



Series Grade
PR13 / SW05

Stable Cutting & Long Tool Life
when machining **Difficult-to-cut Materials**

PR13⁰⁵/13¹⁰/13²⁵

PVD Coated Carbide for:

- Nickel-based heat-resistant alloys
- Iron-based heat-resistant alloys
- Cobalt-based heat-resistant alloys
- Precipitation hardened stainless steel

SW05

Uncoated Carbide for:

- Titanium Alloys

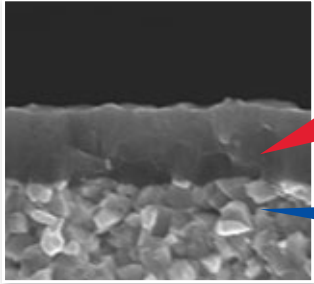


For Heat Resistant Alloys

PR13⁰⁵/13¹⁰/13²⁵

MEGACOAT Technology for Extended Tool Life

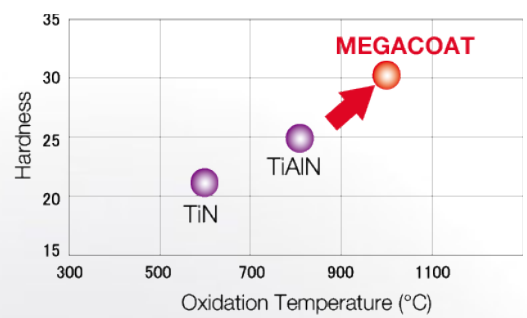
- Excellent Wear & Heat Resistance



MEGACOAT

- ➔ High oxidation resistance
- ➔ Smooth surface
- ➔ High bonding strength of coating layer
- ➔ Extra hard coating layer

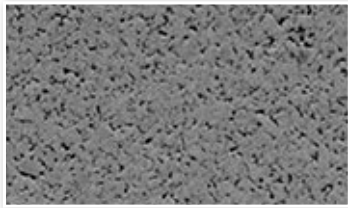
Special Carbide Substrate



MEGACOAT's oxidation resistance and physical hardness are superior to that of TiAlN providing improved crater wear resistance and extended tool life.

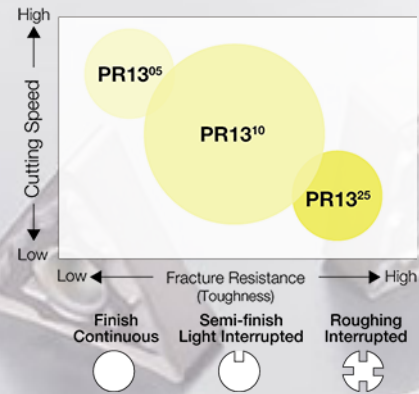
Special Carbide Substrates

- Fracture Resistance and Stabilization



A uniform grain structure provides superior thermal shock resistance and hardness stability

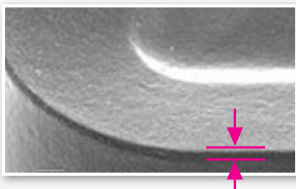
Insert Grade	Application
PR1305	Continuous / Finishing
PR1310	Mid to High-Speed Machining / Light Interruption
PR1325	Interrupted / Roughing



New Edge Preparation for PR13-series & SW05

*Fine Edge Treatment (FET)

- Low Cutting Forces for Reduced Shattering



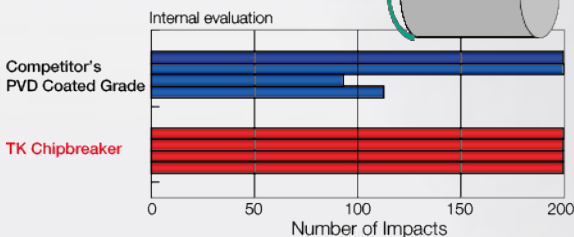
Large rake angle and minimal honing controls burrs and notching and improves surface finish

Improved cutting edge condition by Fine Edge Treatment (FET) technology

Cutting Performance Evaluation of PR13-series

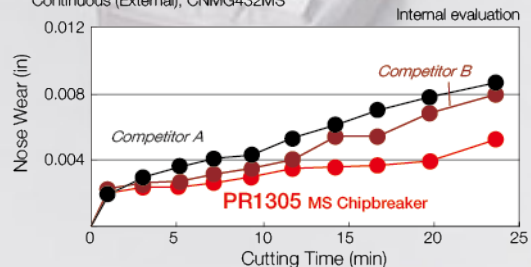
Excellent Fracture Resistance

Cutting Capability (Inconel 718)
Condition Vc=100 sfm, d.o.c=0.010", lpr=0.006"
Inconel 718 Interrupted (External), CNMG432



Excellent Wear Resistance

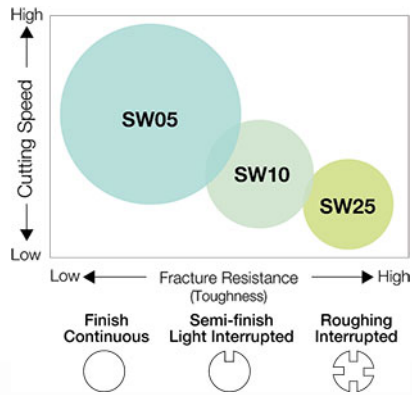
In-house cutting test (Inconel 718)
Condition Vc=150 sfm, d.o.c=0.010", lpr=0.006"
Continuous (External), CNMG432MS



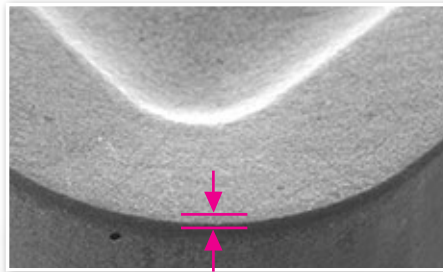
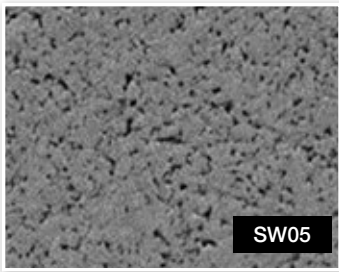
For Titanium Alloys SW05

Great Wear Resistance & Long Tool Life

Insert Grade	Application
SW05	High Speed Finishing to Medium-Roughing of Titanium Alloys



Special Carbide Substrates



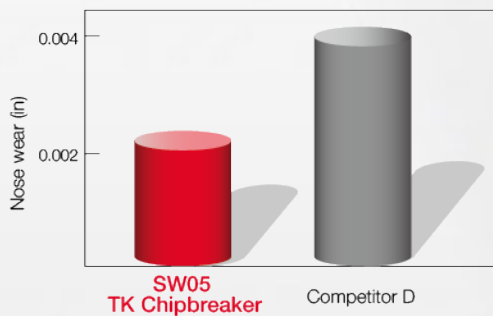
Special carbide maintains hardness at elevated temperatures and provides improved wear resistance for **high-speed finishing to medium cutting**

Improved Cutting Edge Condition with FET Technology

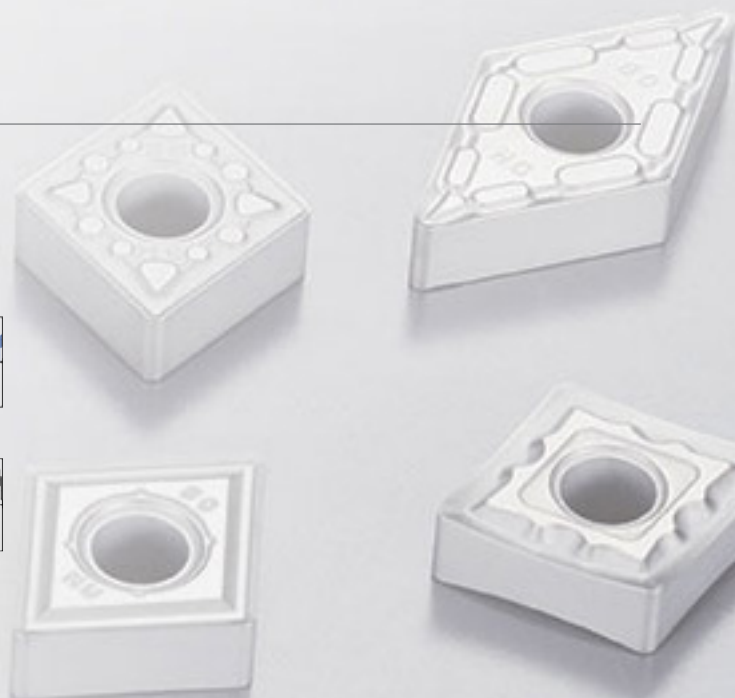
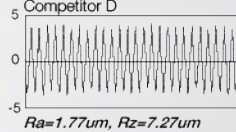
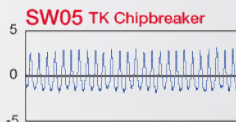
Special Carbide Substrate

Excellent Wear Resistance

- (Ti-6Al-4V)
In-house cutting test
Condition $V_c = 200 \text{sfm}$, $d.o.c = 0.020''$, $f = 0.006 \text{ ipr}$, wet Continuous (External), CNGG432



Finished Surface Roughness (after 153.2min)



Grade & Chipbreaker Selection Guide

PR13-Series & SW05 Insert Grade Selection		
Material	Cutting Range	Insert Grades
<ul style="list-style-type: none"> ➔ Nickel-based heat-resistant alloys (Inconel 718, etc.) ➔ Iron-based heat-resistant alloys (A286, etc.) ➔ Cobalt-based heat-resistant alloys (S816, Stellite, etc.) ➔ Precipitation hardened stainless steels (SUS630, etc.) 	Finishing	PR1305
	Medium-Roughing	PR1310
	Roughing	PR1325
<ul style="list-style-type: none"> ➔ Titanium alloys (Ti-6Al-4V, etc.) 	Finishing	SW05
	Medium-Roughing	SW05

MQ Chipbreaker

For Finishing to Medium Cutting

- ➔ Large rake angle
- ➔ Low cutting force
- ➔ Good chip control

★ First Choice Chipbreaker

MS Chipbreaker

For Medium to Roughing Cutting

- ➔ Positive land
- ➔ Tough cutting edge
- ➔ Good chip control

MU Chipbreaker

For Medium to Roughing Cutting

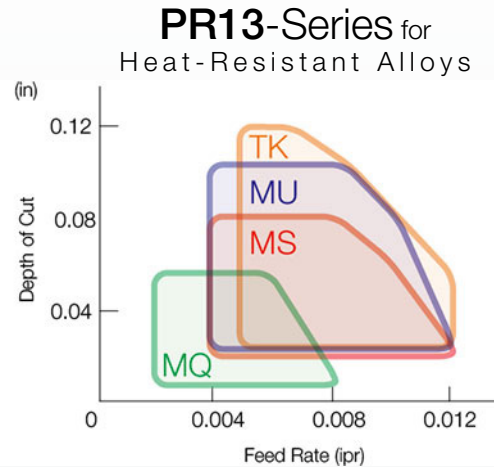
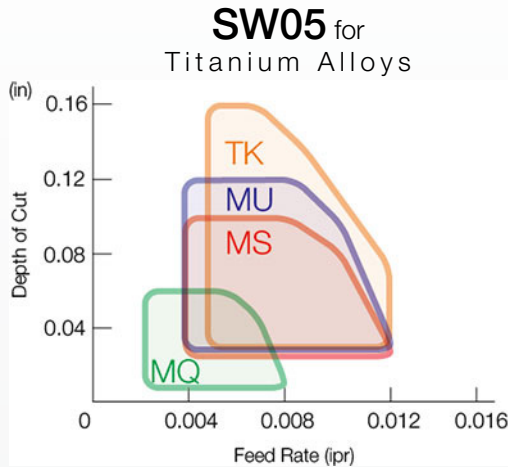
- ➔ Large rake angle
- ➔ Low cutting resistance
- ➔ Reduces notching & burrs
- ➔ Sharp cutting performance

Higher edge strength than MS chipbreaker at large D.O.C. cutting

TK Chipbreaker

For Medium to Roughing Cutting

- ➔ Improved chip evacuation
- ➔ Produces large curled chips



Case Studies

Inconel 718

- Ring (Aircraft Parts)
- Vc=125sfm
- D.O.C.=0.039"
- f = 0.008ipr
- Wet
- CNMG432TK (PR1305)

Good Wear Resistance!

PR1305	More than 10pcs / Edge
Competitor A	10pcs / Edge

After 10 pieces, the PR1305 insert showed better wear resistance than Competitor A which allowed for continued machining.

(User Evaluation)

Inconel 718

- Stator
- Vc=125sfm
- D.O.C.=0.020"
- f = 0.008ipr
- Wet
- WNMG432MU (PR1310)

Double the Tool Life!

PR1310	30-40pcs / Edge
Competitor B	15-20pcs / Edge

Kyocera showed 2 times longer tool life than Competitor B

(User Evaluation)

Case Studies

Incoloy A286

- Shoulder Bush
- Vc=225sfm
- D.O.C.=0.059"
- f = 0.007ipr
- Wet
- CNMG432MS (PR1310)

1.5 Times the Tool Life!
27% Increase in Cutting Speed!

PR1310	3pcs / Edge	Vc = 225sfm
Competitor Coating C	2pcs / Edge	Vc = 175sfm

Kyocera processed 1.5 times as many workpieces compared to Competitor C
Cutting speed increased 27% allowing improved productivity

(User Evaluation)

Inconel 718

- Connector
- Vc=175sfm
- D.O.C.=0.079"
- f = 0.008ipr
- Wet
- CNMG432MS (PR1310)

More than Double the Tool Life!

PR1310	7pcs / Edge	
Competitor D	3pcs / Edge	

Kyocera showed 2 times longer tool life than Competitor D

(User Evaluation)

316L SS

- Nozzle (Aircraft Parts)
- Vc=300sfm
- D.O.C.=0.049"-0.079"
- f = 0.005ipr
- Wet
- CNMG432MU (PR1310)

Five Times the Tool Life!

PR1310	More than 5pcs / Edge	
Competitor E	1pc / Edge	

Kyocera showed 5 times longer tool life than Competitor E

(User Evaluation)

316L SS

- Valve
- Vc=650sfm
- D.O.C.=0.098"
- f = 0.010ipr
- Wet
- CNMG432MS (PR1310)

Two Times the Tool Life!

PR1310	110-125pcs / Edge	
Competitor F	60pcs / Edge	

Kyocera showed 2 times longer tool life than Competitor F

(User Evaluation)

Inconel 625

- Aircraft Parts
- Vc=125sfm
- D.O.C.=0.063"
- f = 0.006ipr
- Wet
- CNMG432MS (PR1310)

Up to 2 Times the Tool Life!

PR1310	8pcs / Edge	
Competitor G	4-5pcs / Edge	

Kyocera showed up to 2 times longer tool life than Competitor G

(User Evaluation)

Inconel 718

- Square Bar
- Vc=75sfm
- D.O.C.=0.049"
- f = 0.009ipr
- Wet
- CNMG432MS (PR1325)

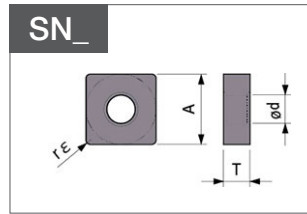
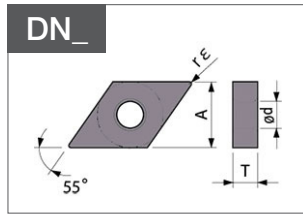
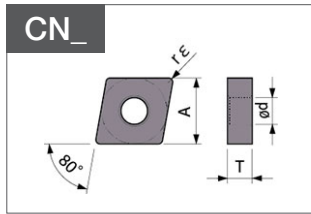
Over 4 Times the Tool Life!

PR1325	25pcs / Edge	
Competitor H	6pcs / Edge	

Kyocera showed 4 times longer tool life than Competitor H

(User Evaluation)

Negative Inserts

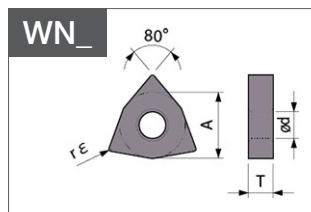
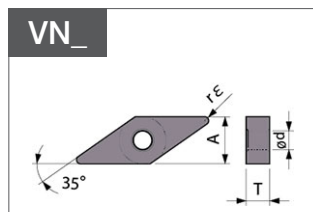
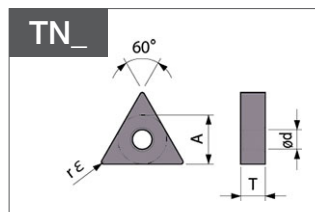


(inches)			
Description	A	T	Ød
CN_43_	0.500	0.188	0.203
CN_54_	0.630	0.250	0.250
CN_64_	0.750	0.250	0.312
DN_43_	0.500	0.188	0.203
DN_44_	0.500	0.250	0.203
SN_43_	0.500	0.188	0.203
SN_64_	0.750	0.250	0.312

CN_ / DN_						
Shape	Part Number	Dimension (inch) rε	MEGACOAT			Carbide
			PR1305	PR1310	PR1325	SW05
	CNMG 431MQ	0.016	●	●	●	○
	432MQ	0.031	●	●	●	○
	Finishing-Medium					
	CNMG 431MS	0.016	●	●	●	○
	432MS	0.031	●	●	●	○
	433MS	0.047	●	●	●	○
	434MS	0.063	●	●	●	
Medium-Roughing						
	CNMG 431MU	0.016	●	●	●	○
	432MU	0.031	●	●	●	○
	CNMG 542MU	0.031	●	●	●	
	543MU	0.047	●	●	●	
	544MU	0.063	●	●	●	
Medium-Roughing						
	CNGG 4302MU	0.004		●		
	4305MU	0.008		●		
Medium-Roughing Sharp Edge						
	CNMG 431TK	0.016	●	●	●	
	432TK	0.031	●	●	●	
Medium-Roughing						
	CNGG 431TK	0.016	●	●		○
	432TK	0.031	●	●		○
Medium-Roughing Sharp Edge						
	DNMG 431MQ	0.016	●	●	●	○
	432MQ	0.031	●	●	●	○
	DNMG 441MQ	0.016	○	○	○	○
	442MQ	0.031	○	○	○	○
Finishing						

DN_ / SN_						
Shape	Part Number	Dimension (inch) rε	MEGACOAT			Carbide
			PR1305	PR1310	PR1325	SW05
	DNMG 431MS	0.016	●	●	●	○
	432MS	0.031	●	●	●	○
	433MS	0.047	●	●	●	○
	DNMG 441MS	0.016	○	○	○	
	442MS	0.031	○	○	○	
Medium-Roughing						
	DNMG 431MU	0.016	●	●	●	○
	432MU	0.031	●	●	●	○
	DNMG 441MU	0.016	○	○	○	○
	442MU	0.031	○	○	○	○
Medium-Roughing						
	DNMG 431TK	0.016	●	●	●	
	432TK	0.031	●	●	●	
	DNMG 441TK	0.016	○	○	○	
	442TK	0.031	○	○	○	
Medium-Roughing						
	DNGG 431TK	0.016	●	●		○
	432TK	0.031	●	●		○
	DNGG 441TK	0.016	○	○		○
	442TK	0.031	○	○		○
Medium-Roughing Sharp Edge						
	SNMG 431MQ	0.016	○	○	○	○
	432MQ	0.031	○	○	○	○
Finishing-Medium						
	SNMG 431MS	0.016	○	○	○	○
	432MS	0.031	○	○	○	○
	433MS	0.047	○	○	○	○
	434MS	0.063	○	○	○	○
Medium-Roughing						
	SNMG 643MU	0.047		○	○	
	644MU	0.063		○	○	
Medium-Roughing						

Negative Inserts

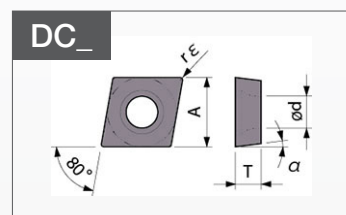
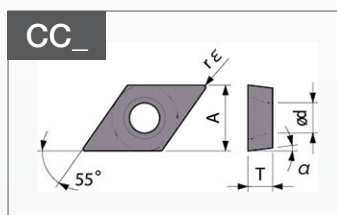


				(inches)		
Description	A	T	Ød			
TN_33_	0.375	0.188	0.150			
VN_33_	0.375	0.188	0.150			
WN_43_	0.500	0.188	0.203			

TN_ / VN_ / WN_						
Shape	Part Number	Dimension (inch) rε	MEGACOAT			Carbide
			PR1305	PR1310	PR1325	SW05
Finishing-Medium	TNMG 331MQ	0.016	●	●	●	○
	332MQ	0.031	●	●	●	○
Medium-Roughing	TNMG 331MS	0.016	●	●	●	○
	332MS	0.031	●	●	●	○
	333MS	0.047	●	●	●	○
Medium-Roughing	TNMG 331MU	0.016	●	●	●	○
	332MU	0.031	●	●	●	○
Medium-Roughing Sharp Edge	TNGG 331TK	0.016	●	●		○
	332TK	0.031	●	●		○
Finishing	VNMG 331MQ	0.016	●	●	●	○
	332MQ	0.031	●	●	●	○
Medium-Roughing	VNMG 331MS	0.016	●	●	●	○
	332MS	0.031	●	●	●	○
	333MS	0.047	●	●	●	○
Medium-Roughing	VNMG 331MU	0.016	●	●	●	○
	332MU	0.031	●	●	●	○
Medium-Roughing Sharp Edge	VNGG 3302MU	0.004		●		
	3305MU	0.008		●		
Finishing-Medium	WNMG 431MQ	0.016	●	●	●	○
	432MQ	0.031	●	●	●	○
Medium-Roughing	WNMG 431MS	0.016	●	●	●	○
	432MS	0.031	●	●	●	○
	433MS	0.047	●	●	●	○

WN_						
Shape	Part Number	Dimension (inch) rε	MEGACOAT			Carbide
			PR1305	PR1310	PR1325	SW05
Medium-Roughing	WNMG 431MU	0.016	●	●	●	○
	432MU	0.031	●	●	●	○
Medium-Roughing	WNMG 431TK	0.016	●	●	●	
	432TK	0.031	●	●	●	
Medium-Roughing Sharp Edge	WNGG 431TK	0.016	●	●		○
	432TK	0.031	●	●		○

Positive Inserts



					(inches)
Description	A	T	Ød	a	
CC_325_	0.375	0.156	0.173	7°	
DC_215_	0.250	0.094	0.110		
DC_325_	0.375	0.156	0.173		

CC_ / DC_						
Shape	Part Number	Dimension (inch) rε	MEGACOAT			Carbide
			PR1305	PR1310	PR1325	SW05
Finishing-Medium	CCMT 3251MQ	0.016	●	●	●	○
	3252MQ	0.031	●	●	●	○
Finishing-Medium	DCMT 21505MQ	0.008	●	●	●	○
	2151MQ	0.016	●	●	●	○
	DCMT 3251MQ	0.016	●	●	●	○
Finishing-Medium	DCMT 3251MQ	0.016	●	●	●	○
	3252MQ	0.031	●	●	●	○

Recommended Cutting Conditions

Workpiece Material	Cutting Range	Recommended Insert Grade	Recommended Chipbreaker	Recommendations		
				Vc (sfm)	D.O.C. (inch)	f (ipr)
Nickel-Based Heat-Resistant Alloys (Inconel 718, etc.)	Finishing	PR1305	MQ	150 ~ 180 ~ 260	0.008 ~ 0.020 ~ 0.039	0.002 ~ 0.004 ~ 0.008
	Medium-Roughing	PR1310	MS / MU	130 ~ 150 ~ 200	0.020 ~ 0.039 ~ 0.079	0.004 ~ 0.006 ~ 0.010
	Roughing	PR1325	TK	110 ~ 130 ~ 160	0.039 ~ 0.059 ~ 0.138	0.004 ~ 0.008 ~ 0.012
Iron-Based Heat-Resistant Alloys (A286, etc.)	Finishing	PR1305	MQ	160 ~ 230 ~ 300	0.008 ~ 0.020 ~ 0.039	0.002 ~ 0.004 ~ 0.008
	Medium-Roughing	PR1310	MS / MU	150 ~ 180 ~ 230	0.020 ~ 0.039 ~ 0.079	0.004 ~ 0.006 ~ 0.010
	Roughing	PR1325	TK	130 ~ 150 ~ 180	0.039 ~ 0.059 ~ 0.138	0.004 ~ 0.008 ~ 0.012
Cobalt-Based Heat-Resistant Alloys (Stellite, etc.)	Finishing	PR1305	MQ	130 ~ 160 ~ 230	0.008 ~ 0.020 ~ 0.039	0.002 ~ 0.004 ~ 0.008
	Medium-Roughing	PR1310	MS / MU	110 ~ 130 ~ 180	0.020 ~ 0.039 ~ 0.079	0.004 ~ 0.006 ~ 0.010
	Roughing	PR1325	TK	100 ~ 110 ~ 150	0.039 ~ 0.059 ~ 0.118	0.004 ~ 0.008 ~ 0.012
Precipitation Hardened Stainless Steels (17-4 PH, etc.)	Finishing	PR1305	MQ	330 ~ 460 ~ 590	0.008 ~ 0.020 ~ 0.059	0.002 ~ 0.004 ~ 0.008
	Medium-Roughing	PR1310	MS / MU	260 ~ 390 ~ 510	0.020 ~ 0.039 ~ 0.098	0.006 ~ 0.008 ~ 0.012
	Roughing	PR1325	TK	200 ~ 260 ~ 330	0.039 ~ 0.079 ~ 0.157	0.006 ~ 0.008 ~ 0.014
Titanium Alloys (Ti-6Al-4V, etc.)	Finishing	SW05	MQ	130 ~ 230 ~ 330	0.008 ~ 0.020 ~ 0.039	0.002 ~ 0.004 ~ 0.008
	Medium-Roughing	SW05	MS / MU / TK	130 ~ 200 ~ 260	0.020 ~ 0.039 ~ 0.157	0.006 ~ 0.008 ~ 0.012

(Conditions based on CNMG432 type insert)



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