

# PRODUCT CATALOGUE 2023



**ROHIT** has been on the vanguard in the field of HSS Cutting Tools & Solid Carbide Cutting Tools industry. We have been serving the Cutting Tools industry for over six decades. The company started its operations in the year 1963 under the visionary leadership of Mr. K.L Duggal who has taken this company from meager resources from a small Workshop in 1963 to 2-Manufacturing Units spread over 40,000 Square Foot and Cutting Tool Brand to Boast about.

## Our Core Strengths:

### Manufacturing Expertise

Our R&D Team which boasts of engineers' from India's Top Engineering Colleges is dedicated in providing new designs for the Carbide Drills, End Mills & Reamers so as to enhance productivity, repeatability and reduce CPC.

### Heat Treatment Facility

We at ROHIT have over 6 decades of HSS Heat Treatment experience which helps in providing best performing HSS tools over and over again.

### Product Know-how

Our employees & engineers have all the knowledge accumulated in the company's 6 Decades of expertise in Cutting Tool Industry. Simultaneously, our R&D center continuously provides Innovations and optimizes tool performance in our testing facility with the assistance of state-of-the-art technologies.

### Innovations & New Designs

Our R&D center is the backbone of ROHIT's new designs. Currently our Milling & Drilling tools for machining Alloy Steels, SS, Titanium & other special alloys are leading the market with Lowest CPC guaranteed to the customer.

### Regrinding Service

Save your Planet! We at ROHIT, believes that it is everyone's duty to do their bit towards the environment; hence Regrinding makes our companies core in enabling the customer reduce their cost, also helping environment by Recycling and our regrinding ensures customer's with refurbished tool similar to the new ROHIT tool they have used with original Tool Designs and coatings.

We are happy to help our customers reduce their Tooling Costs and improve their Bottom Line!



**Chairman**



## Why Choose RIGPL?

- Quality down to last detail
- Expert advice on optimal tool application
- Highest Productivity, Excellent Economic Efficiency
- Specialized solutions to improve your Bottom Line
- Think Tank to make your Cutting Tools Last that bit Longer

## Industry We Support

- Aerospace & Automotive
- Power Generation
- General Engineering
- Die & Mold Industry
- Medical Implants
- Ordnance Manufacturing
- Furniture Manufacturing





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## Carbide High Performance Drills (CTHS, CTHL series)

- Newly Developed High Wear Resistance NOVA coating
- Stable Low Thrust Point Form
- Edge Chamfer to provide longer cutting edge life
- Best suited for Drilling Alloy Steel, SS, Titanium & Ni alloys



## Carbide High Performance Drills (C3HS, C3HL Series)


- Newly Developed High Wear Resistance NOVA coating
- Edge Honing to provide sturdy drill point
- Edge Chamfer to provide longer cutting edge life
- New chip Curling design for faster chip breakage
- Best suited for Drilling Alloy Steel, SS, Titanium & Ni alloys

## “Carbide End Mills 301 or 302 Series

- Especially designed for Hard Machining up to 60HRc
- Use our 401 or 402 series for machining up to 70HRc”

“Wood machining tools to cater to ever so growing needs of the **Wood Routing industry**”









“Carbide Variable Helix  
Endmills 330, 333 or 334 Series  
are designed for Chatter free  
machining of Alloy Steel,  
SS & Super alloys”



## CARBIDE DRILLS

Series Group	Series	Image	Diameter Range (in mm)	Stock	# of Flutes	Coating Type	Page Number	Internal coolant
GP-Drills	C1GS		2 ~ 20	Yes	2	TiALN	17	
	C1GJ		2 ~ 20	Yes	2	None/TiALN	20	
HP-Drills	C3HS		2 ~ 20	Yes	2	NOVA	25	
	C3HL		2 ~ 20	Yes	2	NOVA	29	
	CTHS		4 ~ 20	++	2	NOVA	32	YES
	CTHL		4 ~ 20	++	2	NOVA	36	YES
	CTHM		4 ~ 12	++	2	NOVA	39	YES
SHP-Drills	C4HT		2 ~ 20	++	2	PEROX	40	
Misc. Drills	C1N1		6 ~ 20	++	2	-	44	
	C1N2		6 ~ 20	++	2	-	44	
	C1CB		BS1 ~ BS7	++	2	-	45	
	C1CD		1.6 ~ 8	++	2	-	46	

## CARBIDE REAMERS

Series Group	Series	Image	Diameter Range (in mm)	Stock	# of Flutes	Coating Type	Page Number	Internal coolant
Reamers	C1RS		3 ~ 16	++	4/6	NONE/TiALN	67	
	C1RL		3 ~ 16	++	4/6	NONE/TiALN	69	
	C1RR		3 ~ 16	++	4/6	NONE/TiALN	71	

# Table of Contents-cum-Selection Guide

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Plywood/Laminates	Copper / Brass
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GP - General Purpose

HP - High Performance

Delivery Time	+	1 Week
	++	2 Weeks
	+++	3 Weeks

1 <sup>st</sup>	1 <sup>st</sup> Choice
2 <sup>nd</sup>	2 <sup>nd</sup> choice

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Plywood/Laminates	Copper / Brass
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# CARBIDE END MILLS

Series Group	Series	Image	Dia Range	Stock	# of Flutes	Square End	Ball Nose	Corner Radius	Neck Relief	Coating	Page Number
HP-VHEM*	330		4-20	Yes	4	x		x		AL-PRO	79
	333		6-20	++	5	x		x		AL-PRO	81
	334		6-20	++	4	x				AL-PRO	83
HP-SUS*	222		3-20	Yes	4	x				NOVA	87
	321		3-20	Yes	4	x		x		NOVA	88
	322		4-20	Yes	4	x				NOVA	90
HP-VHEM*	430		4-16	++	4	x		x		AL-PRO	92
	433		6-16	++	5	x		x		AL-PRO	94
HP-4X	401		1-12	++	4	x				NOVA	96
	402		1-12	++	2		x			NOVA	97
	406		2-12	++	2		x		x	NOVA	98
HP-3X	301		1-20	Yes	4	x				NOVA	100
	302		3-16	Yes	4		x			NOVA	102
	304		1-12	Yes	2		x			NOVA	103
	305		1-4	Yes	2	x			x	NOVA	104
	306		1-4	Yes	2		x		x	NOVA	106
	307		2-12	++	2		x		x	NOVA	108
	308		6-20	++	6	x			x	AL-PRO	109





## Table of Contents-cum-Selection Guide















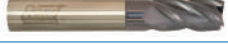







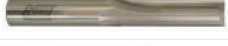

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Plywood/Laminates	Copper / Brass
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GP - General Purpose  
HP - High Performance

Delivery Time	+	1 Week
	++	2 Weeks
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1st	1st Choice
2nd	2nd choice

## CARBIDE END MILLS

Series Group	Series	Image	Dia Range	Stock	# of Flutes	Square End	Ball Nose	Corner Radius	Neck Relief	Coating	Page Number
GP-1X	201		2-25	Yes	4	x				TiALN	110
	202		3-20	Yes	4		x			TiALN	112
	204		1-12	Yes	2		x			TiALN	113
	205		2-16	Yes	4	x				HYPERLOX	114
	206		1-12	Yes	2		x			HYPERLOX	115
	207		2-10	++	2 & 4	x				TiALN	116
	208		2-10	++	2 & 4		x			TiALN	117
	211		2-20	Yes	2	x				-	118
	212		3-20	Yes	2		x			-	119
	213		3-20	Yes	3	x				-	120
	215		4-16	++	3 & 4					TiALN	121
	219		3-12	+	1	x				-	122
GP-0X	101		2-20	Yes	4	x				TiALN	123
	102		3-20	Yes	4		x			TiALN	124
	110		3-20	Yes	4	x				TiALN	131
GP-0X (NON-Ferrous)	103		1-12	Yes	2	x				-	125
	104		1-12	Yes	2		x			-	126
	107		3-16	Yes	1	x				-	128
	108		1-4	+	2	x				-	129
	109		1-4	+	2		x			-	130
	112		6-12.70	+	2	x				-	132
	114		6-12.70	+	2	x				-	133
	118		3-12	+	2	x				-	134
119		3-12	+	1	x				-	136	

# Table of Contents-cum-Selection Guide



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Plywood/Laminates	Copper / Brass
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GP - General Purpose  
HP - High Performance

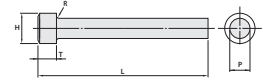
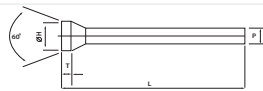
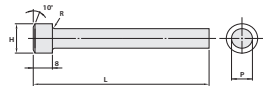
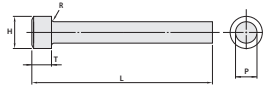
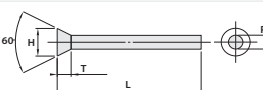
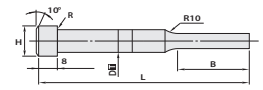
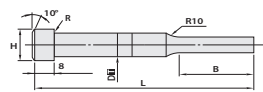
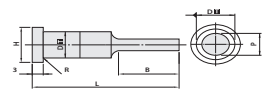
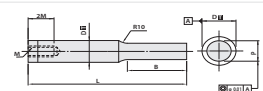
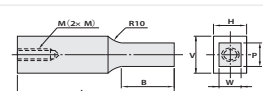

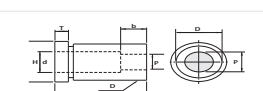
Delivery Time	+	1 Week
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1st	1st Choice
2nd	2nd Choice

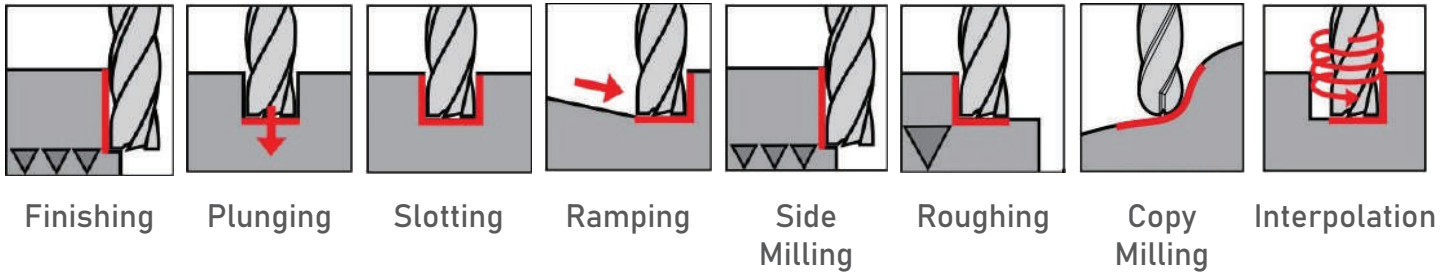


Description	Page No
GRADE CHART of HSS CUTTING TOOLS	157
HSS Square Tools Bits   (Inch Sizes)	158
HSS Square Tools Bits   (Metric Sizes)	159
HSS Rectangular (Flat) Tools Bits   (Inch Sizes)	160
HSS Rectangular (Flat) Tools Bits   (Metric Sizes)	162
HSS Round Tool Bits   (Inch Sizes)	164
HSS Round Tool Bits   (Metric Sizes)	166
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HSS Parallel Shank End Mills   (Imperial Sizes)	174
HSS Parallel Shank End Mills   (Metric Sizes)	175
HSS Center Drills   Type-A	176
Geometry & Instructions	170

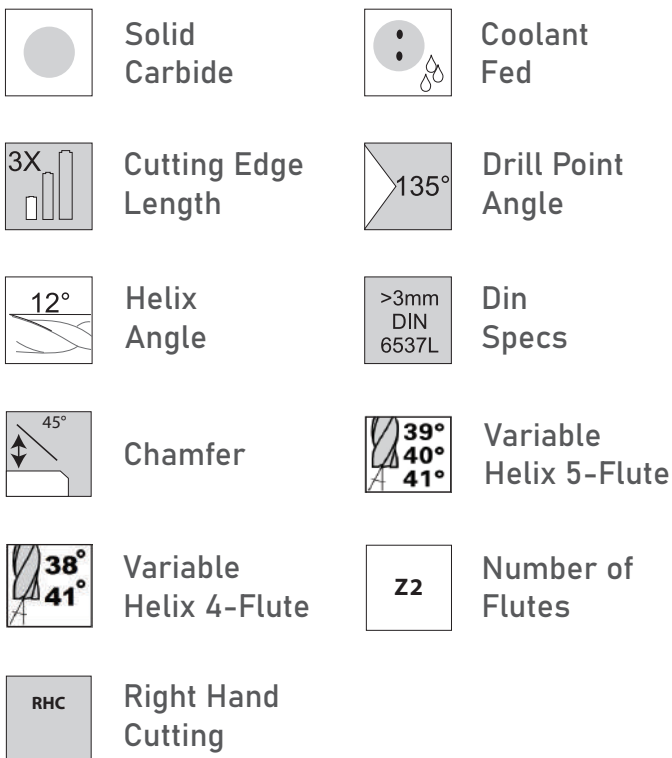


Series	Description	Body/tip Dia "P" (0.1 mm Increments)	Stock Availability	Drawing	Page Number
P101	HSS Straight Punches	1.1-25	Yes		180
P102	HSS Tapered Head Punches	3.0-12	++		181
P103	HSS Straight Punches For Medium Load	2.1-25	++		182
P104	HSS Straight Punches For Heavy Load	2.1-25	++		183
P105	HSS Mini Straight Punches	1-3	++		184
P106	HSS Shoulder Punches	2-24.9	+++		185
P107	HSS Shoulder Punches For Heavy Load	2-24.9	+++		186
P108	HSS Shoulder Punches Short Type	2-9.9	+++		187
P109	HSS Tapped Punches	2-24.9	Ask for Delivery Time		188
P110	HSS Block Punches		Ask for Delivery Time		189
P112	HSS Straight Button Dies		Ask for Delivery Time		190
P113	HSS Headed Button Dies		Ask for Delivery Time		190

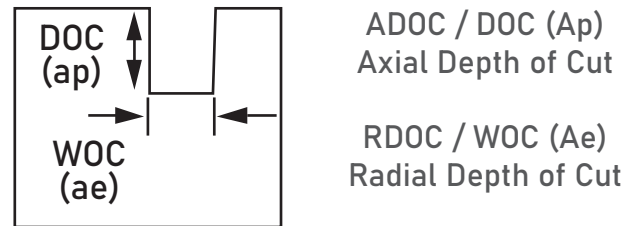
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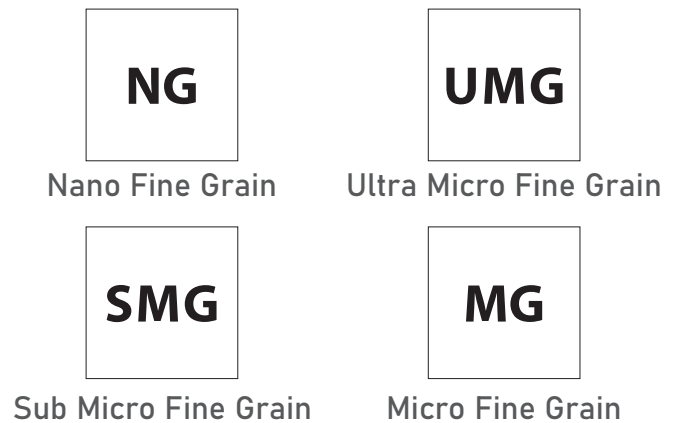
## TOOL IDENTIFICATION



## TYPES OF CUTTING



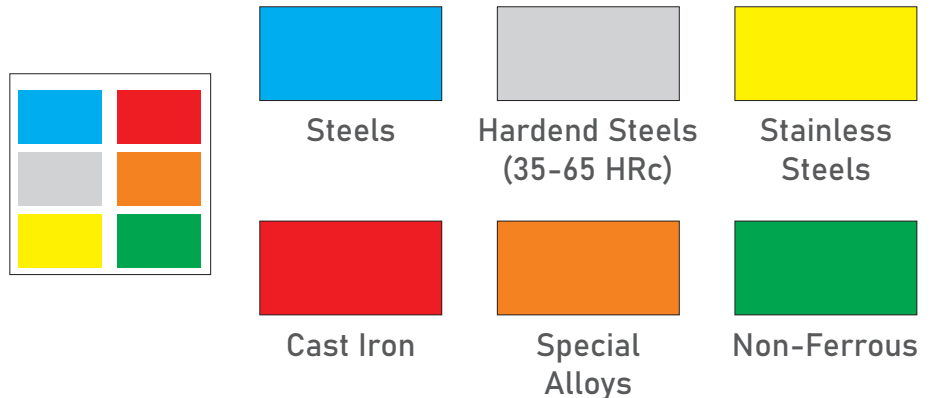
## CARBIDE GRAIN SIZE



## COATING TYPES



## WORKPIECE MATERIAL GROUP





## High Performance End Mills

- Included in our product line are high performance end mills developed for specific applications.
- Newly developed Variable Helix Endmills (VHEM-series) is suited for machining Stainless steel, Titanium and NiCr Alloys and for High productivity machining in Alloy Steel machining.
- For hardened steel we have HP-3X & HP-4X series
- Our SUS-series is designed especially for Ortho manufacturers for machining stainless steel material like SS-316L.

## General Purpose End Mills

In addition to High Performance End Mills we have complete family of standard carbide end mills designed for efficient general purpose milling of all steels, cast iron, aluminium, softer metals, non-ferrous materials etc. these fall under GP-0X & GP-1X group of end mills.

## Benefits of Rohit End Mills

- Thousands of end mills in stock
- Over 40 different variants of end mills available
- Aggressive speeds and feeds to maximize MRR
- Standard, Stub, Long and Extended Reach Lengths are available
- Different coatings for different kind of application / material machining are suggested by our trained engineers
- Top of the notch Quality check Equipments (Zoller) to provide accurate tools with great quality
- Utilize our engineering experience to solve your milling trouble

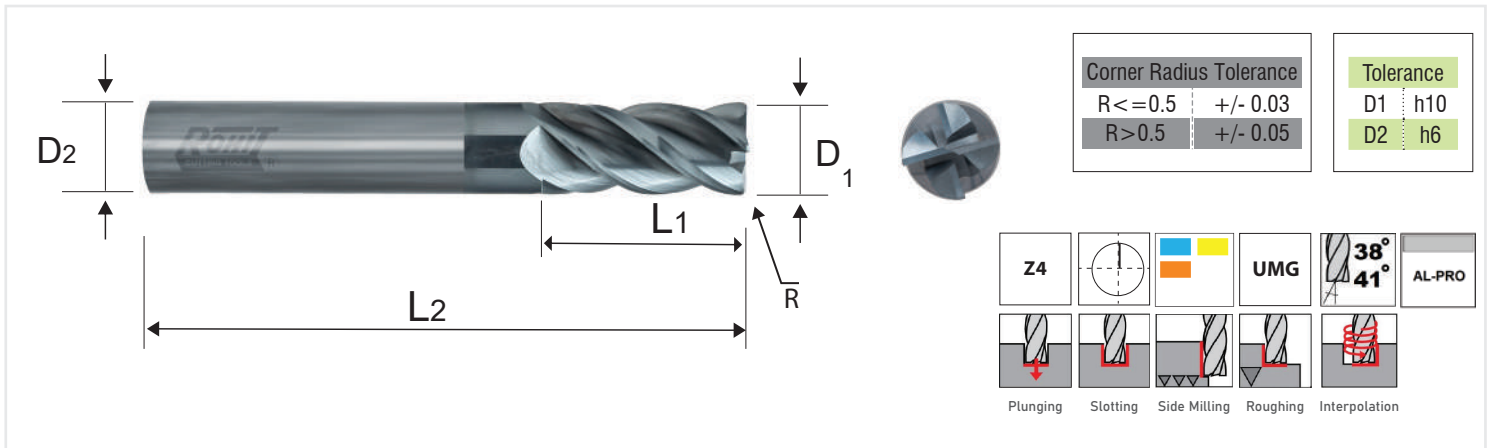
Series Group	Series No.	Page No
HP-VHEM*	330	79
	333	81
	334	83
HP-SUS*	222	87
	321	88
	322	90
HP-VHEM*	430	92
	433	94
HP-4X	401	96
	402	97
	406	98
HP-3X	301	100
	302	102
	304	103
	305	104
	306	106
	307	108
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Series Group	Series No.	Page No
GP-1X	201	110
	202	112
	204	113
	205	114
	206	115
	207	116
	208	117
	211	118
	212	119
	213	120
	215	121
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Series Group	Series No.	Page No
GP-0X	101	123
	102	124
	110	131
GP-0X (NON-Ferrous)	103	125
	104	126
	107	128
	108	129
	109	130
	112	132
	114	133
	118	134
	119	136



## Features:

- Variable Lead Geometry & Unequal Indexing design for Chatter free milling operations
- High DOC for effective material removal at very high Speeds and Feeds
- Highly Effective in Trochoidal milling
- Improved Surface quality of Work Piece
- Capable of machining wide range of material like Alloy Steel, Stainless Steel and Exotic Materials like Titanium
- AL-PRO is an advanced coating for achieving higher tool life on difficult to machine material. It has remarkable wear resistance at lower speeds and feeds, as well as tremendous heat resistance at high speed

Item Code AL-PRO Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Corner Radius (R)
CR35HVH000B3	4	10	54	6	R0.3
CR35HVH00135	4.5	12	50	6	R0.3
CR35HVH00143	5.5	12	50	6	R0.3
CR35HVH00010	6	12	63	6	R0.3
CR35HVH00028	8	19	63	8	R0.5
CR35HVH00036	10	22	72	10	R0.5
CR35HVH00044	12	26	80	12	R0.75
CR35HVH00085	14	26	80	14	R0.75
CR35HVH00051	16	32	92	16	R0.30
CR35HVH00093	16	32	92	16	R0.75
CR35HVH000A5	20	38	100	20	R0.75

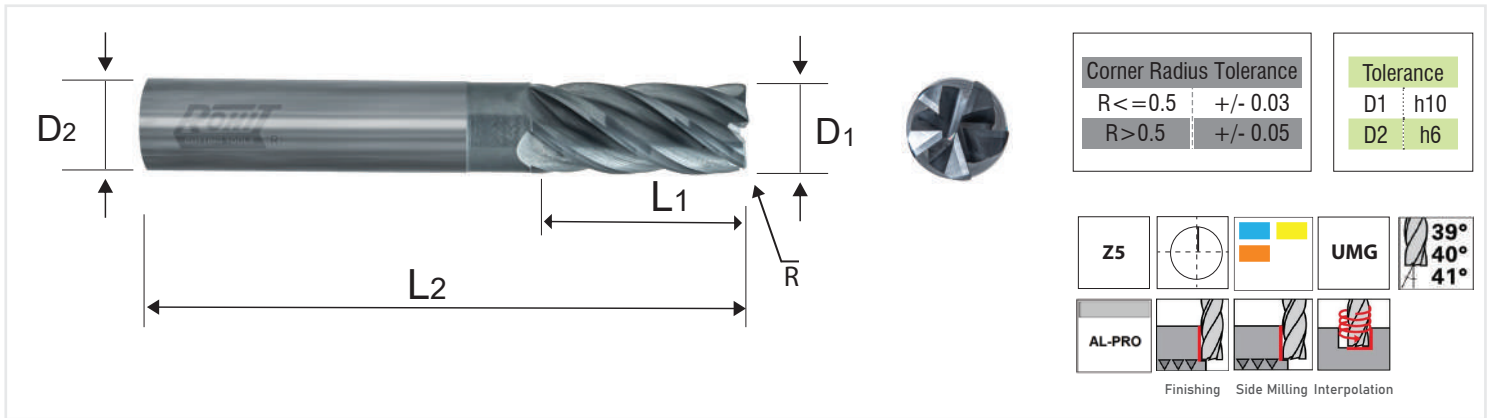
Item Code AL-PRO Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Corner Radius (R)
CX35HVH00071	1/4	1/2	2+1/2	1/4	R0.015
CX35HVH000C5	1/4	3/4	2+1/2	1/4	R0.015
CX35HVH000H4	5/16	13/16	2+1/2	5/16	R0.015
CX35HVH000E0	3/8	1	3	3/8	R0.015
CX35HVH000D2	1/2	1	3	1/2	R0.015
CX35HVH000J9	1/2	1+1/2	3+1/2	1/2	R0.015
CX35HVH00063	1/2	1	3	1/2	R0.03
CX35HVH000K7	1/2	1+1/2	3+1/2	1/2	R0.03
CX35HVH000L5	5/8	1+1/4	3+1/2	5/8	R0.015
CX35HVH000F8	5/8	1+1/4	3+1/2	5/8	R0.03
CX35HVH000M3	3/4	1+1/2	4	3/4	R0.015
CX35HVH000G6	3/4	1+1/2	4	3/4	R0.03



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
1st	1st	1st	1st	1st	2nd	2nd	1st					2nd			

NOTE: FOR FEED & SPEED Rates, go to page no. PG-139





## Features:

- Variable Lead Geometry & Unequal Indexing design for chatter free milling operations
- Excellent for Finishing operations where Ra Value required is less than 5
- High Feed High Speed with Chatter-free machining
- With 5-Flute Larger Core, which helps in Sturdy Machining and increased Productivity
- AL-PRO is an advanced coating for achieving higher tool life on difficult to machine material

Item Code AL-PRO Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Corner Radius (R)
CR35HVH000P2	6	12	63	6	R0.3
CR35HVH000Q0	8	16	63	8	R0.5
CR35HVH000R8	10	22	72	10	R0.5
CR35HVH000S5	12	26	80	12	R0.75
CR35HVH000T3	16	32	92	16	R0.75
CR35HVH000U1	20	38	100	20	R0.75

## Carbide HP 5-Flute Variable Helix End Mills AL-PRO Coated (Inch)

Item Code AL-PRO Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Corner Radius (R)
CX35HVH000V3	1/4	3/4	2-1/2	1/4	R0.015
CX35HVH000W1	5/16	13/16	2-1/2	5/16	R0.015
CX35HVH000X8	3/8	1	3	3/8	R0.015
CX35HVH000Y6	1/2	1	3	1/2	R0.030
CX35HVH000Z4	5/8	1-1/4	3-1/2	5/8	R0.030
CX35HVH00105	3/4	1-1/2	4	3/4	R0.030

**Unequal Spacing of End Teeth**

for stable, vibration-free milling

**Variable Lead**

for efficient milling and suppressed vibration

**Ideal Flute Shape**

for smooth chip evacuation

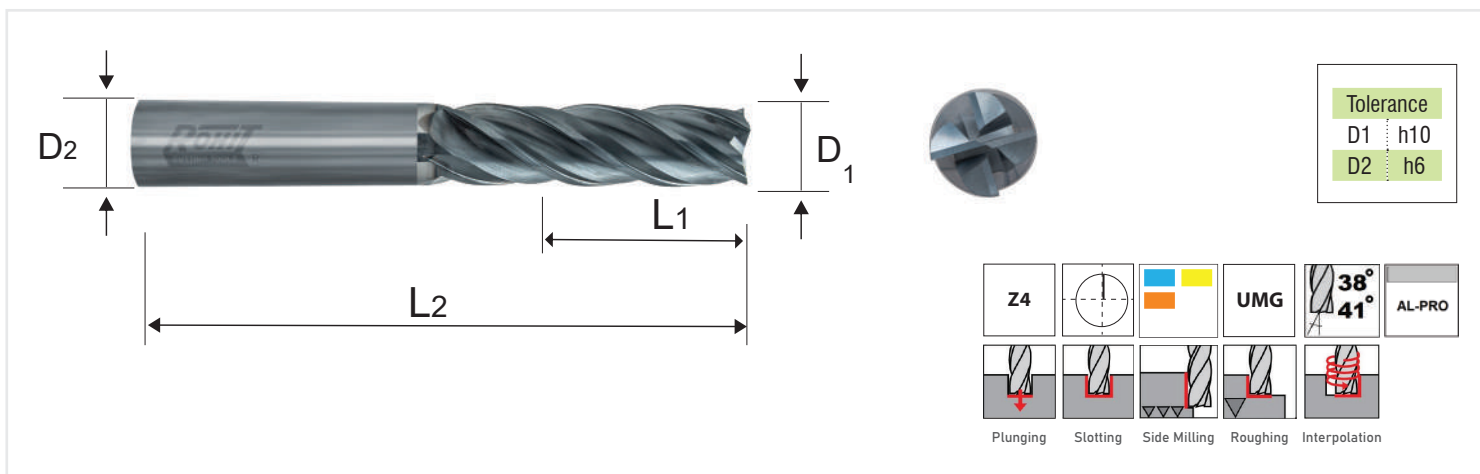
**Web Taper**

for increased rigidity and high efficient milling



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
1st	1st	1st	1st	1st	1st	2nd			2nd	1st					

NOTE: FOR FEED & SPEED Rates, go to page no. PG-139



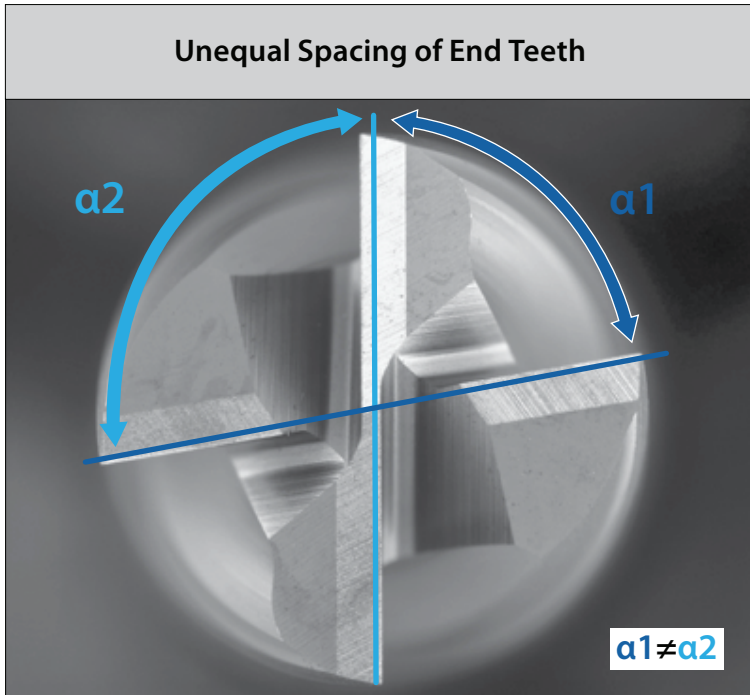
## Features:

- Variable Lead Geometry with X-Flute & Unequal Indexing design for Chatter free milling operations
- Long Flute Lengths with Variable Helix helps in effective side milling and slotting application with higher depths
- High DOC for effective material removal at very high Speeds and Feeds
- Highly Effective in Trochoidal milling
- Capable of machining wide range of material like Alloy Steel, Stainless Steel and Exotic Materials like Titanium
- AL-PRO is an advanced coating for achieving higher tool life on difficult to machine material.

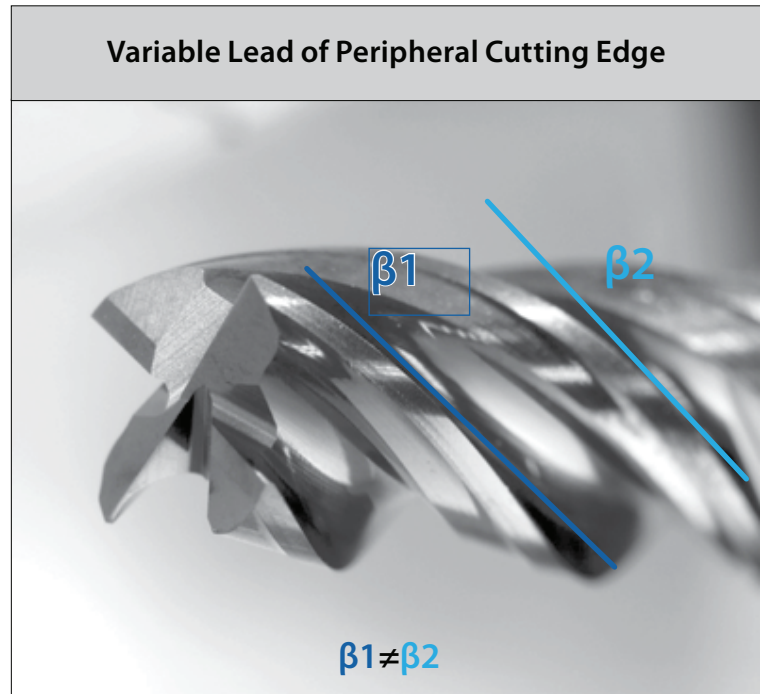
Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
334060050-A	6	16	50	6
334060060-A	6	20	60	6
334060075-A	6	25	75	6
334060100-A	6	30	100	6
334080060-A	8	20	60	8
334080075-A	8	30	75	8
334080100-A	8	40	100	8
334100075-A	10	30	75	10

Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
334100100-A	10	45	100	10
334120075-A	12	30	75	12
334120100-A	12	45	100	12
334140100-A	14	50	100	14
334160100-A	16	50	100	16
334180100-A	18	50	100	18
334200100-A	20	50	100	20

Unequal Spacing of End Teeth



Variable Lead of Peripheral Cutting Edge



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>			2 <sup>nd</sup>				

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period

FOR FEED & SPEED Rates, go to page no. PG-139



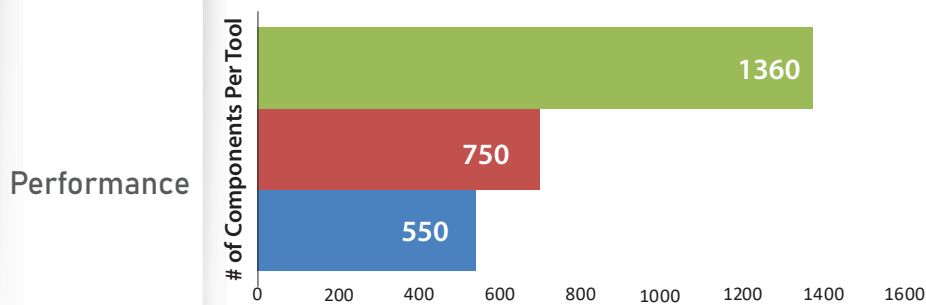
Description: S/C Rohit-3X AL-PRO VHEMAS

CR:0.5 FØ:10 FL:22 SØ:10 OAL:72 Z=4 SERIES C330

Work-Piece Image



Industry	Auto components	
Component	Gear K S Driven	
Cutting Conditions	Tool Diameter	10mm
	Cutting Speed	110m/min
	RPM	3500
	Feed (mm/tooth)	0.05
	Table Feed (mm/min)	700
	DOC	15mm
	Radial Cut	1mm
	Milling Type	Side Milling
Coolant	5% Mix Water Soluble	
Material	Alloy Steel EN8-D	
Hardness	240-290BHN	
Machine	VMC - Haas	



Summary	
Endmill	Life (in components)
ROHIT-330	1360
Competitor 2	750
Competitor 1	550
Improvement	81%

Result

More than 75% improvement in Life

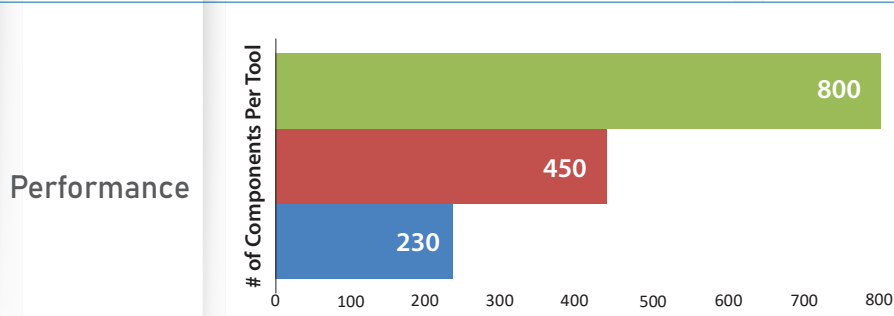
Description: S/C Rohit- 3X AL-PRO (VHEM)

CR:0.5 FØ:8 FL:16 SØ:8 OAL:63 Z=5 SERIES: C333

Work-Piece Image



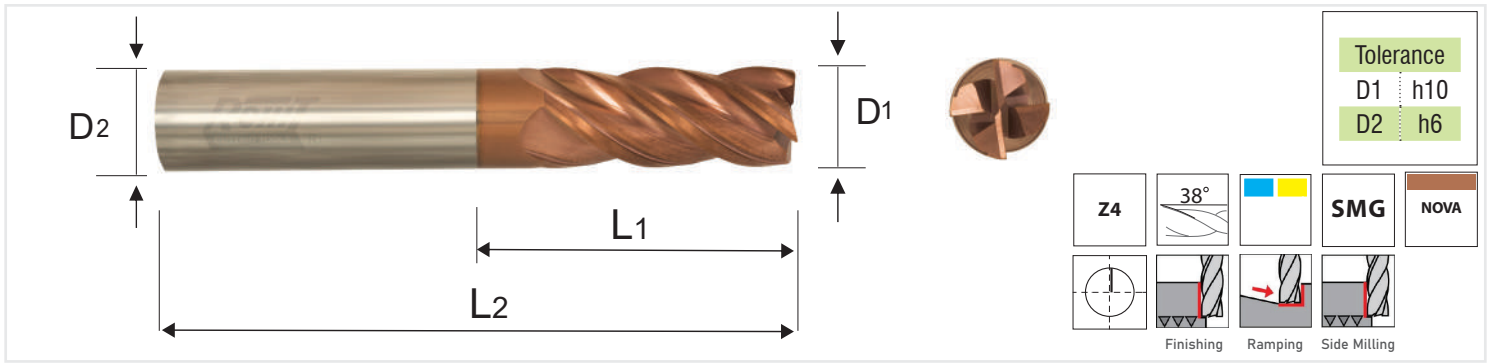
Industry	Auto components	
Component	Gear K S Driven	
Cutting Conditions	Tool Diameter	8mm
	Cutting Speed	125m/min
	RPM	5000
	Feed (mm/tooth)	0.075
	Table Feed (mm/min)	1500
	DOC	4mm
	Radial Cut	0.1mm
	Milling Type	Side Milling
Coolant	5% Mix Water Soluble	
Material	Forged Steel	
Hardness	20-25 HRc	
Machine	VMC	



Summary	
Endmill	Life (in components)
ROHIT-333	800
Competitor 2	450
Competitor 1	230
Improvement	78%

Result

More than 75% improvement in Life



## Features:

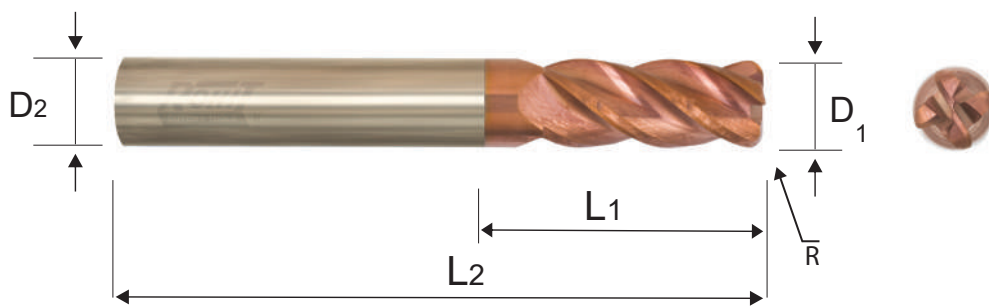
- Best suited for milling all types of Alloy Steel & Stainless Steel (SUS)
- High Wear Resistance NOVA coating
- Excellent performance in machining of Ortho Implants And Material like SS-316L
- Gives optimum performance on Finishing application with lower Ae (WOC) & High Feed

Item Code NOVA Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR1AHSE00LH3	3.0	12	50	4.0
CR1AHSE00SL7	3.0	12	75	3.0
CR1AHSE00MR0	3.5	15	50	4.0
CR1AHSE00MS7	4.0	15	50	4.0
CR1AHSE00LJ8	4.0	16	50	6.0
CR1AHSE00MT5	4.0	25	75	4.0
CR1AHSE00MU3	4.5	15	50	4.5
CR1AHSE00MV1	4.5	25	75	4.5
CR1AHSE00PE5	5.0	16	50	5.0
CR1AHSE00MJ7	5.0	16	50	6.0
CR1AHSE00N37	5.5	16	50	5.5
CR1AHSE00MW9	5.5	25	75	5.5
CR1AHSE00MX6	5.5	35	100	5.5
CR1AHSE00LK6	6.0	16	50	6.0

Item Code NOVA Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR1AHSE00MY4	6.0	20	60	6.0
CR1AHSE00LL4	6.0	25	75	6.0
CR1AHSE00SZ6	6.0	40	100	6.0
CR1AHSE00LM2	8.0	20	60	8.0
CR1AHSE00LN9	8.0	30	75	8.0
CR1AHSE00LP5	8.0	40	100	8.0
CR1AHSE00LQ3	10.0	30	75	10.0
CR1AHSE00LR1	10.0	40	100	10.0
CR1AHSE00LS8	12.0	30	75	12.0
CR1AHSE00LT6	12.0	40	100	12.0
CR1AHSE00LU4	14.0	40	100	14.0
CR1AHSE00LV2	16.0	50	100	16.0
CR1AHSE00LW0	20.0	50	100	20.0

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>			1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>		2 <sup>nd</sup>				

NOTE: The 222-series End Mills contain CR of 0.15-0.30mm to provide extra strength.  
FOR FEED & SPEED Rates, go to page no. PG-141



Corner Radius Tolerance

R ≤ 0.5 +/- 0.03

R &gt; 0.5 +/- 0.05

Tolerance

D1 h10

D2 h6

Z4



38°



UMG

NOVA



Finishing

Slotting

Side Milling

Interpolation

## Features:

- Best suited for milling all types of Alloy Steel & Stainless Steel (SUS)
- High Wear Resistance NOVA coating
- Excellent performance in machining of Ortho Implants And Material like SS-316L
- Gives optimum performance on Finishing application with lower Ae (WOC) & High Feed

Item Code NOVA Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Corner Radius(R)
CR3AHCR00G8	3	12	50	4	0.50
CR3AHCR00Z6	3	12	50	4	1.00
CR3AHCR0016	4	16	50	6	0.50
CR3AHCR00L7	4	16	50	6	1.00
CR3AHCR00F0	5	16	50	6	0.50
CR3AHCR00H6	5	16	50	6	1.00
CR3AHCR0024	6	16	50	6	0.50
CR3AHCR0032	6	25	75	6	0.50
CR3AHCR00K9	6	16	50	6	1.00
CR3AHCR00P8	8	20	60	8	0.50
CR3AHCR00N2	8	30	75	8	0.50
CR3AHCR0040	8	20	60	8	1.00
CR3AHCR0057	8	30	75	8	1.00
CR3AHCR0065	8	40	100	8	1.00
CR3AHCR00J1	10	30	75	10	0.50
CR3AHCR0099	10	30	75	10	1.00
CR3AHCR00D4	10	40	100	10	1.00
CR3AHCR0073	10	30	75	10	1.50
CR3AHCR0081	10	40	100	10	1.50
CR3AHCR00M5	12	30	75	12	0.50
CR3AHCR00B9	12	30	75	12	1.00
CR3AHCR00E2	12	40	100	12	1.00

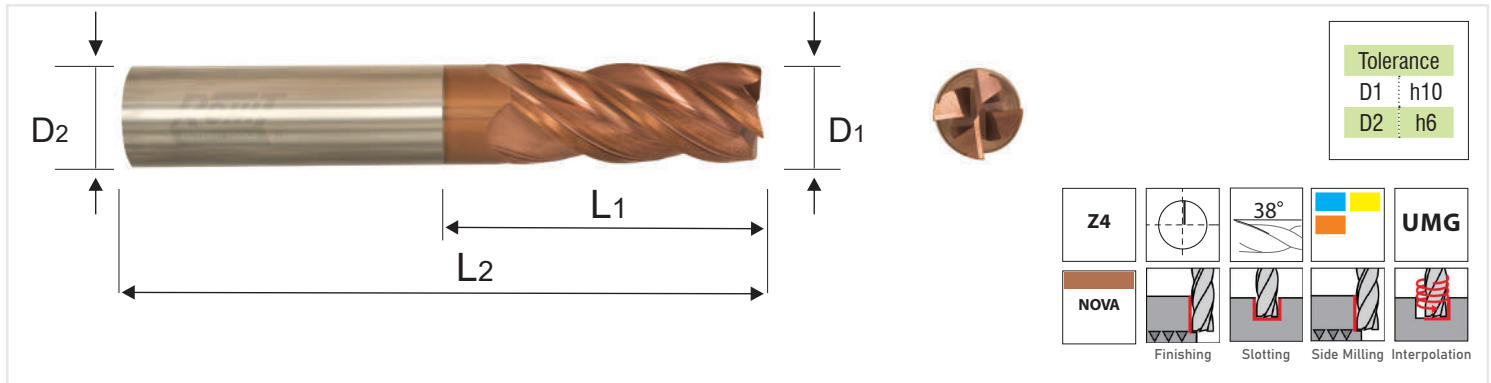
Item Code NOVA Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Corner Radius(R)
CR3AHCR00A1	12	30	75	12	1.50
CR3AHCR00C7	12	40	100	12	1.50
CR3AHCR00U7	14	40	100	14	2.00
CR3AHCR00Y8	16	40	100	16	1.00
CR3AHCR00V5	16	40	100	16	2.00
CR3AHCR00W3	18	40	100	18	2.00
321200100R2.0-N	20	50	100	20	2.00



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRC 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 TO 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	1 <sup>st</sup>				

NOTE: FOR FEED & SPEED Rates, go to page no. PG-141





## Features:

- Best suited for milling all types of Alloy Steel & Stainless Steel (SUS)
- High Wear Resistance NOVA coating
- Excellent performance in machining of Ortho Implants
- Gives optimum performance on Finishing application with lower Ae & High Feed

Item Code NOVA Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR3AHSE00LZ9	3	12	50	4
CR3AHSE00M00	4	16	50	6
CR3AHSE00PF9	4	20	75	6
CR3AHSE00MK1	5	16	50	6
CR3AHSE00M18	6	16	50	6
CR3AHSE00M26	6	25	75	6
CR3AHSE00M34	8	20	60	8
CR3AHSE00M42	8	30	75	8
CR3AHSE00M59	8	40	100	8

Item Code NOVA Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR3AHSE00M67	10	30	75	10
CR3AHSE00M75	10	40	100	10
CR3AHSE00M83	12	30	75	12
CR3AHSE00MA3	12	40	100	12
CR3AHSE00MB1	14	40	100	14
CR3AHSE00MD6	16	50	100	16
CR3AHSE00MM7	18	40	100	18
CR3AHSE00ME4	20	50	100	20

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
1st	1st	1st	1st	1st	2nd	2nd	1st	1st	2nd	2nd		1st			

NOTE: FOR FEED & SPEED Rates, go to page no. PG-141

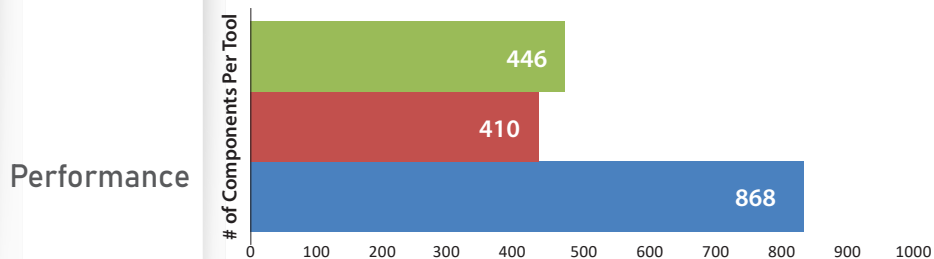
Description: S/C Rohit 3X Nova HP-Flat End Mill SUS

FØ:8 FL:20 SØ:8 OAL:60 Z=4 C322

Work-Piece Image



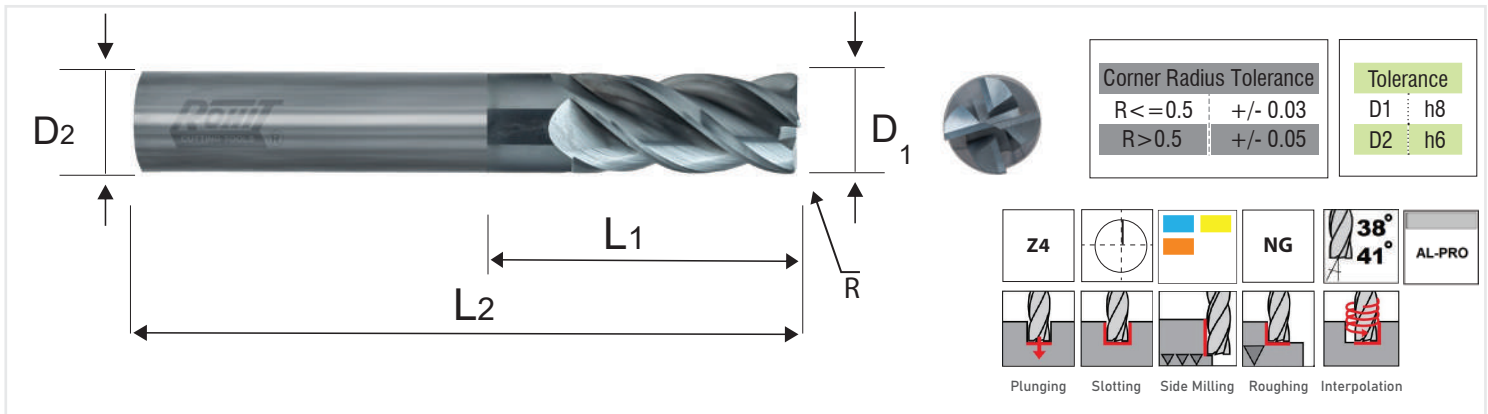
Industry	Automotive	
Component	Gear K S Driven	
Cutting Conditions	Tool Diameter	8mm
	Cutting Speed	100m/min
	RPM	4000
	Feed (mm/tooth)	0.025
	Table Feed (mm/min)	400
	DOC	4mm
	Radial Cut	-
Milling Type	Slotting	
Coolant	6% Mix Water Soluble	
Material	SCM 420M	
Hardness	320BHN	
Machine	Vertical Machining Centre HAAS	



Summary	
Endmill	Life (in components)
Competitor 1	446
Competitor 2	410
ROHIT-322	868
Improvement	95%

Result

~100% higher life than competitor and 30% reduction in cycle time



## Features:

- Variable Lead Geometry & Unequal Indexing design for chatter free milling operations
- Upto 60% Higher Feed Rates
- Specially Designed for machining Exotic Materials like Titanium, Ni-Cr based Alloys
- High DOC for effective material removal at very high Speeds and Feeds
- Highly Effective in Trochoidal milling
- Nano Grain Carbide Ensures Longer Tool Life

Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Corner Radius(R)
430040054-A	4	10	54	6	R0.3
430060063-A	6	12	63	6	R0.3
430080063-A	8	19	63	8	R0.5
430100072-A	10	22	72	10	R0.5
430120080-A	12	26	80	12	R0.75
430140080-A	14	26	80	14	R0.75
430160092-A	16	32	92	16	R0.75

Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Corner Radius(R)
4304428702-1/2-A	1/4	3/4	2-1/2	1/4	R0.01"
4304249102-1/2-A	5/16	13/16	2-1/2	5/16	R0.015"
43044411003-A	3/8	1	3	3/8	R0.015"
43044228003-A	1/2	1	3	1/2	R0.03"
4304441303-1/2-A	5/8	1-1/4	3-1/2	5/8	R0.03"

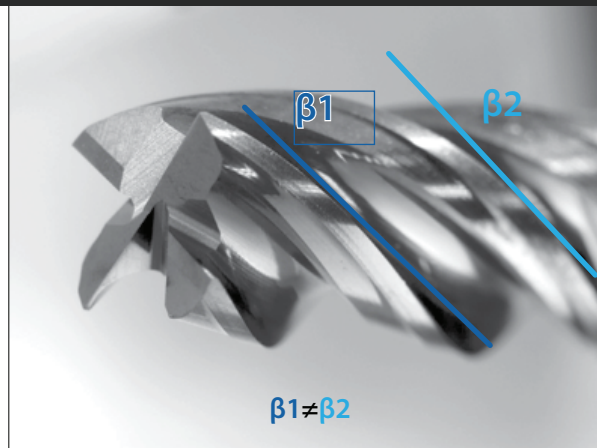
**Do you have difficulty milling INCONEL 718 or Other Nickel Alloys? Here is your guide to solving milling problems for nickel alloys**

Why Inconel behaves like that for machinist all over the world, Does this material has less affinity with the machinist, yes it does, but this love is not one sided but it is reciprocity in nature...



[Read more on rigpl.com/blog](http://rigpl.com/blog)

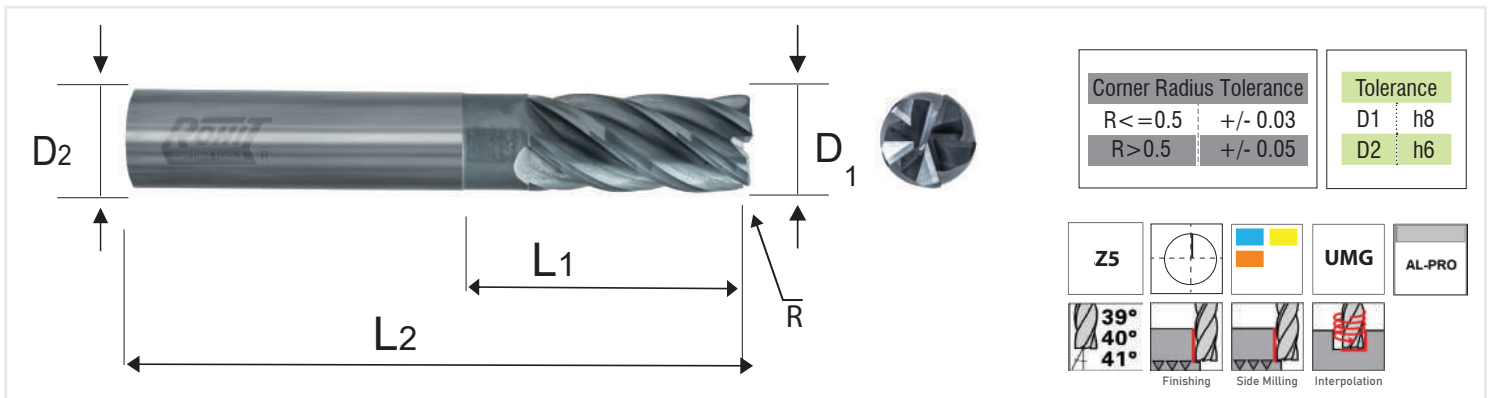
**Variable Lead of Peripheral Cutting Edge**



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>				2 <sup>nd</sup>		2 <sup>nd</sup>			

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period  
FOR FEED & SPEED Rates, go to page no. PG-143





## Features:

- Variable Lead Geometry & Unequal Indexing design for chatter free milling operations on all types of Alloy Steel, Stainless Steel & Exotic Materials
- Excellent for Finishing operations where Ra Value required is less than 5
- Chatter-free machining
- Capable of machining wide range of Exotic material like Titanium & Nickle Chromium Alloys
- Nano Grain Carbide Ensures Longer Tool Life
- With 5-Flute Larger Core, which helps in Sturdy Machining and increased Productivity

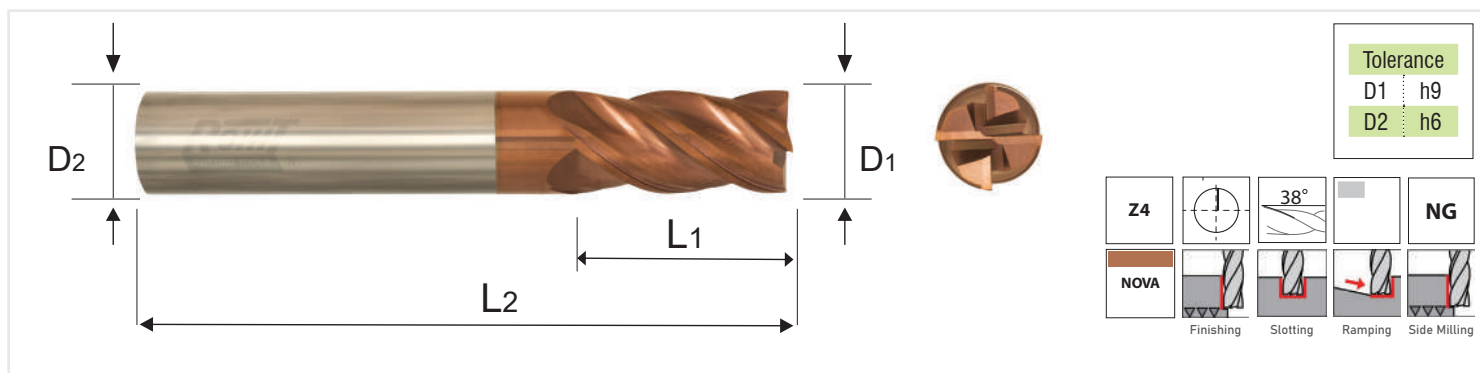
Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Corner Radius(R)
433060063-A	6	12	63	6	R0.3
433080063-A	8	16	63	8	R0.5
433100072-A	10	22	72	10	R0.5
433120080-A	12	26	80	12	R0.75
433140080-A	14	26	80	14	R0.75
433160092-A	16	32	92	16	R0.75

Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Corner Radius(R)
4334428702-1/2-A	1/4	3/4	2-1/2	1/4	R0.01"
4334249102-1/2-A	5/16	13/16	2-1/2	5/16	R0.015"
43344411003-A	3/8	1	3	3/8	R0.015"
43344228003-A	1/2	1	3	1/2	R0.03"
4334441303-1/2-A	5/8	1-1/4	3-1/2	5/8	R0.03"



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>				2 <sup>nd</sup>					

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period  
 FOR FEED & SPEED Rates, go to page no. PG-143

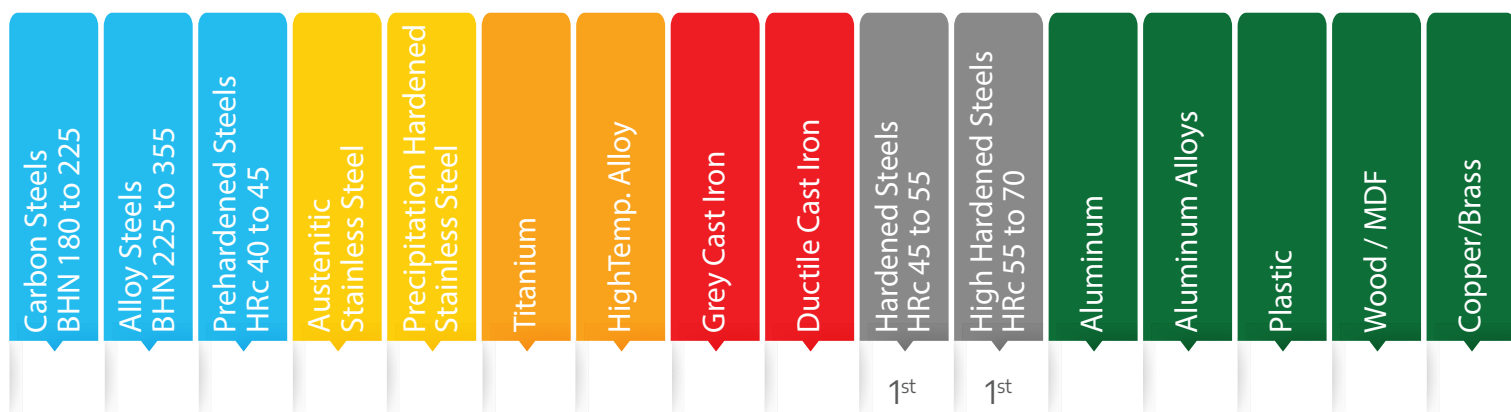


## Features:

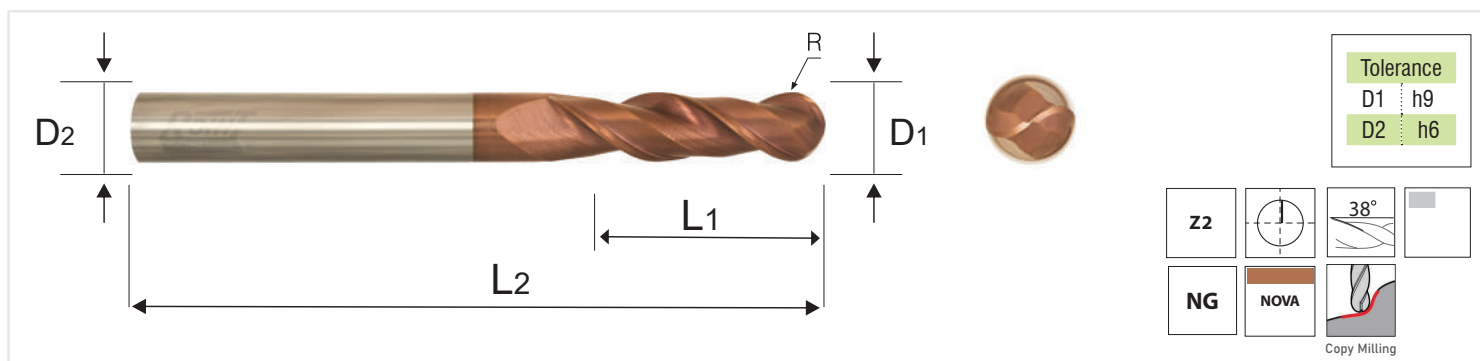
- High Performance Carbide End Mills for Die-Mold Industry developed at RIGPL.
- ~ 2-Times Cutting Tool life is achieved in comparison to 301 Series Carbide End mills.
- ~ 2-Times Cutting Parameters are achieved in comparison to 301 Series Carbide End mills.
- 4-Flute Carbide End Mills manufactured from NG (Nano-Grain) carbide
- Solid Carbide Cutting Tools for milling up to 65-HRc hardened die steel & tool steel like D2, D3, H13 etc.

Item Code NOVA Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR4AHSE00T43	1	2	50	4
CR4AHSE00T68	1.5	3	50	4
CR4AHSE00T50	2	4	50	4
CR4AHSE00T76	2.5	6	50	4
CR49HSE00JU8	3	12	50	4
CR49HSE00JV6	4	12	50	4
CR49HSE00JW4	4	20	75	4
CR49HSE00JX1	6	16	50	6

Item Code NOVA Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR49HSE00JY9	6	25	75	6
CR4AHSE00ML7	8	20	60	8
CR49HSE00JZ7	8	25	75	8
CR49HSE00K08	8	30	100	8
CR49HSE00K16	10	25	75	10
CR49HSE00K24	10	40	100	10
CR49HSE00K32	12	25	75	12
CR49HSE00K40	12	40	100	12



NOTE: FOR FEED & SPEED Rates, go to page no. PG-144



## Features:

- High Performance Carbide Ball Nose for Die-Mold Industry developed at RIGPL.
- ~ 2-Times Cutting Parameters are achieved in comparison to 302/304 Series Ball Nose End mills
- 2-Flute Carbide Ball Nose End Mills manufactured from NG (Nano-Grain) carbide
- ~ 2-Times Cutting Tool life is achieved in comparison to 302/304 Series Carbide Ball Nose
- Ball Nose End Mills for milling up to 65-HRc hardened die steel & tool steel like D2, D3, H13 etc.

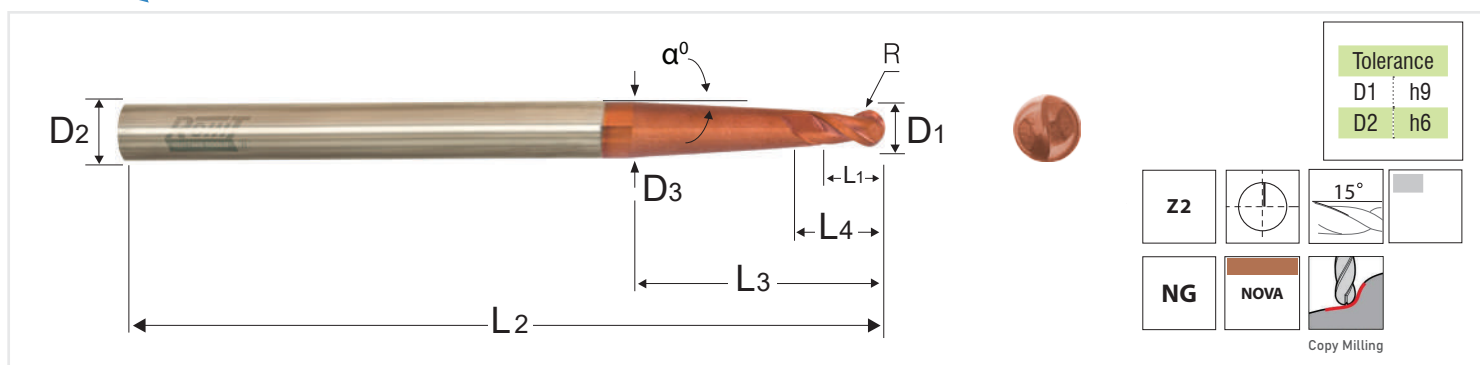
Item Code NOVA Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR4AHBE00FV9	1	2	50	4
CR4AHBE00FX4	1.5	3	50	4
CR4AHBE00FW7	2	4	50	4
CR4AHBE00FY2	2.5	6	50	4
CR49HBE00DE6	3	12	50	4
CR49HBE00DF4	4	12	50	4
CR49HBE00DG2	4	20	75	4
CR49HBE00DH0	6	16	50	6

Item Code NOVA Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR49HBE00DJ5	6	25	75	6
CR4AHBE00FZ0	8	20	60	8
CR49HBE00DK3	8	25	75	8
CR49HBE00DL1	8	30	100	8
CR49HBE00DM9	10	25	75	10
CR49HBE00DN6	10	40	100	10
CR49HBE00DP2	12	25	75	12
CR49HBE00DQ0	12	40	100	12

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
		1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>			1 <sup>st</sup>	1 <sup>st</sup>					

NOTE: FOR FEED & SPEED Rates, go to page no. PG-144

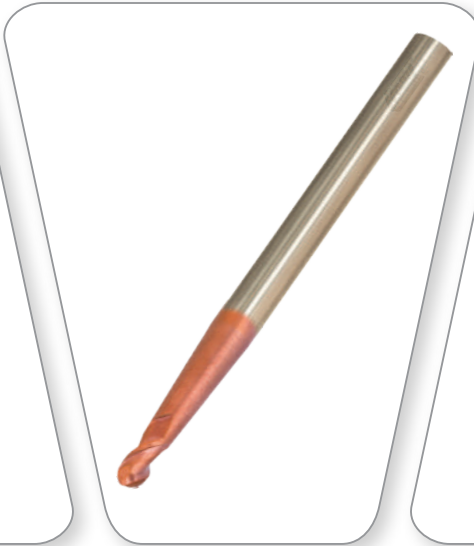
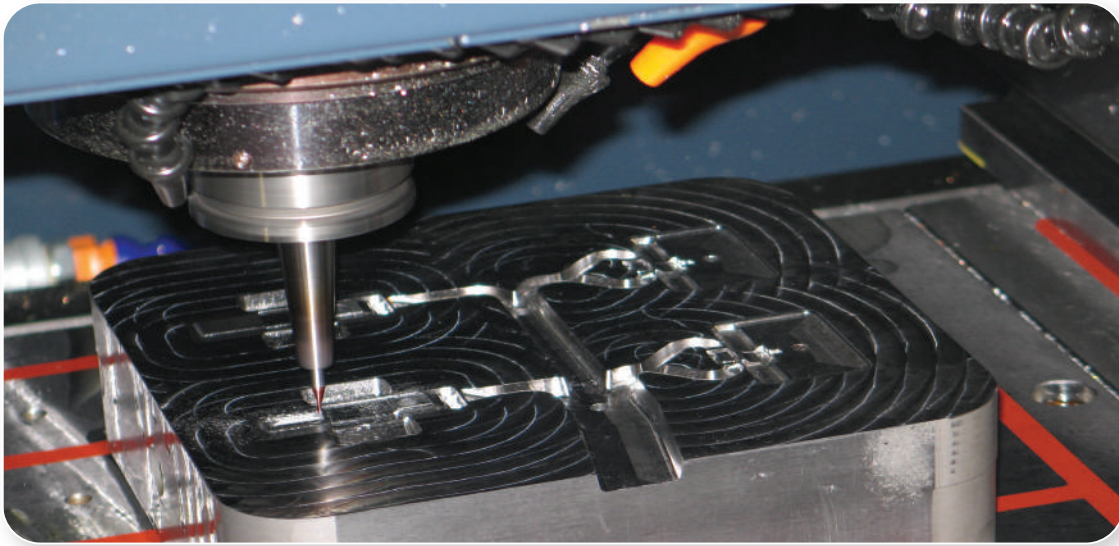




## Features:

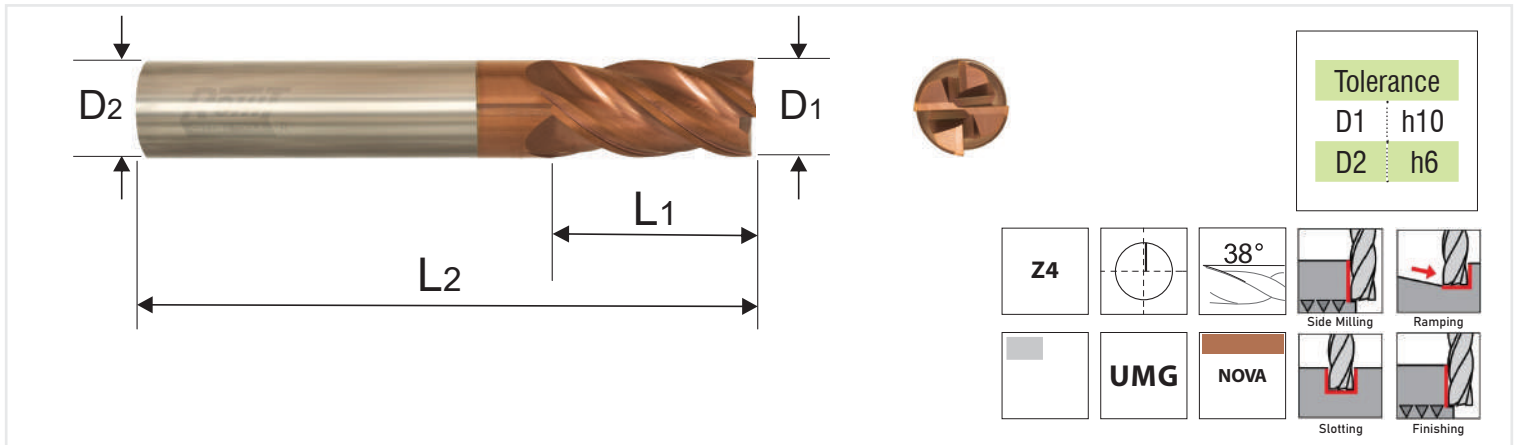
- NOVA coating which work at temperature upto ~1500 deg C
- Suitable for machining Hardened dies & tool steel material upto 65 HRC
- Higher Feeds & Reduced cycle time
- Long neck design for deep machining near walls with LESS Chatter
- Increased Tool Strength and Reduced Tool Deflection

Ordering Code	R	Flute Dia(D1)	Flute Len(L1)	L4	Reach Len(L3)	Overall Len(L2)	Shank Dia(D2)	Neck Dia(D3)	Neck Taper Angle( $\alpha^\circ$ )
40602006006-N	1	2	4	6	23	60	6	2.9	1°30'
40602006006-N	1	2	4	6	23	60	6	5	5°
40602008006-N	1	2	4	6	41	80	6	5.7	3°
40603007506-N	1.5	3	6	8	32	75	6	5.6	3°
40603009006-N	1.5	3	6	8	52	90	6	5.3	1°30'
40604007506-N	2	4	8	10	28	75	6	6	3°
40604009006-N	2	4	8	10	49	90	6	6	1°30'
40605008008-N	2.5	5	10	12	41	80	8	8	3°
40605010008-N	2.5	5	10	12	51	100	8	7	1°30'
40606008008-N	3	6	12	15	34	80	8	8	3°
40606010008-N	3	6	12	15	53	100	8	8	1°30'
40608008010-N	4	8	14	17	36	80	10	10	3°
40608010010-N	4	8	14	17	55	100	10	10	1°30'
40610008012-N	5	10	18	21	40	80	12	12	3°
40610010012-N	5	10	18	21	59	100	12	12	1°30'
40612011016-N	6	12	22	25	63	110	16	16	3°
40612013016-N	6	12	22	25	83	130	16	15	1°30'



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRC 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
		1st	2nd	1st	1st	1st			1st	1st					

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period FOR FEED & SPEED Rates, go to page no. PG-144



## Features:

- High Wear Resistance NOVA coating
- Excellent for machining Hardened dies & tool steel material ranging from 55 ~ 60 HRC
- Specially designed for Chatter free machining
- Rigid Flute Design helps in Side Milling operations with higher WOC

Item Code (NOVA Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR3AHSE00PA0	1.0	3	50	4
CR3AHSE00PB8	1.5	3	50	4
CR3AHSE00PC6	2.0	6	50	4
CR3AHSE00PD3	2.5	8	50	4
CR33HSE003A3	3.0	15	50	3
CR33HSE003C9	3.0	20	75	3
CR33HSE00FY1	3.0	25	100	3
CR33HSE003D6	4.0	14	50	4
CR33HSE003F2	4.0	20	75	4
CR33HSE00FN5	4.0	25	100	4
CR33HSE00HV6	4.0	50	150	4
CR33HSE003G0	5.0	16	50	5
CR33HSE003H8	5.0	20	75	5
CR33HSE00HH7	5.0	25	100	5
CR33HSE003J3	6.0	16	50	6
CR33HSE003K1	6.0	25	75	6
CR33HSE003L9	6.0	30	100	6
CR33HSE00FP1	6.0	50	150	6

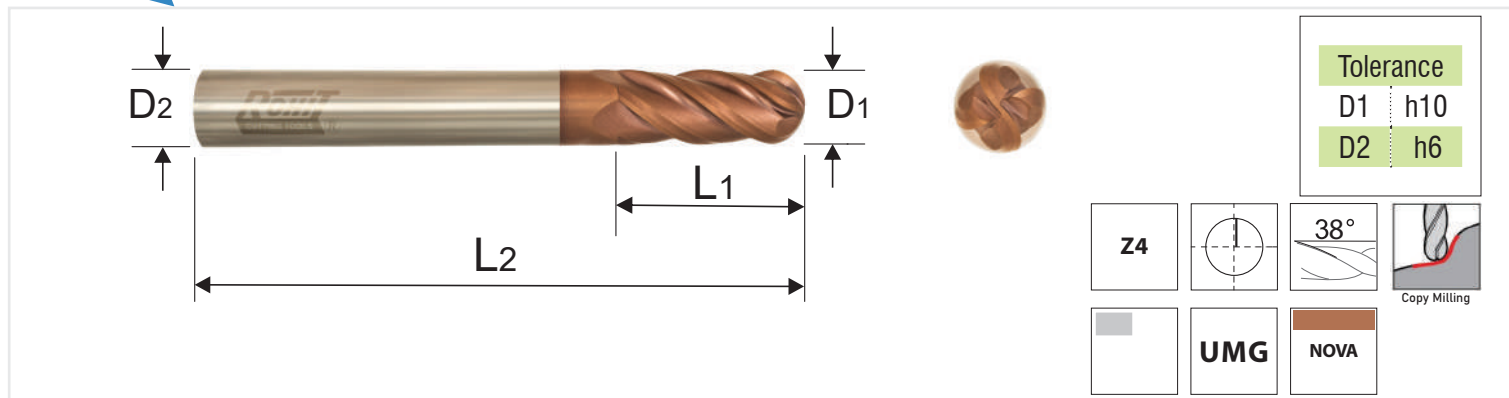
Item Code (NOVA Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR33HSE003M7	8.0	20	60	8
CR33HSE003N4	8.0	25	75	8
CR33HSE00G59	8.0	30	100	8
CR33HSE003P0	8.0	50	150	8
CR33HSE003R6	10.0	25	75	10
CR33HSE003S3	10.0	40	100	10
CR33HSE003T1	10.0	60	150	10
CR3AHSE00PH5	10.0	60	200	10
CR33HSE00CP4	12.0	25	75	12
CR33HSE003U9	12.0	40	100	12
CR33HSE003V7	12.0	60	150	12
CR3AHSE00T86	12.0	60	200	12
CR33HSE00L54	14.0	40	100	14
CR33HSE003X2	16.0	40	100	16
CR33HSE00HT0	16.0	60	150	16
CR33HSE00L47	20.0	40	100	20
CR3AHSE00R39	20.0	60	150	20



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
		2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>					1 <sup>st</sup>	2 <sup>nd</sup>					

NOTE: FOR FEED & SPEED Rates, go to page no. PG-145





## Features:

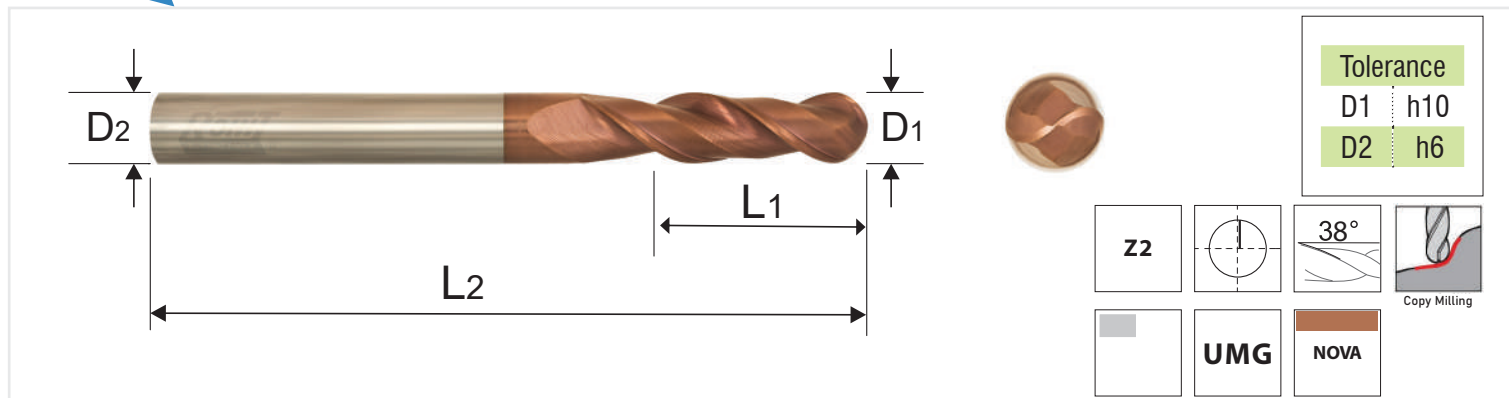
- High Wear Resistance NOVA coating
- Excellent for machining Hardened dies & tool steel material ranging from 55 ~ 60 HRc
- Specially designed tools to provide effective material removal and higher surface finish of Moulds
- Also recommended for machining Stainless Steel material

Item Code (NOVA Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR33HBE00364	3.0	15	50	3
CR33HBE00AM0	3.0	20	75	3
CR33HBE00BV9	4.0	14	50	4
CR33HBE00AN7	4.0	20	75	4
CR33HBE00AY3	4.0	25	100	4
CR33HBE00C50	5.0	16	50	5
CR33HBE00BU1	5.0	20	75	5
CR33HBE00DX2	5.0	25	100	5
CR33HBE00BW7	6.0	16	50	6
CR33HBE00372	6.0	25	75	6
CR33HBE00BB3	6.0	30	100	6
CR33HBE00CA4	6.0	50	150	6

Item Code (NOVA Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR33HBE00C92	8.0	20	60	8
CR33HBE00380	8.0	25	75	8
CR33HBE00B36	8.0	30	100	8
CR33HBE00C84	8.0	50	150	8
CR33HBE00BY2	10.0	25	75	10
CR33HBE00398	10.0	40	100	10
CR33HBE00B44	10.0	60	150	10
CR33HBE00AH1	12.0	25	75	12
CR33HBE00CB2	12.0	40	100	12
CR33HBE00CC0	12.0	60	150	12
CR33HBE003A0	16.0	40	100	16

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>				1 <sup>st</sup>	2 <sup>nd</sup>							

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## Features:

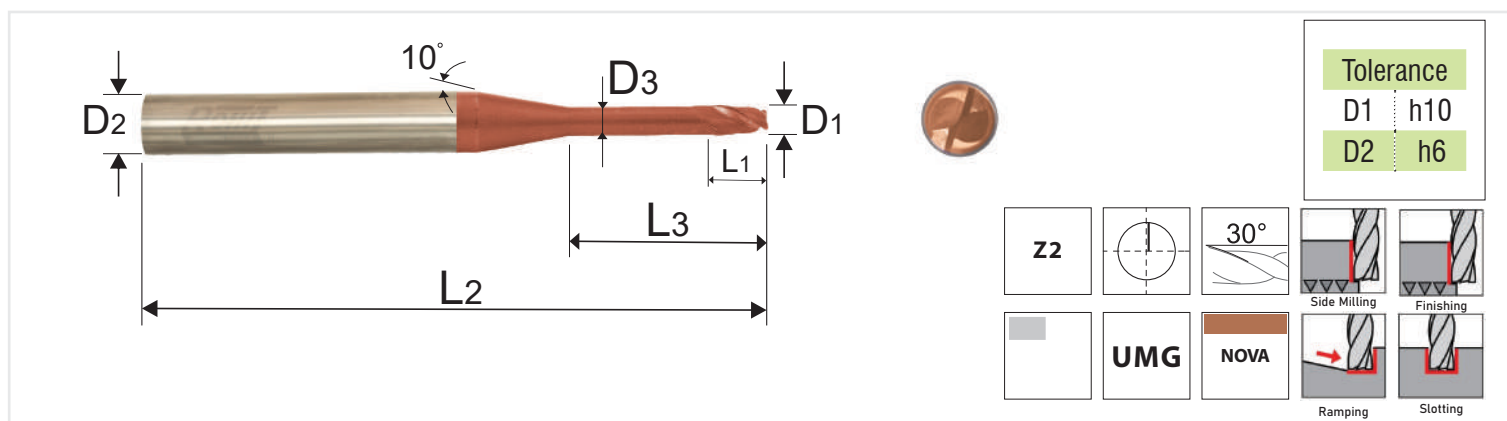
- High Wear Resistance NOVA coating
- Excellent for machining Hardened dies & tool steel material ranging from 55 ~ 60HRc
- Specially designed tools to provide effective material removal and higher surface finish of Moulds

Item Code (NOVA Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR33HBE008R8	1.0	3	50	4
CR3AHBE00E39	1.5	3	50	4
CR3AHBE00E47	2.0	4	50	4
CR3AHBE00E54	2.5	5	50	4
CR33HBE00BR8	3.0	15	50	3
CR33HBE00AT4	3.0	20	75	3
CR33HBE00B51	3.0	25	100	3
CR33HBE00315	4.0	14	50	4
CR33HBE00AU2	4.0	20	75	4
CR33HBE00B69	4.0	25	100	4
CR33HBE00E09	5.0	16	50	5
CR33HBE00C43	5.0	20	75	5
CR33HBE00B93	6.0	16	50	6

Item Code (NOVA Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR33HBE00323	6.0	25	75	6
CR33HBE00331	6.0	30	100	6
CR33HBE00BX4	6.0	50	150	6
CR33HBE00BA5	8.0	20	60	8
CR33HBE00BH0	8.0	25	75	8
CR33HBE00B85	8.0	30	100	8
CR33HBE00349	8.0	50	150	8
CR33HBE00356	10.0	25	75	10
CR33HBE00B77	10.0	40	100	10
CR33HBE009M8	10.0	60	150	10
CR33HBE009N5	12.0	25	75	12
CR33HBE00BP2	12.0	40	100	12
CR33HBE009Q9	12.0	60	150	12

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
		2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>					1 <sup>st</sup>	2 <sup>nd</sup>					

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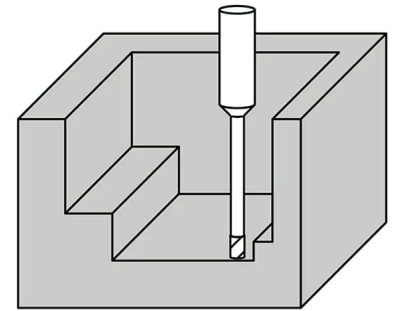


## Features:

- For 3-D milling in Dies and Moulds for deep reach applications
- Re-inforced shank to provide High stability
- High Wear Resistance NOVA coating
- Long neck design for Deep Machining near walls
- 4-Flute above Dia 2mm can be available on Special request

Item Code (NOVA Coated)	Flute Dia (D1)	Flute Len (L1)	Overall Len (L2)	Shank Dia (D2)	Reach Len (L3)	Neck Dia (D3)
CR3AHSE00QW1	1.0	2.0	50	4	6	0.95
CR3AHSE00QX8	1.0	2.0	50	4	10	0.95
CR3AHSE00PN1	1.5	2.5	50	4	6	1.45
CR3AHSE00PP7	1.5	2.5	50	4	10	1.45
CR3AHSE00QY6	1.5	2.5	50	4	20	1.45
CR3AHSE00PQ5	2.0	3.0	50	4	8	1.95
CR3AHSE00PR3	2.0	3.0	50	4	12	1.95
CR3AHSE00PS0	2.0	3.0	50	4	16	1.95
CR3AHSE00PT8	2.0	3.0	50	4	20	1.95
CR3AHSE00PU6	2.5	4.0	50	4	8	2.40
CR3AHSE00PV4	2.5	4.0	50	4	12	2.40
CR3AHSE00PW2	2.5	4.0	50	4	16	2.40
CR3AHSE00PX9	2.5	4.0	50	4	20	2.40
CR3AHSE00PY7	3.0	5.0	50	6	8	2.85
CR3AHSE00PZ5	3.0	5.0	50	6	12	2.85
CR3AHSE00Q06	3.0	5.0	60	6	16	2.85
CR3AHSE00Q14	3.0	5.0	60	6	20	2.85
CR3AHSE00Q22	3.0	5.0	75	6	25	2.85

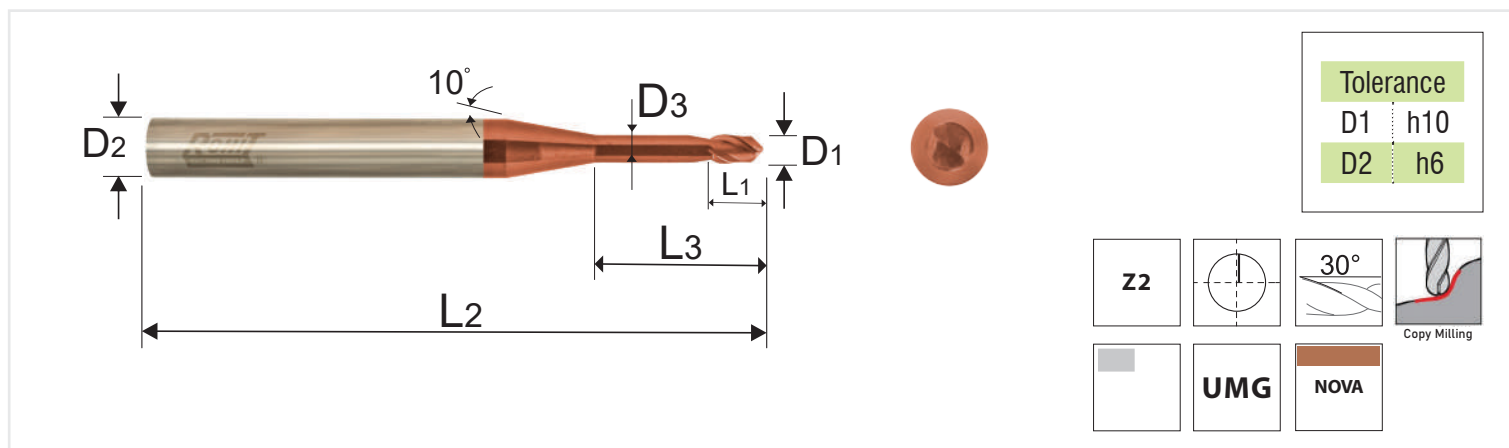
Item Code (NOVA Coated)	Flute Dia (D1)	Flute Len (L1)	Overall Len (L2)	Shank Dia (D2)	Reach Len (L3)	Neck Dia (D3)
CR3AHSE00Q30	4.0	6.0	50	6	12	3.85
CR3AHSE00Q48	4.0	6.0	60	6	16	3.85
CR3AHSE00Q55	4.0	6.0	75	6	20	3.85
CR3AHSE00Q63	4.0	6.0	75	6	25	3.85
CR3AHSE00Q71	4.0	6.0	75	6	30	3.85
CR3AHSE00Q89	4.0	6.0	75	6	35	3.85



In-Depth machining with 305 and 306 series Rib Endmills & Ballnose helps in Effective machining and less chances of Tool breakage

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>					1 <sup>st</sup>	2 <sup>nd</sup>		1 <sup>st</sup>			

NOTE: FOR FEED & SPEED Rates, go to page no. PG-145



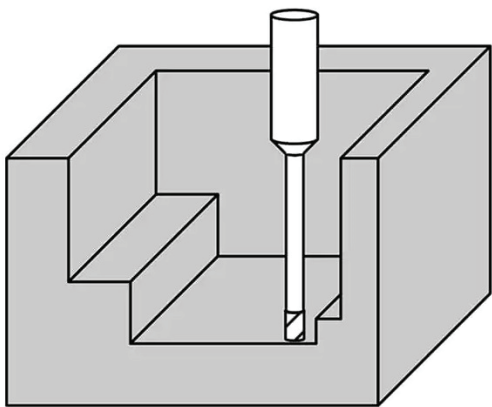
## Features:

- For 3-D milling in Dies and Moulds for deep reach applications
- Re-inforced shank to provide High stability
- High Wear Resistance NOVA coating
- Specially designed Ballnose with Long neck for Deep Machining of Moulds with Higher Accuracy
- 4 Flute Ballnose above dia 2mm can be made on Special request

Item Code (NOVA Coated)	Flute Dia (D1)	Flute Len (L1)	Overall Len (L2)	Shank Dia (D2)	Reach Len (L3)	Neck Dia (D3)
CR3AHBE00EV2	1.0	2.0	50	4	6	0.95
CR3AHBE00EW0	1.0	2.0	50	4	10	0.95
CR3AHBE00E88	1.5	2.5	50	4	6	1.45
CR3AHBE00E96	1.5	2.5	50	4	10	1.45
CR3AHBE00EX7	1.5	2.5	50	4	20	1.45
CR3AHBE00EA8	2.0	3.0	50	4	8	1.95
CR3AHBE00EB6	2.0	3.0	50	4	12	1.95
CR3AHBE00EC4	2.0	3.0	50	4	16	1.95
CR3AHBE00ED1	2.0	3.0	50	4	20	1.95
CR3AHBE00EE9	2.5	4.0	50	4	8	2.40
CR3AHBE00EF7	2.5	4.0	50	4	12	2.40
CR3AHBE00EG5	2.5	4.0	50	4	16	2.40
CR3AHBE00EH3	2.5	4.0	50	4	20	2.40
CR3AHBE00EJ8	3.0	5.0	50	6	8	2.85
CR3AHBE00EK6	3.0	5.0	50	6	12	2.85
CR3AHBE00EL4	3.0	5.0	60	6	16	2.85
CR3AHBE00EM2	3.0	5.0	60	6	20	2.85
CR3AHBE00EN9	3.0	5.0	75	6	25	2.85



Item Code (NOVA Coated)	Flute Dia (D1)	Flute Len (L1)	Overall Len (L2)	Shank Dia (D2)	Reach Len (L3)	Neck Dia (D3)
CR3AHBE00EP5	4.0	6.0	50	6	12	3.85
CR3AHBE00EQ3	4.0	6.0	60	6	16	3.85
CR3AHBE00ER1	4.0	6.0	75	6	20	3.85
CR3AHBE00ES8	4.0	6.0	75	6	25	3.85
CR3AHBE00ET6	4.0	6.0	75	6	30	3.85
CR3AHBE00EU4	4.0	6.0	75	6	35	3.85

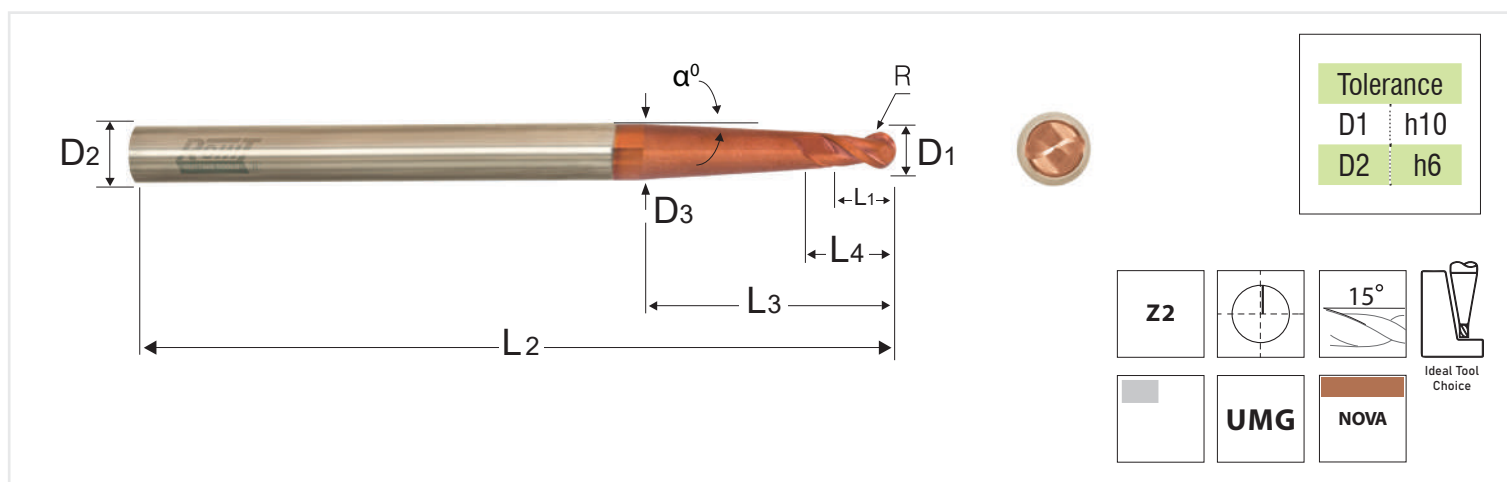


In-Depth machining with 305 and 306 series Rib Endmills & Ballnose helps in Effective machining and less chances of Tool breakage



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>					1 <sup>st</sup>	2 <sup>nd</sup>		1 <sup>st</sup>			

Above Material Selection Table is also applicable for Taperneck Ballnose Series-307  
NOTE: FOR FEED & SPEED Rates, go to page no. PG-147



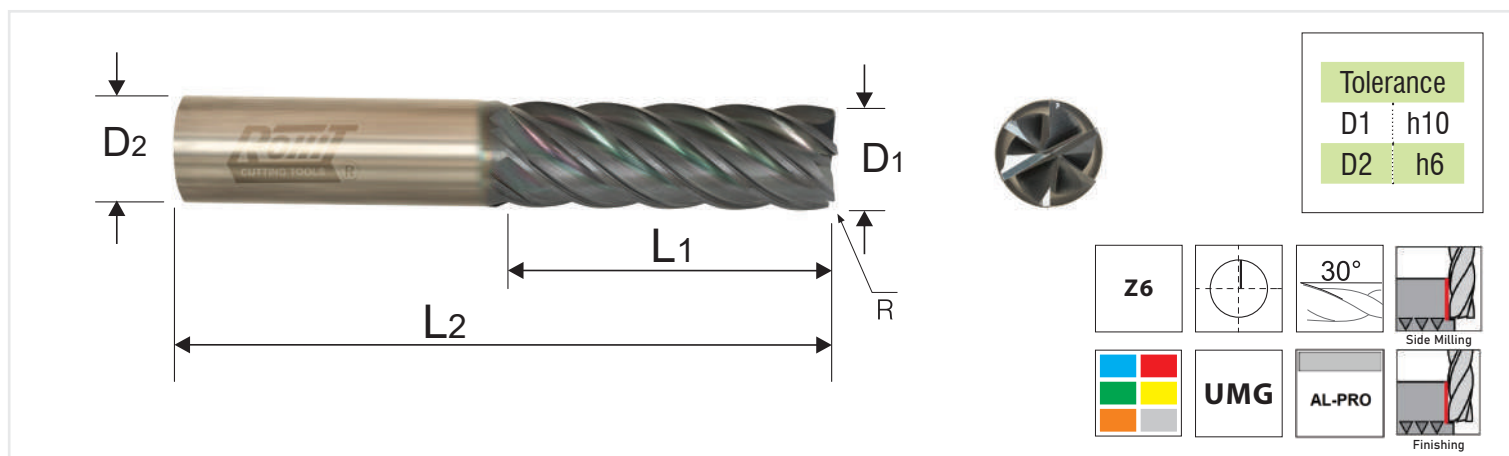
## Features:

- Specially designed Ballnose with Long neck for Deep Machining of Moulds with Higher Accuracy

Ordering Code	Flute Dia (D1)	Flute Len (L1)	L4	Reach Len (L3)	Overall Len (L2)	Shank Dia (D2)	Neck Dia (D3)	Neck Taper Angle ( $\alpha$ )
3070200601-N	2	4	6	23	60	6	2.9	1°3'
3070200605-N	2	4	6	23	60	6	5	5°
3070200803-N	2	4	6	41	80	6	5.7	3°
3070300753-N	3	6	8	32	75	6	5.6	3°
3070300901-N	3	6	8	52	90	6	5.3	1°3'
3070400753-N	4	8	10	28	75	6	6	3°
3070400901-N	4	8	10	49	90	6	6	1°3'
3070500803-N	5	10	12	41	80	8	8	3°
3070501001-N	5	10	12	51	100	8	7	1°3'
3070600803-N	6	12	15	34	80	8	8	3°
3070601001-N	6	12	15	53	100	8	8	1°3'
3070800803-N	8	14	17	36	80	10	10	3°
3070801001-N	8	14	17	55	100	10	10	1°3'
3071000803-N	10	18	21	40	80	12	12	3°
3071001001-N	10	18	21	59	100	12	12	1°3'
3071201103-N	12	22	25	63	110	16	16	3°
3071201301-N	12	22	25	83	130	16	15	1°3'

Refer Page Pg-107 for Material Selection

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period  
 FOR FEED & SPEED Rates, go to page no. PG-147



## Features:

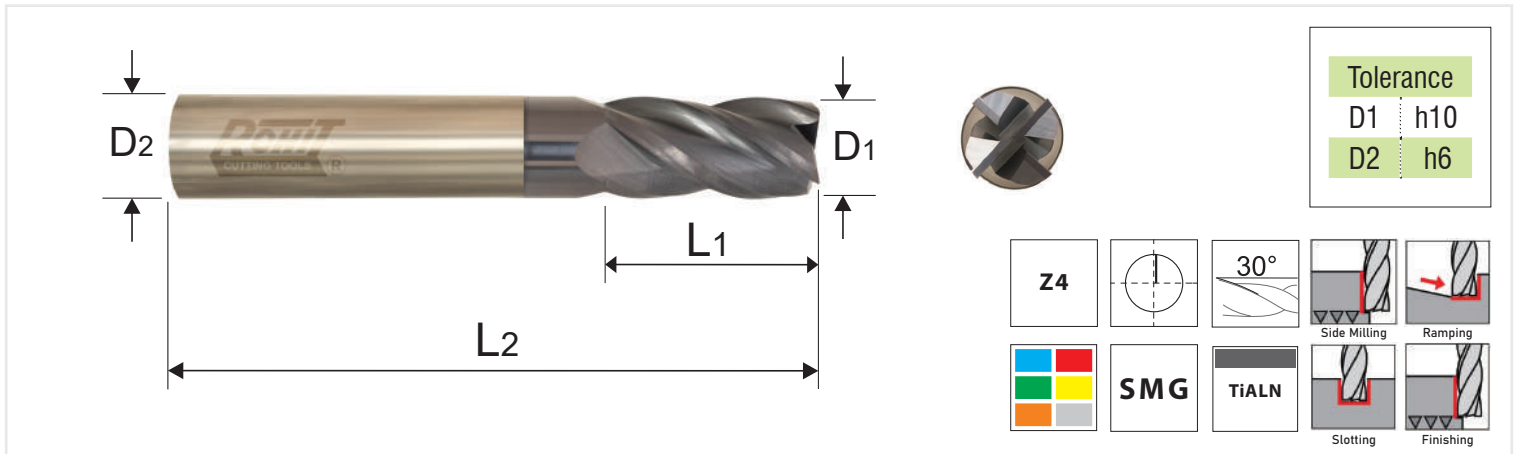
- For machining in FINISHING applications with very LOW width of cut.
- Corner Radius to provide more edge strength.

Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
308060075R0.5-A	6	25	75	R0.5
308060075R1.0-A	6	25	75	R1.0
308080075R0.5-A	8	25	75	R0.5
308080075R1.0-A	8	25	75	R1.0
308080075R1.5-A	8	25	75	R1.5
308100075R0.5-A	10	30	75	R0.5
308100075R1.0-A	10	30	75	R1.0
308100075R1.5-A	10	30	75	R1.5
308120075R1.0-A	12	30	75	R1.0
308120075R1.5-A	12	30	75	R1.5

Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
308120075R2.0-A	12	30	75	R2.0
308160100R1.0-A	16	40	100	R1.0
308160100R2.0-A	16	40	100	R2.0
308160100R3.0-A	16	40	100	R3.0
308180100R1.0-A	18	40	100	R1.0
308180100R2.0-A	18	40	100	R2.0
308180100R3.0-A	18	40	100	R3.0
308200100R1.0-A	20	40	100	R1.0
308200100R2.0-A	20	40	100	R2.0
308200100R3.0-A	20	40	100	R3.0

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRC 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRC 45 to 55	High Hardened Steels HRC 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
1st	1st	1st	1st	1st	1st	2nd	1st	1st	1st	2nd	1st	1st			

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period  
FOR FEED & SPEED Rates, go to page no. PG-145



## Features:

- TiALN Coated for Improved Performance
- General Purpose Machining for Stainless Steel, Soft Steel, Cast Iron & Non-ferrous material
- 4-Flute for improved Surface Finish

Item Code (TiALN Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR11GSE009A5	3	15	50	3
CR11GSE009B3	3	20	75	3
CR11GSE009C1	3	25	100	3
CR11GSE009E6	4	14	50	4
CR11GSE009G2	4	20	75	4
CR11GSE009H0	4	25	100	4
CR11GSE009J5	5	16	50	5
CR11GSE009K3	5	20	75	5
CR11GSE009L1	5	25	100	5
CR11GSE009Q0	6	16	50	6
CR11GSE009R8	6	25	75	6
CR11GSE009S5	6	30	100	6
CR11GSE009T3	6	50	150	6
CR11GSE009X4	7	20	60	7
CR11GSE00A04	8	20	60	8
CR11GSE00A12	8	25	75	8
CR11GSE00A20	8	30	100	8
CR11GSE00A38	8	50	150	8

Item Code (TiALN Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR11GSE00PJ2	8	50	200	8
CR11GSE00A46	9	25	75	9
CR11GSE00A79	10	25	75	10
CR11GSE00A87	10	40	100	10
CR11GSE00A95	10	60	150	10
CR11GSE00PL8	10	60	200	10
CR11GSE00HB8	11	25	75	11
CR11GSE00AA7	12	25	75	12
CR11GSE00AB5	12	40	100	12
CR11GSE00AC3	12	60	150	12
CR11GSE00AD0	12	60	200	12
CR11GSE00HC6	13	40	100	13
CR11GSE00332	14	30	75	14
CR11GSE00AF6	14	40	100	14
CR11GSE00AG4	14	60	150	14
CR11GSE00AH2	14	60	200	14
CR11GSE00HW2	16	30	75	16
CR11GSE00AJ7	16	40	100	16

Item Code (TiALN Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR11GSE00AK5	16	60	150	16
CR11GSE00AL3	16	60	200	16
CR11GSE00AM1	18	40	100	18
CR11GSE00AN8	18	60	150	18
CR11GSE00AP4	18	60	200	18
CR11GSE00AQ2	20	40	100	20

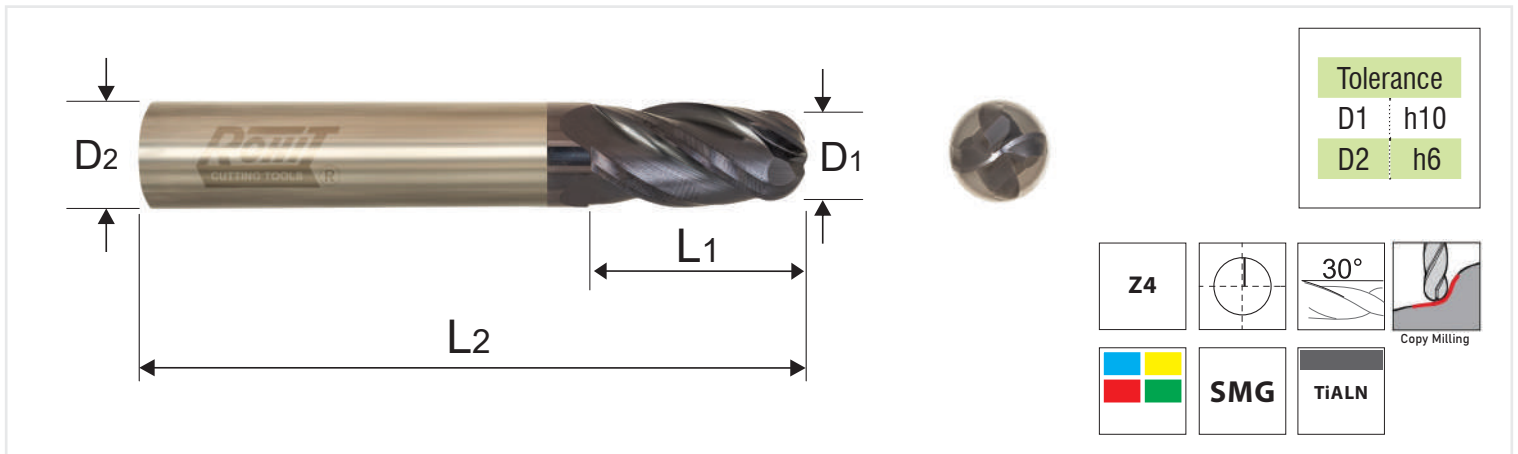
Item Code (TiALN Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR11GSE00AR0	20	60	150	20
CR11GSE00AS7	20	60	200	20
CR11GSE00PK0	22	40	100	22
CR11GSE00AT5	25	40	100	25
CR11GSE00AU3	25	60	150	25
CR11GSE00AV1	25	60	200	25



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
1 <sup>st</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>				1 <sup>st</sup>	2 <sup>nd</sup>			2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>

NOTE: FOR FEED & SPEED Rates, go to page no. PG-151





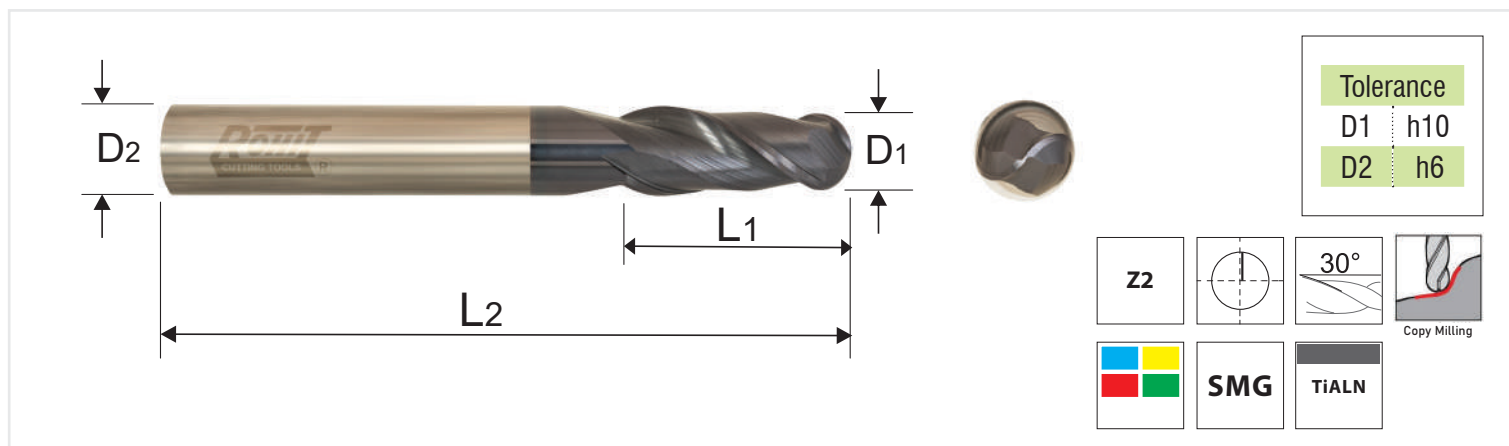
## Features:

- TiALN Coated for Improved Performance
- General Purpose Machining for Stainless Steel, Soft Steel, Cast Iron & Non-ferrous material

Item Code (TiALN Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR11GBE007H9	3	15	50	3
CR11GBE007J4	3	20	75	3
CR11GBE007K2	3	25	100	3
CR11GBE007L0	4	14	50	4
CR11GBE007M8	4	20	75	4
CR11GBE007N5	4	25	100	4
CR11GBE007P1	5	16	50	5
CR11GBE007Q9	5	20	75	5
CR11GBE007R7	5	25	100	5
CR11GBE007S4	6	16	50	6
CR11GBE007T2	6	25	75	6
CR11GBE007U0	6	30	100	6
CR11GBE007V8	6	50	150	6
CR11GBE007W6	7	20	60	7
CR11GBE007X3	8	20	60	8
CR11GBE007Y1	8	25	75	8
CR11GBE007Z9	8	30	100	8
CR11GBE00800	8	50	150	8
CR11GBE00818	9	25	75	9
CR11GBE00826	10	25	75	10
CR11GBE00834	10	40	100	10
CR11GBE00842	10	60	150	10

Item Code (TiALN Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR11GBE00859	12	25	75	12
CR11GBE00867	12	40	100	12
CR11GBE00875	12	60	150	12
CR11GBE00883	12	60	200	12
CR11GBE00C17	14	30	75	14
CR11GBE00891	14	40	100	14
CR11GBE008A3	14	60	150	14
CR11GBE008B1	14	60	200	14
CR11GBE00C74	16	30	75	16
CR11GBE008C9	16	40	100	16
CR11GBE008D6	16	60	150	16
CR11GBE008E4	16	60	200	16
CR11GBE008F2	18	40	100	18
CR11GBE008G0	18	60	150	18
CR11GBE008H8	18	60	200	18
CR11GBE008J3	20	40	100	20
CR11GBE008K1	20	60	150	20
CR11GBE008L9	20	60	200	20
CR11GBE008M7	25	40	100	25
CR11GBE008N4	25	60	150	25
CR11GBE008P0	25	60	200	25

Refer Page Pg-113 for Material Selection



## Features:

- General Purpose Machining for Steel, Cast Iron & Non-ferrous material
- Specifically used for Machining of Hard Wood with UNCOATED BALLNOSE

Item Code (TiALN Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR11GBE00537	3.0	15	50	3
CR11GBE00545	3.0	20	75	3
CR11GBE00552	3.0	25	100	3
CR11GBE00560	4.0	14	50	4
CR11GBE00578	4.0	20	75	4
CR11GBE00586	4.0	25	100	4
CR11GBE00594	5.0	16	50	5
CR11GBE005A6	5.0	20	75	5
CR11GBE005B4	5.0	25	100	5
CR11GBE005C2	6.0	16	50	6

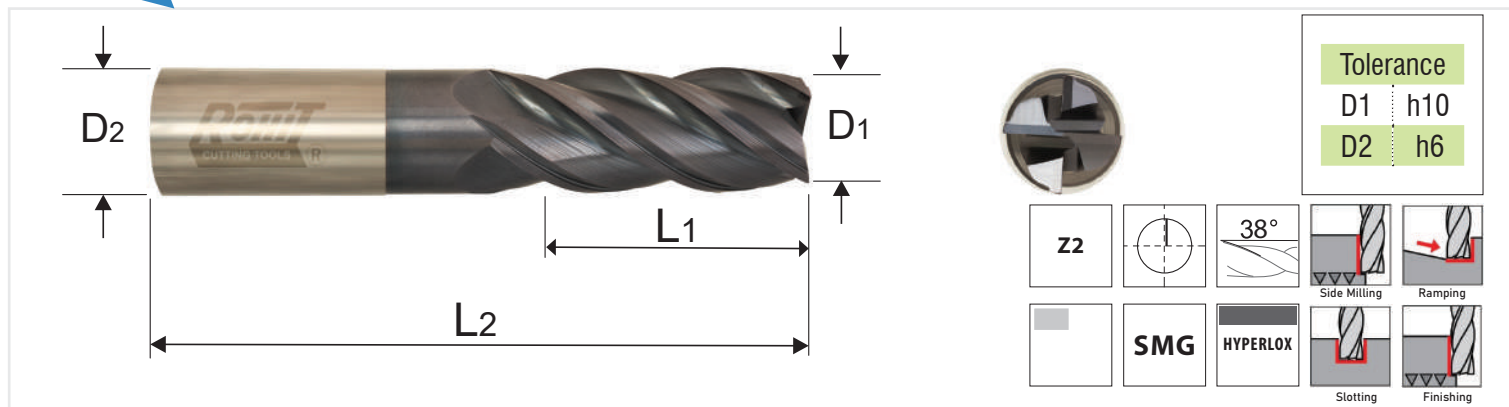
Item Code (TiALN Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR11GBE005D9	6.0	25	75	6
CR11GBE005E7	6.0	30	100	6

Item Code (Uncoated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR1XGBE00EY8	4	22	50	4
CR1XGBE00EZ6	5	22	50	5
CR1XGBE00E16	6	22	50	6

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
1 <sup>st</sup>	2 <sup>nd</sup>						1 <sup>st</sup>	2 <sup>nd</sup>			2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>

Above Material Selection Table is also applicable for Ballnose Series-202

NOTE: FOR FEED & SPEED Rates, go to page no. PG-147



### Features:

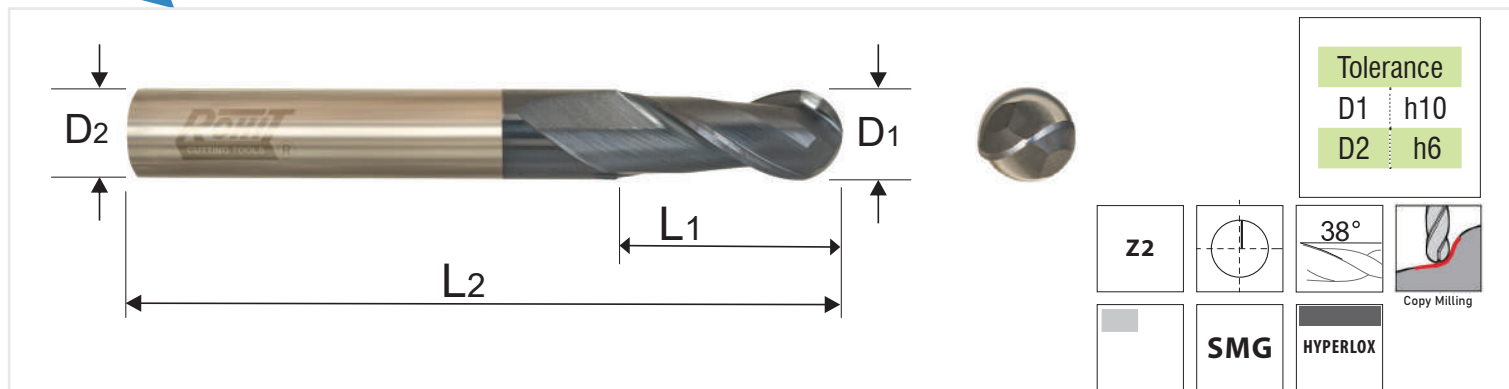
- For Machining Pre-Heat Treated Steels like P20, D2 upto HRc 40-45
- Specially Designed 4-Flute Endmill for Pre-Hardened materials

Item Code (HYPERLOX Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR16GSE00N14	1	3	50	4
CR16GSE00N22	1.5	4	50	4
CR16GSE00HX4	2	6	50	4
CR16GSE00HY2	2.5	8	50	4
CR16GSE00HZ0	3	12	50	3
CR16GSE00J00	3	20	75	3
CR16GSE00J18	3	25	100	3
CR16GSE00J26	4	14	50	4
CR16GSE00J34	4	20	75	4
CR16GSE00J42	4	25	100	4
CR16GSE00J59	5	16	50	5
CR16GSE00J67	5	20	75	5
CR16GSE00J75	5	25	100	5
CR16GSE00J83	6	16	50	6
CR16GSE00J91	6	25	75	6

Item Code (HYPERLOX Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR16GSE00JA3	6	30	100	6
CR16GSE00JB1	6	50	150	6
CR16GSE00JC9	8	20	60	8
CR16GSE00JD6	8	30	100	8
CR16GSE00JE4	8	50	150	8
CR16GSE00JF2	10	25	75	10
CR16GSE00JG0	10	40	100	10
CR16GSE00JH8	10	50	150	10
CR16GSE00JJ3	12	25	75	12
CR16GSE00JK1	12	40	100	12
CR16GSE00JL9	12	50	150	12
CR16GSE00JM7	16	40	100	16
CR16GSE00JN4	16	50	150	16
CR16GSE00JP0	20	40	100	20

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>							1 <sup>st</sup>						

NOTE: FOR FEED & SPEED Rates, go to page no. PG-145



## Features:

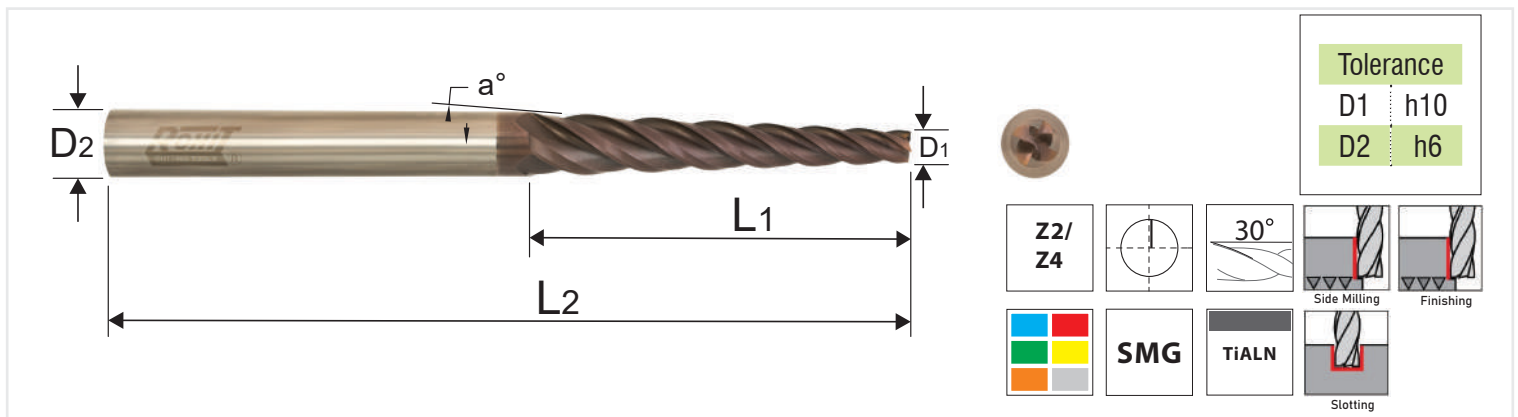
- For Machining Pre-Heat Treated Steels like P20, D2 upto HRc 40-45
- Specially Designed 2-Flute Ballnose for Pre-Hardened materials
- High Quality Coating for Higher Tool life

Item Code (HYPERLOX Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR16GBE00CJ7	1	3	50	4
CR16GBE00CK5	1.5	4	50	4
CR16GBE00CL3	2	6	50	4
CR16GBE00CM1	2.5	8	50	4
CR16GBE00CN8	3	12	50	3
CR16GBE00CP4	3	20	75	3
CR16GBE00CQ2	3	25	100	3
CR16GBE00CR0	4	16	50	4
CR16GBE00CS7	4	20	75	4
CR16GBE00CT5	4	25	100	4
CR16GBE00CU3	5	16	50	5
CR16GBE00CV1	5	20	75	5
CR16GBE00CW9	5	25	100	5
CR16GBE00CX6	6	16	50	6

Item Code (HYPERLOX Coated)	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR16GBE00CY4	6	25	75	6
CR16GBE00CZ2	6	30	100	6
CR16GBE00D03	6	40	150	6
CR16GBE00D11	8	20	60	8
CR16GBE00D29	8	30	100	8
CR16GBE00D37	8	50	150	8
CR16GBE00D45	10	25	75	10
CR16GBE00D52	10	40	100	10
CR16GBE00D60	10	50	150	10
CR16GBE00D78	12	25	75	12
CR16GBE00D86	12	40	100	12
CR16GBE00D94	12	50	150	12
CR16GBE00DA6	16	40	100	16
CR16GBE00DB4	16	50	150	16

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
1st	1st	2nd							1st						

NOTE: FOR FEED & SPEED Rates, go to page no. PG-147



## Features:

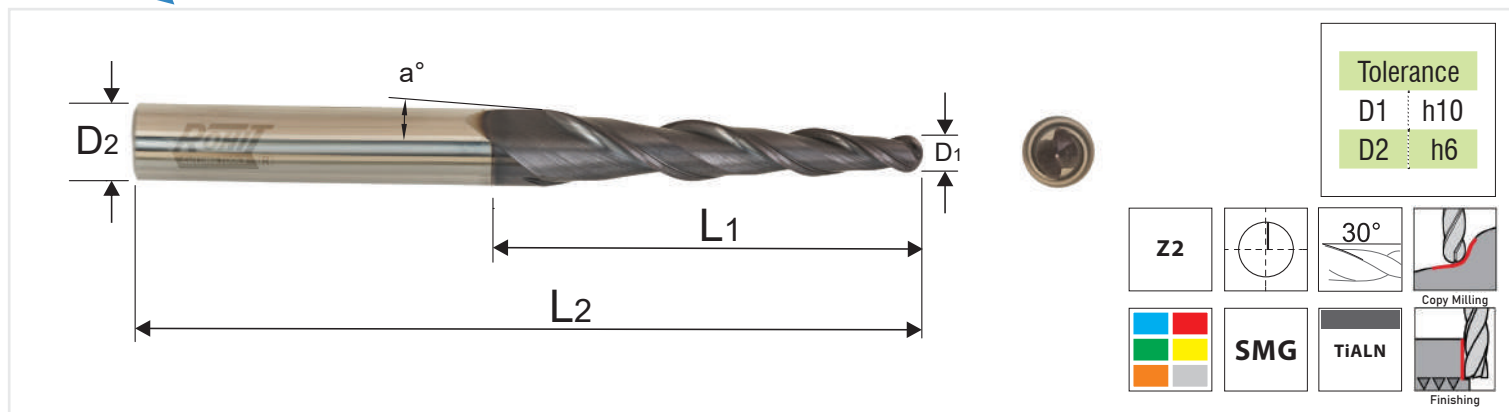
- Suitable for machining special components such as impellers, blisks, tire profiles, turbine blades
- Widely used in machining of Surgical instruments of Stainless Steel

Ordering Code	Flute Dia (D1)	Flute Len (L1)	Overall Len (L2)	Shank Dia (D2)	Taper Angle (a°)
20703008002-F	3	42	80	6	2°
20705008002-F	5	42	80	8	2°
20707008002-F	7	42	80	10	2°
20709008002-F	9	42	80	12	2°
20702508003-F	2.5	32	80	6	3°
20703008003-F	3	48	80	8	3°
20704008003-F	4	38	80	8	3°
20706008003-F	6	38	80	10	3°
20708010503-F	8	56	105	14	3°
20702506305-F	2.5	20	63	6	5°
20703008005-F	3	28	80	8	5°
20704008005-F	4	34	80	10	5°
20706009005-F	6	34	90	12	5°
20708010005-F	8	45	100	16	5°
20710010505-F	10	56	105	20	5°
20703006307-F	3	20	63	8	7°
20705008007-F	5	28	80	12	7°

Refer Page PG-117 for Material Selection

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period  
 FOR FEED & SPEED Rates, go to page no. PG-151





## Features:

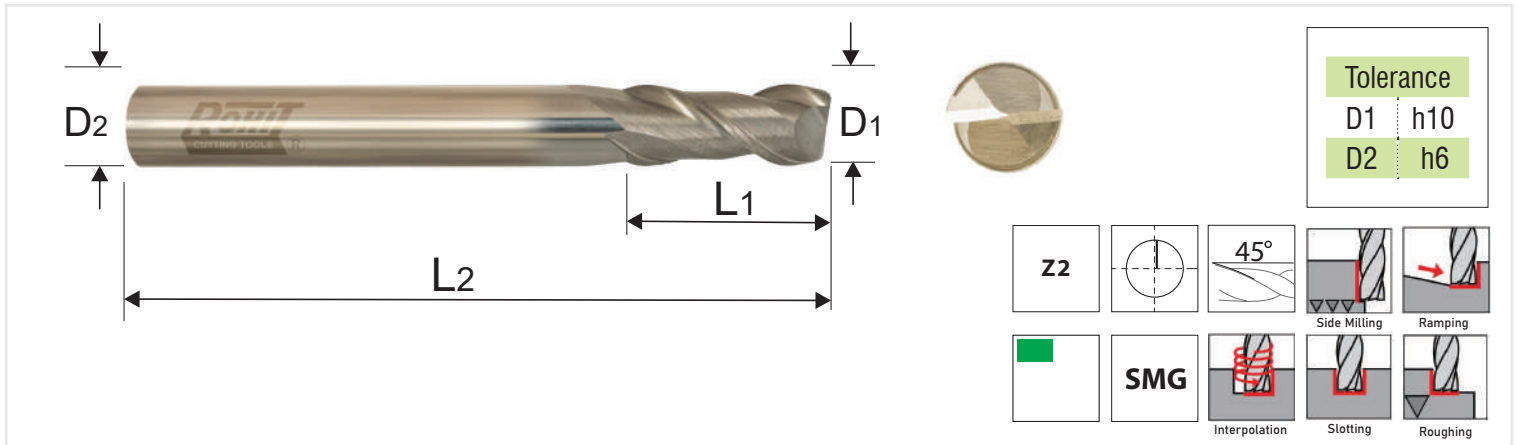
- Suitable for machining special components such as impellers, blisks, tire profiles, turbine blades
- Widely used in machining of Surgical instruments of Stainless Steel

Ordering Code	Flute Dia (D1)	Flute Len (L1)	Overall Len (L2)	Shank Dia (D2)	Taper Angle (a°)
20803008002-F	3	42	80	6	2°
20805008002-F	5	42	80	8	2°
20807008002-F	7	42	80	10	2°
20809008002-F	9	42	80	12	2°
20803008003-F	3	48	80	8	3°
20804008003-F	4	38	80	8	3°
20806008003-F	6	38	80	10	3°
20808010503-F	8	56	105	14	3°
20803008003-F	3	28	80	8	5°
20804008005-F	4	34	80	10	5°
20806009005-F	6	34	90	12	5°
20808010005-F	8	45	100	16	5°
20810010505-F	10	56	105	20	5°

Below material selection Table is also applicable for Series-207

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
1st	1st	2nd	2nd	2nd	2nd	2nd	1st	1st			1st	1st	1st	1st	1st

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period  
FOR FEED & SPEED Rates, go to page no. PG-147



### Features:

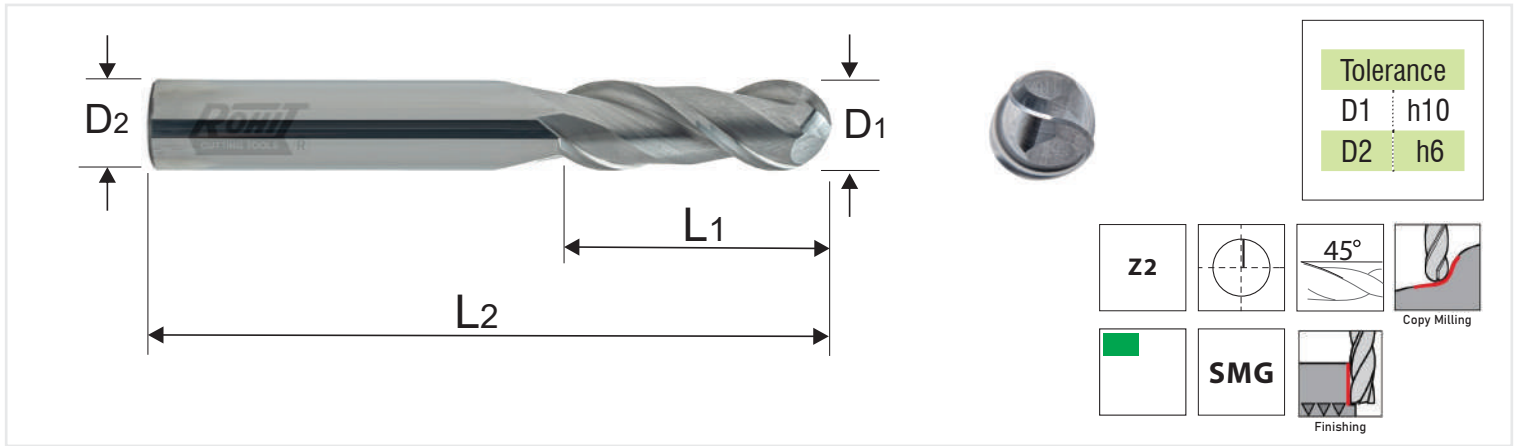
- Effective machining of Aluminium and AL-Alloys
- Higher Helix for Effective Chip Evacuation
- Improved component finish

Item Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR1XGSE00TA9	2	6	50	4
CR1XGSE00QZ7	3	12	50	3
CR1XGSE00NP2	4	14	50	4
CR1XGSE00NQ0	4	25	75	4
CR1XGSE00NR8	4	30	100	4
CR1XGSE00NS5	5	16	50	5
CR1XGSE00NT3	5	25	75	5
CR1XGSE00NU1	5	35	100	5
CR1XGSE00NV9	6	18	50	6
CR1XGSE00NW7	6	30	75	6
CR1XGSE00NX4	6	35	100	6

Item Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR1XGSE00NY2	8	20	60	48
CR1XGSE00NZ0	8	30	75	8
CR1XGSE00P00	8	40	100	8
CR1XGSE00P18	10	30	75	10
CR1XGSE00P26	10	50	100	10
CR1XGSE00P34	12	30	75	12
CR1XGSE00P42	12	50	100	12
CR1XGSE00P59	14	50	100	14
CR1XGSE00P67	16	50	100	16
CR1XGSE00P75	20	50	100	20

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
											1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>

NOTE: FOR FEED & SPEED Rates, go to page no. PG-151



## Features:

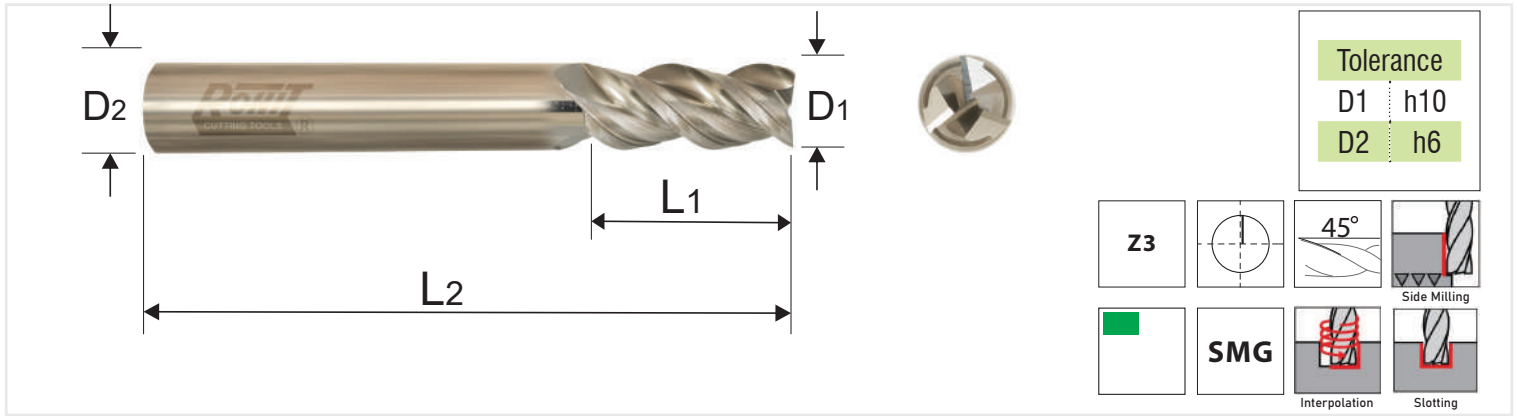
- Effective machining of Aluminium and AL-Alloys
- Higher Helix for Effective Chip Evacuation
- Improved component finish

Item Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR1XGBE00F23	3	12	50	3
CR1XGBE00F31	4	14	50	4
CR1XGBE00F49	4	25	75	4
CR1XGBE00F56	4	30	100	4
CR1XGBE00F64	5	16	50	5
CR1XGBE00F72	5	25	75	5
CR1XGBE00F80	5	35	100	5
CR1XGBE00F98	6	18	50	6
CR1XGBE00FA0	6	30	75	6
CR1XGBE00FB8	6	35	100	6

Item Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR1XGBE00FC6	8	20	60	8
CR1XGBE00FD3	8	30	75	8
CR1XGBE00FE1	8	40	100	8
CR1XGBE00FF9	10	30	75	10
CR1XGBE00FG7	10	50	100	10
CR1XGBE00FH5	12	30	75	12
CR1XGBE00FJ0	12	50	100	12
CR1XGBE00FK8	14	50	100	14
CR1XGBE00FL6	16	50	100	16
CR1XGBE00FM4	20	50	100	20

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRC 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRC 45 to 55	High Hardened Steels HRC 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
											1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period  
FOR FEED & SPEED Rates, go to page no. PG-147



## Features:

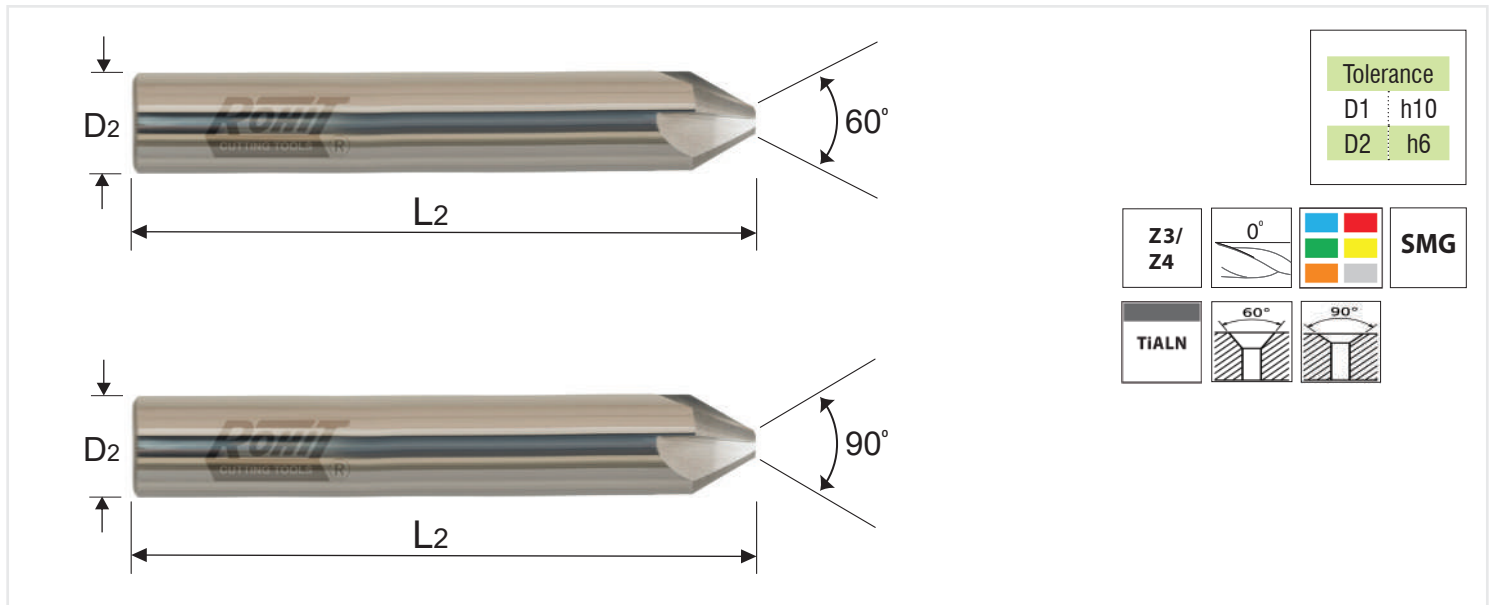
- 3-flute with Special flute form to help in Chip Breakage while milling Aluminium
- 3-Flute also helps in improving productivity as compared to our Carbide 211 Series End Mills for Aluminium
- Designed especially for non-ferrous materials to run at higher cutting speeds

Item Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR1XGSE00T06	2	6	50	4
CR1XGSE00R08	3	12	50	3
CR1XGSE00N44	4	14	50	4
CR1XGSE00N51	4	25	75	4
CR1XGSE00N69	4	30	100	4
CR1XGSE00N77	5	16	50	5
CR1XGSE00N85	5	25	75	5
CR1XGSE00N93	5	35	100	5
CR1XGSE00NA5	6	18	50	6
CR1XGSE00NB3	6	30	75	6
CR1XGSE00NC1	6	35	100	6

Item Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CR1XGSE00ND8	8	20	60	8
CR1XGSE00NE6	8	30	75	8
CR1XGSE00NF4	8	40	100	8
CR1XGSE00NG2	10	30	75	10
CR1XGSE00NH0	10	50	100	10
CR1XGSE00NJ5	12	30	75	12
CR1XGSE00NK3	12	50	100	12
CR1XGSE00NL1	14	50	100	14
CR1XGSE00NM9	16	50	100	16
CR1XGSE00NN6	20	50	100	20

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Pre-hardened Steels HRC 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper / Brass
											1 <sup>st</sup>	1 <sup>st</sup>		2 <sup>nd</sup>	2 <sup>nd</sup>

NOTE: FOR FEED & SPEED Rates, go to page no. PG-151



Tolerance	
D1	h10
D2	h6

Z3/ Z4	0°		SMG
TiAlN	60°	90°	

## Features:

- Smooth cutting operation with low wear
- Long tool life thanks to wear-resistant TiAlN-coating and ultra-tough carbide
- For chamfering, de-burring and contour operations in various materials

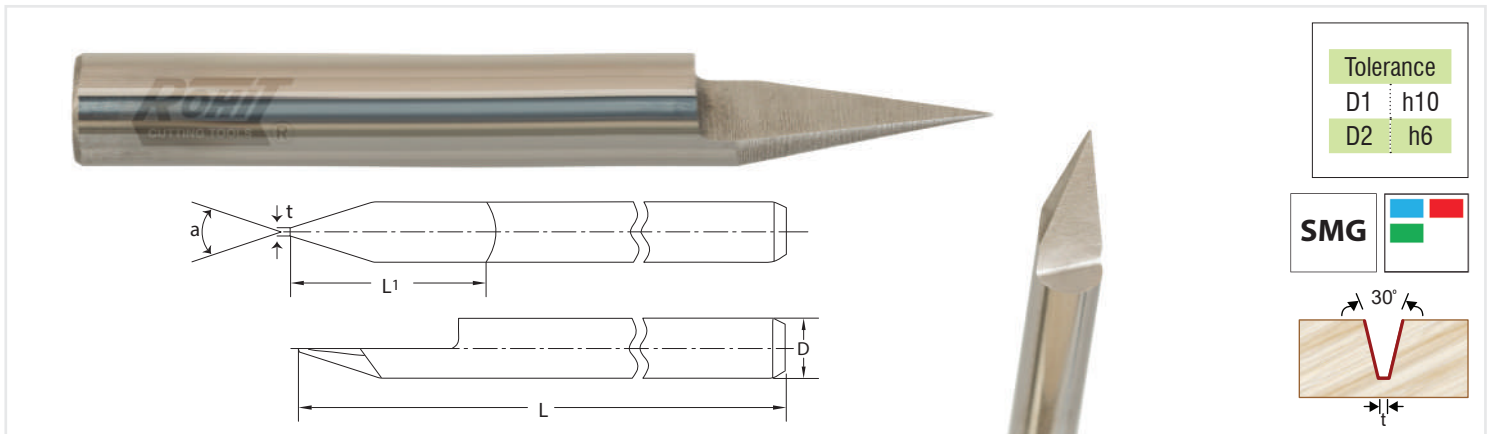
Ordering Code	Angle	Shank Dia(D2)	Overall Len(L2)	Flutes
21504005060-F	60	4	50	3
21506005760-F	60	6	57	3
21508006060-F	60	8	60	3
21510007560-F	60	10	75	4
21512008060-F	60	12	80	4
21516009060-F	60	16	90	4

Ordering Code	Angle	Shank Dia(D2)	Overall Len(L2)	Flutes
21504005090-F	90	4	50	3
21506005790-F	90	6	57	3
21508006090-F	90	8	60	3
21510007590-F	90	10	75	4
21512008090-F	90	12	80	4
21516009090-F	90	16	90	4

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
1st	1st	1st	1st	1st	2nd	2nd	1st	1st			1st	1st		1st	1st

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period





## Features:

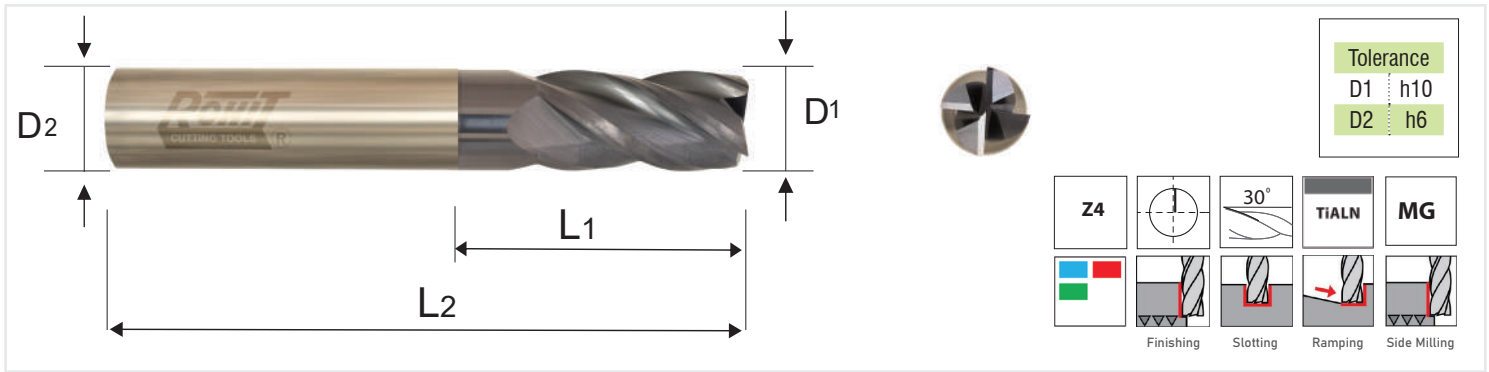
- For Engraving in metals like MS, SS, Die Steel, Alloy Steel and other Hard Materials
- Included Angle: 45, 60 and 90° Can be made on special request. MOQ will apply

Ordering Code	TIP(t)	Angle(a°)	Cutting Len(L1)	Overall Len(L)	Shank Dia(D)
219030050-U	0.2	30°	12	50	3
219040050-U	0.2	30°	12	50	4
219050050-U	0.2	30°	15	50	5
219060050-U	0.2	30°	15	50	6
219080060-U	0.4	30°	25	60	8
219100075-U	0.4	30°	25	75	10
219120075-U	0.4	30°	25	75	12
219127075-U	0.4	30°	25	75	12.7



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>				1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>					

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period



## Features:

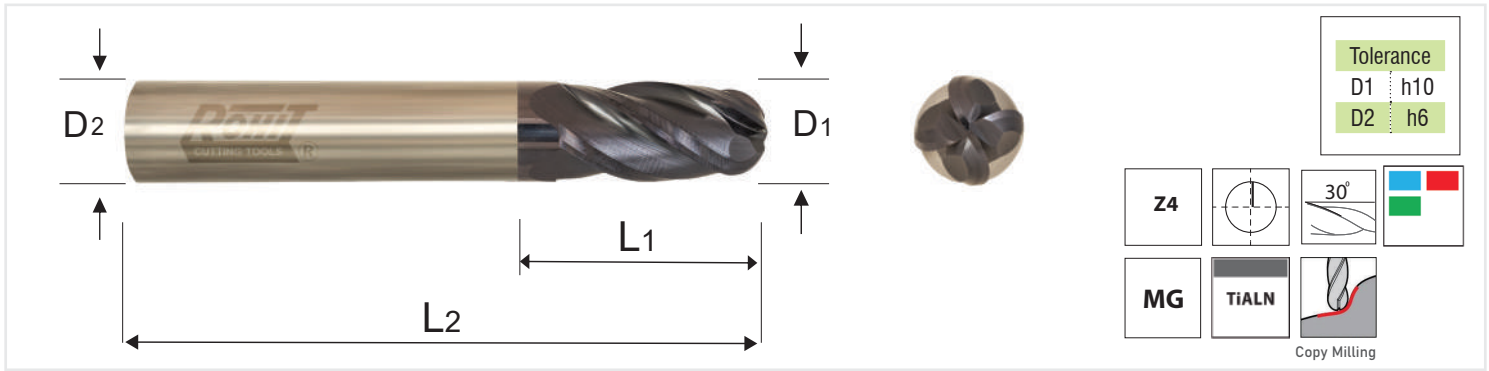
- For milling of easily machinable Al alloys, non-ferrous materials, Pattern Machining
- Economical Carbide End Mills to be used for softer materials up to 35-HRC

Item Code TiALN Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX01GSE000Y7	2	8	50	3
CX01GSE00106	2.5	8	50	3
CX01GSE00148	3	14	50	3
CX01GSE00155	3	25	75	3
CX01GSE00HM0	3	30	100	3
CX01GSE00171	4	14	50	4
CX01GSE001A9	4	25	75	4
CX01GSE001B7	4	30	100	4
CX01GSE001C5	5	16	50	5
CX01GSE001D2	5	25	75	5
CX01GSE001F8	5	35	100	5
CX01GSE001H4	6	18	50	6
CX01GSE001J9	6	30	75	6
CX01GSE001K7	6	35	100	6
CX01GSE00JQ9	6	50	150	6
CX01GSE001M3	7	20	60	7
CX01GSE001P6	8	20	60	8
CX01GSE001Q4	8	30	75	8
CX01GSE001S9	8	40	100	8
CX01GSE001T7	8	60	150	8
CX01GSE00GZ2	8	30	200	8

Item Code TiALN Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX01GSE001W1	10	30	75	10
CX01GSE001X8	10	50	100	10
CX01GSE001Y6	10	60	150	10
CX01GSE00G38	10	30	200	10
CX01GSE00LD5	11	30	75	11
CX01GSE00213	12	30	75	12
CX01GSE00247	12	50	100	12
CX01GSE00254	12	60	150	12
CX01GSE00239	12	30	200	12
CX01GSE00270	14	30	75	14
CX01GSE00296	14	50	100	14
CX01GSE002B6	14	60	150	14
CX01GSE002D1	16	30	75	16
CX01GSE002J8	16	50	100	16
CX01GSE002L4	16	60	150	16
CX01GSE002H3	16	30	200	16
CX01GSE00FX7	18	50	100	18
CX01GSE002P5	20	50	100	20
CX01GSE00G61	20	80	150	20
CX01GSE002N9	20	30	200	20

Refer Page PG-124 for material selection

NOTE: FOR FEED & SPEED Rates, go to page no. PG-151



### Features:

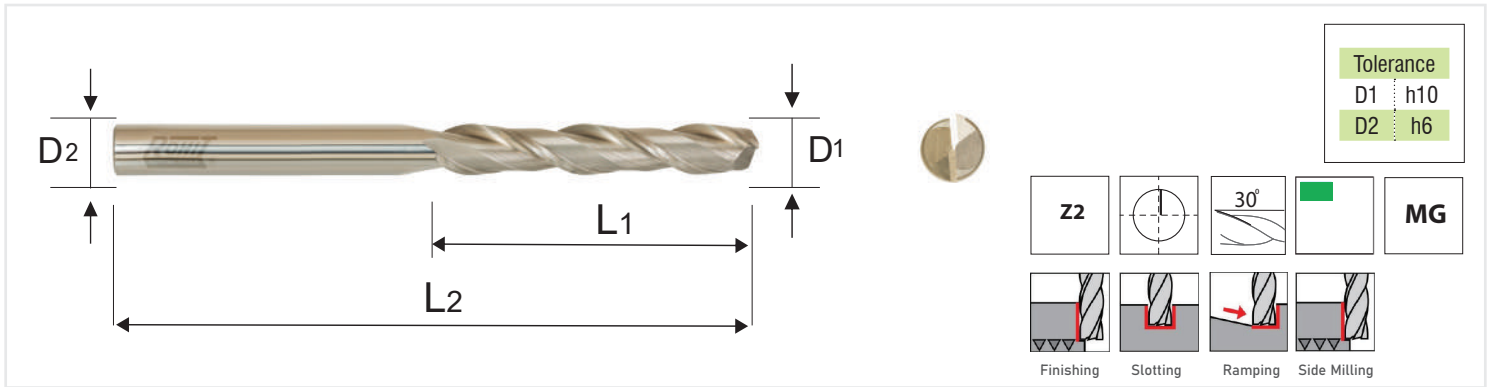
• For milling of easily machinable Al alloys, non-ferrous materials, Pattern Machining

Item Code TiALN Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX01GBE00186	3	14	50	3
CX01GBE001A6	3	25	75	3
CX01GBE00BT7	3	30	100	3
CX01GBE001B4	4	14	50	4
CX01GBE001D9	4	25	75	4
CX01GBE00AR3	4	30	100	4
CX01GBE001F5	5	16	50	5
CX01GBE001H1	5	25	75	5
CX01GBE001K4	5	35	100	5
CX01GBE001M0	6	18	50	6
CX01GBE001P3	6	30	75	6
CX01GBE001R9	6	35	100	6
CX01GBE001T4	6	40	150	6
CX01GBE001W8	8	20	60	8
CX01GBE00202	8	30	75	8
CX01GBE00210	8	40	100	8
CX01GBE00236	8	50	150	8

Item Code TiALN Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX01GBE00BG6	8	30	200	8
CX01GBE00277	10	30	75	10
CX01GBE002A5	10	50	100	10
CX01GBE002B3	10	60	150	10
CX01GBE00B14	10	30	200	10
CX01GBE00DU3	11	30	75	11
CX01GBE002E6	12	30	75	12
CX01GBE002H0	12	50	100	12
CX01GBE002J5	12	60	150	12
CX01GBE00B22	12	30	200	12
CX01GBE00DV1	14	30	75	14
CX01GBE00DR0	16	30	75	16
CX01GBE002N6	16	50	100	16
CX01GBE002P2	16	60	150	16
CX01GBE00DS7	16	30	200	16
CX01GBE00CD1	20	50	100	20
CX01GBE00DT5	20	30	200	20

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRC 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRC 45 to 55	High Hardened Steels HRC 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
2 <sup>nd</sup>	2 <sup>nd</sup>						2 <sup>nd</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>			2 <sup>nd</sup>			2 <sup>nd</sup>

FOR FEED & SPEED Rates, go to page no. PG-147



## Features:

- Especially designed for machining Wood, Plastic & Non-ferrous materials
- 2-Flute construction provides better chip evacuation
- Sharper Rakes for softer metals to cut with ease

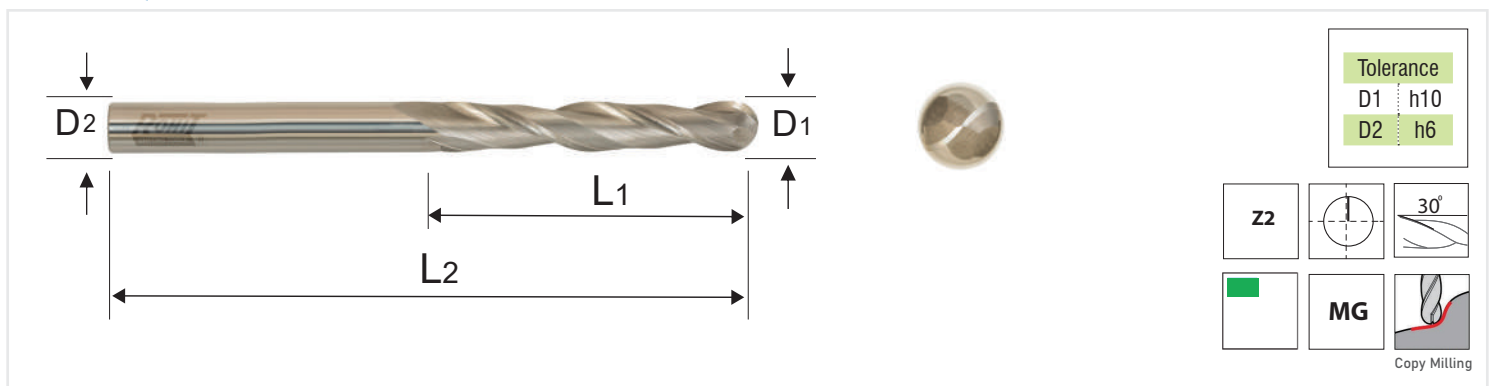
Item Code Uncoated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX0XGSE00H46	2	12	50	3
CX0XGSE00016	3	16	50	3
CX0XGSE00032	4	22	50	4
CX0XGSE00HG4	4	30	60	4
CX0XGSE00G13	4	35	75	4
CX0XGSE00G21	4	50	100	4
CX0XGSE00057	5	22	50	5
CX0XGSE00FZ4	5	30	60	5
CX0XGSE00G05	5	35	75	5
CX0XGSE00GQ3	5	50	100	5
CX0XGSE00073	6	22	50	6
CX0XGSE00099	6	30	60	6
CX0XGSE000A1	6	35	75	6
CX0XGSE00G88	6	50	100	6
CX0XGSE00HN8	8	22	50	8
CX0XGSE00FV3	8	30	60	8
CX0XGSE00GY5	8	35	75	8

Item Code TiALN Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX0XGSE000G8	8	50	100	8
CX0XGSE00K50	10	35	75	10
CX0XGSE00H53	10	50	100	10
CX0XGSE00K68	12	35	75	12
CX0XGSE00H61	12	50	100	12

Item Code TiALN Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX01GSE000K8	1	6	50	3
CX01GSE000M4	1.5	8	50	3
CX01GSE00HD9	2	8	50	3
CX01GSE000P7	3	14	50	3
CX01GSE000Q5	4	22	50	4
CX01GSE00HE7	5	16	50	5
CX01GSE000R3	5	22	50	5
CX01GSE00H11	6	18	50	6
CX01GSE000S0	6	22	50	6
CX01GSE00G87	6	30	75	6

Refer Page PG-127 for Material Selection

NOTE: FOR FEED & SPEED Rates, go to page no. PG-152



## Features:

- Especially designed for machining Wood, Plastic & Non-ferrous materials
- 2-Flute construction provides better chip evacuation
- Sharper Rakes for softer metals to cut with ease

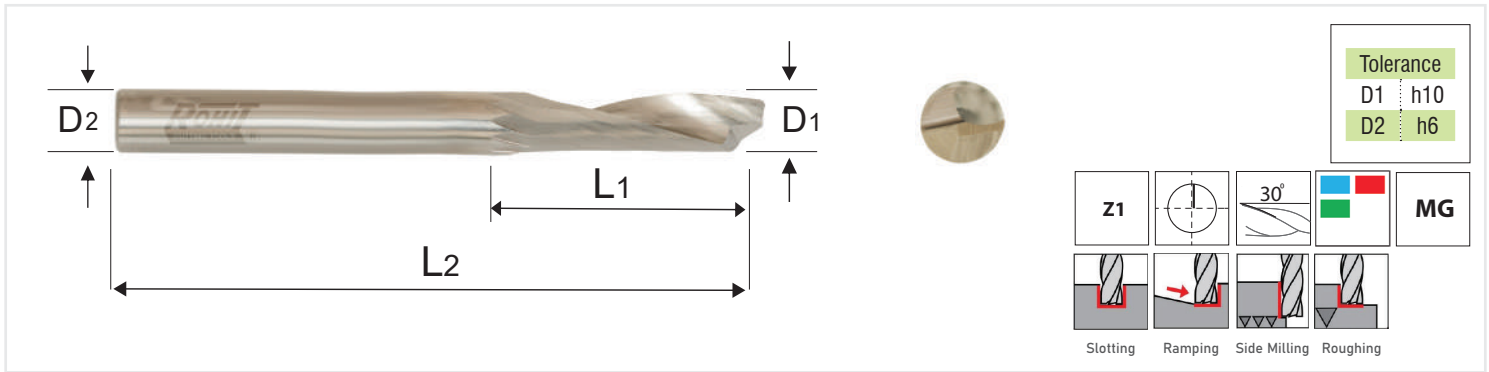
Item Code Uncoated	Item Code Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX0XGBE00BM4	-	2	12	50	3
CX0XGBE003C1	-	3	16	50	3
CX0XGBE003F4	-	4	22	50	4
CX0XGBE00BS0	-	4	30	60	4
CX0XGBE00BD3	-	4	35	75	4
CX0XGBE003J5	-	5	22	50	5
CX0XGBE00054	-	5	30	60	5
CX0XGBE003M9	-	5	35	75	5
CX0XGBE00070	-	5	50	100	5
CX0XGBE003Q0	-	6	22	50	6
CX0XGBE00088	-	6	30	60	6
CX0XGBE000A8	-	6	35	75	6
CX0XGBE000C4	-	6	50	100	6
CX0XGBE000E9	-	8	20	60	8
CX0XGBE00AP8	-	8	22	50	8
CX0XGBE00AQ6	-	8	30	60	8
CX0XGBE00BF9	-	8	35	75	8
CX0XGBE000G5	-	8	50	100	8
CX0XGBE00E20	-	10	30	60	10
CX0XGBE00DY5	-	10	30	75	10
CX0XGBE00BN1	-	10	50	100	10
CX0XGBE00DZ3	-	12	30	75	12
CX0XGBE000H3	-	12	50	100	12



Item Code Uncoated	Item Code TiALN Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
-	CX01GBE00C21	1	6	50	3
-	CX01GBE00AX9	1.5	8	50	3
-	CX01GBE000J7	2	8	50	3
-	CX01GBE00BE0	2.5	8	50	3
-	CX01GBE000N8	3	14	50	3
-	CX01GBE00BJ9	4	14	50	4
-	CX01GBE000P4	4	22	50	4
-	CX01GBE00BD2	4	25	75	4
-	CX01GBE00CF7	4	30	100	4
-	CX01GBE00C62	5	16	50	5
-	CX01GBE000Q2	5	22	50	5
-	CX01GBE000R0	6	18	50	6
-	CX01GBE000T5	6	22	50	6
-	CX01GBE00BZ4	6	30	60	6
-	CX01GBE00CE9	6	35	100	6
-	CX01GBE00CG5	8	20	60	8
-	CX01GBE00BK7	10	30	75	10
-	CX01GBE00AZ5	12	25	150	12
-	CX01GBE00BL5	12	30	75	12
-	CX01GBE00C05	12	30	200	12

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Hard Wood	Soft Wood	MDF	Plywood / Laminates
2 <sup>nd</sup>	2 <sup>nd</sup>										2 <sup>nd</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>

FOR FEED & SPEED Rates, go to page no. PG-147



### Features:

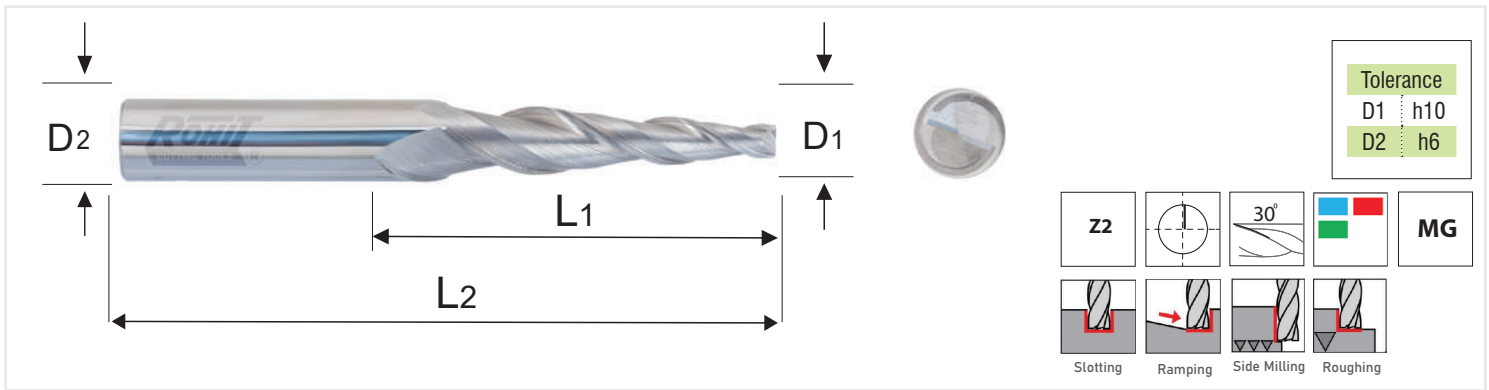
- Especially designed for machining Aluminium, Plastic & Non-ferrous
- Sharper Rakes to cut easily in plastics & wood
- Single Flute Design helps in easy chip evacuation
- Inch sizes & Downcut Single Flute Router Bits are also manufactured on request

Item Code Uncoated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX0XGRB00014	3	16	50	3
CX0XGRB00022	4	22	50	4
CX0XGRB00030	4	30	60	4
CX0XGRB00048	4	35	75	4
CX0XGRB00055	4	50	100	4
CX0XGRB00063	5	22	50	5
CX0XGRB00071	5	30	60	5
CX0XGRB00089	5	35	75	5
CX0XGRB00097	5	50	100	5
CX0XGRB000A9	6	22	50	6
CX0XGRB000B7	6	30	60	6
CX0XGRB000C5	6	35	75	6
CX0XGRB000D2	6	50	100	6

Item Code Uncoated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX0XGRB000E0	8	22	50	8
CX0XGRB000F8	8	30	60	8
CX0XGRB000G6	8	35	75	8
CX0XGRB000H4	8	50	100	8
CX0XGRB000S9	10	22	50	10
CX0XGRB000J9	10	30	60	10
CX0XGRB000K7	10	35	75	10
CX0XGRB000L5	10	50	100	10
CX0XGRB000M3	12	30	60	12
CX0XGRB000N0	12	35	75	12
CX0XGRB000P6	12	50	100	12
CX0XGRB000Q4	14	50	100	14
CX0XGRB000R2	16	50	100	16

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
											1st	2nd	1st	1st	1st

FOR FEED & SPEED Rates, go to page no. PG-152



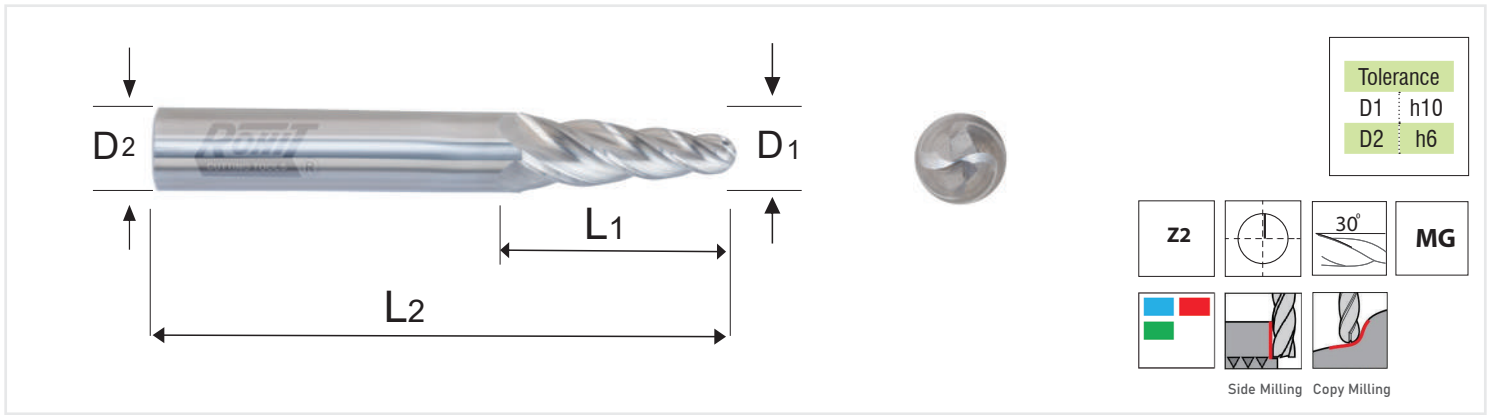
## Features:

- Suitable for making V-shaped slots in wood and other softer materials.
- Other Taper Angles also manufactured on request

Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Taper Angle(a°)
10801006048-U	1.00	30	60	6	4° 50'
10801506043-U	1.50	30	60	6	4° 20'
10802006038-U	2.00	30	60	6	3° 50'
10803006029-U	3.00	30	60	6	2° 50'
10804006019-U	4.00	30	60	6	1° 50'
10804007538-U	4.00	30	75	8	3° 50'

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
2 <sup>nd</sup>							2 <sup>nd</sup>				1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period  
FOR FEED & SPEED Rates, go to page no. PG-151



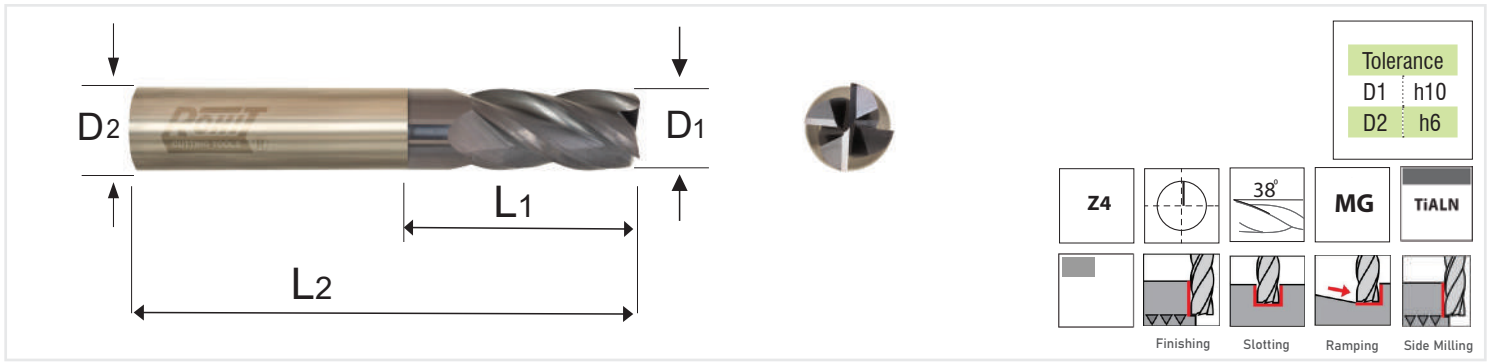
### Features:

- Suitable for making V-shaped slots in wood and other softer materials.
- Other Taper Angles also manufactured on request

Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)	Taper Angle(a°)
10901006048-U	1.00	30	60	6	4° 50'
10901506043-U	1.50	30	60	6	4° 20'
10902006038-U	2.00	30	60	6	3° 50'
10903006029-U	3.00	30	60	6	2° 50'
10904006019-U	4.00	30	60	6	1° 50'
10904007538-U	4.00	30	75	8	3° 50'

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
2 <sup>nd</sup>							2 <sup>nd</sup>				1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period FOR FEED & SPEED Rates, go to page no. PG-147



### Features:

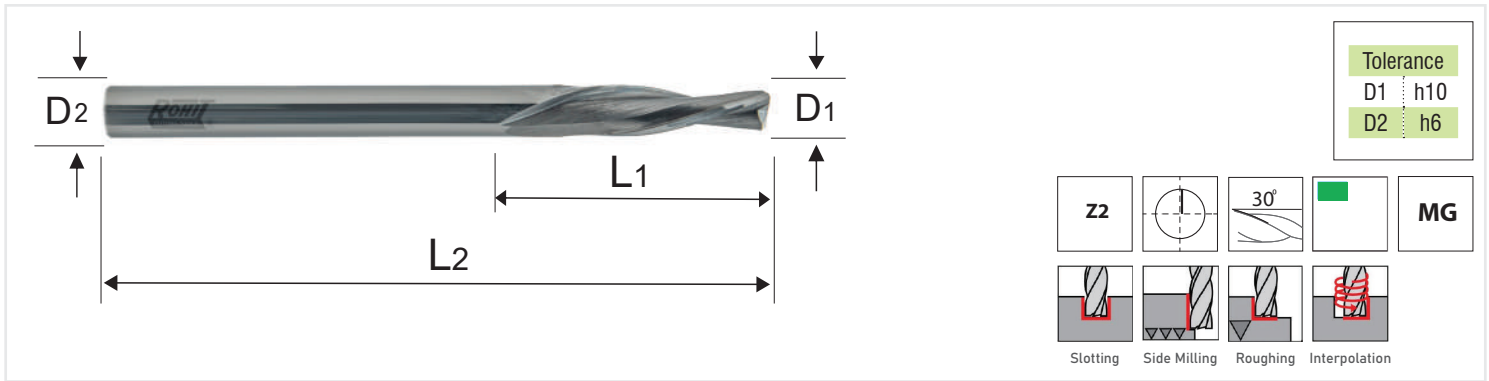
- 4-Flute Carbide End Mills comes with TiALN coating on end mills
- Economical Carbide End Mills to be used for die-mold up to 45-HRc

Item Code TiALN Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX01GSE00K75	3	14	50	3
CX01GSE00KE4	3	25	75	3
CX01GSE00K83	4	14	50	4
CX01GSE00KF2	4	25	75	4
CX01GSE00KG0	4	30	100	4
CX01GSE00K91	5	16	50	5
CX01GSE00KH8	5	25	75	5
CX01GSE00KJ3	5	35	100	5
CX01GSE00L66	5	40	100	5
CX01GSE00KA3	6	18	50	6
CX01GSE00KK1	6	30	75	6
CX01GSE00KL9	6	35	100	6
CX01GSE00L74	6	40	100	6
110070060-F	7	20	60	7
CX01GSE00KB1	8	20	60	8
CX01GSE00KM7	8	30	75	8

Item Code TiALN Coated	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX01GSE00KN4	8	40	100	8
CX01GSE00L82	8	50	100	8
CX01GSE00LA2	8	50	150	8
110090075-F	9	30	75	9
CX01GSE00KC9	10	30	75	10
CX01GSE00KP0	10	50	100	10
CX01GSE00LB0	10	60	150	10
110110075-F	11	30	75	11
CX01GSE00KD6	12	30	75	12
CX01GSE00KQ8	12	50	100	12
CX01GSE00L90	12	60	150	12
CX01GSE00MG8	14	50	100	14
CX01GSE00KR6	16	50	100	16
CX01GSE00LC8	16	60	150	16
CX01GSE00MF0	18	50	100	18
CX01GSE00KS3	20	50	100	20

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
2 <sup>nd</sup>	2 <sup>nd</sup>						2 <sup>nd</sup>		2 <sup>nd</sup>						

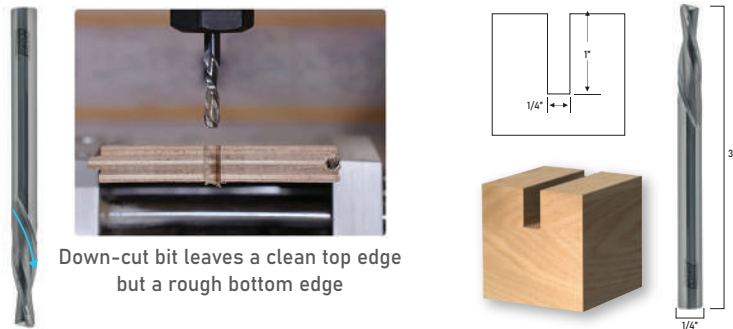




### Features:

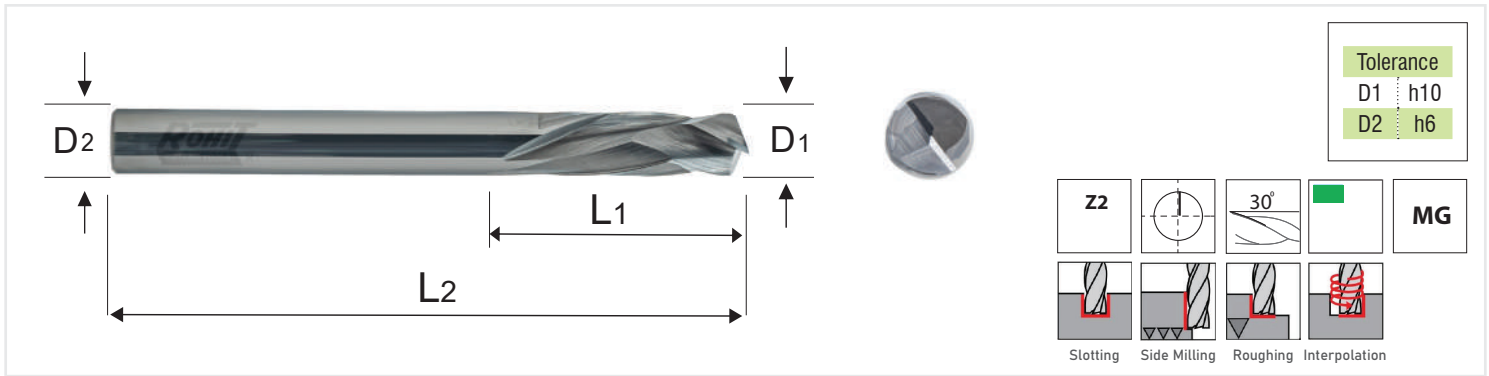
- Clear Chips down, good edge quality on Top face
- Downward Force helps in cutting thin sheets
- Especially designed for machining Plywood, MDF & Hardwood
- Pocket Cutting Applications

Ordering Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
112060075-DOWN-U	6	25	75	6
1124392203"-DOWN-U	1/4	1"	3"	1/4
112080075-DOWN-U	8	25	75	8
112100075-DOWN-U	10	25	75	10
112120075-DOWN-U	12	25	75	12
1124386203"-DOWN-U	1/2	1"	3"	1/2



Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Hard Wood	Soft Wood	MDF	Plywood / Laminates
												2 <sup>nd</sup>	1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>

NOTE: This is Non-stock Item, ask your RIGPL representative for Delivery Period FOR FEED & SPEED Rates, go to page no. PG-152

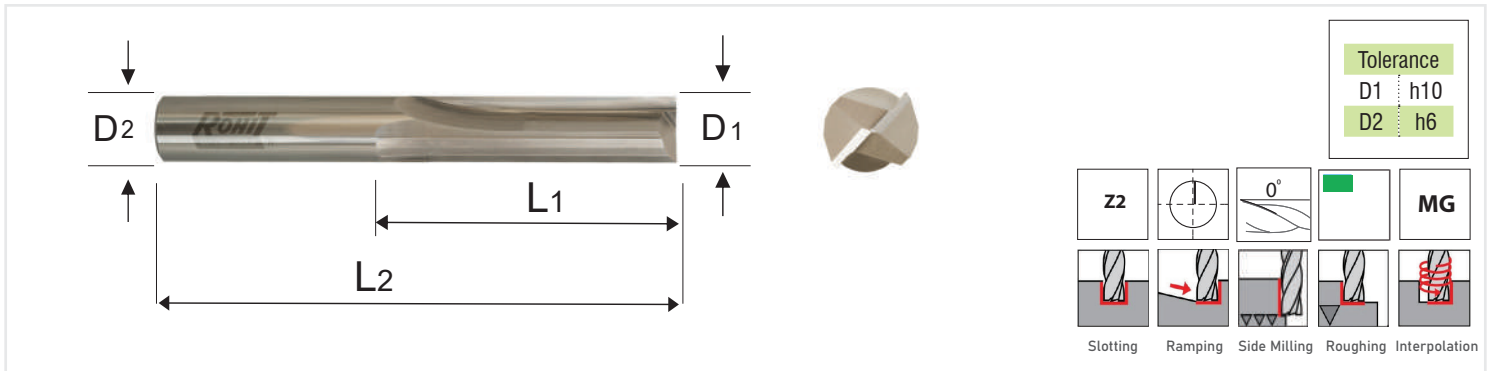


### Features:

- Especially Designed to cut Laminated sheets at full depth in single pass

Item Code	Flute Dia(D1)	Flute Len(L1)	Reach Length (L3)	Overall Len(L2)	Shank Dia(D2)
CX0XGCP00018	6	25	-	75	6
1140635090-COMP-U	1/4"	7/8"	-	3"	1/4"
CX0XGCP00026	8	25	-	75	8
1140950090-COMP-U	3/8"	1"	-	3"	3/8"
CX0XGCP00059	10	25	-	75	10
CX0XGCP00034	10	25	-	100	10
CX0XGCP00067	12	25	-	75	12
CX0XGCP00042	12	25	-	100	12
114127100-COMP-U	1/2"	1-5/16"	-	3"	1/2"
114060100-COMP-L-U	6	25	40	75	6
1140635100-COMP-L-U	1/4"	7/8"	1-1/2"	3"	1/4"
114080100-COMP-L-U	8	25	40	75	8
114095100-COMP-L-U	3/8"	1"	1-5/16"	3"	3/8"
114100090-COMP-L-U	10	25	40	75	10
114120090-COMP-L-U	12	25	40	75	12
114127100-COMP-L-U	1/2	1-5/16"	2"	4"	1/2"

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRC 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRC 45 to 55	High Hardened Steels HRC 55 to 70	Aluminum	Hard Wood	Soft Wood	MDF	Plywood / Laminates
												1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>



## Features:

- For machining Hard Wood and MDF wood
- Specially designed for effective cutting in Hard wood.
- Straight Flute design with higher Flute Depth to ensure smooth flow of chips

Item Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX0XGSE00QH3	3	15	50	4
CX0XGSE00Q96	3	15	50	6
CX0XGSE00QA8	3	20	50	6
CX0XGSE00QB6	4	16	50	6
CX0XGSE00QJ8	4	20	50	4
CX0XGSE00QC4	4	22	50	6
CX0XGSE00QK6	5	22	50	5
CX0XGSE00QD1	5	22	50	6
CX0XGSE00QE9	6	22	50	6
CX0XGSE00QL4	6	25	60	6
CX0XGSE00QG5	6	30	60	8

Item Code	Flute Dia(D1)	Flute Len(L1)	Overall Len(L2)	Shank Dia(D2)
CX0XGSE00QF7	6	35	75	6
CX0XGSE00QM2	8	30	60	8
CX0XGSE00QN9	8	35	75	8
CX0XGSE00QP5	8	50	100	8
CX0XGSE00QQ3	10	30	60	10
CX0XGSE00QR1	10	40	75	10
CX0XGSE00QS8	10	50	100	10
CX0XGSE00QT6	12	30	60	12
CX0XGSE00QU4	12	35	75	12
CX0XGSE00QV2	12	50	100	12

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRc 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRc 45 to 55	High Hardened Steels HRc 55 to 70	Aluminum	Hard Wood	Soft Wood	MDF	Plywood / Laminates
												1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>	1 <sup>st</sup>

NOTE: For FEED & SPEED Rates, go to page no. PG-152

# Benefits of Compression Router Bits

Straight Flute C118



UPCut C103



DownCut C112



Compression Bit C114



**ADVANTAGES**

- Good edge quality on most materials
- Moderate chip clear ability

- Clear chips from the kerf left good quality on bottom face when through-cutting
- Allow faster feed rates than Down cut spiral bit

- Clear chips down, good edge quality on top face
- Downwards force help with cutting thin sheets

- Designed to cut veneer or laminated materials at full depth in one pass
- Clean edge on both top and bottom face

**DISADVANTAGES**

- Lower processing efficiency than the spiral bit

- May chip or fray on top face
- Upwards force may cause part lifting via bit

- Downwards force help with cutting thin sheets
- Chip or fray bottom face when through-cutting
- Require slower feed rate than up cut

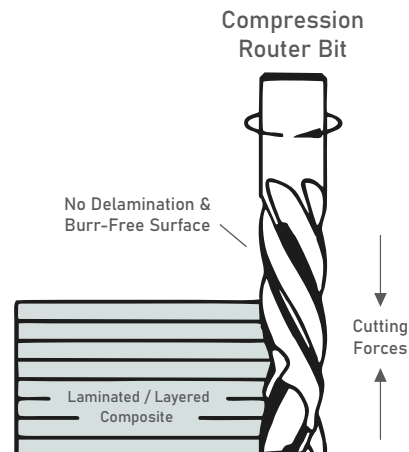
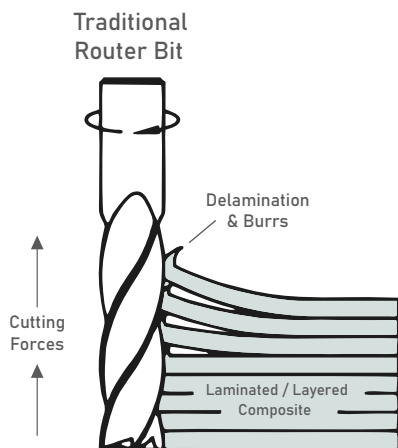
**SUITABLE MATERIAL**

- Fit mostly material

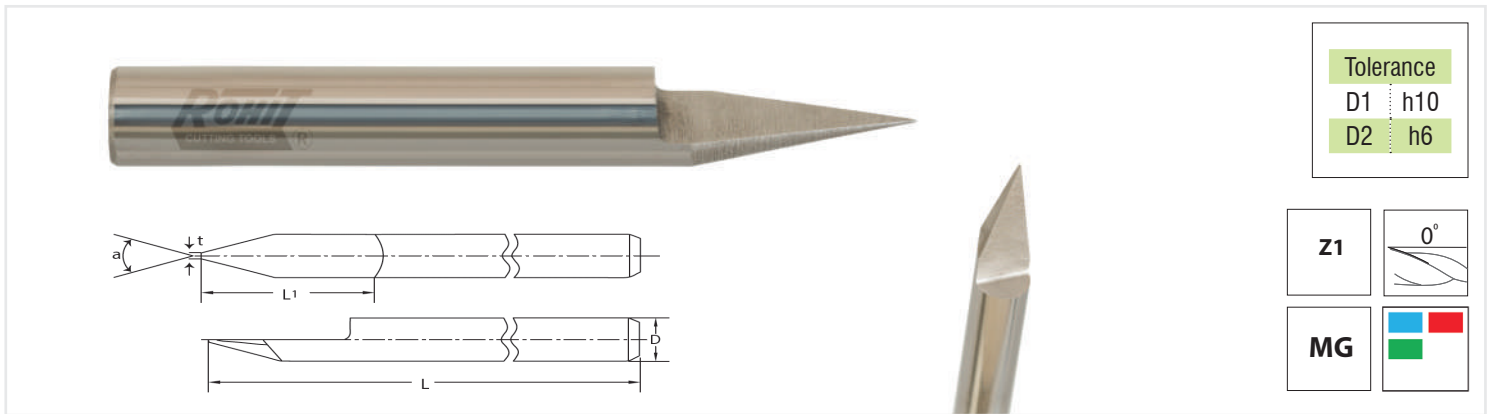
- Plastics, Aluminum, or material of which heat buildup is concerning

- Plywood, Laminates, MDF, Hard wood, Soft wood (Pocketing cutting)

- Plywood, Laminates, MDF, Hard wood, Soft wood (Pocketing cutting)



NOTE: For FEED & SPEED Rates, go to page no. PG-152



## Features:

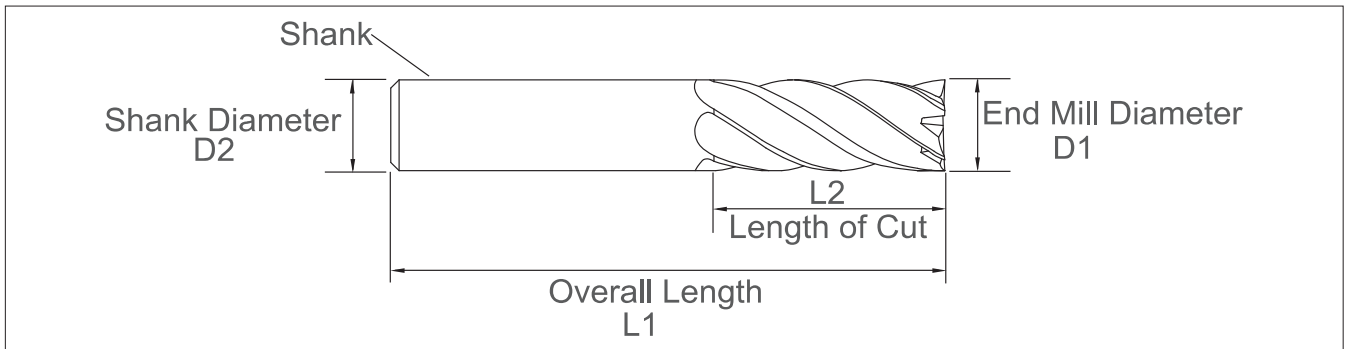
- For engraving in Soft Wood, Hard Wood, MDF, Plastics, Non-ferrous materials etc.
- Included Angle: 45, 60 and 90 deg. Can be made on special request. MOQ will apply
- Engraving bit tip diameters range from 0.10mm to 0.40mm ; so for your delicate Engraving work Opt for these Bits

Ordering Code	TIP (t)	Included Angle (a°)	Cutting Length (L1)	Overall Length(L)	Shank Dia(D)
CX0XEB00013	0.2-0.5	30°	12	50	3
CX0XEB00021	0.2-0.5	30°	12	50	4
CX0XEB00039	0.2-0.5	30°	15	50	5
CX0XEB00047	0.2-0.5	30°	15	50	6
CX0XEB00054	0.4-0.8	30°	25	60	8
119100075-U	0.4-0.8	30°	25	75	10
119120075-U	0.4-0.8	30°	25	75	12
119127075-U	0.4-0.8	30°	25	75	12.7

Carbon Steels BHN 180 to 225	Alloy Steels BHN 225 to 355	Prehardened Steels HRC 40 to 45	Austenitic Stainless Steel	Precipitation Hardened Stainless Steel	Titanium	HighTemp. Alloy	Grey Cast Iron	Ductile Cast Iron	Hardened Steels HRC 45 to 55	High Hardened Steels HRC 55 to 70	Aluminum	Aluminum Alloys	Plastic	Wood / MDF	Copper/Brass
1st	1st	2nd	1st	2nd							1st	2nd	1st	1st	1st

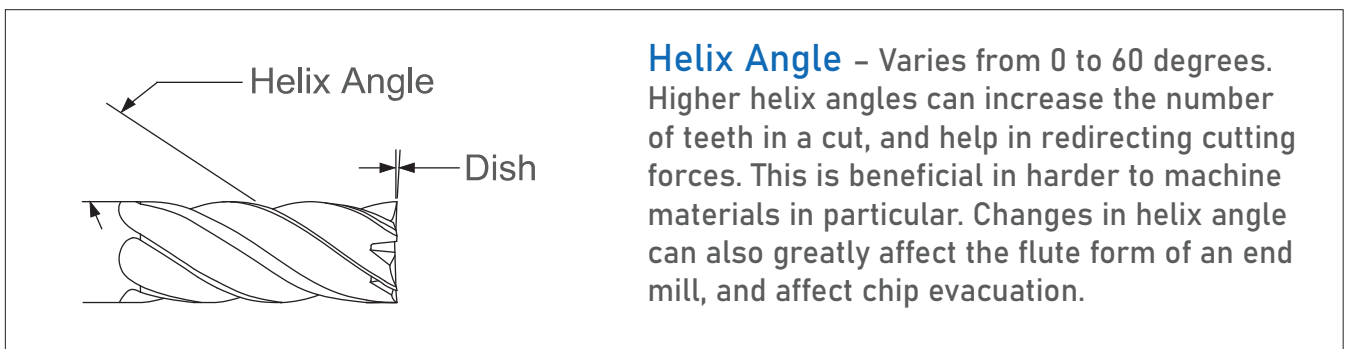


## End Mill Terminology



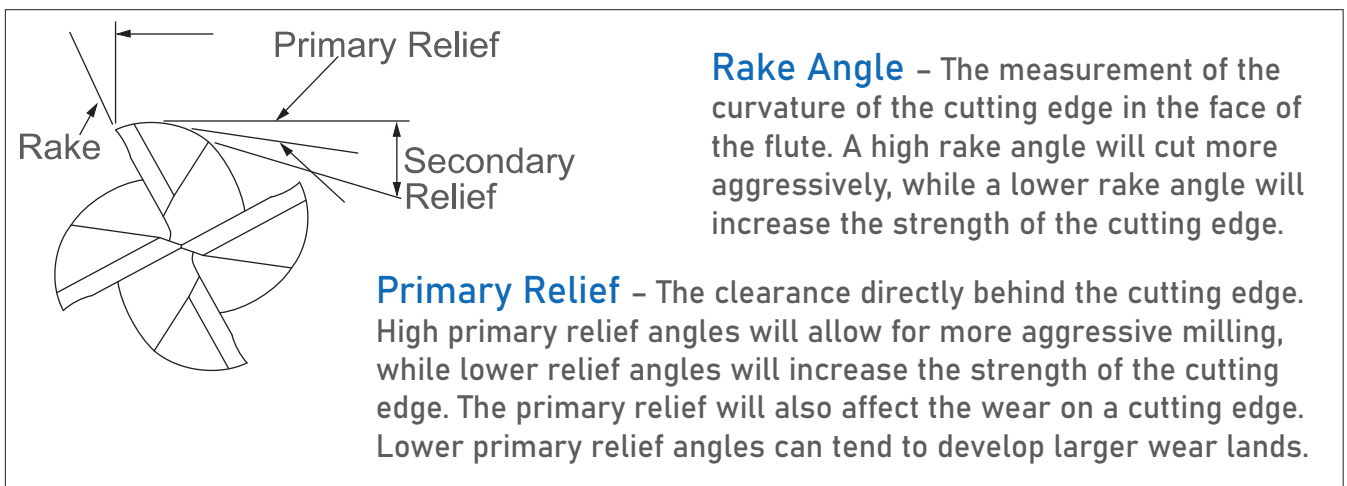
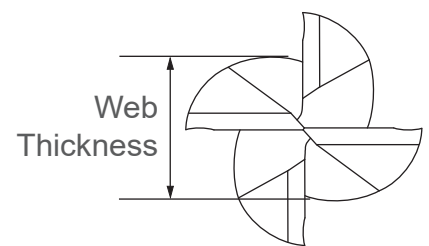
**Length of Cut (Flute Length)** – Always select the shortest Flute Length possible for your application. By selecting the shortest Flute Length, you can increase rigidity and allow for higher feed rates.

**End Mill Diameter** – Always select the largest diameter possible for your milling operation. Increasing your diameter by just 10%, can increase your rigidity by 25%.



**Helix Angle** – Varies from 0 to 60 degrees. Higher helix angles can increase the number of teeth in a cut, and help in redirecting cutting forces. This is beneficial in harder to machine materials in particular. Changes in helix angle can also greatly affect the flute form of an end mill, and affect chip evacuation.

**Web Thickness** – The cross section of the fluting of the end mill. Larger webs allow for more rigidity, while smaller webs allow for better chip evacuation. This feature is highly dependent on the material being machined.



**Rake Angle** – The measurement of the curvature of the cutting edge in the face of the flute. A high rake angle will cut more aggressively, while a lower rake angle will increase the strength of the cutting edge.

**Primary Relief** – The clearance directly behind the cutting edge. High primary relief angles will allow for more aggressive milling, while lower relief angles will increase the strength of the cutting edge. The primary relief will also affect the wear on a cutting edge. Lower primary relief angles can tend to develop larger wear lands.

**Conversion charts**

**English to Metric**

MULTIPLY	BY	TO OBTAIN
Inches	25.4	Millimetres
Inches	2.54	Centimetres
Feet	.3048	Metres
Inches per minute	25.4	Millimetres per minute
Cubic Inches per minute	16.387	Cubic Centimetres per minute
Surface Feet per minute	.3048	Surface Metres per minute

**Metric to English**

MULTIPLY	BY	TO OBTAIN
Millimetres	.0394	Inches
Centimetres	.3937	Inches
Metres	3.2808	Feet
Millimetres per minute	.0394	Inches per minute
Cubic Centimetres per minute	.0610	Cubic Inches per minute
Surface Metres per minute	3.2808	Surface Feet per minute

**Milling Formulas - METRIC Values**

Symbol	Description		Formula
Vc	Surface Meters / Minute		$Vc = \frac{\pi \times D \times n}{1000}$
n	Revolutions / Minute		$n = \frac{Vc \times 1000}{\pi \times D}$
fz	Feed / Tooth		$Fz = \frac{vf}{n \times z}$
Vf	Millimeters / Minute		$vf = (n) \times (z) \times (fz)$
D(eff)	Effective Diameter		$D(eff) = 2 \times \sqrt{D \times ap - ap^2}$

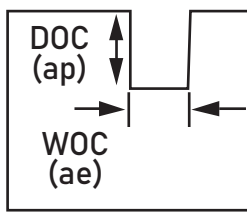
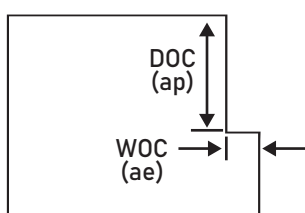
symbol key :  $\pi = 3.1416$  D = tool diameter (mm) z = no. of flutes ap = depth of cut

**Milling Formulas - INCH Values**

Symbol	Description		Formula
SFM	Surface Meters / Minute		$SFM = \frac{RPM \times D}{3.82}$
RPM	Revolutions / Minute		$RPM = \frac{SFM \times 3.82}{D}$
IPT	Feed / Tooth		$IPT = \frac{IPM}{z \times RPM}$
IPM	Inches / Minute		$IPM = IPT \times RPM \times z$
D <sub>(eff)</sub>	Effective Diameter		$D(eff) = 2 \times \sqrt{R^2 - (R - D_1)^2}$

symbol key : D = tool diameter (in.) z = no. of flutes R = Radius D<sub>1</sub> = DOC (ap)

	Material	Hardness
Alloy Steel	Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	BHN 180 to 225
	Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310 Alloy Steels	BHN 225 to 355
	Alloyed heat-treatable, Tool and High Speed Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	40-45 HRc
Stainless Steel	Austenitic SS: Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	<28 HRc
	Austenitic SS Moderately Difficult: 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	<28 HRc
	Precip. Hardened SS Difficult to Machine: 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic	>28 HRc
Super Alloys	Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Al-8V-6Cr-4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	<42 HRc
	High-Temperature Alloys Inconel, Nimonic, Monel, Hastelloy, Waspalloy, A286, Rene41, Udimet, Stellite	<42 HRc
CAST IRON	Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	<240 HB
	Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350	>240 HB



ADOC / DOC (Ap)  
Axial Depth of Cut

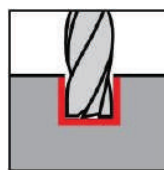
RDOC / WOC (Ae)  
Radial Depth of Cut

NOTE: 1. These are just the Starting Parameters, you may vary the Speed and Feed depending upon other machining condition.

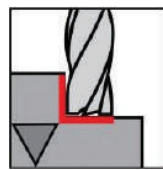
2. Always select shortest possible flute length to prevent breakage & vibration rising due to over hang.

3. Always wear protective gear as high speed tools may break & cause harm

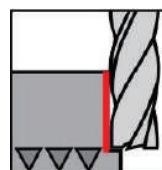
Application	DOC (Ap) max	WOC (Ae) max	Cutting speed (Vc)	FEED per TOOTH								
				4 mm	5 mm	6 mm	8 mm	10 mm	12 mm	14 mm	16 mm	20 mm
			m/min	mm / Z								
SLT	0.04 x D	1.00 x D	110-130	0.011	0.014	0.016	0.026	0.033	0.04	0.048	0.053	0.066
RGH	1.00 x D	0.15 x D	110-130	0.02	0.023	0.031	0.05	0.063	0.075	0.088	0.1	0.125
FIN	2.00 x D	0.02 x D	130-150	0.015	0.018	0.023	0.037	0.046	0.055	0.064	0.074	0.092
SLT	0.04 x D	1.00 x D	90-100	0.011	0.014	0.016	0.024	0.03	0.036	0.044	0.048	0.06
RGH	1.00 x D	0.15 x D	90-100	0.02	0.023	0.031	0.046	0.057	0.068	0.078	0.091	0.114
FIN	2.00 x D	0.02 x D	100-120	0.015	0.018	0.023	0.034	0.042	0.05	0.059	0.067	0.084
SLT	0.03 x D	1.00 x D	60-70	0.011	0.014	0.016	0.024	0.03	0.036	0.044	0.048	0.06
RGH	0.5 x D	0.1 x D	70-80	0.02	0.023	0.031	0.046	0.057	0.068	0.078	0.091	0.114
FIN	1.00 x D	0.01 x D	90-100	0.015	0.018	0.023	0.034	0.042	0.05	0.059	0.067	0.084
SLT	0.03 x D	1.00 x D	60-70	0.008	0.011	0.013	0.017	0.021	0.025	0.031	0.034	0.042
RGH	0.5 x D	0.10 x D	80-90	0.019	0.022	0.029	0.038	0.049	0.058	0.065	0.077	0.097
FIN	1.00 x D	0.02 x D	80-90	0.012	0.015	0.017	0.023	0.029	0.035	0.041	0.047	0.059
SLT	0.03 x D	1.00 x D	50-60	0.008	0.011	0.013	0.017	0.021	0.025	0.031	0.034	0.042
RGH	0.5 x D	0.10 x D	60-70	0.019	0.022	0.029	0.038	0.049	0.058	0.065	0.077	0.097
FIN	1.00 x D	0.02 x D	65-75	0.012	0.015	0.017	0.023	0.029	0.035	0.041	0.047	0.059
SLT	0.02 x D	1.00 x D	30-40	0.008	0.011	0.013	0.017	0.021	0.025	0.031	0.034	0.042
RGH	0.5 x D	0.07 x D	45-55	0.021	0.024	0.032	0.042	0.053	0.063	0.075	0.084	0.105
FIN	1.00 x D	0.01 x D	50-60	0.015	0.018	0.023	0.03	0.038	0.046	0.055	0.061	0.076
SLT	0.02 x D	1.00 x D	30-40	0.008	0.011	0.013	0.017	0.021	0.025	0.031	0.034	0.042
RGH	0.3 x D	0.05 x D	45-55	0.021	0.024	0.032	0.042	0.053	0.063	0.075	0.084	0.105
FIN	0.5 x D	0.01 x D	50-60	0.015	0.018	0.023	0.03	0.038	0.046	0.055	0.061	0.076
SLT	0.01 x D	1.00 x D	20-30	0.007	0.01	0.011	0.014	0.018	0.022	0.025	0.029	0.036
RGH	0.2 x D	0.05 x D	30-40	0.018	0.021	0.027	0.036	0.045	0.054	0.065	0.072	0.09
FIN	0.2 x D	0.01 x D	40-50	0.013	0.016	0.019	0.026	0.032	0.039	0.045	0.052	0.065
SLT	0.04 x D	1.00 x D	110-130	0.011	0.014	0.016	0.026	0.033	0.04	0.048	0.053	0.066
RGH	1.00 x D	0.15 x D	110-130	0.02	0.023	0.031	0.05	0.063	0.075	0.088	0.1	0.125
FIN	2.00 x D	0.02 x D	130-150	0.015	0.018	0.023	0.037	0.046	0.055	0.064	0.074	0.092
SLT	0.04 x D	1.00 x D	90-100	0.011	0.014	0.016	0.024	0.03	0.036	0.044	0.048	0.06
RGH	1.00 x D	0.15 x D	90-100	0.02	0.023	0.031	0.046	0.057	0.068	0.078	0.091	0.114
FIN	2.00 x D	0.02 x D	100-120	0.015	0.018	0.023	0.034	0.042	0.05	0.059	0.067	0.084



Slotting  
(SLT)

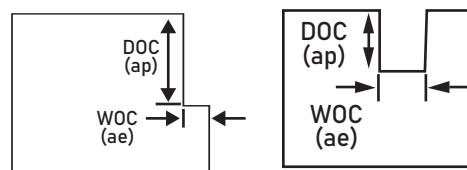


Roughing  
(RGH)



Finishing  
(FIN)

	Material	Hardness
Alloy Steel	Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	BHN 180 to 225
	Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels: 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310 Alloy Steels	BHN 225 to 355
	Alloyed heat-treatable, Tool and High Speed Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	40-45 HRc
Hardened Steel	Hardened Steel Carbon and Alloy Steels, Tool & Die Steels L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	<55 HRc
	High Hardened Steel, Die Steels, High Speed Steel	55-65 HRc
Stainless Steel	Austenitic SS: Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	<28 HRc
	Austenitic SS Moderately Difficult: 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	<28 HRc
	Precip. Hardened SS Difficult to Machine: 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic	>28 HRc
Super Alloys	Titanium Alloys: 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr	<42 HRc
CAST IRON	Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	<240 HB
	CCast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350	>240 HB
Non Ferrous	Aluminium-Cast alloys, Al-Alloys: High Silicon - A380, A390, Castings, 3.2131 G-ALSi-5Cu1, 3.2153 G-ALSi7Cu3, 3.2573 G-ALSi9, 3.2581 G-ALSi12, 3.2583 G-ALSi12Cu.	above 3% Si



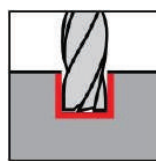
ADOC / DOC (Ap)  
Axial Depth of Cut

RDOC / WOC (Ae)  
Radial Depth of Cut

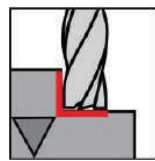
- NOTE: 1. These are just the Starting Parameters, you may vary the Speed and Feed depending upon other machining condition.  
2. Always select shortest possible flute length to prevent breakage & vibration rising due to over hang.  
3. Always wear protective gear as high speed tools may break & cause harm



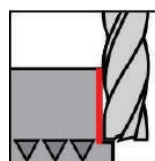
Application	Ap max	Ae max	Cutting speed (Vc)	FEED per TOOTH								
				3 mm	4 mm	6 mm	8 mm	10 mm	12 mm	14 mm	16 mm	20 mm
			m/min	mm / Z								
SLT	0.02 x D	1.00 x D	80-90	0.006	0.009	0.013	0.021	0.026	0.032	0.038	0.042	0.053
RGH	-	-	-	-	-	-	-	-	-	-	-	-
FIN	1.00 x D	0.02 x D	110-120	0.008	0.012	0.018	0.030	0.037	0.044	0.051	0.059	0.074
SLT	0.02 x D	1.00 x D	60-70	0.006	0.009	0.013	0.019	0.024	0.029	0.035	0.038	0.048
RGH	-	-	-	-	-	-	-	-	-	-	-	-
FIN	1.00 x D	0.02 x D	90-100	0.008	0.012	0.018	0.027	0.034	0.040	0.047	0.054	0.067
SLT	-	-	-	-	-	-	-	-	-	-	-	-
RGH	-	-	-	-	-	-	-	-	-	-	-	-
FIN	1.00 x D	0.02 x D	90-100	0.007	0.012	0.018	0.027	0.034	0.040	0.047	0.054	0.067
SLT	-	-	-	-	-	-	-	-	-	-	-	-
RGH	-	-	-	-	-	-	-	-	-	-	-	-
FIN	0.01 x D	0.1 x D	60-70	0.007	0.012	0.018	0.027	0.034	0.04	0.047	0.054	0.067
SLT	-	-	-	-	-	-	-	-	-	-	-	-
RGH	-	-	-	-	-	-	-	-	-	-	-	-
FIN	0.01 x D	0.1 x D	40-50	0.005	0.01	0.015	0.024	0.031	0.038	0.044	0.051	0.062
SLT	0.03 x D	1.00 x D	50-60	0.005	0.006	0.01	0.014	0.017	0.02	0.025	0.027	0.034
RGH	0.5 x D	0.10 x D	60-70	0.008	0.015	0.023	0.03	0.039	0.046	0.052	0.062	0.078
FIN	1.00 x D	0.02 x D	60-70	0.007	0.01	0.014	0.018	0.023	0.028	0.033	0.038	0.047
SLT	0.03 x D	1.00 x D	50-60	0.005	0.006	0.01	0.014	0.017	0.02	0.025	0.027	0.034
RGH	-	-	-	-	-	-	-	-	-	-	-	-
FIN	1.00 x D	0.02 x D	65-75	0.007	0.01	0.014	0.018	0.023	0.028	0.033	0.038	0.047
SLT	0.02 x D	1.00 x D	30-40	0.005	0.006	0.01	0.014	0.017	0.02	0.025	0.027	0.034
RGH	-	-	-	-	-	-	-	-	-	-	-	-
FIN	1.00 x D	0.01 x D	50-60	0.007	0.012	0.018	0.024	0.03	0.037	0.044	0.049	0.061
SLT	-	-	-	-	-	-	-	-	-	-	-	-
RGH	-	-	-	-	-	-	-	-	-	-	-	-
FIN	0.01 x D	0.01 x D	30-40	0.006	0.011	0.016	0.021	0.027	0.032	0.039	0.043	0.053
SLT	0.04 x D	1.00 x D	80-90	0.006	0.009	0.013	0.021	0.026	0.032	0.038	0.042	0.053
RGH	1.00 x D	0.15 x D	90-100	-	0.016	0.025	0.04	0.05	0.06	0.07	0.08	0.1
FIN	2.00 x D	0.02 x D	100-110	0.008	0.012	0.018	0.03	0.037	0.044	0.051	0.059	0.074
SLT	0.04 x D	1.00 x D	70-80	0.005	0.008	0.012	0.019	0.024	0.029	0.035	0.038	0.048
RGH	1.00 x D	0.15 x D	70-80	-	-	-	-	-	-	-	-	-
FIN	2.00 x D	0.02 x D	80-90	0.007	0.012	0.018	0.027	0.034	0.04	0.047	0.054	0.067
SLT	1.00 x D	1.00 x D	140-160	0.02	0.025	0.035	0.045	0.053	0.062	0.075	0.092	0.135
RGH	2.00 x D	1.00 x D	140-160	0.024	0.03	0.04	0.05	0.06	0.07	0.082	0.102	0.15
FIN	2.00 x D	0.5 x D	160-180	0.026	0.03	0.04	0.05	0.06	0.07	0.082	0.102	0.15



Slotting (SLT)

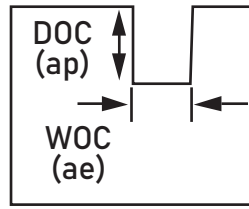
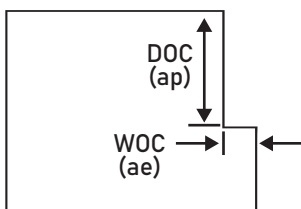


Roughing (RGH)

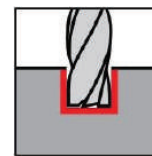


Finishing (FIN)

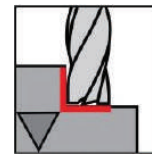
Material	Hardness	Application	DOC (Ap) max	WOC (Ae) max	Cutting speed (Vc)	FEED per TOOTH						
						4 mm	6 mm	8 mm	10 mm	12 mm	16 mm	
					m/min	mm / Z						
<b>Alloy Steel</b> Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels: 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310 Alloy Steels	BHN 225 TO 355	SLT	0.06 x D	1.00 x D	130-140	0.014	0.022	0.032	0.04	0.048	0.064	
		RGH	1.00 x D	0.15 x D	150-160	0.027	0.041	0.061	0.076	0.091	0.122	
		FIN	2.00 x D	0.02 x D	180-190	0.02	0.03	0.045	0.056	0.067	0.09	
	Aligned heat-treatable, Tool and High Speed Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 2100, A 128, D2, D3, D4, D5, D7	40-45 HRc	SLT	0.05 x D	1.00 x D	90-100	0.013	0.020	0.029	0.036	0.043	0.058
			RGH	1.00 x D	0.1 x D	130-140	0.024	0.037	0.055	0.068	0.082	0.110
			FIN	2.00 x D	0.01 x D	150-160	0.018	0.027	0.041	0.050	0.060	0.081
<b>Stainless Steel</b> Austenitic Stainless Steel Moderately Difficult: 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH  Precip. Hardened Stainless Steel Difficult to Machine: 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic	<28 HRc	SLT	0.05 x D	1.00 x D	60-70	0.011	0.017	0.022	0.028	0.034	0.045	
		RGH	1.00 x D	0.10 x D	90-100	0.026	0.038	0.051	0.065	0.078	0.103	
		FIN	2.00 x D	0.02 x D	110-130	0.016	0.023	0.031	0.039	0.047	0.062	
	>28 HRc	SLT	0.05 x D	1.00 x D	45-55	0.011	0.017	0.022	0.028	0.034	0.045	
		RGH	0.5 x D	0.07 x D	70-80	0.028	0.042	0.056	0.07	0.084	0.112	
		FIN	1.00 x D	0.01 x D	90-100	0.02	0.03	0.04	0.05	0.061	0.081	
<b>Super Alloys</b> Titanium Alloys: 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr,  High-Temperature Alloys Inconel, Nimonic, Waspalloy, Stellite	<42 HRc	SLT	0.05 x D	1.00 x D	45-55	0.011	0.017	0.022	0.028	0.034	0.045	
		RGH	0.5 x D	0.05 x D	50-70	0.028	0.042	0.056	0.07	0.084	0.112	
		FIN	1.00 x D	0.01 x D	70-80	0.02	0.03	0.04	0.05	0.061	0.081	
	>42 HRc	SLT	0.03 x D	1.00 x D	30-40	0.01	0.014	0.019	0.024	0.029	0.038	
		RGH	0.5 x D	0.03 x D	40-50	0.024	0.036	0.048	0.06	0.072	0.096	
		FIN	0.5 x D	0.01 x D	50-60	0.018	0.026	0.034	0.043	0.052	0.069	



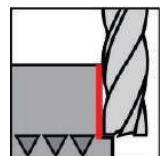
ADOC / DOC (Ap)  
Axial Depth of Cut  
  
RDOC / WOC (Ae)  
Radial Depth of Cut



Slotting (SLT)



Roughing (RGH)



Finishing (FIN)

NOTE: 1. These are just the Starting Parameters, you may vary the Speed and Feed depending upon other machining condition.

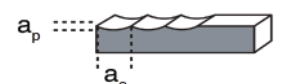
2. Always select shortest possible flute length to prevent breakage & vibration rising due to overhang.

3. Always wear protective gear as high speed tools may break & cause harm

Material	Hardness	Application	Ap max	Ae max	Cutting speed (Vc)	FEED per TOOTH						
						1 to 3 mm	4 mm	6 mm	8 mm	10 mm	12 mm	
					m/min	mm / Z						
Hardened Steel Hardened Steel Carbon and Alloy Steels	50-55 HRc	SLT	-	-	-	-	-	-	-	-	-	
		RGH	-	-	-	-	-	-	-	-	-	
		FIN	0.01 x D	1 x D	80-100	0.009	0.015	0.025	0.038	0.045	0.051	
	High Hardened Steels Tool & Die Steels P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	55-60 HRc	SLT	-	-	-	-	-	-	-	-	-
			RGH	-	-	-	-	-	-	-	-	-
			FIN	0.01 x D	1 x D	60-70	0.007	0.012	0.02	0.032	0.041	0.045
	High Hardened Steels Die Steels & High Speed Steel: M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	> 60 HRc	RGH	-	-	-	-	-	-	-	-	-
			FIN	0.01 x D	1 x D	25-50	0.005	0.01	0.017	0.027	0.034	0.038

Material	Hardness	Application	Ap max	Ae max	Cutting speed (Vc)	FEED per TOOTH						
						1 to 3 mm	4 mm	6 mm	8 mm	10 mm	12 mm	
					m/min	mm / Z						
Hardened Steel Hardened Steel Carbon and Alloy Steels	50-55 HRc	SLT	-	-	-	-	-	-	-	-	-	
		RGH	-	-	-	-	-	-	-	-	-	
		FIN	0.1-0.3	0.02 x D	130-150	0.01	0.015	0.022	0.03	0.041	0.052	
	High Hardened Steels Tool & Die Steels P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	55-60 HRc	SLT	-	-	-	-	-	-	-	-	-
			RGH	-	-	-	-	-	-	-	-	-
			FIN	0.1-0.2	0.01 x D	110-120	0.007	0.009	0.011	0.014	0.021	0.028
	High Hardened Steels Die Steels & High Speed Steel: M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	> 60 HRc	RGH	-	-	-	-	-	-	-	-	-
			FIN	0.05-0.1	0.01 x D	70-100	0.005	0.007	0.009	0.011	0.018	0.023

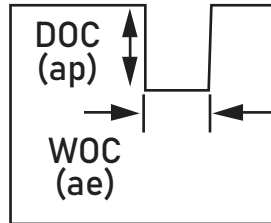
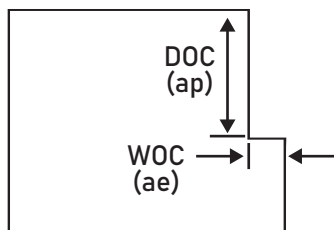
$a_e$  = Width of cut  
 $a_p$  = Depth of cut



NOTE: Coolant Preference: Mist Spray

These are just the Starting Parameters, you may vary the Speed and Feed depending upon other machining condition.

	Material	Hardness
Alloy Steel	Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	BHN 180 to 225
	Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels: 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310 Alloy Steels	BHN 225 to 355
	Alloyed heat-treatable, Tool and High Speed Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	40-45 HRc
Stainless Steel	Hardened Steel Carbon and Alloy Steels, Tool & Die Steels	<55 HRc
	High Hardened Steel, Die Steels, High Speed Steel	55-65 HRc
Super Alloys	Austenitic SS: Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	<28 HRc
	Austenitic SS Moderately Difficult: 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	< 28 HRc
	Precip. Hardened SS Difficult to Machine: 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic	>28 HRc

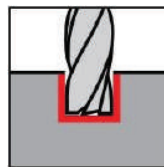


ADOC / DOC (Ap)  
Axial Depth of Cut

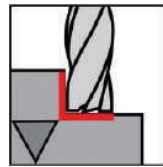
RDOC / WOC (Ae)  
Radial Depth of Cut

- NOTE: 1. These are just the Starting Parameters, you may vary the Speed and Feed depending upon other machining condition.  
 2. Always select shortest possible flute length to prevent breakage & vibration rising due to over hang.  
 3. Always wear protective gear as high speed tools may break & cause harm

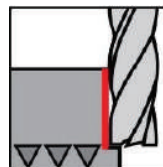
Application	DOC (Ap) max	WOC (Ae) max	Cutting speed (Vc)	FEED per TOOTH									
				1-3 mm	4 mm	5 mm	6 mm	8 mm	10 mm	12 mm	14 mm	16 mm	20 mm
			m/min	mm / Z									
SLT	0.05 x D	1.00 x D	60-80	0.008	0.011	0.016	0.021	0.032	0.038	0.045	0.054	0.061	0.07
RGH	-	-	-	-	-	-	-	-	-	-	-	-	-
FIN	-	-	-	-	-	-	-	-	-	-	-	-	-
SLT	0.03 x D	1.00 x D	50-70	0.007	0.01	0.015	0.02	0.03	0.036	0.043	0.052	0.059	0.068
RGH	-	-	-	-	-	-	-	-	-	-	-	-	-
FIN	-	-	-	-	-	-	-	-	-	-	-	-	-
SLT	0.01 x D	1.00 x D	40-60	0.005	0.08	0.013	0.018	0.029	0.035	0.041	0.05	0.057	0.065
RGH	-	-	-	-	-	-	-	-	-	-	-	-	-
FIN	2.00 x D	0.02 x D	70-90	0.006	0.009	0.012	0.016	0.027	0.034	0.040	0.047	0.054	0.062
SLT	-	-	-	-	-	-	-	-	-	-	-	-	-
RGH	-	-	-	-	-	-	-	-	-	-	-	-	-
FIN	0.01 x D	0.1 x D	40-50	0.006	0.009	0.015	0.018	0.027	0.034	0.04	0.047	0.054	0.062
SLT	-	-	-	-	-	-	-	-	-	-	-	-	-
RGH	-	-	-	-	-	-	-	-	-	-	-	-	-
FIN	0.01 x D	0.01 x D	20-40	0.004	0.007	0.012	0.015	0.024	0.03	0.035	0.042	0.05	0.057
SLT	0.02 x D	1.00 x D	50-70	0.008	0.011	0.019	0.021	0.032	0.038	0.045	0.054	0.061	0.07
RGH	-	-	-	-	-	-	-	-	-	-	-	-	-
FIN	1.00 x D	0.02 x D	70-90	0.006	0.009	0.015	0.018	0.027	0.034	0.04	0.047	0.054	0.062
SLT	-	-	-	-	-	-	-	-	-	-	-	-	-
RGH	-	-	-	-	-	-	-	-	-	-	-	-	-
FIN	0.03 x D	0.01 x D	20-40	0.004	0.007	0.012	0.015	0.024	0.031	0.036	0.043	0.05	0.057
SLT	-	-	-	-	-	-	-	-	-	-	-	-	-
RGH	-	-	-	-	-	-	-	-	-	-	-	-	-
FIN	0.01 x D	0.01 x D	20-40	0.003	0.004	0.008	0.01	0.02	0.027	0.032	0.039	0.046	0.054



Slotting  
(SLT)



Roughing  
(RGH)



Finishing  
(FIN)

NOTE: For 308-Series parameters of Finishing application only to be applied.  
Reduce WOC by 40% and increase FEED by 30%



Material

Alloy Steel	Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330
	Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels: 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310 Alloy Steels
	Alloyed heat-treatable, Tool and High Speed Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7
Hardened Steel	Hardened Steel Carbon and Alloy Steels, Tool & Die Steels
	High Hardened Steel, Die Steels, High Speed Steel
Stainless Steel	Austenitic SS: Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F
	Austenitic SS Moderately Difficult: 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH
	Precip. Hardened SS Difficult to Machine: 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic
Super Alloys	Titanium Alloys: 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr
	High-Temperature Alloys Inconel, Nimonic, Waspalloy, Stellite

Series: 302, 304, 306, 307 & 202, 204, 206, 208, 212 & 102, 104, 109

Hardness	Ballnose Series	Ae max	Cutting speed (Vc)	FEED per TOOTH								
				3 mm	4 mm	5 mm	6 mm	8 mm	10 mm	12 mm	16 mm	20 mm
			m/min	mm / Z								
BHN 180 to 225	C-202, 204, 208	0.1 x D	60-70	0.015	0.018	0.020	0.023	0.030	0.045	0.060	0.075	0.090
	C-202, 204, 208	0.03 x D	90-100	0.011	0.013	0.015	0.016	0.021	0.032	0.042	0.055	0.065
	C-202, 204, 208	0.01 x D	100-120	0.009	0.01	0.012	0.014	0.018	0.027	0.036	0.051	0.055
BHN 225 to 355	C-202, 204, 208	0.1 x D	60-70	0.015	0.018	0.020	0.023	0.030	0.045	0.060	0.075	0.090
	C-202, 204, 208	0.03 x D	90-100	0.011	0.013	0.015	0.016	0.021	0.032	0.042	0.055	0.065
	C-202, 204, 208	0.01 x D	100-120	0.01	0.011	0.013	0.015	0.020	0.030	0.039	0.055	0.060
40-45 HRc	C-206, 302, 306	0.1 x D	50-60	0.007	0.009	0.01	0.011	0.014	0.022	0.029	0.036	0.042
	C-206, 302, 306	0.03 x D	80-90	0.005	0.007	0.007	0.008	0.01	0.015	0.02	0.024	0.03
	C-206, 302, 306	0.01 x D	90-100	0.005	0.007	0.007	0.007	0.009	0.014	0.019	0.024	0.027
< 55 HRc	C-206, 302, 306	0.1 x D	40-50	0.01	0.011	0.013	0.014	0.019	0.029	0.038	0.048	0.056
	C-206, 302, 306	0.02 x D	50-60	0.007	0.009	0.01	0.01	0.014	0.02	0.027	0.032	0.04
	C-206, 302, 306	0.01 x D	60-70	0.006	0.007	0.007	0.009	0.012	0.017	0.023	0.028	0.036
55-65 HRC	C-302, 304, 306, 307	0.02 x D	40-50	0.006	0.007	0.007	0.008	0.011	0.017	0.022	0.028	0.032
	-	-	-	-	-	-	-	-	-	-	-	-
	C-302, 304, 306, 307	0.01 x D	50-60	0.005	0.006	0.007	0.007	0.01	0.014	0.019	0.024	0.028
<28 HRc	C-302, 304, 306, 307	0.1 x D	80-90	0.01	0.012	0.014	0.016	0.021	0.031	0.042	0.052	0.064
	C-302, 304, 306, 307	0.03 x D	100-115	0.007	0.008	0.009	0.011	0.014	0.022	0.029	0.036	0.044
	C-302, 304, 306, 307	0.01 x D	100-120	0.006	0.007	0.009	0.01	0.012	0.019	0.025	0.032	0.036
<28 HRc	C-302, 304, 306, 307	0.1 x D	50-60	0.01	0.011	0.012	0.014	0.019	0.029	0.038	0.048	0.056
	C-302, 304, 306, 307	0.03 x D	80-90	0.007	0.008	0.009	0.01	0.014	0.02	0.027	0.032	0.04
	C-302, 304, 306, 307	0.01 x D	60-70	0.006	0.007	0.008	0.009	0.012	0.017	0.023	0.028	0.036
>28 HRc	C-302, 304, 306, 307	0.1 x D	30-40	0.008	0.009	0.011	0.012	0.016	0.024	0.032	0.04	0.048
	C-302, 304, 306, 307	0.02 x D	40-50	0.006	0.007	0.008	0.008	0.011	0.017	0.022	0.028	0.032
	C-302, 304, 306, 307	0.01 x D	30-40	0.005	0.007	0.012	0.007	0.01	0.014	0.019	0.024	0.028
<42 HRc	C-302, 304, 306, 307	0.1 x D	40-50	0.01	0.011	0.012	0.014	0.019	0.029	0.038	0.048	0.056
	C-302, 304, 306, 307	0.02 x D	60-70	0.007	0.008	0.009	0.01	0.014	0.02	0.027	0.032	0.04
	C-302, 304, 306, 307	0.01 x D	60-70	0.006	0.007	0.008	0.009	0.012	0.017	0.023	0.028	0.036
<42 HRc	C-302, 304, 306, 307	0.1 x D	20-30	0.008	0.009	0.011	0.012	0.016	0.024	0.032	0.04	0.048
	C-302, 304, 306, 307	0.02 x D	30-40	0.006	0.007	0.008	0.008	0.011	0.017	0.022	0.028	0.032
	C-302, 304, 306, 307	0.01 x D	30-40	0.005	0.007	0.012	0.007	0.01	0.014	0.019	0.024	0.028

**Material**

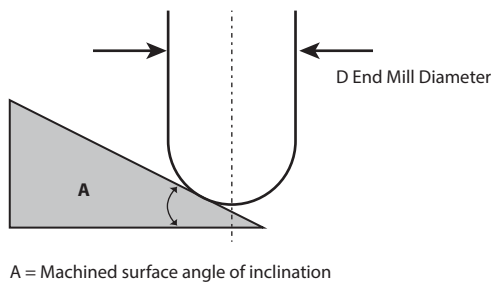
<b>CAST IRON</b>	Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40
	Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350
<b>Non Ferrous</b>	Aluminum, Al-wrought alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075
	Aluminium-Cast alloys, Al-Alloys: High Silicon - A380, A390, Castings, 3.2131 G-ALSi-5Cu1, 3.2153 G-ALSi7Cu3, 3.2573 G-ALSi9, 3.2581 G-ALSi12, 3.2583 G-ALSi12Cu.
	Magnesium-alloys MgMn2, G-MgAl8Zn1, G-MgAl6Zn3
	Wood, Hard Wood, MDF, Plyboards, Plastics
	Non-ferrous metals (copper, short- or long-chipping brass or bronze)

Application	Width/ Depth		Ballnose Diameter (mm)									
			1	2	3	4	6	8	10	12	16	20
Roughing A < 15°	Ae	(mm)	0.2	0.5	0.8	1.2	1.6	2.2	2.8	3.4	4.6	5.8
	Ap	(mm)	0.07	0.12	0.19	0.26	0.58	0.78	1	1.2	1.6	2
Finishing A > 15°	Ae	(mm)	0.01	0.02	0.04	0.06	0.1	0.14	0.18	0.22	0.28	0.32
	Ap	(mm)	0.04	0.08	0.13	0.18	0.27	0.37	0.5	0.6	0.8	0.9

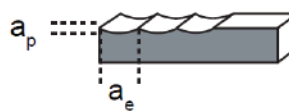
- 1 - Roughing = surface milling, machined surface angle A less than 15°.
- 2 - Finishing = contour milling, machined surface angle A between 15° and 90°.
- 3 - Reduce feeds and speeds 20% for tool projection greater than 5xD.
- 4 - Use Endmill dia. (D1) to calculate RPM (do not use effective diameter).
- 5 - ALL VALUES IN METRIC.

Series: 302, 304, 306, 307 & 202, 204, 206, 208, 212 & 102, 104, 109

Hardness	Ballnose Series	Ae max	Cutting speed (Vc)	FEED per TOOTH								
				3 mm	4 mm	5 mm	6 mm	8 mm	10 mm	12 mm	16 mm	20 mm
			m/min	mm / Z								
<240 HB	C-202, 204, 208	0.1 x D	90-100	0.012	0.014	0.016	0.018	0.024	0.036	0.048	0.06	0.072
	C-202, 204, 208	0.03 x D	110-130	0.008	0.01	0.012	0.013	0.017	0.025	0.034	0.044	0.052
	C-202, 204, 208	0.01 x D	130-150	0.007	0.008	0.01	0.011	0.014	0.022	0.029	0.036	0.044
>240 HB	C-206, 302, 306	0.1 x D	70-80	0.01	0.012	0.014	0.016	0.021	0.031	0.042	0.052	0.064
	C-206, 302, 306	0.02 x D	90-100	0.007	0.009	0.01	0.011	0.014	0.022	0.029	0.036	0.042
	C-206, 302, 306	0.01 x D	100-120	0.006	0.007	0.009	0.01	0.012	0.019	0.025	0.032	0.036
up to 3% Si	C-202, 212, 208	0.1 x D	240-250	0.016	0.019	0.02	0.024	0.032	0.048	0.064	0.08	0.095
	C-202, 212, 208	0.03 x D	300-320	0.011	0.013	0.015	0.017	0.023	0.034	0.045	0.055	0.065
	C-202, 212, 208	0.01 x D	340-360	0.01	0.012	0.014	0.015	0.019	0.029	0.039	0.05	0.06
above 3% Si	C-202, 212, 208	0.1 x D	110-120	0.015	0.018	0.02	0.023	0.03	0.045	0.06	0.075	0.09
	C-202, 212, 208	0.03 x D	150-160	0.011	0.013	0.014	0.016	0.021	0.032	0.042	0.055	0.065
	C-202, 212, 208	0.01 x D	180-200	0.009	0.011	0.013	0.014	0.018	0.027	0.036	0.045	0.055
-	C-202, 212, 208	0.1 x D	70-80	0.013	0.015	0.017	0.02	0.026	0.039	0.052	0.065	0.08
	C-202, 212, 208	0.03 x D	90-110	0.009	0.011	0.013	0.014	0.018	0.028	0.037	0.045	0.055
	C-202, 212, 208	0.01 x D	100-120	0.008	0.01	0.011	0.012	0.016	0.024	0.031	0.04	0.045
-	C-204, 208, 104, 109	0.1 x D	200-250	0.016	0.019	0.02	0.024	0.032	0.048	0.064	0.08	0.095
	C-204, 208, 104, 109	0.03 x D	270-320	0.011	0.013	0.015	0.017	0.023	0.034	0.045	0.055	0.065
	C-204, 208, 104, 109	0.01 x D	300-360	0.01	0.012	0.014	0.015	0.019	0.029	0.039	0.05	0.06
-	C-204, 208, 104, 109	0.1 x D	100-120	0.015	0.018	0.02	0.023	0.03	0.045	0.06	0.075	0.09
	C-204, 208, 104, 109	0.03 x D	140-160	0.011	0.013	0.014	0.016	0.021	0.032	0.042	0.055	0.065
	C-204, 208, 104, 109	0.01 x D	140-160	0.009	0.011	0.013	0.014	0.018	0.027	0.036	0.045	0.055



$a_e$  = Width of cut  
 $a_p$  = Depth of cut



**Copy Milling**

NOTE: These are just the Starting Parameters, you may vary the Speed and Feed depending upon other machining condition.

	Material	Hardness	Application	Ae max	Ae max	Cutting speed (Vc)	FEED per TOOTH						
							4 mm	6 mm	8 mm	10 mm	12 mm	16 mm	20 mm
						m/min	mm / Z						
Non Ferrous	Aluminum, Al-wrought alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075	<3% Si	SLT	1.00 x D	1.00 x D	Max.	0.02	0.045	0.06	0.07	0.085	0.1	0.12
			RGH	3.00 x D	0.8 x D	Max.	0.02	0.045	0.06	0.07	0.085	0.1	0.12
			FIN	1.00 x D	0.3 x D	Max.	0.025	0.05	0.07	0.08	0.095	0.12	0.15
	Aluminium-Cast alloys, Al-Alloys: High Silicon - A380, A390, Castings, 3.2131 G-ALSi-5Cu1, 3.2153 G-ALSi7Cu3, 3.2573 G-ALSi9, 3.2581 G-ALSi12, 3.2583 G-ALSi12Cu.	>3% Si	SLT	0.5 x D	1.00 x D	150-300	0.016	0.036	0.048	0.056	0.068	0.08	0.096
			RGH	2.00 x D	0.6 x D	150-300	0.016	0.036	0.048	0.056	0.068	0.08	0.096
			FIN	1.00 x D	0.2 x D	250-300	0.02	0.04	0.056	0.064	0.076	0.096	0.12
	Magnesium-alloys MgMn2, G-MgAl8Zn1, G-MgAl6Zn3	-	SLT	0.5 x D	1.00 x D	150-300	0.016	0.036	0.048	0.056	0.068	0.08	0.096
			RGH	2.00 x D	0.5 x D	150-300	0.016	0.036	0.048	0.056	0.068	0.08	0.096
			FIN	1.00 x D	0.1 x D	250-300	0.02	0.04	0.056	0.064	0.076	0.096	0.12
	Non-ferrous metals (copper, short- or long-chippingbrass or bronze)	-	SLT	0.5 x D	1.00 x D	120-150	0.016	0.036	0.048	0.056	0.068	0.08	0.096
			RGH	1.00 x D	0.3 x D	120-150	0.016	0.036	0.048	0.056	0.068	0.08	0.096
			FIN	1.00 x D	0.1 x D	160-180	0.02	0.04	0.056	0.064	0.076	0.096	0.12

	Material	Hardness	Application	Ae max	Ae max	Cutting speed (Vc)	FEED per TOOTH						
							4 mm	6 mm	8 mm	10 mm	12 mm	16 mm	20 mm
						m/min	mm / Z						
Alloy Steel	Free Machining & Low Carbon Steels	BHN 180-225		1.00 x D	0.02 x D	80-100	0.012	0.018	0.027	0.034	0.040	0.054	0.067
	Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels	BHN 25-355		0.50 x D	0.01 x D	65-85	0.009	0.013	0.019	0.024	0.029	0.038	0.048
CAST IRON	Cast Iron - Gray CG	up to 240HB)		1.00 x D	0.02 x D	80-100	0.012	0.018	0.027	0.034	0.04	0.054	0.067
Non Ferrous	Aluminum, Al-wrought alloys	<3% Si		1.00 x D	0.05 x D	120-140	0.025	0.035	0.045	0.053	0.062	0.092	0.135
	Aluminium-Cast alloys, Al-Alloys: High Silicon	>3% Si		0.50 x D	0.03 x D	100-110	0.025	0.035	0.045	0.053	0.062	0.092	0.135
	Wood, Hard Wood, MDF, Plyboards, Plastics	-		1.00 x D	0.05 x D	100-120	0.035	0.053	0.062	0.075	0.092	0.092	0.135
	Non-ferrous metals (copper, short- or long-chippingbrass or bronze)	-		1.00 x D	0.05 x D	90-100	0.025	0.035	0.045	0.053	0.062	0.092	0.135

NOTE: For 101 & 110-series Lower the Feed and Speed rates by 30%

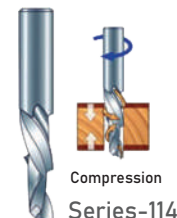
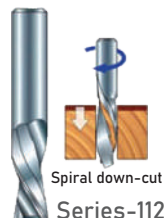
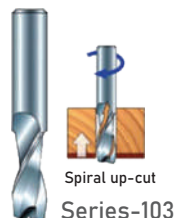
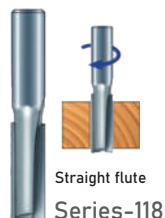
These are just the Starting Parameters, you may vary the Speed and Feed depending upon other machining condition.



## Feed & Speed Parameters for Wood & Plastic machining

Series: 103, 107, 108, 112, 114 & 118

Material	Cutting speed (Vc) m/min	Ap max	Ae max	FEED per TOOTH					
				3 mm	4 mm	6 mm	8 mm	10 mm	12 mm
				mm / Z					
WOOD / PLASTIC	HARD WOOD: maple, oak, teak, and walnut. Max. Available	2 X D	0.5 X D	0.08	0.13	0.23	0.32	0.38	0.48
				-	-	-	-	-	-
	SOFTWOOD / PLYWOOD: cedar, Douglas fir, juniper, pine, redwood, spruce, and yew. 250-400	3 X D	1 X D	0.1	0.17	0.28	0.35	0.43	0.53
				-	-	-	-	-	-
	Medium Density Fiberboard (MDF) / Laminated Plywood 250-400	2 X D	1 X D	0.1	0.2	0.33	0.42	0.51	0.64
-				-	-	-	-	-	
SOFT PLASTIC 150-180	3 X D	1 X D	0.1	0.18	0.2	0.2	0.2	0.25	
			-	-	-	-	-	-	
HARD PLASTIC 120-150	2 X D	0.5 X D	0.15	0.2	0.25	0.25	0.25	0.3	
			-	-	-	-	-	-	



Good edge quality on most materials	May chip or fray top face, good quality on bottom face when through-cutting	Best edge quality on top face, may chip or fray bottom face when through-cutting	Clean edge on both top and bottom face
Moderate chip clearing abilities	Excels at clearing chips and dissipating heat, especially with "o-flute" bits	May compact chips in a groove	Designed to cut veneered or laminated materials at full depth in one pass
	Upwards force may cause part lifting concern	Downwards force may help with cutting thin sheets	
Ideal for : general- purpose cutting	Ideal for: plastics, aluminum, or any material where heat buildup is a concern	Ideal for : plywood and laminates (pocketing)	Ideal for: plywood and laminates (profile cutting)

### Types of CNC Router Bits and there use

CNC Router machines & Handheld routers are being used increasingly in industries like construction, wood furniture, stone carving, aluminium door industry and many more. Hence the right use of the Router Bits & knowledge of the same is must. [Read more on rigpl.com/blog](http://rigpl.com/blog)



## Best Machining with High Efficiency Milling (HEM)

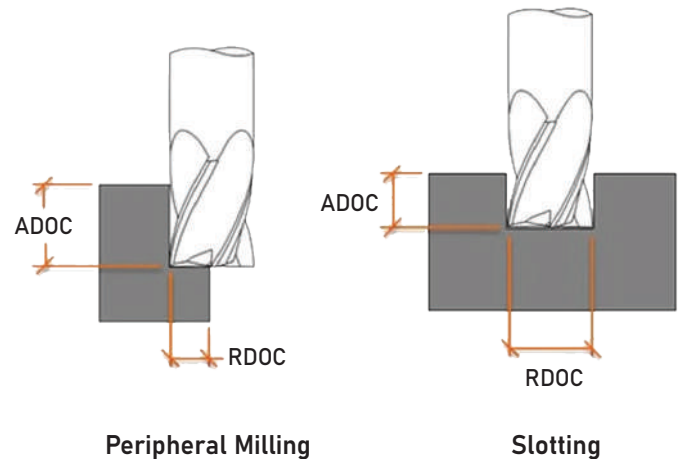
**Radial Depth of Cut (RDOC):** The distance a tool is stepping over into a workpiece. Also referred to as Stepover, Cut Width

**Axial Depth of Cut (ADOC):** The distance a tool engages a workpiece along its centerline. Also referred to as Stepdown, or Cut Depth.

**Peripheral Milling:** An application in which only a percentage of the tool's cutter diameter is engaging a part.

**Slotting:** An application in which the tool's entire cutter diameter is engaging a part.

**High Efficiency Milling (HEM):** A newer machining strategy in which a light RDOC and heavy ADOC is paired with increased feed rates to achieve higher material removal rates and decreased tool wear.



### Depth of Cut Strategy for High Efficiency Milling (HEM)

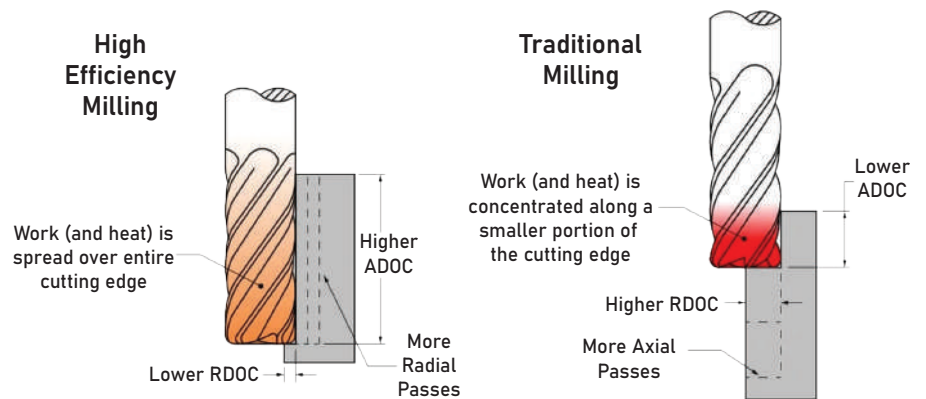
Pairing a light RDOC and heavy ADOC with high performance toolpaths is a machining strategy known as High Efficiency Milling or HEM. With this machining style, feed rates can be increased and cuts are kept uniform to evenly distribute stresses across the cutting portion of the tool, prolonging tool life.

#### Traditional Strategy

- Heavy RDOC
- Light ADOC
- Conservative Feed Rate

#### Newer Strategy – High Efficiency Milling (HEM)

- Light RDOC
- Heavy ADOC
- Increased Feed Rate



HEM involves using 7-30% of the tool diameter radially and up to twice the cutter diameter axially, paired with increased feed rates. Accounting for chip thinning, this combination of running parameters can result in noticeably higher metal removal rates (MRR). Modern CAM software often offers a complete high performance solution with built-in features for HEM toolpaths. These principals can also be applied to trochoidal toolpaths for slotting applications.

#### Best Tools for HEM:

- High flute count for increased MRR.
- Large core diameter for added strength.
- Tool coating optimized for the workpiece material for increased lubricity.
- Variable Pitch/Variable Helix design for reduced harmonics.

## General notes:

- All the cutting rate recommendations specified in this catalog are standard values valid exclusively for new tools or tools re-ground to RIGPL specifications.
- Pre-requisites are stable machines, optimal cooling, optimal tool clamping and maximum concentricity of the tool and the machine spindle.
- Our recommended cutting rates must be reduced if the conditions deviate.
- The values may also be adjusted to influence Surface finish quality, machining rate or tool life.

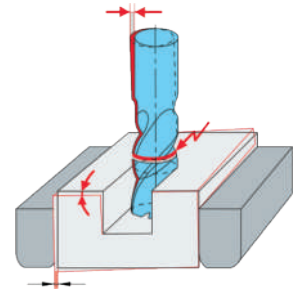
### 1. Workpiece Clamping

Loss of tool life or tool breakage through unstable clamping

Improve workpiece clamping

#### Alternative:

- reduce feed
- reduce cutting width or depth



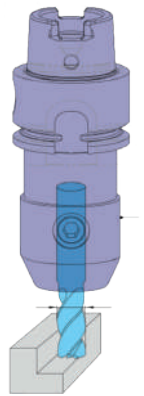
### 2. Tool Clamping

Loss of tool life or tool breakage through unstable, worn or too small/long/thin tool holder

Apply new or larger tool holder or holder with increased clamping force and increased concentricity

#### Alternative:

- reduce cutting rates
- reduce clamping length
- apply tool with smaller diameter
- check clamping screws for wear



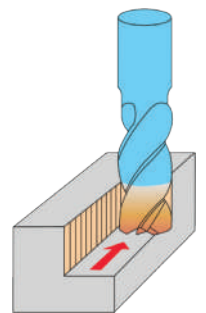
### 3. Surface Finish Quality

Excessive peak-to-valley height Ra/Rz at the tool Surface finish through excessive feed rates or vibrations

Improve workpiece clamping and tool clamping (see points 1 & 2)

#### Alternative:

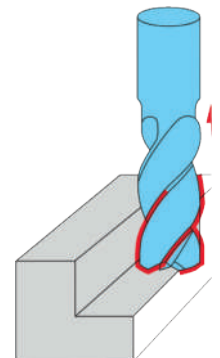
- reduce feed and feed rate
- increase cutting speed



### 4. Vibrations

High tool wear, insufficient workpiece Surface finish quality and insufficient dimensional accuracy through vibration

- Improve workpiece and tool clamping (see points 1 and 2)
- Increase tooth feed, because the chip centre thickness is too small
- Modify speed
- Modify milling strategy, i.e. select alternative cutting distribution
- Change tool selection, i.e. reduce no. of teeth or spiral



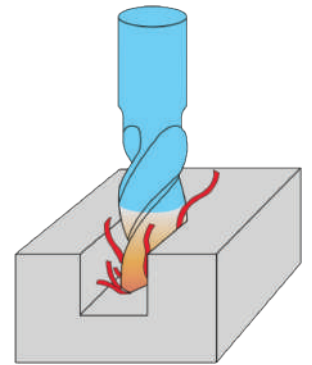
## 5. Chip Congestion / Cooling

Significant reduction in tool life, chipping on cutting edges, edge build-up of flutes through insufficient chip evacuation

Select milling cutters with internal cooling

### Alternative:

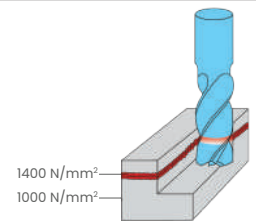
- increase volume flow
- adjust coolant flow
- apply compressed air cooling (according to tool and material)
- reduce feed rate
- modify cutting distribution
- select end mill with fewer flutes



## 6. Thermal Influence on Materials

Through welding or torch cutting, the material characteristics at the parting line do not correspond with the specified material class

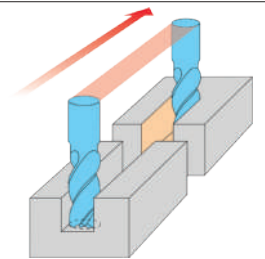
- Reduce cutting rates
- Select tool for materials with a higher tensile strength



## 7. Loss in Tool Life Due to Interrupted Cutting

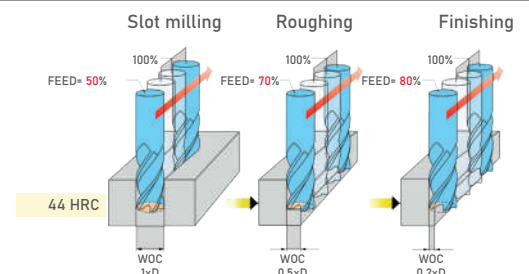
Significant loss in tool life through interrupted cutting (especially with milling angles of 90°)

- Modify cutting distribution
- Reduce feed rate for entry and exit
- Reduce approach angle



## 8. Entry in Hardened Materials

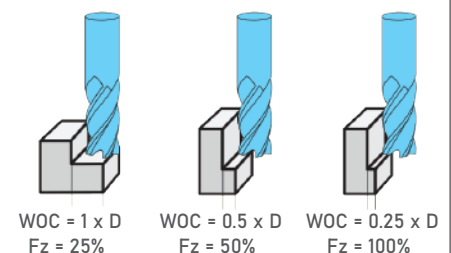
For entering materials over 45 HRC, reduce the feed rate in accordance with the image illustration on the right



## 9. Feed Rate Adjustment: Modifying the Cutting Width:

When modifying the cutting width WOC, the feed rate must be reduced in accordance with the illustration on the right

- Cutting speed or revolutions remain unchanged
- Double reduction applies when also modifying the cutting depth DOC!



## 10. Feed Rate Adjustment: Modifying the Cutting Depth:

When modifying the cutting depth DOC, the feed rate must be reduced in accordance with the illustration on the right

- Cutting speed or revolutions remain unchanged up to cutting depths of 3 x D, must only be adapted over 3 x D
- Double reduction applies when also modifying the cutting width WOC!

