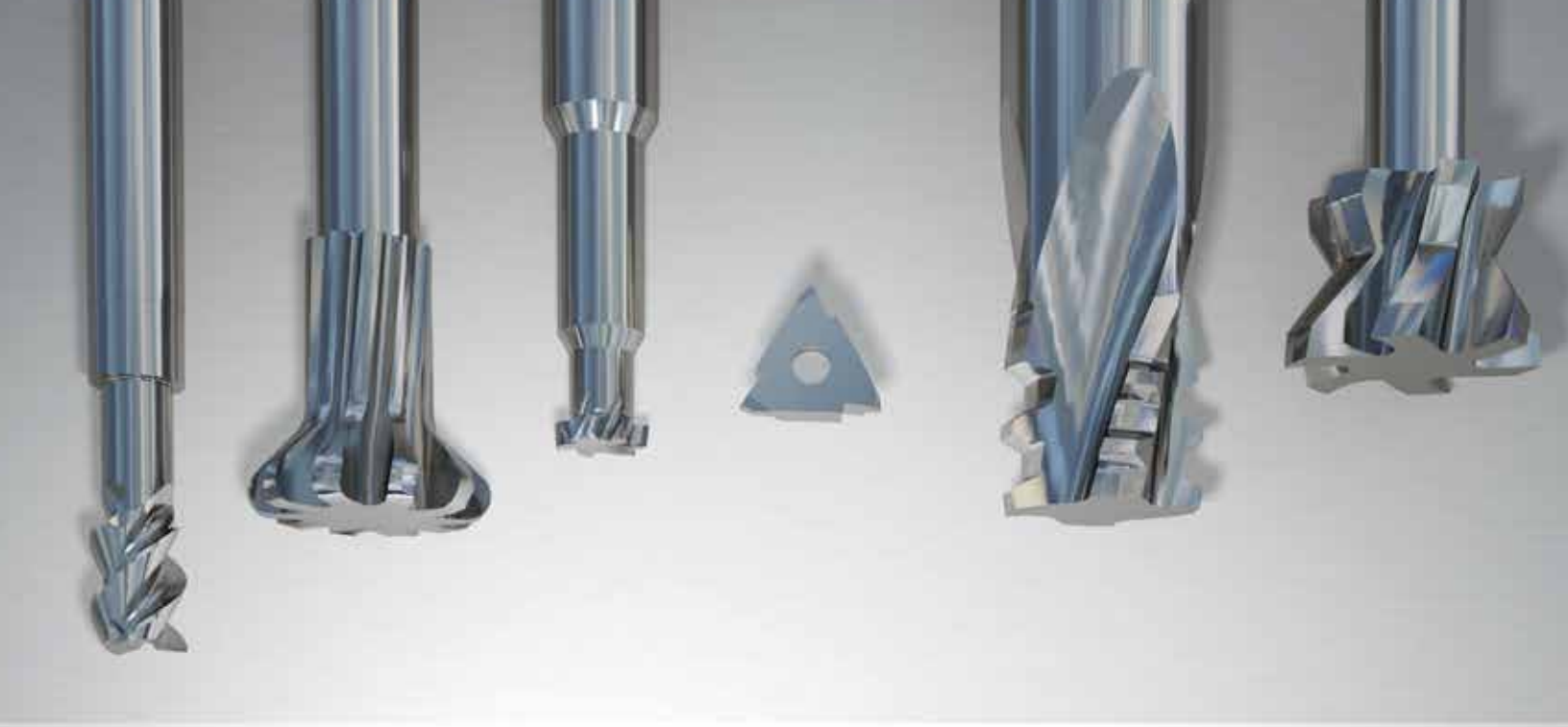


GWS TOOL GROUP

MILLING TURNING HOLEMAKING PRODUCT CATALOG

GWS TOOL GROUP

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.

G.W. SCHULTZ TOOL

CGI TOOL

ALLIANCECNC

BENCHMARK CARBIDE

AS9100 / ISO9001

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

CONTENTS

Discover more about GWS Tool Group and what we offer

INTRO

TECHNICAL INFORMATION

INDEX

PRODUCTS

ULTIMATE PERFORMANCE SERIES

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

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
M Stainless Steel
N Cast Iron
S Non-Ferrous
S High-Temp Alloys
H Hardened Materials

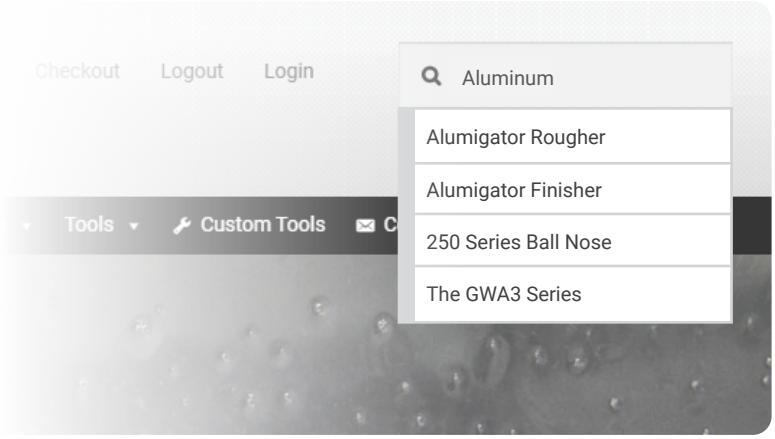
Icon	Material Family	Tensile Strength	Hardness HB	Hardness HRC	Material Number
P1	Low, Medium & High-Carbon Steels, Long Chipping, Short Chipping, Free Machining	>600	<220	<25	A36, 1008, 1010, 1018 through 1029; 1108, 1117, 10L18, 1200, 1213, 12L14, 1035, 1045, 10L45, 1050, 10L50, 1080, 1137, 1144, 11L44, 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

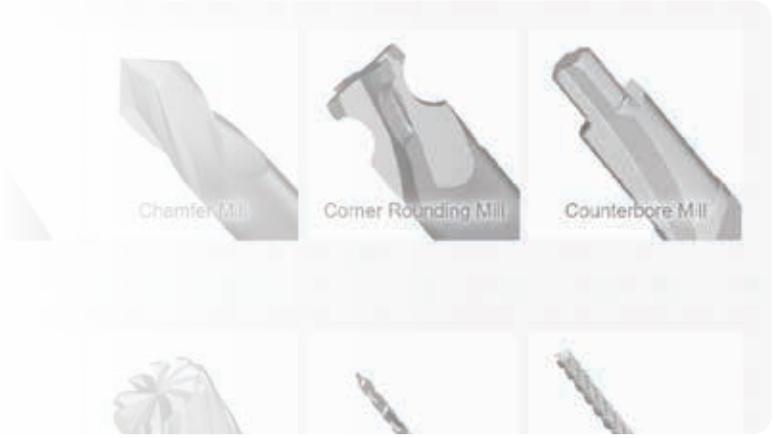
SEARCH WIZARD

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



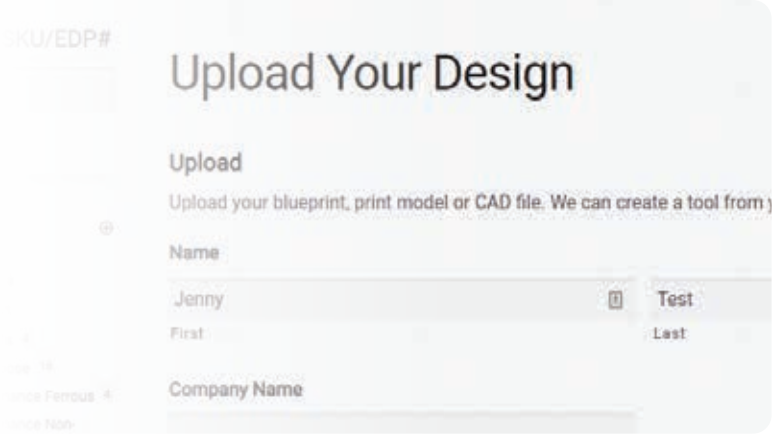
QUICK QUOTE

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.



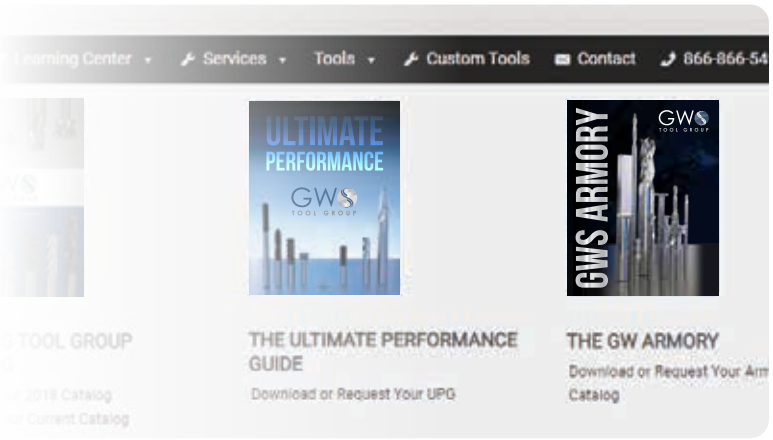
The GWS Tool Group website is mobile responsive - adapting seamlessly to your desktop computer or mobile device. Stop by now for a quick reference, tech support or fast quote request.

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
Search	Search	Search	Search C	Search	Search	Search
103443	Extra Long	3	1	AlTiN	0	$472.15
103747	Stub	0.078	0.0312	NONE	14	$19.29
105142	Stub	0.078	0.0312	AlTiN	0	$21.96
103750	Stub	0.125	0.0625	NONE	1	$23.14
108786	Stub	0.125	0.0625	AlTiN	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.

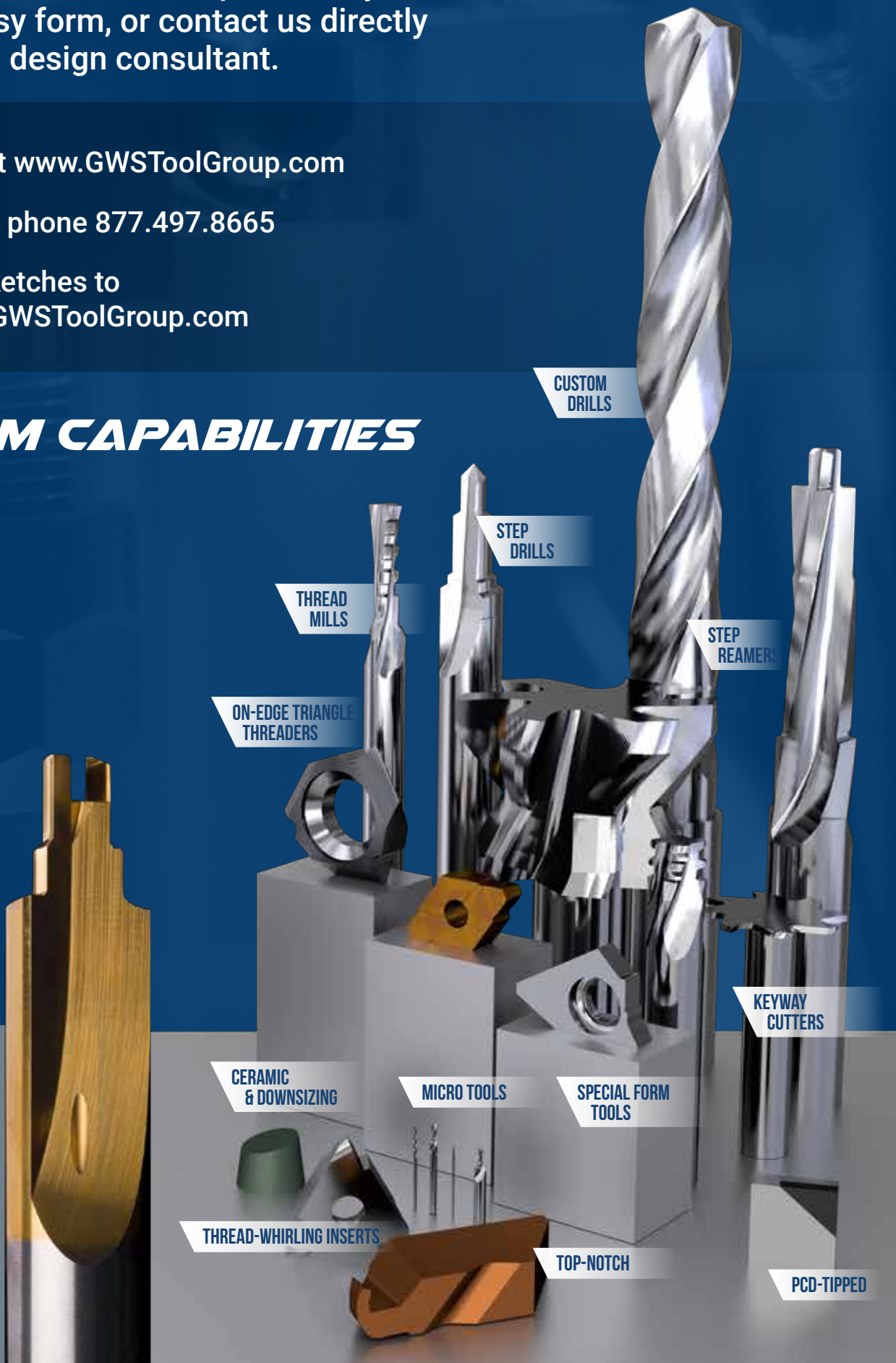
ORDER TOLL FREE:
877.497.8665

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 *

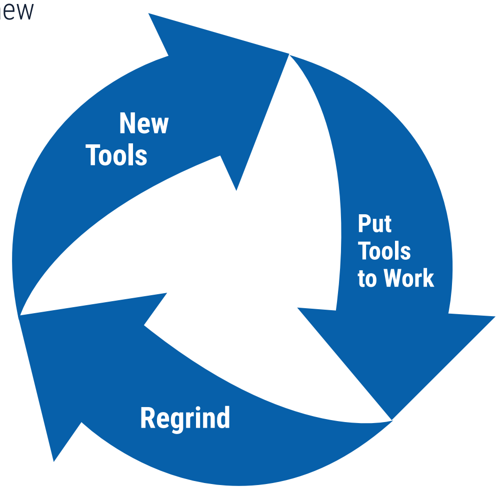
*Delivery subject to change at any time based on capacity and blank availability

GWS REGRIND

WHY REGRIND? QUALITY & PERFORMANCE

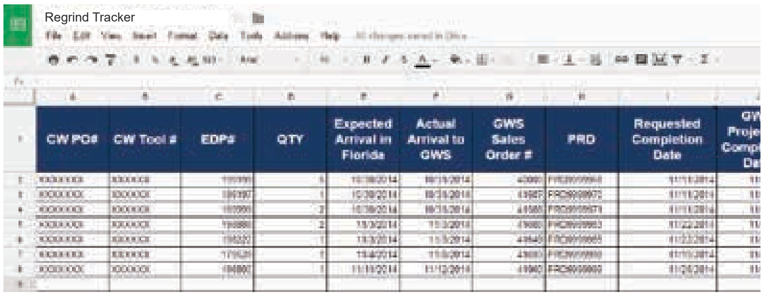
The Regrind Program ensures your tools will be reconditioned to perform as good as a new manufactured tool.

- 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.



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

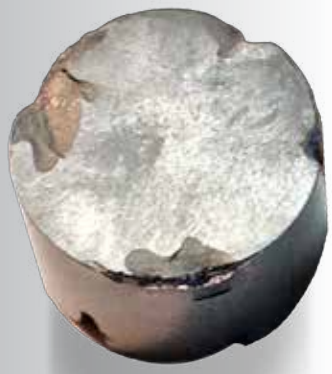
Material costs, manufacturing process time, volume shipping and inventory reduction prove the cost savings of a GW Regrind. Our cost savings are data-driven, not anecdotal. The Regrind Portal tracks and provides real-time comparisons between regrinds and the purchase of new tools.

Ready to Regrind?
Call 877.497.8665

The GWS Tool Group Tool Reconditioning Program

WORN OUT TOOL

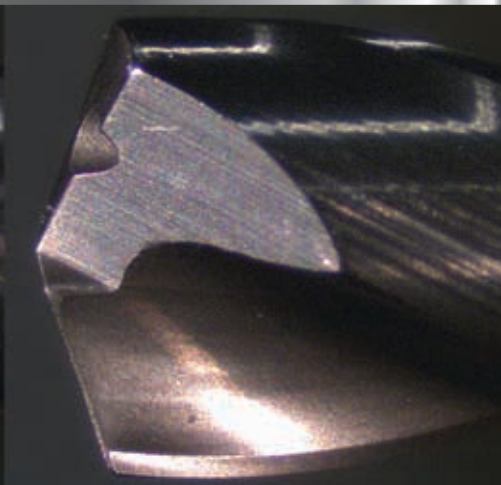
REGRIND



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.	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.	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

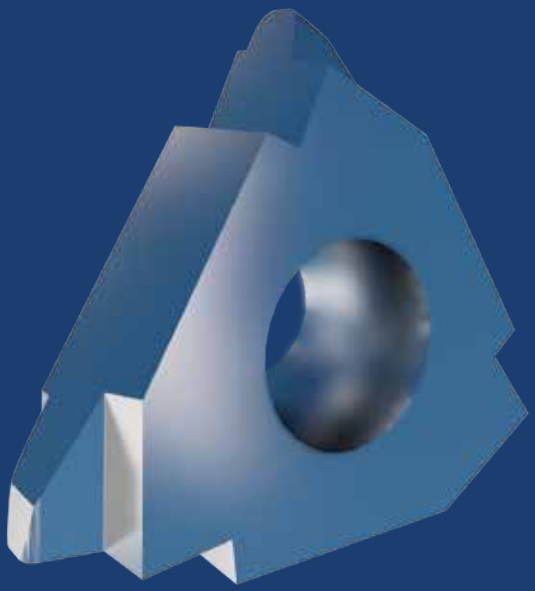
Series No.	P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
230	☆	☆		☆		☆	☆	☆	☆				
237	☆	☆		☆		☆	☆	☆	☆				
240	☆	☆		☆		☆	☆	☆	☆		☆		
241	☆	☆		☆		☆	☆	☆	☆		☆		
243	☆	☆		☆		☆	☆	☆	☆		☆		
244	☆	☆		☆		☆	☆	☆	☆		☆		

★ 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 Turrning of Hardened Steel - Finishing (Cermet)
	CG91-B		HV 1620	Uncoated		Negative	For Turning of Hardened Steel - Finishing (Cermet)
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



ZOMBIE
THREAD WHIRLER

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

AlTiN | P176 | h6 | 140° | 2FL | 30° | NEW

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 fto be combined with our PAC reamers as a perfect "1-2" combination

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	☆	★	★	★	★				

★ 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	AlTiN 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

ULTIMATE PERFORMANCE

Premium High Performance Carbide Reamers

GWS

AlTiN | P178 | h6 | 0° | 1FL | NEW

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

Cutting Diameter mm	Cutting 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"

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	☆	★	★						

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide Reamers

AlTiN | P178 | h6 | 0° | 1FL | NEW

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	☆	★	★						

★ Best ☆ Good

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"

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
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"

GWS TOOL GROUP

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**

ALUMIGATOR

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

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**

ALUMIGATOR

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

Bright | h6 | P179 | CC | SQ | RAD | 3FL | 37°

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**

ALUMIGATOR

More About the Series 1020

Alumigator Finishing Tool. Wiper flat for high quality floor finish

Designed to finish parts at roughing speeds and feeds

P1 | P2 | P3 | M1 | M2 | K1 | K2 | N1 ★ | N2 ★ | S1 | S2 | H1 | H2

★ 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**

ALUMIGATOR

More About the Series 1025

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

Special radii available on request

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Non-Ferrous Alloys

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

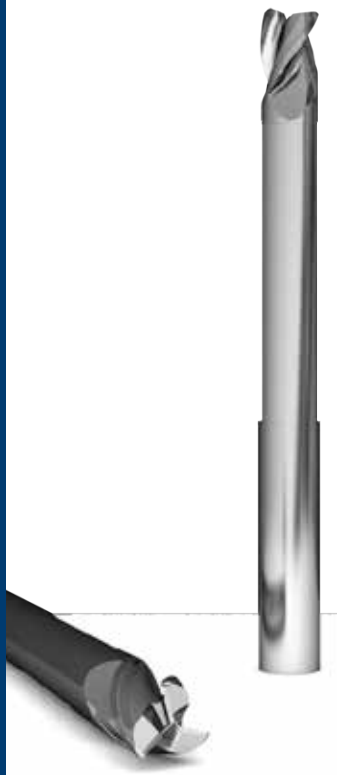
Diameter	Shank Dia.	LOC	OAL	Length Below Shank	Neck Dia.	Bright EDP	ZrN EDP
1/8	1/8	1/4	1-1/2	3/4	0.115	**101066**	**109102**
1/8	1/8	1/4	2	1-1/4	0.115	**101023**	**109101**
3/16	3/16	5/16	2	1	0.170	**101067**	**109103**
3/16	3/16	5/16	3	1-1/2	0.170	**101024**	**103152**
1/4	1/4	3/8	2-1/2	1-1/8	0.235	**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**

ALUMIGATOR

More About the Series 1026

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

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**

ALUMIGATOR

More About the Series 1027

Circular land for exeptional 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

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**

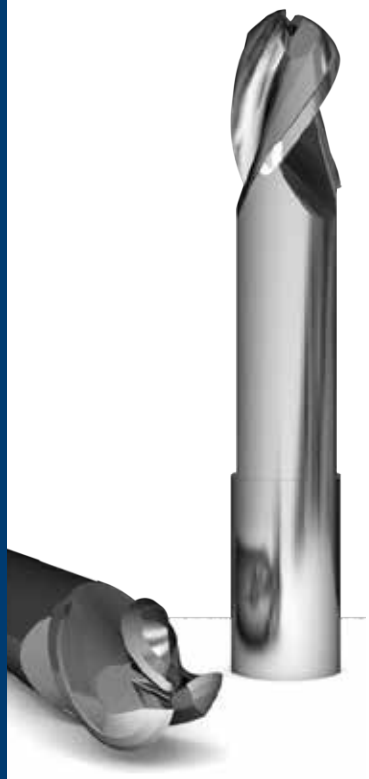
ALUMIGATOR

More About the Series 1028

Designed for High Speed Machining of Aluminum

Ramp, plunge, profile milling

Reduced neck for extended reach



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**

HURRIMILL

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

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P182 | CC | SQ | RAD | 4FL | VAR

HURRIMILL

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
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**

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P182 | CC | SQ | RAD | 4FL | VAR

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**

HURRIMILL

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P182 | CC | SQ | RAD | 4FL | VAR

HURRIMILL

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**

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P182 | CC | SQ | RAD | 4FL | VAR

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**

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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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

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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**

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P183 | CC | SQ | RAD | 5FL | VAR

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**

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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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P183 | CC | SQ | RAD | 5FL | VAR

HURRIMILL

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

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**

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P183 | CC | SQ | RAD | 5FL | VAR

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**

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More About the Series 1035

Ideal for Tool Steels and Hard Alloys

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Special corner radii available upon request

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P183 | CC | SQ | RAD | 5FL | VAR

HURRIMILL

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
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**

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P183 | CC | SQ | RAD | 5FL | VAR

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**

HURRIMILL

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

HURRIMILL

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**

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P184 | CC | SQ | RAD | 7FL | VAR

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**

HURRIMILL

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P184 | CC | SQ | RAD | 7FL | VAR

HURRIMILL

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
1/2	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**

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

nACo | h6 | P184 | CC | SQ | RAD | 7FL | VAR

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**

HURRIMILL

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆		☆	☆	☆			☆		★	☆

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

HURRIMILL

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**

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P185 | CC | SQ | RAD | 4FL | VAR

Series 1031 SRF4 | 4FL | Square & Radius|

Diameter	Shank Dia	LOC	OAL	EDP
1/8	1/8	1/4	1.5	**107988**
1/8	1/8	1/2	1.5	**111235**
3/16	3/16	5/16	2	**111252**
3/16	3/16	5/8	2	**111236**
1/4	1/4	1/2	2	**107794**
1/4	1/4	3/4	2.5	**111237**
1/4	1/4	1-1/8	3	**111244**
5/16	5/16	1/2	2	**107990**
5/16	5/16	13/16	2.5	**111238**
5/16	5/16	1-1/8	3	**111245**
3/8	3/8	5/8	2	**111253**
3/8	3/8	7/8	2.5	**111239**
3/8	3/8	1-1/8	3	**111246**
1/2	1/2	5/8	2.5	**107904**
1/2	1/2	1	3	**107905**
1/2	1/2	2	4	**111247**
5/8	5/8	3/4	3	**107992**
5/8	5/8	1-1/4	3.5	**111277**
5/8	5/8	2-1/4	5	**111248**
3/4	3/4	7/8	3	**107919**
3/4	3/4	1-1/2	4	**111242**
3/4	3/4	2-1/4	5	**111249**
1	1	1	4	**107997**
1	1	1-1/2	4	**111243**
1	1	2-1/4	5	**111250**

HURRIMILL

More About the Series 1031

Ideal for Stainless and Hardened Steels

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

Special corner radii available upon request

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	★	☆	☆	☆			☆	☆		

★ 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	1/8	1/32	3	**100333**
1/16	1/8	1/16	3	**100334**
3/32	1/8	3/32	3	**100335**
1/8	1/8	1/8	3	**100336**
5/32	3/16	5/32	3	**100338**
3/16	3/16	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	3.5	**100349**
1/2	1/2	1/2	4	**100351**

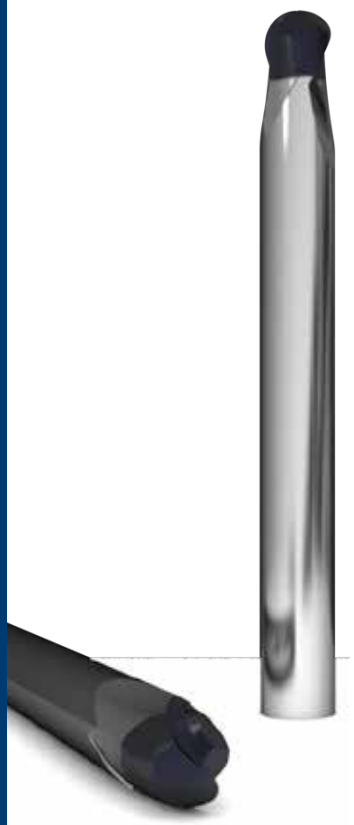
DM2

More About the Series 1050

Ideal for Die/Mold applications in alloy and hardened steels

5-micron radius tolerance

Special modifications available upon request



ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P187 | CC | SQ | RAD | 4FL | VAR

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P187 | CC | SQ | RAD | 4FL | VAR

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**

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P187 | CC | SQ | RAD | 4FL | VAR

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

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P187 | CC | SQ | RAD | 4FL | VAR

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**

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P187 | CC | SQ | RAD | 4FL | VAR

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P187 | CC | SQ | RAD | 4FL | VAR

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**

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ 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**

★ Best ☆ Good

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

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

Alcromax | h6 | 90° | P187 | CC | SQ | RAD | 4FL | VAR

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ 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
3/4	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**

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

Alcromax | h6 | 90° | P187 | CC | SQ | RAD | 4FL | VAR

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ 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

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | CC | P187 | h6 | RAD | 4FL | 38° | VAR

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.

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P188 | CC | SQ | RAD | 5FL | VAR

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**

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P188 | CC | SQ | RAD | 5FL | VAR

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P188 | CC | SQ | RAD | 5FL | VAR

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**

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P188 | CC | SQ | RAD | 5FL | VAR

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

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P188 | CC | SQ | RAD | 5FL | VAR

PYSTL series

More About the Series 2205

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

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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**

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ Best ☆ Good

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | h6 | P188 | CC | SQ | RAD | 5FL | VAR

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

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ 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
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**

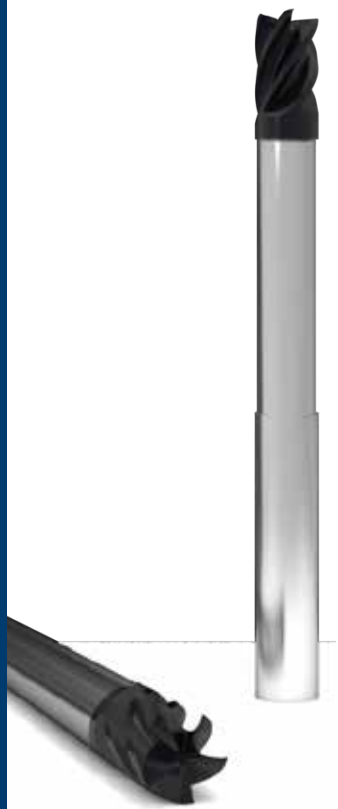
PYSTL series

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



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
3/8	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**

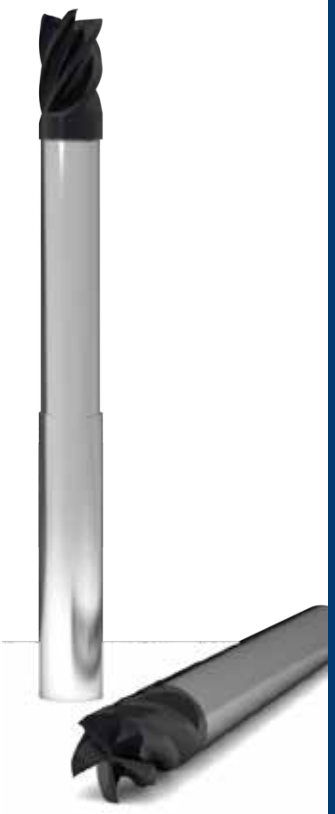
PYSTL series

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



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
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**

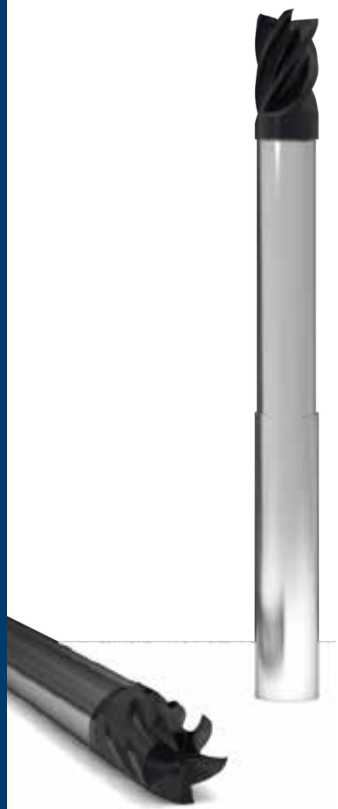
PYSTL series

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

Alcromax | h6 | 90° | P188 | CC | SQ | RAD | 5FL | VAR

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

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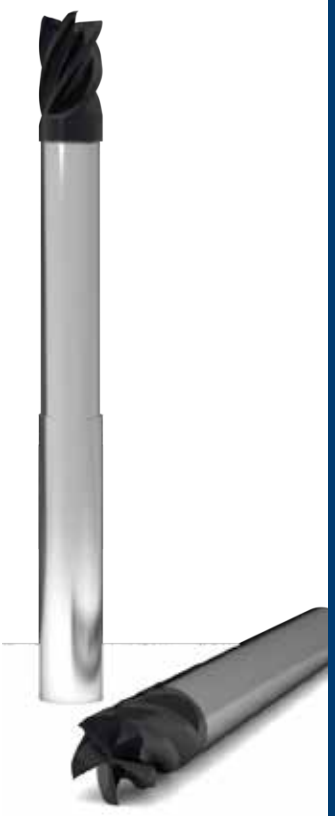
Reduced neck for extended reach



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆				☆		

★ 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
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**

PYSTL series

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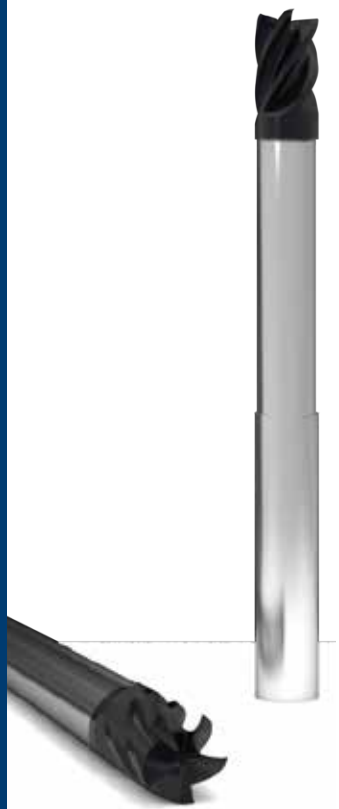
Reduced neck for extended reach



★ 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

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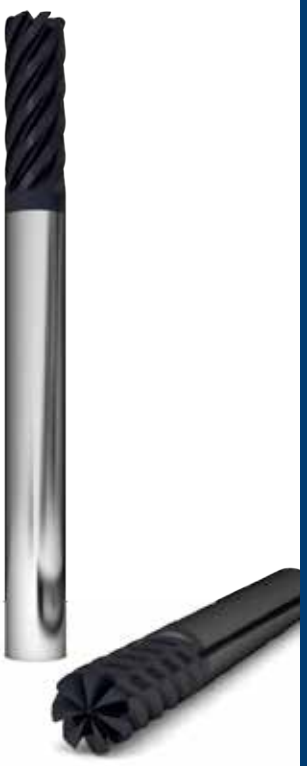

ULTIMATE PERFORMANCE

Premium High Performance Carbide End Mills for Ferrous Materials

Alcromax | P189 | h6 | CC | SQ | RAD | 7FL

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**

PYSTL series

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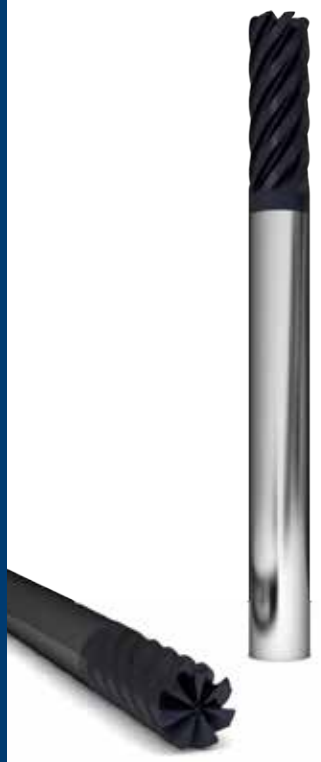

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	★	☆	☆			☆	★		

★ 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
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

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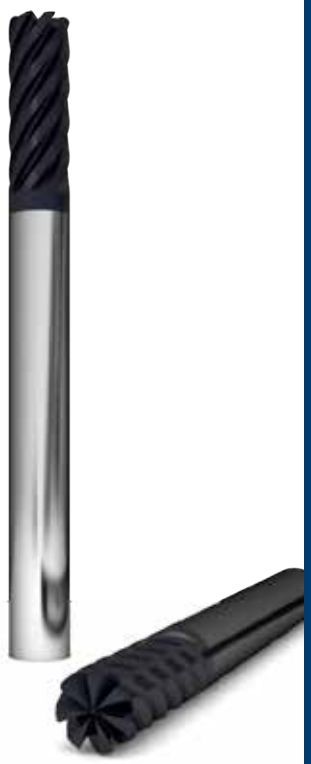
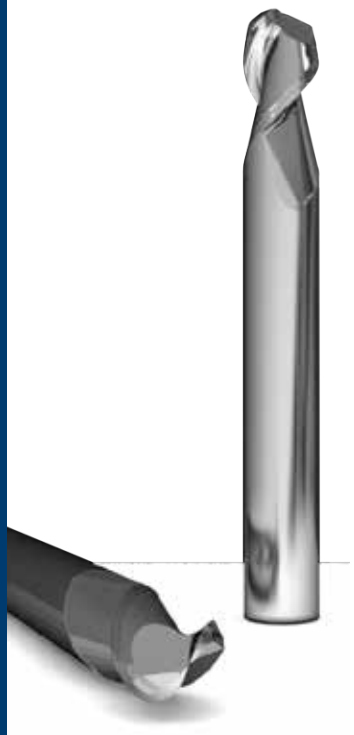


PERFORMANCE

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

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**



PERFORMANCE

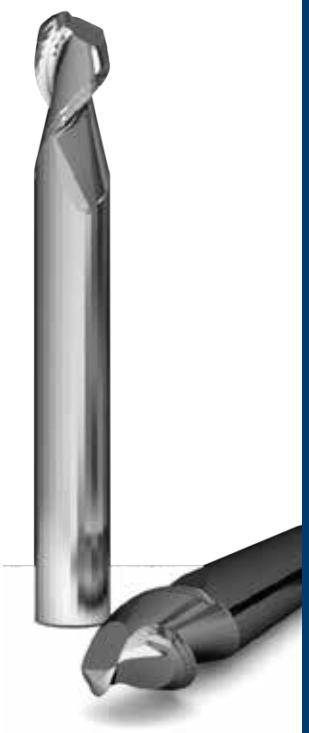
Premium Carbide End Mills for Non-Ferrous Alloys

Bright | ZrN | CC | P181 | h6 | SQ | RAD | 2FL | 45°

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**

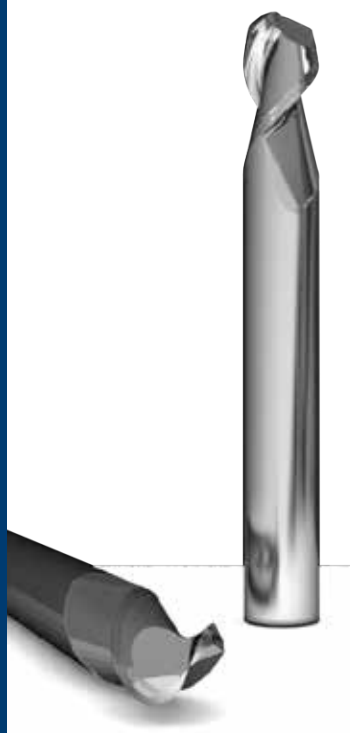
★ Best ☆ Good



Bright | ZrN | CC | P181 | h6 | SQ | RAD | 2FL | 45°

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**

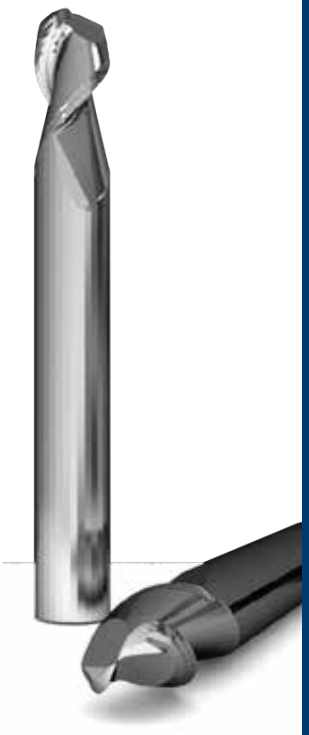


P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							★	★				

★ Best ☆ Good

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**



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**

Bright | ZrN | CC | h6 | P181 | 90° | RAD | SQ | 2FL | 45°

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

P1 | P2 | P3 | M1 | M2 | K1 | K2 | N1 ★ | N2 ★ | S1 | S2 | H1 | H2

★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys

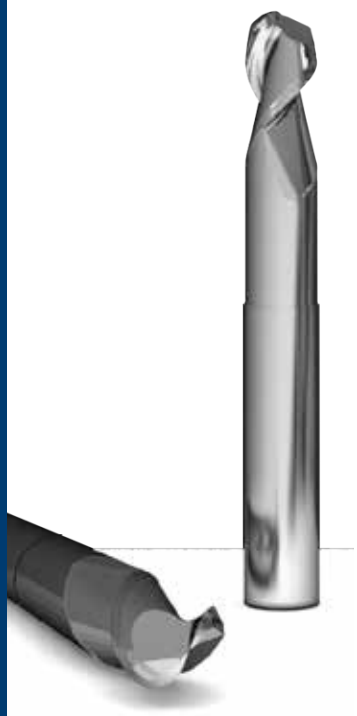
Bright | ZrN | CC | h6 | P181 | 90° | RAD | SQ | 2FL | 45°

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



P1 | P2 | P3 | M1 | M2 | K1 | K2 | N1 ★ | N2 ★ | S1 | S2 | H1 | H2

★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys

Bright | ZrN | CC | h6 | P181 | 90° | RAD | SQ | 2FL | 45°

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

P1 | P2 | P3 | M1 | M2 | K1 | K2 | N1 ★ | N2 ★ | S1 | S2 | H1 | H2

★ Best ☆ Good

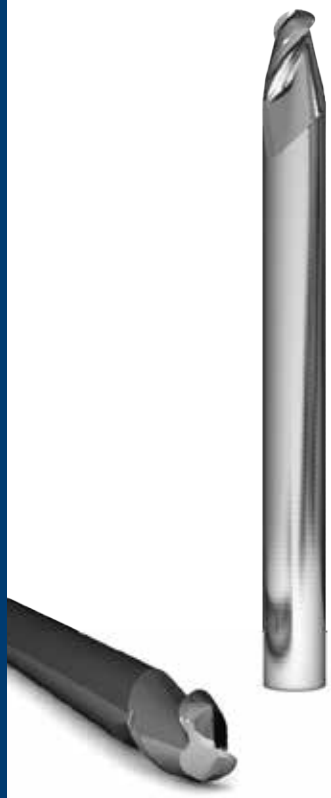
Bright | ZrN | h6 | P181 | CC | 90° | BALL | 2FL | 45°

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



P1 | P2 | P3 | M1 | M2 | K1 | K2 | N1 ★ | N2 ★ | S1 | S2 | H1 | H2

★ Best ☆ Good

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**

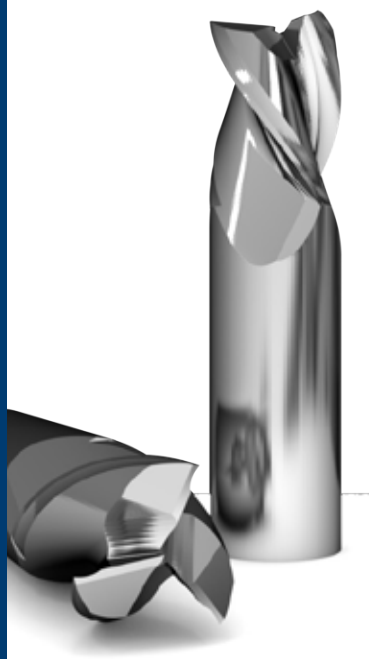
PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys

Bright | ZrN | P181 | CC | h6 | SQ | 3FL | 37°

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**



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							★	★				

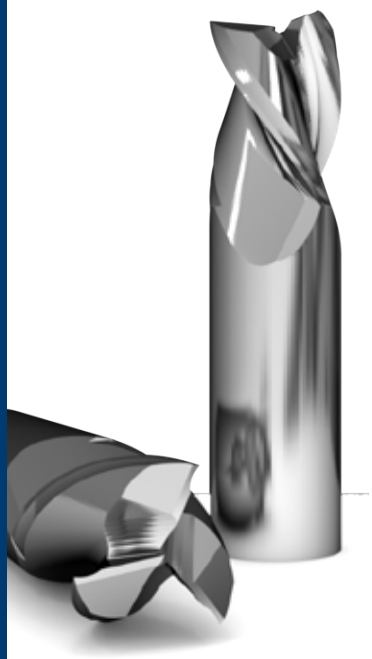
★ Best ☆ Good

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**

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**



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

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**

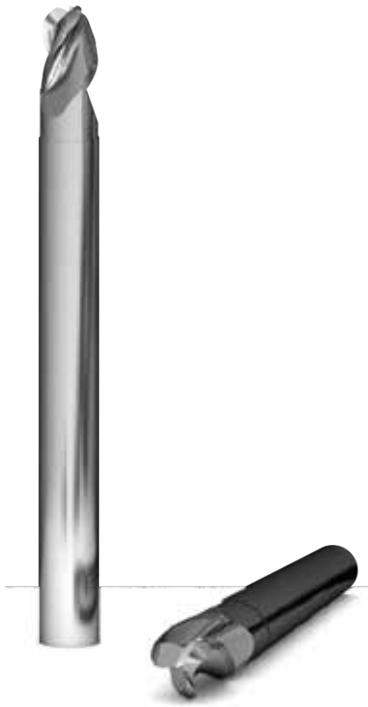
Bright | ZrN | CC | h6 | P181 | 90° | RAD | SQ | 3FL | 37°

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



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							★	★				

★ Best ☆ Good

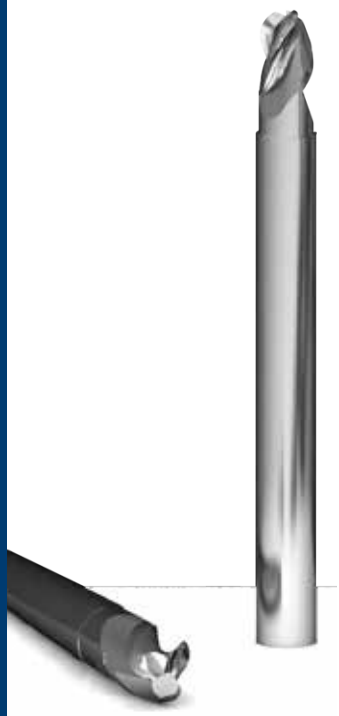
Bright | ZrN | CC | h6 | P181 | 90° | RAD | SQ | 3FL | 37°

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



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							★	★				

★ Best ☆ Good

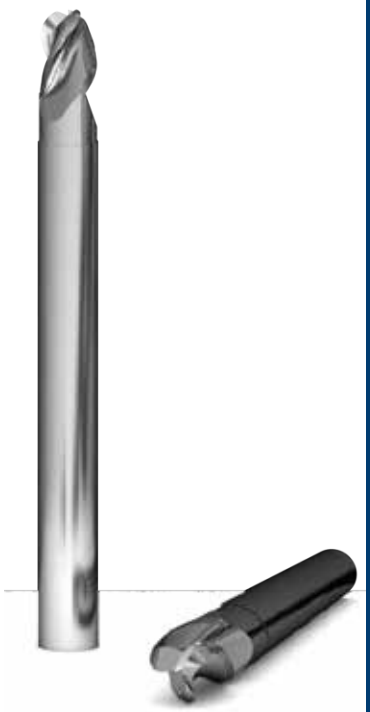
Bright | ZrN | CC | h6 | P181 | 90° | RAD | SQ | 3FL | 37°

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



P1 | P2 | P3 | M1 | M2 | K1 | K2 | N1 ★ | N2 ★ | S1 | S2 | H1 | H2

★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Non-Ferrous Alloys

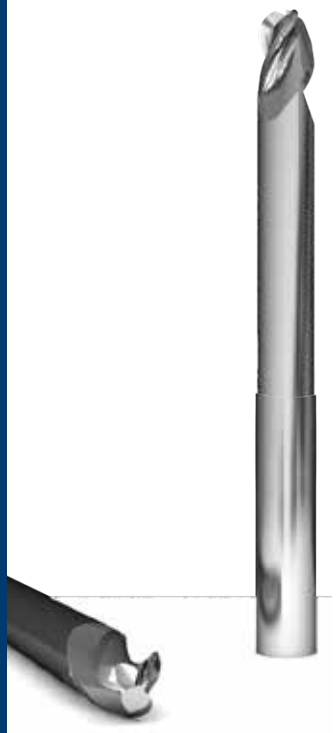
Bright | ZrN | CC | P181 | h6 | BALL | 3FL | 90° | 37°

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



P1 | P2 | P3 | M1 | M2 | K1 | K2 | N1 | N2 | S1 | S2 | H1 | H2

★ Best ☆ Good

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

Alcromax | h6 | P190 | CC | SQ | RAD | 4FL | VAR

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	★	★	☆	☆			☆	☆		

★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

Alcromax | h6 | P190 | CC | SQ | RAD | 4FL | VAR

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	★	★	☆	☆			☆	☆		

★ Best ☆ Good

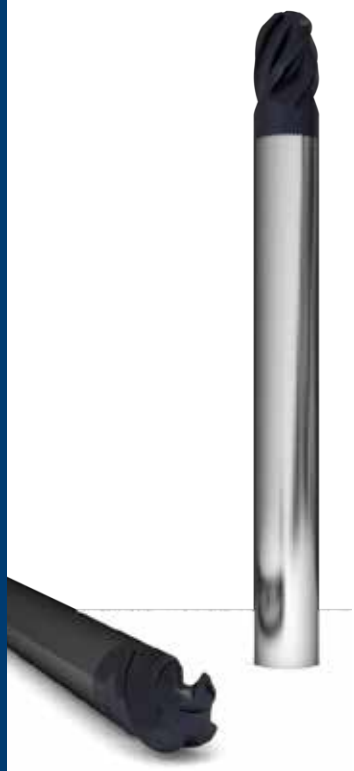
Series 252
440VBN | 4FL | Ball Nose

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



Alcromax | h6 | P191 | CC | SQ | RAD | SFL | VAR

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	★	☆	☆	☆			☆	☆		

★ Best ☆ Good

Alcromax | h6 | P191 | CC | SQ | RAD | SFL | VAR

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	★	☆	☆	☆			☆	☆		

★ 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

Alcromax | h6 | P192 | CC | SQ | RAD | 4FL | 37°

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	☆	☆	☆			★		★	★

★ Best ☆ Good

Alcromax | h6 | P192 | CC | SQ | RAD | 4FL | 37°

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	☆	☆	☆			★		★	★

★ Best ☆ Good

Alcromax | h6 | P193 | CC | SQ | RAD | 5FL | 37°

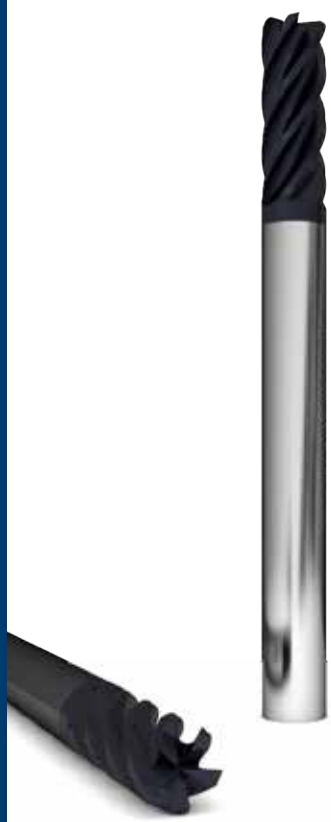
Series 265
537 | 5FL | Square & Radius

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



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	☆	☆	☆			★		★	★

★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

Alcromax | h6 | P193 | CC | SQ | RAD | 5FL | 37°

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★	☆	☆	☆	☆	☆			★		★	★

★ Best ☆ Good

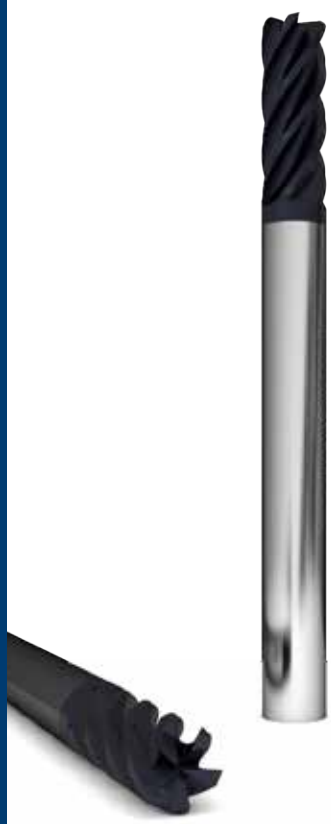
Series 265 537 | 5FL | Square & Radius

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



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

Alcromax | h6 | P194 | CC | SQ | RAD | Multi | 15°

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
		★		★					★		★	★

★ 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

GWS

Alcromax | h6 | 90° | P195 | CC | SQ | RAD | Multi | 40°

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
☆	☆		☆		☆	☆				★		

★ 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

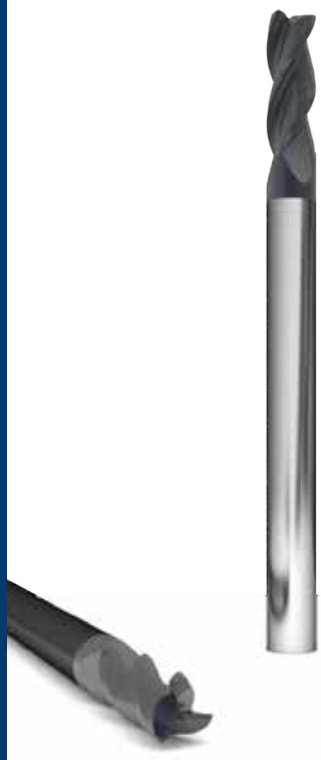
TiCN | AlTiN | Bright | P196 | h6 | CC | RAD | 3FL | 35°

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



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
☆	☆	☆	☆	☆	☆	☆	☆	☆				

★ Best ☆ Good

PERFORMANCE

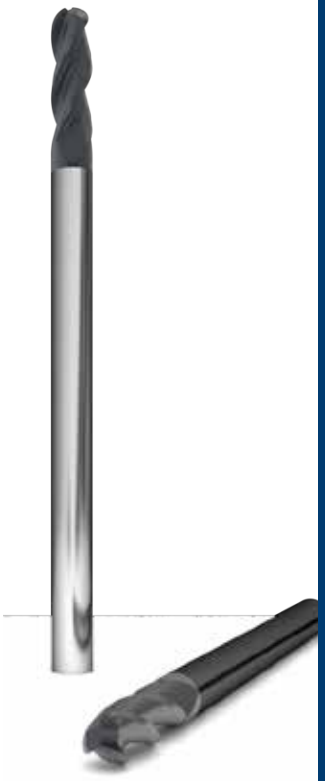
Premium Carbide End Mills for Ferrous Materials

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

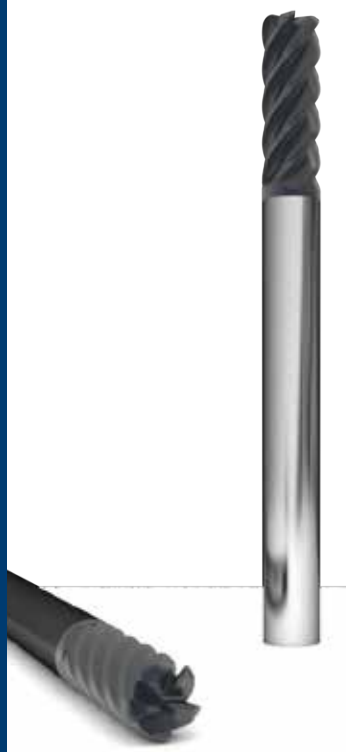


TiCN | AlTiN | Bright | h6 | P197 | CC | SQ | RAD | 5FL | 45°

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



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
☆	☆	☆	☆	☆	☆	☆	☆	☆				

★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

TiCN | AlTiN | Bright | h6 | P197 | CC | SQ | RAD | 5FL | 45°

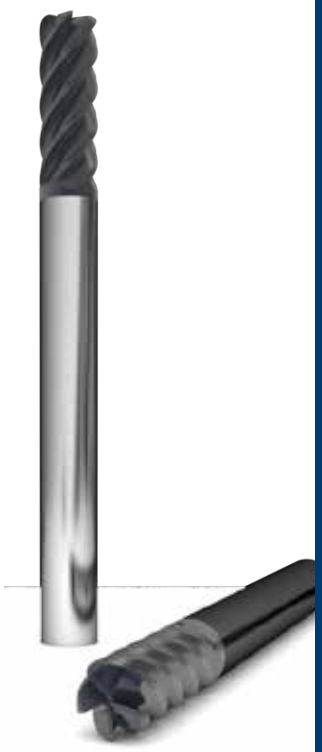
Series 220

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



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
☆	☆	☆	☆	☆	☆	☆	☆	☆				

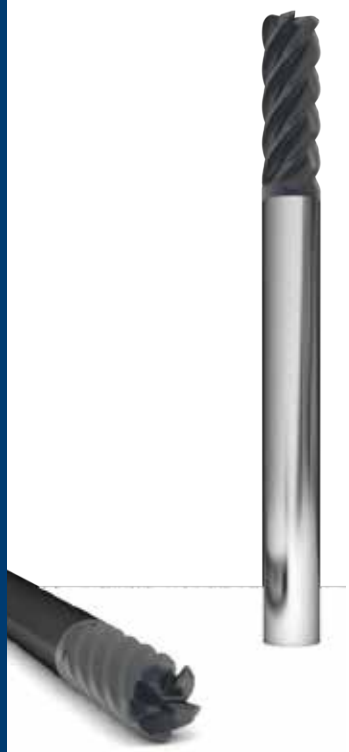
★ Best ☆ Good

TiCN | AlTiN | Bright | h6 | P197 | CC | SQ | RAD | 5FL | 45°

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



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
☆	☆	☆	☆	☆	☆	☆	☆	☆				

★ Best ☆ Good

PERFORMANCE

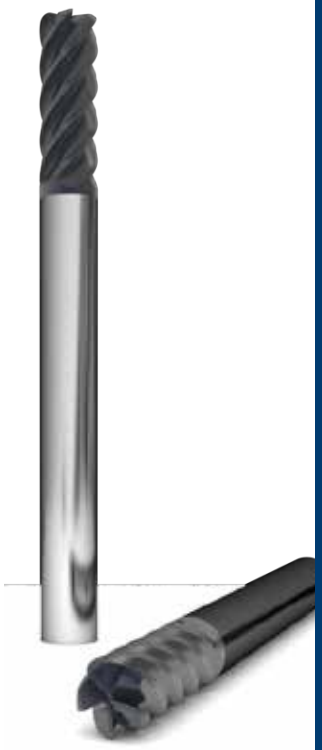
Premium Carbide End Mills for Ferrous Materials

Series 220 545 | 5FL | Square & Radius

Diameter	Shank Dia.	LOC	OAL	Radius	Bright EDP	TiCN EDP	AlTiN EDP
1	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



Bright | P198 | h6 | CC | SQ | 2FL | 30°

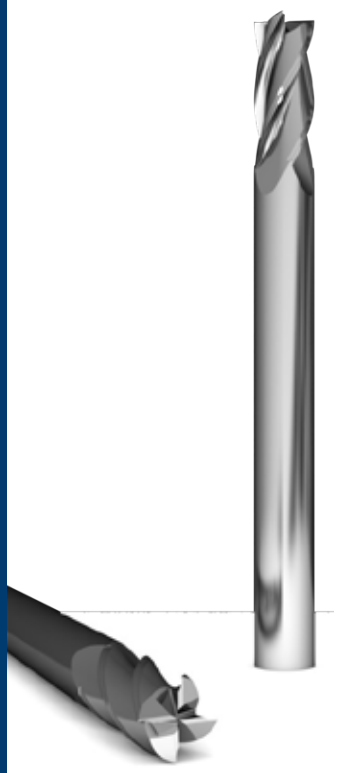
Series 225
504,504S,564,584 | 4FL | Square

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	3/4	2.25	**318609**
1/8	1/8	1	3	**318612**
9/64	3/16	9/16	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	1.125	3	**318660**
1/4	1/4	1-1/2	4	**318664**
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	1.125	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

Radii available on request

Coatings available upon request



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
☆	☆	☆	☆	☆	☆	☆	☆	☆				

★ Best ☆ Good

PERFORMANCE

Premium Carbide End Mills for Ferrous Materials

Bright | P198 | h6 | CC | SQ | 2FL | 30°

Series 225 504,504S,564,584 | 4FL | 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	1	3	**318725**
1/2	1/2	1	4	**318727**
1/2	1/2	1-1/2	6	**318729**
1/2	1/2	2	4	**318731**
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	2.25	5	**318742**
5/8	5/8	3	6	**318745**
3/4	3/4	1	3	**318748**
3/4	3/4	1-1/2	4	**318751**
3/4	3/4	2.25	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	2.25	5	**318767**
1	1	4	7	**318771**

More About the Series 225

Radii available on request

Coatings available upon request

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
☆	☆	☆	☆	☆	☆	☆	☆	☆				

★ Best ☆ Good

Bright | P198 | h6 | CC | BALL | 2FL | 30°

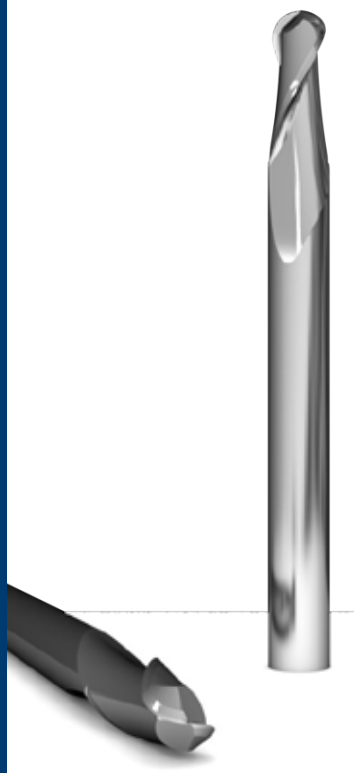
Series 227
502SBN, 502BN, 562BN, 582BN | 2FL | Ball Nose

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	5/8	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	1.25	4	**318853**
1/4	1/4	1.5	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	1.625	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	1.5	6	**318899**

More About the Series 227

Radii available on request

Coatings available upon request



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
☆	☆		☆		☆	☆	☆	☆				

★ Best ☆ Good

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

Diameter	Shank Dia	LOC	OAL	EDP
3/8	3/8	1.75	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	1.5	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

Radii available on request

Coatings available upon request

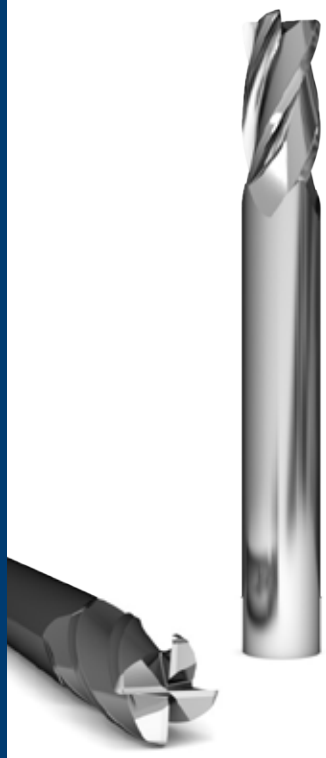
AlTiN | Bright | h6 | P199 | CC | SQ | RAD | 4FL | 30°

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



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★		★		★	★	★	★				

★ Best ☆ Good

AlTiN | Bright | h6 | P199 | CC | SQ | RAD | 4FL | 30°

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

P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
★	★		★		★	★	★	★				

★ Best ☆ Good

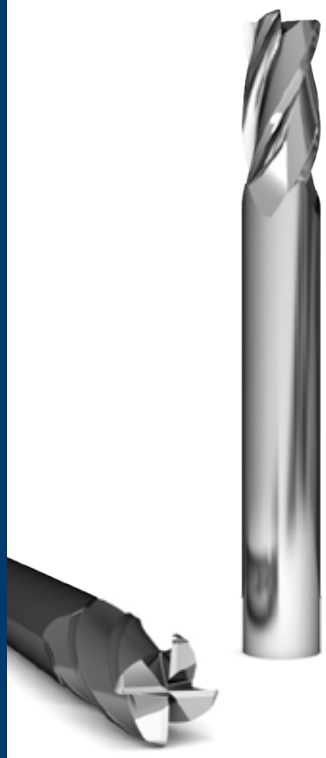
AlTiN | Bright | h6 | P199 | CC | SQ | RAD | 4FL | 30°

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



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
☆	☆		☆		☆	☆	☆	☆				

★ Best ☆ Good

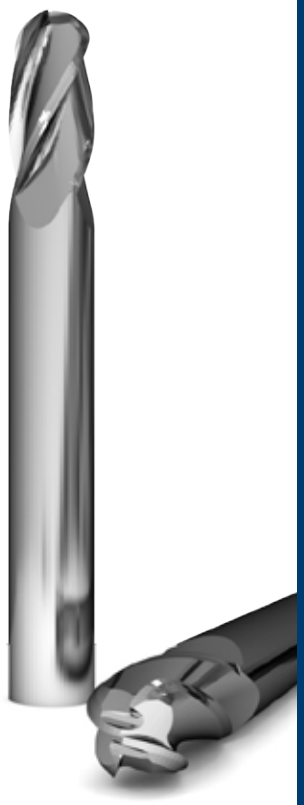
Series 237 504SBN, 504BN, 564BN, 584BN | 4fl | Ball Nose

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	3/8	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	1.25	4	**319409**
1/4	1/4	1.5	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	1.625	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	1.5	6	**319447**
3/8	3/8	1.75	4	**319450**

★ Best ☆ Good

More About the Series 237

Coatings available upon request



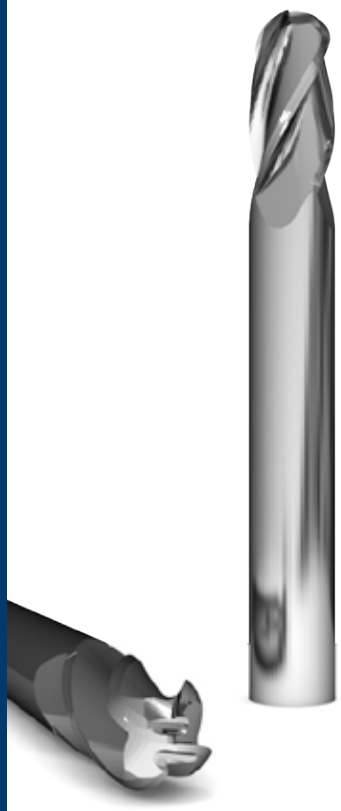
Bright | P199 | h6 | CC | BALL | 4FL | 30°

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	1.5	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

Coatings available upon request



P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
☆	☆		☆		☆	☆	☆	☆				

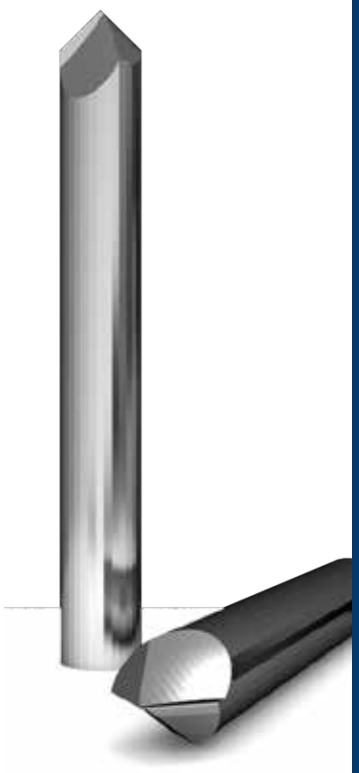
★ Best ☆ Good

PERFORMANCE

Premium Carbide Chamfer End Mills for Ferrous Materials

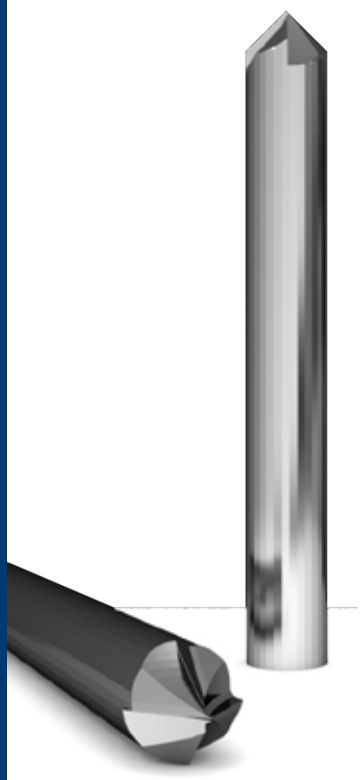
Series 240 S94 | 2FL | Chamfer Mill

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**



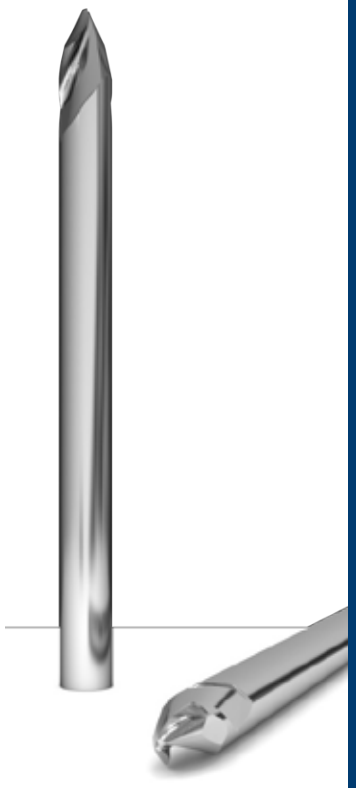
Series 241 S94 | 4FL | Chamfer Mill

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**



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**



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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ISO TURNING INSERTS

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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 21.5.5	CG92-C	204	**126175**
	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**

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**

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**

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**

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**

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**

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**

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**

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**

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**

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**

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**

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**

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**

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 431	CG93-D	205	**126222**
	DNMG 432	CG93-D	205	**126226**
	DNMG 432	CG93-D	205	**126226**
	DNMG 432	CG94-D	205	**126227**
	DNMG 432	CG925-D		**126228**
	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**

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**
	TNMG 332EN	CG93-I	214	**126279**
	WNMG 432	CG93-I	214	**126485**
	WNMG 433	CG93-I	214	**126495**

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**

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**

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**

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 431	CG95-K	215	**126219**
	DNMG 432	CG96-K	215	**126224**
	DNMG 432	CG95-K	215	**126225**
	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**

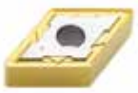
M - Stainless Steel Roughing M25

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**

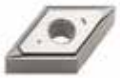
K - Cast Iron K20

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 542	CG99-M	220	**126111**
	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 543	CG99-M	220	**126113**
	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**

S - Titanium Titanium and HRSA S10

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 431	CG911-N	217	**126082**
	CNMG 432	CG911-N	217	**126092**
	CNMG 431	CG912-N	217	**126083**
	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**

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**

P - Steel Heavy Steel P15

Insert	Designation	Grade/Chip Breaker	Tech Page	EDP
	CNMG 321	CG92-H	213	**126078**
	CNMG 321	CG92-H	213	**126078**
	CNMG 431	CG92-H	213	**126085**
	CNMG 431	CG92-H	213	**126085**
	CNMG 432	CG92-H	213	**126096**
	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 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**

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

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

Zirconium Nitride (ZrN)

Machining Magnesium and Titanium

Effectively reduces the built up edges when machining Aluminum and Titanium

Aluminum TItanium Nitride(AlTIN)

High Performance Coating, high aluminum content, high heat resistance

For dry high speed machining, hard machining

nACo

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

For high performance and normal machining conditions

nACRo

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

Especially for hobbing and forming tools

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 - 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 - 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 - 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.

INSERT COATINGS & DESIGNATIONS (cont.)

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 - 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 - 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 - 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 - 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 - 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 - 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 - 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 - 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. mm inch	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. mm inch	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
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. mm inch	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
	High Silicon Aluminum 4% - 13% A242, A319, A356, A390	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
	High Silicon Aluminum 4% - 13% A242, A319, A356, A390	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
	High Silicon Aluminum 4% - 13% A242, A319, A356, A390	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
	High Silicon Aluminum 4% - 13% A242, A319, A356	.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
	High Silicon Aluminum 4% - 13% A242, A319, A356	.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

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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 Aluminun 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 Aluminun 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 Aluminun 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

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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	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, 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

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

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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

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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

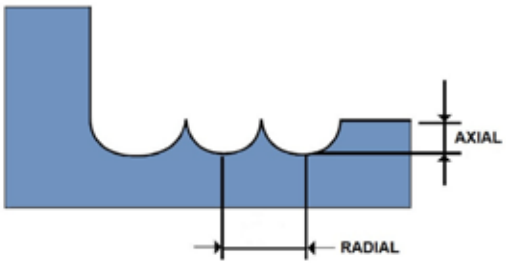
Diameter	30-40 HRC		40-50 HRC		50-60HRC	
	Rough & Semi	Finishing	Rough&Semi	Finishing	Rough & Semi	Finishing
1/32	0.0006 -0.0010	0.0006 -0.0009	0.0006 -0.0008	0.0005 -0.0007	0.0004 -0.0007	0.0004 -0.0006
1/16	0.0012 -0.0016	0.0010 -0.0015	0.0010 -0.0015	0.0010 -0.0014	0.0008 -0.0012	0.0007 -0.0010
3/32	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 2220, 2223

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 2225

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 2230

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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 2235

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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	1345	20	1121	19
		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 2240

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	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

Series 2245, 2250

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

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

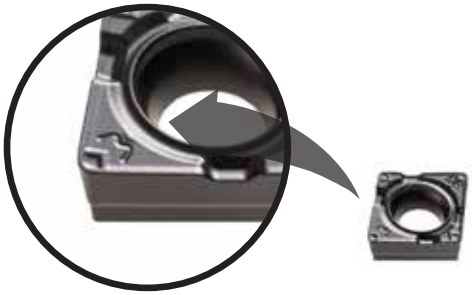
	Material	SFM	1/8		1/4		3/8		1/2		5/8		3/4	
			RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
P	**Low Carbon Steel** 1018	**180**	5501	10	2750	5	1834	7	1375	9	1100	11	917	12
		225	6876	16	3438	8	2292	10	1719	14	1375	16	1146	17
		270	8251	31	4126	16	2750	21	2063	28	1650	32	1375	35
	Med Alloy Steel <375, 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		Type of treatment/alloy	Hardness HB	Coated carbide CG92 V_c [sfm]	Coated carbide CG93 V_c [sfm]	Coated carbide CG94 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
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		
		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	–			

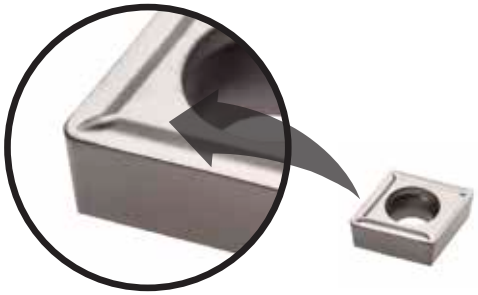
		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	○	X

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		Type of treatment/alloy	Hardness HB	Cermet CG91 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate 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	–			
		Spheroidal	160	722 – 984			
		Malleable/Tempered iron	130	820 – 1148			

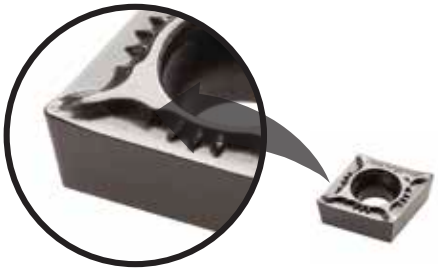
		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	X	X

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 CG92 V_c [sfm]	Coated carbide CG93 V_c [sfm]	Coated carbide CG94 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623	C	0.02 to 0.089	0.006 to 0.003
P	Steel	Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492	Ex: CCMT 32.51-C for CK60 Different in each application		
P	Steel	High alloyed steel	200	591 – 1050	427 – 689	394 – 656			
P	Steel	Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591			
M	Stainless steel	Ferritic	200	722 – 1050	459 – 689	459 – 656			
M	Stainless steel	Austenitic	180	–	328 – 689	361 – 623			
M	Stainless steel	Duplex	230 – 260	–	–	262 – 492			
M	Stainless steel	Martensitic	330	–	230 – 328	180 – 246			
K	Cast iron	Grey cast iron	180	459 – 1214	427 – 689	–			
K	Cast iron	Spheroidal	160	623 – 1411	394 – 787	–			
K	Cast iron	Malleable/Tempered iron	130	591 – 1706	492 – 820	–			

		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	○	X

General cutting parameters depending on the application

Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG92 V_c [sfm]	Coated carbide CG93 V_c [sfm]	Coated carbide CG94 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623	C	0.02 to 0.089	0.006 to 0.003
P	Steel	Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492	Ex: CCMT 32.51-C for CK60 Different in each application		
P	Steel	High alloyed steel	200	591 – 1050	427 – 689	394 – 656			
P	Steel	Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591			
M	Stainless steel	Ferritic	200	722 – 1050	459 – 689	459 – 656			
M	Stainless steel	Austenitic	180	–	328 – 689	361 – 623			
M	Stainless steel	Duplex	230 – 260	–	–	262 – 492			
M	Stainless steel	Martensitic	330	–	230 – 328	180 – 246			
K	Cast iron	Grey cast iron	180	459 – 1214	427 – 689	–			
K	Cast iron	Spheroidal	160	623 – 1411	394 – 787	–			
K	Cast iron	Malleable/Tempered iron	130	591 – 1706	492 – 820	–			

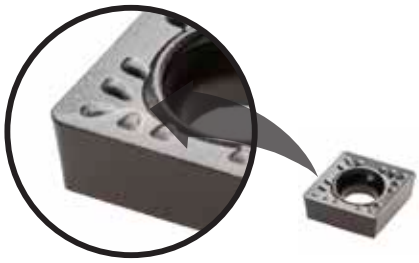
		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	○	X

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			
		Type of treatment/alloy	Hardness HB	V_c [sfm]	V_c [sfm]	V_c [sfm]	Chip breaker	a_p [inch]	f [inch]
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	Ex: CCMT 32.51-D 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	–			

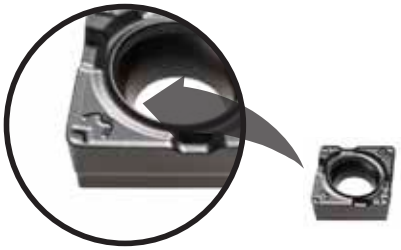
		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	○

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/alloy	Hardness HB	CG93 V_c [sfm]	CG97 V_c [sfm]	Application: Chip breaker	Depth of cut and feed rate: a_p [inch]	Depth of cut and feed rate: f [inch]
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	558 – 787	558 – 623	A	0.039 to 0.138	0.012 to 0.006
		Low alloyed steel	250 – 300	328 – 623	295 – 492	Ex: CCMT 32.52-A for 304 Different in each application		
		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			
		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	–			
		Spheroidal	160	394 – 787	–			
		Malleable/Tempered iron	130	492 – 820	–			

		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	○	X

General cutting parameters depending on the application

Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG96 V_c [sfm]	Application: Chip breaker	Depth of cut and feed rate: a_p [inch]	Depth of cut and feed rate: f [inch]
M	Stainless steel	Ferritic	200	492 – 656	E	0.002 to 0.053	0.001 to 0.004
		Austenitic	180	394 – 656	Ex: CCGT-32.50-E 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			
			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			

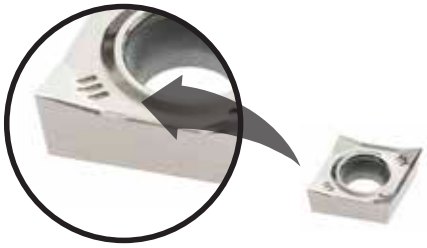
		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	X	X

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 CG98	Application	Depth of cut and feed rate	
		Type of treatment/alloy	Hardness HB	V_c [sfm]	Chip breaker	a_p [inch]	f [inch]
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			
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			

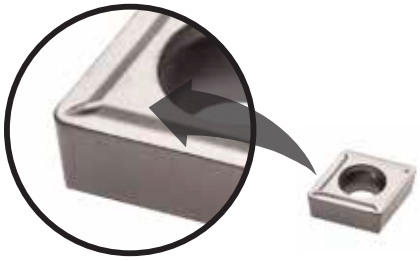
		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	○

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				Cermet CG91	Application	Depth of cut and feed rate	
		Type of treatment/alloy	Hardness HB	V_c [sfm]	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	–			
		Spheroidal	160	722 – 984			
		Malleable/Tempered iron	130	820 – 1148			

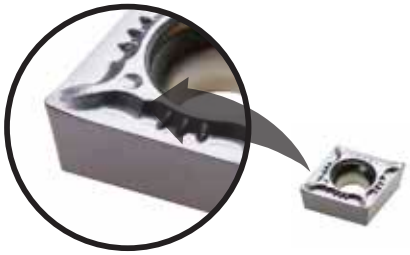
		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	X	X

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Chipbreaker C

To optimize the control of the chip



General cutting parameters depending on the application

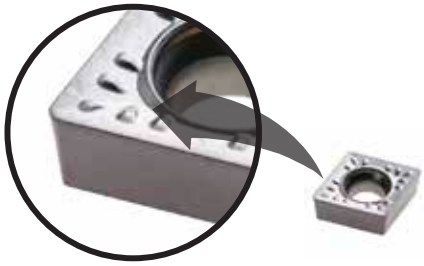
Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG95 V_c [sfm]	Coated carbide CG97 V_c [sfm]	Application: Chip breaker	Depth of cut and feed rate: a_p [inch]	Depth of cut and feed rate: f [inch]
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	427 – 820	558 – 623	C	0.02 to 0.089	0.006 to 0.003
		Low alloyed steel	250 – 300	197 – 591	295 – 492	Ex: CCMT 32.51-C 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	●	○	X
		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				Coated carbide		Application	Depth of cut and feed rate	
				CG95	CG97			
		Type of treatment/alloy	Hardness HB	V_c [sfm]	Vc [sfm]	Chip breaker	a_p [inch]	f [inch]
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			
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			

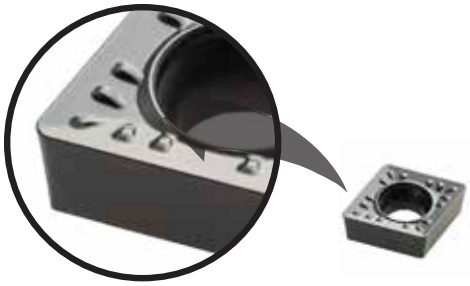
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	○

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/alloy	Hardness HB	Coated carbide CG99 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	f [inch]
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			
K	Cast iron	Grey cast iron	180	492 – 1312			
		Spheroidal	160	656 – 1476			
		Malleable/Tempered iron	130	656 – 1805			

		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	X

General cutting parameters depending on the application

Work piece material		Type of treatment/alloy	Hardness HB	Uncoated carbide CG910 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	f [inch]
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 AlMg1 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			
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			

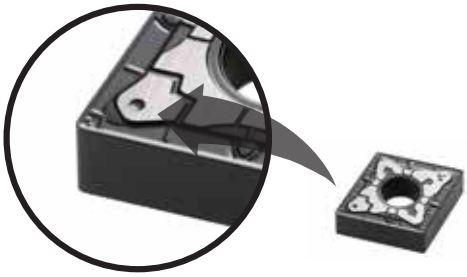
		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	○

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 CG92 Vc: [sfm]	Coated carbide CG93 Vc: [sfm]	Coated carbide CG94 Vc: [sfm]	Application: Chip breaker	Depth of cut and feed rate: a_p [inch]	Depth of cut and feed rate: f [inch]
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
P	Steel	Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492	Ex: Ex: CNMX 432-F Different in each application		
P	Steel	High alloyed steel	200	591 – 1050	427 – 689	394 – 656			
P	Steel	Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591			
M	Stainless steel	Ferritic	200	722 – 1050	459 – 689	459 – 656			
M	Stainless steel	Austenitic	180	–	328 – 689	361 – 623			
M	Stainless steel	Duplex	230 – 260	–	–	262 – 492			
M	Stainless steel	Martensitic	330	–	230 – 328	180 – 246			
K	Cast iron	Grey cast iron	180	459 – 1214	427 – 689	–			
K	Cast iron	Spheroidal	160	623 – 1411	394 – 787	–			
K	Cast iron	Malleable/Tempered iron	130	591 – 1706	492 – 820	–			

		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	○

General cutting parameters depending on the application

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

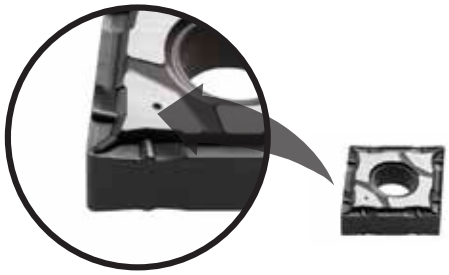
		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	X	X

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				Coated carbide			Application	Depth of cut and feed rate	
				CG92	CG93	CG94			
		Type of treatment/alloy	Hardness HB	V_c [sfm]	V_c [sfm]	V_c [sfm]	Chip breaker	a_p [inch]	f [inch]
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	722 – 1312	558 – 787	558 – 623	H	0.02 to 0.079	0.008 to 0.004
		Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492	Ex: CNMG 432-H 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	–	–	–			
		Spheroidal	160	–	–	–			
		Malleable/Tempered iron	130	–	–	–			

		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	○	X

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

General cutting parameters depending on the application

Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG92 Vc: [sfm]	Coated carbide CG93 Vc: [sfm]	Coated carbide CG94 Vc: [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
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

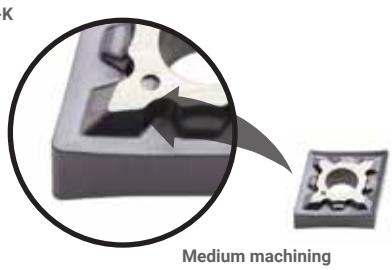
Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG96 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
M	Stainless steel	Ferritic	200	492 – 656	J	0.02 to 0.098	0.01 to 0.004
		Austenitic	180	394 – 656	Ex: CNGP 432-J for 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	Consistent cutting depth / Inconsistent cutting depth / Interrupted cut		
N	Non Ferrous		100	328 – 1312	● / ○ / X		
			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



Medium machining

General cutting parameters depending on the application

Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG95 V_c [sfm]	Coated carbide CG97 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
P	Steel	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			
		Corrosion resistant steel	200	328 – 656	459 – 591			
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			

		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	○	x

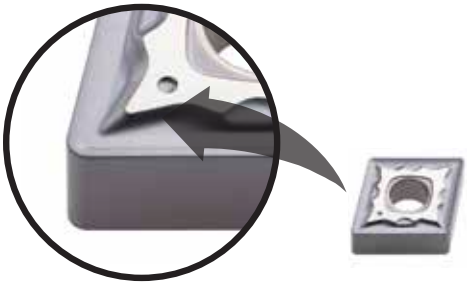
ULTIMATE PERFORMANCE

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 CG95 V_c [sfm]	Coated carbide CG97 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
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
P	Steel	Low alloyed steel	250 – 300	197 – 591	295 – 492	Ex: CNMG 432-L for 304 Different in each application		
P	Steel	High alloyed steel	200	262 – 656	394 – 656			
P	Steel	Corrosion resistant steel	200	328 – 656	459 – 591			
M	Stainless steel	Ferritic	200	394 – 820	459 – 656			
M	Stainless steel	Austenitic	180	328 – 722	361 – 623			
M	Stainless steel	Duplex	230 – 260	197 – 525	262 – 492			
M	Stainless steel	Martensitic	330	131 – 328	180 – 246			

		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	○

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

General cutting parameters depending on the application

Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG911 V_c [sfm]	Coated carbide CG912 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
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			
		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			
		Nickel or Kobalt base	250	115 – 295	115 – 295			
		Nickel or Kobalt base		98 – 164	98 – 164			
		Titanium	Rm 440*	230 – 394	230 – 394			

Ex: CNMG 432-N for Super Alloys
Different in each application

		
Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	○	X

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

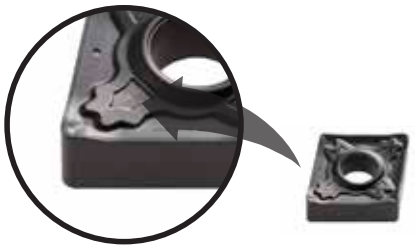
General cutting parameters depending on the application

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

Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	○

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/alloy	Hardness HB	Coated carbide CG92 Vc: [sfm]	Coated carbide CG93 Vc: [sfm]	Coated carbide CG94 Vc: [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
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
P	Steel	Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492	Ex: CNMM 432-P for CK60 Different in each application		
P	Steel	High alloyed steel	200	591 – 1050	427 – 689	394 – 656			
P	Steel	Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591			
M	Stainless steel	Ferritic	200	722 – 1050	459 – 689	459 – 656			
M	Stainless steel	Austenitic	180	–	328 – 689	361 – 623			
M	Stainless steel	Duplex	230 – 260	–	–	262 – 492			
M	Stainless steel	Martensitic	330	–	230 – 328	180 – 246			
K	Cast iron	Grey cast iron	180	459 – 1214	427 – 689	–			
K	Cast iron	Spheroidal	160	623 – 1411	394 – 787	–			
K	Cast iron	Malleable/Tempered iron	130	591 – 1706	492 – 820	–			

Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	○

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

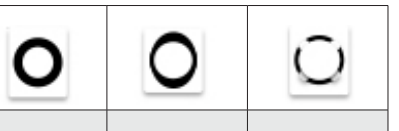
General cutting parameters depending on the application

Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG92 Vc: [sfm]	Coated carbide CG93 Vc: [sfm]	Coated carbide CG94 Vc: [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
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	–			

Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	○

General cutting parameters depending on the application

Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG92 Vc: [sfm]	Coated carbide CG93 Vc: [sfm]	Coated carbide CG94 Vc: [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
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	–			



Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	●	●

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

General cutting parameters depending on the application

Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG92 Vc: [sfm]	Coated carbide CG93 Vc: [sfm]	Coated carbide CG94 Vc: [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
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
P	Steel	Low alloyed steel	250 – 300	656 – 1050	328 – 623	295 – 492			
P	Steel	High alloyed steel	200	591 – 1050	427 – 689	394 – 656			
P	Steel	Corrosion resistant steel	200	656 – 1050	427 – 689	459 – 591			
M	Stainless steel	Ferritic	200	722 – 1050	459 – 689	459 – 656			
M	Stainless steel	Austenitic	180	–	328 – 689	361 – 623			
M	Stainless steel	Duplex	230 – 260	–	–	262 – 492			
M	Stainless steel	Martensitic	330	–	230 – 328	180 – 246			
K	Cast iron	Grey cast iron	180	459 – 1214	427 – 689	–			
K	Cast iron	Spheroidal	160	623 – 1411	394 – 787	–			
K	Cast iron	Malleable/Tempered iron	130	591 – 1706	492 – 820	–			

Ex: CNMG 644-M for CK60
Different in each application

Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	○	X

General cutting parameters depending on the application

Work piece material		Type of treatment/alloy	Hardness HB	Coated carbide CG99 V_c [sfm]	Application Chip breaker	Depth of cut and feed rate a_p [inch]	Depth of cut and feed rate f [inch]
P	Steel	Non alloyed steel 0 - 0.45 % C	150 – 250	656 – 1116	M	0.126 to 0.22	0.024 to 0.015
P	Steel	Low alloyed steel	250 – 300	492 – 951			
P	Steel	High alloyed steel	200	492 – 951			
P	Steel	Corrosion resistant steel	200	525 – 951			
K	Cast iron	Grey cast iron	180	492 – 1312			
K	Cast iron	Spheroidal	160	656 – 1476			
K	Cast iron	Malleable/Tempered iron	130	656 – 1805			

Ex: CNMG 543-M for GC25
Different in each application

Consistent cutting depth	Inconsistent cutting depth	Interrupted cut
●	○	X

ULTIMATE PERFORMANCE

Turning Speed & Feed Guide

Grade designation	Standard designation ISO	Standard designation ANSI	Type of cutting material	Application range 01 05 10 15 20 25 30 35 40 45 50	P Steel	M Stainless	K Cast iron	N Non-ferrous metals	S Heat-resistant	H 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

FORMULAS

Standard Technical Formulas

(SFM) SURFACE FEET PER MINUTE

.262 * DIAMETER * RPM

(RPM) REVOLUTIONS PER MINUTE

3.82 + SFM / DIAMETER

(IPM) INCHES PER MINUTE

FPT * NUMBER OF TEETH * RPM

(FPT) FEED PER TOOTH

IPM / (NUMBER OF TEETH * RPM)

(IPR) INCHES PER REVOLUTION

IPM / RPM

METAL REMOVAL RATE IN CUBIC INCHES

DEPTH OF CUT * WIDTH OF CUT * IPM

(CPT) CHIPLOAD PER TOOTH

IPM / RPM/ NO. OF FLUES

INCH TO METRIC

NCH * 25.4

METRIC TO INCH

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)

Deeper cut, up to 1/2 cutter diameter

$$IPT = \frac{CT \times D}{2 \times \sqrt{(D \times RDOC) - RDOC^2}}$$

Shallow cut, chip is much thinner

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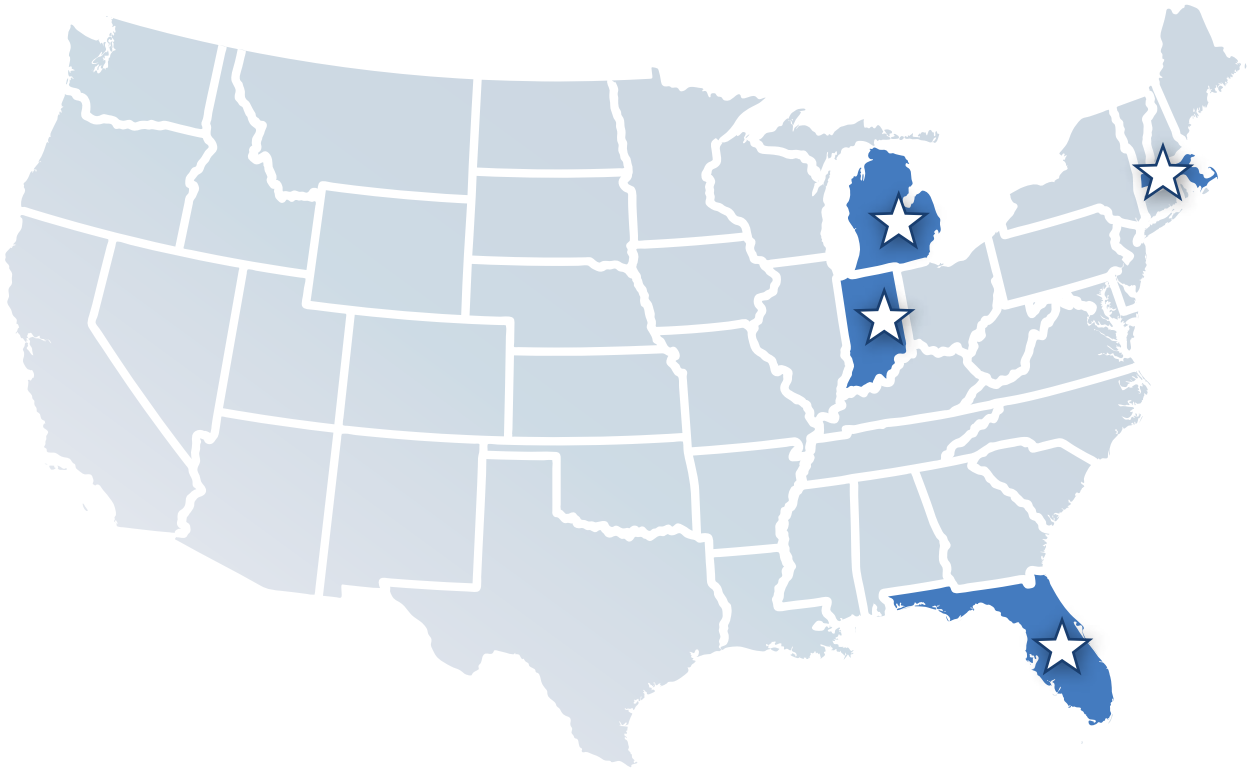
GWS

TOOL GROUP



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