.0072	0.0090	0.0108
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.023	0.30	75	0.0032	0.0048	0.0064	0.0080	0.0096
Austentic Stainless Steels	M	●	X	o	2D/3D HSC	0.023	0.30	75	0.0032	0.0048	0.0064	0.0080	0.0096
High Temp Alloys	S	●	X	X	2D/3D HSC	0.010	0.15	45	0.0024	0.0036	0.0048	0.0060	0.0072
Titanium Alloys	S	●	X	X	2D/3D HSC	0.017	0.25	75	0.0028	0.0042	0.0056	0.0070	0.0084
Pre-Hardened Steel 35-45 HRC	H	o	●	●	2D/3D HSC	0.018	0.25	70	0.0032	0.0048	0.0064	0.0080	0.0096
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.013	0.25	60	0.0030	0.0045	0.0060	0.0075	0.0090
Hardened Steel 55-65 HRC	H	X	●	●	2D/3D HSC	0.011	0.15	60	0.0028	0.0042	0.0056	0.0070	0.0084

12xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.026	0.25	75	0.0032	0.0048	0.0064	0.0080	0.0096
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.023	0.25	65	0.0028	0.0042	0.0056	0.0070	0.0084
Austentic Stainless Steels	M	●	X	o	2D/3D HSC	0.023	0.25	65	0.0028	0.0042	0.0056	0.0070	0.0084
High Temp Alloys	S	●	X	X	2D/3D HSC	0.010	0.10	40	0.0020	0.0030	0.0040	0.0050	0.0060
Titanium Alloys	S	●	X	X	2D/3D HSC	0.017	0.20	65	0.0024	0.0036	0.0048	0.0060	0.0072
Pre-Hardened Steel 35-45 HRC	H	o	●	●	2D/3D HSC	0.018	0.20	60	0.0028	0.0042	0.0056	0.0070	0.0084
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.013	0.20	55	0.0026	0.0039	0.0052	0.0065	0.0078
Hardened Steel 55-65 HRC	H	X	●	●	2D/3D HSC	0.011	0.10	50	0.0024	0.0036	0.0048	0.0060	0.0072

15xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.015	0.25	75	0.0028	0.0042	0.0056	0.0070	0.0084
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.014	0.20	65	0.0026	0.0039	0.0052	0.0065	0.0078
Austentic Stainless Steels	M	●	X	o	2D/3D HSC	0.014	0.20	65	0.0026	0.0039	0.0052	0.0065	0.0078
High Temp Alloys	S	●	X	X	2D/3D HSC	0.006	0.10	40	0.0020	0.0030	0.0040	0.0050	0.0060
Titanium Alloys	S	●	X	X	2D/3D HSC	0.010	0.15	65	0.0022	0.0033	0.0044	0.0055	0.0066
Pre-Hardened Steel 35-45 HRC	H	o	●	●	2D/3D HSC	0.011	0.20	60	0.0026	0.0039	0.0052	0.0065	0.0078
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.008	0.15	55	0.0024	0.0036	0.0048	0.0060	0.0072
Hardened Steel 55-65 HRC	H	X	●	●	2D/3D HSC	0.007	0.10	50	0.0022	0.0033	0.0044	0.0055	0.0066

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											
	0.0126	0.0144	0.0180	0.0225	0.0270	0.0315	0.0360	0.0450	0.0540	0.07200	0.09000	0.10800
	0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.06400	0.08000	0.09600
	0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.0640	0.0800	0.0960
	0.0084	0.0096	0.0120	0.0150	0.0180	0.0210	0.0240	0.0300	0.0360	0.0480	0.0600	0.0720
	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
	0.0105	0.0120	0.0150	0.0188	0.0225	0.0263	0.0300	0.0375	0.0450	0.0600	0.0750	0.0900
	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											
	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											
	0.0112	0.0128	0.0160	0.0200	0.0240	0.0280	0.0320	0.0400	0.0480	0.06400	0.08000	0.09600
	0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.05600	0.07000	0.08400
	0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.0560	0.0700	0.0840
	0.0070	0.0080	0.0100	0.0125	0.0150	0.0175	0.0200	0.0250	0.0300	0.0400	0.0500	0.0600
	0.0084	0.0096	0.0120	0.0150	0.0180	0.0210	0.0240	0.0300	0.0360	0.0480	0.0600	0.0720
	0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.0560	0.0700	0.0840
	0.0091	0.0104	0.0130	0.0163	0.0195	0.0228	0.0260	0.0325	0.0390	0.0520	0.0650	0.0780
	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											
	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											
	0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.05600	0.07000	0.08400
	0.0091	0.0104	0.0130	0.0163	0.0195	0.0228	0.0260	0.0325	0.0390	0.05200	0.06500	0.07800
	0.0091	0.0104	0.0130	0.0163	0.0195	0.0228	0.0260	0.0325	0.0390	0.0520	0.0650	0.0780
	0.0070	0.0080	0.0100	0.0125	0.0150	0.0175	0.0200	0.0250	0.0300	0.0400	0.0500	0.0600
	0.0077	0.0088	0.0110	0.0138	0.0165	0.0193	0.0220	0.0275	0.0330	0.0440	0.0550	0.0660
	0.0091	0.0104	0.0130	0.0163	0.0195	0.0228	0.0260	0.0325	0.0390	0.0520	0.0650	0.0780
	0.0084	0.0096	0.0120	0.0150	0.0180	0.0210	0.0240	0.0300	0.0360	0.0480	0.0600	0.0720
	0.0077	0.0088	0.0110	0.0138	0.0165	0.0193	0.0220	0.0275	0.0330	0.0440	0.0550	0.0660

- 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 Milling

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

3xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.050	0.45	130	0.0048	0.0072	0.0096	0.0120	0.0144
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.045	0.40	110	0.0042	0.0063	0.0084	0.0105	0.0126
Austentic Stainless Steels	M	●	X	o	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	S	●	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	o	●	●	2D/3D HSC	0.040	0.35	105	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.033	0.30	95	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC	H	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: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.030	0.45	105	0.0048	0.0072	0.0096	0.0120	0.0144
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.027	0.40	90	0.0042	0.0063	0.0084	0.0105	0.0126
Austentic Stainless Steels	M	●	X	o	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	S	●	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	o	●	●	2D/3D HSC	0.024	0.35	85	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.020	0.30	80	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC	H	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: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.024	0.35	85	0.0048	0.0072	0.0096	0.0120	0.0144
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.022	0.30	75	0.0042	0.0063	0.0084	0.0105	0.0126
Austentic Stainless Steels	M	●	X	o	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	S	●	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	o	●	●	2D/3D HSC	0.019	0.25	70	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.016	0.25	65	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC	H	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

- 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 Milling

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

10xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.015	0.35	80	0.0048	0.0072	0.0096	0.0120	0.0144
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.014	0.30	70	0.0042	0.0063	0.0084	0.0105	0.0126
Austentic Stainless Steels	M	●	X	o	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	S	●	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	o	●	●	2D/3D HSC	0.012	0.25	65	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.010	0.25	60	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC	H	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: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.015	0.25	65	0.0040	0.0060	0.0080	0.0100	0.0120
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.014	0.25	55	0.0036	0.0054	0.0072	0.0090	0.0108
Austentic Stainless Steels	M	●	X	o	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	S	●	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	o	●	●	2D/3D HSC	0.012	0.20	55	0.0036	0.0054	0.0072	0.0090	0.0108
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.010	0.20	50	0.0034	0.0051	0.0068	0.0085	0.0102
Hardened Steel 55-65 HRC	H	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: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.009	0.25	65	0.0034	0.0051	0.0068	0.0085	0.0102
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.008	0.20	55	0.0030	0.0045	0.0060	0.0075	0.0090
Austentic Stainless Steels	M	●	X	o	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	S	●	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	o	●	●	2D/3D HSC	0.007	0.20	55	0.0030	0.0045	0.0060	0.0075	0.0090
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.006	0.15	50	0.0028	0.0042	0.0056	0.0070	0.0084
Hardened Steel 55-65 HRC	H	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

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											
0.0119	0.0136	0.0170	0.0213	0.0255	0.0298	0.0340	0.0425	0.0510	0.06800	0.08500	0.10200
0.0105	0.0120	0.0150	0.0188	0.0225	0.0263	0.0300	0.0375	0.0450	0.06000	0.07500	0.09000
0.0105	0.0120	0.0150	0.0188	0.0225	0.0263	0.0300	0.0375	0.0450	0.0600	0.0750	0.0900
0.0077	0.0088	0.0110	0.0138	0.0165	0.0193	0.0220	0.0275	0.0330	0.0440	0.0550	0.0660
0.0091	0.0104	0.0130	0.0163	0.0195	0.0228	0.0260	0.0325	0.0390	0.0520	0.0650	0.0780
0.0105	0.0120	0.0150	0.0188	0.0225	0.0263	0.0300	0.0375	0.0450	0.0600	0.0750	0.0900
0.0098	0.0112	0.0140	0.0175	0.0210	0.0245	0.0280	0.0350	0.0420	0.0560	0.0700	0.0840
0.0091	0.0104	0.0130	0.0163	0.0195	0.0228	0.0260	0.0325	0.0390	0.0520	0.0650	0.0780

- 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 Milling

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

3xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.100	0.30	155	0.0070	0.0105	0.0140	0.0175	0.0210
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.090	0.30	150	0.0064	0.0096	0.0128	0.0160	0.0192
Austentic Stainless Steels	M	●	X	o	2D/3D HSC	0.090	0.30	150	0.0064	0.0096	0.0128	0.0160	0.0192
High Temp Alloys	S	●	X	X	2D/3D HSC	0.060	0.20	50	0.0050	0.0075	0.0100	0.0125	0.0150
Titanium Alloys	S	●	X	X	2D/3D HSC	0.065	0.25	130	0.0060	0.0090	0.0120	0.0150	0.0180
Pre-Hardened Steel 35-45 HRC	H	o	●	●	2D/3D HSC	0.080	0.30	145	0.0064	0.0096	0.0128	0.0160	0.0192
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.065	0.30	135	0.0060	0.0090	0.0120	0.0150	0.0180
Hardened Steel 55-65 HRC	H	X	●	●	2D/3D HSC	0.060	0.20	110	0.0050	0.0075	0.0100	0.0125	0.0150

5xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	ADOC (Ap)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.060	0.18	135	0.0066	0.0099	0.0132	0.0165	0.0198
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.054	0.18	130	0.0060	0.0090	0.0120	0.0150	0.0180
Austentic Stainless Steels	M	●	X	o	2D/3D HSC	0.054	0.18	130	0.0060	0.0090	0.0120	0.0150	0.0180
High Temp Alloys	S	●	X	X	2D/3D HSC	0.036	0.12	45	0.0048	0.0072	0.0096	0.0120	0.0144
Titanium Alloys	S	●	X	X	2D/3D HSC	0.039	0.15	115	0.0058	0.0087	0.0116	0.0145	0.0174
Pre-Hardened Steel 35-45 HRC	H	o	●	●	2D/3D HSC	0.048	0.18	125	0.0060	0.0090	0.0120	0.0150	0.0180
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.039	0.18	115	0.0058	0.0087	0.0116	0.0145	0.0174
Hardened Steel 55-65 HRC	H	X	●	●	2D/3D HSC	0.036	0.12	95	0.0048	0.0072	0.0096	0.0120	0.0144

8xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.040	0.12	120	0.0064	0.0096	0.0128	0.0160	0.0192
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.036	0.12	115	0.0060	0.0090	0.0120	0.0150	0.0180
Austentic Stainless Steels	M	●	X	o	2D/3D HSC	0.036	0.12	115	0.0060	0.0090	0.0120	0.0150	0.0180
High Temp Alloys	S	●	X	X	2D/3D HSC	0.024	0.08	40	0.0046	0.0069	0.0092	0.0115	0.0138
Titanium Alloys	S	●	X	X	2D/3D HSC	0.026	0.10	100	0.0056	0.0084	0.0112	0.0140	0.0168
Pre-Hardened Steel 35-45 HRC	H	o	●	●	2D/3D HSC	0.032	0.12	110	0.0060	0.0090	0.0120	0.0150	0.0180
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.026	0.12	105	0.0056	0.0084	0.0112	0.0140	0.0168
Hardened Steel 55-65 HRC	H	X	●	●	2D/3D HSC	0.024	0.08	85	0.0046	0.0069	0.0092	0.0115	0.0138

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											
0.0245	0.0280	0.0350	0.0438	0.0525	0.0613	0.0700	0.0875	0.1050	0.1400	0.1750	0.2100
0.0224	0.0256	0.0320	0.0400	0.0480	0.0560	0.0640	0.0800	0.0960	0.1280	0.1600	0.1920
0.0224	0.0256	0.0320	0.0400	0.0480	0.0560	0.0640	0.0800	0.0960	0.1280	0.1600	0.1920
0.0175	0.0200	0.0250	0.0313	0.0375	0.0438	0.0500	0.0625	0.0750	0.1000	0.1250	0.1500
0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800
0.0224	0.0256	0.0320	0.0400	0.0480	0.0560	0.0640	0.0800	0.0960	0.1280	0.1600	0.1920
0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800
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											
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											
0.0231	0.0264	0.0330	0.0413	0.0495	0.0578	0.0660	0.0825	0.0990	0.13200	0.16500	0.19800
0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.12000	0.15000	0.18000
0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800
0.0168	0.0192	0.0240	0.0300	0.0360	0.0420	0.0480	0.0600	0.0720	0.0960	0.1200	0.1440
0.0203	0.0232	0.0290	0.0363	0.0435	0.0508	0.0580	0.0725	0.0870	0.1160	0.1450	0.1740
0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800
0.0203	0.0232	0.0290	0.0363	0.0435	0.0508	0.0580	0.0725	0.0870	0.1160	0.1450	0.1740
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											
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											
0.0224	0.0256	0.0320	0.0400	0.0480	0.0560	0.0640	0.0800	0.0960	0.12800	0.16000	0.19200
0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.12000	0.15000	0.18000
0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800
0.0161	0.0184	0.0230	0.0288	0.0345	0.0403	0.0460	0.0575	0.0690	0.0920	0.1150	0.1380
0.0196	0.0224	0.0280	0.0350	0.0420	0.0490	0.0560	0.0700	0.0840	0.1120	0.1400	0.1680
0.0210	0.0240	0.0300	0.0375	0.0450	0.0525	0.0600	0.0750	0.0900	0.1200	0.1500	0.1800
0.0196	0.0224	0.0280	0.0350	0.0420	0.0490	0.0560	0.0700	0.0840	0.1120	0.1400	0.1680
0.0161	0.0184	0.0230	0.0288	0.0345	0.0403	0.0460	0.0575	0.0690	0.0920	0.1150	0.1380

- 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 Milling

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

10xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.025	0.08	120	0.0052	0.0078	0.0104	0.0130	0.0156
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.023	0.08	115	0.0048	0.0072	0.0096	0.0120	0.0144
Austentic Stainless Steels	M	●	X	o	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	S	●	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	o	●	●	2D/3D HSC	0.020	0.08	110	0.0048	0.0072	0.0096	0.0120	0.0144
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.016	0.08	105	0.0046	0.0069	0.0092	0.0115	0.0138
Hardened Steel 55-65 HRC	H	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: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.025	0.08	90	0.0046	0.0069	0.0092	0.0115	0.0138
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.023	0.08	85	0.0042	0.0063	0.0084	0.0105	0.0126
Austentic Stainless Steels	M	●	X	o	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	S	●	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	o	●	●	2D/3D HSC	0.020	0.08	80	0.0042	0.0063	0.0084	0.0105	0.0126
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.016	0.08	75	0.0040	0.0060	0.0080	0.0100	0.0120
Hardened Steel 55-65 HRC	H	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: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 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	●	●	o	2D/3D HSC	0.015	0.05	90	0.0042	0.0063	0.0084	0.0105	0.0126
Die / Tool Steels	P	●	●	o	2D/3D HSC	0.014	0.05	85	0.0038	0.0057	0.0076	0.0095	0.0114
Austentic Stainless Steels	M	●	X	o	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	S	●	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	o	●	●	2D/3D HSC	0.012	0.05	80	0.0038	0.0057	0.0076	0.0095	0.0114
Hardened Steel 45-55 HRC	H	X	●	●	2D/3D HSC	0.010	0.05	75	0.0036	0.0054	0.0072	0.0090	0.0108
Hardened Steel 55-65 HRC	H	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

- 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, XM2R & XM4R Slotting & Profile Milling

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

3xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm) 0.1	0.2	0.3	0.4	0.5
						Multiply tool Ø by this factor to calculate depths of cut			fz - mm/tooth				
Medium Carbon Steels	P	•	•	o	Slotting	0.5	-	95	0.0002	0.0005	0.0007	0.0010	0.0012
					Profiling	1.0	0.1	200	0.0007	0.0013	0.0020	0.0026	0.0033
Die / Tool Steels		•	•	o	Slotting	0.5	-	80	0.0002	0.0005	0.0007	0.0010	0.0012
					Profiling	1.0	0.1	170	0.0007	0.0013	0.0020	0.0026	0.0033
Austentic Stainless Steels	M	•	X	o	Slotting	0.5	-	75	0.0002	0.0005	0.0007	0.0010	0.0012
					Profiling	1.0	0.1	150	0.0007	0.0013	0.0020	0.0026	0.0033
Duplex & Super Duplex		•	X	o	Slotting	0.5	-	65	0.0002	0.0005	0.0007	0.0010	0.0012
					Profiling	1.0	0.1	100	0.0007	0.0013	0.0020	0.0026	0.0033
High Temp Alloys	S	•	X	X	Slotting	0.5	-	30	0.0002	0.0004	0.0006	0.0008	0.0010
					Profiling	1.0	0.05	45	0.0006	0.0011	0.0017	0.0022	0.0028
Titanium Alloys		•	X	X	Slotting	0.5	-	75	0.0002	0.0005	0.0007	0.0010	0.0012
					Profiling	1.0	0.1	107	0.0004	0.0008	0.0012	0.0016	0.0020

5xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm) 0.1	0.2	0.3	0.4	0.5
						Multiply tool Ø by this factor to calculate depths of cut			fz - mm/tooth				
Medium Carbon Steels	P	•	•	o	Slotting	0.3	-	95	0.0002	0.0005	0.0007	0.0010	0.0012
					Profiling	1.0	0.08	200	0.0007	0.0013	0.0020	0.0026	0.0033
Die / Tool Steels		•	•	o	Slotting	0.3	-	80	0.0002	0.0005	0.0007	0.0010	0.0012
					Profiling	1.0	0.08	170	0.0007	0.0013	0.0020	0.0026	0.0033
Austentic Stainless Steels	M	•	X	o	Slotting	0.3	-	75	0.0002	0.0005	0.0007	0.0010	0.0012
					Profiling	1.0	0.08	150	0.0007	0.0013	0.0020	0.0026	0.0033
Duplex & Super Duplex		•	X	o	Slotting	0.3	-	65	0.0002	0.0005	0.0007	0.0010	0.0012
					Profiling	1.0	0.08	100	0.0007	0.0013	0.0020	0.0026	0.0033
High Temp Alloys	S	•	X	X	Slotting	0.3	-	30	0.0002	0.0004	0.0006	0.0008	0.0010
					Profiling	1.0	0.05	45	0.0006	0.0011	0.0017	0.0022	0.0028
Titanium Alloys		•	X	X	Slotting	0.3	-	75	0.0002	0.0005	0.0007	0.0010	0.0012
					Profiling	1.0	0.08	110	0.0004	0.0008	0.0012	0.0016	0.0020

8xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm) 0.1	0.2	0.3	0.4	0.5
						Multiply tool Ø by this factor to calculate depths of cut			fz - mm/tooth				
Medium Carbon Steels	P	•	•	o	Slotting	0.2	-	85	0.0002	0.0004	0.0007	0.0009	0.0011
					Profiling	0.75	0.05	180	0.0006	0.0012	0.0018	0.0024	0.0030
Die / Tool Steels		•	•	o	Slotting	0.2	-	75	0.0002	0.0004	0.0007	0.0009	0.0011
					Profiling	0.75	0.05	155	0.0006	0.0012	0.0018	0.0024	0.0030
Austentic Stainless Steels	M	•	X	o	Slotting	0.2	-	70	0.0002	0.0004	0.0007	0.0009	0.0011
					Profiling	0.75	0.05	135	0.0006	0.0012	0.0018	0.0024	0.0030
Duplex & Super Duplex		•	X	o	Slotting	0.2	-	60	0.0002	0.0004	0.0007	0.0009	0.0011
					Profiling	0.75	0.05	90	0.0006	0.0012	0.0018	0.0024	0.0030
High Temp Alloys	S	•	X	X	Slotting	0.2	-	28	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.75	0.05	40	0.0005	0.0010	0.0015	0.0020	0.0025
Titanium Alloys		•	X	X	Slotting	0.2	-	68	0.0002	0.0004	0.0007	0.0009	0.0011
					Profiling	0.75	0.05	95	0.0004	0.0007	0.0011	0.0014	0.0018

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.

	3xD Neck Length											
	End Mill Diameter (mm)											
	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0
	fz - mm/tooth											
	0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.00960	0.01200	0.01440
	0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.02640	0.03300	0.03960
	0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.00960	0.01200	0.01440
	0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.02640	0.03300	0.03960
	0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144
	0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.0264	0.0330	0.0396
	0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144
	0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.0264	0.0330	0.0396
	0.0012	0.0014	0.0016	0.0018	0.0020	0.0030	0.0040	0.0050	0.0060	0.0080	0.0100	0.0120
	0.0034	0.0039	0.0045	0.0050	0.0056	0.0084	0.0112	0.0140	0.0168	0.0224	0.0280	0.0336
	0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144
	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											
	End Mill Diameter (mm)											
	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0
	fz - mm/tooth											
	0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.00960	0.01200	0.01440
	0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.02640	0.03300	0.03960
	0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.00960	0.01200	0.01440
	0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.02640	0.03300	0.03960
	0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144
	0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.0264	0.0330	0.0396
	0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144
	0.0040	0.0046	0.0053	0.0059	0.0066	0.0099	0.0132	0.0165	0.0198	0.0264	0.0330	0.0396
	0.0012	0.0014	0.0016	0.0018	0.0020	0.0030	0.0040	0.0050	0.0060	0.0080	0.0100	0.0120
	0.0034	0.0039	0.0045	0.0050	0.0056	0.0084	0.0112	0.0140	0.0168	0.0224	0.0280	0.0336
	0.0014	0.0017	0.0019	0.0022	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096	0.0120	0.0144
	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											
	End Mill Diameter (mm)											
	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0
	fz - mm/tooth											
	0.0013	0.0015	0.0018	0.0020	0.0022	0.0033	0.0044	0.0055	0.0066	0.00880	0.01100	0.01320
	0.0035	0.0041	0.0047	0.0053	0.0059	0.0089	0.0118	0.0148	0.0177	0.02360	0.02950	0.03540
	0.0013	0.0015	0.0018	0.0020	0.0022	0.0033	0.0044	0.0055	0.0066	0.00880	0.01100	0.01320
	0.0035	0.0041	0.0047	0.0053	0.0059	0.0089	0.0118	0.0148	0.0177	0.02360	0.02950	0.03540
	0.0013	0.0015	0.0018	0.0020	0.0022	0.0033	0.0044	0.0055	0.0066	0.0088	0.0110	0.0132
	0.0035	0.0041	0.0047	0.0053	0.0059	0.0089	0.0118	0.0148	0.0177	0.0236	0.0295	0.0354
	0.0013	0.0015	0.0018	0.0020	0.0022	0.0033	0.0044	0.0055	0.0066	0.0088	0.0110	0.0132
	0.0035	0.0041	0.0047	0.0053	0.0059	0.0089	0.0118	0.0148	0.0177	0.0236	0.0295	0.0354
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
	0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.0200	0.0250	0.0300
	0.0013	0.0015	0.0018	0.0020	0.0022	0.0033	0.0044	0.0055	0.0066	0.0088	0.0110	0.0132
	0.0022	0.0025	0.0029	0.0032	0.0036	0.0054	0.0072	0.0090	0.0108	0.0144	0.0180	0.0216

- 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.**

TuffCut® XM Series XM2S, XM2R & XM4R Slotting & Profile Milling

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

10xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 0.1	0.2	0.3	0.4	0.5
						Multiply tool Ø by this factor to calculate depths of cut			fz - mm/tooth				
Medium Carbon Steels	P	•	•	o	Slotting	0.15	-	75	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.5	0.035	160	0.0005	0.0010	0.0015	0.0020	0.0025
Die / Tool Steels		•	•	o	Slotting	0.15	-	65	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.5	0.035	135	0.0005	0.0010	0.0015	0.0020	0.0025
Austentic Stainless Steels	M	•	X	o	Slotting	0.15	-	60	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.5	0.035	120	0.0005	0.0010	0.0015	0.0020	0.0025
Duplex & Super Duplex		•	X	o	Slotting	0.15	-	55	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.5	0.035	80	0.0005	0.0010	0.0015	0.0020	0.0025
High Temp Alloys	S	•	X	X	Slotting	0.15	-	25	0.0002	0.0003	0.0005	0.0006	0.0008
					Profiling	0.5	0.035	35	0.0004	0.0008	0.0013	0.0017	0.0021
Titanium Alloys		•	X	X	Slotting	0.15	-	60	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.5	0.035	85	0.0003	0.0006	0.0009	0.0012	0.0015

12xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 0.1	0.2	0.3	0.4	0.5
						Multiply tool Ø by this factor to calculate depths of cut			fz - mm/tooth				
Medium Carbon Steels	P	•	•	o	Slotting	0.125	-	70	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.4	0.03	150	0.0005	0.0010	0.0015	0.0020	0.0025
Die / Tool Steels		•	•	o	Slotting	0.125	-	60	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.4	0.03	130	0.0005	0.0010	0.0015	0.0020	0.0025
Austentic Stainless Steels	M	•	X	o	Slotting	0.125	-	55	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.4	0.03	110	0.0005	0.0010	0.0015	0.0020	0.0025
Duplex & Super Duplex		•	X	o	Slotting	0.125	-	50	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.4	0.03	75	0.0005	0.0010	0.0015	0.0020	0.0025
High Temp Alloys	S	•	X	X	Slotting	0.125	-	22	0.0002	0.0003	0.0005	0.0006	0.0008
					Profiling	0.4	0.03	32	0.0004	0.0008	0.0013	0.0017	0.0021
Titanium Alloys		•	X	X	Slotting	0.125	-	55	0.0002	0.0004	0.0005	0.0007	0.0009
					Profiling	0.4	0.03	75	0.0003	0.0006	0.0009	0.0012	0.0015

15xD Neck Length

Workpiece Material Group	ISO	Coolant: Emulsion	Coolant: Air	Coolant: MQL	Application	ADOC (Ap)	RWOC (Ae)	Vc - M/Min	End Mill Diameter (mm): 0.1	0.2	0.3	0.4	0.5
						Multiply tool Ø by this factor to calculate depths of cut			fz - mm/tooth				
Medium Carbon Steels	P	•	•	o	Slotting	0.1	-	60	0.0002	0.0003	0.0005	0.0007	0.0009
					Profiling	0.3	0.025	125	0.0005	0.0009	0.0014	0.0018	0.0023
Die / Tool Steels		•	•	o	Slotting	0.1	-	50	0.0002	0.0003	0.0005	0.0007	0.0009
					Profiling	0.3	0.025	110	0.0005	0.0009	0.0014	0.0018	0.0023
Austentic Stainless Steels	M	•	X	o	Slotting	0.1	-	50	0.0002	0.0003	0.0005	0.0007	0.0009
					Profiling	0.3	0.025	95	0.0005	0.0009	0.0014	0.0018	0.0023
Duplex & Super Duplex		•	X	o	Slotting	0.1	-	40	0.0002	0.0003	0.0005	0.0007	0.0009
					Profiling	0.3	0.025	65	0.0005	0.0009	0.0014	0.0018	0.0023
High Temp Alloys	S	•	X	X	Slotting	0.1	-	20	0.0001	0.0003	0.0004	0.0006	0.0007
					Profiling	0.3	0.025	30	0.0004	0.0008	0.0012	0.0016	0.0020
Titanium Alloys		•	X	X	Slotting	0.1	-	50	0.0002	0.0003	0.0005	0.0007	0.0009
					Profiling	0.3	0.025	65	0.0003	0.0006	0.0008	0.0011	0.0014

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.

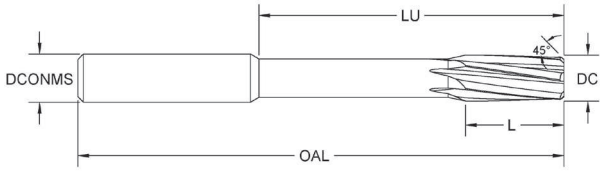
	10xD Neck Length											
	End Mill Diameter (mm)											
	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0
	fz - mm/tooth											
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.00720	0.00900	0.01080
	0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.02000	0.02500	0.03000
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.00720	0.00900	0.01080
	0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.02000	0.02500	0.03000
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
	0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.0200	0.0250	0.0300
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
	0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.0200	0.0250	0.0300
	0.0009	0.0011	0.0012	0.0014	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090
	0.0025	0.0029	0.0034	0.0038	0.0042	0.0063	0.0084	0.0105	0.0126	0.0168	0.0210	0.0252
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
	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											
	End Mill Diameter (mm)											
	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0
	fz - mm/tooth											
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.00720	0.00900	0.01080
	0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.02000	0.02500	0.03000
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.00720	0.00900	0.01080
	0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.02000	0.02500	0.03000
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
	0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.0200	0.0250	0.0300
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
	0.0030	0.0035	0.0040	0.0045	0.0050	0.0075	0.0100	0.0125	0.0150	0.0200	0.0250	0.0300
	0.0009	0.0011	0.0012	0.0014	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090
	0.0025	0.0029	0.0034	0.0038	0.0042	0.0063	0.0084	0.0105	0.0126	0.0168	0.0210	0.0252
	0.0011	0.0013	0.0014	0.0016	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	0.0090	0.0108
	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											
	End Mill Diameter (mm)											
	0.6	0.7	0.8	0.9	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0
	fz - mm/tooth											
	0.0010	0.0012	0.0014	0.0015	0.0017	0.0026	0.0034	0.0043	0.0051	0.00680	0.00850	0.01020
	0.0028	0.0032	0.0037	0.0041	0.0046	0.0069	0.0092	0.0115	0.0138	0.01840	0.02300	0.02760
	0.0010	0.0012	0.0014	0.0015	0.0017	0.0026	0.0034	0.0043	0.0051	0.00680	0.00850	0.01020
	0.0028	0.0032	0.0037	0.0041	0.0046	0.0069	0.0092	0.0115	0.0138	0.01840	0.02300	0.02760
	0.0010	0.0012	0.0014	0.0015	0.0017	0.0026	0.0034	0.0043	0.0051	0.0068	0.0085	0.0102
	0.0028	0.0032	0.0037	0.0041	0.0046	0.0069	0.0092	0.0115	0.0138	0.0184	0.0230	0.0276
	0.0010	0.0012	0.0014	0.0015	0.0017	0.0026	0.0034	0.0043	0.0051	0.0068	0.0085	0.0102
	0.0028	0.0032	0.0037	0.0041	0.0046	0.0069	0.0092	0.0115	0.0138	0.0184	0.0230	0.0276
	0.0008	0.0010	0.0011	0.0013	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084
	0.0023	0.0027	0.0031	0.0035	0.0039	0.0059	0.0078	0.0098	0.0117	0.0156	0.0195	0.0234
	0.0010	0.0012	0.0014	0.0015	0.0017	0.0026	0.0034	0.0043	0.0051	0.0068	0.0085	0.0102
	0.0017	0.0020	0.0022	0.0025	0.0028	0.0042	0.0056	0.0070	0.0084	0.0112	0.0140	0.0168

- 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.**

TrueSize® NC Series 275 Common Shank Reamer



Metric (mm) Sizes	
DC	**Tolerance**
1.00 - 12.00	DIN 1420 H7
DCONMS	**Tolerance (h6)**
0.00 - 3.00	+0/-0.006
3.01 - 6.00	+0/-0.008
6.01 - 10.00	+0/-0.009
10.01 - 14.00	+0/-0.011

DIN1420 H7	
DC	**Tolerance**
≤ 3mm	+0.0041/+0.0078
> 3mm - 6mm	+0.0051/+0.0100
> 6mm - 10mm	+0.0061/+0.0120
> 10mm - 12mm	+0.0078/+0.0150

Lead Chamfer Width (45° ± 1°)	
DC	**Width**
0.00 - 2.45	21% - 23% of DC
2.46 - 3.45	0.38 - 23% of DC
3.46 - 9.52	0.5 - 1.02
9.53 - 12.00	0.76 - 1.27

Tool No.	EDP	DC	DCONMS	OAL	L	LU	NOF
		mm					
275M0100	27530	1.0	3.0	50.0	6.0	22.0	4
275M0150	27531	1.5	3.0	50.0	9.0	22.0	4
275M0200	27535	2.0	3.0	50.0	12.0	22.0	4
275M0250	27538	2.5	3.0	50.0	12.0	22.0	4
275M0300	27539	3.0	4.0	66.0	12.0	38.0	4
275M0350	27546	3.5	4.0	66.0	12.0	38.0	4
275M0400	27548	4.0	6.0	76.0	12.0	40.0	4
275M0450	27549	4.5	6.0	76.0	12.0	40.0	4
275M0500	27554	5.0	6.0	76.0	12.0	40.0	4
275M0550	27555	5.5	6.0	76.0	12.0	40.0	4
275M0600	27557	6.0	8.0	101.0	12.0	65.0	4
275M0650	27562	6.5	8.0	101.0	16.0	65.0	6
275M0700	27563	7.0	8.0	101.0	16.0	65.0	6
275M0750	27566	7.5	8.0	101.0	16.0	65.0	6
275M0800	27568	8.0	10.0	103.0	16.0	63.0	6
275M0850	27569	8.5	10.0	103.0	19.0	63.0	6
275M0900	27570	9.0	10.0	103.0	19.0	63.0	6
275M0950	27571	9.5	10.0	103.0	19.0	63.0	6
275M1000	27575	10.0	12.0	120.0	19.0	75.0	6
275M1050	27576	10.5	12.0	120.0	19.0	75.0	6
275M1100	27577	11.0	12.0	120.0	19.0	75.0	6
275M1150	27579	11.5	12.0	120.0	19.0	75.0	6
275M1200	27581	12.0	14.0	125.0	19.0	80.0	6

TrueSize® NC Series 275

Recommended Cutting Data | Conditions de coupe recommandées | Empfohlene Schnittdaten | Dati di taglio Raccomandati | Zalecane Parametry

Workpiece Material Group	ISO	Vc - M/Min	Tool Diameter (mm)					
			1.0 - 1.5	1.6 - 3.0	3.1 - 5.0	5.1 - 7.0	7.1 - 9.5	9.6 - 12.0
		Low - High	Feed (mm/rev)					
Low Carbon Steels	P	30 - 45	0.08 - 0.200	0.20 - 0.35	0.20 - 0.40	0.25 - 0.55	0.40 - 0.70	0.40 - 0.75
Medium Carbon Steels		25 - 35	0.08 - 0.200	0.20 - 0.35	0.20 - 0.40	0.25 - 0.55	0.40 - 0.70	0.40 - 0.75
Alloy Steels		20 - 35	0.08 - 0.200	0.20 - 0.35	0.20 - 0.40	0.25 - 0.55	0.40 - 0.70	0.40 - 0.75
Die / Tool Steels		15 - 25	0.08 - 0.200	0.20 - 0.35	0.20 - 0.40	0.25 - 0.55	0.40 - 0.70	0.40 - 0.75
Free Machining Stainless Steels	M	20 - 30	0.08 - 0.200	0.20 - 0.35	0.20 - 0.40	0.28 - 0.53	0.40 - 0.70	0.40 - 0.75
Austenitic Stainless Steels		10 - 20	0.03 - 0.12	0.15 - 0.30	0.20 - 0.30	0.20 - 0.40	0.30 - 0.50	0.30 - 0.60
Difficult Stainless Steels		5 - 15	0.03 - 0.12	0.15 - 0.30	0.20 - 0.30	0.20 - 0.40	0.30 - 0.50	0.30 - 0.60
PH Stainless Steels		10 - 20	0.03 - 0.12	0.15 - 0.30	0.20 - 0.30	0.20 - 0.40	0.30 - 0.50	0.30 - 0.60
High Temp Alloys	S	5 - 15	0.02 - 0.07	0.10 - 0.20	0.15 - 0.30	0.20 - 0.30	0.20 - 0.40	0.25 - 0.45
Titanium Alloys		10 - 20	0.03 - 0.13	0.15 - 0.30	0.20 - 0.30	0.20 - 0.40	0.30 - 0.50	0.30 - 0.60
Gray Cast Irons	K	25 - 35	0.12 - 0.30	0.25 - 0.45	0.35 - 0.65	0.40 - 0.78	0.50 - 0.85	0.60 - 1.00
Ductile Cast Irons		20 - 35	0.12 - 0.30	0.25 - 0.45	0.35 - 0.65	0.40 - 0.78	0.50 - 0.85	0.60 - 1.00
Malleable Cast Irons		20 - 30	0.12 - 0.30	0.25 - 0.45	0.35 - 0.65	0.40 - 0.78	0.50 - 0.85	0.60 - 1.00
Aluminium - ≤ 10% Si	N	75 - 105	0.12 - 0.30	0.25 - 0.45	0.35 - 0.65	0.40 - 0.78	0.50 - 0.85	0.60 - 1.00
Aluminium - > 10% Si		60 - 90	0.12 - 0.30	0.25 - 0.45	0.35 - 0.65	0.40 - 0.78	0.50 - 0.85	0.60 - 1.00
Copper / Brass		55 - 75	0.12 - 0.30	0.25 - 0.45	0.35 - 0.65	0.40 - 0.78	0.50 - 0.85	0.60 - 1.00
Hardened Steels 45-50 HRC	H	10 - 20	0.08 - 0.20	0.20 - 0.33	0.20 - 0.40	0.28 - 0.53	0.40 - 0.70	0.40 - 0.78
Hardened Steels 50-55 HRC		10 - 15	0.03 - 0.12	0.15 - 0.30	0.20 - 0.30	0.20 - 0.40	0.30 - 0.50	0.30 - 0.60

Stock Allowance for NC Machine Reamers - Metric

Reamer Diameter (mm)	Total Allowance
1.0 - 1.5	0.08 - 0.15
1.5 - 3.0	0.13 - 0.23
3.0 - 6.0	0.18 - 0.30
6.0 - 12.0	0.25 - 0.38

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

Integrated Manufacturing Solutions

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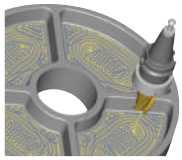

HSM Tool Path Optimisation

REGO-FIX toolVibe® Monitoring and Optimisation

TMS Tool Management System

Technical Support & Advice

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Developed around our proven cutting data, the app supports a wide range of ISO materials including steel, aluminium alloys, stainless steel and titanium, as well as cast iron, hardened steels and exotic alloys.

Once basic information has been selected from 'drop down' menus, such as tool type, diameter and material, the app allows you to 'drag' the tool graphic display to change the radial engagement and depth of cut, which instantly calculates speeds and feeds.

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Colour coded feedback guides you toward the recommended cutting conditions based on the chosen input parameters. User over-ride controls allow cutting data to be fine-tuned for individual applications, as well as enabling calculations to be made that compare multiple scenarios instantly.

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