

GWS

TOOL GROUP

MILLING TURNING HOLEMAKING
PRODUCT CATALOG





GWS Tool Group is a US-based, vertically integrated manufacturer of highly engineered custom, standard, and modified standard cutting tools, primarily servicing the aerospace and defense, power generation, automotive and medical sectors. GWS Tool Group has acquired multiple businesses in the course of its growth which now serve as the respective manufacturing divisions for the company, and include **GW Schultz Tool (Tavares, FL), CGI Tool Chesterfield, IN), Alliance CNC (Grand Rapids, MI) and Benchmark Carbide (Springfield, MA).**

The continued expansion of GWS Tool Group by way of acquisitions and constant investment in the business' capabilities has created an explosive value proposition for customers to leverage in all advanced machining environments. We remain committed to the expansion of this value proposition always and in all ways.





AS9100 / ISO9001

**GWS Tool Group is accredited
under the Aerospace Registration
Management Program and under
the ICOP scheme.**



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ULTIMATE PERFORMANCE SERIES

ECODRILL

28

PACREAMER

30


ALUMIGATOR
HIGH PERFORMANCE ALUMINUM END MILLS

34


HURRIMILL

41

DM²

58

PYSTL_{series}

59



CORE PRODUCTS

Check out any of these on-line resources today at www.gwstoolgroup.com

CUSTOM TOOLS

Specially designed cutting tools are required for a variety of reasons; be it a little extra length for reach or specialized forms and tight tolerances to meet difficult part requirements. At GWS, we have built our capabilities around the necessity for high precision, fast turnaround service. By combining talented engineering and design staff with the latest in automation technology, GWS can output custom tooling for high production facilities in a matter of a few weeks or even a few days.



END MILLS

GWS Tool Group has a large portfolio of stocked standard solid carbide end mills, designed for metal cutting applications in an array of industries including Medical, Aerospace, Automotive, Heavy Industry and General Engineering. We feature both Performance and Ultimate Performance milling series to address materials ranging from mild steels to exotic materials like Titanium and Inconel.



HOLEMAKING

New to the GWS lineup is the addition of precision holemaking tools, which includes our self-centering PAC reamers and ECO drill offering, ideal for automotive and medical industry applications. In addition to our standard holemaking tools, GWS offers custom quick turnaround holemaking solutions like step drills, deep hole drills and step reamers made to your specifications.



TURNING INSERTS

A complete offering of high performance ISO turning inserts is available through the GWS Tool Group. From Cast Iron to Titanium, roughing or finishing, we have the designs and grades you need for the application. Need a special modification to an insert or a complete custom insert like PCD-tipped, CBN or thread-whirling inserts, GWS has you covered.



ICON GUIDE

Tool Specifications

 CC	Center Cutting	 90°	Reduced Neck	 5FL	Flutes	 RAD	Radius
 NC	Non-Center Cutting	 NEW	New Product Line	 VAR	Variable Helix	 SQ	Square End
 CB	Chip Breakers	 CT	Coolant Through	 30°	Helix	 BALL	Ball Nose
 H6	Shank	 P198	Speed & Feed				

Endmill Coatings

 Bright	Uncoated
 TiN	Titanium Nitride(TiN)
 TiAlN	Titanium Aluminium Nitride (TiAlN)
 Advatech	Advatech
 ZrN	Zirconium Nitride (ZrN)
 AlTiN	Aluminum Titanium Nitride(AlTiN)
 nACo	nACo
 nACRo	nACRo
 Alcromax	Alcromax

Insert Coatings

 CG91	CG91 - HT-P15 HT-M10 HT-K10
 CG92	CG92 - HC-P15 HC-K25 HC-M10
 CG93	CG93 - HC-P25 HC-K30 HC-M20
 CG94	G94 - HC-P35 HC-M25 HC-S25
 CG95	CG95 - HC-M20 HC-K20
 CG96	CG96 - HC-M25 HC-P35 HC-S25
 CG97	CG97 - HC-M35 HC-P35
 CG98	CG98 - HC-M15 HC-S15
 CG99	CG99 - HC-K20 HC-P10
 CG910	CG910 - HW-N15 HW-K15
 CG911	CG911 - HC-S15 HC-M15
 CG912	CG912 - HC-S15 HC-M15

MATERIAL OVERVIEW

ISO Materials

P Steel

N Cast Iron

S High-Temp Alloys

M Stainless Steel

S Non-Ferrous

H Hardened Materials

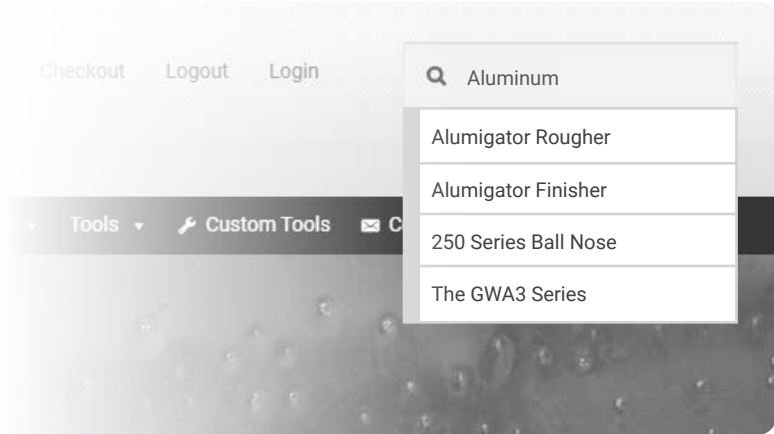
Icon	Material Family	Tensile Strength	Hardness HB	Hardness HRC	Material Number
P1	Low, Medium & High-Carbon Steels, Long Chipping, Short Chipping, Free Machining	>600	<220	<25	A36, 1008, 1010, 1018 through 1029; 1108, 1117, 10L18, 1200, 1213, 12L14, 1035, 1045, 10L45, 1050, 10L50, 1080, 1137, 1144, 11L44, 1525, 1545, 1572
P2	Alloy Steels and Tool Steels	600-1400	<450	<48	1300, 2000, 3000, 4000, 500, 800, P20, SAE:A, D, H, O, S, M, T
P3	Ferretic, Martensitic, and PH Stainless Steels, High-Strength	600-1350	330-450	35-48	15-5 PH, 13-8 PH, 17-4 PH, 400 and 500 Series
M1	Austenitic Stainless Steel	<600	130-200	-	200 Series, 301, 302, 304, 304L, 309
M2	High-Strength, Austenitic Stainless and Cast Stainless Steels, Duplex Stainless Steel	600-800	135-275	<25	310, 316, 316L, 321, 347, 384ASTM Cast XM-1, XM-5, XM-7, XM-21, 323, 329, F55, 2205, S329000
K1	Gray Cast Iron, Low- and Medium-Strength Ductile Irons (Nodular Irons) and Compacted Graphite Irons (CG)	125-600	120-290	<32	class 20, 25, 30, 40, 45, 50, 60, G1800, G3000, G3500, G4000, 60-40-18, 65-42-12, 80-55-06, SAE J434:D4018, D4512, D5506, Grade 250, 300, 350, 400, 450
K2	High-Strength Ductile Irons and Austempered Ductile Iron (ADI)	>600	180-350	<43	ASTM A536: 100-70-03, 120-90-02, SAE J434: D7003, SAE J158: Grade M8501AST A897: 125-80-10, 150-100-7, 175-125-4, 200-150-1, 230-185
N1	Wrought Aluminum, Low-Silicon Aluminum Alloys and Magnesium Alloys	-	-	-	2025, 5050, 7050, 1000, 2017, 2024, 6061, 7075
N2	High-Silicon Aluminum Alloys and Magnesium Alloys	-	-	-	-
S1	Iron-Based, Heat-Resistant Alloys, Cobalt-Based, Heat Resistant Alloys, Nickel-Based, Heat-Resistant Alloys	100-1700	160-450	25-48	A-286, INCOLOY® 800 Series, A608, A567, INVAR®, N-155, A-351, A-567, A-608, Haynes® 25(L605), Haynes 188, J-1570, Stellite®, Haynes 21, MAR-M302 MAR-M509, Hastelloy®, INCONEL® 600 and 700 Series, INCOLOY 900 Series, Rene 41, Waspalloy®, Monel®,
S2	Titanium and Titanium Alloys	900-1600	300-400	33-48	Pure: Ti 98.8, Ti 98.9, Ti99.9; Alloyed: Ti 5Al-2.5Sn, Ti6Al-4V, Ti6Al-2Sn-4Zr-2Mo, Ti-3Al-8V-6Cr-4Mo-4Zr, Ti-10V-2Fe-3Al, Ti-13V-11Cr-3Al
H1	Hardened Materials	-	-	44-48	Tool Steel H10, H11, H13, D2, D3, 4340, P20
H2	Hardened Materials	-	-	56-60	Tool Steel, S7, A2 D2, D3, CPM-10V

ONLINE RESOURCES

Check out any of these on-line resources today at www.gwstoolgroup.com

SEARCH WIZARD

Search by part number, series number or product description to quickly find the GWS tool you are looking for.



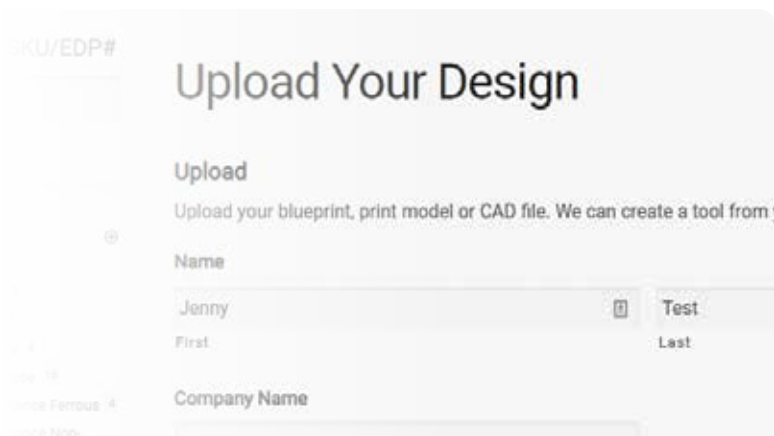
QUICK QUOTE

Simply select the tool type you are looking for, fill in your required dimensional data, provide your contact information, and click submit. Typically within 24 hours you will have your quote complete with pricing and delivery information.



QUOTE PER PRINT

Have an existing tool or part drawing that you want to have our engineers use for quoting a custom solution, no problem! With GWS, you have the option to upload tool drawings and part prints directly.



The GWS Tool Group website is mobile responsive - adapting seamlessly to your desktop computer or mobile device. Stop by now for a quick reference, tech support or fast quote request.

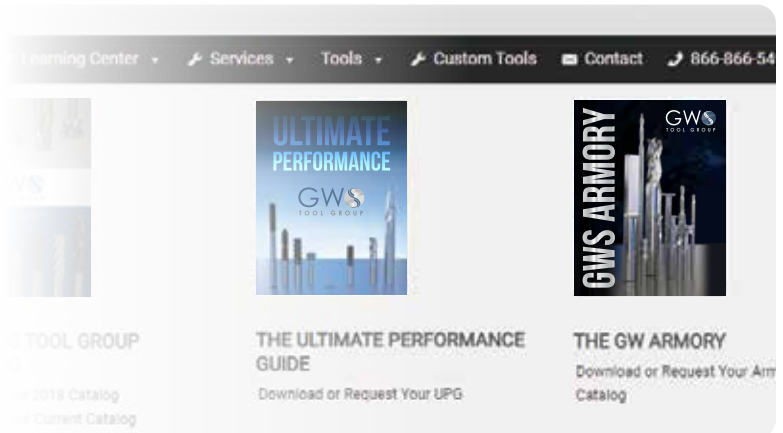
LIVE CHAT SUPPORT

Looking for some quick, no-hassle assistance? Skip the phone during regular business hours and chat live with our knowledgeable support staff. From technical questions to website support, our team is online and ready to help.



LITERATURE

Need to get the latest products brochures or catalog from GWS? You can download all of our latest literature direct from our website.



STOCK & PRICING

Stock and pricing on all our catalog items are available online. Visit www.GWSToolGroup.com and select your tool from our online shop for the latest inventory data.

SKU	Length	Length of Cut	Cutting Diameter	Coating	Stock	Price
<input type="text" value="Search"/>	<input type="text" value="Search"/>	<input type="text" value="Search"/>	<input type="text" value="Search C"/>	<input type="text" value="Search"/>	<input type="text" value="Search"/>	<input type="text" value="Search"/>
103443	Extra Long	3	1	AITiN	0	\$472.15
103747	Stub	0.078	0.0312	NONE	14	\$19.29
105142	Stub	0.078	0.0312	AITiN	0	\$21.96
103750	Stub	0.125	0.0625	NONE	1	\$23.14
108786	Stub	0.125	0.0625	AITiN	0	\$25.83

CUSTOM TOOLS

CUSTOMIZED TOOLS TO FIT ANY APPLICATION

Specialty cutting tools come in a variety of shapes and sizes; every application is different and GWS Tool Group is prepared to help you with your particular situation. The information required is basic and will enable us to design the best tool for your application. From the beginning, GWS Tool Group has specialized in custom design and we look forward to working with you in creating a unique tool that meets and often exceeds your expectations.

Minimum quantity order required on Specialty/Custom tools may be required. Please call for more information. If possible, please provide us with a 3D solid model, CAD drawing, or sketch, including the profile you need to cut, and any additional information you have for your custom tool design.

TYPICAL LEAD TIMES

ONE WEEK OR LESS

Standard or modified standard end mills, inserts & drills. Modify existing stock (add flat, undercut, radius, etc).

TWO WEEKS OR LESS

Standard or modified standard end mills with material in stock. Repeat special/custom with program and material.

THREE WEEKS OR LESS

Repeat orders of special tools without material in stock.

FOUR WEEKS OR LESS

Repeat specials requiring pre-form material in stock.

FIVE TO SIX WEEKS OR LESS

Special/custom requiring pre-form materials that are not in stock.

Coating: Add available in-house coating only (3 day max)
Individual lead times subject to change at any time.



ORDER TOLL FREE:
877.497.8665



REQUEST A CUSTOM TOOL

Submit your custom tool request today using our easy form, or contact us directly to speak to a design consultant.

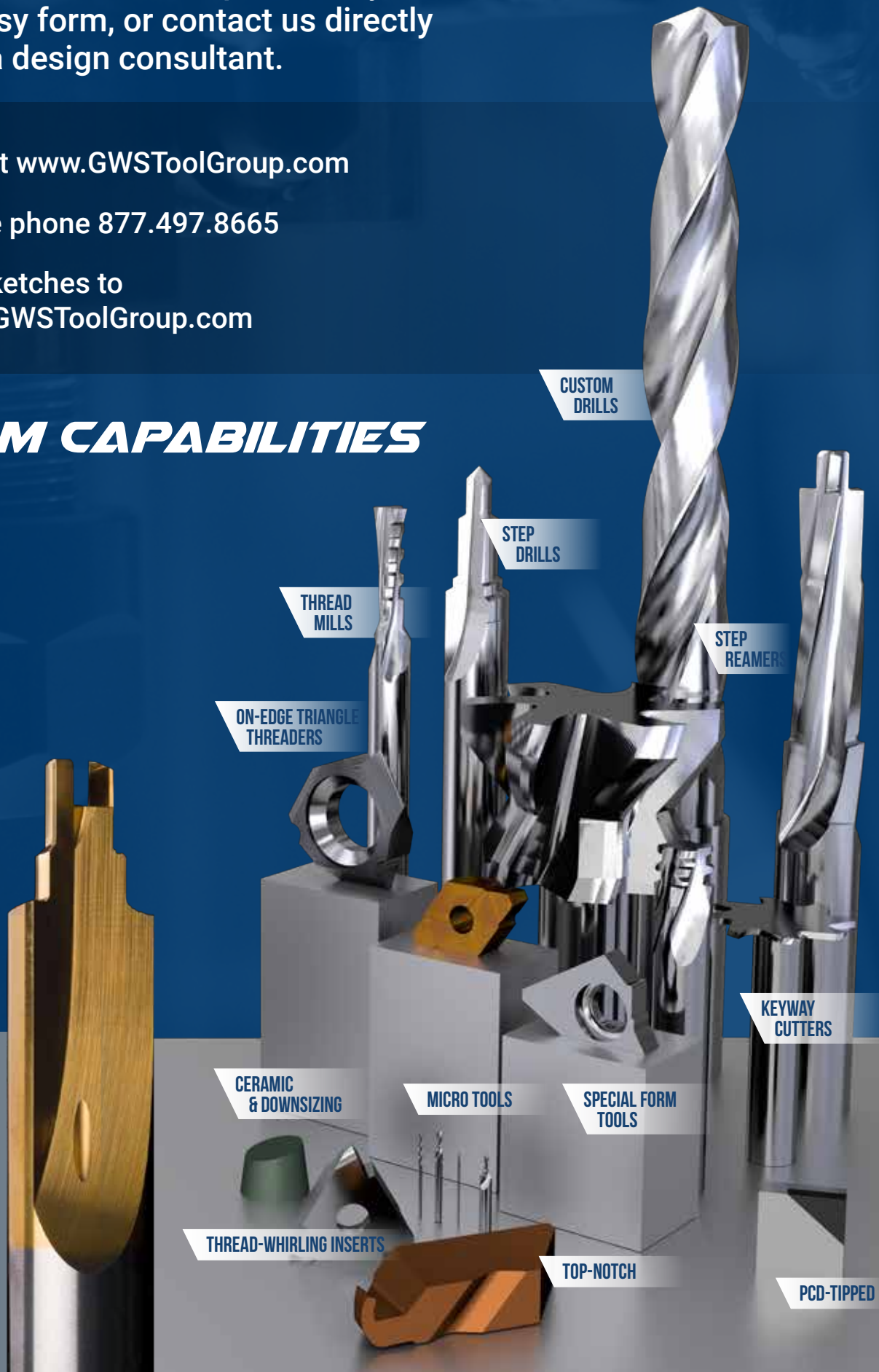
⚡ Online at www.GWSToolGroup.com

📞 Over the phone 877.497.8665

✉ Email sketches to Sales@GWSToolGroup.com

CUSTOM CAPABILITIES

The unique trepan geometry on this tool demonstrates our capability to produce difficult and tight tolerance geometries on a wide range of custom applications. ▶



DESIGNED FOR YOUR APPLICATION

Root Form Cutter | Turbine Blades

This root form cutter is designed for machining the critical root shape on turbine blades for both power generation and aviation. The overall design allows for repeatably tight tolerances, extensive tool life and in some cases, more than 50 regrinds.



**.0005" FORM TOLERANCE TO ACHIEVE
CRITICAL FEATURE PROFILE TOLERANCES**

**POLISHED SURFACES FOR SMOOTH
CHIP EVACUATION AND SUPERIOR
SURFACE FINISHES**

**HELICAL FORM TO PREVENT
PADDLING AND CHATTER**

**BEEFY DESIGN TO INCREASE
RIGIDITY AND REGRIND-ABILITY**

DELIVERED IN 6 WEEKS *

DESIGNED FOR YOUR APPLICATION

Trepan Tool | Engine Frame Mounting Holes

The unique trepan geometry on this tool demonstrates our capability to produce difficult and tight tolerance geometries for a wide range of custom applications.

**SPECIAL TREPAN DESIGN TO CREATE BOTH
INTERNAL AND EXTERNAL COMPLEX FEATURES**

**MULTI FEATURE DESIGN REDUCING THE
NUMBER OF OPERATIONS REQUIRED TO
COMPLETE COMPLEX PARTS**

**INTERNAL COOLANT SUPPLY FOR
IMPROVED TOOL LIFE AND CHIP
EVACUATION**

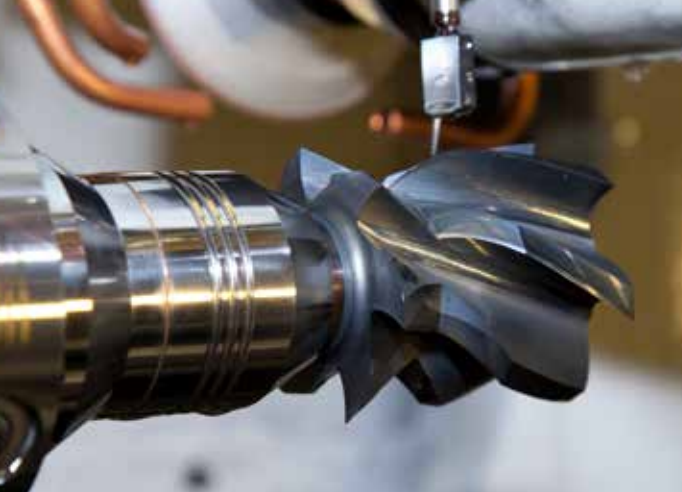
**APPLICATION SPECIFIC HIGH
PERFORMANCE COATINGS FOR
OPTIMAL TOOL LIFE**



DELIVERED IN 2 WEEKS *

*Delivery subject to change at any time
based on capacity and blank availability

GWS REGRIND

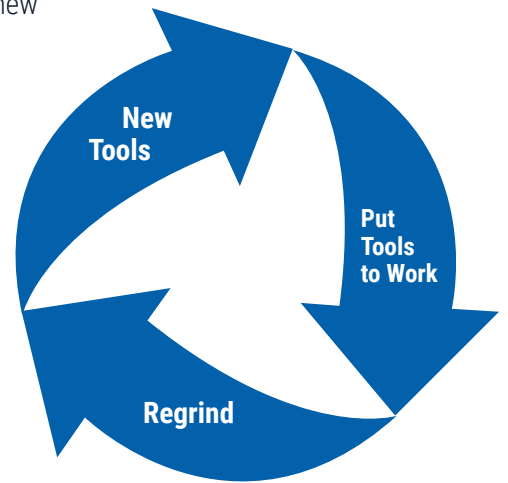


WHY REGRIND?

QUALITY & PERFORMANCE

The Regrind Program ensures your tools will be reconditioned to perform as good as a new manufactured tool.

- Customer portal to track process to and from manufacturer
- Custom etching on regrinds to ensure operator has the correct tools
- Free or reduced shipping based on quantity
- Standard, Custom, or non GWS Tools
- Geometries on regrinds superior to others
- Soft cost savings on reduction of administrative time
- Hard cost savings for materials
- Reduction of inventory
- Direct communication for manufacturing specific products



TRACK YOUR REGRIND

IN THE CLOUD

The GWST Portal - Track your current regrinds & order new ones. We customize your portal and tailor it to your needs.

	CW PO#	CW Tool #	EDP#	QTY	Expected Arrival in Florida	Actual Arrival to GWS	GWS Sales Order #	PRD	Requested Completion Date	QTY Proj Comp Date
1										
2	XXXXXXXX	XXXXXX	99999	1	10/20/2014	10/15/2014	40000	PRC999996	11/18/2014	11
3	XXXXXXXX	XXXXXX	99997	1	10/20/2014	10/15/2014	40000	PRC999997	11/18/2014	11
4	XXXXXXXX	XXXXXX	99999	2	10/20/2014	10/15/2014	40000	PRC999997	11/18/2014	11
5	XXXXXXXX	XXXXXX	99999	2	11/3/2014	11/3/2014	40000	PRC999998	11/22/2014	11
6	XXXXXXXX	XXXXXX	99999	1	11/3/2014	11/3/2014	40000	PRC999998	11/22/2014	11
7	XXXXXXXX	XXXXXX	99999	1	11/4/2014	11/3/2014	40000	PRC999999	11/19/2014	11
8	XXXXXXXX	XXXXXX	99999	1	11/15/2014	11/15/2014	40000	PRC999999	11/26/2014	11



The GWS Tool Group Reconditioning program regrinds your worn out, chipped and used tools back to newly manufactured tool quality.

QUICK TURNAROUND

Typically reduced material removal, thus shortening grind time and associated lead time.

INVENTORY MANAGEMENT

We can accurately predict the number of regrinds of which your tool is capable, in turn, reducing new tool inventory. We also provide custom laser etching/labeling for your regrinds.

COMMUNICATION

Our Tool Tracking System gives you a customized communication experience. We provide live to the minute information on your tools regrind process and keep everything accessible through the cloud.

QUALITY

Our regrinds aren't just made to be as good as your brand new tools, they're reground via your exact specifications, and if applicable, recoated in house with GWS premium coatings.

COST SAVINGS

Material costs, manufacturing process time, volume shipping and inventory reduction prove the cost savings of a GW Regrind. Our cost savings are data-driven, not anecdotal. The Regrind Portal tracks and provides real-time comparisons between regrinds and the purchase of new tools.

Ready to Regrind?
Call 877.497.8665

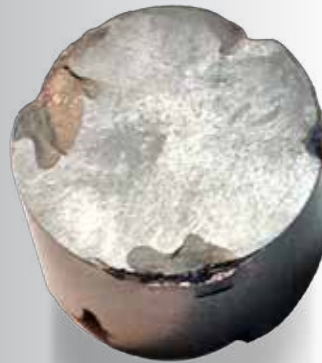
The GWS Tool Group Tool Reconditioning Program



WORN OUT TOOL



REGRIND



Original 1/2"



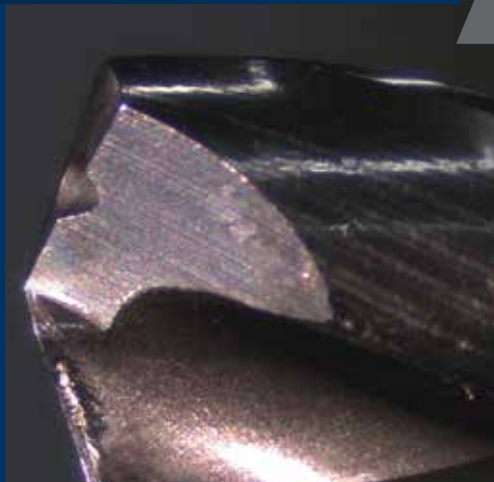
3/8"



1/4"

WORN OUT INSERT

REGRIND



WORN OUT DRILL


























REGRIND

Sales@GWSToolGroup.com

www.GWSRegrind.com

APPLICATION INDEX

Tooling Application Guide - Details

Series No.	Image	Inch/ Metric	Flutes	Description	Coating	Size Range	Product Page	Tech Page
4005		IN/M	2	5D Solid Drill	AlTiN	2.5 - 18.5mm	28	176
4105		IN/M	2	5D Coolant Through Drill	Advatech, AlTiN	2.5 - 18.5mm	29	177
4050		IN/M	1	Reamer	AlTiN	0.1240 - 0.7510	30	178
1010		IN	3	Ramping	ZrN, Bright	3/16 - 3/4	34	179
1015		IN	3	Slotting & Roughing	ZrN, Bright	3/16 - 3/4	35	179
1020		IN	3	Finishing	ZrN, Bright	3/16 - 3/4	36	179
1025		IN	3	Finishing	ZrN, Bright	3/32 - 1/0	37	180
1026		IN	3	Finishing Reduced Neck	ZrN, Bright	1/8 - 1.0	38	180
1027		IN	3	Ball Nose	ZrN, Bright	1/8 - 1.0	39	180
1028		IN	3	Ball Nose Reduced Neck	ZrN, Bright	1/8 - 1.0	40	180
1030		IN	4	Variable Helix/Index	nACo	1/8 - 1.0	41	182
1032		IN	4	Variable Helix/Index	nACo	1/8 - 1.0	46	182
1035		IN	5	Variable Helix/Index	nACo	1/8 - 1.0	47	183
1040		IN	7	Variable Helix/Index	nACo	1/8 - 1.0	52	184
1031		IN	4	Rougher/Finisher	nACo	1/8 - 1.0	57	185
1050		IN	2	Die Mold	nACo	1/32 - 1/2	58	186
2100		IN	4	Variable Index	Alcromax	1/8 - 1-1/4	59	187
2105		IN	4	Variable Index Reduced Neck	Alcromax	1/8 - 1-1/4	65	187
2115		IN	4	Variable Index Ball Nose	Alcromax	1/8 - 1.0	70	187
2117		IN	4	Variable Index Reduced Neck	Alcromax	1/8 - 1.0	71	187
2205		IN	5	Variable Index	Alcromax	1/8 - 1-1/4	72	188
2213		IN	5	Variable Index Reduced Neck	Alcromax	1/8 - 1-1/4	78	188
2215		IN	7	Variable Index	Alcromax	3/8 - 1-1/4	83	189

APPLICATION INDEX









Tooling Application Guide - Work Material

Series No.	Steel			Stainless Steel		Cast Iron		Non-Ferrous		Super Alloys		Hardened Steel	
	P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
4005	★	★	☆	☆	☆	★	★	★	★				
4105	★	★	☆	☆	☆	★	★	★	★				
4050	★	★	☆	☆	☆	★	★						
1010								★	★				
1015								★	★				
1020								★	★				
1025								★	★				
1026								★	★				
1027								★	★				
1028								★	★				
1030	★	★	☆		☆	☆	☆			☆		★	☆
1032	★	★	☆		☆	☆	☆			☆		★	☆
1035	★	★	☆		☆	☆	☆			☆		★	☆
1040	★	★	☆		☆	☆	☆			☆		★	☆
1031	★	★	☆	★	☆	☆	☆			☆	☆		
1050	☆	★	☆									★	★
2100	★	★	☆	☆	★	☆	☆				☆		
2105	★	★	☆	☆	★	☆	☆				☆		
2115	★	★	☆	☆	★	☆	☆				☆		
2117	★	★	☆	☆	★	☆	☆				☆		
2205	★	★	☆	☆	★	☆	☆				☆		
2213	★	★	☆	☆	★	☆	☆				☆		
2215	★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

APPLICATION INDEX

Tooling Application Guide - Details

Series No.	Image	Inch/Metric	Flutes	Description	Coating	Size Range	Product Page	Tech Page
2010		IN	2	General Milling	ZrN, Bright	1/8 - 1-1/4	88	181
2015		IN	2	General Milling Ball	ZrN, Bright	1/8 - 1.0	92	181
2012		IN	2	General Milling RN	ZrN, Bright	1/8 - 1.0	93	181
2014		IN	2	General Milling RN BN	ZrN, Bright	1/4 - 1.0	96	181
2030		IN	3	General Milling	ZrN, Bright	1/8 - 1-1/4	97	181
2031		IN	3	General Milling WF	ZrN, Bright	1/8 - 1.0	101	181
2045		IN	3	General Milling BN	ZrN, Bright	1/4 - 1.0	102	181
2032		IN	3	General Milling RN	ZrN, Bright	1/8 - 1.0	103	181
2050		IN	3	General Milling RN BN	ZrN, Bright	1/4 - 1.0	102	181
2060		IN	5	Finishing	ZrN, Bright	1/4 - 1.0	107	181
250		IN	4	Variable Index	Alcromax	1/4 - 1.0	108	190
252		IN	4	Variable Index Ball Nose	Alcromax	1/4 - 1.0	110	190
255		IN	4	Variable Index	Alcromax	1/4 - 1.0	111	191
260		IN	4	Variable Index	Alcromax	1/8 - 1.0	113	192
265		IN	5	Variable index	Alcromax	1/4 - 1.0	116	193
270		IN	6-12	Variable Helix/Index	Alcromax	3/8 - 1.0	119	194
280		IN	8-10	Variable Index	Alcromax	1/2 - 1.0	121	195
285		IN	8-10	Variable Index Reduced Neck	Alcromax	1/2 - 1.0	122	195
210		IN	3	Semi-Roughing & Finishing	Bright, AlTiN, TiCN	1/8 - 1.0	124	196
215		IN	3	Semi-Roughing & Finishing BN	Bright, AlTiN, TiCN	1/8 - 1.0	125	196
220		IN	5	Finishing	Bright, AlTiN, TiCN	1/8 - 1-1/4	126	197
225		IN	4	General Milling	Bright	3/64 - 1.0	130	198
227		IN	2	General Milling Ball Nose	Bright	3/64 - 1.0	132	198

APPLICATION INDEX







Tooling Application Guide - Work Material

Series No.	Steel			Stainless Steel		Cast Iron		Non-Ferrous		Super Alloys		Hardened Steel	
	P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
2010								★	★				
2015								★	★				
2012								★	★				
2014								★	★				
2030								★	★				
2031								★	★				
2045								★	★				
2032								★	★				
2050								★	★				
2060								★	★				
250	★	★	☆	★	★	☆	☆			☆	☆		
252	★	★	☆	★	★	☆	☆			☆	☆		
255	★	★	☆	★	☆	☆	☆			☆	☆		
260	★	★	☆	☆	☆	☆	☆			★		★	★
265	★	★	☆	☆	☆	☆	☆			★		★	★
270			★		★					★		★	★
280	☆	☆		☆							★		
285	☆	☆		☆		☆	☆				★		
210	☆	☆	☆	☆	☆	☆	☆	☆	☆				
215	☆	☆	☆	☆	☆	☆	☆	☆	☆				
220	☆	☆	☆	☆	☆	☆	☆	☆	☆				
225	☆	☆	☆	☆	☆	☆	☆	☆	☆				
227	☆	☆		☆		☆	☆	☆	☆				

★ Best ☆ Good

APPLICATION INDEX

Milling, Drilling & Holemaking

Series No.	Image	Inch/Metric	Flutes	Description	Coating	Size Range	Product Page	Tech Page
230		IN	4	General Milling	Bright, AlTiN	3/64 - 1.0	134	199
237		IN	4	General Milling Ball Nose	Bright	3/64 - 1.0	137	199
240		IN	2	Chamfering	Bright, AlTiN, TiCN	1/8 - 3/4	139	200
241		IN	4	Chamfering	Bright, AlTiN, TiCN	1/4 - 3/4	140	201
243		IN	2	Chamfering	Bright, AlTiN	3/32 - 1-1/4	141	200
244		IN	4	Chamfering	Bright, AlTiN	3/32 - 1-1/4	142	201

APPLICATION INDEX

Tooling Application Guide - Work Material

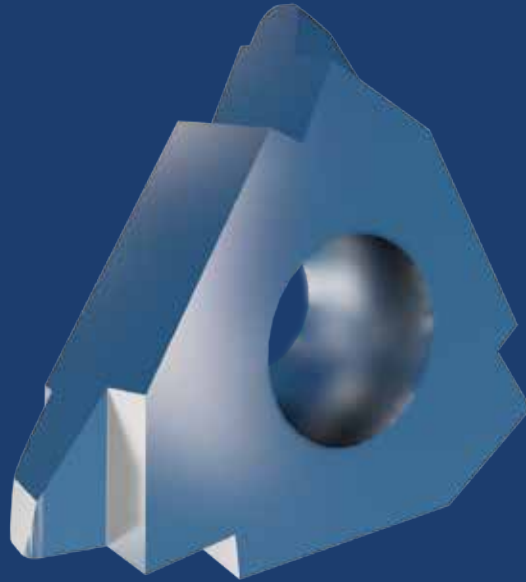
Series No.	Steel			Stainless Steel		Cast Iron		Non-Ferrous		Super Alloys		Hardened Steel	
	P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
230	☆	☆		☆		☆	☆	☆	☆				
237	☆	☆		☆		☆	☆	☆	☆				
240	☆	☆		☆		☆	☆	☆	☆		☆		
241	☆	☆		☆		☆	☆	☆	☆		☆		
243	☆	☆		☆		☆	☆	☆	☆		☆		
244	☆	☆		☆		☆	☆	☆	☆		☆		

★ Best ☆ Good

APPLICATION INDEX

Tooling Application Guide - Inserts

Material Class	Grade	Grain Size	Hardness (HV)	Coating Method	Coating Composition	Geometry	Application
K	CG99-D	1µm	HV 1630	CVD	TICN-AL2O3	Positive	For Turning of Cast Iron
	CG99-D	1µm	HV 1630	CVD	TICN-AL2O3	Negative	For Medium Turning of Cast Iron
	CG99-M	1µm	HV 1630	CVD	TICN-AL2O3	Negative	Light Roughing of Cast Iron
M1	CG96-E	1-2 µm	HV 1400	PVD	TiAlTaN	Positive	For Turning of Stainless Steel - Extreme Finishing
	CG95-C	1-2 µm	HV 1460	PVD	TiAlTaN	Positive	For Turning of Stainless Steel - Finishing
	CG97-D	1.5-3 µm	HV 1330	PVD	Dark Grey	Positive	For Turning of Stainless Steel - Medium
	CG93-M	1-2 µm	HV 1450	CVD	TICN-AL2O3	Negative	For Turning Steel - Semi-Roughing
	CG94-M	1-2 µm	HV 1460	CVD	TICN-AL2O3	Negative	For Turning of Steel (Interrupted) - Roughing
M2	CG95-D	1-2 µm	HV 1460	PVD	TiAlTaN	Positive	For Turning of Stainless Steel - Semi Finishing
	CG96-J	1-2 µm	HV 1400	PVD	TiAlTaN	Negative	For Turning of Stainless Steel - Finishing
	CG96-K	1-2 µm	HV 1400	PVD	TiAlTaN	Negative	For Turning of Stainless Steel - General
	CG97-A	1.5-3 µm	HV 1330	PVD	Dark Grey	Positive	For Turning of Stainless Steel - Extreme Finishing
	CG97-I	1.5-3 µm	HV 1330	PVD	Dark Grey	Negative	For Turning of Stainless Steel - Roughing
P1	CG92-C	1-2 µm	HV 1550	CVD	TICN-AL2O3	Positive	For Turning of Steel - Finishing
	CG92-BB	1-2 µm	HV 1550	CVD	TICN-AL2O3	Positive	For Turning of Steel - Semi-Finishing
	CG92-D	1-2 µm	HV 1550	CVD	TICN-AL2O3	Positive	For Turning of Steel - Semi-Finishing
	CG92-I	1-2 µm	HV 1550	CVD	TICN-AL2O3	Negative	For Turning of Steel - Roughing
	CG92-F	1-2 µm	HV 1550	CVD	TICN-AL2O3	Negative	For Turning of Steel - Extreme Finishing
	CG92-H	1-2 µm	HV 1550	CVD	TICN-AL2O3	Negative	For Turning of Steel - Semi-Finishing
	CG92-P,Q	1-2 µm	HV 1550	CVD	TICN-AL2O3	Negative	For Turning of Steel - Heavy Roughing
P2	CG93-C	1-2 µm	HV 1450	CVD	TICN-AL2O3	Positive	For Turning of Steel - Finishing
	CG93-BB	1-2 µm	HV 1450	CVD	TICN-AL2O3	Positive	For Turning of Steel - Semi-Finishing
	CG93-D	1-2 µm	HV 1450	CVD	TICN-AL2O3	Positive	For Turning of Steel - Semi-Finishing
	CG93-I	1-2 µm	HV 1450	CVD	TICN-AL2O3	Negative	For Turning of Steel - Roughing
	CG93-H	1-2 µm	HV 1450	CVD	TICN-AL2O3	Negative	For Turning of Steel - Semi-Finishing
	CG93-Q	1-2 µm	HV 1450	CVD	TICN-AL2O3	Negative	For Turning of Steel - Heavy Roughing
	CG94-D	1-2 µm	HV 1460	CVD	TICN-AL2O3	Positive	For Turning of Steel (Interrupted) - Semi Finishing
	CG94-D	1-2 µm	HV 1460	CVD	TICN-AL2O3	Negative	For Turning of Steel (Interrupted) - Semi Finishing
CG95-P	1.5-3 µm	HV 1330	PVD	Dark Grey	Negative	For Turning of Stainless Steel - Heavy Roughing	
H	CG91-B		HV 1620	Uncoated		Positive	For Turning of Hardened Steel - Finishing (Cermets)
	CG91-B		HV 1620	Uncoated		Negative	For Turning of Hardened Steel - Finishing (Cermets)
N	CG910-AA	1µm	HV 1630	Uncoated		Positive	For Turning of Non-Ferrous Materials
S	CG911-N	0.8 µm	HV 1820	PVD	TiAlN	Negative	For Turning of Titanium and Heat Resistant Super Alloys
	CG912-N	0.8 µm	HV 1820	PVD	TiAlN-TiN	Negative	For Turning of Titanium and Heat Resistant Super Alloys



YOU JUST CAN'T KILL THE ZOMBIE

Precise geometries make GWS thread whirlers leaders in high performance single-point threading.

- ▮ Single Pass Threading
- ▮ Shorter cycle times
- ▮ Multiple cutting edges

ULTIMATE PERFORMANCE

When nothing less than the best will do, you need cutting tools that yield only the Ultimate in Performance.

The Ultimate Performance series of cutting tools from GWS feature the finest grades of micrograin carbide, application specific geometries and a multitude of advanced PVD coatings that align with the intended work material.

ULTIMATE PERFORMANCE

Premium High Performance Carbide Drills



Series 4005 ECO | 2FL | 5xD | Solid | Inch & Metric

Diameter	Shank Dia.	LOC	OAL	EDP
2.5	3	12.5	69	427001
4	4	20	80	427002
5	5	25	88	427004
5.5	6	27.5	91	427007
6	6	30	95	427010
1/4	1/4	1-1/4	3-7/8	427014
7	7	35	103	427016
7.5	8	37.5	106	427018
5/16	5/16	1-9/16	4-11/32	427020
8	8	40	110	427021
9	10	45	118	427023
9.5	10	47.5	121	427027
3/8	3/8	1-7/8	4-13/16	427028
10	10	50	125	427029
10.5	12	52.5	129	427032
11.5	12	57.5	136	427034
12	12	60	140	427037
1/2	1/2	2-1/2	5-3/4	427040
13.5	14	67.5	151	427044
15	15	75	163	427045
15.5	16	77.5	166	427047
18.5	20	92.5	189	427048

ECODRILL

More About the Series 4005

Every Cut Optimized.

Self-centering drill point design means no pre-drilling operations are required

The ECO drill sizes are designed to be combined with our PAC reamers as a perfect "1-2" combination



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide Drills



Series 4105 ECO | 2FL | 5xD | Coolant-through | Inch & Metric

Diameter	Shank Dia.	LOC	OAL	AdvaTech EDP	AITiN EDP
2.5	3	12.5	69	400355	427051
4	4	20	80	400357	427055
5	5	25	88	400361	427057
5.5	6	27.5	91	400365	427060
6	6	30	95	400368	427064
1/4	1/4	1-1/4	3-7/8	400369	427065
7	7	35	103	400373	427069
7.5	8	37.5	106	400377	427071
5/16	5/16	1-9/16	4-11/32	400378	427075
8	8	40	110	400382	427079
9	10	45	118	400385	427082
9.5	10	47.5	121	400386	427084
3/8	3/8	1-7/8	4-13/16	400388	427087
10	10	50	125	400390	427089
10.5	12	52.5	129	400393	427092
11.5	12	57.5	136	400397	427093
12	12	60	140	400399	427096
1/2	1/2	2-1/2	5-3/4	400402	427097
13.5	14	67.5	151	400403	427100
15	15	75	163	400407	427104
15.5	16	77.5	166	400408	427107
18.5	20	92.5	189	400411	427109

ECODRILL

More About the Series 4105

Every Cut Optimized. Self-centering drill point design means no pre-drilling operations are required

The ECO drill sizes are designed to be combined with our PAC reamers as a perfect "1-2" combination

Coolant-through for increased MRR & tool life.

AdvaTech nano PVD coating increases wear resistance and lubricity over traditional drill coatings for ultimate drilling performance



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide Reamers



Series 4050 PAC | 1FL | Solid Carbide | Inch & Metric

Cutting Diameter mm	Diameter decimal	Shank Dia.	LOC	OAL	EDP	ECO Drill Size
3.1496	0.1240	1/8	1-3/4	3	427113	Use 2.5mm ECO DRILL
3.1623	0.1245	1/8	1-3/4	3	427115	Use 2.5mm ECO DRILL
3.1750	0.1250	1/8	1-3/4	3	427118	Use 2.5mm ECO DRILL
3.1877	0.1255	1/8	1-3/4	3	427122	Use 2.5mm ECO DRILL
3.2004	0.1260	1/8	1-3/4	3	427123	Use 2.5mm ECO DRILL
4.7371	0.1865	3/16	2-3/4	4	427126	Use 4.0mm ECO DRILL
4.7498	0.1870	3/16	2-3/4	4	427127	Use 4.0mm ECO DRILL
4.7625	0.1875	3/16	2-3/4	4	427130	Use 4.0mm ECO DRILL
4.7752	0.1880	3/16	2-3/4	4	427131	Use 4.0mm ECO DRILL
4.7879	0.1885	3/16	2-3/4	4	427134	Use 4.0mm ECO DRILL
5.9750	0.2352	6	69.65	101	427136	Use 5.5mm ECO DRILL
5.9870	0.2357	6	69.65	101	427137	Use 5.5mm ECO DRILL
6.0000	0.2362	6	69.65	101	427141	Use 5.5mm ECO DRILL
6.0130	0.2367	6	69.65	101	427142	Use 5.5mm ECO DRILL
6.0250	0.2372	6	69.65	101	427145	Use 5.5mm ECO DRILL
6.3246	0.2490	1/4	2-3/4	4	427147	Use 6.0mm ECO DRILL
6.3373	0.2495	1/4	2-3/4	4	427151	Use 6.0mm ECO DRILL
6.3500	0.2500	1/4	2-3/4	4	427154	Use 6.0mm ECO DRILL
6.3627	0.2505	1/4	2-3/4	4	427157	Use 6.0mm ECO DRILL
6.3754	0.2510	1/4	2-3/4	4	427161	Use 6.0mm ECO DRILL
7.9121	0.3115	5/16	2-3/4	4	427163	Use 7.5mm ECO DRILL
7.9121	0.3115	5/16	3-3/4	6	427164	Use 7.5mm ECO DRILL
7.9248	0.3120	5/16	2-3/4	4	427168	Use 7.5mm ECO DRILL
7.9248	0.3120	5/16	3-3/4	6	427170	Use 7.5mm ECO DRILL
7.9375	0.3125	5/16	2-3/4	4	427173	Use 7.5mm ECO DRILL
7.9375	0.3125	5/16	3-3/4	6	427177	Use 7.5mm ECO DRILL
7.9502	0.3130	5/16	2-3/4	4	427178	Use 7.5mm ECO DRILL
7.9502	0.3130	5/16	3-3/4	6	427179	Use 7.5mm ECO DRILL
7.9629	0.3135	5/16	2-3/4	4	427181	Use 7.5mm ECO DRILL
7.9629	0.3135	5/16	3-3/4	6	427182	Use 7.5mm ECO DRILL
7.9750	0.3140	8	69.65	101	427185	Use 7.5mm ECO DRILL
7.9750	0.3140	8	94.65	152	427188	Use 7.5mm ECO DRILL
7.9870	0.3144	8	69.65	101	427192	Use 7.5mm ECO DRILL
7.9870	0.3144	8	94.65	152	427196	Use 7.5mm ECO DRILL
8.0000	0.3150	8	69.65	101	427198	Use 7.5mm ECO DRILL
8.0000	0.3150	8	94.65	152	427199	Use 7.5mm ECO DRILL
8.0130	0.3155	8	69.65	101	427202	Use 7.5mm ECO DRILL
8.0130	0.3155	8	94.65	152	427204	Use 7.5mm ECO DRILL
8.0250	0.3159	8	69.65	101	427206	Use 7.5mm ECO DRILL

PACREAMER

More About the Series 4050

Precise. Accurate. Concentric. The PAC reamer design is self-locating, thereby able to provide straightness and true position for dowel pin holes

Ideally coupled with the ECO drill series.

Diameter Tolerance: +0 /- .0002"



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide Reamers



Series 4050 PAC | 1FL | Solid Carbide | Inch & Metric

Cutting Diameter mm	Cutting Diameter decimal	Shank Dia.	LOC	OAL	EDP	ECO Drill Size
8.0250	0.3159	8	94.65	152	427207	Use 7.5mm ECO DRILL
9.4996	0.3740	3/8	2-3/4	4	427210	Use 9.0mm ECO DRILL
9.4996	0.3740	3/8	3-3/4	6	427214	Use 9.0mm ECO DRILL
9.5123	0.3745	3/8	2-3/4	4	427215	Use 9.0mm ECO DRILL
9.5123	0.3745	3/8	3-3/4	6	427219	Use 9.0mm ECO DRILL
9.5250	0.3750	3/8	2-3/4	4	427222	Use 9.0mm ECO DRILL
9.5250	0.3750	3/8	3-3/4	6	427225	Use 9.0mm ECO DRILL
9.5377	0.3755	3/8	2-3/4	4	427226	Use 9.0mm ECO DRILL
9.5377	0.3755	3/8	3-3/4	6	427229	Use 9.0mm ECO DRILL
9.5504	0.3760	3/8	2-3/4	4	427231	Use 9.0mm ECO DRILL
9.5504	0.3760	3/8	3-3/4	6	427233	Use 9.0mm ECO DRILL
9.9750	0.3927	10	94.65	152	427235	Use 9.5mm ECO DRILL
9.9870	0.3932	10	94.65	152	427238	Use 9.5mm ECO DRILL
10.0000	0.3937	10	94.65	152	427239	Use 9.5mm ECO DRILL
10.0130	0.3942	10	94.65	152	427242	Use 9.5mm ECO DRILL
10.0250	0.3947	10	94.65	152	427243	Use 9.5mm ECO DRILL
11.0871	0.4365	7/16	3-3/4	6	427247	Use 10.5mm ECO DRILL
11.0998	0.4370	7/16	3-3/4	6	427250	Use 10.5mm ECO DRILL
11.1125	0.4375	7/16	3-3/4	6	427252	Use 10.5mm ECO DRILL
11.1252	0.4380	7/16	3-3/4	6	427255	Use 10.5mm ECO DRILL
11.1379	0.4385	7/16	3-3/4	6	427256	Use 10.5mm ECO DRILL
11.9750	0.4715	12	94.7	152	427257	Use 11.5mm ECO DRILL
11.9870	0.4719	12	94.7	152	427258	Use 11.5mm ECO DRILL
12.0000	0.4724	12	94.7	152	427262	Use 11.5mm ECO DRILL
12.0130	0.4730	12	94.7	152	427266	Use 11.5mm ECO DRILL
12.0250	0.4734	12	94.7	152	427269	Use 11.5mm ECO DRILL
12.6746	0.4990	1/2	3-3/4	6	427271	Use 12mm ECO DRILL
12.6873	0.4995	1/2	3-3/4	6	427273	Use 12mm ECO DRILL
12.7000	0.5000	1/2	3-3/4	6	427275	Use 12mm ECO DRILL
12.7127	0.5005	1/2	3-3/4	6	427277	Use 12mm ECO DRILL
12.7254	0.5010	1/2	3-3/4	6	427279	Use 12mm ECO DRILL
13.9750	0.5502	14	94.65	152	427281	Use 13.5mm ECO DRILL
13.9870	0.5507	14	94.65	152	427285	Use 13.5mm ECO DRILL
14.0000	0.5512	14	94.65	152	427289	Use 13.5mm ECO DRILL
14.0130	0.5517	14	94.65	152	427293	Use 13.5mm ECO DRILL
14.0250	0.5522	14	94.65	152	427297	Use 13.5mm ECO DRILL
15.8496	0.6240	5/8	3-3/4	6	427300	Use 15mm ECO DRILL
15.8623	0.6245	5/8	3-3/4	6	427302	Use 15mm ECO DRILL
15.8750	0.6250	5/8	3-3/4	6	427305	Use 15mm ECO DRILL
15.8877	0.6255	5/8	3-3/4	6	427308	Use 15mm ECO DRILL

PACREAMER

More About the Series 4050

Precise. Accurate. Concentric. The PAC reamer design is self-locating, thereby able to provide straightness and true position for dowel pin holes

Ideally coupled with the ECO drill series.

Diameter Tolerance: +0 /- .0002"



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide Reamers



Series 4050 PAC | 1FL | Solid Carbide | Inch & Metric

Cutting Diameter mm	Diameter decimal	Shank Dia.	LOC	OAL	EDP	ECO Drill Size
15.9004	0.6260	5/8	3-3/4	6	427312	Use 15mm ECO DRILL
15.9750	0.6289	16	94.65	152	427316	Use 15.5mm ECO DRILL
15.9870	0.6294	16	94.65	152	427320	Use 15.5mm ECO DRILL
16.0000	0.6299	16	94.65	152	427324	Use 15.5mm ECO DRILL
16.0130	0.6304	16	94.65	152	427325	Use 15.5mm ECO DRILL
16.0250	0.6309	16	94.65	152	427329	Use 15.5mm ECO DRILL
19.0246	0.7490	3/4	3-3/4	6	427333	Use 18.5mm ECO DRILL
19.0373	0.7495	3/4	3-3/4	6	427337	Use 18.5mm ECO DRILL
19.0500	0.7500	3/4	3-3/4	6	427339	Use 18.5mm ECO DRILL
19.0627	0.7505	3/4	3-3/4	6	427341	Use 18.5mm ECO DRILL
19.0754	0.7510	3/4	3-3/4	6	427344	Use 18.5mm ECO DRILL

PACREAMER

More About the Series 4050

Precise. Accurate. Concentric. The PAC reamer design is self-locating, thereby able to provide straightness and true position for dowel pin holes

Ideally coupled with the ECO drill series.

Diameter Tolerance: +0 /- .0002"



★ Best ☆ Good



ONE SOURCE HOLEMAKING

ECO Drills & PAC Reamers working together are ideal for close tolerance, round-hole applications that require a micro-finish. Order the perfect pair today.



ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Non-Ferrous Alloys



Series 1010 | ART | 3FL | Chip Breaker | Radius | Alumigator

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
3/16	3/16	5/8	2	0.010	118482
3/16	3/16	5/8	2	0.030	118300
1/4	1/4	3/4	2-1/2	0.010	118483
1/4	1/4	3/4	2-1/2	0.040	118484
5/16	5/16	3/4	2-1/2	0.010	118485
5/16	5/16	3/4	2-1/2	0.050	118486
3/8	3/8	1	2-1/2	0.015	118083
3/8	3/8	1	2-1/2	0.060	118084
1/2	1/2	1-1/4	3	0.015	118043
1/2	1/2	1-1/4	3	0.060	117601
1/2	1/2	1-1/4	3	0.080	118695
5/8	5/8	1-5/8	3-1/2	0.020	118487
5/8	5/8	1-5/8	3-1/2	0.060	118301
5/8	5/8	1-5/8	3-1/2	0.100	119594
3/4	3/4	1-5/8	4	0.030	118488
3/4	3/4	1-5/8	4	0.120	119621



More About the Series 1010

Alumigator Ramping

Tool. Ideal for pocketing, profiling and ramping up to 45 degrees

When the absolute highest in Metal Removal Rates is the goal



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Non-Ferrous Alloys



Series 1015 AST | 3FL | Chip Breaker | Square & Radius | Alumigator

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
3/16	3/16	5/8	2	-	120650
3/16	3/16	5/8	2	0.010	120651
3/16	3/16	5/8	2	0.030	120652
1/4	1/4	3/4	2-1/2	-	120653
1/4	1/4	3/4	2-1/2	0.010	120654
1/4	1/4	3/4	2-1/2	0.040	120655
5/16	5/16	3/4	2-1/2	-	120656
5/16	5/16	3/4	2-1/2	0.010	120657
5/16	5/16	3/4	2-1/2	0.050	120658
3/8	3/8	1	2-1/2	-	120659
3/8	3/8	1	2-1/2	0.015	120660
3/8	3/8	1	2-1/2	0.060	120661
1/2	1/2	1-1/4	3	-	120662
1/2	1/2	1-1/4	3	0.015	120663
1/2	1/2	1-1/4	3	0.080	120664
5/8	5/8	1-5/8	3-1/2	-	120665
5/8	5/8	1-5/8	3-1/2	0.020	120666
5/8	5/8	1-5/8	3-1/2	0.100	120667
3/4	3/4	1-5/8	4	-	120668
3/4	3/4	1-5/8	4	0.030	120669
3/4	3/4	1-5/8	4	0.060	123610
3/4	3/4	1-5/8	4	0.090	123397
3/4	3/4	1-5/8	4	0.120	120670



More About the Series 1015

Alumigator Slotting & Roughing Tool. High speed slotting up to two times diameter

Staggered chip breakers for easy chip management and high quality surface finishes



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Non-Ferrous Alloys



More About the Series 1020

Alumigator Finishing Tool.

Wiper flat for high quality floor finish

Designed to finish parts at roughing speeds and feeds

Series 1020 AFT | 3FL | Square & Radius | Alumigator

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
3/16	3/16	5/8	2	-	120671
3/16	3/16	5/8	2	0.010	120672
3/16	3/16	5/8	2	0.030	120673
1/4	1/4	3/4	2-1/2	-	120674
1/4	1/4	3/4	2-1/2	0.010	120675
1/4	1/4	3/4	2-1/2	0.040	120676
5/16	5/16	3/4	2-1/2	-	120677
5/16	5/16	3/4	2-1/2	0.010	120678
5/16	5/16	3/4	2-1/2	0.050	120679
3/8	3/8	1	2-1/2	-	120680
3/8	3/8	1	2-1/2	0.015	120681
3/8	3/8	1	2-1/2	0.060	120682
1/2	1/2	1-1/4	3	-	120683
1/2	1/2	1-1/4	3	0.015	120684
1/2	1/2	1-1/4	3	0.080	120685
5/8	5/8	1-5/8	3-1/2	-	120686
5/8	5/8	1-5/8	3-1/2	0.020	120687
5/8	5/8	1-5/8	3-1/2	0.100	120688
3/4	3/4	1-5/8	4	-	120689
3/4	3/4	1-5/8	4	0.030	120690
3/4	3/4	1-5/8	4	0.120	120691



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Non-Ferrous Alloys



Series 1025 | GWA3 | 3FL | Square | Alumigator

Diameter	Shank Dia.	LOC	OAL	Bright EDP	ZrN EDP
3/32	1/8	3/16	1-1/2	102537	103123
1/8	1/8	1/4	1-1/2	101035	101037
1/8	1/8	1/2	1-1/2	100942	105059
5/32	3/16	1/2	2	106407	108028
3/16	3/16	3/16	2	101039	101040
3/16	3/16	5/8	3	100947	100952
1/4	1/4	3/8	2-1/2	101044	101045
1/4	1/4	3/4	2-1/2	100955	103126
1/4	1/4	1-1/8	2-1/2	100994	100996
5/16	5/16	7/16	2-1/2	101046	101048
5/16	5/16	3/4	2-1/2	100960	100963
5/16	5/16	1-1/8	3	100997	100998
3/8	3/8	1/2	2-1/2	101049	101053
3/8	3/8	1	2-1/2	100964	100971
3/8	3/8	1-1/2	4	100999	101002
1/2	1/2	5/8	3	101054	101056
1/2	1/2	1-1/4	3	100972	104458
1/2	1/2	2-1/4	4	101003	101011
5/8	5/8	3/4	3-1/2	101057	101058
5/8	5/8	1-5/8	3-1/2	100986	100987
5/8	5/8	2-1/2	5	101012	101013
3/4	3/4	1	4	101061	101062
3/4	3/4	1-5/8	4	100988	105058
3/4	3/4	2-1/2	5	101014	101018
1	1	1-1/4	4	101063	101065
1	1	2	4	100992	100993
1	1	2-1/2	6	101020	101022



More About the Series 1025

Wiper flat and circular land for high quality floor and wall finishes

Special radii available on request



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Non-Ferrous Alloys



More About the Series 1026

Wiper flat and circular land for high quality floor and wall finishes

Special radii available on request

Series 1026 | GWA3 | 3FL | Reduced Neck | Square | Alumigator

Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Neck Dia.	Bright EDP	ZrN EDP
1/8	1/8	1/4	1-1/2	3/4	0.115	101066	109102
1/8	1/8	1/4	2	1-1/4	0.115	101023	109101
3/16	3/16	5/16	2	1	0.170	101067	109103
3/16	3/16	5/16	3	1-1/2	0.170	101024	103152
1/4	1/4	3/8	2-1/2	1-1/8	0.235	101068	109104
1/4	1/4	3/8	4	2-1/8	0.235	101026	103153
1/4	1/4	3/8	4	2-7/8	0.235	101091	109110
5/16	5/16	7/16	2-1/2	1-1/8	0.295	101069	108136
5/16	5/16	7/16	4	2-1/8	0.295	101028	103154
5/16	5/16	7/16	4	2-7/8	0.295	101092	103161
3/8	3/8	1/2	2-1/2	1-1/8	0.335	101070	109105
3/8	3/8	1/2	4	2-1/8	0.335	101029	103155
3/8	3/8	1/2	6	3-3/8	0.335	101093	109111
1/2	1/2	5/8	3	1-3/8	0.460	101071	109106
1/2	1/2	5/8	4	2-1/8	0.460	101030	103156
1/2	1/2	5/8	6	3-3/8	0.460	101094	109112
5/8	5/8	3/4	3-1/2	1-5/8	0.590	101073	109107
5/8	5/8	3/4	6	2-3/8	0.590	101031	103157
5/8	5/8	3/4	6	3-3/8	0.590	101095	109113
3/4	3/4	1	4	1-5/8	0.715	101074	109108
3/4	3/4	1	6	2-1/2	0.715	101032	103158
3/4	3/4	1	6	3-3/8	0.715	101096	109114
1	1	1-1/4	4	2	0.960	101080	109109
1	1	1-1/4	6	3-3/8	0.960	101034	103159
1	1	1-1/4	6	4-1/2	0.960	101097	109115



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Non-Ferrous Alloys



Series 1027 BNA3 | 3FL | Ball Nose | Alumigator

Diameter	Shank Dia.	LOC	OAL	Bright EDP	ZrN EDP
1/8	1/8	1/4	1-1/2	104730	107510
1/8	1/8	1/2	1-1/2	105116	108708
3/16	3/16	5/16	2	106293	108734
3/16	3/16	5/8	2	106332	108709
1/4	1/4	3/8	2-1/2	104777	108735
1/4	1/4	3/4	2-1/2	104778	108710
1/4	1/4	1-1/8	3	104779	108715
5/16	5/16	7/16	2-1/2	104714	108736
5/16	5/16	3/4	2-1/2	106331	108711
5/16	5/16	1-1/8	3	106602	108716
3/8	3/8	1/2	2-1/2	106905	107853
3/8	3/8	1	2-1/2	103918	107737
3/8	3/8	1-1/2	4	104775	108717
1/2	1/2	5/8	3	104847	106555
1/2	1/2	1-1/4	3	104594	107488
1/2	1/2	2-1/4	4	104776	106558
5/8	5/8	3/4	3-1/2	106868	108737
5/8	5/8	1-5/8	3-1/2	105935	108712
5/8	5/8	2-1/2	5	108718	108719
3/4	3/4	1	4	104737	108738
3/4	3/4	1-5/8	4	100332	112468
3/4	3/4	2-1/2	5	108720	108721
1	1	1-1/4	4	-	108739
1	1	2	4	104740	108714
1	1	2-1/2	6	104738	108722



More About the Series 1027

Circular land for exceptional wall finishes

Great for 3D surfacing non-ferrous alloys from Aluminum to Beryllium



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Non-Ferrous Alloys



More About the Series 1028

Designed for High Speed Machining of Aluminum

Ramp, plunge, profile milling

Reduced neck for extended reach

Series 1028 | BNA3 | 3FL | Reduced Neck | Ball Nose | Alumigator

Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Bright EDP	ZrN EDP
1/8	1/8	1/4	1-1/2	3/4	105617	108740
1/8	1/8	1/4	2	1-1/4	107231	108723
3/16	3/16	5/16	2	1	108741	108742
3/16	3/16	5/16	3	1-1/2	105419	108724
1/4	1/4	3/8	2-1/2	1-1/8	104680	108067
1/4	1/4	3/8	4	2-1/8	104681	108725
1/4	1/4	3/8	4	2-7/8	105329	108751
5/16	5/16	7/16	2-1/2	1-1/8	108743	108744
5/16	5/16	7/16	4	2-1/8	108726	108727
5/16	5/16	7/16	4	2-7/8	105803	108752
3/8	3/8	1/2	2-1/2	1-1/8	107411	108745
3/8	3/8	1/2	4	2-1/8	106535	108728
3/8	3/8	1/2	6	3-3/8	105731	108753
1/2	1/2	5/8	3	1-3/8	107457	106556
1/2	1/2	5/8	4	2-1/8	104889	106557
1/2	1/2	5/8	6	3-3/8	103847	108754
5/8	5/8	3/4	3-1/2	1-5/8	108746	108747
5/8	5/8	3/4	6	2-3/8	108729	108730
5/8	5/8	3/4	6	3-3/8	107412	108755
3/4	3/4	1	4	1-5/8	108748	108749
3/4	3/4	1	6	2-1/2	108731	108732
3/4	3/4	1	6	3-3/8	108756	108757
1	1	1-1/4	4	2	107363	108750
1	1	1-1/4	6	2-3/8	105169	108733
1	1	1-1/4	7	4-1/2	108758	108759



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ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 1030 HGW4 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/8	1/8	1/4	1-1/2	-	120432
1/8	1/8	1/4	1-1/2	0.005	120542
1/8	1/8	1/4	1-1/2	0.015	121556
1/8	1/8	1/4	1-1/2	0.030	121557
1/8	1/8	1/2	2	-	119342
1/8	1/8	1/2	2	0.005	119333
1/8	1/8	1/2	2	0.015	121425
1/8	1/8	1/2	2	0.030	121426
3/16	3/16	5/16	2	-	120433
3/16	3/16	5/16	2	0.005	120543
3/16	3/16	5/16	2	0.015	121558
3/16	3/16	5/16	2	0.030	121559
3/16	3/16	5/8	2	-	119343
3/16	3/16	5/8	2	0.005	119334
3/16	3/16	5/8	2	0.015	121427
3/16	3/16	5/8	2	0.030	121428
3/16	3/16	3/4	2	-	120151
3/16	3/16	3/4	2	0.005	120159
3/16	3/16	3/4	2	0.015	121518
3/16	3/16	3/4	2	0.030	121519
3/16	3/16	3/4	2	0.060	120550
1/4	1/4	5/16	2	-	121555
1/4	1/4	5/16	2	0.005	121560
1/4	1/4	5/16	2	0.010	121561
1/4	1/4	5/16	2	0.015	121562
1/4	1/4	5/16	2	0.030	121563
1/4	1/4	5/16	2	0.060	121564
1/4	1/4	1/2	2-1/2	-	120434
1/4	1/4	1/2	2-1/2	0.005	121565
1/4	1/4	1/2	2-1/2	0.010	120544
1/4	1/4	1/2	2-1/2	0.015	121566
1/4	1/4	1/2	2-1/2	0.030	121567
1/4	1/4	1/2	2-1/2	0.060	121568
1/4	1/4	3/4	2-1/2	-	119344
1/4	1/4	3/4	2-1/2	0.005	121429
1/4	1/4	3/4	2-1/2	0.010	119335
1/4	1/4	3/4	2-1/2	0.015	121430
1/4	1/4	3/4	2-1/2	0.030	120697
1/4	1/4	3/4	2-1/2	0.060	120473
1/4	1/4	1-1/8	3	-	120152



More About the Series 1030

Ideal for Tool Steels and Hard Alloys

Variable helix/unequal index design reduces vibration and enables higher metal removal rates

Special corner radii available upon request



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



More About the Series 1030

Ideal for Tool Steels and Hard Alloys

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Series 1030 HGW4 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/4	1/4	1-1/8	3	0.005	121521
1/4	1/4	1-1/8	3	0.010	120160
1/4	1/4	1-1/8	3	0.015	121522
1/4	1/4	1-1/8	3	0.030	121523
1/4	1/4	1-1/8	3	0.060	121524
5/16	5/16	1/2	2	-	120435
5/16	5/16	1/2	2	0.010	120545
5/16	5/16	1/2	2	0.015	121569
5/16	5/16	1/2	2	0.030	121570
5/16	5/16	1/2	2	0.060	121571
5/16	5/16	13/16	2-1/2	-	119345
5/16	5/16	13/16	2-1/2	0.010	119336
5/16	5/16	13/16	2-1/2	0.015	121432
5/16	5/16	13/16	2-1/2	0.030	121433
5/16	5/16	13/16	2-1/2	0.060	121434
5/16	5/16	1-1/8	3	-	120153
5/16	5/16	1-1/8	3	0.010	120161
5/16	5/16	1-1/8	3	0.015	121525
5/16	5/16	1-1/8	3	0.030	121526
5/16	5/16	1-1/8	3	0.060	121527
3/8	3/8	7/16	2	-	122483
3/8	3/8	7/16	2	0.015	121572
3/8	3/8	7/16	2	0.030	121573
3/8	3/8	7/16	2	0.060	121574
3/8	3/8	5/8	2	-	120436
3/8	3/8	5/8	2	0.015	120546
3/8	3/8	5/8	2	0.030	121575
3/8	3/8	5/8	2	0.060	121576
3/8	3/8	7/8	2-1/2	-	119346
3/8	3/8	7/8	2-1/2	0.010	119315
3/8	3/8	7/8	2-1/2	0.015	119337
3/8	3/8	7/8	2-1/2	0.030	121435
3/8	3/8	7/8	2-1/2	0.060	121488
3/8	3/8	1-1/8	3	-	120154
3/8	3/8	1-1/8	3	0.010	120162
3/8	3/8	1-1/8	3	0.015	121528
3/8	3/8	1-1/8	3	0.030	121529
3/8	3/8	1-1/8	3	0.060	121530
3/8	3/8	1-1/8	3	0.090	121531
3/8	3/8	1-1/8	3	0.120	121532



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ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 1030 HGW4 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/2	1/2	5/8	2-1/2	-	120437
1/2	1/2	5/8	2-1/2	0.015	120547
1/2	1/2	5/8	2-1/2	0.030	120551
1/2	1/2	5/8	2-1/2	0.060	121577
1/2	1/2	5/8	2-1/2	0.090	121578
1/2	1/2	5/8	2-1/2	0.120	121579
1/2	1/2	1	3	-	119347
1/2	1/2	1	3	0.015	119338
1/2	1/2	1	3	0.020	121516
1/2	1/2	1	3	0.030	119546
1/2	1/2	1	3	0.060	120076
1/2	1/2	1	3	0.090	121489
1/2	1/2	1	3	0.120	121490
1/2	1/2	1-1/4	3	-	121515
1/2	1/2	1-1/4	3	0.015	121491
1/2	1/2	1-1/4	3	0.030	121492
1/2	1/2	1-1/4	3	0.060	121493
1/2	1/2	1-1/4	3	0.090	121494
1/2	1/2	1-1/4	3	0.120	121495
1/2	1/2	1-1/2	3	-	122282
1/2	1/2	1-1/2	3	0.015	121496
1/2	1/2	1-1/2	3	0.030	121497
1/2	1/2	1-1/2	3	0.060	121498
1/2	1/2	1-1/2	3	0.090	121499
1/2	1/2	1-1/2	3	0.120	121500
1/2	1/2	1-3/4	4	-	121517
1/2	1/2	1-3/4	4	0.015	121533
1/2	1/2	1-3/4	4	0.030	121534
1/2	1/2	1-3/4	4	0.060	121535
1/2	1/2	1-3/4	4	0.090	121536
1/2	1/2	1-3/4	4	0.120	121537
1/2	1/2	2	4	-	120155
1/2	1/2	2	4	0.015	120163
1/2	1/2	2	4	0.030	121538
1/2	1/2	2	4	0.060	121539
1/2	1/2	2	4	0.090	121540
1/2	1/2	2	4	0.120	121541
5/8	5/8	3/4	3	-	120438
5/8	5/8	3/4	3	0.015	121580
5/8	5/8	3/4	3	0.020	120548



More About the Series 1030

Ideal for Tool Steels and Hard Alloys

Variable helix/unequal index design reduces vibration and enables higher metal removal rates

Special corner radii available upon request



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



More About the Series 1030

Ideal for Tool Steels and Hard Alloys

Variable helix/unequal index design reduces vibration and enables higher metal removal rates

Special corner radii available upon request

Series 1030 HGW4 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
5/8	5/8	3/4	3	0.030	121581
5/8	5/8	3/4	3	0.060	121582
5/8	5/8	3/4	3	0.090	121583
5/8	5/8	3/4	3	0.120	121584
5/8	5/8	1-1/4	3-1/2	-	119348
5/8	5/8	1-1/4	3-1/2	0.015	121502
5/8	5/8	1-1/4	3-1/2	0.020	119339
5/8	5/8	1-1/4	3-1/2	0.030	121503
5/8	5/8	1-1/4	3-1/2	0.060	121504
5/8	5/8	1-1/4	3-1/2	0.090	121505
5/8	5/8	1-1/4	3-1/2	0.120	121506
5/8	5/8	2-1/4	5	-	120156
5/8	5/8	2-1/4	5	0.015	121542
5/8	5/8	2-1/4	5	0.020	120164
5/8	5/8	2-1/4	5	0.030	121543
5/8	5/8	2-1/4	5	0.060	121544
5/8	5/8	2-1/4	5	0.090	121545
5/8	5/8	2-1/4	5	0.120	121546
3/4	3/4	7/8	3	-	120439
3/4	3/4	7/8	3	0.015	121585
3/4	3/4	7/8	3	0.030	120486
3/4	3/4	7/8	3	0.060	121586
3/4	3/4	7/8	3	0.090	121587
3/4	3/4	7/8	3	0.120	121588
3/4	3/4	1-1/2	4	-	119349
3/4	3/4	1-1/2	4	0.020	121507
3/4	3/4	1-1/2	4	0.030	119340
3/4	3/4	1-1/2	4	0.060	121508
3/4	3/4	1-1/2	4	0.090	121509
3/4	3/4	1-1/2	4	0.120	121510
3/4	3/4	2-1/4	5	-	119722
3/4	3/4	2-1/4	5	0.015	121547
3/4	3/4	2-1/4	5	0.030	119723
3/4	3/4	2-1/4	5	0.060	121548
3/4	3/4	2-1/4	5	0.090	121549
3/4	3/4	2-1/4	5	0.120	121550
1	1	1	4	-	120440
1	1	1	4	0.015	121589
1	1	1	4	0.030	120549
1	1	1	4	0.060	121590



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 1030 HGW4 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1	1	1	4	0.090	121591
1	1	1	4	0.120	121592
1	1	1-1/2	4	-	119350
1	1	1-1/2	4	0.015	121511
1	1	1-1/2	4	0.030	119341
1	1	1-1/2	4	0.060	121512
1	1	1-1/2	4	0.090	121513
1	1	1-1/2	4	0.120	121514
1	1	2-1/4	5	-	120158
1	1	2-1/4	5	0.015	121551
1	1	2-1/4	5	0.030	120166
1	1	2-1/4	5	0.060	121552
1	1	2-1/4	5	0.090	121553
1	1	2-1/4	5	0.120	121554



More About the Series 1030

Ideal for Tool Steels and Hard Alloys

Variable helix/unequal index design reduces vibration and enables higher metal removal rates

Special corner radii available upon request



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



More About the Series 1032

Ideal for Tool Steels and Hard Alloys

Variable helix/variable index design reduces vibration and enables higher metal removal rates

Series 1032 HGW4BN | 4FL | Ball Nose

Diameter	Shank Dia.	LOC	OAL	EDP
1/8	1/8	1/4	1-1/2	122963
1/8	1/8	1/2	2	120360
3/16	3/16	5/16	2	123087
3/16	3/16	5/8	2	120361
3/16	3/16	3/4	2	123098
1/4	1/4	5/16	2	123088
1/4	1/4	1/2	2-1/2	122983
1/4	1/4	3/4	2-1/2	120362
1/4	1/4	1-1/8	3	123099
5/16	5/16	1/2	2	123089
5/16	5/16	13/16	2-1/2	120363
5/16	5/16	1-1/8	3	123100
3/8	3/8	7/16	2	123090
3/8	3/8	5/8	2	120364
3/8	3/8	1-1/8	3	122969
1/2	1/2	5/8	2-1/2	123091
1/2	1/2	1	3	120526
1/2	1/2	1-1/4	3	123095
1/2	1/2	1-1/2	3	123096
1/2	1/2	1-3/4	4	122971
1/2	1/2	2	4	123101
5/8	5/8	3/4	3	123092
5/8	5/8	1-1/4	3-1/2	120365
5/8	5/8	2-1/4	5	123102
3/4	3/4	7/8	3	123093
3/4	3/4	1-1/2	4	120366
3/4	3/4	2-1/4	5	123103
1	1	1	4	123094
1	1	1-1/2	4	123097
1	1	2-1/4	5	123104



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ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 1035 HGW5 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/8	1/8	1/4	1-1/2	-	120988
1/8	1/8	1/4	1-1/2	0.005	121373
1/8	1/8	1/4	1-1/2	0.015	121374
1/8	1/8	1/4	1-1/2	0.030	120979
1/8	1/8	1/2	2	-	120954
1/8	1/8	1/2	2	0.005	120945
1/8	1/8	1/2	2	0.015	121298
1/8	1/8	1/2	2	0.030	121299
3/16	3/16	5/16	2	-	120980
3/16	3/16	5/16	2	0.005	120989
3/16	3/16	5/16	2	0.015	121375
3/16	3/16	5/16	2	0.030	121376
3/16	3/16	5/8	2	-	120955
3/16	3/16	5/8	2	0.005	120946
3/16	3/16	5/8	2	0.015	121300
3/16	3/16	5/8	2	0.030	121301
3/16	3/16	3/4	2	-	120963
3/16	3/16	3/4	2	0.005	120971
3/16	3/16	3/4	2	0.015	121341
3/16	3/16	3/4	2	0.030	121342
3/16	3/16	3/4	2	0.060	121343
1/4	1/4	5/16	2	-	120184
1/4	1/4	5/16	2	0.005	121472
1/4	1/4	5/16	2	0.010	121481
1/4	1/4	5/16	2	0.015	121482
1/4	1/4	5/16	2	0.030	121483
1/4	1/4	5/16	2	0.060	121484
1/4	1/4	1/2	2-1/2	-	120981
1/4	1/4	1/2	2-1/2	0.005	121377
1/4	1/4	1/2	2-1/2	0.010	120990
1/4	1/4	1/2	2-1/2	0.015	121380
1/4	1/4	1/2	2-1/2	0.030	121381
1/4	1/4	1/2	2-1/2	0.060	121382
1/4	1/4	3/4	2-1/2	-	120956
1/4	1/4	3/4	2-1/2	0.005	121302
1/4	1/4	3/4	2-1/2	0.010	120947
1/4	1/4	3/4	2-1/2	0.015	121303
1/4	1/4	3/4	2-1/2	0.030	121304
1/4	1/4	3/4	2-1/2	0.060	121305
1/4	1/4	1-1/8	3	-	120964



More About the Series 1035

Ideal for Tool Steels and Hard Alloys

Variable helix/variable index design reduces vibration and enables higher metal removal rates

Special corner radii available upon request



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



More About the Series 1035

Ideal for Tool Steels and Hard Alloys

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Special corner radii available upon request

Series 1035 HGW5 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/4	1/4	1-1/8	3	0.005	121344
1/4	1/4	1-1/8	3	0.010	120972
1/4	1/4	1-1/8	3	0.015	121345
1/4	1/4	1-1/8	3	0.030	121346
1/4	1/4	1-1/8	3	0.060	121347
5/16	5/16	1/2	2	-	120982
5/16	5/16	1/2	2	0.010	120991
5/16	5/16	1/2	2	0.015	121383
5/16	5/16	1/2	2	0.030	121385
5/16	5/16	1/2	2	0.060	121386
5/16	5/16	13/16	2-1/2	-	120957
5/16	5/16	13/16	2-1/2	0.010	120948
5/16	5/16	13/16	2-1/2	0.015	121312
5/16	5/16	13/16	2-1/2	0.030	121313
5/16	5/16	13/16	2-1/2	0.060	121314
5/16	5/16	1-1/8	3	-	120965
5/16	5/16	1-1/8	3	0.010	120973
5/16	5/16	1-1/8	3	0.015	121348
5/16	5/16	1-1/8	3	0.030	121349
5/16	5/16	1-1/8	3	0.060	121350
3/8	3/8	7/16	2	-	122484
3/8	3/8	7/16	2	0.015	121485
3/8	3/8	7/16	2	0.030	121486
3/8	3/8	7/16	2	0.060	121487
3/8	3/8	5/8	2	-	120983
3/8	3/8	5/8	2	0.015	120992
3/8	3/8	5/8	2	0.030	121387
3/8	3/8	5/8	2	0.060	121388
3/8	3/8	7/8	2-1/2	-	120958
3/8	3/8	7/8	2-1/2	0.010	120481
3/8	3/8	7/8	2-1/2	0.015	120949
3/8	3/8	7/8	2-1/2	0.030	121315
3/8	3/8	7/8	2-1/2	0.060	121316
3/8	3/8	1-1/8	3	-	120966
3/8	3/8	1-1/8	3	0.010	120974
3/8	3/8	1-1/8	3	0.015	121351
3/8	3/8	1-1/8	3	0.030	121352
3/8	3/8	1-1/8	3	0.060	121353
3/8	3/8	1-1/8	3	0.090	121354
3/8	3/8	1-1/8	3	0.120	121355



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ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 1035 HGW5 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/2	1/2	5/8	2-1/2	-	120984
1/2	1/2	5/8	2-1/2	0.015	120993
1/2	1/2	5/8	2-1/2	0.030	121389
1/2	1/2	5/8	2-1/2	0.060	121390
1/2	1/2	5/8	2-1/2	0.090	121391
1/2	1/2	5/8	2-1/2	0.120	121392
1/2	1/2	1	3	-	119762
1/2	1/2	1	3	0.015	120950
1/2	1/2	1	3	0.020	122033
1/2	1/2	1	3	0.030	120648
1/2	1/2	1	3	0.060	121317
1/2	1/2	1	3	0.090	121318
1/2	1/2	1	3	0.120	121319
1/2	1/2	1-1/4	3	-	123121
1/2	1/2	1-1/4	3	0.015	121457
1/2	1/2	1-1/4	3	0.030	121458
1/2	1/2	1-1/4	3	0.060	121459
1/2	1/2	1-1/4	3	0.090	121460
1/2	1/2	1-1/4	3	0.120	121461
1/2	1/2	1-1/2	3	-	121600
1/2	1/2	1-1/2	3	0.015	121462
1/2	1/2	1-1/2	3	0.030	121463
1/2	1/2	1-1/2	3	0.060	121464
1/2	1/2	1-1/2	3	0.090	121465
1/2	1/2	1-1/2	3	0.120	121466
1/2	1/2	1-3/4	4	-	121520
1/2	1/2	1-3/4	4	0.015	121467
1/2	1/2	1-3/4	4	0.030	121468
1/2	1/2	1-3/4	4	0.060	121469
1/2	1/2	1-3/4	4	0.090	121470
1/2	1/2	2	4	-	120967
1/2	1/2	2	4	0.015	120975
1/2	1/2	2	4	0.030	121356
1/2	1/2	2	4	0.060	121357
1/2	1/2	2	4	0.090	121358
1/2	1/2	2	4	0.120	121359
1/2	1/2	1-3/4	4	0.120	121471
5/8	5/8	3/4	3	-	120985
5/8	5/8	3/4	3	0.015	121393
5/8	5/8	3/4	3	0.020	120994



More About the Series 1035

Ideal for Tool Steels and Hard Alloys

Variable helix/variable index design reduces vibration and enables higher metal removal rates

Special corner radii available upon request



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ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



More About the Series 1035

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Special corner radii available upon request

Series 1035 HGW5 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
5/8	5/8	3/4	3	0.030	121394
5/8	5/8	3/4	3	0.060	121395
5/8	5/8	3/4	3	0.090	121396
5/8	5/8	3/4	3	0.120	121398
5/8	5/8	1-1/4	3-1/2	-	119764
5/8	5/8	1-1/4	3-1/2	0.015	121320
5/8	5/8	1-1/4	3-1/2	0.020	119756
5/8	5/8	1-1/4	3-1/2	0.030	121321
5/8	5/8	1-1/4	3-1/2	0.060	121324
5/8	5/8	1-1/4	3-1/2	0.090	121325
5/8	5/8	1-1/4	3-1/2	0.120	121326
5/8	5/8	2-1/4	5	-	120968
5/8	5/8	2-1/4	5	0.015	121360
5/8	5/8	2-1/4	5	0.020	120976
5/8	5/8	2-1/4	5	0.030	121361
5/8	5/8	2-1/4	5	0.060	121362
5/8	5/8	2-1/4	5	0.090	121363
5/8	5/8	2-1/4	5	0.120	121364
3/4	3/4	7/8	3	-	120986
3/4	3/4	7/8	3	0.015	121399
3/4	3/4	7/8	3	0.030	120995
3/4	3/4	7/8	3	0.060	121400
3/4	3/4	7/8	3	0.090	121401
3/4	3/4	7/8	3	0.120	121402
3/4	3/4	1-1/2	4	-	119765
3/4	3/4	1-1/2	4	0.020	121327
3/4	3/4	1-1/2	4	0.030	119758
3/4	3/4	1-1/2	4	0.060	121328
3/4	3/4	1-1/2	4	0.090	121329
3/4	3/4	1-1/2	4	0.120	121330
3/4	3/4	2-1/4	5	-	120969
3/4	3/4	2-1/4	5	0.015	121365
3/4	3/4	2-1/4	5	0.030	120977
3/4	3/4	2-1/4	5	0.060	121366
3/4	3/4	2-1/4	5	0.090	121367
3/4	3/4	2-1/4	5	0.120	121368
1	1	1	4	-	120987
1	1	1	4	0.015	121403
1	1	1	4	0.030	120996
1	1	1	4	0.060	121404



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ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 1035 HGW5 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1	1	1	4	0.090	121405
1	1	1	4	0.120	121406
1	1	1-1/2	4	-	119766
1	1	1-1/2	4	0.015	121336
1	1	1-1/2	4	0.030	119760
1	1	1-1/2	4	0.060	121338
1	1	1-1/2	4	0.090	121339
1	1	1-1/2	4	0.120	121340
1	1	2-1/4	5	-	120970
1	1	2-1/4	5	0.015	121369
1	1	2-1/4	5	0.030	120978
1	1	2-1/4	5	0.060	121370
1	1	2-1/4	5	0.090	121371
1	1	2-1/4	5	0.120	121372



More About the Series 1035

Ideal for Tool Steels and Hard Alloys

Variable helix/variable index design reduces vibration and enables higher metal removal rates

Special corner radii available upon request



★ Best ☆ Good



ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



More About the Series 1040

Ideal for Tool Steels and Hard Alloys

Variable helix/variable index design reduces vibration and enables higher metal removal rates

Special corner radii available upon request

Series 1040 HGW7 | 7FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/8	1/8	1/4	1-1/2	-	122664
1/8	1/8	1/4	1-1/2	0.005	122612
1/8	1/8	1/4	1-1/2	0.015	122613
1/8	1/8	1/4	1-1/2	0.030	122614
1/8	1/8	1/2	2	-	122876
1/8	1/8	1/2	2	0.005	122798
1/8	1/8	1/2	2	0.015	122799
1/8	1/8	1/2	2	0.030	122800
3/16	3/16	5/16	2	-	122665
3/16	3/16	5/16	2	0.005	122615
3/16	3/16	5/16	2	0.015	122616
3/16	3/16	5/16	2	0.030	122617
3/16	3/16	5/8	2	-	122877
3/16	3/16	5/8	2	0.005	122801
3/16	3/16	5/8	2	0.015	122802
3/16	3/16	5/8	2	0.030	122803
3/16	3/16	3/4	2	-	122930
3/16	3/16	3/4	2	0.005	122885
3/16	3/16	3/4	2	0.015	122886
3/16	3/16	3/4	2	0.030	122887
3/16	3/16	3/4	2	0.060	122888
1/4	1/4	5/16	2	-	122666
1/4	1/4	5/16	2	0.005	122618
1/4	1/4	5/16	2	0.010	122619
1/4	1/4	5/16	2	0.015	122620
1/4	1/4	5/16	2	0.030	122621
1/4	1/4	5/16	2	0.060	122622
1/4	1/4	1/2	2-1/2	-	122667
1/4	1/4	1/2	2-1/2	0.005	122623
1/4	1/4	1/2	2-1/2	0.010	122624
1/4	1/4	1/2	2-1/2	0.015	122625
1/4	1/4	1/2	2-1/2	0.030	122626
1/4	1/4	1/2	2-1/2	0.060	122627
1/4	1/4	3/4	2-1/2	-	122878
1/4	1/4	3/4	2-1/2	0.005	122804
1/4	1/4	3/4	2-1/2	0.010	122805
1/4	1/4	3/4	2-1/2	0.015	122806
1/4	1/4	3/4	2-1/2	0.030	122807
1/4	1/4	3/4	2-1/2	0.060	122808
1/4	1/4	1-1/8	3	-	122931



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Premium High Performance Carbide End Mills for Ferrous Materials



Series 1040 HGW7 | 7FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/4	1/4	1-1/8	3	0.005	122889
1/4	1/4	1-1/8	3	0.010	122890
1/4	1/4	1-1/8	3	0.015	122891
1/4	1/4	1-1/8	3	0.030	122892
1/4	1/4	1-1/8	3	0.060	122893
5/16	5/16	1/2	2	-	122668
5/16	5/16	1/2	2	0.010	122628
5/16	5/16	1/2	2	0.015	122629
5/16	5/16	1/2	2	0.030	122630
5/16	5/16	1/2	2	0.060	122631
5/16	5/16	13/16	2-1/2	-	122879
5/16	5/16	13/16	2-1/2	0.010	122809
5/16	5/16	13/16	2-1/2	0.015	122810
5/16	5/16	13/16	2-1/2	0.030	122811
5/16	5/16	13/16	2-1/2	0.060	122812
5/16	5/16	1-1/8	3	-	122932
5/16	5/16	1-1/8	3	0.010	122894
5/16	5/16	1-1/8	3	0.015	122895
5/16	5/16	1-1/8	3	0.030	122896
5/16	5/16	1-1/8	3	0.060	122897
3/8	3/8	7/16	2	-	122670
3/8	3/8	7/16	2	0.015	122632
3/8	3/8	7/16	2	0.030	122633
3/8	3/8	7/16	2	0.060	122634
3/8	3/8	5/8	2	-	122669
3/8	3/8	5/8	2	0.015	122635
3/8	3/8	5/8	2	0.030	122636
3/8	3/8	5/8	2	0.060	122637
3/8	3/8	7/8	2-1/2	-	122880
3/8	3/8	7/8	2-1/2	0.010	122813
3/8	3/8	7/8	2-1/2	0.015	122814
3/8	3/8	7/8	2-1/2	0.030	122815
3/8	3/8	7/8	2-1/2	0.060	122816
3/8	3/8	1-1/8	3	-	122933
3/8	3/8	1-1/8	3	0.010	122898
3/8	3/8	1-1/8	3	0.015	122899
3/8	3/8	1-1/8	3	0.030	122900
3/8	3/8	1-1/8	3	0.060	122901
3/8	3/8	1-1/8	3	0.090	122902
3/8	3/8	1-1/8	3	0.120	122903



More About the Series 1040

Ideal for Tool Steels and Hard Alloys

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Special corner radii available upon request



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More About the Series 1040

Ideal for Tool Steels and Hard Alloys

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Special corner radii available upon request

Series 1040 | HGW7 | 7FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/2	1/2	5/8	2-1/2	-	122671
1/2	1/2	5/8	2-1/2	0.015	122638
1/2	1/2	5/8	2-1/2	0.030	122639
1/2	1/2	5/8	2-1/2	0.060	122640
1/2	1/2	5/8	2-1/2	0.090	121901
1/2	1/2	5/8	2-1/2	0.120	122641
1/2	1/2	1	3	-	121242
1/2	1/2	1	3	0.015	124462
1/2	1/2	1	3	0.020	122823
1/2	1/2	1	3	0.030	122824
1/2	1/2	1	3	0.060	122825
1/2	1/2	1	3	0.090	122826
1/2	1/2	1	3	0.120	122827
1/2	1/2	1-1/4	3	-	122268
1/2	1/2	1-1/4	3	0.015	122828
1/2	1/2	1-1/4	3	0.030	122829
1/2	1/2	1-1/4	3	0.060	122830
1/2	1/2	1-1/4	3	0.090	122831
1/2	1/2	1-1/4	3	0.120	122832
1/2	1/2	1-1/2	3	-	122881
1/2	1/2	1-1/2	3	0.015	122833
1/2	1/2	1-1/2	3	0.030	122835
1/2	1/2	1-1/2	3	0.060	122836
1/2	1/2	1-1/2	3	0.090	122837
1/2	1/2	1-1/2	3	0.120	122838
1/2	1/2	1-3/4	4	-	122934
1/2	1/2	1-3/4	4	0.015	122904
1/2	1/2	1-3/4	4	0.030	122905
1/2	1/2	1-3/4	4	0.060	122906
1/2	1/2	1-3/4	4	0.090	122907
1/2	1/2	1-3/4	4	0.120	122908
1/2	1/2	2	4	-	122935
1/2	1/2	2	4	0.015	122909
1/2	1/2	2	4	0.030	122910
1/2	1/2	2	4	0.060	122911
1/2	1/2	2	4	0.090	122912
1/2	1/2	2	4	0.120	122913
5/8	5/8	3/4	3	-	122715
5/8	5/8	3/4	3	0.015	122642
5/8	5/8	3/4	3	0.020	122643



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ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 1040 HGW7 | 7FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
5/8	5/8	3/4	3	0.030	122644
5/8	5/8	3/4	3	0.060	122645
5/8	5/8	3/4	3	0.090	122646
5/8	5/8	3/4	3	0.120	122647
5/8	5/8	1-1/4	3-1/2	-	122882
5/8	5/8	1-1/4	3-1/2	0.015	122839
5/8	5/8	1-1/4	3-1/2	0.020	122840
5/8	5/8	1-1/4	3-1/2	0.030	122841
5/8	5/8	1-1/4	3-1/2	0.060	122851
5/8	5/8	1-1/4	3-1/2	0.090	122852
5/8	5/8	1-1/4	3-1/2	0.120	122853
5/8	5/8	2-1/4	5	-	122936
5/8	5/8	2-1/4	5	0.015	122914
5/8	5/8	2-1/4	5	0.020	122915
5/8	5/8	2-1/4	5	0.030	122916
5/8	5/8	2-1/4	5	0.060	122917
5/8	5/8	2-1/4	5	0.090	122918
5/8	5/8	2-1/4	5	0.120	122919
3/4	3/4	7/8	3	-	122716
3/4	3/4	7/8	3	0.015	122648
3/4	3/4	7/8	3	0.030	122651
3/4	3/4	7/8	3	0.060	122654
3/4	3/4	7/8	3	0.090	122655
3/4	3/4	7/8	3	0.120	122656
3/4	3/4	1-1/2	4	-	122883
3/4	3/4	1-1/2	4	0.020	122854
3/4	3/4	1-1/2	4	0.030	122866
3/4	3/4	1-1/2	4	0.060	122867
3/4	3/4	1-1/2	4	0.090	122868
3/4	3/4	1-1/2	4	0.120	122761
3/4	3/4	2-1/4	5	-	122937
3/4	3/4	2-1/4	5	0.015	122920
3/4	3/4	2-1/4	5	0.030	122921
3/4	3/4	2-1/4	5	0.060	122922
3/4	3/4	2-1/4	5	0.090	122923
3/4	3/4	2-1/4	5	0.120	122924
1	1	1	4	-	122797
1	1	1	4	0.015	122659
1	1	1	4	0.030	122660
1	1	1	4	0.060	122661



More About the Series 1040

Ideal for Tool Steels and Hard Alloys

Variable helix/variable index design reduces vibration and enables higher metal removal rates

Special corner radii available upon request



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



More About the Series 1040

Ideal for Tool Steels and Hard Alloys

Variable helix/variable index design reduces vibration and enables higher metal removal rates

Special corner radii available upon request

Series 1040 HGW7 | 7FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1	1	1	4	0.090	122662
1	1	1	4	0.120	122663
1	1	1-1/2	4	-	122884
1	1	1-1/2	4	0.015	122869
1	1	1-1/2	4	0.030	122871
1	1	1-1/2	4	0.060	122872
1	1	1-1/2	4	0.090	122873
1	1	1-1/2	4	0.120	122875
1	1	2-1/4	5	-	122938
1	1	2-1/4	5	0.015	122925
1	1	2-1/4	5	0.030	122926
1	1	2-1/4	5	0.060	122927
1	1	2-1/4	5	0.090	122928
1	1	2-1/4	5	0.120	122929



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 1031 SRF4 | 4FL | Chamfer

Diameter	Shank Dia.	LOC	OAL	Chamfer	EDP
1/8	1/8	1/4	1.5	.007	107988
1/8	1/8	1/2	1-1/2	.007	111235
3/16	3/16	5/16	2	.007	111252
3/16	3/16	5/8	2	.007	111236
1/4	1/4	1/2	2	.010	107794
1/4	1/4	3/4	2-1/2	.010	111237
1/4	1/4	1-1/8	3	.010	111244
5/16	5/16	1/2	2	.010	107990
5/16	5/16	13/16	2-1/2	.010	111238
5/16	5/16	1-1/8	3	.010	111245
3/8	3/8	5/8	2	.010	111253
3/8	3/8	7/8	2-1/2	.010	111239
3/8	3/8	1-1/8	3	.010	111246
1/2	1/2	5/8	2.5	.015	107904
1/2	1/2	1	3	.015	107905
1/2	1/2	2	4	.015	111247
5/8	5/8	3/4	3	.015	107992
5/8	5/8	1-1/4	3-1/2	.015	111277
5/8	5/8	2-1/4	5	.015	111248
3/4	3/4	7/8	3	.020	107919
3/4	3/4	1-1/2	4	.020	111242
3/4	3/4	2-1/4	5	.020	111249
1	1	1	4	.020	107997
1	1	1-1/2	4	.020	111243
1	1	2-1/4	5	.020	111250



More About the Series 1031

Ideal for Stainless and Hardened Steels

Variable helix/variable index design reduces vibration and enables higher metal removal rates



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 1050 BND2 | DM2 | 2FL | Ball Nose | Die/Mold | MoldMaster

Diameter	Shank Dia.	LOC	OAL	EDP
1/32	1/4	1/32	3	100333
1/16	1/4	1/16	3	100334
3/32	1/4	3/32	3	100335
1/8	1/4	1/8	3	100336
5/32	1/4	5/32	3	100338
3/16	1/4	3/16	3	100342
1/4	1/4	1/4	3	100346
5/16	5/16	5/16	3	100348
3/8	3/8	3/8	3-1/2	100349
1/2	1/2	1/2	4	100351



More About the Series 1050

Ideal for Die/Mold applications in alloy and hardened steels

5-micron radius tolerance

Special modifications available upon request



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2100 438 | 4FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/8	1/8	1/4	1-1/2	-	310001
1/8	1/8	1/4	1-1/2	0.010	310005
1/8	1/8	1/4	1-1/2	0.020	310007
1/8	1/8	1/4	1-1/2	0.030	310009
1/8	1/8	1/2	2	-	310013
1/8	1/8	1/2	2	0.010	310017
1/8	1/8	1/2	2	0.020	310019
1/8	1/8	1/2	2	0.030	310023
1/8	1/8	3/4	2-1/2	-	310025
1/8	1/8	3/4	2-1/2	0.010	310029
1/8	1/8	3/4	2-1/2	0.020	310031
1/8	1/8	3/4	2-1/2	0.030	310034
3/16	3/16	5/16	2	-	310037
3/16	3/16	5/16	2	0.010	310040
3/16	3/16	5/16	2	0.020	310044
3/16	3/16	5/16	2	0.030	310048
3/16	3/16	9/16	2	-	310050
3/16	3/16	9/16	2	0.010	310054
3/16	3/16	9/16	2	0.020	310058
3/16	3/16	9/16	2	0.030	310060
3/16	3/16	3/4	2-1/2	-	310063
3/16	3/16	3/4	2-1/2	0.010	310066
3/16	3/16	3/4	2-1/2	0.020	310069
3/16	3/16	3/4	2-1/2	0.030	310071
1/4	1/4	3/8	2	-	310074
1/4	1/4	3/8	2	0.010	310078
1/4	1/4	3/8	2	0.020	310081
1/4	1/4	3/8	2	0.030	310085
1/4	1/4	3/8	2	0.060	310089
1/4	1/4	1/2	2-1/2	-	310093
1/4	1/4	1/2	2-1/2	0.010	310097
1/4	1/4	1/2	2-1/2	0.020	310100
1/4	1/4	1/2	2-1/2	0.030	310103
1/4	1/4	1/2	2-1/2	0.060	310105
1/4	1/4	3/4	2-1/2	-	310109
1/4	1/4	3/4	2-1/2	0.010	310113
1/4	1/4	3/4	2-1/2	0.020	310115
1/4	1/4	3/4	2-1/2	0.030	310117
1/4	1/4	3/4	2-1/2	0.060	310121
1/4	1/4	1	3	-	310125

PYSTL_{series}

More About the Series 2100

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Ideally suited for gummy materials like Titanium and Stainless Steel



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



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Series 2100 | 438 | 4FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/4	1/4	1	3	0.010	310128
1/4	1/4	1	3	0.020	310130
1/4	1/4	1	3	0.030	310133
1/4	1/4	1	3	0.060	310136
1/4	1/4	1-1/4	3	-	310139
1/4	1/4	1-1/4	3	0.010	310141
1/4	1/4	1-1/4	3	0.020	310144
1/4	1/4	1-1/4	3	0.030	310147
1/4	1/4	1-1/4	3	0.060	310150
5/16	5/16	7/16	2	-	310154
5/16	5/16	7/16	2	0.010	310158
5/16	5/16	7/16	2	0.020	310160
5/16	5/16	7/16	2	0.030	310162
5/16	5/16	7/16	2	0.060	310166
5/16	5/16	13/16	2-1/2	-	310168
5/16	5/16	13/16	2-1/2	0.010	310172
5/16	5/16	13/16	2-1/2	0.020	310176
5/16	5/16	13/16	2-1/2	0.030	310180
5/16	5/16	13/16	2-1/2	0.060	310182
5/16	5/16	1	3	-	310186
5/16	5/16	1	3	0.010	310190
5/16	5/16	1	3	0.020	310194
5/16	5/16	1	3	0.030	310198
5/16	5/16	1	3	0.060	310201
3/8	3/8	1/2	2	-	310203
3/8	3/8	1/2	2	0.010	310205
3/8	3/8	1/2	2	0.020	310207
3/8	3/8	1/2	2	0.030	310210
3/8	3/8	1/2	2	0.060	310212
3/8	3/8	1/2	2	0.090	310214
3/8	3/8	1	2-1/2	-	310217
3/8	3/8	1	2-1/2	0.010	310220
3/8	3/8	1	2-1/2	0.020	310222
3/8	3/8	1	2-1/2	0.030	310224
3/8	3/8	1	2-1/2	0.060	310226
3/8	3/8	1	2-1/2	0.090	310229
3/8	3/8	1-1/4	3	-	310231
3/8	3/8	1-1/4	3	0.010	310233
3/8	3/8	1-1/4	3	0.020	310236
3/8	3/8	1-1/4	3	0.030	310238



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ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2100 438 | 4FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
3/8	3/8	1-1/4	3	0.060	310240
3/8	3/8	1-1/4	3	0.090	310243
3/8	3/8	1-1/2	3	-	310245
3/8	3/8	1-1/2	3	0.010	310247
3/8	3/8	1-1/2	3	0.020	310251
3/8	3/8	1-1/2	3	0.030	310255
3/8	3/8	1-1/2	3	0.060	310257
3/8	3/8	1-1/2	3	0.090	310259
1/2	1/2	5/8	2-1/2	-	310263
1/2	1/2	5/8	2-1/2	0.020	310267
1/2	1/2	5/8	2-1/2	0.030	310269
1/2	1/2	5/8	2-1/2	0.060	310273
1/2	1/2	5/8	2-1/2	0.090	310275
1/2	1/2	5/8	2-1/2	0.120	310279
1/2	1/2	1	3	-	310281
1/2	1/2	1	3	0.020	310284
1/2	1/2	1	3	0.030	310288
1/2	1/2	1	3	0.060	310290
1/2	1/2	1	3	0.090	310293
1/2	1/2	1	3	0.120	310295
1/2	1/2	1-1/4	3	-	310297
1/2	1/2	1-1/4	3	0.020	310301
1/2	1/2	1-1/4	3	0.030	310303
1/2	1/2	1-1/4	3	0.060	310307
1/2	1/2	1-1/4	3	0.090	310310
1/2	1/2	1-1/4	3	0.120	310312
1/2	1/2	1-5/8	4	-	310316
1/2	1/2	1-5/8	4	0.020	310318
1/2	1/2	1-5/8	4	0.030	310322
1/2	1/2	1-5/8	4	0.060	310325
1/2	1/2	1-5/8	4	0.090	310328
1/2	1/2	1-5/8	4	0.120	310332
1/2	1/2	2	4	-	310334
1/2	1/2	2	4	0.020	310338
1/2	1/2	2	4	0.030	310342
1/2	1/2	2	4	0.060	310346
1/2	1/2	2	4	0.090	310350
1/2	1/2	2	4	0.120	310354
5/8	5/8	3/4	3	-	310356
5/8	5/8	3/4	3	0.030	310360

PYSTL_{series}

More About the Series 2100

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Ideally suited for gummy materials like Titanium and Stainless Steel



★ Best ☆ Good

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More About the Series 2100

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Series 2100 438 | 4FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
5/8	5/8	3/4	3	0.060	310364
5/8	5/8	3/4	3	0.090	310367
5/8	5/8	3/4	3	0.120	310370
5/8	5/8	1-1/4	3-1/2	-	310374
5/8	5/8	1-1/4	3-1/2	0.030	310376
5/8	5/8	1-1/4	3-1/2	0.060	310379
5/8	5/8	1-1/4	3-1/2	0.090	310383
5/8	5/8	1-1/4	3-1/2	0.120	310385
5/8	5/8	1-5/8	3-1/2	-	310388
5/8	5/8	1-5/8	3-1/2	0.030	310392
5/8	5/8	1-5/8	3-1/2	0.060	310395
5/8	5/8	1-5/8	3-1/2	0.090	310397
5/8	5/8	1-5/8	3-1/2	0.120	310400
5/8	5/8	2-1/8	4	-	310403
5/8	5/8	2-1/8	4	0.030	310407
5/8	5/8	2-1/8	4	0.060	310410
5/8	5/8	2-1/8	4	0.090	310412
5/8	5/8	2-1/8	4	0.120	310414
5/8	5/8	2-1/2	5	-	310416
5/8	5/8	2-1/2	5	0.030	310420
5/8	5/8	2-1/2	5	0.060	310422
5/8	5/8	2-1/2	5	0.090	310425
5/8	5/8	2-1/2	5	0.120	310429
3/4	3/4	1	3	-	310431
3/4	3/4	1	3	0.030	310434
3/4	3/4	1	3	0.060	310437
3/4	3/4	1	3	0.090	310441
3/4	3/4	1	3	0.120	310444
3/4	3/4	1	3	0.250	310447
3/4	3/4	1-5/8	4	-	310451
3/4	3/4	1-5/8	4	0.030	310455
3/4	3/4	1-5/8	4	0.060	310458
3/4	3/4	1-5/8	4	0.090	310461
3/4	3/4	1-5/8	4	0.120	310463
3/4	3/4	1-5/8	4	0.250	310467
3/4	3/4	2-1/4	5	-	310469
3/4	3/4	2-1/4	5	0.030	310473
3/4	3/4	2-1/4	5	0.060	310476
3/4	3/4	2-1/4	5	0.090	310479
3/4	3/4	2-1/4	5	0.120	310483



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ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2100 438 | 4FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
3/4	3/4	2-1/4	5	0.250	310485
3/4	3/4	2-3/4	5	-	310489
3/4	3/4	2-3/4	5	0.030	310491
3/4	3/4	2-3/4	5	0.060	310494
3/4	3/4	2-3/4	5	0.090	310496
3/4	3/4	2-3/4	5	0.120	310498
3/4	3/4	2-3/4	5	0.250	310502
3/4	3/4	3-1/4	6	-	310505
3/4	3/4	3-1/4	6	0.030	310509
3/4	3/4	3-1/4	6	0.060	310513
3/4	3/4	3-1/4	6	0.090	310515
3/4	3/4	3-1/4	6	0.120	310519
3/4	3/4	3-1/4	6	0.250	310521
1	1	1-1/4	4	-	310525
1	1	1-1/4	4	0.030	310529
1	1	1-1/4	4	0.060	310531
1	1	1-1/4	4	0.090	310534
1	1	1-1/4	4	0.120	310536
1	1	1-1/4	4	0.250	310538
1	1	2	4	-	310541
1	1	2	4	0.030	310545
1	1	2	4	0.060	310549
1	1	2	4	0.090	310553
1	1	2	4	0.120	310557
1	1	2	4	0.250	310559
1	1	2-5/8	5	-	310562
1	1	2-5/8	5	0.030	310565
1	1	2-5/8	5	0.060	310567
1	1	2-5/8	5	0.090	310569
1	1	2-5/8	5	0.120	310573
1	1	2-5/8	5	0.250	310576
1	1	3-1/4	6	-	310578
1	1	3-1/4	6	0.030	310582
1	1	3-1/4	6	0.060	310586
1	1	3-1/4	6	0.090	310590
1	1	3-1/4	6	0.120	310592
1	1	3-1/4	6	0.250	310596
1	1	4-1/4	7	-	310600
1	1	4-1/4	7	0.030	310602
1	1	4-1/4	7	0.060	310605

PYSTL_{series}

More About the Series 2100

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Ideally suited for gummy materials like Titanium and Stainless Steel



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



PYSTL_{series}

More About the Series 2100

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Ideally suited for gummy materials like Titanium and Stainless Steel

Series 2100 438 | 4FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1	1	4-1/4	7	0.090	310609
1	1	4-1/4	7	0.120	310613
1	1	4-1/4	7	0.250	310617
1-1/4	1-1/4	1-1/2	4-1/2	-	310621
1-1/4	1-1/4	1-1/2	4-1/2	0.030	310624
1-1/4	1-1/4	1-1/2	4-1/2	0.060	310628
1-1/4	1-1/4	1-1/2	4-1/2	0.090	310630
1-1/4	1-1/4	1-1/2	4-1/2	0.120	310632
1-1/4	1-1/4	1-1/2	4-1/2	0.250	310636
1-1/4	1-1/4	2	4-1/2	-	310640
1-1/4	1-1/4	2	4-1/2	0.030	310642
1-1/4	1-1/4	2	4-1/2	0.060	310644
1-1/4	1-1/4	2	4-1/2	0.090	310648
1-1/4	1-1/4	2	4-1/2	0.120	310651
1-1/4	1-1/4	2	4-1/2	0.250	310654
1-1/4	1-1/4	2-5/8	6	-	310657
1-1/4	1-1/4	2-5/8	6	0.030	310661
1-1/4	1-1/4	2-5/8	6	0.060	310664
1-1/4	1-1/4	2-5/8	6	0.090	310667
1-1/4	1-1/4	2-5/8	6	0.120	310671
1-1/4	1-1/4	2-5/8	6	0.250	310673
1-1/4	1-1/4	4-1/2	7	-	310676
1-1/4	1-1/4	4-1/2	7	0.030	310680
1-1/4	1-1/4	4-1/2	7	0.060	310683
1-1/4	1-1/4	4-1/2	7	0.090	310687
1-1/4	1-1/4	4-1/2	7	0.120	310690
1-1/4	1-1/4	4-1/2	7	0.250	310693



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2105 438RN | 4FL | Reduced Neck | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	Length Below Shank	EDP
1/8	1/8	5/32	2	-	3/8	310697
1/8	1/8	5/32	2	0.010	3/8	310701
1/8	1/8	5/32	2	0.020	3/8	310704
1/8	1/8	5/32	2	0.030	3/8	310706
1/8	1/8	5/32	2	-	1/2	310709
1/8	1/8	5/32	2	0.010	1/2	310711
1/8	1/8	5/32	2	0.020	1/2	310714
1/8	1/8	5/32	2	0.030	1/2	310717
1/8	1/8	5/32	2	-	3/4	310719
1/8	1/8	5/32	2	0.010	3/4	310722
1/8	1/8	5/32	2	0.020	3/4	310724
1/8	1/8	5/32	2	0.030	3/4	310727
3/16	3/16	7/32	2	-	1/2	310729
3/16	3/16	7/32	2	0.010	1/2	310732
3/16	3/16	7/32	2	0.020	1/2	310735
3/16	3/16	7/32	2	0.030	1/2	310738
3/16	3/16	7/32	2-1/2	-	3/4	310741
3/16	3/16	7/32	2-1/2	0.010	3/4	310745
3/16	3/16	7/32	2-1/2	0.020	3/4	310748
3/16	3/16	7/32	2-1/2	0.030	3/4	310750
3/16	3/16	7/32	2-1/2	-	1-1/8	310754
3/16	3/16	7/32	2-1/2	0.010	1-1/8	310758
3/16	3/16	7/32	2-1/2	0.020	1-1/8	310760
3/16	3/16	7/32	2-1/2	0.030	1-1/8	310762
1/4	1/4	3/8	4	-	3/4	310765
1/4	1/4	3/8	4	0.010	3/4	310767
1/4	1/4	3/8	4	0.020	3/4	310769
1/4	1/4	3/8	4	0.030	3/4	310772
1/4	1/4	3/8	4	0.060	3/4	310776
1/4	1/4	3/8	4	-	1-1/8	310780
1/4	1/4	3/8	4	0.010	1-1/8	310783
1/4	1/4	3/8	4	0.020	1-1/8	310787
1/4	1/4	3/8	4	0.030	1-1/8	310791
1/4	1/4	3/8	4	0.060	1-1/8	310794
1/4	1/4	3/8	4	-	2-1/8	310798
1/4	1/4	3/8	4	0.010	2-1/8	310802
1/4	1/4	3/8	4	0.020	2-1/8	310806
1/4	1/4	3/8	4	0.030	2-1/8	310810
1/4	1/4	3/8	4	0.060	2-1/8	310814
3/8	3/8	1/2	4	-	1-1/8	310817
3/8	3/8	1/2	4	0.020	1-1/8	310819
3/8	3/8	1/2	4	0.030	1-1/8	310821

PYSTL_{series}

More About the Series 2105

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Reduced neck for extended reach



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2105 | 438RN | 4FL | Reduced Neck | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	Length Below Shank	EDP
3/8	3/8	1/2	4	0.060	1-1/8	310823
3/8	3/8	1/2	4	0.090	1-1/8	310825
3/8	3/8	1/2	4	-	2-1/8	310829
3/8	3/8	1/2	4	0.020	2-1/8	310831
3/8	3/8	1/2	4	0.030	2-1/8	310835
3/8	3/8	1/2	4	0.060	2-1/8	310837
3/8	3/8	1/2	4	0.090	2-1/8	310839
3/8	3/8	1/2	6	-	3-1/8	310841
3/8	3/8	1/2	6	0.020	3-1/8	310843
3/8	3/8	1/2	6	0.030	3-1/8	310845
3/8	3/8	1/2	6	0.060	3-1/8	310848
3/8	3/8	1/2	6	0.090	3-1/8	310850
3/8	3/8	1/2	6	-	4-1/8	310853
3/8	3/8	1/2	6	0.020	4-1/8	310857
3/8	3/8	1/2	6	0.030	4-1/8	310860
3/8	3/8	1/2	6	0.060	4-1/8	310863
3/8	3/8	1/2	6	0.090	4-1/8	310866
1/2	1/2	5/8	4	-	1-1/2	310870
1/2	1/2	5/8	4	0.020	1-1/2	310874
1/2	1/2	5/8	4	0.060	1-1/2	310878
1/2	1/2	5/8	4	0.090	1-1/2	310881
1/2	1/2	5/8	4	0.120	1-1/2	310884
1/2	1/2	5/8	4	-	2-1/4	310888
1/2	1/2	5/8	4	0.020	2-1/4	310890
1/2	1/2	5/8	4	0.030	2-1/4	310893
1/2	1/2	5/8	4	0.060	2-1/4	310895
1/2	1/2	5/8	4	0.090	2-1/4	310897
1/2	1/2	5/8	4	0.120	2-1/4	310900
1/2	1/2	5/8	6	-	3-3/8	310903
1/2	1/2	5/8	6	0.020	3-3/8	310906
1/2	1/2	5/8	6	0.030	3-3/8	310910
1/2	1/2	5/8	6	0.060	3-3/8	310912
1/2	1/2	5/8	6	0.090	3-3/8	310915
1/2	1/2	5/8	6	0.120	3-3/8	310917
1/2	1/2	5/8	6	-	4-1/8	310921
1/2	1/2	5/8	6	0.020	4-1/8	310925
1/2	1/2	5/8	6	0.030	4-1/8	310927
1/2	1/2	5/8	6	0.060	4-1/8	310929
1/2	1/2	5/8	6	0.090	4-1/8	310933

PYSTL_{series}

More About the Series 2105

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Reduced neck for extended reach



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2105 | 438RN | 4FL | Reduced Neck | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	Length Below Shank	EDP
5/8	5/8	3/4	4	-	1-5/8	310937
5/8	5/8	3/4	4	0.030	1-5/8	310941
5/8	5/8	3/4	4	0.060	1-5/8	310943
5/8	5/8	3/4	4	0.090	1-5/8	310945
5/8	5/8	3/4	4	0.120	1-5/8	310949
5/8	5/8	3/4	6	-	2-3/8	310951
5/8	5/8	3/4	6	0.030	2-3/8	310955
5/8	5/8	3/4	6	0.060	2-3/8	310957
5/8	5/8	3/4	6	0.090	2-3/8	310961
5/8	5/8	3/4	6	0.120	2-3/8	310964
5/8	5/8	3/4	6	-	3-3/8	310968
5/8	5/8	3/4	6	0.030	3-3/8	310972
5/8	5/8	3/4	6	0.060	3-3/8	310975
5/8	5/8	3/4	6	0.090	3-3/8	310979
5/8	5/8	3/4	6	0.120	3-3/8	310982
5/8	5/8	3/4	6	-	4-1/8	310985
5/8	5/8	3/4	6	0.030	4-1/8	310987
5/8	5/8	3/4	6	0.060	4-1/8	310989
5/8	5/8	3/4	6	0.090	4-1/8	310992
5/8	5/8	3/4	6	0.120	4-1/8	310994
3/4	3/4	1	4	-	2	310997
3/4	3/4	1	4	0.030	2	310999
3/4	3/4	1	4	0.060	2	311002
3/4	3/4	1	4	0.090	2	311006
3/4	3/4	1	4	0.120	2	311010
3/4	3/4	1	4	0.190	2	311013
3/4	3/4	1	4	0.250	2	311016
3/4	3/4	1	6	-	2-1/2	311019
3/4	3/4	1	6	0.030	2-1/2	311023
3/4	3/4	1	6	0.060	2-1/2	311027
3/4	3/4	1	6	0.090	2-1/2	311031
3/4	3/4	1	6	0.120	2-1/2	311034
3/4	3/4	1	6	0.190	2-1/2	311037
3/4	3/4	1	6	0.250	2-1/2	311041
3/4	3/4	1	6	-	3-3/8	311043
3/4	3/4	1	6	0.030	3-3/8	311045
3/4	3/4	1	6	0.060	3-3/8	311049
3/4	3/4	1	6	0.090	3-3/8	311051
3/4	3/4	1	6	0.120	3-3/8	311053
3/4	3/4	1	6	0.190	3-3/8	311056
3/4	3/4	1	6	0.250	3-3/8	311059
3/4	3/4	1	6	-	4-1/8	311063

PYSTL_{series}

More About the Series 2105

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Reduced neck for extended reach



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2105 | 438RN | 4FL | Reduced Neck | Square & Radius | PYSTL

PYSTL_{series}

More About the Series 2105

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Reduced neck for extended reach

Diameter	Shank Dia.	LOC	OAL	Radius	Length Below Shank	EDP
3/4	3/4	1	6	0.030	4-1/8	311067
3/4	3/4	1	6	0.060	4-1/8	311071
3/4	3/4	1	6	0.090	4-1/8	311075
3/4	3/4	1	6	0.120	4-1/8	311077
3/4	3/4	1	6	0.190	4-1/8	311079
3/4	3/4	1	6	0.250	4-1/8	311082
1	1	1-1/4	4	-	2-1/4	311084
1	1	1-1/4	4	0.030	2-1/4	311088
1	1	1-1/4	4	0.060	2-1/4	311090
1	1	1-1/4	4	0.090	2-1/4	311092
1	1	1-1/4	4	0.120	2-1/4	311096
1	1	1-1/4	4	0.190	2-1/4	311099
1	1	1-1/4	4	0.250	2-1/4	311102
1	1	1-1/4	6	-	2-5/8	311104
1	1	1-1/4	6	0.030	2-5/8	311108
1	1	1-1/4	6	0.060	2-5/8	311110
1	1	1-1/4	6	0.090	2-5/8	311114
1	1	1-1/4	6	0.120	2-5/8	311118
1	1	1-1/4	6	0.190	2-5/8	311121
1	1	1-1/4	6	0.250	2-5/8	311124
1	1	1-1/4	6	-	3-3/8	311127
1	1	1-1/4	6	0.030	3-3/8	311131
1	1	1-1/4	6	0.060	3-3/8	311135
1	1	1-1/4	6	0.090	3-3/8	311138
1	1	1-1/4	6	0.120	3-3/8	311142
1	1	1-1/4	6	0.190	3-3/8	311144
1	1	1-1/4	6	0.250	3-3/8	311146
1	1	1-1/4	6	-	4-1/8	311149



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2105 | 438RN | 4FL | Reduced Neck | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	Length Below Shank	EDP
1	1	1-1/4	6	0.030	4-1/8	311152
1	1	1-1/4	6	0.060	4-1/8	311156
1	1	1-1/4	6	0.090	4-1/8	311158
1	1	1-1/4	6	0.120	4-1/8	311160
1	1	1-1/4	6	0.190	4-1/8	311163
1	1	1-1/4	6	0.250	4-1/8	311167

PYSTL_{series}

More About the Series 2105

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Reduced neck for extended reach



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2115 438 | 4FL | Ball Nose | PYSTL

Diameter	Shank Dia.	LOC	OAL	EDP
1/8	1/8	1/4	1-1/2	311169
1/8	1/8	1/2	2	311171
3/16	3/16	5/16	2	311174
3/16	3/16	9/16	2	311176
1/4	1/4	3/8	2	311179
1/4	1/4	1/2	2-1/2	311183
1/4	1/4	3/4	2-1/2	311186
5/16	5/16	7/16	2	311190
5/16	5/16	13/16	2-1/2	311193
3/8	3/8	1/2	2	311197
3/8	3/8	1	2-1/2	311201
1/2	1/2	5/8	2-1/2	311204
1/2	1/2	1	3	311208
1/2	1/2	1-1/4	3	311210
5/8	5/8	1-1/4	3-1/2	311214
5/8	5/8	1-5/8	3-1/2	311216
3/4	3/4	1	3	311219
3/4	3/4	1-5/8	4	311222
1	1	1-1/4	4	311224
1	1	2	4	311226

PYSTL_{series}

More About the Series 2115

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2117 438CB | 4FL | Radius | Chip Breaker | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/8	1/8	1/4	1-1/2	0.010	311228
1/8	1/8	1/2	2	0.010	311231
1/8	1/8	3/4	2-1/2	0.010	311235
3/16	3/16	5/16	2	0.010	311237
3/16	3/16	9/16	2	0.010	311241
3/16	3/16	3/4	2-1/2	0.010	311245
1/4	1/4	3/8	2	0.020	311248
1/4	1/4	1/2	2-1/2	0.020	311250
1/4	1/4	3/4	2-1/2	0.020	311254
1/4	1/4	1	3	0.020	311258
5/16	5/16	7/16	2	0.020	311262
5/16	5/16	13/16	2-1/2	0.020	311265
5/16	5/16	1	3	0.020	311268
3/8	3/8	1/2	2	0.020	311271
3/8	3/8	7/8	2-1/2	0.020	311275
3/8	3/8	1	2-1/2	0.020	311278
3/8	3/8	1-1/4	3	0.020	311280
3/8	3/8	1-1/2	3	0.020	311282
1/2	1/2	5/8	2-1/2	0.030	311284
1/2	1/2	1	3	0.030	311287
1/2	1/2	1-1/4	3	0.030	311290
1/2	1/2	1-5/8	4	0.020	311292
1/2	1/2	1-5/8	4	0.030	311294
1/2	1/2	2	4	0.030	311297
5/8	5/8	3/4	3	0.030	311300
5/8	5/8	1-1/4	3-1/2	0.030	311302
5/8	5/8	1-5/8	3-1/2	0.030	311305
5/8	5/8	2-1/8	4	0.030	311307
5/8	5/8	2-1/2	5	0.030	311310
3/4	3/4	1	3	0.030	311314
3/4	3/4	1-5/8	4	0.030	311317
3/4	3/4	2-1/4	5	0.030	311320
3/4	3/4	2-3/4	5	0.030	311324
3/4	3/4	3-1/4	6	0.030	311327
1	1	1-1/4	4	0.030	311330
1	1	2	4	0.030	311333
1	1	2-5/8	5	0.030	311337
1	1	3-1/4	6	0.030	311340
1	1	4-1/4	7	0.030	311344

PYSTL_{series}

More About the Series 2117

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Roughing nicks along the cutting edge act as chip breakers that produce smaller chips and reduce overall machine load. Ideal for roughing applications.



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



PYSTL_{series}

More About the Series 2205

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Series 2205 | 538 | 5FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/8	1/8	1/4	1-1/2	-	311348
1/8	1/8	1/4	1-1/2	0.010	311351
1/8	1/8	1/4	1-1/2	0.020	311353
1/8	1/8	1/4	1-1/2	0.030	311356
1/8	1/8	1/2	2	-	311358
1/8	1/8	1/2	2	0.010	311360
1/8	1/8	1/2	2	0.020	311362
1/8	1/8	1/2	2	0.030	311364
1/8	1/8	3/4	2-1/2	-	311367
1/8	1/8	3/4	2-1/2	0.010	311369
1/8	1/8	3/4	2-1/2	0.020	311371
3/16	3/16	5/16	2	-	311373
3/16	3/16	5/16	2	0.010	311375
3/16	3/16	5/16	2	0.020	311378
3/16	3/16	9/16	2	-	311381
3/16	3/16	9/16	2	0.010	311384
3/16	3/16	9/16	2	0.020	311388
3/16	3/16	9/16	2	0.030	311392
3/16	3/16	3/4	2-1/2	-	311395
3/16	3/16	3/4	2-1/2	0.010	311398
3/16	3/16	3/4	2-1/2	0.020	311401
3/16	3/16	3/4	2-1/2	0.030	311403
1/4	1/4	3/8	2	-	311405
1/4	1/4	3/8	2	0.010	311408
1/4	1/4	3/8	2	0.020	311410
1/4	1/4	3/8	2	0.030	311413
1/4	1/4	3/8	2	0.060	311417
1/4	1/4	1/2	2-1/2	-	311421
1/4	1/4	1/2	2-1/2	0.010	311423
1/4	1/4	1/2	2-1/2	0.020	311425
1/4	1/4	1/2	2-1/2	0.030	311427
1/4	1/4	1/2	2-1/2	0.060	311430
1/4	1/4	3/4	2-1/2	-	311432
1/4	1/4	3/4	2-1/2	0.010	311434
1/4	1/4	3/4	2-1/2	0.020	311438
1/4	1/4	3/4	2-1/2	0.030	311440
1/4	1/4	3/4	2-1/2	0.060	311444
1/4	1/4	1	3	-	311446
1/4	1/4	1	3	0.010	311448
1/4	1/4	1	3	0.020	311452



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Premium High Performance Carbide End Mills for Ferrous Materials



Series 2205 | 538 | 5FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/4	1/4	1	3	0.030	311454
1/4	1/4	1	3	0.060	311458
1/4	1/4	1-1/4	3	-	311461
1/4	1/4	1-1/4	3	0.010	311464
1/4	1/4	1-1/4	3	0.020	311467
1/4	1/4	1-1/4	3	0.030	311469
1/4	1/4	1-1/4	3	0.060	311473
5/16	5/16	7/16	2	-	311477
5/16	5/16	7/16	2	0.010	311480
5/16	5/16	7/16	2	0.020	311484
5/16	5/16	7/16	2	0.030	311486
5/16	5/16	7/16	2	0.060	311489
5/16	5/16	13/16	2-1/2	-	311491
5/16	5/16	13/16	2-1/2	0.010	311495
5/16	5/16	13/16	2-1/2	0.020	311499
5/16	5/16	13/16	2-1/2	0.030	311501
5/16	5/16	13/16	2-1/2	0.060	311503
5/16	5/16	1	3	-	311505
5/16	5/16	1	3	0.010	311509
5/16	5/16	1	3	0.020	311512
5/16	5/16	1	3	0.030	311514
5/16	5/16	1	3	0.060	311518
3/8	3/8	1/2	2	-	311522
3/8	3/8	1/2	2	0.010	311524
3/8	3/8	1/2	2	0.020	311528
3/8	3/8	1/2	2	0.030	311531
3/8	3/8	1/2	2	0.060	311535
3/8	3/8	1/2	2	0.090	311537
3/8	3/8	1	2-1/2	-	311540
3/8	3/8	1	2-1/2	0.010	311543
3/8	3/8	1	2-1/2	0.020	311547
3/8	3/8	1	2-1/2	0.030	311550
3/8	3/8	1	2-1/2	0.060	311553
3/8	3/8	1	2-1/2	0.090	311556
3/8	3/8	1-1/4	3	-	311558
3/8	3/8	1-1/4	3	0.010	311562
3/8	3/8	1-1/4	3	0.020	311566
3/8	3/8	1-1/4	3	0.030	311568
3/8	3/8	1-1/4	3	0.060	311570
3/8	3/8	1-1/4	3	0.090	311574

PYSTL_{series}

More About the Series 2205

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling



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Series 2205 | 538 | 5FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
3/8	3/8	1-1/2	3	-	311576
3/8	3/8	1-1/2	3	0.010	311578
3/8	3/8	1-1/2	3	0.020	311582
3/8	3/8	1-1/2	3	0.030	311586
3/8	3/8	1-1/2	3	0.060	311588
3/8	3/8	1-1/2	3	0.090	311590
1/2	1/2	5/8	2-1/2	-	311594
1/2	1/2	5/8	2-1/2	0.020	311597
1/2	1/2	5/8	2-1/2	0.030	311601
1/2	1/2	5/8	2-1/2	0.060	311604
1/2	1/2	5/8	2-1/2	0.090	311606
1/2	1/2	5/8	2-1/2	0.120	311610
1/2	1/2	1	3	-	311613
1/2	1/2	1	3	0.020	311615
1/2	1/2	1	3	0.030	311619
1/2	1/2	1	3	0.060	311622
1/2	1/2	1	3	0.090	311626
1/2	1/2	1	3	0.120	311630
1/2	1/2	1-1/4	3	-	311634
1/2	1/2	1-1/4	3	0.020	311637
1/2	1/2	1-1/4	3	0.030	311640
1/2	1/2	1-1/4	3	0.060	311642
1/2	1/2	1-1/4	3	0.090	311644
1/2	1/2	1-1/4	3	0.120	311648
1/2	1/2	1-5/8	4	-	311652
1/2	1/2	1-5/8	4	0.020	311654
1/2	1/2	1-5/8	4	0.030	311658
1/2	1/2	1-5/8	4	0.060	311660
1/2	1/2	1-5/8	4	0.090	311664
1/2	1/2	1-5/8	4	0.120	311666
1/2	1/2	2	4	-	311670
1/2	1/2	2	4	0.020	311674
1/2	1/2	2	4	0.030	311678
1/2	1/2	2	4	0.060	311681
1/2	1/2	2	4	0.090	311683
1/2	1/2	2	4	0.120	311687
5/8	5/8	3/4	3	-	311691
5/8	5/8	3/4	3	0.030	311695
5/8	5/8	3/4	3	0.060	311699
5/8	5/8	3/4	3	0.090	311703



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Premium High Performance Carbide End Mills for Ferrous Materials



Series 2205 538 | 5FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
5/8	5/8	3/4	3	0.120	311705
5/8	5/8	1-1/4	3-1/2	-	311708
5/8	5/8	1-1/4	3-1/2	0.030	311712
5/8	5/8	1-1/4	3-1/2	0.060	311715
5/8	5/8	1-1/4	3-1/2	0.090	311719
5/8	5/8	1-1/4	3-1/2	0.120	311723
5/8	5/8	1-5/8	3-1/2	-	311725
5/8	5/8	1-5/8	3-1/2	0.030	311727
5/8	5/8	1-5/8	3-1/2	0.060	311730
5/8	5/8	1-5/8	3-1/2	0.090	311734
5/8	5/8	1-5/8	3-1/2	0.120	311737
5/8	5/8	2-1/8	4	-	311741
5/8	5/8	2-1/8	4	0.030	311743
5/8	5/8	2-1/8	4	0.060	311745
5/8	5/8	2-1/8	4	0.090	311748
5/8	5/8	2-1/8	4	0.120	311750
5/8	5/8	2-1/2	5	-	311754
5/8	5/8	2-1/2	5	0.030	311756
5/8	5/8	2-1/2	5	0.060	311759
5/8	5/8	2-1/2	5	0.090	311761
5/8	5/8	2-1/2	5	0.120	311764
3/4	3/4	1	3	-	311767
3/4	3/4	1	3	0.030	311771
3/4	3/4	1	3	0.060	311773
3/4	3/4	1	3	0.090	311776
3/4	3/4	1	3	0.120	311778
3/4	3/4	1	3	0.250	311780
3/4	3/4	1-5/8	4	-	311782
3/4	3/4	1-5/8	4	0.030	311785
3/4	3/4	1-5/8	4	0.060	311787
3/4	3/4	1-5/8	4	0.090	311789
3/4	3/4	1-5/8	4	0.120	311793
3/4	3/4	1-5/8	4	0.250	311796
3/4	3/4	2-1/4	5	-	311800
3/4	3/4	2-1/4	5	0.030	311804
3/4	3/4	2-1/4	5	0.060	311808
3/4	3/4	2-1/4	5	0.090	311810
3/4	3/4	2-1/4	5	0.120	311812
3/4	3/4	2-1/4	5	0.250	311814
3/4	3/4	2-3/4	5	-	311818

PYSTL_{series}

More About the Series 2205

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Series 2205 538 | 5FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
3/4	3/4	2-3/4	5	0.030	311820
3/4	3/4	2-3/4	5	0.060	311824
3/4	3/4	2-3/4	5	0.090	311826
3/4	3/4	2-3/4	5	0.120	311828
3/4	3/4	2-3/4	5	0.250	311831
3/4	3/4	3-1/4	6	-	311833
3/4	3/4	3-1/4	6	0.030	311837
3/4	3/4	3-1/4	6	0.060	311839
3/4	3/4	3-1/4	6	0.090	311842
3/4	3/4	3-1/4	6	0.120	311846
3/4	3/4	3-1/4	6	0.250	311848
1	1	1-1/4	4	-	311852
1	1	1-1/4	4	0.030	311855
1	1	1-1/4	4	0.060	311857
1	1	1-1/4	4	0.090	311860
1	1	1-1/4	4	0.120	311864
1	1	1-1/4	4	0.250	311868
1	1	2	4	-	311872
1	1	2	4	0.030	311876
1	1	2	4	0.060	311878
1	1	2	4	0.090	311881
1	1	2	4	0.120	311884
1	1	2	4	0.250	311888
1	1	2-5/8	5	-	311890
1	1	2-5/8	5	0.030	311893
1	1	2-5/8	5	0.060	311896
1	1	2-5/8	5	0.090	311900
1	1	2-5/8	5	0.120	311902
1	1	2-5/8	5	0.250	311905
1	1	3-1/4	6	-	311909
1	1	3-1/4	6	0.030	311913
1	1	3-1/4	6	0.060	311915
1	1	3-1/4	6	0.090	311918
1	1	3-1/4	6	0.120	311920
1	1	3-1/4	6	0.250	311924
1	1	4-1/4	7	-	311927
1	1	4-1/4	7	0.030	311931
1	1	4-1/4	7	0.060	311933
1	1	4-1/4	7	0.090	311935
1	1	4-1/4	7	0.120	311937



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Premium High Performance Carbide End Mills for Ferrous Materials



Series 2205 538 | 5FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1	1	4-1/4	7	0.250	311940
1-1/4	1-1/4	1-1/2	4-1/2	-	311943
1-1/4	1-1/4	1-1/2	4-1/2	0.030	311947
1-1/4	1-1/4	1-1/2	4-1/2	0.060	311949
1-1/4	1-1/4	1-1/2	4-1/2	0.090	311951
1-1/4	1-1/4	1-1/2	4-1/2	0.120	311955
1-1/4	1-1/4	1-1/2	4-1/2	0.250	311957
1-1/4	1-1/4	2	4-1/2	-	311961
1-1/4	1-1/4	2	4-1/2	0.030	311964
1-1/4	1-1/4	2	4-1/2	0.060	311966
1-1/4	1-1/4	2	4-1/2	0.090	311968
1-1/4	1-1/4	2	4-1/2	0.120	311971
1-1/4	1-1/4	2	4-1/2	0.250	311975
1-1/4	1-1/4	2-5/8	6	-	311977
1-1/4	1-1/4	2-5/8	6	0.030	311979
1-1/4	1-1/4	2-5/8	6	0.060	311983
1-1/4	1-1/4	2-5/8	6	0.090	311985
1-1/4	1-1/4	2-5/8	6	0.120	311987
1-1/4	1-1/4	2-5/8	6	0.250	311991
1-1/4	1-1/4	4-1/2	7	-	311993
1-1/4	1-1/4	4-1/2	7	0.030	311995
1-1/4	1-1/4	4-1/2	7	0.060	311998
1-1/4	1-1/4	4-1/2	7	0.090	312001
1-1/4	1-1/4	4-1/2	7	0.120	312003
1-1/4	1-1/4	4-1/2	7	0.250	312005

PYSTL_{series}

More About the Series 2205

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Premium High Performance Carbide End Mills for Ferrous Materials



PYSTL_{series}

More About the Series 2213

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Reduced neck for extended reach

Series 2213 538RN | 5FL | Reduced Neck | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	Length Below Shank	EDP
1/8	1/8	5/32	2	0.020	3/8	312009
1/8	1/8	5/32	2	0.030	3/8	312011
1/8	1/8	5/32	2	-	1/2	312013
1/8	1/8	5/32	2	0.010	1/2	312015
1/8	1/8	5/32	2	0.020	1/2	312018
1/8	1/8	5/32	2	0.030	1/2	312022
1/8	1/8	5/32	2	-	3/4	312025
1/8	1/8	5/32	2	0.010	3/4	312029
1/8	1/8	5/32	2	0.020	3/4	312033
1/8	1/8	5/32	2	0.030	3/4	312036
3/16	3/16	7/32	2	-	1/2	312038
3/16	3/16	7/32	2	0.010	1/2	312041
3/16	3/16	7/32	2	0.020	1/2	312044
3/16	3/16	7/32	2	0.030	1/2	312046
3/16	3/16	7/32	2-1/2	-	3/4	312050
3/16	3/16	7/32	2-1/2	0.010	3/4	312053
3/16	3/16	7/32	2-1/2	0.020	3/4	312056
3/16	3/16	7/32	2-1/2	0.030	3/4	312060
3/16	3/16	7/32	2-1/2	-	1-1/8	312064
3/16	3/16	7/32	2-1/2	0.010	1-1/8	312066
3/16	3/16	7/32	2-1/2	0.020	1-1/8	312068
3/16	3/16	7/32	2-1/2	0.030	1-1/8	312071
1/4	1/4	3/8	4	-	3/4	312073
1/4	1/4	3/8	4	0.010	3/4	312075
1/4	1/4	3/8	4	0.020	3/4	312079
1/4	1/4	3/8	4	0.030	3/4	312082
1/4	1/4	3/8	4	0.060	3/4	312086
1/4	1/4	3/8	4	-	1-1/8	312090
1/4	1/4	3/8	4	0.010	1-1/8	312093
1/4	1/4	3/8	4	0.020	1-1/8	312096
1/4	1/4	3/8	4	0.030	1-1/8	312099
1/4	1/4	3/8	4	0.060	1-1/8	312103
1/4	1/4	3/8	4	-	2-1/8	312106
1/4	1/4	3/8	4	0.010	2-1/8	312109
1/4	1/4	3/8	4	0.020	2-1/8	312113
1/4	1/4	3/8	4	0.030	2-1/8	312116
1/4	1/4	3/8	4	0.060	2-1/8	312118
3/8	3/8	1/2	4	-	1-1/8	312122
3/8	3/8	1/2	4	0.020	1-1/8	312126



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Premium High Performance Carbide End Mills for Ferrous Materials



Series 2213 | 538RN | 5FL | Reduced Neck | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	Length Below Shank	EDP
3/8	3/8	1/2	4	0.030	1-1/8	312130
3/8	3/8	1/2	4	0.060	1-1/8	312134
3/8	3/8	1/2	4	0.090	1-1/8	312137
3/8	3/8	1/2	4	-	2-1/8	312140
3/8	3/8	1/2	4	0.020	2-1/8	312143
3/8	3/8	1/2	4	0.030	2-1/8	312145
3/8	3/8	1/2	4	0.060	2-1/8	312149
3/8	3/8	1/2	4	0.090	2-1/8	312153
3/8	3/8	1/2	6	-	3-1/8	312155
3/8	3/8	1/2	6	0.020	3-1/8	312157
3/8	3/8	1/2	6	0.030	3-1/8	312159
3/8	3/8	1/2	6	0.060	3-1/8	312161
3/8	3/8	1/2	6	0.090	3-1/8	312164
3/8	3/8	1/2	6	-	4-1/8	312168
3/8	3/8	1/2	6	0.020	4-1/8	312171
3/8	3/8	1/2	6	0.030	4-1/8	312174
3/8	3/8	1/2	6	0.060	4-1/8	312176
3/8	3/8	1/2	6	0.090	4-1/8	312180
1/2	1/2	5/8	4	-	1-1/2	312182
1/2	1/2	5/8	4	0.020	1-1/2	312184
1/2	1/2	5/8	4	0.060	1-1/2	312187
1/2	1/2	5/8	4	0.090	1-1/2	312190
1/2	1/2	5/8	4	0.120	1-1/2	312193
1/2	1/2	5/8	4	-	2-1/4	312197
1/2	1/2	5/8	4	0.020	2-1/4	312199
1/2	1/2	5/8	4	0.030	2-1/4	312203
1/2	1/2	5/8	4	0.060	2-1/4	312207
1/2	1/2	5/8	4	0.090	2-1/4	312209
1/2	1/2	5/8	4	0.120	2-1/4	312212
1/2	1/2	5/8	6	-	3-3/8	312214
1/2	1/2	5/8	6	0.020	3-3/8	312217
1/2	1/2	5/8	6	0.030	3-3/8	312220
1/2	1/2	5/8	6	0.060	3-3/8	312222
1/2	1/2	5/8	6	0.090	3-3/8	312226
1/2	1/2	5/8	6	0.120	3-3/8	312228
1/2	1/2	5/8	6	-	4-1/8	312230
1/2	1/2	5/8	6	0.020	4-1/8	312233
1/2	1/2	5/8	6	0.030	4-1/8	312237
1/2	1/2	5/8	6	0.060	4-1/8	312241
1/2	1/2	5/8	6	0.090	4-1/8	312244
1/2	1/2	5/8	6	0.120	4-1/8	312248
5/8	5/8	3/4	4	-	1-5/8	312251

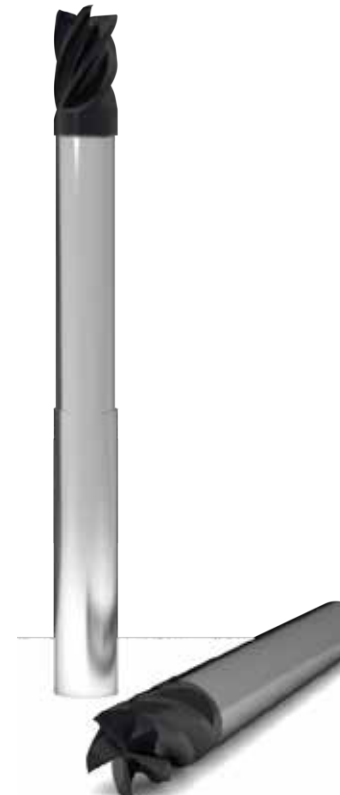
PYSTL_{series}

More About the Series 2213

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Reduced neck for extended reach



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



PYSTL_{series}

More About the Series 2213

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

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Reduced neck for extended reach

Series 2213 | 538RN | 5FL | Reduced Neck | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	Length Below Shank	EDP
5/8	5/8	3/4	4	0.030	1-5/8	312253
5/8	5/8	3/4	4	0.060	1-5/8	312256
5/8	5/8	3/4	4	0.090	1-5/8	312259
5/8	5/8	3/4	4	0.120	1-5/8	312261
5/8	5/8	3/4	6	-	2-3/8	312263
5/8	5/8	3/4	6	0.030	2-3/8	312267
5/8	5/8	3/4	6	0.060	2-3/8	312270
5/8	5/8	3/4	6	0.090	2-3/8	312273
5/8	5/8	3/4	6	0.120	2-3/8	312275
5/8	5/8	3/4	6	-	3-3/8	312277
5/8	5/8	3/4	6	0.030	3-3/8	312279
5/8	5/8	3/4	6	0.060	3-3/8	312282
5/8	5/8	3/4	6	0.090	3-3/8	312286
5/8	5/8	3/4	6	0.120	3-3/8	312290
5/8	5/8	3/4	6	-	4-1/8	312293
5/8	5/8	3/4	6	0.030	4-1/8	312297
5/8	5/8	3/4	6	0.060	4-1/8	312300
5/8	5/8	3/4	6	0.090	4-1/8	312302
5/8	5/8	3/4	6	0.120	4-1/8	312306
3/4	3/4	1	4	-	2	312309
3/4	3/4	1	4	0.030	2	312312
3/4	3/4	1	4	0.060	2	312314
3/4	3/4	1	4	0.090	2	312318
3/4	3/4	1	4	0.120	2	312322
3/4	3/4	1	4	0.190	2	312325
3/4	3/4	1	4	0.250	2	312329
3/4	3/4	1	6	-	2-1/2	312333
3/4	3/4	1	6	0.030	2-1/2	312335
3/4	3/4	1	6	0.060	2-1/2	312338
3/4	3/4	1	6	0.090	2-1/2	312340
3/4	3/4	1	6	0.120	2-1/2	312342
3/4	3/4	1	6	0.190	2-1/2	312345
3/4	3/4	1	6	0.250	2-1/2	312349
3/4	3/4	1	6	-	3-3/8	312353
3/4	3/4	1	6	0.030	3-3/8	312357
3/4	3/4	1	6	0.060	3-3/8	312360
3/4	3/4	1	6	0.090	3-3/8	312364
3/4	3/4	1	6	0.120	3-3/8	312366
3/4	3/4	1	6	0.190	3-3/8	312370



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2213 538RN | 5FL | Reduced Neck | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	Length Below Shank	EDP
3/4	3/4	1	6	-	4-1/8	312374
3/4	3/4	1	6	0.030	4-1/8	312378
3/4	3/4	1	6	0.060	4-1/8	312381
3/4	3/4	1	6	0.090	4-1/8	312385
3/4	3/4	1	6	0.120	4-1/8	312388
3/4	3/4	1	6	0.190	4-1/8	312391
3/4	3/4	1	6	0.250	4-1/8	312394
1	1	1-1/4	4	-	2-1/4	312398
1	1	1-1/4	4	0.030	2-1/4	312401
1	1	1-1/4	4	0.060	2-1/4	312404
1	1	1-1/4	4	0.090	2-1/4	312408
1	1	1-1/4	4	0.120	2-1/4	312411
1	1	1-1/4	4	0.190	2-1/4	312415
1	1	1-1/4	4	0.250	2-1/4	312417
1	1	1-1/4	6	-	2-5/8	312419
1	1	1-1/4	6	0.030	2-5/8	312423
1	1	1-1/4	6	0.060	2-5/8	312425
1	1	1-1/4	6	0.090	2-5/8	312428
1	1	1-1/4	6	0.120	2-5/8	312432
1	1	1-1/4	6	0.190	2-5/8	312436
1	1	1-1/4	6	0.250	2-5/8	312438
1	1	1-1/4	6	-	3-3/8	312441
1	1	1-1/4	6	0.030	3-3/8	312444
1	1	1-1/4	6	0.060	3-3/8	312448
1	1	1-1/4	6	0.090	3-3/8	312451
1	1	1-1/4	6	0.120	3-3/8	312455
1	1	1-1/4	6	0.190	3-3/8	312458
1	1	1-1/4	6	0.250	3-3/8	312461
1	1	1-1/4	6	-	4-1/8	312463
1	1	1-1/4	6	0.030	4-1/8	312467
1	1	1-1/4	6	0.060	4-1/8	312470
1	1	1-1/4	6	0.090	4-1/8	312474
1	1	1-1/4	6	0.120	4-1/8	312477
1	1	1-1/4	6	0.190	4-1/8	312480
1	1	1-1/4	6	0.250	4-1/8	312484
1-1/4	1-1/4	1-1/2	5	-	2-1/4	312487
1-1/4	1-1/4	1-1/2	5	0.030	2-1/4	312490
1-1/4	1-1/4	1-1/2	5	0.060	2-1/4	312493
1-1/4	1-1/4	1-1/2	5	0.090	2-1/4	312495
1-1/4	1-1/4	1-1/2	5	0.120	2-1/4	312499
1-1/4	1-1/4	1-1/2	5	0.190	2-1/4	312501
1-1/4	1-1/4	1-1/2	5	0.250	2-1/4	312505

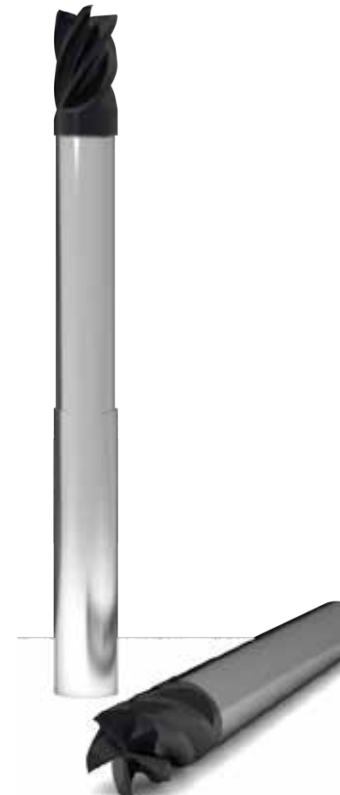
PYSTL_{series}

More About the Series 2213

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling

Reduced neck for extended reach



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



PYSTL_{series}

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Reduced neck for extended reach

Series 2213 538RN | 5FL | Reduced Neck | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	Length Below Shank	EDP
1-1/4	1-1/4	1-1/2	6	-	2-5/8	312507
1-1/4	1-1/4	1-1/2	6	0.030	2-5/8	312510
1-1/4	1-1/4	1-1/2	6	0.060	2-5/8	312514
1-1/4	1-1/4	1-1/2	6	0.090	2-5/8	312517
1-1/4	1-1/4	1-1/2	6	0.120	2-5/8	312521
1-1/4	1-1/4	1-1/2	6	0.190	2-5/8	312525
1-1/4	1-1/4	1-1/2	6	0.250	2-5/8	312528
1-1/4	1-1/4	1-1/2	6	-	3-3/8	312532
1-1/4	1-1/4	1-1/2	6	0.030	3-3/8	312536
1-1/4	1-1/4	1-1/2	6	0.060	3-3/8	312540
1-1/4	1-1/4	1-1/2	6	0.090	3-3/8	312544
1-1/4	1-1/4	1-1/2	6	0.120	3-3/8	312547
1-1/4	1-1/4	1-1/2	6	0.190	3-3/8	312549
1-1/4	1-1/4	1-1/2	6	0.250	3-3/8	312551
1-1/4	1-1/4	1-1/2	6	-	4-1/8	312553
1-1/4	1-1/4	1-1/2	6	0.030	4-1/8	312556
1-1/4	1-1/4	1-1/2	6	0.060	4-1/8	312558
1-1/4	1-1/4	1-1/2	6	0.090	4-1/8	312560
1-1/4	1-1/4	1-1/2	6	0.120	4-1/8	312564
1-1/4	1-1/4	1-1/2	6	0.190	4-1/8	312568
1-1/4	1-1/4	1-1/2	6	0.250	4-1/8	312571



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2215 | 738 | 7FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
3/8	3/8	1/2	2	-	312575
3/8	3/8	1/2	2	0.030	312577
3/8	3/8	1/2	2	0.060	312581
3/8	3/8	1	2-1/2	-	312585
3/8	3/8	1	2-1/2	0.030	312589
3/8	3/8	1	2-1/2	0.060	312591
3/8	3/8	1-1/4	3	-	312595
3/8	3/8	1-1/4	3	0.030	312597
3/8	3/8	1-1/4	3	0.060	312599
3/8	3/8	1-1/2	4	-	312603
3/8	3/8	1-1/2	4	0.030	312606
3/8	3/8	1-1/2	4	0.060	312608
3/8	3/8	2-1/2	6	-	312610
3/8	3/8	2-1/2	6	0.030	312612
3/8	3/8	2-1/2	6	0.060	312614
1/2	1/2	3/4	2-1/2	-	312616
1/2	1/2	3/4	2-1/2	0.030	312620
1/2	1/2	3/4	2-1/2	0.060	312624
1/2	1/2	3/4	2-1/2	0.090	312628
1/2	1/2	1-1/4	3	-	312632
1/2	1/2	1-1/4	3	0.030	312636
1/2	1/2	1-1/4	3	0.060	312638
1/2	1/2	1-1/4	3	0.090	312642
1/2	1/2	2	4	-	312645
1/2	1/2	2	4	0.030	312649
1/2	1/2	2	4	0.060	312652
1/2	1/2	2	4	0.090	312654
1/2	1/2	3-1/4	6	-	312657
1/2	1/2	3-1/4	6	0.030	312659
1/2	1/2	3-1/4	6	0.060	312662
1/2	1/2	3-1/4	6	0.090	312664
5/8	5/8	3/4	3	-	312666
5/8	5/8	3/4	3	0.030	312669
5/8	5/8	3/4	3	0.060	312672
5/8	5/8	3/4	3	0.090	312674
5/8	5/8	3/4	3	0.120	312676
5/8	5/8	1-5/8	3-1/2	-	312679
5/8	5/8	1-5/8	3-1/2	0.030	312681
5/8	5/8	1-5/8	3-1/2	0.060	312684
5/8	5/8	1-5/8	3-1/2	0.090	312688

PYSTL_{series}

More About the Series 2215

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a 38 degree helix that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



PYSTL_{series}

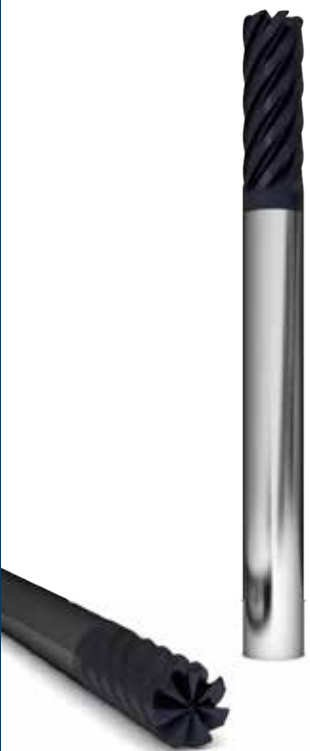
More About the Series 2215

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Series 2215 738 | 7FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
5/8	5/8	1-5/8	3-1/2	0.120	312692
5/8	5/8	2	5	-	312695
5/8	5/8	2	5	0.030	312697
5/8	5/8	2	5	0.060	312699
5/8	5/8	2	5	0.090	312701
5/8	5/8	2	5	0.120	312705
5/8	5/8	3-1/4	6	-	312708
5/8	5/8	3-1/4	6	0.030	312710
5/8	5/8	3-1/4	6	0.060	312714
5/8	5/8	3-1/4	6	0.090	312718
5/8	5/8	3-1/4	6	0.120	312720
3/4	3/4	1	3	-	312724
3/4	3/4	1	3	0.030	312726
3/4	3/4	1	3	0.060	312728
3/4	3/4	1	3	0.090	312730
3/4	3/4	1	3	0.120	312732
3/4	3/4	1-5/8	4	-	312736
3/4	3/4	1-5/8	4	0.030	312739
3/4	3/4	1-5/8	4	0.060	312742
3/4	3/4	1-5/8	4	0.090	312744
3/4	3/4	1-5/8	4	0.120	312746
3/4	3/4	2-1/4	5	-	312749
3/4	3/4	2-1/4	5	0.030	312753
3/4	3/4	2-1/4	5	0.060	312757
3/4	3/4	2-1/4	5	0.090	312759
3/4	3/4	2-1/4	5	0.120	312761
3/4	3/4	3-1/4	6	-	312764
3/4	3/4	3-1/4	6	0.030	312766
3/4	3/4	3-1/4	6	0.060	312770
3/4	3/4	3-1/4	6	0.090	312773
3/4	3/4	3-1/4	6	0.120	312777
1	1	1-1/4	4	-	312781
1	1	1-1/4	4	0.030	312783
1	1	1-1/4	4	0.060	312787
1	1	1-1/4	4	0.090	312791
1	1	1-1/4	4	0.120	312793
1	1	2	5	-	312795
1	1	2	5	0.030	312798
1	1	2	5	0.060	312800
1	1	2	5	0.090	312802



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ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials



Series 2215 | 738 | 7FL | Square & Radius | PYSTL

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1	1	2	5	0.120	312804
1	1	3-1/4	6	-	312807
1	1	3-1/4	6	0.030	312809
1	1	3-1/4	6	0.060	312811
1	1	3-1/4	6	0.090	312815
1	1	3-1/4	6	0.120	312818
1	1	4-1/8	7	-	312821
1	1	4-1/8	7	0.030	312824
1	1	4-1/8	7	0.060	312828
1	1	4-1/8	7	0.090	312830
1	1	4-1/8	7	0.120	312834
1-1/4	1-1/4	2	4-1/2	-	312836
1-1/4	1-1/4	2	4-1/2	0.030	312839
1-1/4	1-1/4	2	4-1/2	0.060	312842
1-1/4	1-1/4	2	4-1/2	0.090	312846
1-1/4	1-1/4	2	4-1/2	0.120	312848
1-1/4	1-1/4	2-5/8	6	-	312851
1-1/4	1-1/4	2-5/8	6	0.030	312855
1-1/4	1-1/4	2-5/8	6	0.060	312858
1-1/4	1-1/4	2-5/8	6	0.090	312861
1-1/4	1-1/4	2-5/8	6	0.120	312863
1-1/4	1-1/4	3-1/4	6	-	312867
1-1/4	1-1/4	3-1/4	6	0.030	312869
1-1/4	1-1/4	3-1/4	6	0.060	312871
1-1/4	1-1/4	3-1/4	6	0.090	312874
1-1/4	1-1/4	3-1/4	6	0.120	312877
1-1/4	1-1/4	5	7-1/2	-	312880
1-1/4	1-1/4	5	7-1/2	0.030	312884
1-1/4	1-1/4	5	7-1/2	0.060	312887
1-1/4	1-1/4	5	7-1/2	0.090	312889
1-1/4	1-1/4	5	7-1/2	0.120	312893

PYSTL_{series}

More About the Series 2215

Special edge preparation makes this an ideal tool for a broad spectrum of work materials

PYSTL features a 38 degree helix that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

PERFORMANCE

When versatility and utility are a necessity, look to GWS Performance series cutting tools. The capability you need for everyday applications.

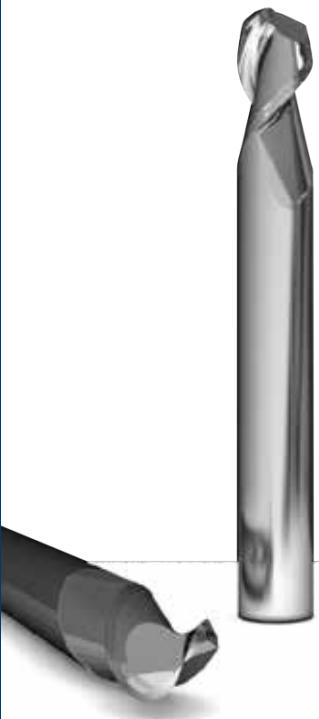
PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2010 250 | 2FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	ZrN EDP
1/8	1/8	1/4	1-1/2	-	312896	312900
1/8	1/8	1/4	1-1/2	0.010	-	312902
1/8	1/8	5/16	1-1/2	-	312904	312908
1/8	1/8	3/8	1-1/2	-	312911	312924
1/8	1/8	3/8	1-1/2	0.010	-	312915
1/8	1/8	3/8	1-1/2	0.020	-	312918
1/8	1/8	3/8	1-1/2	0.030	-	312922
1/8	1/8	1/2	2	-	312926	312928
1/8	1/8	5/8	2	-	312930	312934
1/8	1/8	3/4	2	-	312937	312939
1/8	1/8	1	2-1/2	-	312942	312944
5/32	3/16	5/16	2	-	312946	312948
5/32	3/16	9/16	2	-	312952	312955
3/16	3/16	5/16	2	-	312958	312960
3/16	3/16	5/16	2	0.020	-	312964
3/16	3/16	5/16	3	-	-	312966
3/16	3/16	3/8	2	-	312970	312973
3/16	3/16	5/8	2-1/2	-	312976	312979
3/16	3/16	5/8	2-1/2	0.010	-	312981
3/16	3/16	5/8	2-1/2	0.020	-	312984
3/16	3/16	5/8	2-1/2	0.030	-	312986
3/16	3/16	3/4	2-1/2	-	312988	312990
3/16	3/16	1	2-1/2	-	312993	312995
7/32	1/4	3/8	2-1/2	-	312997	313000
7/32	1/4	3/4	2-1/2	-	313002	313006
1/4	1/4	3/8	2-1/2	-	313010	313013
1/4	1/4	3/8	2-1/2	0.015	-	313015
1/4	1/4	3/8	2-1/2	0.020	-	313017
1/4	1/4	3/8	2-1/2	0.030	-	313021
1/4	1/4	3/8	2-1/2	0.060	-	313024
1/4	1/4	1/2	2-1/2	-	313028	313031
1/4	1/4	5/8	2-1/2	-	313033	313035
1/4	1/4	3/4	2-1/2	-	313037	313039
1/4	1/4	3/4	2-1/2	0.010	-	313042
1/4	1/4	3/4	2-1/2	0.015	-	313044
1/4	1/4	3/4	2-1/2	0.020	-	313047
1/4	1/4	3/4	2-1/2	0.030	-	313049
1/4	1/4	3/4	2-1/2	0.045	-	313052
1/4	1/4	3/4	2-1/2	0.060	-	313054
1/4	1/4	1	2-1/2	-	313056	313060



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2010 250 | 2FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	ZrN EDP
1/4	1/4	1-1/8	2-1/2	-	313063	313067
1/4	1/4	1-1/4	3	-	313070	313072
1/4	1/4	1-1/2	3	-	313074	313077
1/4	1/4	2	4	-	313079	313083
9/32	5/16	7/16	2-1/2	-	313087	313089
9/32	5/16	13/16	2-1/2	-	313091	313094
5/16	5/16	7/16	2-1/2	-	313096	313098
5/16	5/16	7/16	2-1/2	0.020	-	313100
5/16	5/16	7/16	2-1/2	0.030	-	313102
5/16	5/16	1/2	2-1/2	-	313104	313108
5/16	5/16	13/16	2-1/2	-	313111	313114
5/16	5/16	13/16	2-1/2	0.020	-	313117
5/16	5/16	13/16	2-1/2	0.030	-	313120
5/16	5/16	13/16	2-1/2	0.060	-	313122
5/16	5/16	1-1/8	2-1/2	-	313124	313127
5/16	5/16	1-1/4	3-1/2	-	313129	313133
5/16	5/16	1-1/2	3-1/2	-	313136	313140
5/16	5/16	2-1/8	4	-	313144	313148
11/32	3/8	1/2	2-1/2	-	313150	313153
11/32	3/8	1	2-1/2	-	313157	313159
3/8	3/8	1/2	2-1/2	-	313162	313164
3/8	3/8	1/2	2-1/2	0.020	-	313166
3/8	3/8	1/2	2-1/2	0.030	-	313169
3/8	3/8	1/2	2-1/2	0.040	-	313172
3/8	3/8	5/8	2-1/2	-	313175	313177
3/8	3/8	3/4	2-1/2	-	313181	313183
3/8	3/8	1	2-1/2	-	313187	313189
3/8	3/8	1	2-1/2	0.020	-	313192
3/8	3/8	1	2-1/2	0.030	-	313194
3/8	3/8	1	2-1/2	0.045	-	313198
3/8	3/8	1	2-1/2	0.060	-	313201
3/8	3/8	1-1/4	3	-	313203	313207
3/8	3/8	1-1/2	4	-	313209	313212
3/8	3/8	2	4	-	313215	313218
3/8	3/8	2-1/2	6	-	313222	313225
13/32	7/16	9/16	2-3/4	-	313229	313231
13/32	7/16	1	2-3/4	-	313234	313238
7/16	7/16	9/16	2-3/4	-	313241	313244
7/16	7/16	1	2-3/4	-	313246	313249
7/16	7/16	2	4	-	313252	313254



★ Best ☆ Good



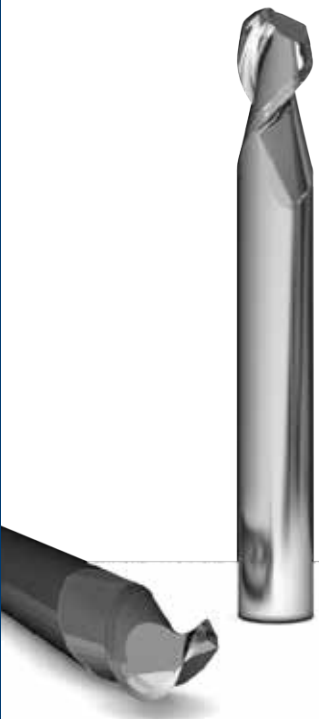
PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2010 250 | 2FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	ZrN EDP
15/32	1/2	5/8	3	-	313257	313260
15/32	1/2	1-1/4	3	-	313264	313266
1/2	1/2	5/8	3	-	313270	313274
1/2	1/2	5/8	3	0.015	-	313276
1/2	1/2	5/8	3	0.020	-	313278
1/2	1/2	5/8	3	0.030	-	313281
1/2	1/2	5/8	3	0.060	-	313284
1/2	1/2	5/8	3	0.090	-	313288
1/2	1/2	3/4	3	-	313291	313293
1/2	1/2	1	3	-	313297	313300
1/2	1/2	1-1/4	3	-	313302	313304
1/2	1/2	1-1/4	3	0.015	-	313307
1/2	1/2	1-1/4	3	0.020	-	313311
1/2	1/2	1-1/4	3	0.030	-	313315
1/2	1/2	1-1/4	3	0.060	-	313317
1/2	1/2	1-1/4	3	0.090	-	313321
1/2	1/2	1-1/4	3	0.120	-	313325
1/2	1/2	1-1/2	4	-	313329	313331
1/2	1/2	2	4	-	313333	313337
1/2	1/2	2-1/4	6	-	313339	313341
1/2	1/2	2-1/2	6	-	313344	313346
1/2	1/2	3-1/4	6	-	313348	313350
1/2	1/2	4	8	-	313353	313356
5/8	5/8	3/4	3-1/2	-	313358	313362
5/8	5/8	1-1/4	3-1/2	-	313366	313370
5/8	5/8	1-5/8	3-1/2	-	313372	313374
5/8	5/8	1-5/8	3-1/2	0.030	-	313378
5/8	5/8	1-5/8	3-1/2	0.060	-	313381
5/8	5/8	1-5/8	3-1/2	0.090	-	313383
5/8	5/8	1-5/8	3-1/2	0.120	-	313385
5/8	5/8	2	5	-	313389	313392
5/8	5/8	2-1/2	5	-	313395	313397
5/8	5/8	2-3/4	5	-	313399	313401
5/8	5/8	3-1/4	6	-	313403	313406
5/8	5/8	4	8	-	313410	313414
3/4	3/4	1	4	-	313418	313422
3/4	3/4	1	4	0.060	-	313424
3/4	3/4	1	4	0.090	-	313427
3/4	3/4	1	4	0.120	-	313429
3/4	3/4	1-1/2	4	-	313431	313435



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2010 | 250 | 2FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	ZrN EDP
3/4	3/4	1-5/8	4	-	313439	313443
3/4	3/4	1-5/8	4	0.060	-	313447
3/4	3/4	1-5/8	4	0.090	-	313450
3/4	3/4	1-5/8	4	0.120	-	313453
3/4	3/4	2	5	-	313456	313458
3/4	3/4	2-1/4	5	-	313461	313463
3/4	3/4	2-1/2	5	-	313465	313469
3/4	3/4	3	6	-	313473	313477
3/4	3/4	3-1/4	6	-	313479	313483
3/4	3/4	3-1/2	6	-	313487	313489
3/4	3/4	4	7	-	313492	313496
3/4	3/4	5	8	-	313499	313502
1	1	1-1/4	5	-	313506	313509
1	1	1-1/2	5	-	313511	313514
1	1	2	5	-	313517	313519
1	1	2	5	0.060	-	313523
1	1	2	5	0.090	-	313526
1	1	2	5	0.120	-	313528
1	1	2-1/2	5	-	313531	313533
1	1	3	6	-	313535	313537
1	1	3-1/2	6	-	313541	313543
1	1	4-1/8	7	-	313546	313548
1	1	5-1/2	8	-	313550	313553
1-1/4	1-1/4	1-1/4	4-1/2	-	-	313555
1-1/4	1-1/4	2	4-1/2	-	-	313557
1-1/4	1-1/4	5	7-1/2	-	-	313560



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2015 250BN | 2FL | Ball Nose

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	ZrN EDP
1/8	1/8	1/2	2	-	-	313563
1/8	1/8	1/4	1-1/2	-	-	313567
1/8	1/8	3/4	2	-	-	313571
3/16	3/16	5/16	2	-	-	313573
3/16	3/16	5/8	2-1/2	-	-	313576
3/16	3/16	1	2-1/2	-	-	313580
1/4	1/4	3/8	2-1/2	-	313584	313588
1/4	1/4	3/4	2-1/2	-	313592	313596
1/4	1/4	1-1/4	3	-	313598	313602
5/16	5/16	7/16	2-1/2	-	313604	313607
5/16	5/16	13/16	2-1/2	-	313609	313612
5/16	5/16	1-1/4	3	-	313615	313617
3/8	3/8	1/2	2-1/2	-	313621	313624
3/8	3/8	1	2-1/2	-	313628	313630
3/8	3/8	1-1/2	4	-	313632	313636
7/16	7/16	9/16	2-3/4	-	313640	313643
7/16	7/16	1	2-3/4	-	313645	313649
7/16	7/16	2	4	-	313652	313655
1/2	1/2	5/8	3	-	313659	313662
1/2	1/2	1-1/4	3	-	313666	313668
1/2	1/2	2	4	-	313671	313674
5/8	5/8	3/4	3-1/2	-	313678	313682
5/8	5/8	1-5/8	3-1/2	-	313685	313687
5/8	5/8	2-1/2	5	-	313691	313693
3/4	3/4	1	4	-	313697	313700
3/4	3/4	1-5/8	4	-	313704	313707
3/4	3/4	3-1/4	6	-	313709	313711
1	1	1-1/4	5	-	313714	313717
1	1	2	5	-	313721	313723
1	1	3-1/4	6	-	313725	313729



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2012 | 250 | 2FL | Reduced Neck | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Radius	Bright EDP	ZrN EDP
1/8	1/8	1/4	1-1/2	-	-	313733	313736
1/8	1/8	1/4	1-1/2	1/2	-	313739	313743
1/8	1/8	1/4	1-1/2	1/2	0.020	-	313745
1/8	1/8	1/4	1-1/2	1/2	0.030	-	313749
1/8	1/8	1/4	3	-	-	313751	313755
1/8	1/8	1/4	3	1-3/8	-	313758	313761
1/8	1/8	1/4	3	1-3/8	0.020	-	313763
1/8	1/8	1/4	3	1-3/8	0.030	-	313766
3/16	3/16	5/16	2	-	-	313768	313771
3/16	3/16	5/16	2	1/2	-	313773	313777
3/16	3/16	5/16	2	1/2	0.010	-	313781
3/16	3/16	5/16	2	1/2	0.030	-	313785
3/16	3/16	5/16	3	-	-	313788	-
3/16	3/16	5/16	3	1-3/8	-	313792	313794
3/16	3/16	5/16	3	1-3/8	0.010	-	313797
3/16	3/16	5/16	3	1-3/8	0.030	-	313800
1/4	1/4	3/8	2-1/2	-	-	313802	313805
1/4	1/4	3/8	2-1/2	1-1/8	-	313808	-
1/4	1/4	3/8	2-1/2	1-1/8	0.015	-	313811
1/4	1/4	3/8	2-1/2	1-1/8	0.030	-	313813
1/4	1/4	3/8	2-1/2	1-1/8	0.060	-	313817
1/4	1/4	3/8	2-1/2	1-1/8	0.090	-	313819
1/4	1/4	3/8	4	-	-	313822	313826
1/4	1/4	3/8	4	2-1/8	-	313828	313831
1/4	1/4	3/8	4	2-1/8	0.015	-	313834
1/4	1/4	3/8	4	2-1/8	0.030	-	313836
1/4	1/4	3/8	4	2-1/8	0.060	-	313839
1/4	1/4	3/8	4	2-1/8	0.090	-	313843
1/4	1/4	3/4	4	2-1/8	0.015	-	313847
1/4	1/4	3/4	4	2-1/8	0.030	-	313851
1/4	1/4	3/4	4	2-1/8	0.060	-	313855
1/4	1/4	3/4	4	2-1/8	0.090	-	313858
5/16	5/16	7/16	2-1/2	-	-	313862	313864
5/16	5/16	7/16	2-1/2	1-1/8	-	313867	313869
5/16	5/16	7/16	2-1/2	1-1/8	0.015	-	313873
5/16	5/16	7/16	4	-	-	313877	313879
5/16	5/16	7/16	4	2-1/8	-	313882	313886
5/16	5/16	13/16	4	2-1/8	0.015	-	313888
3/8	3/8	1/2	2-1/2	-	-	313892	313894
3/8	3/8	1/2	2-1/2	1-1/8	-	313897	-

More About the Series 2012

Reduced neck for extended reach



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys

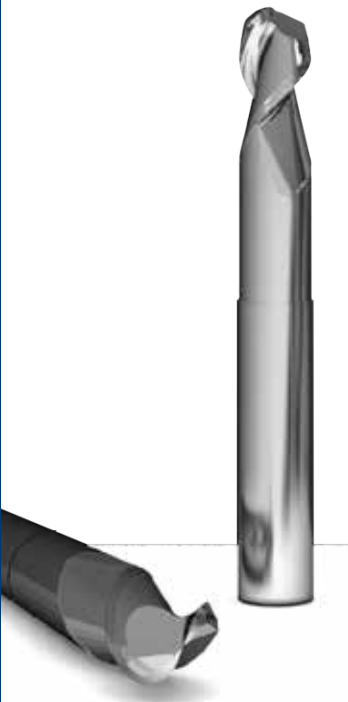


Series 2012 | 250 | 2FL | Reduced Neck | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Radius	Bright EDP	ZrN EDP
3/8	3/8	1/2	4	-	-	313900	313904
3/8	3/8	1/2	4	2-1/8	-	313907	313909
3/8	3/8	1/2	4	2-1/8	0.030	-	313913
1/2	1/2	5/8	3	-	-	313917	313920
1/2	1/2	5/8	3	1-3/8	-	313924	313927
1/2	1/2	5/8	3	1-3/8	0.015	-	313929
1/2	1/2	5/8	3	1-3/8	0.020	-	313932
1/2	1/2	5/8	3	1-3/8	0.030	-	313936
1/2	1/2	5/8	3	1-3/8	0.060	-	313938
1/2	1/2	5/8	3	1-3/8	0.090	-	313941
1/2	1/2	5/8	3	1-3/8	0.120	-	313943
1/2	1/2	5/8	4	-	-	313947	313949
1/2	1/2	5/8	4	2-3/8	-	313953	313957
1/2	1/2	5/8	4	2-3/8	0.015	-	313961
1/2	1/2	5/8	4	2-3/8	0.020	-	313963
1/2	1/2	5/8	4	2-3/8	0.030	-	313967
1/2	1/2	5/8	4	2-3/8	0.060	-	313969
1/2	1/2	5/8	4	2-3/8	0.090	-	313972
1/2	1/2	5/8	4	2-3/8	0.120	-	313974
1/2	1/2	5/8	6	-	-	313978	313982
1/2	1/2	5/8	6	3-3/8	0.015	-	313986
1/2	1/2	5/8	6	3-3/8	0.020	-	313989
1/2	1/2	5/8	6	3-3/8	0.030	-	313992
1/2	1/2	5/8	6	3-3/8	0.060	-	313994
1/2	1/2	5/8	6	3-3/8	0.090	-	313996
1/2	1/2	5/8	6	3-3/8	0.120	-	313999
1/2	1/2	1-1/4	6	3-3/8	0.015	-	314001
1/2	1/2	1-1/4	6	3-3/8	0.030	-	314004
1/2	1/2	1-1/4	6	3-3/8	0.060	-	314008
1/2	1/2	1-1/4	6	3-3/8	0.090	-	314010
1/2	1/2	1-1/4	6	3-3/8	0.120	-	314014
5/8	5/8	3/4	3-1/2	-	-	314017	314019
5/8	5/8	3/4	3-1/2	1-5/8	-	314022	314024
5/8	5/8	3/4	5	-	-	314027	314030
5/8	5/8	3/4	5	2-3/8	-	314032	314035
5/8	5/8	3/4	6	-	-	314037	314039
5/8	5/8	3/4	6	3-3/8	-	314043	314045
3/4	3/4	1	4	-	-	314049	314053
3/4	3/4	1	4	1-5/8	-	314057	314060
3/4	3/4	1	4	1-5/8	0.030	-	314064

More About the Series 2012

Reduced neck for extended reach



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2012 250 | 2FL | Reduced Neck | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Radius	Bright EDP	ZrN EDP
3/4	3/4	1	4	1-5/8	0.060	-	314067
3/4	3/4	1	4	1-5/8	0.090	-	314071
3/4	3/4	1	4	1-5/8	0.120	-	314074
3/4	3/4	1	5	-	-	314077	314079
3/4	3/4	1	5	2-1/2	-	314082	314086
3/4	3/4	1	5	2-1/2	0.030	-	314088
3/4	3/4	1	5	2-1/2	0.060	-	314091
3/4	3/4	1	5	2-1/2	0.090	-	314095
3/4	3/4	1	5	2-1/2	0.120	-	314098
3/4	3/4	1	6	-	-	314101	314105
3/4	3/4	1	6	3-3/8	-	314109	314111
3/4	3/4	1	6	3-3/8	0.030	-	314114
3/4	3/4	1	6	3-3/8	0.060	-	314116
3/4	3/4	1	6	3-3/8	0.090	-	314119
3/4	3/4	1	6	3-3/8	0.120	-	314122
3/4	3/4	1-5/8	6	3-3/8	0.030	-	314126
3/4	3/4	1-5/8	6	3-3/8	0.060	-	314128
3/4	3/4	1-5/8	6	3-3/8	0.090	-	314130
3/4	3/4	1-5/8	6	3-3/8	0.120	-	314133
1	1	1-1/4	5	-	-	314136	314140
1	1	1-1/4	5	2-1/8	-	314142	314144
1	1	1-1/4	6	-	-	314146	314149
1	1	1-1/4	6	3-3/8	-	314153	314157
1	1	1-1/4	6	3-3/8	0.030	-	314161
1	1	1-1/4	6	3-3/8	0.060	-	314165
1	1	1-1/4	6	3-3/8	0.090	-	314167
1	1	1-1/4	6	3-3/8	0.120	-	314170
1	1	1-1/4	7	-	-	314172	314176
1	1	1-1/4	7	4-3/8	-	314179	314181
1	1	1-1/4	7	4-3/8	0.030	-	314184
1	1	1-1/4	7	4-3/8	0.060	-	314186
1	1	1-1/4	7	4-3/8	0.090	-	314190
1	1	1-1/4	7	4-3/8	0.120	-	314193
1	1	2	7	4-3/8	0.030	-	314197
1	1	2	7	4-3/8	0.060	-	314199
1	1	2	7	4-3/8	0.090	-	314202
1	1	2	7	4-3/8	0.120	-	314206

More About the Series 2012

Reduced neck for extended reach



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2014 | 250BN | 2FL | Reduced Neck | Ball Nose

Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Bright EDP	ZrN EDP
1/4	1/4	3/8	2-1/2	-	314210	314214
1/4	1/4	3/8	4	-	314218	314220
1/4	1/4	3/8	2-1/2	1-1/8	314223	314227
1/4	1/4	3/8	4	2-1/8	314231	314229
1/4	1/4	3/8	4	2-1/8	314231	314229
5/16	5/16	7/16	2-1/2	-	314233	314237
5/16	5/16	7/16	4	-	314239	314243
5/16	5/16	7/16	2-1/2	1-1/8	314245	314249
5/16	5/16	7/16	4	2-1/8	314253	314255
3/8	3/8	1/2	2-1/2	-	314259	314263
3/8	3/8	1/2	4	-	314266	314269
3/8	3/8	1/2	2-1/2	1-1/8	314273	314275
3/8	3/8	1/2	4	2-1/8	314278	314280
1/2	1/2	5/8	3	-	314282	314285
1/2	1/2	5/8	4	-	314289	314293
1/2	1/2	5/8	6	-	314297	314301
1/2	1/2	5/8	3	1-3/8	314303	314307
1/2	1/2	5/8	4	2-3/8	314309	314312
1/2	1/2	5/8	6	3-3/8	314316	314319
5/8	5/8	3/4	3-1/2	-	314323	314326
5/8	5/8	3/4	5	-	314330	314333
5/8	5/8	3/4	6	-	314336	314340
5/8	5/8	3/4	3-1/2	1-5/8	314343	314346
5/8	5/8	3/4	5	2-3/8	314350	314353
5/8	5/8	3/4	6	3-3/8	314357	314359
3/4	3/4	1	4	-	314361	314363
3/4	3/4	1	5	-	314367	314370
3/4	3/4	1	6	-	314374	314376
3/4	3/4	1	4	1-5/8	314378	314382
3/4	3/4	1	5	2-3/8	314386	314390
3/4	3/4	1	6	3-3/8	314392	314396
1	1	1-1/4	5	-	314398	314401
1	1	1-1/4	6	-	314403	314407
1	1	1-1/4	7	-	314410	314413
1	1	1-1/4	5	2-1/8	314415	314417
1	1	1-1/4	6	3-3/8	314421	314425
1	1	1-1/4	7	4-3/8	314428	314431

More About the Series 2014

Reduced neck for extended reach



★ Best ☆ Good

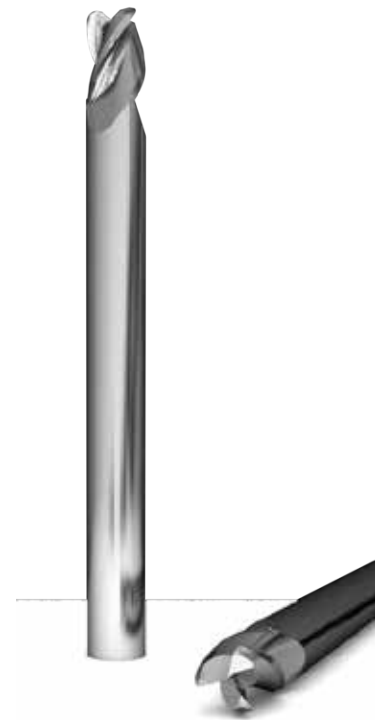
PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2030 350 | 3FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	ZrN EDP
1/8	1/8	1/4	1-1/2	-	314434	314436
1/8	1/8	1/4	1-1/2	0.010	314440	-
1/8	1/8	5/16	1-1/2	-	314442	314445
1/8	1/8	3/8	1-1/2	-	314447	314450
1/8	1/8	3/8	1-1/2	0.010	314453	-
1/8	1/8	3/8	1-1/2	0.020	314456	-
1/8	1/8	3/8	1-1/2	0.030	314458	-
1/8	1/8	1/2	2	-	314462	314466
1/8	1/8	5/8	2	-	314468	314472
1/8	1/8	3/4	2	-	314476	314479
1/8	1/8	1	2-1/2	-	314483	314487
5/32	3/16	5/16	2	-	314491	314493
5/32	3/16	9/16	2	-	314496	-
3/16	3/16	5/16	2	-	314498	314502
3/16	3/16	5/16	2	0.020	-	314504
3/16	3/16	3/8	2	-	314508	314512
3/16	3/16	5/8	2-1/2	-	314516	314518
3/16	3/16	5/8	2-1/2	0.010	-	314520
3/16	3/16	5/8	2-1/2	0.020	-	314523
3/16	3/16	5/8	2-1/2	0.030	-	314527
3/16	3/16	3/4	2-1/2	-	314531	314534
3/16	3/16	1	2-1/2	-	314536	314539
7/32	1/4	3/8	2-1/2	-	314542	314545
7/32	1/4	3/4	2-1/2	-	314547	314549
1/4	1/4	3/8	2-1/2	-	314551	314553
1/4	1/4	3/8	2-1/2	0.015	-	314556
1/4	1/4	3/8	2-1/2	0.020	-	314558
1/4	1/4	3/8	2-1/2	0.030	-	314560
1/4	1/4	3/8	2-1/2	0.060	-	314564
1/4	1/4	1/2	2-1/2	-	314568	314570
1/4	1/4	5/8	2-1/2	-	314572	314575
1/4	1/4	3/4	2-1/2	-	314577	314581
1/4	1/4	3/4	2-1/2	0.010	-	314584
1/4	1/4	3/4	2-1/2	0.015	-	314586
1/4	1/4	3/4	2-1/2	0.020	-	314590
1/4	1/4	3/4	2-1/2	0.030	-	314592
1/4	1/4	3/4	2-1/2	0.045	-	314596
1/4	1/4	3/4	2-1/2	0.060	-	314598
1/4	1/4	1	2-1/2	-	314600	314602
1/4	1/4	1-1/8	2-1/2	-	314605	314607



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2030 350 | 3FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	ZrN EDP
1/4	1/4	1-1/4	3	-	314610	314614
1/4	1/4	1-1/2	3	-	314616	314618
1/4	1/4	2	4	-	314622	314624
9/32	5/16	7/16	2-1/2	-	314626	314630
9/32	5/16	13/16	2-1/2	-	314633	314636
5/16	5/16	7/16	2-1/2	-	314639	314642
5/16	5/16	7/16	2-1/2	0.020	-	314645
5/16	5/16	7/16	2-1/2	0.030	-	314648
5/16	5/16	1/2	2-1/2	-	314651	314655
5/16	5/16	13/16	2-1/2	-	314657	314661
5/16	5/16	13/16	2-1/2	0.020	-	314663
5/16	5/16	13/16	2-1/2	0.030	-	314666
5/16	5/16	13/16	2-1/2	0.060	-	314670
5/16	5/16	1-1/8	2-1/2	-	314672	314674
5/16	5/16	1-1/4	3-1/2	-	314678	314681
5/16	5/16	1-1/2	3-1/2	-	314684	314687
5/16	5/16	2-1/8	4	-	314690	314692
11/32	3/8	1/2	2-1/2	-	314694	314696
11/32	3/8	1	2-1/2	-	314700	314703
3/8	3/8	1/2	2-1/2	-	314705	314709
3/8	3/8	1/2	2-1/2	0.020	-	314711
3/8	3/8	1/2	2-1/2	0.030	-	314714
3/8	3/8	1/2	2-1/2	0.040	-	314716
3/8	3/8	5/8	2-1/2	-	314719	314723
3/8	3/8	3/4	2-1/2	-	314726	314729
3/8	3/8	1	2-1/2	-	314732	314736
3/8	3/8	1	2-1/2	0.020	-	314738
3/8	3/8	1	2-1/2	0.030	-	314742
3/8	3/8	1	2-1/2	0.045	-	314744
3/8	3/8	1	2-1/2	0.060	-	314747
3/8	3/8	1-1/4	3	-	314749	314753
3/8	3/8	1-1/2	4	-	314755	314758
3/8	3/8	2	4	-	314762	314766
3/8	3/8	2-1/2	6	-	314768	314771
13/32	7/16	9/16	2-3/4	-	314773	314775
13/32	7/16	1	2-3/4	-	314779	314781
7/16	7/16	9/16	2-3/4	-	314783	314786
7/16	7/16	1	2-3/4	-	314790	314793
7/16	7/16	2	4	-	314797	314801
15/32	1/2	5/8	3	-	314803	314805



★ Best ☆ Good

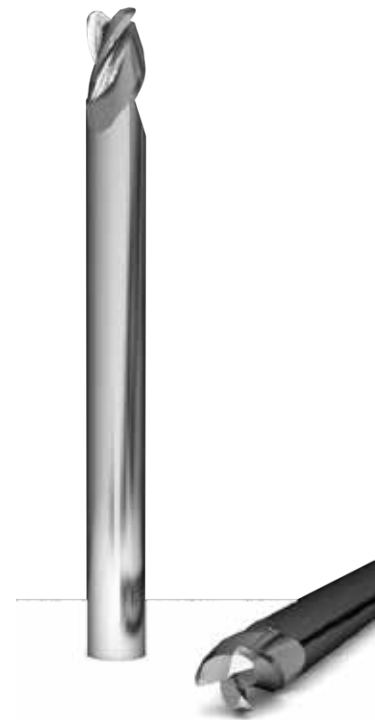
PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2030 350 | 3FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	ZrN EDP
15/32	1/2	1-1/4	3	-	314808	314810
1/2	1/2	5/8	3	-	314814	314818
1/2	1/2	5/8	3	0.020	-	314821
1/2	1/2	5/8	3	0.030	-	314823
1/2	1/2	5/8	3	0.060	-	314827
1/2	1/2	5/8	3	0.090	-	314830
1/2	1/2	3/4	3	-	314834	314836
1/2	1/2	1	3	-	314838	314840
1/2	1/2	1-1/4	3	-	314843	314845
1/2	1/2	1-1/4	3	0.020	-	314847
1/2	1/2	1-1/4	3	0.030	-	314850
1/2	1/2	1-1/4	3	0.060	-	314854
1/2	1/2	1-1/4	3	0.090	-	314857
1/2	1/2	1-1/4	3	0.120	-	314860
1/2	1/2	1-1/2	4	-	314863	314865
1/2	1/2	2	4	-	314869	314872
1/2	1/2	2-1/4	6	-	314876	314878
1/2	1/2	2-1/2	6	-	314880	314884
1/2	1/2	3-1/4	6	-	314888	314892
1/2	1/2	4	8	-	314896	314900
5/8	5/8	3/4	3-1/2	-	314904	314908
5/8	5/8	1-1/4	3-1/2	-	314912	314914
5/8	5/8	1-5/8	3-1/2	-	314917	314920
5/8	5/8	1-5/8	3-1/2	0.030	-	314924
5/8	5/8	1-5/8	3-1/2	0.060	-	314928
5/8	5/8	1-5/8	3-1/2	0.090	-	314930
5/8	5/8	1-5/8	3-1/2	0.120	-	314934
5/8	5/8	2	5	-	314938	314941
5/8	5/8	2-1/2	5	-	314944	314948
5/8	5/8	2-3/4	5	-	314952	314954
5/8	5/8	3-1/4	6	-	314956	314960
5/8	5/8	4	8	-	314962	314965
3/4	3/4	1	4	-	314969	314972
3/4	3/4	1	4	0.060	-	314975
3/4	3/4	1	4	0.090	-	314978
3/4	3/4	1	4	0.120	-	314981
3/4	3/4	1-1/2	4	-	314983	314987
3/4	3/4	1-5/8	4	-	314991	314994
3/4	3/4	1-5/8	4	0.060	-	314996
3/4	3/4	1-5/8	4	0.090	-	314998



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2030 350 | 3FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	ZrN EDP
3/4	3/4	1-5/8	4	0.120	-	315002
3/4	3/4	2	5	-	315005	315007
3/4	3/4	2-1/4	5	-	315011	315013
3/4	3/4	2-1/2	5	-	315017	315021
3/4	3/4	3	6	-	315023	315025
3/4	3/4	3-1/4	6	-	315027	315029
3/4	3/4	3-1/2	6	-	315031	315033
3/4	3/4	4	7	-	315036	315039
3/4	3/4	5	8	-	315043	315047
1	1	1-1/4	5	-	315051	315054
1	1	1-1/2	5	-	315057	315060
1	1	2	5	-	315062	315065
1	1	2	5	0.060	-	315067
1	1	2	5	0.090	-	315070
1	1	2	5	0.120	-	315074
1	1	2-1/2	5	-	315077	315081
1	1	3	6	-	315084	315086
1	1	3-1/2	6	-	315090	315093
1	1	4-1/8	7	-	315096	315099
1	1	5-1/2	8	-	315101	315105
1-1/4	1-1/4	1-1/4	4-1/2	-	-	315107
1-1/4	1-1/4	2	4-1/2	-	315109	315112
1-1/4	1-1/4	3-1/4	6	-	315115	315118
1-1/4	1-1/4	5	7-1/2	-	-	315121



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2031 350WF | 3FL | Square | Wiper Flats

Diameter	Shank Dia	LOC	OAL	EDP
1/8	1/8	1/4	1-1/2	315123
1/8	1/8	1/2	2	315126
1/8	1/8	3/4	2	315130
3/16	3/16	5/16	2	315133
3/16	3/16	5/8	2-1/2	315137
3/16	3/16	3/4	2-1/2	315140
1/4	1/4	3/8	2-1/2	315143
1/4	1/4	3/4	2-1/2	315147
1/4	1/4	1-1/4	3	315149
5/16	5/16	7/16	2-1/2	315152
5/16	5/16	13/16	2-1/2	315155
5/16	5/16	1-1/4	3-1/2	315159
3/8	3/8	1/2	2-1/2	315162
3/8	3/8	1	2-1/2	315165
3/8	3/8	1-1/2	4	315167
1/2	1/2	5/8	3	315171
1/2	1/2	1-1/4	3	315173
1/2	1/2	2	4	315175
1/2	1/2	3-1/4	6	315178
5/8	5/8	3/4	3-1/2	315180
5/8	5/8	1-5/8	3-1/2	315184
5/8	5/8	2-1/2	5	315188
3/4	3/4	1	4	315190
3/4	3/4	1-5/8	4	315192
3/4	3/4	2-1/2	5	315196
3/4	3/4	3-1/4	6	315200
1	1	1-1/4	5	315203
1	1	2	5	315205
1	1	3	6	315209

More About the Series 2031

Integrated wiper flat design ideal for finishing operations

Floor finishing



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2045 350BN | 3FL | Ball Nose

Diameter	Shank Dia.	LOC	OAL	Bright EDP	ZrN EDP
1/4	1/4	1-1/4	3	315212	315215
1/4	1/4	3/4	2-1/2	315219	315221
1/4	1/4	3/8	2-1/2	315223	315227
5/16	5/16	1-1/4	3	315229	315232
5/16	5/16	13/16	2-1/2	315236	315238
5/16	5/16	7/16	2-1/2	315240	315244
3/8	3/8	1	2-1/2	315248	315250
3/8	3/8	1/2	2-1/2	315253	315256
3/8	3/8	1-1/2	4	315259	315261
7/16	7/16	1	2-3/4	315265	315268
7/16	7/16	2	4	315271	315274
7/16	7/16	9/16	2-3/4	315277	315280
1/2	1/2	1-1/4	3	315282	315285
1/2	1/2	2	4	315288	315292
1/2	1/2	5/8	3	315296	315299
5/8	5/8	1-5/8	3-1/2	315303	315306
5/8	5/8	2-1/2	5	315308	315312
5/8	5/8	3/4	3-1/2	315316	315318
3/4	3/4	1	4	315320	315322
3/4	3/4	1-5/8	4	315324	315326
3/4	3/4	3-1/4	6	315330	315333
1	1	1-1/4	5	315336	315340
1	1	2	5	315343	315346
1	1	3-1/4	6	315348	315352



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2032 350 | 3FL | Reduced Neck | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Radius	Bright EDP	ZrN EDP
1/8	1/8	1/4	1-1/2	1/2	0.020	-	315355
1/8	1/8	1/4	1-1/2	1/2	0.030	-	315359
1/8	1/8	1/4	3	1-3/8	0.020	-	315363
1/8	1/8	1/4	3	1-3/8	0.030	-	315367
3/16	3/16	5/16	2	1/2	0.010	-	315369
3/16	3/16	5/16	2	1/2	0.030	-	315371
3/16	3/16	5/16	3	1-3/8	0.010	-	315374
3/16	3/16	5/16	3	1-3/8	0.030	-	315377
1/4	1/4	3/8	2-1/2	-	-	315379	315381
1/4	1/4	3/8	2-1/2	1-1/8	-	315384	315388
1/4	1/4	3/8	2-1/2	1-1/8	0.015	-	315392
1/4	1/4	3/8	2-1/2	1-1/8	0.030	-	315394
1/4	1/4	3/8	2-1/2	1-1/8	0.060	-	315397
1/4	1/4	3/8	2-1/2	1-1/8	0.090	-	315399
1/4	1/4	3/8	4	-	-	315403	315405
1/4	1/4	3/8	4	2-1/8	-	315408	315411
1/4	1/4	3/8	4	2-1/8	0.015	-	315413
1/4	1/4	3/8	4	2-1/8	0.030	-	315415
1/4	1/4	3/8	4	2-1/8	0.060	-	315417
1/4	1/4	3/8	4	2-1/8	0.090	-	315419
1/4	1/4	3/4	4	2-1/8	0.015	-	315423
1/4	1/4	3/4	4	2-1/8	0.030	-	315427
1/4	1/4	3/4	4	2-1/8	0.060	-	315429
1/4	1/4	3/4	4	2-1/8	0.090	-	315433
5/16	5/16	7/16	2-1/2	-	-	315437	315441
5/16	5/16	7/16	2-1/2	1-1/8	-	315445	315447
5/16	5/16	7/16	2-1/2	1-1/8	0.015	-	315450
5/16	5/16	7/16	4	-	-	315453	315456
5/16	5/16	7/16	4	2-1/8	-	315458	315460
5/16	5/16	13/16	4	2-1/8	0.015	-	315464
3/8	3/8	1/2	2-1/2	-	-	315466	315469
3/8	3/8	1/2	2-1/2	1-1/8	-	315473	315476
3/8	3/8	1/2	4	-	-	315478	315481
3/8	3/8	1/2	4	2-1/8	-	315483	315486
3/8	3/8	1/2	4	2-1/8	0.030	-	315489
1/2	1/2	5/8	3	-	-	315491	315495
1/2	1/2	5/8	3	1-3/8	-	315498	315502
1/2	1/2	5/8	3	1-3/8	0.015	-	315505
1/2	1/2	5/8	3	1-3/8	0.020	-	315507
1/2	1/2	5/8	3	1-3/8	0.030	-	315511

More About the Series 2032

Reduced neck for extended reach



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2032 | 350 | 3FL | Reduced Neck | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Radius	Bright EDP	ZrN EDP
1/2	1/2	5/8	3	1-3/8	0.060	-	315515
1/2	1/2	5/8	3	1-3/8	0.090	-	315518
1/2	1/2	5/8	3	1-3/8	0.120	-	315520
1/2	1/2	5/8	4	-	-	315523	315525
1/2	1/2	5/8	4	2-3/8	-	315527	315529
1/2	1/2	5/8	4	2-3/8	0.015	-	315532
1/2	1/2	5/8	4	2-3/8	0.020	-	315535
1/2	1/2	5/8	4	2-3/8	0.030	-	315537
1/2	1/2	5/8	4	2-3/8	0.060	-	315539
1/2	1/2	5/8	4	2-3/8	0.090	-	315542
1/2	1/2	5/8	4	2-3/8	0.120	-	315546
1/2	1/2	5/8	6	-	-	315548	315552
1/2	1/2	5/8	6	3-3/8	-	-	315554
1/2	1/2	5/8	6	3-3/8	0.015	-	315558
1/2	1/2	5/8	6	3-3/8	0.020	-	315562
1/2	1/2	5/8	6	3-3/8	0.030	-	315565
1/2	1/2	5/8	6	3-3/8	0.060	-	315569
1/2	1/2	5/8	6	3-3/8	0.090	-	315572
1/2	1/2	5/8	6	3-3/8	0.120	-	315574
1/2	1/2	1-1/4	6	3-3/8	0.015	-	315578
1/2	1/2	1-1/4	6	3-3/8	0.030	-	315581
1/2	1/2	1-1/4	6	3-3/8	0.060	-	315583
1/2	1/2	1-1/4	6	3-3/8	0.090	-	315586
1/2	1/2	1-1/4	6	3-3/8	0.120	-	315589
5/8	5/8	3/4	3-1/2	-	-	315591	315593
5/8	5/8	3/4	3-1/2	1-5/8	-	315597	315599
5/8	5/8	3/4	5	-	-	315601	315603
5/8	5/8	3/4	5	2-3/8	-	315605	315607
5/8	5/8	3/4	6	-	-	315609	315611
5/8	5/8	3/4	6	3-3/8	-	315615	315618
3/4	3/4	1	4	-	-	315621	315625
3/4	3/4	1	4	1-5/8	-	315627	315629
3/4	3/4	1	4	1-5/8	0.030	-	315632
3/4	3/4	1	4	1-5/8	0.060	-	315636
3/4	3/4	1	4	1-5/8	0.090	-	315640
3/4	3/4	1	4	1-5/8	0.120	-	315642
3/4	3/4	1	5	-	-	-	315644
3/4	3/4	1	5	2-1/2	-	315646	315650
3/4	3/4	1	5	2-1/2	0.030	-	315654
3/4	3/4	1	5	2-1/2	0.060	-	315656

More About the Series 2032

Reduced neck for extended reach



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2032 350 | 3FL | Reduced Neck | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Radius	Bright EDP	ZrN EDP
3/4	3/4	1	5	2-1/2	0.090	-	315659
3/4	3/4	1	5	2-1/2	0.120	-	315662
3/4	3/4	1	6	-	-	-	315664
3/4	3/4	1	6	3-3/8	-	315667	315669
3/4	3/4	1	6	3-3/8	0.030	-	315671
3/4	3/4	1	6	3-3/8	0.060	-	315673
3/4	3/4	1	6	3-3/8	0.090	-	315675
3/4	3/4	1	6	3-3/8	0.120	-	315677
3/4	3/4	1-5/8	6	3-3/8	0.030	-	315679
3/4	3/4	1-5/8	6	3-3/8	0.060	-	315683
3/4	3/4	1-5/8	6	3-3/8	0.090	-	315686
3/4	3/4	1-5/8	6	3-3/8	0.120	-	315689
1	1	1-1/4	5	-	-	315693	315696
1	1	1-1/4	5	2-1/8	-	315699	315702
1	1	1-1/4	6	-	-	315706	315709
1	1	1-1/4	6	3-3/8	-	315713	315716
1	1	1-1/4	6	3-3/8	0.030	-	315720
1	1	1-1/4	6	3-3/8	0.060	-	315724
1	1	1-1/4	6	3-3/8	0.090	-	315728
1	1	1-1/4	6	3-3/8	0.120	-	315730
1	1	1-1/4	7	-	-	315734	315738
1	1	1-1/4	7	4-3/8	-	315742	315745
1	1	1-1/4	7	4-3/8	0.030	-	315749
1	1	1-1/4	7	4-3/8	0.060	-	315751
1	1	1-1/4	7	4-3/8	0.090	-	315755
1	1	1-1/4	7	4-3/8	0.120	-	315758
1	1	2	7	4-3/8	0.030	-	315761
1	1	2	7	4-3/8	0.060	-	315764
1	1	2	7	4-3/8	0.090	-	315767
1	1	2	7	4-3/8	0.120	-	315771

More About the Series 2032

Reduced neck for extended reach



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2047 | 350BN | 3FL | Reduced Neck | Ball Nose

Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Bright EDP	ZrN EDP
1/4	1/4	3/8	2-1/2	-	315774	315776
1/4	1/4	3/8	2-1/2	1-1/8	315779	315781
1/4	1/4	3/8	4	-	315785	315788
1/4	1/4	3/8	4	2-1/8	315790	-
5/16	5/16	7/16	2-1/2	-	315794	315797
5/16	5/16	7/16	2-1/2	1-1/8	315799	315802
5/16	5/16	7/16	4	-	315806	315808
5/16	5/16	7/16	4	2-1/8	315811	315814
3/8	3/8	1/2	2-1/2	-	315817	315821
3/8	3/8	1/2	2-1/2	1-1/8	315823	315825
3/8	3/8	1/2	4	-	315829	315831
3/8	3/8	1/2	4	2-1/8	315835	315838
1/2	1/2	5/8	3	-	315842	315845
1/2	1/2	5/8	3	1-3/8	315848	315852
1/2	1/2	5/8	4	-	315856	315858
1/2	1/2	5/8	4	2-3/8	315860	315864
1/2	1/2	5/8	6	-	315868	315871
1/2	1/2	5/8	6	3-3/8	315873	315877
5/8	5/8	3/4	3-1/2	-	315880	315882
5/8	5/8	3/4	3-1/2	1-5/8	315884	315886
5/8	5/8	3/4	5	-	315888	315892
5/8	5/8	3/4	5	2-3/8	315895	315899
5/8	5/8	3/4	6	-	315902	315906
5/8	5/8	3/4	6	3-3/8	315909	315912
3/4	3/4	1	4	-	315914	315916
3/4	3/4	1	4	1-5/8	315920	315924
3/4	3/4	1	5	-	315928	315932
3/4	3/4	1	5	2-3/8	315935	315938
3/4	3/4	1	6	-	315940	315943
3/4	3/4	1	6	3-3/8	315947	315951
1	1	1-1/4	5	-	315953	315957
1	1	1-1/4	5	2-1/8	315960	315963
1	1	1-1/4	6	-	315967	315970
1	1	1-1/4	6	3-3/8	315973	315977
1	1	1-1/4	7	-	315979	315983
1	1	1-1/4	7	4-3/8	315987	315991

More About the Series 2047

Reduced neck for extended reach



PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys



Series 2060 550 | 5FL | Square

Diameter	Shank Dia.	LOC	OAL	Bright EDP	ZrN EDP
1/4	1/4	3/8	2-1/2	315994	315997
1/4	1/4	3/4	2-1/2	316000	316002
1/4	1/4	1-1/4	3	316005	316009
5/16	5/16	7/16	2-1/2	316013	316016
5/16	5/16	13/16	2-1/2	316019	316021
5/16	5/16	1-1/4	3-1/2	316023	316026
3/8	3/8	1/2	2-1/2	316030	316033
3/8	3/8	1	2-1/2	316035	316039
3/8	3/8	1-1/4	3	316041	316044
3/8	3/8	2	4	316046	316048
1/2	1/2	5/8	3	316052	316056
1/2	1/2	1-1/4	3	316058	316061
1/2	1/2	2	4	316064	316068
1/2	1/2	3-1/4	6	316070	316073
5/8	5/8	3/4	3-1/2	316076	316079
5/8	5/8	1-5/8	3-1/2	316083	316087
5/8	5/8	2-1/2	5	316091	316095
3/4	3/4	1	4	316098	316102
3/4	3/4	1-5/8	4	316105	316108
3/4	3/4	2-1/4	5	316111	316113
3/4	3/4	3	6	316116	316120
1	1	1-1/4	5	316122	316126
1	1	2	5	316130	316132
1	1	2-1/2	5	316136	316139
1	1	3	6	316142	316146

More About the Series 2060

Designed for High Speed Profiling of Aluminum



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 250		440V 4FL Square & Radius			
Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/4	1/4	3/8	2	-	316148
1/4	1/4	3/8	2	0.020	316152
1/4	1/4	3/4	2-1/2	-	316154
1/4	1/4	3/4	2-1/2	0.020	316158
1/4	1/4	1-1/4	3	-	316160
1/4	1/4	1-1/4	3	0.020	316163
5/16	5/16	7/16	2	-	316167
5/16	5/16	7/16	2	0.020	316169
5/16	5/16	13/16	2-1/2	-	316171
5/16	5/16	13/16	2-1/2	0.020	316175
5/16	5/16	1-3/8	3	-	316177
5/16	5/16	1-3/8	3	0.020	316179
3/8	3/8	1/2	2	-	316183
3/8	3/8	1/2	2	0.020	316187
3/8	3/8	1/2	2	0.030	316189
3/8	3/8	1	2-1/2	-	316191
3/8	3/8	1	2-1/2	0.020	316194
3/8	3/8	1	2-1/2	0.030	316196
3/8	3/8	1-1/2	2-1/2	-	316198
3/8	3/8	1-1/2	2-1/2	0.020	316200
3/8	3/8	1-1/2	2-1/2	0.030	316203
1/2	1/2	5/8	2-1/2	-	316207
1/2	1/2	5/8	2-1/2	0.030	316209
1/2	1/2	5/8	2-1/2	0.060	316213
1/2	1/2	1-1/4	3	-	316216
1/2	1/2	1-1/4	3	0.030	316219
1/2	1/2	1-1/4	3	0.060	316223
1/2	1/2	2	4	-	316227
1/2	1/2	2	4	0.030	316230
1/2	1/2	2	4	0.060	316234
5/8	5/8	3/4	3	-	316236
5/8	5/8	3/4	3	0.030	316239
5/8	5/8	3/4	3	0.060	316242
5/8	5/8	1-5/8	3-1/2	-	316246
5/8	5/8	1-5/8	3-1/2	0.030	316249
5/8	5/8	1-5/8	3-1/2	0.060	316253
5/8	5/8	2-1/4	5	-	316257
5/8	5/8	2-1/4	5	0.030	316260
5/8	5/8	2-1/4	5	0.060	316262
3/4	3/4	1	3	-	316266

More About the Series 250

Performance edge treatment

Features a variable helix and unequal index design that reduces chatter and enables more aggressive and stable milling



☆ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 250 440V | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
3/4	3/4	1	3	0.030	316270
3/4	3/4	1	3	0.060	316272
3/4	3/4	1-5/8	4	-	316274
3/4	3/4	1-5/8	4	0.030	316276
3/4	3/4	1-5/8	4	0.060	316278
3/4	3/4	2-1/4	5	-	316281
3/4	3/4	2-1/4	5	0.030	316283
3/4	3/4	2-1/4	5	0.060	316285
1	1	1-1/4	3	-	316287
1	1	1-1/4	3	0.030	316290
1	1	1-1/4	3	0.060	316294
1	1	2	4	-	316296
1	1	2	4	0.030	316298
1	1	2	4	0.060	316302
1	1	3-1/4	5	-	316304
1	1	3-1/4	5	0.030	316306
1	1	3-1/4	5	0.060	316309

More About the Series 250

Performance edge treatment

Features a variable helix and unequal index design that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 252 440VBN | 4FL | Ball Nose

Diameter	Shank Dia.	LOC	OAL	EDP
1/4	1/4	3/8	2	316312
1/4	1/4	3/4	2-1/2	316314
1/4	1/4	1-1/4	3	316318
5/16	5/16	7/16	2	316320
5/16	5/16	13/16	2-1/2	316323
5/16	5/16	1-3/8	3	316327
3/8	3/8	1/2	2	316331
3/8	3/8	1	2-1/2	316335
3/8	3/8	1-1/2	2-1/2	316339
1/2	1/2	5/8	2-1/2	316343
1/2	1/2	1-1/4	3	316345
1/2	1/2	2	4	316349
5/8	5/8	3/4	3	316351
5/8	5/8	1-5/8	3-1/2	316354
5/8	5/8	2-1/4	5	316356
3/4	3/4	1	3	316360
3/4	3/4	1-5/8	4	316362
3/4	3/4	2-1/4	5	316366
1	1	1-1/4	3	316369
1	1	2	4	316372
1	1	3-1/4	6	316376

More About the Series 252

Performance edge treatment

Features a variable helix design that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 255 540V | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/4	1/4	3/8	2	-	316380
1/4	1/4	3/8	2	0.020	316384
1/4	1/4	3/4	2-1/2	-	316386
1/4	1/4	3/4	2-1/2	0.020	316388
1/4	1/4	1-1/4	3	-	316392
1/4	1/4	1-1/4	3	0.020	316396
5/16	5/16	7/16	2	-	316400
5/16	5/16	7/16	2	0.020	316404
5/16	5/16	13/16	2-1/2	-	316406
5/16	5/16	13/16	2-1/2	0.020	316408
5/16	5/16	1-3/8	3	-	316410
5/16	5/16	1-3/8	3	0.020	316413
3/8	3/8	1/2	2	-	316416
3/8	3/8	1/2	2	0.020	316420
3/8	3/8	1/2	2	0.030	316422
3/8	3/8	1	2-1/2	-	316425
3/8	3/8	1	2-1/2	0.020	316428
3/8	3/8	1	2-1/2	0.030	316432
3/8	3/8	1-1/2	2-1/2	-	316435
3/8	3/8	1-1/2	2-1/2	0.020	316438
3/8	3/8	1-1/2	2-1/2	0.030	316441
1/2	1/2	5/8	2-1/2	-	316445
1/2	1/2	5/8	2-1/2	0.030	316448
1/2	1/2	5/8	2-1/2	0.060	316451
1/2	1/2	1-1/4	3	-	316453
1/2	1/2	1-1/4	3	0.030	316455
1/2	1/2	1-1/4	3	0.060	316457
1/2	1/2	2	4	-	316460
1/2	1/2	2	4	0.030	316463
1/2	1/2	2	4	0.060	316465
5/8	5/8	3/4	3	-	316468
5/8	5/8	3/4	3	0.030	316470
5/8	5/8	3/4	3	0.060	316473
5/8	5/8	1-5/8	3-1/2	-	316476
5/8	5/8	1-5/8	3-1/2	0.030	316479
5/8	5/8	1-5/8	3-1/2	0.060	316483
5/8	5/8	2-1/4	5	-	316486
5/8	5/8	2-1/4	5	0.030	316488
5/8	5/8	2-1/4	5	0.060	316492
3/4	3/4	1	3	-	316495

More About the Series 255

Performance edge treatment

Features a variable helix design that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 255		540V 4FL Square & Radius			
Diameter	Shank Dia.	LOC	OAL	Radius	EDP
3/4	3/4	1	3	0.030	316499
3/4	3/4	1	3	0.060	316502
3/4	3/4	1-5/8	4	-	316504
3/4	3/4	1-5/8	4	0.030	316508
3/4	3/4	1-5/8	4	0.060	316511
3/4	3/4	2-1/4	5	-	316515
3/4	3/4	2-1/4	5	0.030	316519
3/4	3/4	2-1/4	5	0.060	316523
1	1	1-1/4	3	-	316525
1	1	1-1/4	3	0.030	316527
1	1	1-1/4	3	0.060	316531
1	1	2	4	-	316533
1	1	2	4	0.030	316537
1	1	2	4	0.060	316541
1	1	3-1/4	5	-	316544
1	1	3-1/4	5	0.030	316548
1	1	3-1/4	5	0.060	316551

More About the Series 255

Performance edge treatment

Features a variable helix design that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 260 | 437 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/8	1/8	1/4	2	-	316554
1/8	1/8	1/4	2	0.010	316556
1/8	1/8	1/4	2	0.020	316558
1/8	1/8	1/4	2	0.030	316560
1/8	1/8	1/2	2	-	316562
1/8	1/8	1/2	2	0.010	316566
1/8	1/8	1/2	2	0.020	316569
1/8	1/8	1/2	2	0.030	316573
3/16	3/16	5/16	2	-	316576
3/16	3/16	5/16	2	0.010	316579
3/16	3/16	5/16	2	0.020	316582
3/16	3/16	5/16	2	0.030	316586
3/16	3/16	9/16	2	-	316589
3/16	3/16	9/16	2	0.010	316592
3/16	3/16	9/16	2	0.020	316596
3/16	3/16	9/16	2	0.030	316599
1/4	1/4	3/8	2-1/2	-	316603
1/4	1/4	3/8	2-1/2	0.010	316605
1/4	1/4	3/8	2-1/2	0.020	316609
1/4	1/4	3/8	2-1/2	0.030	316613
1/4	1/4	3/4	2-1/2	-	316617
1/4	1/4	3/4	2-1/2	0.010	316619
1/4	1/4	3/4	2-1/2	0.020	316622
1/4	1/4	3/4	2-1/2	0.030	316626
1/4	1/4	3/4	4	-	316630
1/4	1/4	3/4	4	0.010	316633
1/4	1/4	3/4	4	0.020	316636
5/16	5/16	13/16	2-1/2	-	316639
5/16	5/16	13/16	2-1/2	0.030	316642
1/2	1/2	5/8	3	-	316644
1/2	1/2	5/8	3	0.020	316647
1/2	1/2	5/8	3	0.030	316650
1/2	1/2	5/8	3	0.060	316652
1/2	1/2	5/8	0	0.090	316656
1/2	1/2	5/8	3	0.120	316658
1/2	1/2	1-1/4	3	-	316660
1/2	1/2	1-1/4	3	0.020	316662
1/2	1/2	1-1/4	3	0.030	316664
1/2	1/2	1-1/4	3	0.060	316668
1/2	1/2	1-1/4	3	0.090	316671

More About the Series 260

Special edge preparation makes this an ideal tool for exotic materials

Features a variable index design with 37 degree helix that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 260 437 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/2	1/2	1-1/4	3	0.120	316674
1/2	1/2	1-1/4	4	-	316677
1/2	1/2	1-1/4	4	0.020	316679
1/2	1/2	1-1/4	4	0.030	316683
1/2	1/2	1-1/4	4	0.060	316686
1/2	1/2	1-1/4	4	0.090	316688
1/2	1/2	1-1/4	4	0.120	316691
5/8	5/8	3/4	3	-	316693
5/8	5/8	3/4	3	0.030	316696
5/8	5/8	3/4	3	0.060	316699
5/8	5/8	3/4	3	0.090	316701
5/8	5/8	3/4	3	0.120	316705
5/8	5/8	1-5/8	3-1/2	-	316707
5/8	5/8	1-5/8	3-1/2	0.030	316710
5/8	5/8	1-5/8	3-1/2	0.060	316712
5/8	5/8	1-5/8	3-1/2	0.090	316714
5/8	5/8	1-5/8	3-1/2	0.120	316718
3/4	3/4	1	4	-	316720
3/4	3/4	1	4	0.030	316723
3/4	3/4	1	4	0.060	316727
3/4	3/4	1	4	0.090	316730
3/4	3/4	1	4	0.120	316734
3/4	3/4	1	4	0.156	316736
3/4	3/4	1	4	0.190	316740
3/4	3/4	1-5/8	4	-	316742
3/4	3/4	1-5/8	4	0.030	316744
3/4	3/4	1-5/8	4	0.060	316747
3/4	3/4	1-5/8	4	0.090	316751
3/4	3/4	1-5/8	4	0.120	316753
3/4	3/4	1-5/8	4	0.156	316756
3/4	3/4	1-5/8	4	0.190	316758
3/4	3/4	1-5/8	6	-	316760
3/4	3/4	1-5/8	6	0.030	316764
3/4	3/4	1-5/8	6	0.060	316766
3/4	3/4	1-5/8	6	0.090	316769
3/4	3/4	1-5/8	6	0.120	316773
3/4	3/4	1-5/8	6	0.156	316776
3/4	3/4	1-5/8	6	0.190	316778
1	1	1-1/4	4	-	316782
1	1	1-1/4	4	0.030	316786

More About the Series 260

Special edge preparation makes this an ideal tool for exotic materials

Features a variable index design with 37 degree helix that reduces chatter and enables more aggressive and stable milling



☆ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 260 | 437 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1	1	1-1/4	4	0.060	316788
1	1	1-1/4	4	0.090	316791
1	1	1-1/4	4	0.120	316794
1	1	1-1/4	4	0.156	316798
1	1	1-1/4	4	0.190	316802
1	1	2	4	-	316804
1	1	2	4	0.030	316806
1	1	2	4	0.060	316810
1	1	2	4	0.090	316813
1	1	2	4	0.120	316817
1	1	2	4	0.156	316820
1	1	2	4	0.190	316824
1	1	3-1/4	6	-	316827
1	1	3-1/4	6	0.120	316831

More About the Series 260

Special edge preparation makes this an ideal tool for exotic materials

Features a variable index design with 37 degree helix that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 265 | 537 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1/4	1/4	3/8	2-1/2	-	316835
1/4	1/4	3/8	2-1/2	0.020	316837
1/4	1/4	3/8	2-1/2	0.030	316841
1/4	1/4	3/4	2-1/2	-	316844
1/4	1/4	3/4	2-1/2	0.010	316848
1/4	1/4	3/4	2-1/2	0.020	316852
1/4	1/4	3/4	2-1/2	0.030	316855
1/4	1/4	3/4	4	-	316859
1/4	1/4	3/4	4	0.010	316862
1/4	1/4	3/4	4	0.020	316864
1/4	1/4	3/4	4	0.030	316868
5/16	5/16	13/16	2-1/2	-	316870
5/16	5/16	13/16	2-1/2	0.030	316873
1/2	1/2	5/8	3	-	316875
1/2	1/2	5/8	3	0.020	316878
1/2	1/2	5/8	3	0.030	316880
1/2	1/2	5/8	3	0.060	316883
1/2	1/2	5/8	3	0.090	316885
1/2	1/2	5/8	3	0.120	316887
1/2	1/2	1-1/4	3	-	316891
1/2	1/2	1-1/4	3	0.020	316893
1/2	1/2	1-1/4	3	0.030	316896
1/2	1/2	1-1/4	3	0.060	316898
1/2	1/2	1-1/4	3	0.090	316901
1/2	1/2	1-1/4	3	0.120	316903
1/2	1/2	1-1/4	4	-	316906
1/2	1/2	1-1/4	4	0.020	316910
1/2	1/2	1-1/4	4	0.030	316913
1/2	1/2	1-1/4	4	0.060	316915
1/2	1/2	1-1/4	4	0.090	316918
1/2	1/2	1-1/4	4	0.120	316921
5/8	5/8	3/4	3	-	316923
5/8	5/8	3/4	3	0.030	316927
5/8	5/8	3/4	3	0.060	316929
5/8	5/8	3/4	3	0.090	316931
5/8	5/8	3/4	3	0.120	316933
5/8	5/8	1-5/8	3-1/2	-	316937
5/8	5/8	1-5/8	3-1/2	0.030	316939
5/8	5/8	1-5/8	3-1/2	0.060	316942
5/8	5/8	1-5/8	3-1/2	0.090	316946

More About the Series 265

Special edge preparation makes this an ideal tool for exotic materials

Features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling



☆ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 265 | 537 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
5/8	5/8	1-5/8	3-1/2	0.120	316948
3/4	3/4	1	4	-	316952
3/4	3/4	1	4	0.030	316954
3/4	3/4	1	4	0.060	316956
3/4	3/4	1	4	0.090	316960
3/4	3/4	1	4	0.120	316963
3/4	3/4	1	4	0.156	316965
3/4	3/4	1	4	0.190	316969
3/4	3/4	1-5/8	4	-	316973
3/4	3/4	1-5/8	4	0.030	316977
3/4	3/4	1-5/8	4	0.060	316980
3/4	3/4	1-5/8	4	0.090	316983
3/4	3/4	1-5/8	4	0.120	316985
3/4	3/4	1-5/8	4	0.156	316987
3/4	3/4	1-5/8	4	0.190	316991
3/4	3/4	1-5/8	6	-	316994
3/4	3/4	1-5/8	6	0.030	316997
3/4	3/4	1-5/8	6	0.060	316999
3/4	3/4	1-5/8	6	0.090	317003
3/4	3/4	1-5/8	6	0.120	317005
3/4	3/4	1-5/8	6	0.156	317009
3/4	3/4	1-5/8	6	0.190	317012
1	1	1-1/4	4	-	317015
1	1	1-1/4	4	0.030	317018
1	1	1-1/4	4	0.060	317020
1	1	1-1/4	4	0.090	317023
1	1	1-1/4	4	0.120	317025
1	1	1-1/4	4	0.156	317029
1	1	1-1/4	4	0.190	317032
1	1	2	4	-	317036
1	1	2	4	0.030	317038
1	1	2	4	0.060	317041
1	1	2	4	0.090	317045
1	1	2	4	0.120	317047
1	1	2	4	0.156	317049
1	1	2	4	0.190	317053

More About the Series 265

Special edge preparation makes this an ideal tool for exotic materials

Features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 265 | 537 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	EDP
1	1	3-1/4	6	-	317057
1	1	3-1/4	6	0.030	317060
1	1	3-1/4	6	0.060	317063
1	1	3-1/4	6	0.090	317066
1	1	3-1/4	6	0.120	317069
1	1	3-1/4	6	0.156	317072
1	1	3-1/4	6	0.190	317076

More About the Series 265

Special edge preparation makes this an ideal tool for exotic materials

Features a variable index design with 38 degree helix that reduces chatter and enables more aggressive and stable milling



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 270 | 815 | Multi Flute | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Flutes	EDP
3/8	3/8	1/2	2-1/2	-	6	317080
3/8	3/8	1/2	2-1/2	0.020	6	317083
3/8	3/8	1/2	2-1/2	0.030	6	317086
3/8	3/8	1	2-1/2	-	6	317088
3/8	3/8	1	2-1/2	0.020	6	317092
3/8	3/8	1	2-1/2	0.030	6	317096
3/8	3/8	1	4	-	6	317099
3/8	3/8	1	4	0.020	6	317102
3/8	3/8	1	4	0.030	6	317106
1/2	1/2	5/8	3	-	8	317110
1/2	1/2	5/8	3	0.030	8	317113
1/2	1/2	5/8	3	0.060	8	317117
1/2	1/2	1-1/4	3	-	8	317119
1/2	1/2	1-1/4	3	0.030	8	317123
1/2	1/2	1-1/4	3	0.060	8	317125
1/2	1/2	1-1/4	4	-	8	317127
5/8	5/8	3/4	3	-	8	317130
5/8	5/8	3/4	3	0.030	8	317132
5/8	5/8	3/4	3	0.060	8	317135
5/8	5/8	1-5/8	3-1/2	-	8	317138
5/8	5/8	1-5/8	3-1/2	0.030	8	317142
5/8	5/8	1-5/8	3-1/2	0.060	8	317146
3/4	3/4	1	4	-	10	317148
3/4	3/4	1	4	0.030	10	317150
3/4	3/4	1	4	0.060	10	317152
3/4	3/4	1-5/8	4	-	10	317155
3/4	3/4	1-5/8	4	0.030	10	317158
3/4	3/4	1-5/8	4	0.060	10	317162
3/4	3/4	1-5/8	6	0.090	10	317164
1	1	1-1/4	4	-	12	317168
1	1	1-1/4	4	0.030	12	317172
1	1	1-1/4	4	0.060	12	317174
1	1	1-1/4	4	0.090	12	317176
1	1	2	4	-	12	317180

More About the Series 270

Ideal for hardened alloys and steels



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 270 | 815 | Multi Flute | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Flutes	EDP
1	1	2	4	0.030	12	317182
1	1	2	4	0.060	12	317186
1	1	2	4	0.090	12	317190
1	1	3-1/4	6	-	12	317193
1	1	3-1/4	6	0.030	12	317195
1	1	3-1/4	6	0.060	12	317199
1	1	3-1/4	6	0.090	12	317201

More About the Series 270

Ideal for hardened alloys and steels



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mill for Titanium



Series 280 840 | Multi Flute | Square & Radius | Titanium

Diameter	Shank Dia.	LOC	OAL	Radius	Flutes	EDP
1/2	1/2	5/8	3	-	8	317204
1/2	1/2	5/8	3	0.030	8	317208
1/2	1/2	5/8	3	0.060	8	317212
1/2	1/2	1-1/4	3	-	8	317216
1/2	1/2	1-1/4	3	0.030	8	317218
1/2	1/2	1-1/4	3	0.060	8	317221
5/8	5/8	3/4	3	-	8	317225
5/8	5/8	3/4	3	0.030	8	317228
5/8	5/8	3/4	3	0.060	8	317232
5/8	5/8	3/4	3	0.090	8	317236
5/8	5/8	1-5/8	3-1/2	-	8	317238
5/8	5/8	1-5/8	3-1/2	0.030	8	317240
5/8	5/8	1-5/8	3-1/2	0.060	8	317243
5/8	5/8	1-5/8	3-1/2	0.090	8	317245
3/4	3/4	1	4	-	10	317247
3/4	3/4	1	4	0.030	10	317249
3/4	3/4	1	4	0.060	10	317253
3/4	3/4	1	4	0.090	10	317257
3/4	3/4	1	4	0.120	10	317260
3/4	3/4	1-5/8	4	-	10	317262
3/4	3/4	1-5/8	4	0.030	10	317264
3/4	3/4	1-5/8	4	0.060	10	317267
3/4	3/4	1-5/8	4	0.090	10	317269
3/4	3/4	1-5/8	4	0.120	10	317272
1	1	1-1/4	4	-	10	317275
1	1	1-1/4	4	0.030	10	317277
1	1	1-1/4	4	0.060	10	317279
1	1	1-1/4	4	0.090	10	317282
1	1	1-1/4	4	0.120	10	317286
1	1	2	4	-	10	317288
1	1	2	4	0.030	10	317291
1	1	2	4	0.060	10	317295
1	1	2	4	0.090	10	317299
1	1	2	4	0.120	10	317302
1	1	3-1/4	6	-	10	317305
1	1	3-1/4	6	0.030	10	317309
1	1	3-1/4	6	0.060	10	317311
1	1	3-1/4	6	0.090	10	317314
1	1	3-1/4	6	0.120	10	317317

More About the Series 280

Ideal for Titanium and Titanium Alloys



PERFORMANCE

Premium Carbide End Mill for Titanium



Series 285 | 840 | Multi Flute | Square & Radius | Reduced Neck | Titanium

Diameter	Shank Dia.	LOC	OAL	Radius	Flutes	Length Below Shank	EDP
1/2	1/2	5/8	3	-	8	1-1/8	317321
1/2	1/2	5/8	3	0.030	8	1-1/8	317324
1/2	1/2	5/8	3	0.060	8	1-1/8	317326
1/2	1/2	5/8	4	-	8	2-1/8	317329
1/2	1/2	5/8	4	0.030	8	2-1/8	317331
1/2	1/2	5/8	4	0.060	8	2-1/8	317335
1/2	1/2	5/8	6	-	8	3-1/8	317339
1/2	1/2	5/8	6	0.030	8	3-1/8	317343
1/2	1/2	5/8	6	0.060	8	3-1/8	317345
5/8	5/8	3/4	4	-	8	1-5/8	317349
5/8	5/8	3/4	4	0.030	8	1-5/8	317352
5/8	5/8	3/4	4	0.060	8	1-5/8	317354
5/8	5/8	3/4	4	0.090	8	1-5/8	317358
5/8	5/8	3/4	5	-	8	2-5/8	317362
5/8	5/8	3/4	5	0.030	8	2-5/8	317364
5/8	5/8	3/4	5	0.060	8	2-5/8	317368
5/8	5/8	3/4	5	0.090	8	2-5/8	317370
5/8	5/8	3/4	6	-	8	3-5/8	317374
5/8	5/8	3/4	6	0.030	8	3-5/8	317376
5/8	5/8	3/4	6	0.060	8	3-5/8	317378
5/8	5/8	3/4	6	0.090	8	3-5/8	317381
3/4	3/4	1	4	-	10	1-7/8	317385
3/4	3/4	1	4	0.030	10	1-7/8	317388
3/4	3/4	1	4	0.060	10	1-7/8	317391
3/4	3/4	1	4	0.090	10	1-7/8	317395
3/4	3/4	1	4	0.120	10	1-7/8	317398
3/4	3/4	1	5	-	10	2-7/8	317402
3/4	3/4	1	5	0.030	10	2-7/8	317406
3/4	3/4	1	5	0.060	10	2-7/8	317409
3/4	3/4	1	5	0.090	10	2-7/8	317412
3/4	3/4	1	5	0.120	10	2-7/8	317414
3/4	3/4	1	6	-	10	3-7/8	317416
3/4	3/4	1	6	0.030	10	3-7/8	317420
3/4	3/4	1	6	0.060	10	3-7/8	317423
3/4	3/4	1	6	0.090	10	3-7/8	317427
3/4	3/4	1	6	0.120	10	3-7/8	317430
1	1	1-1/4	4	-	10	1-5/8	317433
1	1	1-1/4	4	0.030	10	1-5/8	317435

More About the Series 285

Ideal for Titanium and Titanium Alloys

Reduced neck for extended reach



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mill for Titanium



Series 285 | 840 | Multi Flute | Square & Radius | Reduced Neck | Titanium

Diameter	Shank Dia.	LOC	OAL	Radius	Flutes	Length Below Shank	EDP
1	1	1-1/4	4	0.060	10	1-5/8	317439
1	1	1-1/4	4	0.090	10	1-5/8	317441
1	1	1-1/4	4	0.120	10	1-5/8	317444
1	1	1-1/4	5	-	10	2-5/8	317447
1	1	1-1/4	5	0.030	10	2-5/8	317449
1	1	1-1/4	5	0.060	10	2-5/8	317452
1	1	1-1/4	5	0.090	10	2-5/8	317454
1	1	1-1/4	5	0.120	10	2-5/8	317458
1	1	1-1/4	6	-	10	3-5/8	317461
1	1	1-1/4	6	0.030	10	3-5/8	317464
1	1	1-1/4	6	0.060	10	3-5/8	317467
1	1	1-1/4	6	0.090	10	3-5/8	317470
1	1	1-1/4	6	0.120	10	3-5/8	317474

More About the Series 285

Ideal for Titanium and Titanium Alloys

Reduced neck for extended reach



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 210 335 | 3FL | Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	TiCN EDP	AlTiN EDP
1/8	1/8	1/4	1-1/2	0.010	317477	317480	-
1/8	1/8	1/2	1-1/2	0.010	317483	317488	317486
5/32	5/32	5/16	2	0.010	-	317493	317491
5/32	5/32	9/16	2	0.010	317496	-	317498
3/16	3/16	5/16	2	0.010	317501	317507	317503
3/16	3/16	9/16	2	0.010	317511	317513	-
7/32	7/32	3/8	2	0.015	317515	317520	317517
7/32	7/32	3/4	2-1/2	0.015	-	317526	317522
1/4	1/4	3/8	2	0.015	317529	-	317533
1/4	1/4	3/4	2-1/2	0.015	317535	317539	317537
9/32	9/32	7/16	2	0.015	-	317546	317543
9/32	9/32	13/16	2-1/2	0.015	-	317550	317548
5/16	5/16	7/16	2	0.015	317554	317558	-
5/16	5/16	13/16	2-1/2	0.015	317560	317565	317562
11/32	11/32	1/2	2	0.015	-	317571	317568
11/32	11/32	1	2-1/2	0.015	317575	-	317579
3/8	3/8	1/2	2	0.015	317583	317590	317587
3/8	3/8	1	2-1/2	0.015	317594	317596	-
7/16	7/16	1	2-3/4	0.015	317600	317606	317602
7/16	7/16	9/16	2-1/2	0.015	-	317613	317609
1/2	1/2	5/8	2-1/2	0.030	317617	-	317619
1/2	1/2	1-1/4	3	0.030	317622	317628	317624
5/8	5/8	3/4	3	0.030	317630	317634	-
5/8	5/8	1-5/8	3-1/2	0.030	317637	317643	317639
3/4	3/4	1	3	0.030	-	317649	317645
3/4	3/4	1-5/8	4	0.030	317653	-	317655
1	1	1-1/4	3	0.030	317657	317661	317659
1	1	2	4	0.030	-	317667	317663

More About the Series 210

Ideal for Semi-Roughing and Finishing



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

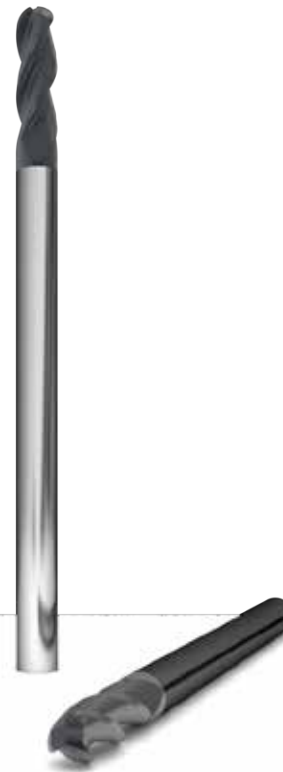


Series 215 335BN | 3FL | Ball Nose

Diameter	Shank Dia.	LOC	OAL	Bright EDP	TiCN EDP	AlTiN EDP
1/8	1/8	1/4	1-1/2	317671	317677	317675
1/8	1/8	1/2	1-1/2	317681	317685	317683
5/32	5/32	5/16	2	317687	317692	317690
5/32	5/32	9/16	2	317694	317700	317697
3/16	3/16	5/16	2	317702	317709	317705
3/16	3/16	9/16	2	317712	317719	317715
7/32	7/32	3/8	2	317722	317727	317725
7/32	7/32	3/4	2-1/2	317729	317735	317731
1/4	1/4	3/8	2	317738	317744	317740
1/4	1/4	3/4	2-1/2	317746	317752	317749
9/32	9/32	7/16	2	317755	317763	317759
9/32	9/32	13/16	2-1/2	317766	317773	317769
5/16	5/16	7/16	2	317775	317782	317778
5/16	5/16	13/16	2-1/2	317784	317790	317788
11/32	11/32	1/2	2	317794	317801	317798
11/32	11/32	1	2-1/2	317805	317809	317807
3/8	3/8	1/2	2	317811	317815	317813
3/8	3/8	1	2-1/2	317818	317822	317820
7/16	7/16	1	2-3/4	317824	317830	317827
7/16	7/16	9/16	2-1/2	317833	317838	317836
1/2	1/2	5/8	2-1/2	317840	317846	317843
1/2	1/2	1-1/4	3	317850	317858	317854
5/8	5/8	3/4	3	317860	317864	317862
5/8	5/8	1-5/8	3-1/2	317868	317876	317872
3/4	3/4	1	3	317880	317886	317883
3/4	3/4	1-5/8	4	317890	317896	317894
1	1	1-1/4	3	317899	317904	317901
1	1	2	4	317907	317912	317910

More About the Series 215

Ideal for Semi-Roughing and Finishing



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 220		545 5FL Square & Radius					
Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	TiCN EDP	AlTiN EDP
1/8	1/8	1/4	1-1/2	-	317915	317923	317919
1/8	1/8	1/2	1-1/2	-	317927	317932	317929
1/8	3/8	1/4	2-1/2	-	317934	-	-
5/32	3/16	5/16	2	-	317936	317940	317938
5/32	3/16	9/16	2	-	317944	317950	317948
3/16	3/16	5/16	2	-	317954	317959	317957
3/16	3/16	9/16	2	-	317962	317969	317965
3/16	3/8	5/16	2-1/2	-	317973	-	-
7/32	5/16	13/16	2-1/2	-	317975	-	-
7/32	1/4	3/8	2	-	317978	317986	317982
7/32	1/4	3/4	2-1/2	-	317988	317994	317990
1/4	1/4	3/8	2	-	317996	318001	317999
1/4	1/4	3/8	2	0.030	-	-	318005
1/4	1/4	3/8	2-1/2	-	318009	-	-
1/4	1/4	3/4	2-1/2	-	318012	318018	318015
1/4	1/4	3/4	2-1/2	0.010	-	-	318021
1/4	1/4	3/4	2-1/2	0.015	-	-	318024
1/4	1/4	3/4	2-1/2	0.020	-	-	318027
1/4	1/4	3/4	2-1/2	0.025	-	-	318031
1/4	1/4	3/4	2-1/2	0.030	-	-	318034
1/4	1/4	3/4	2-1/2	0.035	-	-	318036
1/4	1/4	3/4	2-1/2	0.045	-	-	318038
1/4	1/4	3/4	2-1/2	0.060	-	-	318041
1/4	1/4	1-1/4	4	-	318044	318051	318047
1/4	3/8	3/8	2-1/2	-	318055	-	-
9/32	5/16	7/16	2	-	318059	318066	318063
9/32	5/16	13/16	2-1/2	-	-	318072	318068
5/16	5/16	7/16	2	-	318074	318079	318076
5/16	5/16	13/16	2-1/2	-	318082	318090	318086
5/16	5/16	1-1/4	4	-	318094	318099	318097
11/32	3/8	1/2	2	-	318102	318108	318104
11/32	3/8	1	2-1/2	-	318112	318117	318114
3/8	3/8	1/2	2	-	318119	318127	318123
3/8	3/8	1/2	2	0.030	-	-	318130
3/8	3/8	1/2	2	0.060	-	-	318132
3/8	3/8	1	2-1/2	-	318136	318141	318138
3/8	3/8	1	2-1/2	0.010	-	-	318143
3/8	3/8	1	2-1/2	0.015	-	-	318147
3/8	3/8	1	2-1/2	0.020	-	-	318150
3/8	3/8	1	2-1/2	0.025	-	-	318154
3/8	3/8	1	2-1/2	0.030	-	-	318158

More About the Series 220

Ideal tool for finishing



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 220 | 545 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	TiCN EDP	AlTiN EDP
3/8	3/8	1	2-1/2	0.035	-	-	318160
3/8	3/8	1	2-1/2	0.040	-	-	318164
3/8	3/8	1	2-1/2	0.045	-	-	318166
3/8	3/8	1	2-1/2	0.060	-	-	318168
3/8	3/8	1	2-1/2	0.090	-	-	318171
3/8	3/8	1	2-1/2	0.125	-	-	318174
3/8	3/8	1-1/2	4	-	318178	318184	318181
3/8	3/8	1-1/2	4	0.030	-	-	318186
3/8	3/8	1-1/2	4	0.060	-	-	318190
13/32	7/16	9/16	2-1/2	-	318193	318199	318197
13/32	7/16	1	2-3/4	-	318203	318210	318207
7/16	7/16	9/16	2-1/2	-	318213	318219	318215
7/16	7/16	1	2-3/4	-	318222	318230	318226
7/16	7/16	2	4	-	318232	318238	318234
15/32	1/2	5/8	2-1/2	-	318240	318245	318243
15/32	1/2	1-1/4	3	-	318249	318255	318253
1/2	1/2	5/8	2-1/2	-	318259	318264	318262
1/2	1/2	5/8	2-1/2	0.030	-	-	318267
1/2	1/2	5/8	2-1/2	0.060	-	-	318271
1/2	1/2	5/8	2-1/2	0.090	-	-	318273
1/2	1/2	1-1/4	3	-	318276	318283	318279
1/2	1/2	1-1/4	3	0.010	-	-	318287
1/2	1/2	1-1/4	3	0.015	-	-	318291
1/2	1/2	1-1/4	3	0.020	-	-	318295
1/2	1/2	1-1/4	3	0.025	-	-	318297
1/2	1/2	1-1/4	3	0.030	-	-	318301
1/2	1/2	1-1/4	3	0.035	-	-	318305
1/2	1/2	1-1/4	3	0.040	-	-	318308
1/2	1/2	1-1/4	3	0.045	-	-	318312
1/2	1/2	1-1/4	3	0.060	-	-	318315
1/2	1/2	1-1/4	3	0.090	-	-	318318
1/2	1/2	2	4	-	318320	318325	318323
1/2	1/2	2	4	0.030	-	-	318329
1/2	1/2	2	4	0.060	-	-	318333
1/2	1/2	2	4	0.090	-	-	318336
9/16	5/8	1-1/2	3-1/2	-	318340	318347	318344
5/8	5/8	3/4	3	-	318351	318359	318355
5/8	5/8	3/4	3	0.030	-	-	318362
5/8	5/8	3/4	3	0.060	-	-	318366
5/8	5/8	3/4	3	0.900	-	-	318370
5/8	5/8	1-5/8	3-1/2	-	318373	318381	318377

More About the Series 220

Ideal tool for finishing



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 220 545 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	TiCN EDP	AlTiN EDP
5/8	5/8	1-5/8	3-1/2	0.015	-	-	318383
5/8	5/8	1-5/8	3-1/2	0.020	-	-	318385
5/8	5/8	1-5/8	3-1/2	0.025	-	-	318387
5/8	5/8	1-5/8	3-1/2	0.030	-	-	318390
5/8	5/8	1-5/8	3-1/2	0.045	-	-	318394
5/8	5/8	1-5/8	3-1/2	0.060	-	-	318397
5/8	5/8	1-5/8	3-1/2	0.090	-	-	318399
5/8	5/8	2-1/2	5	-	318403	318407	318405
5/8	5/8	2-1/2	5	0.030	-	-	318409
5/8	5/8	2-1/2	5	0.060	-	-	318411
5/8	5/8	2-1/2	5	0.090	-	-	318413
3/4	3/4	1	3	-	318415	318421	318419
3/4	3/4	1	3	0.030	-	-	318425
3/4	3/4	1	3	0.060	-	-	318427
3/4	3/4	1	3	0.090	-	-	318430
3/4	3/4	1-5/8	4	-	318433	318441	318437
3/4	3/4	1-5/8	4	0.015	-	-	318443
3/4	3/4	1-5/8	4	0.020	-	-	318446
3/4	3/4	1-5/8	4	0.025	-	-	318448
3/4	3/4	1-5/8	4	0.300	-	-	318452
3/4	3/4	1-5/8	4	0.045	-	-	318456
3/4	3/4	1-5/8	4	0.060	-	-	318458
3/4	3/4	1-5/8	4	0.090	-	-	318462
3/4	3/4	1-5/8	4	0.125	-	-	318466
3/4	3/4	1-5/8	4	0.150	-	-	318469
3/4	3/4	3-1/4	6	-	318473	318478	318476
3/4	3/4	3-1/4	6	0.030	-	-	318480
3/4	3/4	3-1/4	6	0.060	-	-	318482
3/4	3/4	3-1/4	6	0.090	-	-	318484
7/8	7/8	2	4	-	318488	318492	318490
1	1	1-1/4	3	-	318496	318503	318500
1	1	1-1/4	3	0.030	-	-	318505
1	1	1-1/4	3	0.060	-	-	318508
1	1	1-1/4	3	0.090	-	-	318512
1	1	2	4	-	318516	318523	318520
1	1	2	4	0.030	-	-	318527
1	1	2	4	0.060	-	-	318531
1	1	2	4	0.090	-	-	318535
1	1	2	4	0.125	-	-	318539
1	1	2	4	0.150	-	-	318542
1	1	3-1/4	6	-	318545	318553	318549

More About the Series 220

Ideal tool for finishing



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PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

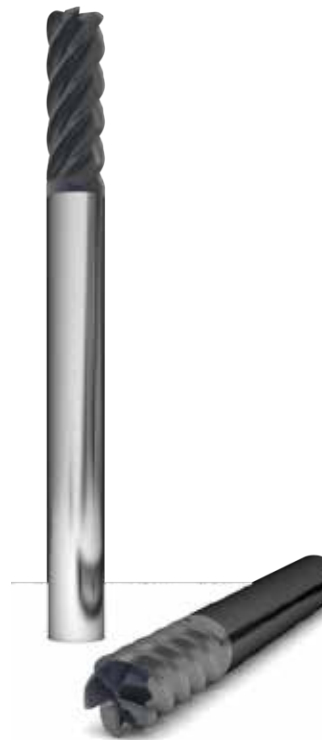


Series 220 | 545 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	TiCN EDP	AlTiN EDP
1	1	3-1/4	6	0.060	-	-	318561
1	1	3-1/4	6	0.090	-	-	318563
1-1/4	1-1/4	2	4-1/2	-	-	318568	318566
1-1/4	1-1/4	3-1/4	6	-	318571	318578	318574

More About the Series 220

Ideal tool for finishing



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 225 | 502,502S,562,582 | 2FL | Square

Diameter	Shank Dia.	LOC	OAL	EDP
3/64	1/8	3/32	1-1/2	318582
3/64	1/8	9/64	1-1/2	318586
1/16	1/8	1/8	1-1/2	318588
1/16	1/8	3/16	1-1/2	318590
5/64	1/8	1/4	1-1/2	318592
3/32	1/8	3/16	1-1/2	318594
3/32	1/8	3/8	1-1/2	318596
7/64	1/8	3/8	1-1/2	318600
1/8	1/8	1/4	1-1/2	318603
1/8	1/8	1/2	1-1/2	318605
1/8	1/8	1/2	1-1/2	318609
1/8	1/8	1	3	318612
9/64	3/16	1/2	2	318615
5/32	3/16	5/16	2	318619
5/32	3/16	9/16	2	318622
11/64	3/16	5/8	2	318625
3/16	3/16	5/16	2	318628
3/16	3/16	5/8	2	318632
3/16	3/16	3/4	2.25	318636
3/16	3/16	1-1/8	3	318639
13/64	1/4	5/8	2-1/2	318641
7/32	1/4	7/16	2	318645
7/32	1/4	5/8	2-1/2	318648
1/4	1/4	1/2	2	318652
1/4	1/4	3/4	2-1/2	318654
1/4	1/4	1	4	318658
1/4	1/4	1-1/8	3	318660
1/4	1/4	1-1/2	6	318668
9/32	5/16	3/4	2-1/2	318671
19/64	5/16	13/16	2-1/2	318675
5/16	5/16	1/2	2	318677
5/16	5/16	13/16	2-1/2	318681
5/16	5/16	1-1/8	3	318683
5/16	5/16	1-5/8	4	318686
21/64	3/8	7/8	2-1/2	318690
11/32	3/8	7/8	2-1/2	318692
3/8	3/8	5/8	2	318696
3/8	3/8	7/8	2-1/2	318698

More About the Series 225

Coatings available upon request



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

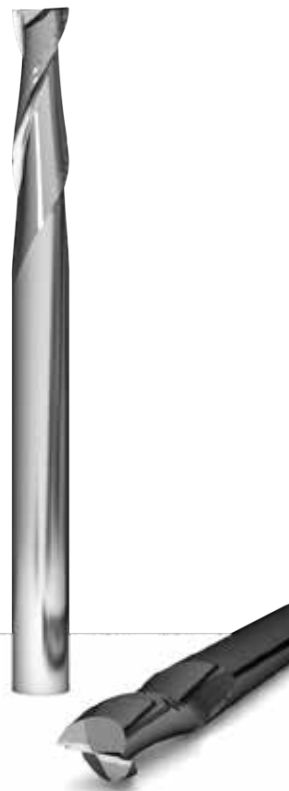


Series 225 | 502,502S,562,582 | 2FL | Square

Diameter	Shank Dia	LOC	OAL	EDP
3/8	3/8	1	4	318702
3/8	3/8	1.125	3	318705
3/8	3/8	1-1/2	6	318708
3/8	3/8	1-3/4	4	318711
13/32	7/16	1	2-3/4	318715
7/16	7/16	1	2-3/4	318717
7/16	7/16	3	6	318720
1/2	1/2	5/8	2-1/2	318722
1/2	1/2	2	4	318725
1/2	1/2	2-1/4	4	318727
1/2	1/2	1-1/2	6	318729
1/2	1/2	3	6	318733
5/8	5/8	3/4	3	318735
5/8	5/8	1-1/4	3-1/2	318738
5/8	5/8	2-1/4	5	318742
5/8	5/8	3	6	318745
3/4	3/4	2-1/4	4	318751
3/4	3/4	3	5	318755
3/4	3/4	4	7	318758
7/8	7/8	1-1/2	4	318761
1	1	1-1/2	4	318764
1	1	2-1/4	5	318767
1	1	4	7	318771

More About the Series 225

Coatings available upon request



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PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

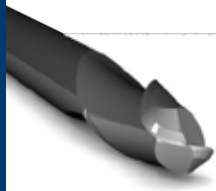


Series 227 | 502SBN, 502BN, 562BN, 582BN | 2FL | Ball Nose

Diameter	Shank Dia.	LOC	OAL	EDP
3/64	1/8	3/32	1-1/2	318775
3/64	1/8	9/64	1-1/2	318778
1/16	1/8	1/8	1-1/2	318780
1/16	1/8	3/16	1-1/2	318784
5/64	1/8	1/4	1-1/2	318788
3/32	1/8	3/16	1-1/2	318790
3/32	1/8	3/8	1-1/2	318794
7/64	1/8	3/8	1-1/2	318797
1/8	1/8	1	3	318800
1/8	1/8	1/2	1-1/2	318802
1/8	1/8	1/4	1-1/2	318804
1/8	1/8	3/4	2-1/4	318807
9/64	3/16	9/16	2	318811
5/32	3/16	5/16	2	318815
5/32	3/16	9/16	2	318818
11/64	3/16	5/8	2	318821
3/16	3/16	1-1/8	3	318825
3/16	3/16	3/4	2-1/4	318829
3/16	3/16	5/16	2	318833
3/16	3/16	5/8	2	318836
13/64	1/4	3/4	2-1/2	318840
7/32	1/4	5/8	2-1/2	318844
7/32	1/4	7/16	2	318848
1/4	1/4	1	4	318850
1/4	1/4	1-1/2	4	318853
1/4	1/4	1-1/2	6	318857
1/4	1/4	1-1/8	3	318861
1/4	1/4	1/2	2	318865
1/4	1/4	3/4	2-1/2	318869
9/32	5/16	3/4	2-1/2	318872
19/64	5/16	13/16	2-1/2	318875
5/16	5/16	1-5/8	4	318877
5/16	5/16	1-1/8	3	318879
5/16	5/16	1/2	2	318883
5/16	5/16	13/16	2-1/2	318887
21/64	3/8	7/8	2-1/2	318889
11/32	3/8	7/8	2-1/2	318892
3/8	3/8	1	4	318896
3/8	3/8	1-1/2	6	318899

More About the Series 227

Coatings available upon request



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 227 502SBN, 502BN, 562BN, 582BN | 2FL | Ball Nose

Diameter	Shank Dia	LOC	OAL	EDP
3/8	3/8	1-3/4	4	318901
3/8	3/8	1-1/8	3	318905
3/8	3/8	5/8	2	318907
3/8	3/8	7/8	2-1/2	318911
13/32	7/16	1	2-3/4	318913
7/16	7/16	1	2-3/4	318916
7/16	7/16	2	4	318920
7/16	7/16	3	6	318922
1/2	1/2	1	3	318926
1/2	1/2	1	4	318930
1/2	1/2	1-1/2	6	318933
1/2	1/2	2	4	318935
1/2	1/2	3	6	318938
1/2	1/2	5/8	2-1/2	318941
9/16	9/16	1-1/8	3-1/2	318944
5/8	5/8	3	6	318948
5/8	5/8	1-1/4	3-1/2	318952
5/8	5/8	2-1/4	5	318956
5/8	5/8	3/4	3	318959
3/4	3/4	1	3	318962
3/4	3/4	3	6	318966
3/4	3/4	1-1/2	4	318970
3/4	3/4	2-1/4	5	318972
7/8	7/8	1-1/2	4	318976
1	1	3	6	318978
1	1	1-1/2	4	318982
1	1	2-1/4	5	318986

More About the Series 227

Coatings available upon request



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

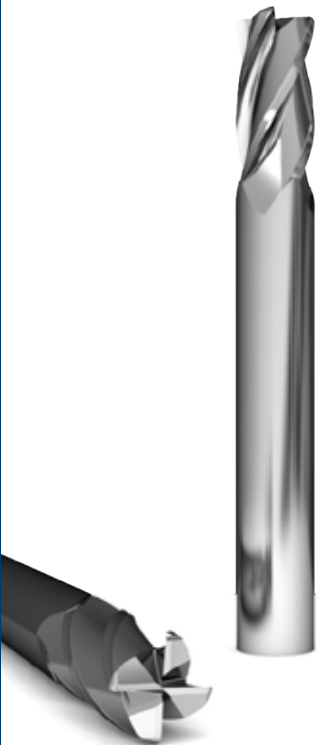


Series 230 504, 504S 564, 584 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Coating	EDP
3/64	1/8	3/32	1-1/2	-	Bright	318989
3/64	1/8	9/64	1-1/2	-	Bright	318992
1/16	1/8	1/8	1-1/2	-	Bright	318996
1/16	1/8	3/16	1-1/2	-	Bright	319000
5/64	1/8	1/4	1-1/2	-	Bright	319003
3/32	1/8	3/16	1-1/2	-	Bright	319007
3/32	1/8	3/8	1-1/2	-	Bright	319010
7/64	1/8	3/8	1-1/2	-	Bright	319012
1/8	1/8	1/4	1-1/2	-	AlTiN	319014
1/8	1/8	1/2	1-1/2	0.015	AlTiN	319017
1/8	1/8	1/2	1-1/2	0.020	AlTiN	319019
1/8	1/8	1/2	1-1/2	0.030	Bright	319022
1/8	1/8	1/2	1-1/2	-	Bright	319025
1/8	1/8	3/4	2-1/4	-	Bright	319029
1/8	1/8	1	3	-	Bright	319032
9/64	3/16	9/16	2	-	Bright	319034
5/32	3/16	5/16	2	-	Bright	319038
5/32	3/16	9/16	2	-	Bright	319042
11/64	3/16	5/8	2	-	Bright	319044
3/16	3/16	5/16	2	-	AlTiN	319048
3/16	3/16	5/8	2	0.015	AlTiN	319052
3/16	3/16	5/8	2	0.020	AlTiN	319056
3/16	3/16	5/8	2	0.030	Bright	319058
3/16	3/16	5/8	2	-	Bright	319060
3/16	3/16	3/4	2-1/4	-	Bright	319062
3/16	3/16	1-1/8	3	-	Bright	319066
13/64	1/4	5/8	2-1/2	-	Bright	319070
7/32	1/4	7/16	2	-	Bright	319073
7/32	1/4	5/8	2-1/2	-	Bright	319077
1/4	1/4	1/2	2	-	AlTiN	319079
1/4	1/4	3/4	2-1/2	0.015	AlTiN	319083
1/4	1/4	3/4	2-1/2	0.020	AlTiN	319087
1/4	1/4	3/4	2-1/2	0.030	AlTiN	319089
1/4	1/4	3/4	2-1/2	0.045	AlTiN	319092
1/4	1/4	3/4	2-1/2	0.060	Bright	319096
1/4	1/4	3/4	2-1/2	-	AlTiN	319100
1/4	1/4	13/16	2-1/2	0.015	Bright	319104
1/4	1/4	1	4	-	Bright	319106
1/4	1/4	1-1/8	3	-	Bright	319108

More About the Series 230

Diverse for use in all general machining applications



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 230 504, 504S 564, 584 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Coating	EDP
1/4	1/4	1-1/2	4	-	Bright	319111
1/4	1/4	1-1/2	6	-	Bright	319113
9/32	5/16	3/4	2-1/2	-	Bright	319115
19/64	5/16	13/16	2-1/2	-	Bright	319119
5/16	5/16	1/2	2	-	AlTiN	319123
5/16	1/4	13/16	2-1/2	0.020	AlTiN	319127
5/16	1/4	13/16	2-1/2	0.030	AlTiN	319131
5/16	1/4	13/16	2-1/2	0.045	AlTiN	319133
5/16	1/4	13/16	2-1/2	0.060	Bright	319137
5/16	5/16	13/16	2-1/2	-	Bright	319140
5/16	5/16	1-1/8	3	-	Bright	319143
5/16	5/16	1-5/8	4	-	Bright	319147
21/64	3/8	7/8	2-1/2	-	Bright	319150
11/32	3/8	7/8	2-1/2	-	Bright	319152
3/8	3/8	5/8	2	-	AlTiN	319154
3/8	3/8	7/8	2-1/2	0.015	AlTiN	319157
3/8	3/8	7/8	2-1/2	0.020	AlTiN	319160
3/8	3/8	7/8	2-1/2	0.030	AlTiN	319162
3/8	3/8	7/8	2-1/2	0.045	AlTiN	319165
3/8	3/8	7/8	2-1/2	0.060	Bright	319169
3/8	3/8	7/8	2-1/2	-	Bright	319173
3/8	3/8	1	4	-	Bright	319175
3/8	3/8	1-1/8	3	-	Bright	319177
3/8	3/8	1-1/2	6	-	Bright	319179
3/8	3/8	1-3/4	4	-	Bright	319183
13/32	7/16	1	2-3/4	-	Bright	319187
7/16	7/16	1	2-3/4	-	Bright	319190
7/16	7/16	3	6	-	Bright	319193
1/2	1/2	5/8	2-1/2	-	AlTiN	319197
1/2	1/2	1	3	0.015	AlTiN	319199
1/2	1/2	1	3	0.020	AlTiN	319203
1/2	1/2	1	3	0.030	AlTiN	319205
1/2	1/2	1	3	0.045	AlTiN	319207
1/2	1/2	1	3	0.060	AlTiN	319209
1/2	1/2	1	3	0.090	AlTiN	319212
1/2	1/2	1	3	0.125	Bright	319215
1/2	1/2	1	3	-	Bright	319218
1/2	1/2	1	4	-	Bright	319222
1/2	1/2	1-1/2	6	-	Bright	319226
1/2	1/2	2	4	-	Bright	319229

More About the Series 230

Diverse for use in all general machining applications



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

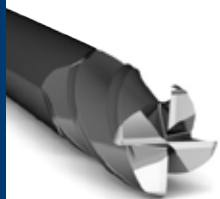


Series 230 504, 504S 564, 584 | 4FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Coating	EDP
1/2	1/2	3	6	-	Bright	319232
9/16	9/16	1-1/8	3-1/2	-	Bright	319235
5/8	5/8	3/4	3	-	AlTiN	319237
5/8	5/8	1-1/4	3-1/2	0.015	AlTiN	319239
5/8	5/8	1-1/4	3-1/2	0.020	AlTiN	319241
5/8	5/8	1-1/4	3-1/2	0.030	AlTiN	319243
5/8	5/8	1-1/4	3-1/2	0.045	AlTiN	319246
5/8	5/8	1-1/4	3-1/2	0.060	AlTiN	319248
5/8	5/8	1-1/4	3-1/2	0.090	Bright	319252
5/8	5/8	1-1/4	3-1/2	-	Bright	319255
5/8	5/8	2-1/4	5	-	Bright	319259
5/8	5/8	3	6	-	Bright	319262
3/4	3/4	1	3	-	AlTiN	319265
3/4	3/4	1-1/2	4	0.015	AlTiN	319269
3/4	3/4	1-1/2	4	0.020	AlTiN	319271
3/4	3/4	1-1/2	4	0.030	AlTiN	319275
3/4	3/4	1-1/2	4	0.045	AlTiN	319278
3/4	3/4	1-1/2	4	0.060	AlTiN	319282
3/4	3/4	1-1/2	4	0.090	AlTiN	319284
3/4	3/4	1-1/2	4	0.125	Bright	319287
3/4	3/4	1-1/2	4	-	Bright	319290
3/4	3/4	2-1/4	5	-	Bright	319292
3/4	3/4	3	6	-	Bright	319295
3/4	3/4	4	7	-	Bright	319298
7/8	7/8	1-1/2	4	-	AlTiN	319300
1	1	1-1/2	4	0.015	AlTiN	319304
1	1	1-1/2	4	0.020	AlTiN	319307
1	1	1-1/2	4	0.030	AlTiN	319309
1	1	1-1/2	4	0.045	AlTiN	319313
1	1	1-1/2	4	0.060	AlTiN	319316
1	1	1-1/2	4	0.090	AlTiN	319320
1	1	1-1/2	4	0.125	Bright	319324
1	1	1-1/2	4	-	Bright	319327
1	1	2-1/4	5	-	Bright	319330
1	1	3	6	-	Bright	319332
1	1	4	7	-	Bright	319335

More About the Series 230

Diverse for use in all general machining applications



★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

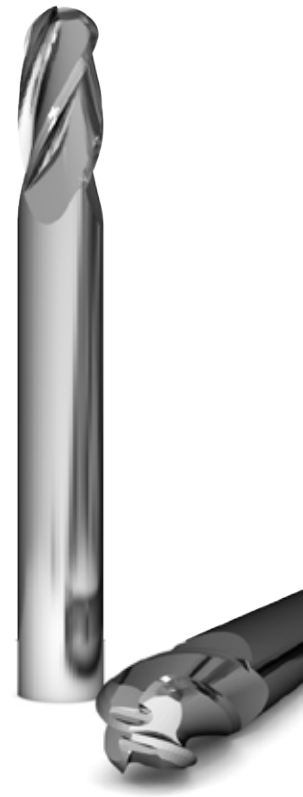


Series 237 | 504SBN, 504BN, 564BN, 584BN | 4FL | Ball Nose

Diameter	Shank Dia	LOC	OAL	EDP
3/64	1/8	3/32	1-1/2	319337
3/64	1/8	9/64	1-1/2	319340
1/16	1/8	1/8	1-1/2	319344
1/16	1/8	3/16	1-1/2	319346
5/64	1/8	1/4	1-1/2	319350
3/32	1/8	3/16	1-1/2	319353
3/32	1/8	3/8	1-1/2	319356
7/64	1/8	7/16	1-1/2	319358
1/8	1/8	1	3	319360
1/8	1/8	1/2	1-1/2	319364
1/8	1/8	1/4	1-1/2	319368
1/8	1/8	3/4	2-1/4	319371
9/64	3/16	9/16	2	319373
5/32	3/16	5/16	2	319377
5/32	3/16	9/16	2	319379
11/64	3/16	5/8	2	319381
3/16	3/16	1-1/8	3	319385
3/16	3/16	3/4	2-1/4	319389
3/16	3/16	5/16	2	319391
3/16	3/16	5/8	2	319394
13/64	1/4	5/8	2-1/2	319396
7/32	1/4	5/8	2-1/2	319398
7/32	1/4	7/16	2	319402
1/4	1/4	1	4	319405
1/4	1/4	1-1/2	4	319409
1/4	1/4	1-1/2	6	319413
1/4	1/4	1-1/8	3	319415
1/4	1/4	1/2	2	319419
1/4	1/4	3/4	2-1/2	319421
9/32	5/16	3/4	2-1/2	319425
19/64	5/16	13/16	2-1/2	319427
5/16	5/16	1-5/8	4	319430
5/16	5/16	1-1/8	3	319434
5/16	5/16	1/2	2	319436
5/16	5/16	13/16	2-1/2	319438
21/64	3/8	7/8	2-1/2	319440
11/32	3/8	7/8	2-1/2	319442
3/8	3/8	1	4	319445
3/8	3/8	1-1/2	6	319447
3/8	3/8	1-3/4	4	319450

More About the Series 237

Radii available on request
Coatings available upon request



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PERFORMANCE

Premium Carbide End Mills for Ferrous Materials



Series 237 | 504SBN, 504BN, 564BN, 584BN | 4FL | Ball Nose

Diameter	Shank Dia.	LOC	OAL	EDP
3/8	3/8	1-1/8	3	319452
3/8	3/8	5/8	2	319455
3/8	3/8	7/8	2-1/2	319459
13/32	7/16	1	2-3/4	319462
7/16	7/16	1	2-3/4	319464
7/16	7/16	2	4	319466
7/16	7/16	3	6	319468
1/2	1/2	1	3	319471
1/2	1/2	1	4	319474
1/2	1/2	1-1/2	6	319477
1/2	1/2	2	4	319479
1/2	1/2	3	6	319482
1/2	1/2	5/8	2-1/2	319485
9/16	9/16	1-1/8	3-1/2	319488
5/8	5/8	3	6	319491
5/8	5/8	1-1/4	3-1/2	319493
5/8	5/8	2-1/4	5	319496
5/8	5/8	3/4	3	319500
3/4	3/4	1	3	319503
3/4	3/4	3	6	319507
3/4	3/4	1-1/2	4	319511
3/4	3/4	2-1/4	5	319513
7/8	7/8	1-1/2	4	319516
1	1	3	6	319520
1	1	1-1/2	4	319524
1	1	2-1/4	5	319527

More About the Series 237

Radii available on request

Coatings available upon request



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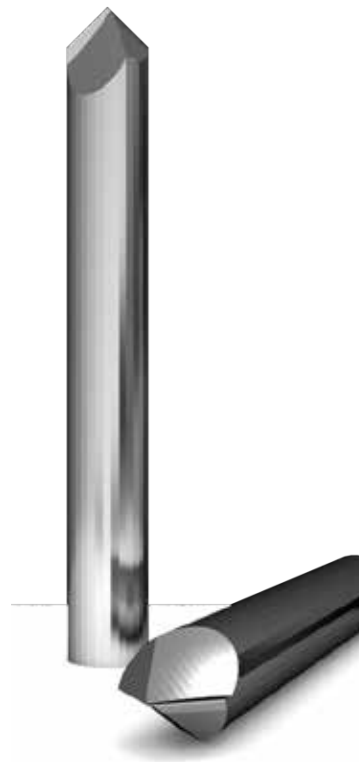
PERFORMANCE

Premium Carbide Chamfer End Mills for Ferrous Materials



Series 240 | S94 | 2FL | Chamfer Mill

Diameter	OAL	Angle	Bright EDP	TiCN EDP	AlTiN EDP
1/8	1-1/2	60°	319531	319536	319533
1/8	1-1/2	82°	319540	319544	319542
1/8	1-1/2	90°	319547	319553	319550
1/8	1-1/2	120°	319556	319562	319559
3/16	2	60°	319565	319569	319567
3/16	2	82°	319573	319577	319575
3/16	2	90°	319580	319586	319583
3/16	2	120°	319588	319593	319591
1/4	2-1/2	60°	319595	319601	319597
1/4	2-1/2	82°	319605	319613	319609
1/4	2-1/2	90°	319616	319620	319618
1/4	2-1/2	120°	319623	319631	319627
3/8	2-1/2	60°	319633	319641	319637
3/8	2-1/2	82°	319645	319649	319647
3/8	2-1/2	90°	319652	319656	319654
3/8	2-1/2	120°	319658	319665	319662
1/2	3	60°	319669	319674	319671
1/2	3	82°	319678	319683	319681
1/2	3	90°	319686	319693	319689
1/2	3	120°	319697	319703	319700
3/4	4	60°	319706	319711	319709
3/4	4	82°	319714	319719	319717
3/4	4	90°	319722	319728	319724
3/4	4	120°	319731	319739	319735



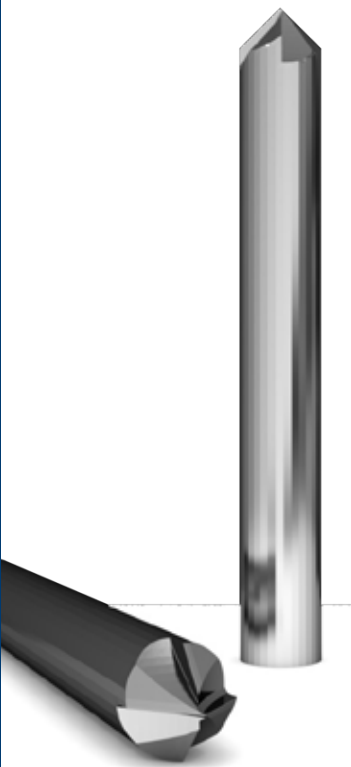
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PERFORMANCE

Premium Carbide Chamfer End Mills for Ferrous Materials



Series 241		S94 4FL Chamfer Mill			
Diameter	OAL	Angle	Bright EDP	TiCN EDP	AlTiN EDP
1/4	2-1/2	60°	319741	319747	319743
1/4	2-1/2	82°	319751	319758	319754
1/4	2-1/2	90°	319761	319767	319764
1/4	2-1/2	120°	319770	319777	319774
3/8	2-1/2	60°	319779	319784	319782
3/8	2-1/2	82°	319787	319791	319789
3/8	2-1/2	90°	319795	319802	319799
3/8	2-1/2	120°	319806	319813	319810
1/2	3	60°	319815	319820	319818
1/2	3	82°	319824	319828	319826
1/2	3	90°	319830	319836	319832
1/2	3	120°	319840	319847	319844
3/4	4	60°	319851	319857	319855
3/4	4	82°	319859	319866	319863
3/4	4	90°	319870	319876	319874
3/4	4	120°	319879	319886	319882



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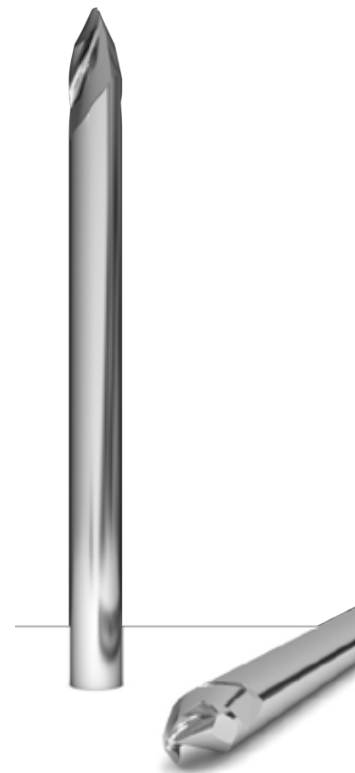
PERFORMANCE

Premium Carbide Chamfer End Mills for Ferrous Materials



Series 243 CM2 | 2FL | 90 deg. | Chamfer + End Mill

Diameter	Shank Dia.	LOC	OAL	Bright EDP	AlTiN EDP
3/32	1/8	1-1/2	90	108913	108914
3/32	1/8	1-1/2	90	108873	108874
1/8	1/8	1-1/2	90	108915	108916
1/8	1/8	1-1/2	90	108875	108876
3/16	3/16	2	90	108917	108918
3/16	3/16	2	90	108877	108878
1/4	1/4	2	90	108919	108920
1/4	1/4	2-1/2	90	108879	108880
5/16	5/16	2	90	108921	108922
5/16	5/16	2-1/2	90	108881	108882
3/8	3/8	2	90	108923	108924
3/8	3/8	2-1/2	90	108883	108884
1/2	1/2	2-1/2	90	108925	108926
1/2	1/2	3	90	108885	108886
5/8	5/8	3	90	108927	108928
5/8	5/8	3-1/2	90	108887	108888
3/4	3/4	3	90	108929	108930
3/4	3/4	4	90	108889	108890
1	1	3	90	108931	108932
1	1	4	90	108891	108892
1-1/4	1-1/4	3	90	108933	108934
1-1/4	1-1/4	4	90	108893	108894



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PERFORMANCE

Premium Carbide Chamfer End Mills for Ferrous Materials



Series 244 CM4 | 4FL | 90 deg. | Chamfer + End Mill

Diameter	Shank Dia.	LOC	OAL	Bright EDP	AlTiN EDP
3/32	1/8	1-1/2	90	108935	108936
3/32	1/8	1-1/2	90	108895	108896
1/8	1/8	1-1/2	90	108937	108938
1/8	1/8	1-1/2	90	108897	108898
3/16	3/16	2	90	108939	108940
3/16	3/16	2	90	107761	108899
1/4	1/4	2	90	108941	108942
1/4	1/4	2-1/2	90	108106	108900
5/16	5/16	2	90	108943	108944
5/16	5/16	2-1/2	90	108901	108902
3/8	3/8	2	90	108945	108946
3/8	3/8	2-1/2	90	108107	108903
1/2	1/2	2-1/2	90	108947	108948
1/2	1/2	3	90	108108	108904
5/8	5/8	3	90	108949	108950
5/8	5/8	3-1/2	90	108905	108906
3/4	3/4	3	90	108951	108952
3/4	3/4	4	90	108907	108908
1	1	3	90	108953	108954
1	1	4	90	108909	108910
1-1/4	1-1/4	3	90	108955	108956
-	1-1/4	4	90	108911	108912



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PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning








P - Steel

Finishing P15

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCMT 21.51	CG92-C	204	126030
	CCMT 32.51	CG92-C	204	126046
	CCMT 32.52	CG92-C	204	126055
	CCMT 431	CG92-C	204	126060
	DCMT 21.51	CG92-C	204	126175
	DCMT 32.5.5	CG92-C	204	126181
	DCMT 32.51	CG92-C	204	126189
	VBMT 331	CG92-C	204	126387
	VBMT 332	CG92-C	204	126394
	VCMT 22.5	CG92-C	204	126418
	VCMT 221	CG92-C	204	126424
	VCMT 331	CG92-C	204	126436

P - Steel

Semi Finishing P15

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCMT 21.51	CG92-D	205	126024
	CCMT 21.52	CG92-D	205	126031
	CCMT 32.51	CG92-D	205	126039
	CCMT 32.52	CG92-D	205	126049
	DCMT 32.51	CG92-D	205	126184
	DCMT 32.52	CG92-D	205	126194
	SCMT 431	CG92-D	205	126291
	TCMT 21.51	CG92-D	205	126341
	VBMT 331	CG92-BB	205	126390




PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



P - Steel

Finishing P25

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCMT 21.5.5	CG93-C	204	126020
	CCMT 21.51	CG93-C	204	126028
	CCMT 32.5.5	CG93-C	204	126035
	CCMT 32.51	CG93-C	204	126044
	CCMT 32.52	CG93-C	204	126047
	DCMT 21.5.5	CG93-C	204	126165
	DCMT 21.51	CG93-C	204	126173
	DCMT 32.5.5	CG93-C	204	126179
	DCMT 32.51	CG93-C	204	126190
	DCMT 32.52	CG93-C	204	126192
	VCMT 22.5	CG93-C	204	126416
	VCMT 221	CG93-C	204	126425
	VCMT 331	CG93-C	204	126437
	VCMT 332	CG93-C	204	126443

PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



P - Steel

Medium P25

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCMT 21.51	CG93-D	205	126025
	CCMT 21.52	CG93-D	205	126032
	CCMT 32.51	CG93-D	205	126040
	CCMT 32.52	CG93-D	205	126050
	CCMT 431	CG93-D	205	126058
	CCMT 432	CG93-D	205	126062
	CCMT 433	CG93-D	205	126065
	DCMT 21.51	CG93-D	205	126170
	DCMT 21.52	CG93-D	205	126176
	DCMT 32.51	CG93-D	205	126185
	DCMT 32.52	CG93-D	205	126195
	SCMT 32.51	CG93-D	205	126285
	SCMT 32.52	CG93-D	205	126288
	SCMT 431	CG93-D	205	126292
	SCMT 432	CG93-D	205	126295
	SCMT 433	CG93-D	205	126298
	TCMT 1.81.51	CG93-D	205	126336
	TCMT 21.51	CG93-D	205	126342
	TCMT 21.52	CG93-D	205	126347
	TCMT 32.51	CG93-D	205	126352
	TCMT 32.52	CG93-D	205	126356
	TCMT 32.53	CG93-D	205	126359
	VBMT 331	CG93-BB	205	126391
	VBMT 332	CG93-BB	205	126396
	VCMT 221	CG93-D	205	126420
	VCMT 222	CG93-D	205	126428
	VCMT 331	CG93-D	205	126433
	VCMT 332	CG93-D	205	126440
	WCMT 21.51	CG93-D	205	126455
	WCMT 21.52	CG93-D	205	126457
	WCMT 32.51	CG93-D	205	126459
	WCMT 32.52	CG93-D	205	126461
	WCMT 431	CG93-D	205	126463
	WCMT 432	CG93-D	205	126465
	WCMT 433	CG93-D	205	126467




PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



P - Steel

Medium P35

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCMT 21.51	CG94-D	205	126026
	CCMT 21.52	CG94-D	205	126033
	CCMT 32.51	CG94-D	205	126041
	CCMT 32.52	CG94-D	205	126051
	DCMT 21.51	CG94-D	205	126171
	DCMT 21.52	CG94-D	205	126177
	DCMT 32.51	CG94-D	205	126186
	DCMT 32.52	CG94-D	205	126196
	RCMT 0803	CG94-D	205	126272
	RCMT 1003	CG94-D	205	126273
	RCMT 1204	CG94-D	205	126274
	SCMT 32.52	CG94-D	205	126289
	SCMT 432	CG94-D	205	126296
	SCMT 433	CG94-D	205	126299
	TCMT 21.51	CG94-D	205	126343
	TCMT 21.52	CG94-D	205	126348
	TCMT 32.51	CG94-D	205	126353
	TCMT 32.52	CG94-D	205	126357
	VCMT 221	CG94-D	205	126421
	VCMT 222	CG94-D	205	126429
	VCMT 331	CG94-D	205	126434
	VCMT 332	CG94-D	205	126441


PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



P - Steel

Medium Roughing




Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	RCMT 1606	CG93-S	219	126275
	RCMT 1606	CG94-S	219	126276
	RCMT 2006Z	CG93-S	219	126277
	RCMT 2006Z	CG94-S	219	126278

PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



M - Stainless Steel Extreme Finishing

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCGT 21.5X0	CG96-E	206	126000
	CCGT 21.50	CG96-E	206	126001
	CCGT 32.5X0	CG96-E	206	126008
	CCGT 32.50	CG96-E	206	126009
	DCGT 21.5X0	CG96-E	206	126148
	DCGT 21.50	CG96-E	206	126149
	DCGT 32.5X0	CG96-E	206	126157
	DCGT 32.50	CG96-E	206	126158
	VCGT 22X0	CG96-E	206	126397
	VCGT 220	CG96-E	206	126398
	VCGT 33X0	CG96-E	206	126407
	VCGT 330	CG96-E	206	126408

PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



M - Stainless Steel M15





Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCGT 21.50	CG98-AA	207	126002
	CCGT 21.5.5	CG98-AA	207	126004
	CCGT 21.51	CG98-AA	207	126006
	CCGT 32.5.5	CG98-AA	207	126010
	CCGT 32.51	CG98-AA	207	126012
	CCGT 32.52	CG98-AA	207	126014
	CCGT 431	CG98-AA	207	126016
	CCGT 432	CG98-AA	207	126018
	DCGT 21.50	CG98-AA	207	126150
	DCGT 21.5.5	CG98-AA	207	126152
	DCGT 21.51	CG98-AA	207	126154
	DCGT 32.5.5	CG98-AA	207	126159
	DCGT 32.51	CG98-AA	207	126161
	DCGT 32.52	CG98-AA	207	126163
	SCGT 32.51	CG98-AA	207	126279
	SCGT 32.52	CG98-AA	207	126281
	SCGT 432	CG98-AA	207	126283
	TCGT 21.51	CG98-AA	207	126332
	VCGT 22.5	CG98-AA	207	126399
	VCGT 221	CG98-AA	207	126401
	VCGT 130302	CG98-AA	207	126403
	VCGT 130304	CG98-AA	207	126405
	VCGT 331	CG98-AA	207	126409
	VCGT 332	CG98-AA	207	126411
	VCGT 333	CG98-AA	207	126413

PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



M - Stainless Steel Finishing M25

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCMT 21.5.5	CG95-C	209	126021
	CCMT 21.51	CG95-C	209	126029
	CCMT 32.5.5	CG95-C	209	126036
	CCMT 32.51	CG95-C	209	126045
	CCMT 32.52	CG95-C	209	126054
	DCMT 21.5.5	CG95-C	209	126166
	DCMT 21.51	CG95-C	209	126174
	DCMT 32.5.5	CG95-C	209	126180
	DCMT 32.51	CG95-C	209	126191
	DCMT 32.52	CG95-C	209	126199
	TCMT 21.5.5	CG95-C	209	126338
	VCMT 220.5	CG95-C	209	126417
	VCMT 221	CG95-C	209	126426
	VCMT 331	CG95-C	209	126438

PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



M - Stainless Steel M25





Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCMT 21.51	CG95-D	210	126027
	CCMT 21.52	CG95-D	210	126034
	CCMT 32.51	CG95-D	210	126042
	CCMT 32.52	CG95-D	210	126052
	CCMT 431	CG95-D	210	126059
	CCMT 432	CG95-D	210	126063
	CCMT 433	CG95-D	210	126066
	DCMT 21.51	CG95-D	210	126172
	DCMT 21.52	CG95-D	210	126178
	DCMT 32.51	CG95-D	210	126187
	DCMT 32.52	CG95-D	210	126197
	SCMT 32.51	CG95-D	210	126286
	SCMT 32.52	CG95-D	210	126290
	SCMT 431	CG95-D	210	126293
	SCMT 432	CG95-D	210	126297
	SCMT 433	CG95-D	210	126300
	TCMT 1.81.51	CG95-D	210	126337
	TCMT 21.51	CG95-D	210	126344
	TCMT 21.52	CG95-D	210	126349
	TCMT 32.51	CG95-D	210	126354
	TCMT 32.52	CG95-D	210	126358
	TCMT 32.53	CG95-D	210	126360
	VCMT 221	CG95-D	210	126422
	VCMT 222	CG95-D	210	126430
	VCMT 331	CG95-D	210	126435
	VCMT 332	CG95-D	210	126442
	WCMT 21.51	CG95-D	210	126456
	WCMT 21.52	CG95-D	210	126458
	WCMT 32.51	CG95-D	210	126460
	WCMT 32.52	CG95-D	210	126462
	WCMT 431	CG95-D	210	126464
	WCMT 432	CG95-D	210	126466
	WCMT 433	CG95-D	210	126468

PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



M - Stainless Steel Medium

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCMT 32.51	CG97-D	210	126043
	CCMT 32.52	CG97-D	210	126053
	DCMT 32.51	CG97-D	210	126188
	DCMT 32.52	CG97-D	210	126198
	TCMT 21.51	CG97-D	210	126345
	TCMT 21.52	CG97-D	210	126350
	VCMT 221	CG97-D	210	126423
	VCMT 222	CG97-D	210	126431





PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



K - Cast Iron

K20

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCMT 21.51	CG99-D	211	126023
	CCMT 32.51	CG99-D	211	126038
	CCMT 32.52	CG99-D	211	126048
	CCMT 432	CG99-D	211	126061
	DCMT 21.51	CG99-D	211	126169
	DCMT 32.51	CG99-D	211	126183
	DCMT 32.52	CG99-D	211	126193
	SCMT 32.51	CG99-D	211	126284
	SCMT 32.52	CG99-D	211	126287
	SCMT 432	CG99-D	211	126294
	TCMT 1.81.51	CG99-D	211	126335
	TCMT 21.51	CG99-D	211	126340
	TCMT 21.52	CG99-D	211	126346
	TCMT 32.51	CG99-D	211	126351
	TCMT 32.52	CG99-D	211	126355

PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



N - Non-Ferrous

N15






Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCGT 21.50	CG910-AA	211	126003
	CCGT 21.5.5	CG910-AA	211	126005
	CCGT 21.51	CG910-AA	211	126007
	CCGT 32.5.5	CG910-AA	211	126011
	CCGT 32.51	CG910-AA	211	126013
	CCGT 32.52	CG910-AA	211	126015
	CCGT 431	CG910-AA	211	126017
	CCGT 432	CG910-AA	211	126019
	DCGT 21.50	CG910-AA	211	126151
	DCGT 21.5.5	CG910-AA	211	126153
	DCGT 21.51	CG910-AA	211	126155
	DCGT 21.52	CG910-AA	211	126156
	DCGT 32.5.5	CG910-AA	211	126160
	DCGT 32.51	CG910-AA	211	126162
	DCGT 32.52	CG910-AA	211	126164
	SCGT 32.51	CG910-AA	211	126280
	SCGT 32.52	CG910-AA	211	126282
	TCGT 21.51	CG910-AA	211	126330
	TCGT 32.51	CG910-AA	211	126333
	TCGT 32.52	CG910-AA	211	126334
	VCGT 220.5	CG910-AA	211	126400
	VCGT 221	CG910-AA	211	126402
	VCGT 130302	CG910-AA	211	126404
	VCGT 130304	CG910-AA	211	126406
	VCGT 331	CG910-AA	211	126410
	VCGT 332	CG910-AA	211	126412
	VCGT 333	CG910-AA	211	126414
	VCGT 43.57.5	CG910-AA	211	126415

PERFORMANCE SERIES - POSITIVE GEOMETRY

Precision Quality Turning



H - Hardened Steel CERMET | Finishing

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CCMT 21.51	CG91-B	208	126022
	CCMT 32.51	CG91-B	208	126037
	DCMT 21.51	CG91-B	208	126168
	DCMT 32.51	CG91-B	208	126182
	TCGT 21.5.5	CG91-B	208	126331
	TCMT 21.51	CG91-B	208	126339
	WCGT 020102	CG91-B	208	126454







PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning





P - Steel

Finishing P15

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 431	CG92-D	205	126087
	CNMG 432	CG92-D	205	126099
	CNMG 433	CG92-D	205	126107
	DNMG 331	CG92-D	205	126213
	DNMG 332	CG92-D	205	126216
	DNMG 441	CG92-D	205	126232
	DNMG 442	CG92-D	205	126241
	DNMG 443	CG92-D	205	126249
	SNMG 432	CG92-D	205	126308
	SNMG 433	CG92-D	205	126312
	TNMG 331	CG92-D	205	126363
	TNMG 332	CG92-D	205	126372
	TNMG 333	CG92-D	205	126378
	VNMG 331	CG92-D	205	126447
	VNMG 332	CG92-D	205	126452
	WNMG 331	CG92-D	205	126474
	WNMG 332	CG92-D	205	126477
	WNMG 431	CG92-D	205	126482
	WNMG 432	CG92-D	205	126491
	WNMG 433	CG92-D	205	126499

P - Steel

Roughing P15

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 432	CG92-I	214	126102
	CNMG 432	CG92-I	214	126102
	DNMG 442	CG92-I	214	126244
	DNMG 442	CG92-I	214	126244
	DNMG 443	CG92-I	214	126252
	DNMG 443	CG92-I	214	126252







PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning



P - Steel

P25

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 431	CG93-D	205	126088
	CNMG 432	CG93-D	205	126100
	CNMG 433	CG93-D	205	126108
	DNMG 331	CG93-D	205	126214
	DNMG 332	CG93-D	205	126217
	DNMG 431	CG92-D	205	126220
	DNMG 431	CG94-D	205	126221
	DNMG 431	CG93-D	205	126222
	DNMG 432	CG93-D	205	126226
	DNMG 432	CG94-D	205	126227
	SNMG 432	CG93-D	205	126309
	SNMG 433	CG93-D	205	126313
	TNMG 331	CG93-D	205	126364
	TNMG 332	CG93-D	205	126373
	TNMG 333	CG93-D	205	126379
	TNMG 431	CG93-D	205	126380
	TNMG 432	CG93-D	205	126382
	VNMG 331	CG93-D	205	126448
	VNMG 332	CG93-D	205	126453
	WNMG 331	CG93-D	205	126475
	WNMG 332	CG93-D	205	126478
	WNMG 431	CG93-D	205	126483
	WNMG 432	CG93-D	205	126492
	WNMG 433	CG93-D	205	126500






PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning



P - Steel

Roughing P25

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 432	CG93-I	214	126091
	CNMG 433	CG93-I	214	126104
	DNMG 442	CG93-I	214	126245
	DNMG 443	CG93-I	214	126253
	SNMG 432	CG93-I	214	126303
	SNMG 433	CG93-I	214	126311
	TNMG 333	CG93-I	214	126375
	WNMG 432	CG93-I	214	126485
	WNMG 433	CG93-I	214	126495






PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning




P - Steel

Medium Roughing P35

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 432	CG94-D	205	126101
	CNMG 433	CG94-D	205	126109
	DNMG 332	CG94-D	205	126218
	DNMG 442	CG94-D	205	126243
	DNMG 443	CG94-D	205	126251
	SNMG 432	CG94-D	205	126310
	SNMG 433	CG94-D	205	126314
	TNMG 332	CG94-D	205	126374
	WNMG 432	CG94-D	205	126493
	WNMG 433	CG94-D	205	126501

P - Steel

Roughing P35

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	DNMG 442	CG94-I	214	126246
	DNMG 443	CG94-I	214	126254




PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning



P - Steel

Medium Roughing





Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 542	CG94-M	220	126112
	CNMG 543	CG93-M	220	126114
	CNMG 543	CG94-M	220	126115
	CNMG 643	CG93-M	220	126117
	CNMG 643	CG94-M	220	126118
	CNMG 644	CG93-M	220	126119
	CNMG 644	CG94-M	220	126120
	SNMG 543	CG93-M	220	126315
	SNMG 543	CG94-M	220	126316
	SNMG 643	CG93-M	220	126317
	SNMG 643	CG94-M	220	126318
	TNMG 433	CG93-M	220	126384

PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning



M - Stainless Steel Finishing M25







Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNGP 43.5	CG96-J	214	126071
	CNGP 431	CG96-J	214	126072
	CNGP 432	CG96-J	214	126073
	CNGP 433	CG96-J	214	126074
	DNGP 431	CG96-J	214	126205
	DNGP 44.5	CG96-J	214	126206
	DNGP 441	CG96-J	214	126207
	DNGP 442	CG96-J	214	126208
	VNGP 33.5	CG96-J	214	126444
	VNGP 331	CG96-J	214	126445
	WNGP 431	CG96-J	214	126469
	WNGP 432	CG96-J	214	126470

PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning



M - Stainless Steel M25





Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 321	CG95-K	215	126079
	CNMG 322	CG95-K	215	126080
	CNMG 431	CG95-K	215	126084
	CNMG 432	CG95-K	215	126094
	DNMG 331	CG95-K	215	126210
	DNMG 332	CG95-K	215	126215
	DNMG 431	CG95-K	215	126219
	DNMG 432	CG96-K	215	126224
	DNMG 432	CG95-K	215	126225
	DNMG 441	CG95-K	215	126230
	DNMG 442	CG95-K	215	126237
	SNMG 432	CG95-K	215	126306
	TNMG 331	CG95-K	215	126362
	TNMG 332	CG95-K	215	126369
	VNMG 332	CG95-K	215	126451
	WNMG 331	CG95-K	215	126472
	WNMG 332	CG95-K	215	126476
	WNMG 431	CG95-K	215	126480
	WNMG 432	CG95-K	215	126488
	WNMG 433	CG95-K	215	126496

PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning



M - Stainless Steel Roughing M25

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 432	CG95-L	216	126095
	CNMG 433	CG95-L	216	126105
	DNMG 442	CG95-L	216	126238
	DNMG 443	CG95-L	216	126247
	TNMG 332	CG95-L	216	126370
	TNMG 333	CG95-L	216	126376
	WNMG 432	CG95-L	216	126489
	WNMG 433	CG95-L	216	126497

PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning



K - Cast Iron

K20

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMA 432	CG99-NCB	220	126075
	CNMA 433	CG99-NCB	220	126076
	CNMA 434	CG99-NCB	220	126077
	CNMG 432	CG99-M	220	126089
	CNMG 432	CG99-D	211	126098
	CNMG 433	CG99-M	220	126103
	CNMG 433	CG99-D	211	126106
	CNMG 542	CG99-M	220	126111
	CNMG 543	CG99-M	220	126113
	CNMG 643	CG99-M	220	126116
	DNMG 442	CG99-M	220	126234
	DNMG 442	CG99-D	211	126240
	DNMG 443	CG99-D	211	126248
	SNMA 432	CG99-NCB	220	126301
	SNMG 432	CG99-M	220	126302
	SNMG 432	CG99-I	211	126307
	TNMA 332	CG99-NCB	220	126361
	TNMG 332	CG99-M	220	126365
	TNMG 332	CG99-D	211	126371
	TNMG 333	CG99-D	211	126377
	TNMG 432	CG99-D	211	126381
	WNMA 432	CG99-NCB	220	126471
	WNMG 432	CG99-M	220	126484
	WNMG 432	CG99-D	211	126490
	WNMG 433	CG99-M	220	126494
	WNMG 433	CG99-D	211	126498


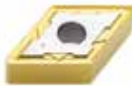




PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning



S - Titanium

Titanium and HRSA S10



Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 431	CG911-N	217	126082
	CNMG 431	CG912-N	217	126083
	CNMG 432	CG911-N	217	126092
	CNMG 432	CG912-N	217	126093
	DNMG 442	CG911-N	217	126235
	DNMG 442	CG912-N	217	126236
	SNMG 432	CG911-N	217	126304
	SNMG 432	CG912-N	217	126305
	TNMG 332	CG911-N	217	126367
	TNMG 332	CG912-N	217	126368
	VNMG 332	CG911-N	217	126449
	VNMG 332	CG912-N	217	126450
	WNMG 432	CG911-N	217	126486
	WNMG 432	CG912-N	217	126487

PERFORMANCE SERIES - NEGATIVE GEOMETRY

Precision Quality Turning



H - Hardened Steel CERMET | Finishing

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 431	CG91-B	208	126081
	CNMG 432	CG91-B	208	126090
	DNMG 331	CG91-B	208	126209
	DNMG 441	CG91-B	208	126229

PERFORMANCE SERIES - HEAVY DUTY

Precision Quality Turning



P - Steel

Heavy Steel P15

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 321	CG92-H	213	126078
	CNMG 431	CG92-H	213	126085
	CNMG 432	CG92-H	213	126096
	CNMX 431	CG92-F	212	126146
	CNMX 432	CG92-F	212	126147
	DNMG 331	CG92-H	213	126211
	DNMG 441	CG92-H	213	126231
	DNMG 442	CG92-H	213	126239
	DNMM 442	CG92-P	218	126255
	DNMM 443	CG92-Q	219	126258
	DNMX 441	CG92-F	212	126261
	DNMX 442	CG92-F	212	126262
	VNMG 331	CG92-H	213	126446
	WNMG 331	CG92-H	213	126473
	WNMG 431	CG92-H	213	126481
	WNMX 431	CG92-F	212	126502
	WNMX 432	CG92-F	212	126503



PERFORMANCE SERIES - HEAVY DUTY

Precision Quality Turning







P - Steel

Heavy Steel - P25

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	DNMM 443	CG93-Q	219	126259
	SNMM 643	CG93-Q	219	126319
	SNMM 644	CG93-Q	219	126320

P - Steel

Heavy Steel P25

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 431	CG93-H	213	126086
	CNMG 432	CG93-H	213	126097
	DNMG 331	CG93-H	213	126212
	DNMM 442	CG93-P	218	126256
	SNMM 644	CG93-O	218	126321
	SNMM 866	CG93-O	218	126326

TECHNICAL INFORMATION

From cutting speed recommendations and cutting grades to coatings and formulas, you will find it here.

ROUND TOOL COATINGS



Advatech

Advatech

AlTiN based, with a hardness of 35+/-3. Highly stable with optimal balance and improved tool lifetimes.

Deep-hole drills, Step drills and all standard drills



ZrN

Zirconium Nitride (ZrN)

Machining Magnesium and Titanium

Effectively reduces the built up edges when machining Aluminum and Titanium



AlTiN

Aluminum Titanium Nitride(AlTiN)

High Performance Coating, high aluminum content, high heat resistance

For dry high speed machining, hard machining



nACo

nACo

Nano Composite coating, extremely high nano hardness and high heat resistance

For high performance and normal machining conditions



nACRo

nACRo

Nano Composite coating, extremely high scratch and high heat resistance, high coating thickness possible

Especially for hobbing and forming tools



Alcromax

Alcromax

Suitable for tool steel and for wet and MQL conditions. Excellent for titanium, high temp alloys & hardened and tempered tool steels with 35 HRC or greater.

Especially for hobbing and forming tools

INSERT COATINGS & DESIGNATIONS



CG91

CG91 - HT-P15 | HT-M10 | HT-K10

Cermet Co/Ni 12.2 %; WC 15.0 %; TaNbC 10.0 %; TiCN balance | Hardness: HV30 1620

The uncoated cermet grade for the finishing of hardened steel.



CG92

CG92 - HC-P15 | HC-K25 | HC-M10

Co 5.8 %; mixed carbides 6.4 %; WC balance | Grain size: 1 - 2 µm | Hardness: HV30 1550 | Coating specification: CVD TiCN-Al2O3

The wear-resistant high-performance grade for steel machining.



CG93

CG93 - HC-P25 | HC-K30 | HC-M20

Co 7.0 %; mixed carbides 8.0 %; WC balance | Grain size: 1 - 2 µm | Hardness: HV30 1450 | Coating specification: CVD TiCN-Al2O3

The first choice for the universal machining of steel.



CG94

G94 - HC-P35 | HC-M25 | HC-S25

Co 9.6 %; mixed carbides 6.7 %; WC balance | Grain size: 1 - 2 μm | Hardness: HV30 1460 | Coating specification: CVD TiCN-Al₂O₃ multi-layer

The tough alternative for heavily interrupted cutting action.



CG95

CG95 - HC-M20 | HC-K20

Co 10.5 %; mixed carbide 2.0 %; WC balance | Grain size: 1-2 μm
Hardness: HV30 1400 | Coating specification: PVD TiAlTaN

Particularly suitable for the wet machining of steels.



CG96

CG96 - HC-M25 | HC-P35 | HC-S25

Co 9.6 %; mixed carbides 7.8 %; others 0.4 %; WC balance | Grain size: 1 - 2 μm
Hardness: HV30 1460 | Coating specification: PVD TiAlTaN

The first choice for the machining of austenitic steels.



CG97

CG97 - HC-M35 | HC-P35

Co 8.0 %; WC balance; mixed carbides 4.2 % ; Grain size: 1.5-3.0 μm
Hardness: HV30 1330

Universal stainless steel turning grade. The best in difficult situations.



CG98

CG98 - HC-M15 | HC-S15

Co 6.0 %; WC balance | Grain size 0.8-1.3 μm | Hardness HV30 1630
Coating specification PVD TiAlN

The first choice for the machining of Stainless Steels and Exotic.



CG99

CG99 - HC-K20 | HC-P10

Co 6.0 %; TaC 2.0 %; WC balance | Grain size: 1 μm
Hardness: HV30 1630 Coating specification: CVD TiCN-Al₂O₃

Machining cast iron at high cutting speeds & where high toughness is required.



CG910

CG910 - HW-N15 | HW-K15

Co 6.0 %; WC balance | Grain size: 1 μm
Hardness: HV30 1630

Uncoated carbide grade for machining of aluminium & other non-ferrous metals.

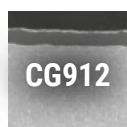


CG911

CG911 - HC-S15 | HC-M15

Co 6.0 %; WC balance | Grain size: 0.8 μm
Hardness: HV30 1820 | Coating specification: PVD TiAlN

The alternative when machining heat-resistant materials.



CG912

CG912 - HC-S15 | HC-M15

Co 6.0 %; WC balance | Grain size: 0.8 μm
Hardness: HV30 1820 | Coating specification: PVD TiAlN-TiN

The first choice for the machining of heat-resistant materials.

SPEED & FEED GUIDE



Optimum Performance

Series 4005

ECO | 2FL | 5xD | Solid | Inch & Metric

Work Material	P						M				K				N			
	Carbon Steel		Alloy Steel		Tool Steel		300 & 400 SS		PH SS		Gray		Ductile		6061, 7075		> 10% Si	
SFM	220 - 350		210 - 315		205 - 295		130 - 200		120 - 190		235-390		170 - 300		300 - 460		330 - 385	
Drill Dia.	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
1	23287	0.0008	21346	0.0008	20376	0.0008	15524	0.0006	14554	0.0006	26683	0.0008	22802	0.0008	33960	0.0014	32019	0.0014
1/16	14669	0.0013	13446	0.0013	12835	0.0013	9779	0.0009	9168	0.0009	16808	0.0013	14363	0.0013	21392	0.0022	20170	0.0022
2	11643	0.0016	10673	0.0016	10188	0.0016	7762	0.0012	7277	0.0012	13341	0.0016	11401	0.0016	16980	0.0028	16010	0.0028
3/32	9779	0.0019	8964	0.0019	8557	0.0019	6519	0.0014	6112	0.0014	11205	0.0019	9575	0.0019	14261	0.0033	13446	0.0033
3	7762	0.0024	7115	0.0024	6792	0.0024	5175	0.0018	4851	0.0018	8894	0.0024	7601	0.0024	11320	0.0041	10673	0.0041
1/8	7334	0.0025	6723	0.0025	6418	0.0025	4890	0.0019	4584	0.0019	8404	0.0025	7182	0.0025	10696	0.0044	10085	0.0044
4	5822	0.0031	5337	0.0031	5094	0.0031	3881	0.0024	3639	0.0024	6671	0.0031	5700	0.0031	8490	0.0055	8005	0.0055
3/16	4890	0.0038	4482	0.0038	4278	0.0038	3260	0.0028	3056	0.0028	5603	0.0038	4788	0.0038	7131	0.0066	6723	0.0066
6	3881	0.0047	3558	0.0047	3396	0.0047	2587	0.0035	2426	0.0035	4447	0.0047	3800	0.0047	5660	0.0083	5337	0.0083
1/4	3667	0.0050	3362	0.0050	3209	0.0050	2445	0.0038	2292	0.0038	4202	0.0050	3591	0.0050	5348	0.0088	5042	0.0088
8	2911	0.0063	2668	0.0063	2547	0.0063	1941	0.0047	1819	0.0047	3335	0.0063	2850	0.0063	4245	0.0110	4002	0.0110
3/8	2445	0.0075	2241	0.0075	2139	0.0075	1630	0.0056	1528	0.0056	2801	0.0075	2394	0.0075	3565	0.0131	3362	0.0131
10	2329	0.0079	2135	0.0079	2038	0.0079	1552	0.0059	1455	0.0059	2668	0.0079	2280	0.0079	3396	0.0138	3202	0.0138
7/16	2096	0.0088	1921	0.0088	1834	0.0088	1397	0.0066	1310	0.0066	2401	0.0088	2052	0.0088	3056	0.0153	2881	0.0153
12	1941	0.0094	1779	0.0094	1698	0.0094	1294	0.0071	1213	0.0071	2224	0.0094	1900	0.0094	2830	0.0165	2668	0.0165
1/2	1834	0.0100	1681	0.0100	1604	0.0100	1222	0.0075	1146	0.0075	2101	0.0100	1795	0.0100	2674	0.0175	2521	0.0175
14	1663	0.0110	1525	0.0110	1455	0.0110	1109	0.0083	1040	0.0083	1906	0.0110	1629	0.0110	2426	0.0193	2287	0.0193
5/8	1467	0.0125	1345	0.0125	1284	0.0125	978	0.0094	917	0.0094	1681	0.0125	1436	0.0125	2139	0.0219	2017	0.0219
18	1294	0.0142	1186	0.0142	1132	0.0142	862	0.0106	809	0.0106	1482	0.0142	1267	0.0142	1887	0.0248	1779	0.0248

SPEED & FEED GUIDE

Optimum Performance



Series 4105

ECO | 2FL | 5xD | Coolant-through | Inch & Metric

Work Material	P						M				K				N			
	Carbon Steel		Alloy Steel		Tool Steel		300 & 400 SS		PH SS		Gray		Ductile		6061, 7075		> 10% Si	
SFM	220 - 350		210 - 315		205 - 295		130 - 200		120 - 190		235-390		170 - 300		300 - 460		330 - 385	
Drill Dia.	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
mm inch																		
1	26780	0.0008	24548	0.0008	23432	0.0008	17853	0.0006	16737	0.0006	30685	0.0008	26222	0.0008	39054	0.0014	36822	0.0014
1/16	16869	0.0013	15463	0.0013	14760	0.0013	11246	0.0009	10543	0.0009	19329	0.0013	16518	0.0013	24601	0.0022	23195	0.0022
2	13390	0.0016	12274	0.0016	11716	0.0016	8927	0.0012	8369	0.0012	15343	0.0016	13111	0.0016	19527	0.0028	18411	0.0028
3/32	11246	0.0019	10309	0.0019	9840	0.0019	7497	0.0014	7029	0.0014	12886	0.0019	11012	0.0019	16401	0.0033	15463	0.0033
3	8927	0.0024	8183	0.0024	7811	0.0024	5951	0.0018	5579	0.0018	10228	0.0024	8741	0.0024	13018	0.0041	12274	0.0041
1/8	8435	0.0025	7732	0.0025	7380	0.0025	5623	0.0019	5272	0.0019	9665	0.0025	8259	0.0025	12300	0.0044	11598	0.0044
4	6695	0.0031	6137	0.0031	5858	0.0031	4463	0.0024	4184	0.0024	7671	0.0031	6555	0.0031	9763	0.0055	9206	0.0055
3/16	5623	0.0038	5154	0.0038	4920	0.0038	3749	0.0028	3514	0.0028	6443	0.0038	5506	0.0038	8200	0.0066	7732	0.0066
6	4463	0.0047	4091	0.0047	3905	0.0047	2976	0.0035	2790	0.0035	5114	0.0047	4370	0.0047	6509	0.0083	6137	0.0083
1/4	4217	0.0050	3866	0.0050	3690	0.0050	2812	0.0038	2636	0.0038	4832	0.0050	4129	0.0050	6150	0.0088	5799	0.0088
8	3347	0.0063	3069	0.0063	2929	0.0063	2232	0.0047	2092	0.0047	3836	0.0063	3278	0.0063	4882	0.0110	4603	0.0110
3/8	2812	0.0075	2577	0.0075	2460	0.0075	1874	0.0056	1757	0.0056	3222	0.0075	2753	0.0075	4100	0.0131	3866	0.0131
10	2678	0.0079	2455	0.0079	2343	0.0079	1785	0.0059	1674	0.0059	3069	0.0079	2622	0.0079	3905	0.0138	3682	0.0138
7/16	2410	0.0088	2209	0.0088	2109	0.0088	1607	0.0066	1506	0.0066	2761	0.0088	2360	0.0088	3514	0.0153	3314	0.0153
12	2232	0.0094	2046	0.0094	1953	0.0094	1488	0.0071	1395	0.0071	2557	0.0094	2185	0.0094	3254	0.0165	3069	0.0165
1/2	2109	0.0100	1933	0.0100	1845	0.0100	1406	0.0075	1318	0.0075	2416	0.0100	2065	0.0100	3075	0.0175	2899	0.0175
14	1913	0.0110	1753	0.0110	1674	0.0110	1275	0.0083	1196	0.0083	2192	0.0110	1873	0.0110	2790	0.0193	2630	0.0193
5/8	1687	0.0125	1546	0.0125	1476	0.0125	1125	0.0094	1054	0.0094	1933	0.0125	1652	0.0125	2460	0.0219	2320	0.0219
18	1488	0.0142	1364	0.0142	1302	0.0142	992	0.0106	930	0.0106	1705	0.0142	1457	0.0142	2170	0.0248	2046	0.0248

SPEED & FEED GUIDE

Optimum Performance



Series 4050

ECO | 1FL | Inch & Metric | Solid | PAC Reamers

Work Material	P						M				K				N	
	Carbon Steel		Alloy Steel		Tool Steel		300 & 400 SS		PH SS		Gray		Ductile		> 10% Si	
SFM	220 - 350		210 - 315		205 - 295		130 - 200		120 - 190		300 - 455		170 - 300		330 - 385	
Drill Dia.	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
1/8	7334	0.0013	6723	0.0013	6418	0.0013	4890	0.0013	4584	0.0013	8404	0.0013	7182	0.0013	10085	0.0013
4	5822	0.0016	5337	0.0016	5094	0.0016	3881	0.0016	3639	0.0016	6671	0.0016	5700	0.0016	8005	0.0016
3/16	4890	0.0019	4482	0.0019	4278	0.0019	3260	0.0019	3056	0.0019	5603	0.0019	4788	0.0019	6723	0.0019
6	3881	0.0024	3558	0.0024	3396	0.0024	2587	0.0024	2426	0.0024	4447	0.0024	3800	0.0024	5337	0.0024
1/4	3667	0.0025	3362	0.0025	3209	0.0025	2445	0.0025	2292	0.0025	4202	0.0025	3591	0.0025	5042	0.0025
8	2911	0.0031	2668	0.0031	2547	0.0031	1941	0.0031	1819	0.0031	3335	0.0031	2850	0.0031	4002	0.0031
3/8	2445	0.0038	2241	0.0038	2139	0.0038	1630	0.0038	1528	0.0038	2801	0.0038	2394	0.0038	3362	0.0038
10	2329	0.0039	2135	0.0039	2038	0.0039	1552	0.0039	1455	0.0039	2668	0.0039	2280	0.0039	3202	0.0039
7/16	2096	0.0044	1921	0.0044	1834	0.0044	1397	0.0044	1310	0.0044	2401	0.0044	2052	0.0044	2881	0.0044
12	1941	0.0047	1779	0.0047	1698	0.0047	1294	0.0047	1213	0.0047	2224	0.0047	1900	0.0047	2668	0.0047
1/2	1834	0.0050	1681	0.0050	1604	0.0050	1222	0.0050	1146	0.0050	2101	0.0050	1795	0.0050	2521	0.0050
14	1663	0.0055	1525	0.0055	1455	0.0055	1109	0.0055	1040	0.0055	1906	0.0055	1629	0.0055	2287	0.0055
5/8	1467	0.0063	1345	0.0063	1284	0.0063	978	0.0063	917	0.0063	1681	0.0063	1436	0.0063	2017	0.0063

SPEED & FEED GUIDE



Optimum Performance

Series 1010

ART 3 FLUTE SERIES NON-FERROUS

Material	Axial ↓	Radial →	3/16		1/4		5/16		3/8		1/2		5/8		3/4	
			RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	0.5 X D	0.7 X D	12000	169	12000	227	12000	283	12000	341	12000	454	12000	568	12000	680
	1 X D	.6 X D	12000	155	12000	208	12000	260	12000	312	12000	416	12000	520	12000	624
	2 X D	.4 X D	12000	141	12000	189	12000	236	12000	284	12000	378	12000	473	12000	567
	0.5 X D	0.7 X D	12000	140	12000	188	12000	235	12000	282	12000	376	12000	470	12000	564
	1 X D	.6 X D	12000	133	12000	179	12000	223	12000	268	12000	357	12000	447	12000	536
	2 X D	.4 X D	12000	127	12000	170	12000	212	12000	256	12000	340	12000	426	12000	510

Series 1015

AST 3 FLUTE SERIES NON-FERROUS

Material	Axial ↓	Radial →	3/16		1/4		5/16		3/8		1/2		5/8		3/4	
			RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	1 X D	1.0 X D	12000	98	12000	132	12000	165	12000	198	12000	263	12000	330	12000	395
	2 X D	1.0 X D	12000	74	12000	99	12000	124	12000	149	12000	198	12000	248	12000	297
	2 X D	.4 X D	12000	141	12000	189	12000	236	12000	284	12000	378	12000	473	12000	567
	1 X D	1.0 X D	12000	89	12000	119	12000	148	12000	178	12000	237	12000	297	12000	356
	2 X D	1.0 X D	12000	67	12000	89	12000	112	12000	134	12000	178	12000	223	12000	267
	2 X D	.4 X D	12000	127	12000	170	12000	212	12000	256	12000	340	12000	426	12000	510

Series 1020

AFT 3 FLUTE SERIES NON-FERROUS

Material	Axial ↓	Radial →	3/16		1/4		5/16		3/8		1/2		5/8		3/4	
			RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	2 X D	.05 X D	12000	101	12000	135	12000	168	12000	203	12000	270	12000	338	12000	405
	.05 X D	0.65 X D	12000	111	12000	149	12000	185	12000	223	12000	297	12000	372	12000	446
	2 X D	.05 X D	12000	91	12000	122	12000	151	12000	183	12000	243	12000	304	12000	365
	.05 X D	0.65 X D	12000	100	12000	134	12000	166	12000	201	12000	267	12000	335	12000	401

SPEED & FEED GUIDE



Optimum Performance

Series 1025, 1026

GWA 3 FLUTE SERIES NON-FERROUS

Material	Axial ↓	Radial →	SFM	1/8		1/4		5/16		3/8		1/2		5/8		3/4	
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	.5 x D	1 x D	600	18336	66	9168	66	7334	79	6112	79	4584	83	3667	80	3056	80
	1.25 x D	.3 x D	720	22003	99	11002	96	8801	115	7334	115	5501	121	4401	116	3667	116
	1.5 x D	.1 x D	1200	36672	220	18336	193	14669	231	12224	231	9168	243	7334	233	6112	233
	.5 x D	1 x D	600	18336	55	9168	55	7334	66	6112	66	4584	69	3667	67	3056	67
	1.25 x D	.3 x D	720	22003	79	11002	79	8801	95	7334	95	5501	100	4401	96	3667	96
	1.5 x D	.1 x D	1200	36672	176	18336	165	14669	198	12224	198	9168	208	7334	200	6112	200

Series 1027, 1028

BNA 3 FLUTE SERIES NON-FERROUS

Material	Axial ↓	Radial →	SFM	1/8		1/4		5/16		3/8		1/2		5/8		3/4	
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	.5 x D	1 x D	600	18336	66	9168	66	7334	79	6112	79	4584	83	3667	80	3056	80
	1.25 x D	.3 x D	720	22003	99	11002	96	8801	115	7334	115	5501	121	4401	116	3667	116
	1.5 x D	.1 x D	1200	36672	220	18336	193	14669	231	12224	231	9168	243	7334	233	6112	233
	.5 x D	1 x D	600	18336	55	9168	55	7334	66	6112	66	4584	69	3667	67	3056	67
	1.25 x D	.3 x D	720	22003	79	11002	79	8801	95	7334	95	5501	100	4401	96	3667	96
	1.5 x D	.1 x D	1200	36672	176	18336	165	14669	198	12224	198	9168	208	7334	200	6112	200

SPEED & FEED GUIDE



Optimum Performance

Series 2010, 2012, 2014, 2015

250 2 FLUTE SERIES NON-FERROUS

Material	Axial ↓	Radial →	SFM	1/8		1/4		5/16		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
N Aluminum, Brass, Copper 6061, 7050, 7075	.5 x D	1 x D	600	18336	44	9168	48	7334	53	6112	53	4584	55	3667	53	3056	53	
	1.25 x D	.3 x D	720	22003	66	11002	70	8801	77	7334	77	5501	80	4401	77	3667	77	
	1.5 x D	.1 x D	1200	36672	147	18336	150	14669	154	12224	154	9168	162	7334	155	6112	155	
	High Silicon Aluminum 4% - 13% A242, A319, A356, A390	.5 x D	1 x D	600	18336	37	9168	40	7334	44	6112	44	4584	46	3667	44	3056	44
		1.25 x D	.3 x D	720	22003	53	11002	56	8801	63	7334	63	5501	67	4401	64	3667	64
		1.5 x D	.1 x D	1200	36672	117	18336	121	14669	132	12224	132	9168	139	7334	133	6112	133

Series 2030, 2031, 2047, 2032, 2050, 2053

350 3 FLUTE SERIES NON-FERROUS

Material	Axial ↓	Radial →	SFM	1/8		1/4		5/16		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
N Aluminum, Brass, Copper 6061, 7050, 7075	.5 x D	1 x D	600	18336	66	9168	66	7334	79	6112	79	4584	83	3667	80	3056	80	
	1.25 x D	.3 x D	720	22003	99	11002	96	8801	115	7334	115	5501	121	4401	116	3667	116	
	1.5 x D	.1 x D	1200	36672	220	18336	193	14669	231	12224	231	9168	243	7334	233	6112	233	
	High Silicon Aluminum 4% - 13% A242, A319, A356, A390	.5 x D	1 x D	600	18336	55	9168	55	7334	66	6112	66	4584	69	3667	67	3056	67
		1.25 x D	.3 x D	720	22003	79	11002	79	8801	95	7334	95	5501	100	4401	96	3667	96
		1.5 x D	.1 x D	1200	36672	176	18336	165	14669	198	12224	198	9168	208	7334	200	6112	200

Series 2060

550 5 FLUTE SERIES NON-FERROUS

Material	Axial ↓	Radial →	SFM	1/8		1/4		5/16		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
N Aluminum, Brass, Copper 6061, 7050, 7075	.5 x D	.5 x D	600	18336	110	9168	110	7334	132	6112	132	4584	139	3667	133	3056	133	
	1.25 x D	.3 x D	720	22003	165	11002	160	8801	191	7334	191	5501	201	4401	193	3667	193	
	1.5 x D	.1 x D	1200	36672	367	18336	321	14669	385	12224	385	9168	404	7334	388	6112	388	
	High Silicon Aluminum 4% - 13% A242, A319, A356, A390	.5 x D	.5 x D	600	18336	92	9168	92	7334	110	6112	110	4584	116	3667	111	3056	111
		1.25 x D	.3 x D	720	22003	132	11002	132	8801	158	7334	158	5501	166	4401	160	3667	160
		1.5 x D	.1 x D	1200	36672	293	18336	275	14669	330	12224	330	9168	347	7334	333	6112	333

SPEED & FEED GUIDE

Optimum Performance



Series 1030, 1032

HGW4

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
				P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	220	6723	13	3362	13	2241	16	1681	17
1.25 x D	.3 x D	264	8068			19	4034	19	2689	23	2017	24	1614	23	1345	21
1.5 X D	.1 x D	343	10488			42	5244	42	3496	50	2622	53	2098	51	1748	47
Alloy Steel 4140, 8620	1 x D	1 x D	180		5501	21	2750	16	1834	13	1375	13	1100	13	917	12
	1.25 x D	.3 x D	225		6876	31	3438	24	2292	19	1719	20	1375	19	1146	17
	1.5 X D	.1 x D	270		8251	63	4126	47	2750	38	2063	40	1650	38	1375	35
Tool Steel A2 ,A3, D2, H11, H13	1 x D	.5 x D	180		5501	10	2750	10	1834	13	1375	13	1100	13	917	12
	1.25 x D	.3 x D	225		6876	16	3438	16	2292	19	1719	20	1375	19	1146	17
	1.5 X D	.1 x D	270		8251	31	4126	31	2750	38	2063	40	1650	38	1375	35
M	SS 300 & 400 Series 303, 304, 316, 420, 417	.75 x D	1 x D	140	4278	7	2139	7	1426	8	1070	9	856	8	713	8
		1.25 x D	.3 x D	185	5654	11	2827	11	1885	13	1413	14	1131	13	942	12
		1.5 x D	.1 x D	230	7039	23	3519	23	2346	28	1760	29	1408	28	1173	25
	Precipitation SS 15-5, 16-6, 17-4, 17-6	2 X D	0.07 X D	393 - 800	12000	50	10696	107	7131	107	5348	107	4270	107	4075	107
		1.5 X D	0.15 X D	393 - 800	12000	55	10696	118	7131	118	5348	118	4270	118	4075	118
		1.0 X D	0.25 X D	393 - 800	12000	62	10696	132	7131	132	5348	132	4270	132	4075	132
S	High Temp Alloys Inconel 718, Hastalloy, A286, Waspalloy, CoCr	2 X D	0.1 X D	93 - 125	3820	8	1910	8	1273	5	955	8	764	8	477	6
		1.5 X D	0.15	84 - 112	3438	6	1719	6	1146	4	860	6	688	6	429	5
		1.0 X D	0.25	70-90	2865	5	1433	5	955	3	716	5	573	5	358	4

SPEED & FEED GUIDE

Optimum Performance



Series 1035, 1037

HGW5

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	220	6723	17	3362	17	2241	20	1681	21	1345	20	1121	19
		1.25 x D	.3 x D	264	8068	24	4034	24	2689	29	2017	30	1614	29	1345	27
		1.5 X D	.1 x D	343	10488	52	5244	52	3496	63	2622	66	2098	63	1748	58
	Alloy Steel 4140, 8620	1 x D	1 x D	180	5501	16	2750	20	1834	16	1375	16	1100	16	917	14
		1.25 x D	.3 x D	225	6876	24	3438	29	2292	24	1719	25	1375	24	1146	22
		1.5 X D	.1 x D	270	8251	47	4126	59	2750	47	2063	49	1650	47	1375	43
	Tool Steel A2 ,A3, D2, H11, H13	1 x D	.5 x D	180	5501	13	2750	13	1834	16	1375	16	1100	16	917	14
		1.25 x D	.3 x D	225	6876	20	3438	20	2292	24	1719	25	1375	24	1146	22
		1.5 X D	.1 x D	270	8251	39	4126	39	2750	47	2063	49	1650	47	1375	43
M	SS 300 & 400 Series 303, 304, 316, 420, 417	.75 x D	1 x D	140	4278	9	2139	9	1426	10	1070	11	856	11	713	10
		1.25 x D	.3 x D	185	5654	14	2827	14	1885	17	1413	17	1131	17	942	15
		1.5 x D	.1 x D	230	7039	29	3519	29	2346	34	1760	36	1408	35	1173	32
	Precipitation SS 15-5, 16-6, 17-4, 17-6	2 X D	0.07 X D	393 - 800	12000	60	10696	107	7131	107	5348	107	4270	107	4075	107
		1.5 X D	0.15 X D	393 - 800	12000	66	10696	120	7131	120	5348	120	4270	120	4075	120
		1.0 X D	0.25 X D	393 - 800	12000	74	10696	150	7131	150	5348	150	4270	150	4075	150
S	High Temp Alloys Inconel 718, Hastalloy, A286, Waspalloy, CoCr	2 X D	0.07 X D	93 - 125	3820	10	1910	8	1273	5	955	8	764	8	477	6
		1.5 X D	0.15 X D	84 - 112	3438	8	1719	6	1146	4	860	6	688	6	429	5
		1.0 X D	0.25 X D	70-90	2865	6	1433	5	955	3	716	5	573	5	358	4

SPEED & FEED GUIDE



Optimum Performance

Series 1040, 1043

HGW7

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	220	6723	24	3362	24	2241	28	1681	30	1345	28	1121	26
		1.25 x D	.3 x D	264	8068	34	4034	34	2689	41	2017	43	1614	41	1345	38
		1.5 X D	.1 x D	343	10488	73	5244	73	3496	88	2622	93	2098	89	1748	81
	Alloy Steel 4140, 8620	1 x D	1 x D	180	5501	37	2750	27	1834	22	1375	23	1100	22	917	20
		1.25 x D	.3 x D	225	6876	55	3438	41	2292	33	1719	35	1375	33	1146	30
		1.5 X D	.1 x D	270	8251	110	4126	82	2750	66	2063	69	1650	66	1375	61
	Tool Steel A2 ,A3, D2, H11, H13	1 x D	.5 x D	180	5501	18	2750	18	1834	22	1375	23	1100	22	917	20
		1.25 x D	.3 x D	225	6876	27	3438	27	2292	33	1719	35	1375	33	1146	30
		1.5 X D	.1 x D	270	8251	55	4126	55	2750	66	2063	69	1650	66	1375	61
M	SS 300 & 400 Series 303, 304, 316, 420, 417	.75 x D	1 x D	140	4278	12	2139	12	1426	15	1070	15	856	15	713	14
		1.25 x D	.3 x D	185	5654	19	2827	19	1885	23	1413	24	1131	23	942	21
		1.5 x D	.1 x D	230	7039	40	3519	40	2346	48	1760	51	1408	49	1173	44
	Precipitation SS 15-5, 16-6, 17-4, 17-6	2 X D	0.07 X D	393 - 800	12000	70	10696	107	7131	107	5348	107	4270	107	4075	107
		1.5 X D	0.15 X D	393 - 800	12000	80	10696	122	7131	122	5348	122	4270	122	4075	122
		1.0 X D	0.25 X D	393 - 800	12000	96	10696	146	7131	146	5348	146	4270	146	4075	146
S	High Temp Alloys Inconel 718, Hastalloy, A286, Waspalloy, CoCr	2 X D	0.07 X D	93 - 125	3820	10	1910	8	1273	5	955	8	764	8	477	6
		1.5 X D	0.15 X D	84 - 112	3438	8	1719	6	1146	4	860	6	688	6	429	5
		1.0 X D	0.25 X D	70-90	2865	6	1433	5	955	3	716	5	573	5	358	4

SPEED & FEED GUIDE



Optimum Performance

Series 1031

SRF4 4-FLUTE

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	220	6723	13	3362	13	2241	16	1681	17	1345	16	1121	15
		1.25 x D	.3 x D	264	8068	19	4034	19	2689	23	2017	24	1614	23	1345	21
		1.5 X D	.1 x D	343	10488	42	5244	42	3496	50	2622	53	2098	51	1748	47
	Alloy Steel 4140, 8620	1 x D	1 x D	180	5501	21	2750	16	1834	13	1375	13	1100	13	917	12
		1.25 x D	.3 x D	225	6876	31	3438	24	2292	19	1719	20	1375	19	1146	17
		1.5 X D	.1 x D	270	8251	63	4126	47	2750	38	2063	40	1650	38	1375	35
	Tool Steel A2, A3, D2, H11, H13	1 x D	.5 x D	180	5501	10	2750	10	1834	13	1375	13	1100	13	917	12
		1.25 x D	.3 x D	225	6876	16	3438	16	2292	19	1719	20	1375	19	1146	17
		1.5 X D	.1 x D	270	8251	31	4126	31	2750	38	2063	40	1650	38	1375	35
M	SS 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	1 x D	140	4278	7	2139	7	1426	8	1070	9	856	8	713	8
		1.25 x D	.3 x D	185	5654	11	2827	11	1885	13	1413	14	1131	13	942	12
		1.5 x D	.1 x D	230	7039	23	3519	23	2346	28	1760	29	1408	28	1173	25
	Precipitation SS 15-5, 16-6, 17-4, 17-5	2 X D	0.07 X D	393 - 800	12000	50	10696	107	7131	107	5348	107	4270	107	4075	107
		1.5 X D	0.15 X D	393 - 800	12000	55	10696	118	7131	118	5348	118	4270	118	4075	118
		1.0 X D	0.25 X D	393 - 800	12000	62	10696	132	7131	132	5348	132	4270	132	4075	132
K	Cast Iron- Grey, GG-10, GG-40	1 x D	1 x D	100	3056	6	1528	6	1019	7	764	7	611	7	509	6
		1.25 x D	.3 x D	125	3820	8	1910	8	1273	10	955	10	764	10	637	9
		1.5 X D	.1 x D	163	4966	18	2483	18	1655	22	1242	23	993	22	828	20
	Cast Iron- Ductile GGG-40, GGG-70	.75 x D	1 x D	155	4737	8	2368	8	1579	10	1184	10	947	10	789	9
		1.25 x D	.3 x D	180	5501	11	2750	11	1834	14	1375	14	1100	14	917	13
		1.5 x D	.1 x D	216	6601	23	3300	23	2200	27	1650	29	1320	27	1100	25
S	High Temp Alloys Inconel 718, Hastalloy, A286, CoCr	2 X D	0.1 X D	93 - 125	3820	8	1910	8	1273	5	955	8	764	8	477	6
		1.5 X D	0.15	84 - 112	3438	6	1719	6	1146	4	860	6	688	6	429	5
		1.0 X D	0.25	70-90	2865	5	1433	5	955	3	716	5	573	5	358	4

SPEED & FEED GUIDE



Optimum Performance

Series 1050

Speed & Feed Recommendations for 3-D Machining with GWS Ball End Mills

Speeds

Diameter	Roughing & Semi-finishing			Finishing		
	RPM			RPM		
	30-40HRC	40-50HRC	50-60 HRC	30-40 HRC	40-50HRC	50-60HRC
1/32	38,400 - 60,000	32,000 - 50,000	24,600 - 40,000	20,000 - 50,000	20,000 - 50,000	20,000 - 50,000
1/16	26,400 - 42,000	22,000 - 35,000	16,600 - 28,000	20,000 - 50,000	20,000 - 50,000	20,000 - 50,000
3/32	21,600 - 31,200	18,000 - 26,000	13,400 - 20,800	20,000 - 50,000	20,000 - 50,000	20,000 - 50,000
1/8	19,200 - 28,800	16,000 - 24,000	11,800 - 19,200	20,000 - 38,000	20,000 - 50,000	20,000 - 30,500
3/16	15,000 - 19,776	12,500 - 16,480	9,000 - 13,184	20,000 - 26,000	20,000 - 34,000	16,000 - 20,300
1/4	12,120 - 16,800	10,100 - 14,000	7,080 - 11,200	15,000 - 18,000	18,000 - 24,400	12,000 - 15,000
5/16	11,400 - 15,900	9,200 - 13,250	6,360 - 10,600	12,000 - 14,000	14,600 - 19,000	9,700 - 12,000
3/8	10,560 - 14,520	8,800 - 12,100	6,040 - 9,680	10,000 - 12,000	12,000 - 16,200	8,100 - 10,000
7/16	9,480 - 12,480	7,900 - 10,400	5,320 - 8,320	8,700 - 10,400	10,000 - 13,900	6,900 - 8,700
1/2	8,280 - 10,920	6,900 - 9,100	4,520 - 7,280	7,800 - 9,800	9,100 - 12,200	6,100 - 7,600

Chip Load per Tooth

Diameter	30-40 HRC		40-50 HRC		50-60HRC	
	Rough & Semi	Finishing	Rough&Semi	Finishing	Rough & Semi	Finishing
1/32	0.0006 - 0.0010	0.0006 - 0.0009	0.0006 - 0.0008	0.0005 - 0.0007	0.0004 - 0.0007	0.0004 - 0.0006
1/16	0.0012 - 0.0016	0.0010 - 0.0015	0.0010 - 0.0015	0.0010 - 0.0014	0.0008 - 0.0012	0.0007 - 0.0010
3/32	0.0020 - 0.0025	0.0014 - 0.0024	0.0015 - 0.0022	0.0014 - 0.0020	0.0012 - 0.0020	0.0010 - 0.0014
1/8	0.0025 - 0.0030	0.0019 - 0.0028	0.0020 - 0.0027	0.0019 - 0.0026	0.0017 - 0.0022	0.0015 - 0.0020
3/16	0.0035 - 0.0043	0.0032 - 0.0042	0.0032 - 0.0041	0.0030 - 0.0040	0.0030 - 0.0039	0.0023 - 0.0031
1/4	0.0050 - 0.0060	0.0040 - 0.0053	0.0050 - 0.0057	0.0040 - 0.0051	0.0040 - 0.0050	0.0038 - 0.0048
5/16	0.0063 - 0.0070	0.0053 - 0.0068	0.0052 - 0.0066	0.0052 - 0.0063	0.0051 - 0.0062	0.0046 - 0.0054
3/8	0.0070 - 0.0080	0.0062 - 0.0079	0.0062 - 0.0077	0.0054 - 0.0065	0.0060 - 0.0072	0.0050 - 0.0061
7/16	0.0080 - 0.0087	0.0068 - 0.0086	0.0068 - 0.0084	0.0060 - 0.0078	0.0066 - 0.0080	0.0053 - 0.0070
1/2	0.0087 - 0.0100	0.0080 - 0.0094	0.0080 - 0.0092	0.0070 - 0.0090	0.0078 - 0.0090	0.0062 - 0.0081

Axial Depth of Cut

30 - 40 HRC = 0.10 X Diameter

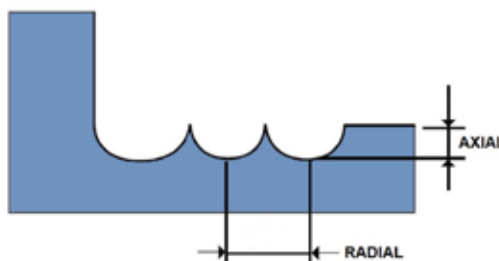
40 - 50 HRC = 0.07 X Diameter

50 - 60 HRC = 0.05 X Diameter

Radial Depth of Cut

Roughing - 0.35 X Diameter

Finishing = 0.02 - 0.05 X Diameter



SPEED & FEED GUIDE



Optimum Performance

Series 2100,2105, 2115, 2117

438 4 FLUTE

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	220	6723	13	3362	13	2241	16	1681	17	1345	16	1121	15
		1.25 x D	.3 x D	264	8068	19	4034	19	2689	23	2017	24	1614	23	1345	21
		1.5 X D	.1 x D	343	10488	42	5244	42	3496	50	2622	53	2098	51	1748	47
	Alloy Steel 4140, 8620	1 x D	1 x D	180	5501	21	2750	16	1834	13	1375	13	1100	13	917	12
		1.25 x D	.3 x D	225	6876	31	3438	24	2292	19	1719	20	1375	19	1146	17
		1.5 X D	.1 x D	270	8251	63	4126	47	2750	38	2063	40	1650	38	1375	35
	Tool Steel A2 ,A3, D2, H11, H13	1 x D	.5 x D	180	5501	10	2750	10	1834	13	1375	13	1100	13	917	12
		1.25 x D	.3 x D	225	6876	16	3438	16	2292	19	1719	20	1375	19	1146	17
		1.5 X D	.1 x D	270	8251	31	4126	31	2750	38	2063	40	1650	38	1375	35
M	SS 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	1 x D	140	4278	7	2139	7	1426	8	1070	9	856	8	713	8
		1.25 x D	.3 x D	185	5654	11	2827	11	1885	13	1413	14	1131	13	942	12
		1.5 x D	.1 x D	230	7039	23	3519	23	2346	28	1760	29	1408	28	1173	25
	Precipitation SS 15-5, 16-6, 17-4, 17-5	0.5	1 x D	115	3514	5	1757	5	1171	7	879	7	703	7	586	6
		1.25 x D	.3 x D	180	5501	10	2750	10	1834	12	1375	13	1100	12	917	11
		1.5 x D	.1 x D	250	7640	24	3820	24	2547	28	1910	30	1528	29	1273	26
K	Cast Iron - Grey GG-10 to GG-40	1 x D	1 x D	100	3056	6	1528	6	1019	7	764	7	611	7	509	6
		1.25 x D	.3 x D	125	3820	8	1910	8	1273	10	955	10	764	10	637	9
		1.5 X D	.1 x D	163	4966	18	2483	18	1655	22	1242	23	993	22	828	20
	Cast Iron- Ductile GGG-40, to GGG-70	.75 x D	1 x D	155	4737	8	2368	8	1579	10	1184	10	947	10	789	9
		1.25 x D	.3 x D	180	5501	11	2750	11	1834	14	1375	14	1100	14	917	13
		1.5 x D	.1 x D	216	6601	23	3300	23	2200	27	1650	29	1320	27	1100	25
S	High Temp Alloys Inconel 718, Hastalloy, Waspalloy, A286, CoCr	.25 x D	.4 x D	70	2139	3	1070	3	713	4	535	4	428	4	357	3
		1.25 x D	.2 x D	80	2445	4	1222	4	815	5	611	5	489	5	407	5
		1.5 x D	.07 x D	125	3820	11	1910	11	1273	13	955	14	764	14	637	12
	Titanium Alloy Ti-6Al4V Grades (5-38)	0.5	1 x D	180	5501	8	2750	8	1834	9	1375	10	1100	9	917	9
		1.25 x D	.3 x D	225	6876	12	3438	12	2292	14	1719	15	1375	14	1146	13
		1.5 x D	.1 x D	360	11002	31	5501	31	3667	37	2750	39	2200	37	1834	34

SPEED & FEED GUIDE



Optimum Performance

Series 2205, 2213

538 5 FLUTE

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	220	6723	17	3362	17	2241	20	1681	21	1345	20	1121	19
		1.25 x D	.3 x D	264	8068	24	4034	24	2689	29	2017	30	1614	29	1345	27
		1.5 X D	.1 x D	343	10488	52	5244	52	3496	63	2622	66	2098	63	1748	58
	Alloy Steel 4140, 8620	1 x D	1 x D	180	5501	16	2750	20	1834	16	1375	16	1100	16	917	14
		1.25 x D	.3 x D	225	6876	24	3438	29	2292	24	1719	25	1375	24	1146	22
		1.5 X D	.1 x D	270	8251	47	4126	59	2750	47	2063	49	1650	47	1375	43
	Tool Steel A2 ,A3, D2, H11, H13	1 x D	.5 x D	180	5501	13	2750	13	1834	16	1375	16	1100	16	917	14
		1.25 x D	.3 x D	225	6876	20	3438	20	2292	24	1719	25	1375	24	1146	22
		1.5 X D	.1 x D	270	8251	39	4126	39	2750	47	2063	49	1650	47	1375	43
M	SS 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	1 x D	140	4278	9	2139	9	1426	10	1070	11	856	11	713	10
		1.25 x D	.3 x D	185	5654	14	2827	14	1885	17	1413	17	1131	17	942	15
		1.5 x D	.1 x D	230	7039	29	3519	29	2346	34	1760	36	1408	35	1173	32
	Precipitation SS 15-5, 16-6, 17-4, 17-5	0.5	1 x D	115	3514	7	1757	7	1171	8	879	9	703	8	586	8
		1.25 x D	.3 x D	180	5501	13	2750	13	1834	15	1375	16	1100	15	917	14
		1.5 x D	.1 x D	250	7640	30	3820	30	2547	35	1910	37	1528	36	1273	33
K	Cast Iron - Grey GG-10 to GG-40	1 x D	1 x D	100	3056	7	1528	7	1019	8	764	9	611	8	509	8
		1.25 x D	.3 x D	125	3820	10	1910	10	1273	12	955	13	764	13	637	11
		1.5 X D	.1 x D	163	4966	22	2483	22	1655	27	1242	28	993	27	828	25
	Cast Iron- Ductile GGG-40, to GGG-70	.75 x D	1 x D	155	4737	10	2368	10	1579	12	1184	13	947	12	789	11
		1.25 x D	.3 x D	180	5501	14	2750	14	1834	17	1375	18	1100	17	917	16
		1.5 x D	.1 x D	216	6601	28	3300	28	2200	34	1650	36	1320	34	1100	31
S	High Temp Alloys Inconel 718, Hastalloy, Waspalloy, A286, CoCr	.25 x D	.4 x D	70	2139	4	1070	4	713	5	535	5	428	5	357	4
		1.25 x D	.2 x D	80	2445	5	1222	5	815	6	611	7	489	7	407	6
		1.5 x D	.07 x D	125	3820	14	1910	14	1273	17	955	18	764	17	637	16
	Titanium Alloy Ti-6Al4V Grades (5-38)	0.5	1 x D	180	5501	10	2750	10	1834	12	1375	12	1100	12	917	11
		1.25 x D	.3 x D	225	6876	14	3438	14	2292	17	1719	18	1375	17	1146	16
		1.5 x D	.1 x D	360	11002	38	5501	38	3667	46	2750	48	2200	46	1834	43

SPEED & FEED GUIDE



Optimum Performance

Series 2215

738 7 FLUTE

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	220	6723	24	3362	24	2241	28	1681	30	1345	28	1121	26
		1.25 x D	.3 x D	264	8068	34	4034	34	2689	41	2017	43	1614	41	1345	38
		1.5 x D	.1 x D	343	10488	73	5244	73	3496	88	2622	93	2098	89	1748	81
	Alloy Steel 4140, 8620	1 x D	1 x D	180	5501	37	2750	27	1834	22	1375	23	1100	22	917	20
		1.25 x D	.3 x D	225	6876	55	3438	41	2292	33	1719	35	1375	33	1146	30
		1.5 x D	.1 x D	270	8251	110	4126	82	2750	66	2063	69	1650	66	1375	61
	Tool Steel A2 ,A3, D2, H11, H13	1 x D	.5 x D	180	5501	18	2750	18	1834	22	1375	23	1100	22	917	20
		1.25 x D	.3 x D	225	6876	27	3438	27	2292	33	1719	35	1375	33	1146	30
		1.5 x D	.1 x D	270	8251	55	4126	55	2750	66	2063	69	1650	66	1375	61
M	SS 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	1 x D	140	4278	12	2139	12	1426	15	1070	15	856	15	713	14
		1.25 x D	.3 x D	185	5654	19	2827	19	1885	23	1413	24	1131	23	942	21
		1.5 x D	.1 x D	230	7039	40	3519	40	2346	48	1760	51	1408	49	1173	44
	Precipitation SS 15-5, 16-6, 17-4, 17-5	0.5	1 x D	115	3514	10	1757	10	1171	11	879	12	703	12	586	11
		1.25 x D	.3 x D	180	5501	18	2750	18	1834	21	1375	23	1100	22	917	20
		1.5 x D	.1 x D	250	7640	41	3820	41	2547	50	1910	52	1528	50	1273	46
K	Cast Iron - Grey, GG-10 to GG-40	1 x D	1 x D	100	3056	10	1528	10	1019	12	764	12	611	12	509	11
		1.25 x D	.3 x D	125	3820	14	1910	14	1273	17	955	18	764	18	637	16
		1.5 x D	.1 x D	163	4966	31	2483	31	1655	38	1242	40	993	38	828	35
	Cast Iron - Ductile GGG-40, to GGG-70	.75 x D	1 x D	155	4737	14	2368	14	1579	17	1184	18	947	17	789	16
		1.25 x D	.3 x D	180	5501	20	2750	20	1834	24	1375	25	1100	24	917	22
		1.5 x D	.1 x D	216	6601	40	3300	40	2200	48	1650	50	1320	48	1100	44
S	High Temp Alloys Inconel 718, Hastalloy, Waspalloy, A286, CoCr	.25 x D	.4 x D	70	2139	6	1070	6	713	7	535	7	428	7	357	6
		1.25 x D	.2 x D	80	2445	8	1222	8	815	9	611	10	489	9	407	8
		1.5 x D	.07 x D	125	3820	20	1910	20	1273	24	955	25	764	24	637	22
	Titanium Alloy Ti-6Al4V Grades (5-38)	0.5	1 x D	180	5501	13	2750	13	1834	16	1375	17	1100	16	917	15
		1.25 x D	.3 x D	225	6876	20	3438	20	2292	24	1719	25	1375	24	1146	22
		1.5 x D	.1 x D	360	11002	54	5501	54	3667	65	2750	68	2200	65	1834	60

SPEED & FEED GUIDE



Optimum Performance

Series 250, 252

440V 440VBN 4 FLUTE

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	220	3362	10	2241	17	2241	17	1681	18	1345	18	1121	16
		1.25 x D	.3 x D	264	4034	15	2689	25	2689	25	2017	26	1614	25	1345	23
		1.5 X D	.1 x D	343	5244	31	3496	55	3496	55	2622	57	2098	55	1748	50
	Alloy Steel 4140, 8620	1 x D	1 x D	180	2750	8	1834	14	1834	14	1375	14	1100	14	917	13
		1.25 x D	.3 x D	225	3438	12	2292	20	2292	20	1719	21	1375	21	1146	19
		1.5 X D	.1 x D	270	4126	24	2750	41	2750	41	2063	43	1650	41	1375	38
	Tool Steel A2 ,A3, D2, H11, H13	1 x D	.5 x D	180	2750	6	1630	10	1834	10	1375	11	1100	10	917	9
		1.25 x D	.3 x D	225	3438	10	2037	18	2292	18	1719	19	1375	18	1146	17
		1.5 X D	.1 x D	270	4126	17	2445	29	2750	29	2063	30	1650	29	1375	26
M	SS 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	1 x D	140	2139	5	1426	9	1426	9	1070	10	856	9	713	8
		1.25 x D	.3 x D	185	2827	8	1885	14	1885	14	1413	15	1131	14	942	13
		1.5 x D	.1 x D	230	3519	17	2346	30	2346	30	1760	31	1408	30	1173	28
	Precipitation SS 15-5, 16-6, 17-4, 17-5	0.5	1 x D	115	1757	4	1171	7	1171	7	879	7	703	7	586	7
		1.25 x D	.3 x D	180	2750	8	1834	13	1834	13	1375	14	1100	13	917	12
		1.5 x D	.1 x D	250	3820	18	2547	31	2547	31	1910	32	1528	31	1273	28
K	Cast Iron - Grey, GG-10 to GG-40	1 x D	1 x D	100	1528	4	1019	7	1019	7	764	8	611	7	509	7
		1.25 x D	.3 x D	125	1910	6	1273	11	1273	11	955	11	764	11	637	10
		1.5 X D	.1 x D	163	2483	13	1655	23	1655	23	1242	24	993	23	828	22
	Cast Iron- Ductile GGG-40, to GGG-70	.75 x D	1 x D	155	2368	6	1579	11	1579	11	1184	11	947	11	789	10
		1.25 x D	.3 x D	180	2750	8	1834	15	1834	15	1375	15	1100	15	917	14
		1.5 x D	.1 x D	216	3300	17	2200	29	2200	29	1650	31	1320	30	1100	27
S	High Temp Alloys Inconel 718, Hastalloy, Waspalloy, A286, CoCr	.25 x D	.4 x D	70	1070	2	713	4	713	4	535	4	428	4	357	4
		1.25 x D	.2 x D	80	1222	3	815	6	815	6	611	6	489	6	407	5
		1.5 x D	.07 x D	125	1910	8	1273	15	1273	15	955	15	764	15	637	13
	Titanium Alloy Ti-6Al4V Grades (5-38)	0.5	1 x D	180	2750	6	1834	10	1834	10	1375	10	1100	10	917	9
		1.25 x D	.3 x D	225	3438	9	2292	15	2292	15	1719	16	1375	15	1146	14
		1.5 x D	.1 x D	360	5501	23	3667	40	3667	40	2750	42	2200	40	1834	37

SPEED & FEED GUIDE



Optimum Performance

Series 255

540V 5-FLUTE

Material	Axial ↓	Radial →	SFM	1/4		1/8		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	220	3362	17	2689	20	2241	30	1681	32	1345	30	1121	28
		1.25 x D	.3 x D	264	4034	24	3227	29	2689	44	2017	46	1614	44	1345	40
		1.5 X D	.1 x D	343	5244	52	4195	63	3496	94	2622	99	2098	95	1748	87
	Alloy Steel 4140, 8620	1 x D	1 x D	180	2750	13	2200	16	1834	24	1375	25	1100	24	917	22
		1.25 x D	.3 x D	225	3438	20	2750	24	2292	35	1719	37	1375	36	1146	33
		1.5 X D	.1 x D	270	4126	39	3300	47	2750	71	2063	74	1650	71	1375	65
	Tool Steel A2 ,A3, D2, H11, H13	1 x D	.5 x D	180	2445	6	1956	7	1630	10	1222	11	978	10	815	9
		1.25 x D	.3 x D	225	3056	10	2445	13	2037	18	1528	19	1222	18	1019	17
		1.5 X D	.1 x D	270	3667	17	2934	20	2445	29	1834	30	1467	29	1222	26
M	SS 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	1 x D	140	2139	9	1711	10	1426	16	1070	16	856	16	713	14
		1.25 x D	.3 x D	185	2827	14	2261	17	1885	25	1413	26	1131	25	942	23
		1.5 x D	.1 x D	230	3519	29	2815	34	2346	52	1760	54	1408	52	1173	48
	Precipitation SS 15-5, 16-6, 17-4, 17-5	0.5	1 x D	115	1757	7	1406	8	1171	12	879	13	703	12	586	11
		1.25 x D	.3 x D	180	2750	13	2200	15	1834	23	1375	24	1100	23	917	21
		1.5 x D	.1 x D	250	3820	30	3056	35	2547	53	1910	56	1528	54	1273	49
K	Cast Iron - Grey GG-10 to GG-40	1 x D	1 x D	100	1528	7	1222	8	1019	12	764	13	611	13	509	11
		1.25 x D	.3 x D	125	1910	10	1528	12	1273	19	955	20	764	19	637	17
		1.5 X D	.1 x D	163	2483	22	1986	27	1655	40	1242	42	993	41	828	37
	Cast Iron- Ductile GGG-40, to GGG-70	.75 x D	1 x D	155	2368	10	1895	12	1579	18	1184	19	947	18	789	17
		1.25 x D	.3 x D	180	2750	14	2200	17	1834	25	1375	27	1100	26	917	24
		1.5 x D	.1 x D	216	3300	28	2640	34	2200	51	1650	53	1320	51	1100	47
S	High Temp Alloys Inconel 718, Hastalloy, Waspalloy, A286, CoCr	.25 x D	.4 x D	70	1070	4	856	5	713	7	535	7	428	7	357	7
		1.25 x D	.2 x D	80	1222	5	978	6	815	10	611	10	489	10	407	9
		1.5 x D	.07 x D	125	1910	14	1528	17	1273	25	955	27	764	25	637	23
	Titanium Alloy Ti-6Al4V Grades (5-38)	0.5	1 x D	180	2750	10	2200	12	1834	17	1375	18	1100	17	917	16
		1.25 x D	.3 x D	225	3438	14	2750	17	2292	26	1719	27	1375	26	1146	24
		1.5 x D	.1 x D	360	5501	38	4401	46	3667	69	2750	73	2200	70	1834	64

SPEED & FEED GUIDE



Optimum Performance

Series 260

437

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 2XX, 13XX	1 x D	.3 x D	220	6723	13	3362	13	2241	16	1681	17	1345	16	1121	15
		1.25 x D	.2 x D	264	8068	19	4034	194	2689	23	2017	24	1614	23	1345	21
		1.5 x D	.08 x D	317	9681	39	4841	39	3227	45	2420	47	1936	46	1614	42
		1.5 x D	.05 x D	380	11618	60	5809	51	3873	59	2904	62	2324	59	1936	54
	Alloy Steel 4140, 8620	1 x D	.3 x D	180	5501	11	2750	15	1834	13	1375	14	1100	13	917	12
		1.25 x D	.2 x D	225	6876	17	3438	23	2292	20	1719	21	1375	20	1146	18
		1.5 x D	.08 x D	270	8251	33	4126	462	2750	39	2063	40	1650	39	1375	36
		1.5 x D	.05 x D	297	9076	47	4538	54	3025	46	2269	48	1815	46	1513	42
	Tool Steel A2 ,A3, D2, H11, H13	.5 x D	.3 x D	160	4890	10	2445	14	1630	12	1222	12	978	12	815	11
		1.0 x D	.2 x D	200	6112	15	3056	21	2037	18	1528	18	1222	18	1019	16
		1.5 x D	.08 x D	240	7334	29	3667	411	2445	34	1834	36	1467	35	1222	32
		1.5 x D	.05 x D	264	8068	42	4034	48	2689	41	2017	43	1614	41	1345	38
M	SS 300 & 400 Series 303, 304, 316, 420, 417	.75 x D	.3 x D	140	4278	9	2139	7	1426	10	1070	11	856	10	713	9
		1.25 x D	.2 x D	185	5654	14	2827	11	1885	16	1413	17	1131	16	942	15
		1.5 x D	.08 x D	230	7039	28	3519	23	2346	33	1760	34	1408	33	1173	30
		1.5 x D	.05 x D	276	8446	44	4223	34	2815	43	2112	45	1689	43	1408	40
	Precipitation SS 15-5, 16-6, 17-4, 17-6	.5 x D	.3 x D	115	3514	7	1757	6	1171	7	879	7	703	7	586	6
		1.25 x D	.2 x D	180	5501	13	2750	11	1834	12	1375	12	1100	12	917	11
		1.5 x D	.08 x D	250	7640	31	3820	24	2547	26	1910	28	1528	27	1273	24
		1.5 x D	.05 x D	300	9168	48	4584	37	3056	44	2292	46	1834	44	1528	41
S	High Temp Alloys Inconel 718, Hastalloy, A286, Waspalloy, CoCr	.25 x D	.3 x D	70	2139	4	1070	3	713	4	535	4	428	4	357	4
		1 x D	.2 x D	80	2445	6	1222	5	815	5	611	5	489	5	407	5
		1.25 x D	.08 x D	125	3820	15	1910	12	1273	13	955	14	764	13	637	12
		1.5 x D	.05 x D	160	4890	25	2445	20	1630	23	1222	25	978	24	815	22

SPEED & FEED GUIDE

Optimum Performance



Series 265

537

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
				P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	.3 x D	220	6723	17	3362	17	2241	20	1681	21
1.25 x D	.2 x D	264	8068			24	4034	24	2689	29	2017	30	1614	29	1345	27
1.5 x D	.08 x D	317	9681			48	4841	48	3227	56	2420	59	1936	57	1614	52
1.5 x D	.05 x D	380	11618			76	5809	64	3873	74	2904	77	2324	74	1936	68
Alloy Steel 4140, 8620	1 x D	.3 x D	180		5501	14	2750	19	1834	17	1375	17	1100	17	917	15
	1.25 x D	.2 x D	225		6876	21	3438	29	2292	25	1719	26	1375	25	1146	23
	1.5 x D	.08 x D	270		8251	41	4126	57	2750	48	2063	51	1650	49	1375	44
	1.5 x D	.05 x D	297		9076	59	4538	68	3025	57	2269	60	1815	58	1513	53
Tool Steel A2, A3, D2, H11, H13	.5 x D	.3 x D	160		4890	12	2445	17	1630	15	1222	15	978	15	815	14
	1.0 x D	.2 x D	200		6112	18	3056	26	2037	22	1528	23	1222	22	1019	20
	1.5 x D	.08 x D	240		7334	37	3667	51	2445	43	1834	45	1467	43	1222	40
	1.5 x D	.05 x D	264		8068	52	4034	61	2689	51	2017	54	1614	52	1345	47
M	SS 300 & 400 Series 303, 304, 316, 420, 417	.75 x D	.3 x D	140	4278	11	2139	9	1426	13	1070	13	856	13	713	12
		1.25 x D	.2 x D	185	5654	17	2827	14	1885	20	1413	21	1131	21	942	19
		1.5 x D	.08 x D	230	7039	35	3519	28	2346	41	1760	43	1408	41	1173	38
		1.5 x D	.05 x D	276	8446	55	4223	42	2815	53	2112	56	1689	54	1408	49
	Precipitation SS 15-5, 16-6, 17-4, 17-6	.5 x D	.3 x D	115	3514	9	1757	7	1171	8	879	9	703	8	586	8
		1.25 x D	.2 x D	180	5501	17	2750	14	1834	15	1375	15	1100	15	917	14
		1.5 x D	.08 x D	250	7640	38	3820	31	2547	33	1910	35	1528	33	1273	31
		1.5 x D	.05 x D	300	9168	60	4584	46	3056	55	2292	58	1834	55	1528	51
S	High Temp Alloys Inconel 718, Hastalloy, A286, Waspalloy, CoCr	.25 x D	.3 x D	70	2139	5	1070	4	713	5	535	5	428	5	357	5
		1 x D	.2 x D	80	2445	7	1222	6	815	7	611	7	489	7	407	6
		1.25 x D	.08 x D	125	3820	19	1910	15	1273	17	955	17	764	17	637	15
		1.5 x D	.05 x D	160	4890	32	2445	24	1630	29	1222	31	978	30	815	27

SPEED & FEED GUIDE



Optimum Performance

Series 270

TMF MULTI-FLUTE 815

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
				P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	.3 x D	220	6723	13	3362	13	2241	16	1681	17
1.25 x D	.2 x D	264	8068			19	4034	194	2689	23	2017	24	1614	23	1345	21
1.5 x D	.08 x D	317	9681			39	4841	39	3227	45	2420	47	1936	46	1614	42
1.5 x D	.05 x D	380	11618			60	5809	51	3873	59	2904	62	2324	59	1936	54
Alloy Steel 4140, 8620	1 x D	.3 x D	180		5501	11	2750	15	1834	13	1375	14	1100	13	917	12
	1.25 x D	.2 x D	225		6876	17	3438	23	2292	20	1719	21	1375	20	1146	18
	1.5 x D	.08 x D	270		8251	33	4126	462	2750	39	2063	40	1650	39	1375	36
	1.5 x D	.05 x D	297		9076	47	4538	54	3025	46	2269	48	1815	46	1513	42
Tool Steel A2 ,A3, D2, H11, H13	.5 x D	.3 x D	160		4890	10	2445	14	1630	12	1222	12	978	12	815	11
	1.0 x D	.2 x D	200		6112	15	3056	21	2037	18	1528	18	1222	18	1019	16
	1.5 x D	.08 x D	240		7334	29	3667	411	2445	34	1834	36	1467	35	1222	32
	1.5 x D	.05 x D	264		8068	42	4034	48	2689	41	2017	43	1614	41	1345	38
M	SS 300 & 400 Series 303, 304, 316, 420, 417	.75 x D	.3 x D	140	4278	9	2139	7	1426	10	1070	11	856	10	713	9
		1.25 x D	.2 x D	185	5654	14	2827	11	1885	16	1413	17	1131	16	942	15
		1.5 x D	.08 x D	230	7039	28	3519	23	2346	33	1760	34	1408	33	1173	30
		1.5 x D	.05 x D	276	8446	44	4223	34	2815	43	2112	45	1689	43	1408	40
	Precipitation SS 15-5, 16-6, 17-4, 17-6	.5 x D	.3 x D	115	3514	7	1757	6	1171	7	879	7	703	7	586	6
		1.25 x D	.2 x D	180	5501	13	2750	11	1834	12	1375	12	1100	12	917	11
		1.5 x D	.08 x D	250	7640	31	3820	24	2547	26	1910	28	1528	27	1273	24
		1.5 x D	.05 x D	300	9168	48	4584	37	3056	44	2292	46	1834	44	1528	41
S	High Temp Alloys Inconel 718, Hastalloy, A286, Waspalloy, CoCr	.25 x D	.3 x D	70	2139	4	1070	3	713	4	535	4	428	4	357	4
		1 x D	.2 x D	80	2445	6	1222	5	815	5	611	5	489	5	407	5
		1.25 x D	.08 x D	125	3820	15	1910	12	1273	13	955	14	764	13	637	12
		1.5 x D	.05 x D	160	4890	25	2445	20	1630	23	1222	25	978	24	815	22

SPEED & FEED GUIDE



Optimum Performance

Series 280, 285

TMF MULTI-FLUTE for Ti 840

Material		Axial ↓	Radial →	SFM	1/2			5/8			3/4		
					RPM	IPM	CPT	RPM	IPM	CPT	RPM	IPM	CPT
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	.5 x D	220	1681	32	0	1345	31	0	1121	35	0
		1.25 x D	.3 x D	264	2017	46	0	1614	45	0	1345	51	0
		1.5 x D	.1 x D	343	2622	100	0	2098	96	0	1748	110	0
		1.5 x D	.07 x D	378	2884	155	0	2307	148	0	1923	170	0
M	SS 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	.5 x D	140	1070	18	0	856	17	0	713	19	0
		1.25 x D	.3 x D	185	1413	28	0	1131	27	0	942	31	0
		1.5 x D	.1 x D	230	1760	43	0	1408	41	0	1173	47	0
		1.5 x D	.07 x D	276	2112	68	0	1689	65	0	1408	75	0
S	High Temp Alloys Ti-6Al4V Grades (5-38)	.75 x D	.5 x D	180	1375	28	0	1100	27	0	917	30	0
		1.25 x D	.3 x D	225	1719	42	0	1375	40	0	1146	46	0
		1.5 x D	.1 x D	275	2101	85	0	1681	81	0	1401	93	0
		1.5 x D	.07 x D	303	2311	130	0	1849	125	0	1541	144	0

SPEED & FEED GUIDE



Optimum Performance

Series 210, 215

335 335BN 3 FLUTE

Material	Axial ↓	Radial →	SFM	1/4		5/16		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	.5 x D	1 x D	220	3362	10	2689	12	2241	12	1681	13	1345	12	1121	12
		1.25 x D	.3 x D	264	4034	15	3227	17	2689	17	2017	18	1614	18	1345	18
		1.5 x D	.1 x D	343	5244	31	4195	38	3496	38	2622	40	2098	38	1748	38
	Alloy Steel 4140, 8620	.5 x D	1 x D	180	2750	8	2200	9	1834	9	1375	10	1100	9	917	9
		1.25 x D	.3 x D	225	3438	12	2750	14	2292	14	1719	15	1375	14	1146	13
		1.5 x D	.1 x D	270	4126	24	3300	28	2750	28	2063	30	1650	28	1375	26
	Tool Steel A2, A3, D2, H11, H13	.5 x D	1 x D	160	2445	6	1956	7	1630	8	1222	8	978	8	815	9
		1.0 x D	.3 x D	200	3056	10	2445	13	2037	14	1528	14	1222	14	1019	17
		1.5 x D	.1 x D	240	3667	17	2934	20	2445	21	1834	23	1467	22	1222	26
M	SS 300 & 400 Series 303, 304, 316, 420, 416	.5 x D	1 x D	140	2139	5	1711	6	1426	6	1070	7	856	6	713	6
		1.25 x D	.3 x D	185	2827	8	2261	10	1885	10	1413	10	1131	10	942	9
		1.5 x D	.1 x D	230	3519	17	2815	21	2346	21	1760	22	1408	21	1173	19
	Precipitation SS 15-5, 16-6, 17-4, 17-5	.5 x D	1 x D	115	1757	4	1406	5	1171	5	879	5	703	5	586	5
		1.25 x D	.3 x D	180	2750	8	2200	9	1834	9	1375	10	1100	9	917	8
		1.5 x D	.1 x D	250	3820	18	3056	21	2547	21	1910	22	1528	21	1273	20
K	Cast Iron- Grey, GG-10 to GG-40	1 x D	1 x D	100	1528	4	1222	5	1019	5	764	5	611	5	509	5
		1.25 x D	.3 x D	125	1910	6	1528	7	1273	7	955	8	764	8	637	7
		1.5 x D	.1 x D	163	2483	13	1986	16	1655	16	1242	17	993	16	828	15
	Cast Iron- Ductile GGG-40, to GGG-70	.75 x D	1 x D	155	2368	6	1895	7	1579	7	1184	8	947	7	789	7
		1.25 x D	.3 x D	180	2750	8	2200	10	1834	10	1375	11	1100	10	917	9
		1.5 x D	.1 x D	216	3300	17	2640	20	2200	20	1650	21	1320	21	1100	19
S	High Temp Alloys Inconel 718, Hastalloy, Waspalloy, A286, CoCr	.5 x D	1 x D	70	1070	2	856	3	713	3	535	3	428	3	357	3
		1.25 x D	.2 x D	80	1222	3	978	4	815	4	611	4	489	4	407	4
		1.5 x D	.07 x D	125	1910	8	1528	10	1273	10	955	11	764	10	637	9
	Titanium Alloy Ti-6Al4V Grades (5-38)	.5 x D	1 x D	180	2750	6	2200	7	1834	7	1375	7	1100	7	917	6
		1.25 x D	.3 x D	225	3438	9	2750	10	2292	10	1719	11	1375	10	1146	10
		1.5 x D	.1 x D	360	5501	23	4401	28	3667	28	2750	29	2200	28	1834	26

SPEED & FEED GUIDE



Optimum Performance

Series 220

545 5 FLUTE

Material	Axial ↓	Radial →	SFM	1/4		5/16		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Carbon Steel 10XX, 11XX, 12XX, 13XX	.5 x D	1 x D	220	3362	17	2689	20	2241	20	1681	21	1345	20	1121	20
		1.25 x D	.3 x D	264	4034	24	3227	29	2689	29	2017	30	1614	29	1345	29
		1.5 X D	.1 x D	343	5244	52	4195	63	3496	52	2622	55	2098	53	1748	53
	Alloy Steel 4140, 8620	.5 x D	1 x D	180	2750	13	2200	16	1834	13	1375	14	1100	13	917	12
		1.25 x D	.3 x D	225	3438	20	2750	24	2292	20	1719	21	1375	20	1146	18
		1.5 X D	.1 x D	270	4126	39	3300	47	2750	39	2063	41	1650	40	1375	36
	Tool Steel A2 ,A3, D2, H11, H13	.5 x D	1 x D	160	2445	6	1956	7	1630	10	1222	11	978	10	815	9
		1.0 x D	.3 x D	200	3056	10	2445	13	2037	18	1528	19	1222	18	1019	17
		1.5 x D	.1 x D	240	3667	17	2934	20	2445	29	1834	30	1467	29	1222	26
M	SS 300 & 400 Series 303, 304, 316, 420, 416	.5 x D	1 x D	140	2139	9	1711	10	1426	9	1070	9	856	9	713	8
		1.25 x D	.3 x D	185	2827	14	2261	17	1885	14	1413	15	1131	14	942	13
		1.5 x D	.1 x D	230	3519	29	2815	34	2346	29	1760	30	1408	29	1173	26
	Precipitation SS 15-5, 16-6, 17-4, 17-5	.5 x D	1 x D	115	1757	7	1406	8	1171	7	879	7	703	7	586	6
		1.25 x D	.3 x D	180	2750	13	2200	15	1834	13	1375	13	1100	13	917	12
		1.5 x D	.1 x D	250	3820	30	3056	35	2547	30	1910	31	1528	30	1273	27
K	Cast Iron - Grey, GG-10 to GG-40	1 x D	1 x D	100	1528	7	1222	8	1019	7	764	7	611	7	509	6
		1.25 x D	.3 x D	125	1910	10	1528	12	1273	10	955	11	764	10	637	10
		1.5 X D	.1 x D	163	2483	22	1986	27	1655	22	1242	24	993	23	828	21
	Cast Iron- Ductile GGG-40, to GGG-70	3/4 x D	1 x D	155	2368	10	1895	12	1579	10	1184	11	947	10	789	9
		1.25 x D	.3 x D	180	2750	14	2200	17	1834	14	1375	15	1100	14	917	13
		1.5 x D	.1 x D	216	3300	28	2640	34	2200	28	1650	30	1320	29	1100	26
S	High Temp Alloys Inconel 718, Hastalloy, Waspalloy, A286, CoCr	3/8 x D	1 x D	70	1070	4	856	5	713	4	535	4	428	4	357	4
		1.25 x D	.2 x D	80	1222	5	978	6	815	5	611	6	489	5	407	5
		1.5 x D	.07 x D	125	1910	14	1528	17	1273	14	955	15	764	14	637	13
	Titanium Alloy Ti-6Al4V Grades (5-38)	.5 x D	1 x D	180	2750	10	2200	12	1834	10	1375	10	1100	10	917	9
		1.25 x D	.3 x D	225	3438	14	2750	17	2292	14	1719	15	1375	15	1146	13
		1.5 x D	.1 x D	360	5501	38	4401	46	3667	38	2750	40	2200	39	1834	35

SPEED & FEED GUIDE



Optimum Performance

Series 225, 227

General Purpose End Mills 2 FLUTES

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Low Carbon Steel 1018	.5 x D	1 x D	180	5501	5	2750	3	1834	6	1375	5	1100	6	917	5
		1.25 x D	.4 x D	225	6876	8	3438	4	2292	9	1719	7	1375	9	1146	8
		1.5 X D	.1 x D	270	8251	16	4126	8	2750	19	2063	14	1650	19	1375	16
	Med Alloy Steel <375 1045, 1050	.5 x D	1 x D	100	3056	3	1528	1	1019	3	764	2	611	3	509	3
		1.25 x D	.4 x D	125	3820	4	1910	2	1273	5	955	4	764	5	637	4
		1.5 X D	.1 x D	163	4966	9	2483	4	1655	11	1242	8	993	11	828	9
	Tool Steel <375 4140, P20	.5 x D	1 x D	155	4737	4	2368	2	1579	5	1184	4	947	5	789	4
		1.25 x D	.4 x D	180	5501	6	2750	3	1834	7	1375	5	1100	7	917	6
		1.5 X D	.1 x D	216	6601	11	3300	6	2200	14	1650	10	1320	14	1100	11
M	Stainless Steel 303, 304, 420	.5 x D	1 x D	80	2445	2	1222	1	815	2	611	2	489	2	407	2
		1.25 x D	.4 x D	90	2750	2	1375	1	917	3	688	2	550	3	458	2
		1.5 X D	.1 x D	125	3820	6	1910	3	1273	7	955	5	764	7	637	6
	Stainless Steel 316L, 404	.5 x D	1 x D	180	5501	4	2750	2	1834	5	1375	4	1100	5	917	4
		1.25 x D	.4 x D	225	6876	6	3438	3	2292	7	1719	5	1375	7	1146	6
		1.5 X D	.1 x D	270	8251	12	4126	6	2750	14	2063	10	1650	14	1375	12
K	Cast Iron- Gray <220 GG-10 G1800	.5 x D	1 x D	140	4278	3	2139	2	1426	4	1070	3	856	4	713	4
		1.25 x D	.4 x D	185	5654	6	2827	3	1885	7	1413	5	1131	7	942	6
		1.5 X D	.1 x D	230	7039	11	3519	6	2346	14	1760	10	1408	14	1173	12
	Ductile Cast GGG-40	.5 x D	1 x D	115	3514	3	1757	1	1171	3	879	2	703	3	586	3
		1.25 x D	.4 x D	180	5501	5	2750	3	1834	6	1375	5	1100	6	917	5
		1.5 X D	.1 x D	250	7640	12	3820	6	2547	14	1910	11	1528	14	1273	12
N	Cast Aluminum Casting	.5 x D	.5 x D	350	10696	22	5348	23	3565	26	2674	28	2139	27	1783	27
		1.25 x D	.3 x D	420	12835	33	6418	34	4278	38	3209	40	2567	39	2139	39
		1.5 X D	.1 x D	500	15280	73	7640	75	5093	77	3820	81	3056	78	2547	78
	Aluminum Alloy 6061, 7075	.5 x D	.5 x D	300	9168	18	4584	18	3056	22	2292	23	1834	22	1528	22
		1.25 x D	.3 x D	360	11002	26	5501	27	3667	32	2750	33	2200	32	1834	32
		1.5 X D	.1 x D	500	15280	59	7640	60	5093	66	3820	69	3056	67	2547	67

SPEED & FEED GUIDE



Optimum Performance

Series 230, 237

General Purpose End Mills 4 FLUTES

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Low Carbon Steel 1018	.5 x D	1 x D	180	5501	10	2750	5	1834	7	1375	9	1100	11	917	12
		1.25 x D	.4 x D	225	6876	16	3438	8	2292	10	1719	14	1375	16	1146	17
		1.5 X D	.1 x D	270	8251	31	4126	16	2750	21	2063	28	1650	32	1375	35
	Med Alloy Steel <375, 1045, 1050	.5 x D	1 x D	100	3056	6	1528	3	1019	4	764	5	611	6	509	6
		1.25 x D	.4 x D	125	3820	8	1910	4	1273	6	955	7	764	8	637	9
		1.5 X D	.1 x D	163	4966	18	2483	9	1655	12	1242	16	993	18	828	20
	Tool Steel <375, 4140, P20	.5 x D	1 x D	155	4737	8	2368	4	1579	5	1184	7	947	8	789	9
		1.25 x D	.4 x D	180	5501	11	2750	6	1834	8	1375	10	1100	11	917	13
		1.5 X D	.1 x D	216	6601	23	3300	11	2200	15	1650	20	1320	23	1100	25
M	Stainless Steel 303, 304, 420	.5 x D	1 x D	70	2139	3	1070	2	713	2	535	3	428	3	357	3
		1.25 x D	.4 x D	80	2445	4	1222	2	815	3	611	4	489	4	407	5
		1.5 X D	.1 x D	125	3820	11	1910	6	1273	7	955	10	764	11	637	12
	Stainless Steel 316L, 404	.5 x D	1 x D	180	5501	88	2750	44	1834	59	1375	79	1100	89	917	98
		1.25 x D	.4 x D	225	6876	12	3438	6	2292	8	1719	10	1375	12	1146	13
		1.5 X D	.1 x D	270	8251	23	4126	12	2750	15	2063	21	1650	23	1375	26
K	Cast Iron- Gray <220 GG-10, G1800	.5 x D	1 x D	140	4278	7	2139	3	1426	5	1070	6	856	7	713	8
		1.25 x D	.4 x D	185	5654	11	2827	6	1885	7	1413	10	1131	11	942	12
		1.5 X D	.1 x D	230	7039	23	3519	11	2346	15	1760	21	1408	23	1173	25
	Ductile Cast GGG-40	.5 x D	1 x D	115	3514	5	1757	3	1171	4	879	5	703	5	586	6
		1.25 x D	.4 x D	180	5501	10	2750	5	1834	7	1375	9	1100	10	917	11
		1.5 X D	.1 x D	250	7640	24	3820	12	2547	16	1910	21	1528	24	1273	26
N	Cast Aluminum Casting	.5 x D	.5 x D	350	10696	28	5348	28	3565	33	2674	35	2139	33	1783	33
		1.25 x D	.3 x D	420	12835	41	6418	42	4278	48	3209	50	2567	48	2139	48
		1.5 X D	.1 x D	500	15280	92	7640	94	5093	96	3820	101	3056	97	2547	97
	Aluminum Alloy 6061, 7075	.5 x D	.5 x D	300	9168	23	4584	23	3056	28	2292	29	1834	28	1528	28
		1.25 x D	.3 x D	360	11002	33	5501	34	3667	40	2750	42	2200	40	1834	40
		1.5 X D	.1 x D	500	15280	73	7640	75	5093	83	3820	87	3056	83	2547	83

SPEED & FEED GUIDE



Optimum Performance

Series 240, 243

2FLUTES CHAMFER MILLS

Material	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
		RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P	Low Carbon Steel 1018	180	5501	5	2750	3	1834	6	1375	5	1100	6	917	5
		225	6876	8	3438	4	2292	9	1719	7	1375	9	1146	8
		270	8251	16	4126	8	2750	19	2063	14	1650	19	1375	16
	Med Alloy Steel <375, 1045, 1050	100	3056	3	1528	1	1019	3	764	2	611	3	509	3
		125	3820	4	1910	2	1273	5	955	4	764	5	637	4
		162	4966	9	2483	4	1655	11	1242	8	993	11	828	9
	Tool Steel <375, 4140, P20	155	4737	4	2368	2	1579	5	1184	4	947	5	789	4
		180	5501	6	2750	3	1834	7	1375	5	1100	7	917	6
		216	6601	11	3300	6	2200	14	1650	10	1320	14	1100	11
M	Stainless Steel 303, 304, 420	80	2445	2	1222	1	815	2	611	2	489	2	407	2
		90	2750	2	1375	1	917	3	688	2	550	3	458	2
		125	3820	6	1910	3	1273	7	955	5	764	7	637	6
	Stainless Steel 316L, 404	180	5501	4	2750	2	1834	5	1375	4	1100	5	917	4
		225	6876	6	3438	3	2292	7	1719	5	1375	7	1146	6
		270	8251	12	4126	6	2750	14	2063	10	1650	14	1375	12
K	Cast Iron- Gray <220, GG-10, G1800	140	4278	3	2139	2	1426	4	1070	3	856	4	713	4
		185	5654	6	2827	3	1885	7	1413	5	1131	7	942	6
		230	7039	11	3519	6	2346	14	1760	10	1408	14	1173	12
	Ductile Cast GGG-40	115	3514	3	1757	1	1171	3	879	2	703	3	586	3
		180	5501	5	2750	3	1834	6	1375	5	1100	6	917	5
		250	7640	12	3820	6	2547	14	1910	11	1528	14	1273	12
N	Cast Aluminum Casting	350	10696	22	5348	23	3565	26	2674	28	2139	27	1783	27
		420	12835	33	6418	34	4278	38	3209	40	2567	39	2139	39
		500	15280	73	7640	75	5093	77	3820	81	3056	78	2547	78
	Aluminum Alloy 6061, 7075	300	9168	18	4584	18	3056	22	2292	23	1834	22	1528	22
		360	11002	26	5501	27	3667	32	2750	33	2200	32	1834	32
		500	15280	59	7640	60	5093	66	3820	69	3056	67	2547	67

SPEED & FEED GUIDE



Optimum Performance

Series 241, 244 4 FLUTES CHAMFER MILLS

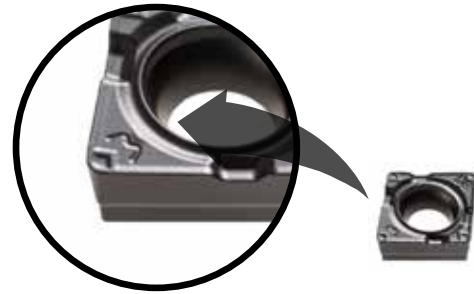
Material	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
		RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
P 	Low Carbon Steel 1018	180	5501	10	2750	5	1834	7	1375	9	1100	11	917	12
		225	6876	16	3438	8	2292	10	1719	14	1375	16	1146	17
		270	8251	31	4126	16	2750	21	2063	28	1650	32	1375	35
	Med Alloy Steel <375, 1045, 1050	100	3056	6	1528	3	1019	4	764	5	611	6	509	6
		125	3820	8	1910	4	1273	6	955	7	764	8	637	9
		162	4966	18	2483	9	1655	12	1242	16	993	18	828	20
	Tool Steel <375, 4140, P20	155	4737	8	2368	4	1579	5	1184	7	947	8	789	9
		180	5501	11	2750	6	1834	8	1375	10	1100	11	917	13
		216	6601	23	3300	11	2200	15	1650	20	1320	23	1100	25
M 	Stainless Steel 303, 304, 420	70	2139	3	1070	2	713	2	535	3	428	3	357	3
		80	2445	4	1222	2	815	3	611	4	489	4	407	5
		125	3820	11	1910	6	1273	7	955	10	764	11	637	12
	Stainless Steel 316L, 404	180	5501	88	2750	44	1834	59	1375	79	1100	89	917	98
		225	6876	12	3438	6	2292	8	1719	10	1375	12	1146	13
		270	8251	23	4126	12	2750	15	2063	21	1650	23	1375	26
K 	Cast Iron- Gray <220, GG-10, G1800	140	4278	7	2139	3	1426	5	1070	6	856	7	713	8
		185	5654	11	2827	6	1885	7	1413	10	1131	11	942	12
		230	7039	23	3519	11	2346	15	1760	21	1408	23	1173	25
	Ductile Cast GGG-40	115	3514	5	1757	3	1171	4	879	5	703	5	586	6
		180	5501	10	2750	5	1834	7	1375	9	1100	10	917	11
		250	7640	24	3820	12	2547	16	1910	21	1528	24	1273	26
N 	Cast Aluminum Casting	350	10696	28	5348	28	3565	33	2674	35	2139	33	1783	33
		420	12835	41	6418	42	4278	48	3209	50	2567	48	2139	48
		500	15280	92	7640	94	5093	96	3820	101	3056	97	2547	97
	Aluminum Alloy 6061, 7075	300	9168	23	4584	23	3056	28	2292	29	1834	28	1528	28
		360	11002	33	5501	34	3667	40	2750	42	2200	40	1834	40
		500	15280	73	7640	75	5093	83	3820	87	3056	83	2547	83

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Chipbreaker A

Positive Masterfinish Geometry
High surface quality



General cutting parameters depending on the application

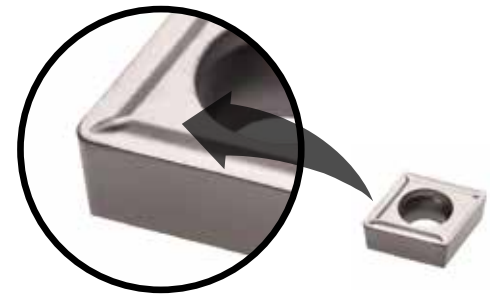
Work piece material			Coated carbide			Application	Depth of cut and feed rate										
			CG92	CG93	CG94		Chip breaker	a _p [inch]	f [inch]								
	Type of treatment/ally	Hardness HB	V _c [sfm]	V _c [sfm]	V _c [sfm]												
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623	A	0.039 to 0.138	0.012 to 0.006								
		Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492	Ex: CCMT 32.52-A for CK60 Different in each application	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> <tr> <td>●</td> <td>○</td> <td>✕</td> </tr> </table>				Consistent cutting depth	Inconsistent cutting depth	Interrupted cut	●	○	✕
		Consistent cutting depth	Inconsistent cutting depth	Interrupted cut													
●	○	✕															
High alloyed steel	200	591 – 1050	427 – 689	394 – 656													
Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591													
M	Stainless steel	Ferritic	200	722 – 1050	459 – 689	459 – 656	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> <tr> <td>●</td> <td>○</td> <td>✕</td> </tr> </table>				Consistent cutting depth	Inconsistent cutting depth	Interrupted cut	●	○	✕	
		Consistent cutting depth	Inconsistent cutting depth	Interrupted cut													
●	○	✕															
Austenitic	180	-	328 – 689	361 – 623													
Duplex	230 – 260	-	-	262 – 492													
K	Cast iron	Martensitic	330	-	230 – 328	180 – 246	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> <tr> <td>●</td> <td>○</td> <td>✕</td> </tr> </table>				Consistent cutting depth	Inconsistent cutting depth	Interrupted cut	●	○	✕	
		Consistent cutting depth	Inconsistent cutting depth	Interrupted cut													
●	○	✕															
Grey cast iron	180	459 – 1214	427 – 689	-													
Spheroidal	160	623 – 1411	394 – 787	-													
Malleable/Tempered iron	130	591 – 1706	492 – 820	-													

ULTIMATE PERFORMANCE





Turning Speed & Feed Guide

Chipbreaker B

Increase life time
Reduce temperature and stresses



General cutting parameters depending on the application

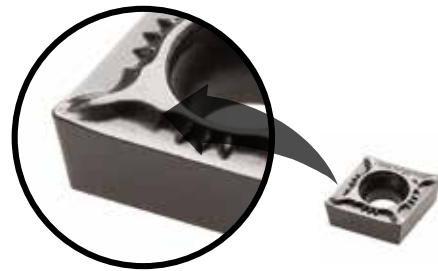
Work piece material			Cermet	Application	Depth of cut and feed rate		
	Type of treatment/ally	Hardness HB	CG91		Chip breaker	a_p [inch]	f [inch]
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	755 – 886	B	0.004 to 0.065	0.008 to 0.002
		Low alloyed steel	250 – 300	591 – 755	Ex: CCMT 32.51-B Different in each application		
		High alloyed steel	200	525 – 656			
		Corrosion resistant steel	200	755 – 886			
M	Stainless steel	Ferritic	200	558 – 787			
		Austenitic	180	656 – 787			
		Duplex	230 – 260	-			
		Martensitic	330	427 – 525			
K	Cast iron	Grey cast iron	180	-		X	X
		Spheroidal	160	722 – 984			
		Malleable/Tempered iron	130	820 – 1148			

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Chipbreaker C

To optimize the control of the chip



General cutting parameters depending on the application

Work piece material	Type of treatment/alloy	Hardness HB	Coated carbide			Application	Depth of cut and feed rate										
			CG92	CG93	CG94		Chip breaker	a _p [inch]	f [inch]								
			V _c [sfm]	V _c [sfm]	V _c [sfm]												
P	Steel					C	0.02 to 0.089	0.006 to 0.003									
	Non alloyed steel 0 - 0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623												
	Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492												
	High alloyed steel	200	591 – 1050	427 – 689	394 – 656												
M	Stainless steel					Ex: CCMT 32.51-C for CK60 Different in each application	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> <tr> <td>●</td> <td>○</td> <td>✕</td> </tr> </table>				Consistent cutting depth	Inconsistent cutting depth	Interrupted cut	●	○	✕	
	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut														
	●	○	✕														
Ferritic	200	722 – 1050	459 – 689	459 – 656													
Austenitic	180	–	328 – 689	361 – 623													
Duplex	230 – 260	–	–	262 – 492													
K	Cast iron																
	Grey cast iron	180	459 – 1214	427 – 689	–												
	Spheroidal	160	623 – 1411	394 – 787	–												
	Malleable/Tempered iron	130	591 – 1706	492 – 820	–												

General cutting parameters depending on the application

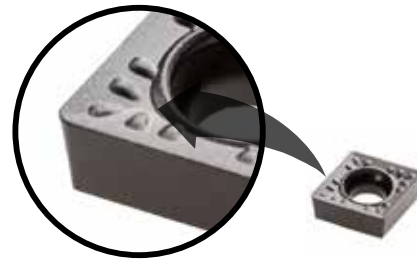
Work piece material	Type of treatment/alloy	Hardness HB	Coated carbide			Application	Depth of cut and feed rate										
			CG92	CG93	CG94		Chip breaker	a _p [inch]	f [inch]								
			V _c [sfm]	V _c [sfm]	V _c [sfm]												
P	Steel					C	0.02 to 0.089	0.006 to 0.003									
	Non alloyed steel 0 - 0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623												
	Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492												
	High alloyed steel	200	591 – 1050	427 – 689	394 – 656												
M	Stainless steel					Ex: CCMT 32.51-C for CK60 Different in each application	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> <tr> <td>●</td> <td>○</td> <td>✕</td> </tr> </table>				Consistent cutting depth	Inconsistent cutting depth	Interrupted cut	●	○	✕	
	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut														
	●	○	✕														
Ferritic	200	722 – 1050	459 – 689	459 – 656													
Austenitic	180	–	328 – 689	361 – 623													
Duplex	230 – 260	–	–	262 – 492													
K	Cast iron																
	Grey cast iron	180	459 – 1214	427 – 689	–												
	Spheroidal	160	623 – 1411	394 – 787	–												
	Malleable/Tempered iron	130	591 – 1706	492 – 820	–												

ULTIMATE PERFORMANCE



Turning Speed & Feed Guide

Optimized by FEM:

Increase life time
Reduce temperature and stresses
Universal application



General cutting parameters depending on the application

Work piece material			Coated carbide			Applica-tion	Depth of cut and feed rate			
			CG92	CG93	CG94		Chip breaker	a_p [inch]	f [inch]	
	Type of treatment/alloy	Hardness HB	V_c [sfm]	V_c [sfm]	V_c [sfm]					
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623	D	0.02 to 0.118	0.008 to 0.005	
		Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492				
		High alloyed steel	200	591 – 1050	427 – 689	394 – 656				
		Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591				
M	Stainless steel	Ferritic	200	722 – 1050	459 – 689	459 – 656	Ex: CCMT 32.51-D for CK60 Different in each application 	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
		Austenitic	180	–	328 – 689	361 – 623				
		Duplex	230 – 260	–	–	262 – 492				
K	Cast iron	Martensitic	330	–	230 – 328	180 – 246		Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
		Grey cast iron	180	459 – 1214	427 – 689	–				
		Spheroidal	160	623 – 1411	394 – 787	–				
		Malleable/Tempered iron	130	591 – 1706	492 – 820	–				

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Optimized by FEM:

Positive Masterfinish Geometry
High surface quality



General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide		Application	Depth of cut and feed rate										
			CG93	CG97		Chip breaker	a_p [inch]	f [inch]								
P Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	558 – 787	558 – 623	A Ex: CCMT 32.52-A for 304 Different in each application	0.039 to 0.138	0.012 to 0.006									
	Low alloyed steel	250 – 300	328 – 623	295 – 492												
	High alloyed steel	200	427 – 689	394 – 656												
	Corrosion resistant steel	200	427 – 689	459 – 591												
M Stainless steel	Ferritic	200	459 – 689	459 – 656	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>				Consistent cutting depth	Inconsistent cutting depth	Interrupted cut				0.039 to 0.138	0.012 to 0.006
	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut													
Austenitic	180	328 – 689	361 – 623													
Duplex	230 – 260	–	262 – 492													
Martensitic	330	230 – 328	180 – 246													
K Cast iron	Grey cast iron	180	427 – 689	–	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>							0.039 to 0.138	0.012 to 0.006			
Spheroidal	160	394 – 787	–													
Malleable/Tempered iron	130	492 – 820	–													

General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide		Application	Depth of cut and feed rate										
			CG96	CG96		Chip breaker	a_p [inch]	f [inch]								
M Stainless steel	Ferritic	200	492 – 656	492 – 656	E Ex: CCGT-32.50-E for 304 Different in each application	0.002 to 0.053	0.001 to 0.004									
	Austenitic	180	394 – 656	394 – 656												
	Duplex	230 – 260	295 – 525	295 – 525												
	Martensitic	330	197 – 262	197 – 262												
K Cast iron	Grey cast iron	180	394 – 525	394 – 525	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>				Consistent cutting depth	Inconsistent cutting depth	Interrupted cut				0.002 to 0.053	0.001 to 0.004
	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut													
Spheroidal	160	394 – 525	394 – 525													
Malleable / Tempered iron	130	459 – 722	459 – 722													
N Non Ferrous		100	328 – 1312	328 – 1312	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>							0.002 to 0.053	0.001 to 0.004			
		130	328 – 1312	328 – 1312												
	90	328 – 1969	328 – 1969													
	100	328 – 1312	328 – 1312													
S Exotic	Fe base	200	66 – 164	66 – 164	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>							0.002 to 0.053	0.001 to 0.004			
	Nickel or Kobalt base	280	66 – 164	66 – 164												
	Nickel or Kobalt base	250	49 – 131	49 – 131												
Nickel or Kobalt base		66 – 115	66 – 115													
Titanium	Rm 440*	262 – 459	262 – 459													



ULTIMATE PERFORMANCE







Turning Speed & Feed Guide

Optimized by FEM:

Increased life expectancy
Small feedrate in bar turning



General cutting parameters depending on the application

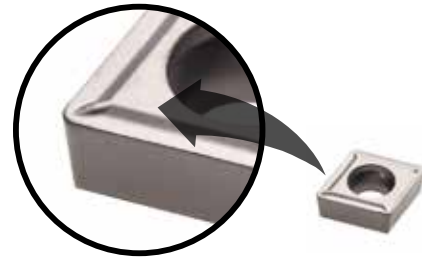
Work piece material			Coated carbide	Application	Depth of cut and feed rate		
			CG98		Chip breaker	a_p [inch]	f [inch]
	Type of treatment/alloy	Hardness HB	V_c [sfm]				
K	Cast iron	Grey cast iron	180	–	AA	0.002 to 0.053	0.001 to 0.004
		Spheroidal	160	–	Ex: CCGT 432FN-AA for 304 Different in each application		
		Malleable/Tempered iron	130	–			
N	Alu Cuivre		100	328 – 6562			
			130	328 – 2625			
			90	328 – 1969			
			100	328 – 984	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
S	Exotic	Fe base	200	98 – 148			
		Nickel or Kobalt base	280	66 – 115			
		Nickel or Kobalt base	250	66 – 115			
		Nickel or Kobalt base		59 – 98			
		Titanium	Rm 440*	197 – 394			

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Optimized by FEM:

Increase life time
Reduce temperature and stresses



General cutting parameters depending on the application

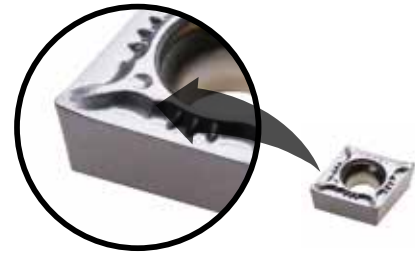
Work piece material	Type of treatment/alloy	Hardness HB	Cermet	Application	Depth of cut and feed rate								
			CG91		Chip breaker	a_p [inch]	f [inch]						
			V_c [sfm]										
P	Steel	Non alloyed steel 0-0.45% C	150 – 250	755 – 886	B	0.004 to 0.065	0.008 to 0.002						
		Low alloyed steel	250 – 300	591 – 755	Ex: CCMT 32.51-B Different in each application								
		High alloyed steel	200	525 – 656	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> </table>						Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut											
Corrosion resistant steel	200	755 – 886											
M	Stainless steel	Ferritic	200	558 – 787	<table border="1"> <tr> <td></td> <td>X</td> <td>X</td> </tr> </table>				X	X			
			X	X									
		Austenitic	180	656 – 787									
Duplex	230 – 260	–											
Martensitic	330	427 – 525											
K	Cast iron	Grey cast iron	180	–	<table border="1"> <tr> <td></td> <td>X</td> <td>X</td> </tr> </table>				X	X			
			X	X									
		Spheroidal	160	722 – 984									
Malleable/Tempered iron	130	820 – 1148											

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Chipbreaker C

To optimize the control of the chip



General cutting parameters depending on the application

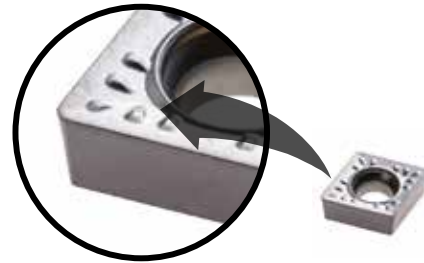
Work piece material			Coated carbide		Application	Depth of cut and feed rate		
			CG95	CG97		Chip breaker	a_p [inch]	f [inch]
	Type of treatment/ally	Hardness HB	V_c [sfm]	V_c [sfm]				
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	427 – 820	558 – 623	C	0.02 to 0.089	0.006 to 0.003
		Low alloyed steel	250 – 300	197 – 591	295 – 492			
		High alloyed steel	200	262 – 656	394 – 656			
		Corrosion resistant steel	200	328 – 656	459 – 591			
M	Stainless steel	Ferritic	200	394 – 820	459 – 656	Ex: CCMT 32.51-C Different in each application 		
		Austenitic	180	328 – 722	361 – 623			
		Duplex	230 – 260	197 – 525	262 – 492			
		Martensitic	330	131 – 328	180 – 246			

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Optimized by FEM:

- Increase life time
- Reduce temperature and stresses
- Universal application



General cutting parameters depending on the application

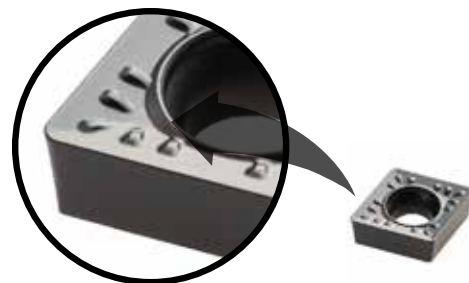
Work piece material	Type of treatment/ally	Hardness HB	Coated carbide		Application	Depth of cut and feed rate						
			CG95	CG97		Chip breaker	a_p [inch]	f [inch]				
			V_c [sfm]	V_c [sfm]								
P Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	427 – 820	558 – 623	D	0.02 to 0.118	0.008 to 0.005					
	Low alloyed steel	250 – 300	197 – 591	295 – 492	Ex: CCMT 32.51-D for 304 Different in each application							
	High alloyed steel	200	262 – 656	394 – 656								
	Corrosion resistant steel	200	328 – 656	459 – 591	<table border="1"> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>			Consistent cutting depth	Inconsistent cutting depth	Interrupted cut		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut										
M Stainless steel	Ferritic	200	394 – 820	459 – 656								
	Austenitic	180	328 – 722	361 – 623								
	Duplex	230 – 260	197 – 525	262 – 492								
	Martensitic	330	131 – 328	180 – 246								

ULTIMATE PERFORMANCE






Turning Speed & Feed Guide

Optimized by FEM:







- Increase life time
- Reduce temperature and stresses
- Universal application



General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide	Application	Depth of cut and feed rate	
			CG99		Chip breaker	a_p [inch]
			V_c [sfm]			
P Steel	Non alloyed steel 0-0.45% C	150 – 250	656 – 1116	D	0.039 to 0.118	0.016 to 0.009
	Low alloyed steel	250 – 300	492 – 951	Ex: CCMT 32.52-D for GG25 Different in each application		
	High alloyed steel	200	492 – 951			
	Corrosion resistant steel	200	525 – 951	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
K Cast iron	Grey cast iron	180	492 – 1312			X
	Spheroidal	160	656 – 1476			
	Malleable/Tempered iron	130	656 – 1805			

General cutting parameters depending on the application

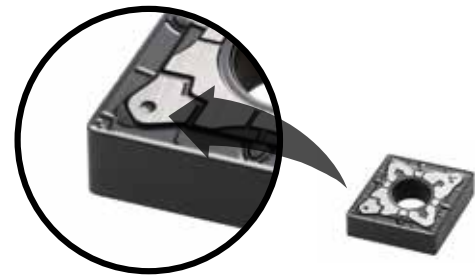
Work piece material	Type of treatment/ally	Hardness HB	Uncoated carbide	Application	Depth of cut and feed rate	
			CG910		Chip breaker	a_p [inch]
			V_c [sfm]			
K Cast iron	Grey cast iron	180	394 – 525	AA	0.059 to 0.256	0.02 to 0.008
	Spheroidal	160	427 – 558	Ex: C CGT 432FN-AA for AIMg1 Different in each application		
	Malleable/Tempered iron	130	459 – 656			
N Alu Cuivre	Aluminium wrought alloys	100	328 – 6562			
	Aluminium cast alloys	130	328 – 2625			
	Copper and copper alloys	90	328 – 1969			
	Non-metallic materials	100	328 – 984	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
S Exotic	Fe base	200	98 – 148			
	Nickel or Kobalt base	280	66 – 115			
	Nickel or Kobalt base	250	66 – 115			
	Nickel or Kobalt base	–	59 – 98			
	Titanium	Rm 440*	197 – 394			

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Optimized by FEM:

Masterfinish Geometry
High surface quality



General cutting parameters depending on the application

Work piece material	Type of treatment/alloy	Hardness HB	Coated carbide			Application	Depth of cut and feed rate		
			CG92	CG93	CG94		Chip breaker	a_p [inch]	f [inch]
			V _c : [sfm]	V _c : [sfm]	V _c : [sfm]				
P	Steel	Non alloyed steel 0-0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623	F	0.02 to 0.118	0.014 to 0.006
		Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492	Ex: Ex: CNMX 432-F Different in each application		
		High alloyed steel	200	591 – 1050	427 – 689	394 – 656			
		Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591			
M	Stainless steel	Ferritic	200	722 – 1050	459 – 689	459 – 656			
		Austenitic	180	–	328 – 689	361 – 623			
		Duplex	230 – 260	–	–	262 – 492			
		Martensitic	330	–	230 – 328	180 – 246			
K	Cast iron	Grey cast iron	180	459 – 1214	427 – 689	–			
		Spheroidal	160	623 – 1411	394 – 787	–			
		Malleable/Tempered iron	130	591 – 1706	492 – 820	–			

General cutting parameters depending on the application

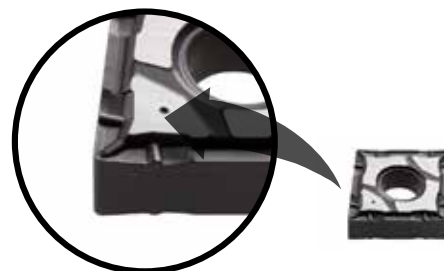
Work piece material	Type of treatment/alloy	Hardness HB	Cermet	Application	Depth of cut and feed rate		
			CG91		Chip breaker	a_p [inch]	f [inch]
			V _c [sfm]				
P	Steel	Non alloyed steel 0-0.45 % C	150 – 250	755 – 886	B	0.004 to 0.079	0.008 to 0.002
		Low alloyed steel	250 – 300	591 – 755	Ex: CNMG 431EN-B for CK60 Different in each application		
		High alloyed steel	200	525 – 656			
		Corrosion resistant steel	200	755 – 886			
M	Stainless steel	Ferritic	200	558 – 787			
		Austenitic	180	656 – 787			
		Duplex	230 – 260	–			
		Martensitic	330	427 – 525			
K	Cast iron	Grey cast iron	180	–			
		Spheroidal	160	722 – 984			
		Malleable/Tempered iron	130	820 – 1148			

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Optimized by FEM:

Increase life time
Reduce temperature and stresses










General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide			Application	Depth of cut and feed rate										
			CG92	CG93	CG94		Chip breaker	a _p [inch]	f [inch]								
			V _c [sfm]	V _c [sfm]	V _c [sfm]												
P	Steel					H	0.02 to 0.079	0.008 to 0.004									
	Non alloyed steel 0 - 0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623	Ex: CNMG 432-H for CK60 Different in each application	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> <tr> <td>●</td> <td>○</td> <td>⊗</td> </tr> </table>				Consistent cutting depth	Inconsistent cutting depth	Interrupted cut	●	○	⊗	
	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut														
●	○	⊗															
Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492													
High alloyed steel	200	591 – 1050	427 – 689	394 – 656													
Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591													
M	Stainless steel																
	Ferritic	200	722 – 1050	459 – 689	459 – 656												
	Austenitic	180	–	328 – 689	361 – 623												
	Duplex	230 – 260	–	–	262 – 492												
K	Cast iron																
	Grey cast iron	180	–	–	–												
	Spheroidal	160	–	–	–												
	Malleable/Tempered iron	130	–	–	–												








ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide			Application	Depth of cut and feed rate		
			CG92	CG93	CG94		Chip breaker	a_p [inch]	f [inch]
			V _c : [sfm]	V _c : [sfm]	V _c : [sfm]				
P	Steel	Non alloyed steel 0-0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623	I	0.059 to 0.197	0.02 to 0.012
		Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492	Ex: CNMG 432-I for CK60 Different in each application		
		High alloyed steel	200	591 – 1050	427 – 689	394 – 656			
		Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591			
M	Stainless steel	Ferritic	200	722 – 1050	459 – 689	459 – 656			
		Austenitic	180	-	328 – 689	361 – 623			
		Duplex	230 – 260	-	-	262 – 492	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
		Martensitic	330	-	230 – 328	180 – 246			
K	Cast iron	Grey cast iron	180	459 – 1214	427 – 689	-			
		Spheroidal	160	623 – 1411	394 – 787	-			
		Malleable/Tempered iron	130	591 – 1706	492 – 820	-			

General cutting parameters depending on the application

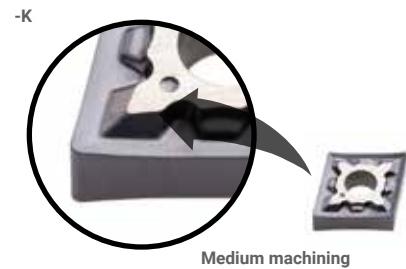
Work piece material	Type of treatment/ally	Hardness HB	Coated carbide	Application	Depth of cut and feed rate		
			CG96		Chip breaker	a_p [inch]	f [inch]
			V _c [sfm]				
M	Stainless steel	Ferritic	200	492 – 656	J	0.02 to 0.098	0.01 to 0.004
		Austenitic	180	394 – 656	Ex: CNGP 432-J for 304 Different in each application		
		Duplex	230 – 260	295 – 525			
		Martensitic	330	197 – 262			
K	Cast iron	Grey cast iron	180	394 – 525			
		Spheroidal	160	394 – 525			
		Malleable / Tempered iron	130	459 – 722			
N	Non Ferrous		100	328 – 1312	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
			130	328 – 1312			
			90	328 – 1969			
			100	328 – 1312			
S	Exotic	Fe base	200	66 – 164			
		Nickel or Kobalt base	280	66 – 164			
		Nickel or Kobalt base	250	49 – 131			
		Nickel or Kobalt base		66 – 115			
		Titanium	Rm 440*	262 – 459			

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Sharp positive cutting edges:

- Reduced formation of burrs
- Good surface finish
- Low cutting forces



General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide		Application	Depth of cut and feed rate										
			CG95	CG97		Chip breaker	a _p [inch]	f [inch]								
			V _c [sfm]	V _c [sfm]												
P	Non alloyed steel 0 - 0.45 % C	150 – 250	427 – 820	558 – 623	K	0.039 to 0.165	0.016 to 0.009									
	Low alloyed steel	250 – 300	197 – 591	295 – 492	Ex: CNMG 432-K for 304 Different in each application											
	High alloyed steel	200	262 – 656	394 – 656	<table border="1"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Consistent cutting depth</td> <td>Inconsistent cutting depth</td> <td>Interrupted cut</td> </tr> <tr> <td>●</td> <td>○</td> <td>✘</td> </tr> </table>						Consistent cutting depth	Inconsistent cutting depth	Interrupted cut	●	○	✘
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut														
●	○	✘														
Corrosion resistant steel	200	328 – 656	459 – 591													
M	Ferritic	200	394 – 820	459 – 656												
	Austenitic	180	328 – 722	361 – 623												
	Duplex	230 – 260	197 – 525	262 – 492												
	Martensitic	330	131 – 328	180 – 246												

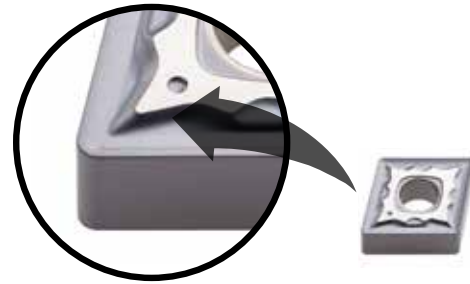
ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

-L







Sharp positive cutting edges:

- Reduced formation of burrs
- Good surface finish
- Low cutting forces



Medium machining and light roughing








General cutting parameters depending on the application

Work piece material	Type of treatment/alloy	Hardness HB	Coated carbide		Application	Depth of cut and feed rate	
			CG95	CG97		Chip breaker	a_p [inch]
			V_c [sfm]	V_c [sfm]			
P Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	427 – 820	558 – 623	L	0.059 to 0.236	0.02 to 0.01
	Low alloyed steel	250 – 300	197 – 591	295 – 492	Ex: CNMG 432-L for 304 Different in each application		
	High alloyed steel	200	262 – 656	394 – 656			
	Corrosion resistant steel	200	328 – 656	459 – 591	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
M Stainless steel	Ferritic	200	394 – 820	459 – 656			
	Austenitic	180	328 – 722	361 – 623			
	Duplex	230 – 260	197 – 525	262 – 492			
	Martensitic	330	131 – 328	180 – 246			

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

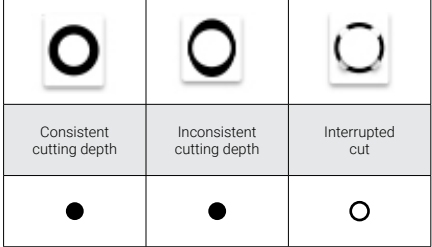

General cutting parameters depending on the application

Work piece material			Coated carbide		Application	Depth of cut and feed rate		
			CG911	CG912		Chip breaker	a _p [inch]	f [inch]
	Type of treatment/alloy	Hardness HB	V _c [sfm]	V _c [sfm]				
M	Stainless steel	Ferritic	200	492 – 755	427 – 722	N	0.031 to 0.118	0.012 to 0.004
		Austenitic	180	459 – 623	394 – 591	Ex: CNMG 432-N for Super Alloys Different in each application		
		Duplex	230 – 260	197 – 328	164 – 295			
		Martensitic	330	–	–			
S	Exotic	Febase	200	262 – 394	262 – 394			
		Nickel or Kobalt base	280	197 – 328	197 – 328	Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
		Nickel or Kobalt base	250	115 – 295	115 – 295			
		Nickel or Kobalt base		98 – 164	98 – 164			
		Titanium	Rm 440*	230 – 394	230 – 394			

ULTIMATE PERFORMANCE

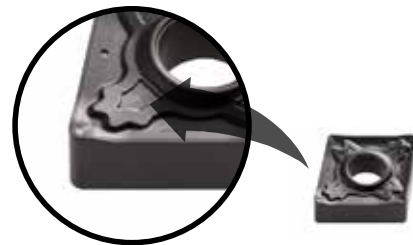
Turning Speed & Feed Guide

General cutting parameters depending on the application

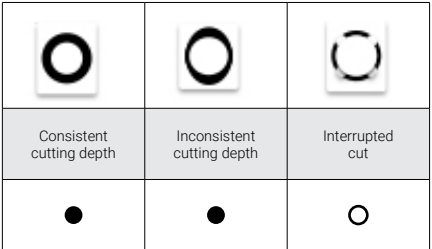
Work piece material	Type of treatment/ally	Hardness HB	Coated carbide			Application	Depth of cut and feed rate		
			CG92	CG93	CG94		Chip breaker	a _p [inch]	f [inch]
			Vc: [sfm]	Vc: [sfm]	Vc: [sfm]				
P	Steel	Non alloyed steel 0 - 0.45 % C	150 - 250	722 - 1312	558 - 787	558 - 623	O	0.098 to 0.394	0.024 to 0.012
		Low alloyed steel	250 - 300	656 - 1050	328 - 623	295 - 492	Different in each application		
		High alloyed steel	200	591 - 1050	427 - 689	394 - 656			
		Corrosion resistant steel	200	656 - 1050	427 - 689	459 - 591			
M	Stainless steel	Ferritic	200	722 - 1050	459 - 689	459 - 656			
		Austenitic	180	-	328 - 689	361 - 623			
		Duplex	230 - 260	-	-	262 - 492			
K	Cast iron	Martensitic	330	-	230 - 328	180 - 246			
		Grey cast iron	180	459 - 1214	427 - 689	-			
		Spheroidal	160	623 - 1411	394 - 787	-			
		Malleable/Tempered iron	130	591 - 1706	492 - 820	-			

Sharp positive cutting edges:

Single Sided roughing geometry
 Good chip control
 For steels with high strength (800N/mm²)



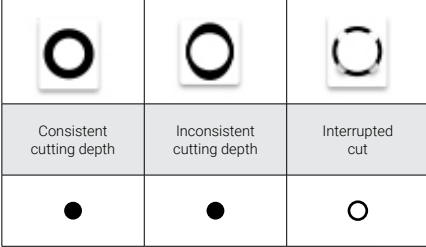

General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide			Application	Depth of cut and feed rate		
			CG92	CG93	CG94		Chip breaker	a _p [inch]	f [inch]
			Vc: [sfm]	Vc: [sfm]	Vc: [sfm]				
P	Steel	Non alloyed steel 0 - 0.45 % C	150 - 250	722 - 1312	558 - 787	558 - 623	P	0.059 to 0.472	0.02 to 0.035
		Low alloyed steel	250 - 300	656 - 1050	328 - 623	295 - 492	Ex: CNMM 432-P for CK60		
		High alloyed steel	200	591 - 1050	427 - 689	394 - 656	Different in each application		
		Corrosion resistant steel	200	656 - 1050	427 - 689	459 - 591			
M	Stainless steel	Ferritic	200	722 - 1050	459 - 689	459 - 656			
		Austenitic	180	-	328 - 689	361 - 623			
		Duplex	230 - 260	-	-	262 - 492			
K	Cast iron	Martensitic	330	-	230 - 328	180 - 246			
		Grey cast iron	180	459 - 1214	427 - 689	-			
		Spheroidal	160	623 - 1411	394 - 787	-			
		Malleable/Tempered iron	130	591 - 1706	492 - 820	-			

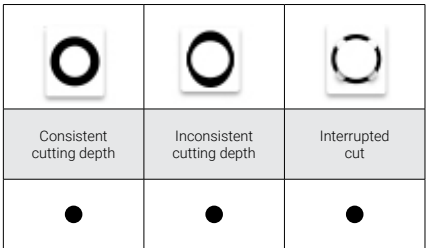

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide			Application	Depth of cut and feed rate		
			CG92	CG93	CG94		Chip breaker	a _p [inch]	f [inch]
			Vc: [sfm]	Vc: [sfm]	Vc: [sfm]				
P	Steel	Non alloyed steel 0 - 0.45 % C	150 - 250	722 - 1312	558 - 787	558 - 623	Q	0.079 to 0.472	0.031 to 0.012
		Low alloyed steel	250 - 300	656 - 1050	328 - 623	295 - 492	Ex: CNMM 644EN-Q for CK60 Different in each application		
		High alloyed steel	200	591 - 1050	427 - 689	394 - 656			
		Corrosion resistant steel	200	656 - 1050	427 - 689	459 - 591			
M	Stainless steel	Ferritic	200	722 - 1050	459 - 689	459 - 656			
		Austenitic	180	-	328 - 689	361 - 623			
		Duplex	230 - 260	-	-	262 - 492			
		Martensitic	330	-	230 - 328	180 - 246			
K	Cast iron	Grey cast iron	180	459 - 1214	427 - 689	-			
		Spheroidal	160	623 - 1411	394 - 787	-			
		Malleable/Tempered iron	130	591 - 1706	492 - 820	-			

General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide			Application	Depth of cut and feed rate		
			CG92	CG93	CG94		Chip breaker	a _p [inch]	f [inch]
			Vc: [sfm]	Vc: [sfm]	Vc: [sfm]				
P	Steel	Non alloyed steel 0 - 0.45 % C	150 - 250	722 - 1312	558 - 787	558 - 623	R	0.098 to 0.472	0.047 to 0.014
		Low alloyed steel	250 - 300	656 - 1050	328 - 623	295 - 492	Ex: CNMM 644-R for CK60 Different in each application		
		High alloyed steel	200	591 - 1050	427 - 689	394 - 656			
		Corrosion resistant steel	200	656 - 1050	427 - 689	459 - 591			
M	Stainless steel	Ferritic	200	722 - 1050	459 - 689	459 - 656			
		Austenitic	180	-	328 - 689	361 - 623			
		Duplex	230 - 260	-	-	262 - 492			
		Martensitic	330	-	230 - 328	180 - 246			
K	Cast iron	Grey cast iron	180	459 - 1214	427 - 689	-			
		Spheroidal	160	623 - 1411	394 - 787	-			
		Malleable/Tempered iron	130	591 - 1706	492 - 820	-			

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide			Application	Depth of cut and feed rate		
			CG92	CG93	CG94		Chip breaker	a _p [inch]	f [inch]
			V _c : [sfm]	V _c : [sfm]	V _c : [sfm]				
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623	M	0.126 to 0.299	0.039 to 0.024
		Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492	Ex: CNMG 644-M for CK60 Different in each application		
		High alloyed steel	200	591 – 1050	427 – 689	394 – 656			
		Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591			
M	Stainless steel	Ferritic	200	722 – 1050	459 – 689	459 – 656			
		Austenitic	180	–	328 – 689	361 – 623			
		Duplex	230 – 260	–	–	262 – 492			
		Martensitic	330	–	230 – 328	180 – 246			
K	Cast iron	Grey cast iron	180	459 – 1214	427 – 689	–			
		Spheroidal	160	623 – 1411	394 – 787	–			
		Malleable/Tempered iron	130	591 – 1706	492 – 820	–			

General cutting parameters depending on the application

Work piece material	Type of treatment/ally	Hardness HB	Coated carbide	Application	Depth of cut and feed rate		
			CG99		Chip breaker	a _p [inch]	f [inch]
			V _c [sfm]				
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	656 – 1116	M	0.126 to 0.22	0.024 to 0.015
		Low alloyed steel	250 – 300	492 – 951	Ex: CNMG 543-M for GC25 Different in each application		
		High alloyed steel	200	492 – 951			
		Corrosion resistant steel	200	525 – 951			
K	Cast iron	Grey cast iron	180	492 – 1312			
		Spheroidal	160	656 – 1476			
		Malleable/Tempered iron	130	656 – 1805			

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Grade designation	Standard designation		Type of cutting material	Application range											P	M	K	N	S	H	
	ISO	ANSI		01 05 10 15 20 25 30 35 40 45 50											Steel	Stainless	Cast iron	Non-ferrous metals	Heat-resistant	Hard materials	
CG91	HC-P15	C7	T												●						
	HC-M10	-	T													●					
	HC-K10	C3	T														○				
CG92	HC-P15	C7	C												●						
	HC-K25	C2	C														●				
	HC-M10	-	C													○					
CG93	HC-P25	C6	C												●						
	HC-K30	C1	C														●				
	HC-M20	-	C													○					
CG94	HC-M35	C5	C												●						
	HC-M25	-	C													○					
	HC-S25	-	C																○		
CG95	HC-M25	-	P													●					
	HC-M35	C5	P												●						
	HC-S25	-	P																○		
CG96	HC-M20	C3	P													●					
	HC-K20	C2	P														○	○			
CG97	HC-M35	C5	P													●					
	HC-P35	-	P												○						
CG98	HC-M15	-	P													●					
	HC-S15	-	P														○				
CG99	HC-K20	C2	C														●				
	HC-P10	C8	C												○						
CG910	HW-N15	C3	W															●			
	HW-K15	C3	W														●				
CG911	HC-S15	-	P																	●	
	HC-M15	-	P													○					
CG912	HC-S15	-	P																	●	
	HC-M15	-	P													○					
				01 05 10 15 20 25 30 35 40 45 50											● Main application ○ Extended application						

(SFM) SURFACE FEET PER MINUTE

$.262 * \text{DIAMETER} * \text{RPM}$

(RPM) REVOLUTIONS PER MINUTE

$3.82 + \text{SFM} / \text{DIAMETER}$

(IPM) INCHES PER MINUTE

$\text{FPT} * \text{NUMBER OF TEETH} * \text{RPM}$

(FPT) FEED PER TOOTH

$\text{IPM} / (\text{NUMBER OF TEETH} * \text{RPM})$

(IPR) INCHES PER REVOLUTION

IPM / RPM

METAL REMOVAL RATE IN CUBIC INCHES

$\text{DEPTH OF CUT} * \text{WIDTH OF CUT} * \text{IPM}$

(CPT) CHIPLOAD PER TOOTH

$\text{IPM} / \text{RPM} / \text{NO. OF FLUES}$

INCH TO METRIC

$\text{NCH} * 25.4$

METRIC TO INCH

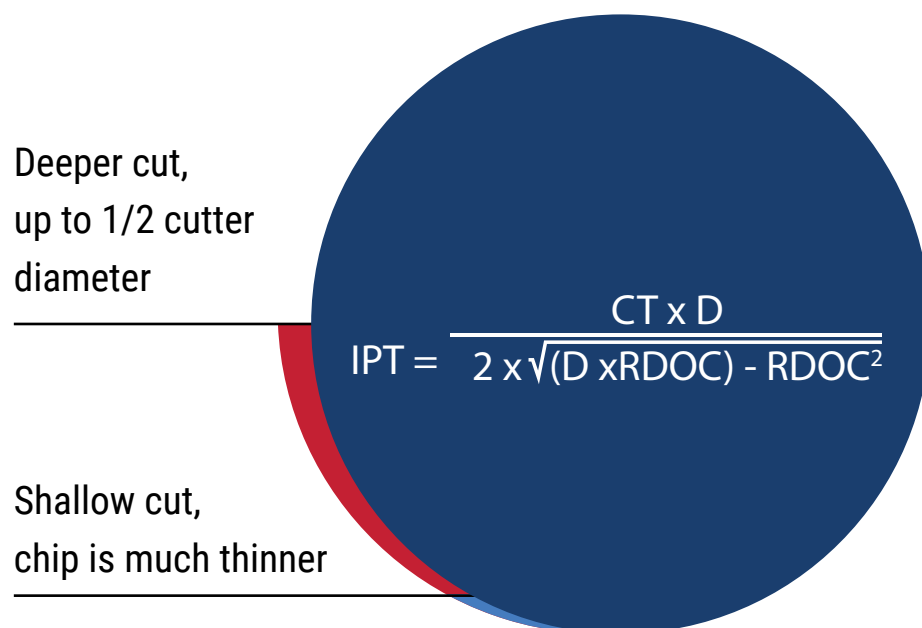
$\text{METRIC} / 25.4$

Chip thinning is applied when Radial Depth of Cut (RDOC) = < 50% x Tool Diameter

The result of the formula is an increased Inch per Tooth (IPT), which subsequently improves productivity while maintaining tool life through via proper control of chip thickness.

Chip Thinning Formula Key:

- IPT = Inch per Tooth
- CT = Chip Thickness
(for CT, use recommended IPT for 50% or greater step over)
- D = Diameter
- RDOC = Radial Depth of Cut
(aka. Step Over)



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25025020BN	313598	92	25037508NS0	313900	94	25050010N22030C5	313936	94	25062512N0C5	314019	94		
25025020BNC5	313602	92	25037508NS0C5	313904	94	25050010N22060C5	313938	94	25062512N26	314022	94		
25025020C5	313072	89	25037508NS34	313907	94	25050010N22090C5	313941	94	25062512N26C5	314024	94		
25025024	313074	89	25037508NS34030C5	313913	94	25050010N22120C5	313943	94	25062512NS05	314027	94		
25025024C5	313077	89	25037508NS34C5	313909	94	25050010N22C5	313927	94	25062512NS05C5	314030	94		
25025032	313079	89	25037510	313175	89	25050010NS04	313947	94	25062512NS06	314037	94		
25025032C5	313083	89	25037510C5	313177	89	25050010NS04C5	313949	94	25062512NS06C5	314039	94		
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25028107C5	313089	89	25037512C5	313183	89	25050010NS06C5	313982	94	25062512NS38C5	314035	94		
25028113	313091	89	25037516	313187	89	25050010NS38	313953	94	25062512NS54	314043	94		
25028113C5	313094	89	25037516020C5	313192	89	25050010NS38015C5	313961	94	25062512NS54C5	314045	94		
25031207	313096	89	25037516030C5	313194	89	25050010NS38020C5	313963	94	25062520	313366	90		
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25031207N18015C5	313873	93	25037524BN	313632	92	25050010NS54060C5	313994	94	25062526C5	313374	90		
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25031208	313104	89	25037540C5	313225	89	25050016C5	313300	90	25062540C5	313397	90		
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25031213060C5	313122	89	25043709	313241	89	25050020060C5	313317	90	25062564	313410	90		
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25031218C5	313127	89	25043716C5	313249	89	25050020NS54015C5	314001	94	25075016BN	313697	92		
25031220	313129	89	25043732	313252	89	25050020NS54030C5	314004	94	25075016BNC5	313700	92		
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25031220C5	313133	89	25043732C5	313254	89	25050020NS54120C5	314014	94	25075016N0C5	314053	94		
25031224	313136	89	25046810	313257	90	25050024C5	313329	90	25075016N26	314057	94		
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25075016NS5C5	314079	95	250N312074BN	314253	96	3351562BNC4	317700	125	3357500C15	317655	124
25075016NS6	314101	95	250N312074BNC5	314255	96	3351562C15	317498	124	335S1000	317657	124
25075016NS6C5	314105	95	250N375081BN	314259	96	3351875	317511	124	335S1000BN	317899	125
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25075024C5	313435	90	250N375082BN	314273	96	3351875BNC15	317715	125	335S1000BNC4	317904	125
25075026	313439	91	250N375082BNC5	314275	96	3351875BNC4	317719	125	335S1000C15	317659	124
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25075026BN	313704	92	250N375084BNC5	314280	96	3352188BNC4	317735	125	335S1250BNC15	317675	125
25075026BNC5	313707	92	250N500101BN	314282	96	3352188C15	317522	124	335S1250BNC4	317677	125
25075026C5	313443	91	250N500101BNC5	314285	96	3352188C4	317526	124	335S1250C4	317480	124
25075026N40120C5	314126	95	250N500102BN	314303	96	3352500	317535	124	335S1562BN	317687	125
25075026N54030C5	314128	95	250N500102BNC5	314307	96	3352500BN	317746	125	335S1562BNC15	317690	125
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25075032	313456	91	250N500104BN	314309	96	3352500C15	317537	124	335S1562C4	317493	124
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25075036	313461	91	250N500105BN	314297	96	3352812BN	317766	125	335S1875BN	317702	125
25075036C5	313463	91	250N500105BNC5	314301	96	3352812BNC15	317769	125	335S1875BNC15	317705	125
25075040	313465	91	250N500106BN	314316	96	3352812BNC4	317773	125	335S1875BNC4	317709	125
25075040C5	313469	91	250N500106BNC5	314319	96	3352812C15	317548	124	335S1875C15	317503	124
25075048	313473	91	250N625121BN	314323	96	3352812C4	317550	124	335S1875C4	317507	124
25075048C5	313477	91	250N625121BNC5	314326	96	3353125	317560	124	335S2188	317515	124
25075052	313479	91	250N625122BN	314343	96	3353125BN	317784	125	335S2188BN	317722	125
25075052BN	313709	92	250N625122BNC5	314346	96	3353125BNC15	317788	125	335S2188BNC15	317725	125
25075052BNC5	313711	92	250N625123BN	314330	96	3353125BNC4	317790	125	335S2188BNC4	317727	125
25075052C5	313483	91	250N625123BNC5	314333	96	3353125C15	317562	124	335S2188C15	317517	124
25075056	313487	91	250N625124BN	314350	96	3353125C4	317565	124	335S2188C4	317520	124
25075056C5	313489	91	250N625124BNC5	314353	96	3353438	317575	124	335S2500	317529	124
25075064	313492	91	250N625125BN	314336	96	3353438BN	317805	125	335S2500BN	317738	125
25075064C5	313496	91	250N625125BNC5	314340	96	3353438BNC15	317807	125	335S2500BNC15	317740	125
25075080	313499	91	250N625126BN	314357	96	3353438BNC4	317809	125	335S2500BNC4	317744	125
25075080C5	313502	91	250N625126BNC5	314359	96	3353438C15	317579	124	335S2500C15	317533	124
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250N100202BN	314415	96	250N750162BN	314378	96	3353750BNC15	317820	125	335S2812BNC4	317763	125
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250N250063BN	314218	96	3351000C15	317663	124	3355000C4	317628	124	335S3750BN	317811	125
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335S5000	317617	124	35010032WFC5	315205	101	35018716	314536	97	35025032	314622	98
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335S5000BNC4	317846	125	35010048	315084	100	35021806C5	314545	97	35028107C5	314630	98
335S5000C15	317619	124	35010048C5	315086	100	35021812	314547	97	35028113	314633	98
335S6250	317630	124	35010048WFC5	315209	101	35021812C5	314549	97	35028113C5	314636	98
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335S6250BNC4	317864	125	35010056	315090	100	35025006020C5	314558	97	35031207030C5	314648	98
335S6250C4	317634	124	35010056C5	315093	100	35025006030C5	314560	97	35031207BN	315240	102
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335S7500C15	317645	124	35010088C5	315105	100	35025006C5	314553	97	35031207N0C5	315441	103
335S7500C4	317649	124	35012504	314434	97	35025006N0	315379	103	35031207N18	315445	103
			35012504010C5	314440	97	35025006N0C5	315381	103	35031207N18015C5	315450	103
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3501.2520C5	315107	100	35012504N08020C5	315355	103	35025006N18015C5	315392	103	35031207N18C5	315447	103
3501.2532	315109	100	35012504N08030C5	315359	103	35025006N18030C5	315394	103	35031207NS0	315453	103
3501.2532C5	315112	100	35012504NS22020C5	315363	103	35025006N18060C5	315397	103	35031207NS0C5	315456	103
3501.2552	315115	100	35012504NS22030C5	315367	103	35025006N18090C5	315399	103	35031207NS34	315458	103
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35010020	315051	100	35012505C5	314445	97	35025006NS0	315403	103	35031208	314651	98
35010020BN	315336	102	35012506	314447	97	35025006NS0C5	315405	103	35031208C5	314655	98
35010020BNC5	315340	102	35012506010C5	314453	97	35025006NS34	315408	103	35031213	314657	98
35010020C5	315054	100	35012506020C5	314456	97	35025006NS34015C5	315413	103	35031213020C5	314663	98
35010020N0	315693	105	35012506020C5	314456	97	35025006NS34030C5	315415	103	35031213030C5	314666	98
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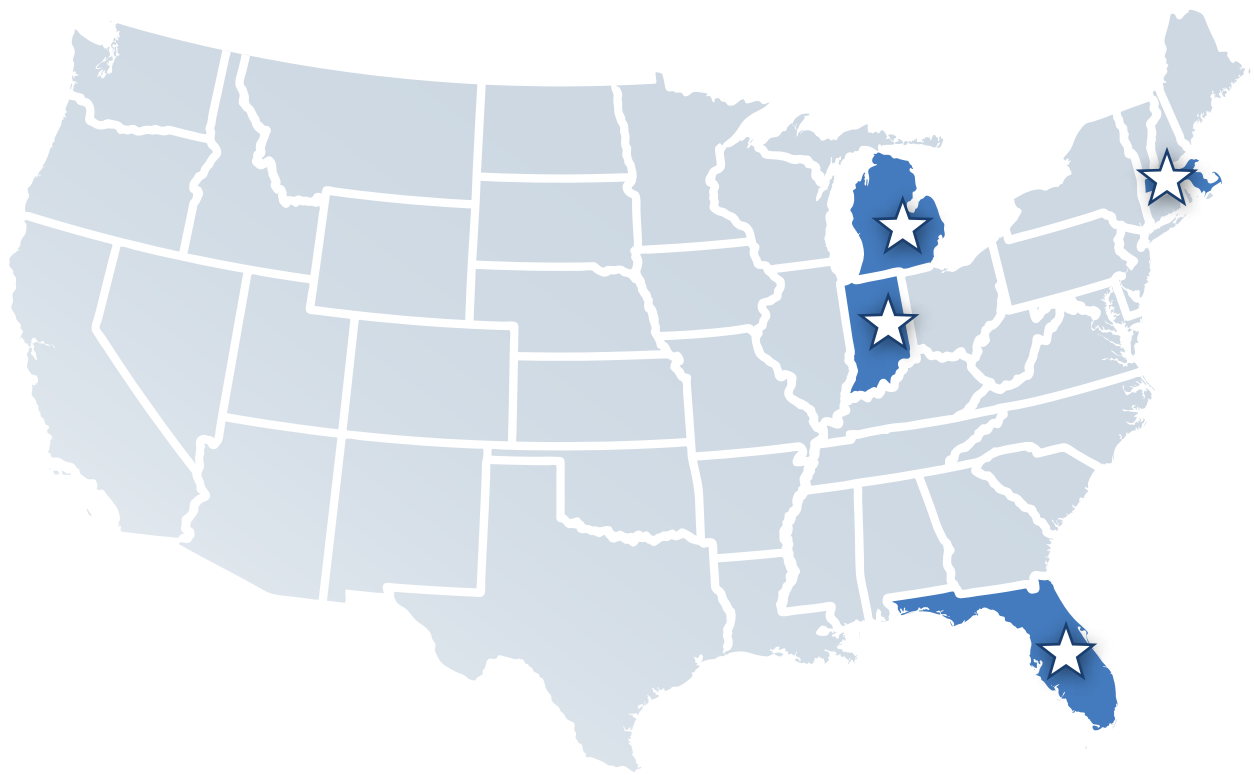
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