

THE NEW VALUE FRONTIER



CERATIP®

KYOCERA Cutting Tools

CP184-E

CA65^{15/25} and PR11²⁵ for **Stainless Steel Machining**

■ Innovative Solution for Stainless Steel Machining

- Minimizes Notching
- Prevents Burrs
- Reduces Edge Build-up

New!
Chipbreaker
MQ



New Coated Carbide CA65¹⁵/CA65²⁵ PR11²⁵

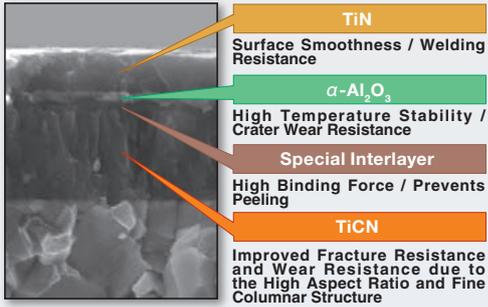
CVD Coated Carbide PVD Coated Carbide

- CA6515/CA6525 (CVD coating) and PR1125 (PVD coating) is applicable to various types of machining such as stainless steel, heat-resistant steel and steel, etc.

CA65^{15/25}

Thin Ultra Fine TiCN

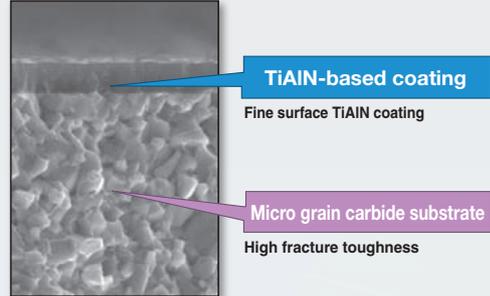
- CVD coated carbide grade
- Prevents fracture by thin film coating



PR11²⁵

Fine surface thin TiAlN

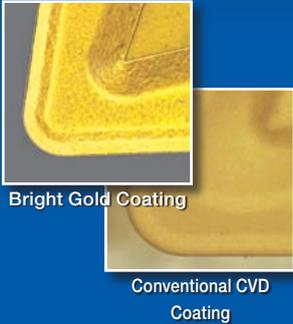
- Stable machining with tough substrate
- Low cutting resistance on fine surface



Smooth Coating Film Surface

- Reduces adhesion and edge build-up
- Low cutting resistance on smooth surface

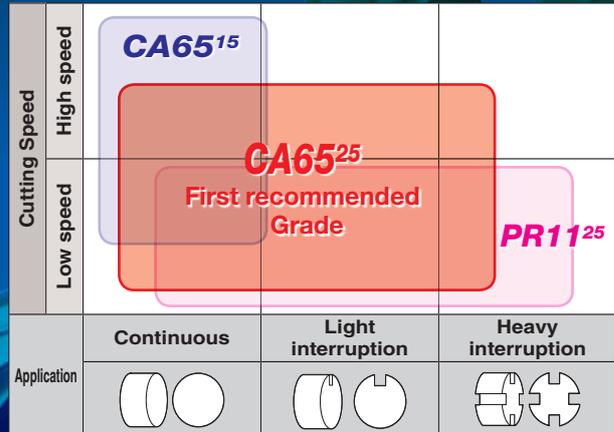
<CA65^{15/25} Coating>



<PR11²⁵ Coating>



Application Range

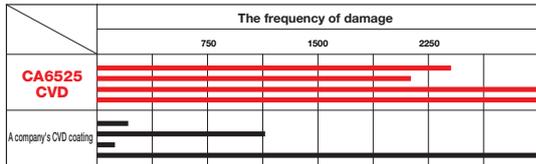


Cutting capability

Cutting Performance of CA6525

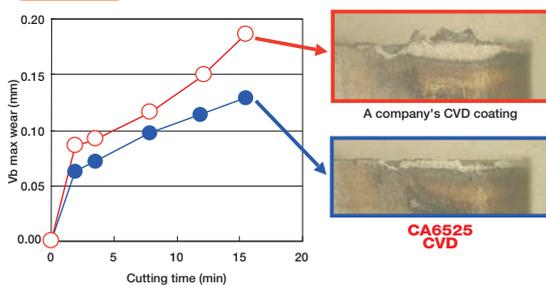
Stabilization

Vc=100m/min ap=0.5mm f=0.3mm/rev Wet
CNMG120408 SUS304 Four grooves



Wear resistance

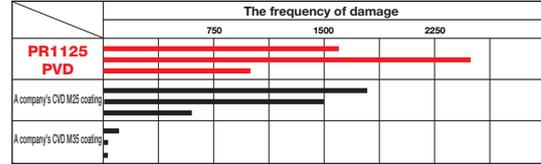
Vc=200m/min ap=1.5mm f=0.3mm/rev Wet
CNMG120408 SUS304



Cutting Performance of PR1125

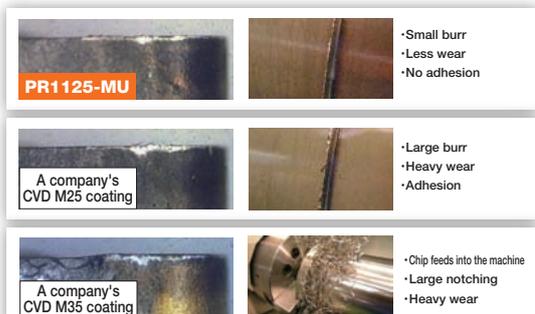
Stabilization

Vc=100m/min ap=1.5mm f=0.3mm/rev Wet
CNMG120408 SUS304 Four grooves



Wear resistance and burr condition

Vc=120m/min ap=1.0mm f=0.15mm/rev Wet
CNMG120408 SUS304 Hour of cutting :30min



As for stainless steel processing edge deciding factor!

New edge preparation

- Introduce the 'FET Technology (Fine edge treatment)' which realizes large edge strength and sharp rake angle.
- Minimized R honing

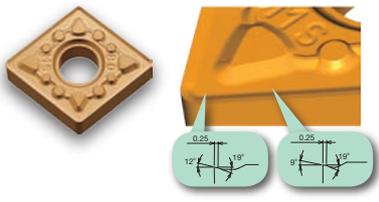


Feature of New Chipbreaker for Stainless Machining

● Chip control oriented type

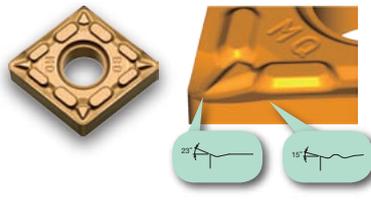
MS Chipbreaker

- First recommended chipbreaker from medium to roughing
- Positive land
- Tough cutting edge
- Good chip control



MQ Chipbreaker

- From finishing to Medium
- Large rake angle, Circular edge line
- Low cutting force and Good chip control

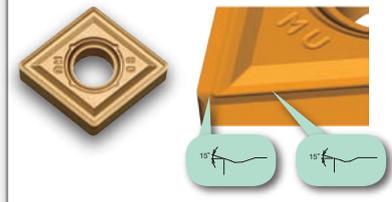


New!

● Sharpness oriented type

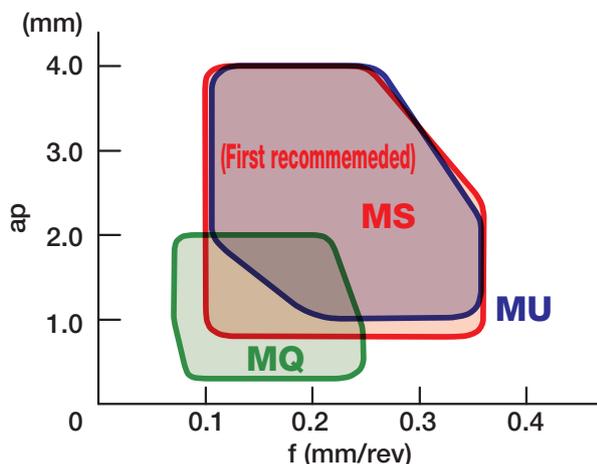
MU Chipbreaker

- from Medium to Roughing
- Large rake angle, Low cutting resistance
- Reduces notching & burrs



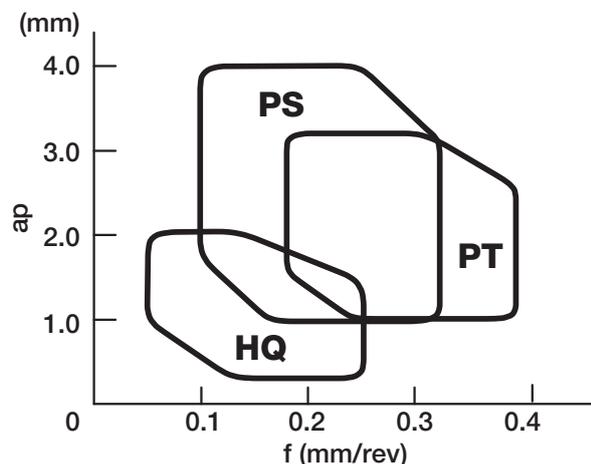
● Special Chipbreaker for Stainless Steel

Sharp edge with large positive land and large rake angle



● Optional Chipbreaker

Higher edge strength than MS, MQ and MU

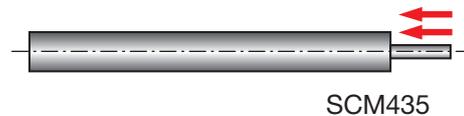


Prevents chattering, burrs and cutting edge damage at steel machining

Kyocera's new chipbreaker for stainless steel prevents adhesion, chattering and burrs by its sharp cutting edge with minimum honing. It is also suitable for interrupted cutting of soft steel and low carbon steel, preventing chip biting.

Prevents chattering at steel machining

- Sharp cutting due to small R honing of CA65 series



Chattering and burrs



CVD Chipbreaker for steel

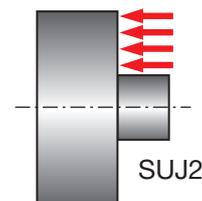
No chattering and burrs



CA6525-MU

Prevents cutting edge damage at steel machining

- CA65 prevents cutting edge damage due to thin film coating
- Less damage caused by biting chips at corner wall, boring and sticky materials machining



Cutting edge damage by chip biting



CVD Chipbreaker for steel

Available until maximum tool life without non-cutting edge damage



CA6525-MU

Case Studies

SUS316 (Austenitic Stainless Steel)	
<ul style="list-style-type: none"> • Connector • Vc=120m/min • ap=2mm • f=0.2mm/rev • WET • CNMG120408MS (CA6525) 	
CA65²⁵	580pcs/edge
Competitor A	200pcs/edge
<ul style="list-style-type: none"> • Compared to competitor coated A, MS chipbreaker (CA6525) shows good chip evacuation and wear resistance, and improved the tool life by almost 300%. <p style="text-align: right;">Evaluation from the customer</p>	

SUS316 (Austenitic Stainless Steel)	
<ul style="list-style-type: none"> • Nipple • Vc=120m/min • ap=2.5mm • f=0.15mm/rev • WET • CNMG120408MS (CA6525) 	
CA65²⁵	30pcs/edge
Competitor B	15pcs/edge
<ul style="list-style-type: none"> • Kyocera's coating is two times longer than Competitor B. • Chip evacuation. <p style="text-align: right;">Evaluation from the customer</p>	

SUS304 (Austenitic Stainless Steel)	
<ul style="list-style-type: none"> • Pump parts • Vc=150m/min • ap=1.5m • f=0.2mm/rev • WET • WNMG080408MS (CA6525) 	
CA65²⁵	100pcs/edge
Competitor D	50pcs/edge
<ul style="list-style-type: none"> • MS chipbreaker (CA6525) doubled the tool life of Competitor D. <p style="text-align: right;">Evaluation from the customer</p>	

SUS304 (Austenitic Stainless Steel)	
<ul style="list-style-type: none"> • Jig • Vc=100 m/min • ap=1.0 mm • f=0.20 mm/rev • WET • WNMG080412MS (CA6525) 	
CA65²⁵	150pcs/edge
Competitor E	80pcs/edge
<ul style="list-style-type: none"> • Kyocera's coating is 1.8 times longer than Competitor E. <p style="text-align: right;">Evaluation from the customer</p>	

SUS303 (Austenitic Stainless Steel)	
<ul style="list-style-type: none"> • Connector • Vc=100~120m/min • ap=1.5~2.0mm • f=0.12~0.15mm/rev • WET • CNMG120408MS (PR1125) 	
PR11²⁵	180pcs/edge
Competitor G	120pcs/edge
<ul style="list-style-type: none"> • Kyocera's coating is 1.3 times longer than Competitor G. <p style="text-align: right;">Evaluation from the customer</p>	

SUS316L (Austenitic Stainless Steel)	
<ul style="list-style-type: none"> • Shaft • Vc=100m/min • ap=0.5~1.0mm • f=0.15mm/rev • WET • DNMG150404MS (PR1125) 	
PR11²⁵	1pcs/edge
Competitor H	0.5pcs/edge
<ul style="list-style-type: none"> • Kyocera's cutting length is 2 times longer than Competitor H. (Competitor H was not able to cut even 1 workpiece) • Edge condition is excellent compared to Competitor H. <p style="text-align: right;">Evaluation from the customer</p>	

Case Studies

SUS440C (Martensitic Stainless Steel)	
<ul style="list-style-type: none"> • Housing • Vc=122m/min • ap=1~2mm • f=0.18mm/rev • WET • CNMG120408MS (CA6525) 	
CA65²⁵	More than 4,000pcs/edge
Competitor I	2,000pcs/edge
<ul style="list-style-type: none"> • MS chipbreaker (CA6525) doubled the tool life of Competitor I. <p style="text-align: center;">Evaluation from the customer</p>	

SUS630 (Precipitation hardening Stainless Steel)	
<ul style="list-style-type: none"> • Sleeve • Vc=100m/min • ap=0.4mm • f=0.15mm/rev • WET • TNMG160408MU (CA6525) 	
CA65²⁵	350pcs/edge
Competitor J	200pcs/edge
<ul style="list-style-type: none"> • Compared to competitor J, CA6525 provided better chip control with longer tool life. <p style="text-align: center;">Evaluation from the customer</p>	

Permalloy	
<ul style="list-style-type: none"> • Housing • Vc=80m/min • ap=0.7mm • f=0.12mm/rev • WET • WNMG080408MU (CA6525) 	
CA65²⁵	34pcs/edge
Competitor K	12pcs/edge
<ul style="list-style-type: none"> • By changing the edge face machining and the chipbreaker, cutting evacuation was improved and the machine did not stop operating. This also helped to extend tool life. <p style="text-align: center;">Evaluation from the customer</p>	

SCS14A (Stainless steel cast steel)	
<ul style="list-style-type: none"> • valve seat • Vc=120m/min • ap=1.0mm • f=0.10mm/rev • WET • CNMG120408MS (CA6525) 	
CA65²⁵	69pcs/edge
Competitor L	30pcs/edge
<ul style="list-style-type: none"> • The coating life is two times longer than Competitor L. • The chip evacuation is the same as others. <p style="text-align: center;">Evaluation from the customer</p>	

Inconel 718 (High-Temp.Alloy)	
<ul style="list-style-type: none"> • Shaft • Vc=50m/min • ap=2mm/per cut • f=0.1mm/rev • Wet • CNMG120408PS 	
CA65²⁵	3 pcs/edge
Competitor M	1 1/2 pcs/edge
<ul style="list-style-type: none"> • CA65²⁵ machined more than 2 times as many workpieces as Competitor M. • Cutting edge condition of CA6525 was better than Competitor M. <p style="text-align: center;">Evaluation from the customer</p>	

Inconel 718 (High-Temp.Alloy)	
<ul style="list-style-type: none"> • Shaft • Vc=50m/min • ap=2mm/per cut • f=0.1mm/rev • Wet • CNMG120408MS 	
PR1125	3 pcs/edge
Competitor N	3 pcs/edge
<ul style="list-style-type: none"> • PR11²⁵ showed superior wear resistance and machining stability compared with Competitor N. <p style="text-align: center;">Evaluation from the customer</p>	

Stock Items

Shape	Description	Dimension (mm)					Stock Grades		
							CVD Coated		PVD Coated
		I.C.	Thickness	Hole	Corner-R	Relief Angle	CA 6515	CA 6525	PR 1125
	CNMG 120404HQ 120408HQ 120412HQ	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
	1.2				-	●	●	●	
Medium-Roughing	CNMG 120404PS 120408PS 120412PS 120416PS	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
	1.2				-	●	●	●	
	1.6				-	●	●	●	
Medium-Roughing	CNMG 160612PS 160616PS	15.875	6.35	6.35	1.2	-	●	●	
	1.6				-	●	●		
Medium-Roughing	CNMG 120408PT 120412PT	12.70	4.76	5.16	0.8	-	●	●	
	1.2				-	●	●		
Medium-Roughing	CNMG 160608PT 160612PT 160616PT	15.875	6.35	6.35	0.8	-	●	●	
	1.2				-	●	●		
Roughing	CNMG 120404 120408 120412	12.70	4.76	5.16	0.4	-	●	●	
	0.8				-	●	●		
	1.2				-	●	●		
Stainless Steel Finishing	CNMG 120404GU 120408GU	12.70	4.76	5.16	0.4	-	●	●	
	0.8				-	●	●		
Stainless Steel Medium-Roughing	CNMG 120408HU 120412HU	12.70	4.76	5.16	0.8	-	●	●	
	1.2				-	●	●		
NEW	CNMG 120404MQ 120408MQ	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
Stainless Steel Medium-Roughing	CNMG 120404MS 120408MS 120412MS 120416MS	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
	1.2				-	●	●	●	
	1.6				-	●	●	●	
Stainless Steel Medium-Roughing	CNMG 120404MU 120408MU 120412MU	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
	1.2				-	●	●	●	
Stainless Steel Medium-Roughing	CNMG 120404TK 120408TK	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
Finishing-Medium	DNMG 150404HQ 150408HQ	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
Finishing-Medium	DNMG 150604HQ 150608HQ	12.70	6.35	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	

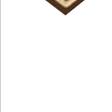
Shape	Description	Dimension (mm)					Stock Grades		
							CVD Coated		PVD Coated
		I.C.	Thickness	Hole	Corner-R	Relief Angle	CA 6515	CA 6525	PR 1125
	DNMG 150404PS 150408PS 150412PS	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
	1.2				-	●	●	●	
Medium-Roughing	DNMG 150604PS 150608PS 150612PS	12.70	6.35	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
	1.2				-	●	●	●	
	1.6				-	●	●	●	
Medium-Roughing/High Feed	DNMG 150408PT 150412PT	12.70	4.76	5.16	0.8	-	●	●	
	1.2				-	●	●		
Medium-Roughing/High Feed	DNMG 150608PT 150612PT	12.70	6.35	5.16	0.8	-	●	●	
	1.2				-	●	●		
Stainless Steel Finishing	DNMG 150404GU 150408GU	12.70	4.76	5.16	0.4	-	●	●	
	0.8				-	●	●		
Stainless Steel Finishing	DNMG 150604GU 150608GU	12.70	6.35	5.16	0.4	-	●	●	
	0.8				-	●	●		
Stainless Steel Medium-Roughing	DNMG 150408HU 150412HU	12.70	4.76	5.16	0.8	-	●	●	
	1.2				-	●	●		
Stainless Steel Medium-Roughing	DNMG 150608HU 150612HU	12.70	6.35	5.16	0.8	-	●	●	
	1.2				-	●	●		
NEW	DNMG 150404MQ 150408MQ	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
Stainless Steel Finishing-Medium	DNMG 150604MQ 150608MQ	12.70	6.35	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
Stainless Steel Medium-Roughing	DNMG 150404MS 150408MS 150412MS	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
	1.2				-	●	●	●	
Stainless Steel Medium-Roughing	DNMG 150604MS 150608MS 150612MS	12.70	6.35	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
	1.2				-	●	●	●	
Stainless Steel Medium-Roughing	DNMG 150404MU 150408MU	12.70	4.76	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	
Stainless Steel Medium-Roughing	DNMG 150604MU 150608MU	12.70	6.35	5.16	0.4	-	●	●	●
	0.8				-	●	●	●	

Stock Items

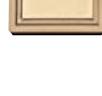
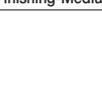
Shape	Description	Dimension (mm)					Stock Grades		
							CVD Coated		PVD Coated
		I.C.	Thickness	Hole	Corner-R	Relief Angle	CA 6515	CA 6525	PR 1125
	DNMG 150404TK 150408TK	12.70	4.76	5.16	0.4 0.8	-	● ●	● ●	● ●
	DNMG 150604TK 150608TK	12.70	6.35	5.16	0.4 0.8	-	● ●	● ●	● ●
Stainless Steel Medium-Roughing									
	SNMG 120408HQ	12.70	4.76	5.16	0.8	-	●	●	●
Finishing-Medium									
	SNMG 120408PS 120412PS 120416PS	12.70	4.76	5.16	0.8 1.2 1.6	-	● ● ●	● ● ●	● ● ●
Medium-Roughing									
	SNMG 120408PT 120412PT	12.70	4.76	5.16	0.8 1.2	-	● ●	● ●	● ●
Medium-Roughing/High Feed									
	SNMG 120408	12.70	4.76	5.16	0.8	-	●	●	●
Roughing									
	SNMG 120404MQ 120408MQ	12.70	4.76	5.16	0.4 0.8	-	● ●	● ●	● ●
Stainless Steel Finishing-Medium									
	SNMG 120404MS 120408MS 120412MS 120416MS	12.70	4.76	5.16	0.4 0.8 1.2 1.6	-	● ● ● ●	● ● ● ●	● ● ● ●
Stainless Steel Medium-Roughing									
	TNMG 160404HQ 160408HQ	9.525	4.76	3.81	0.4 0.8	-	● ●	● ●	● ●
Finishing-Medium									
	TNMG 160404PS 160408PS 160412PS	9.525	4.76	3.81	0.4 0.8 1.2	-	● ● ●	● ● ●	● ● ●
	TNMG 220408PS 220412PS	12.70	4.76	5.16	0.8 1.2	-	● ●	● ●	● ●
Medium-Roughing									
Shape	Description	Dimension (mm)					Stock Grades		
							CVD Coated		PVD Coated
		I.C.	Thickness	Hole	Corner-R	Relief Angle	CA 6515	CA 6525	PR 1125
	TNMG 160408PT 160412PT	9.525	4.76	3.81	0.8 1.2	-	● ●	● ●	● ●
Medium-Roughing/High Feed									
	TNMG 160404 160408 160412	9.525	4.76	3.81	0.4 0.8 1.2	-	● ● ●	● ● ●	● ● ●
Roughing									
	TNMG 160404GU 160408GU	9.525	4.76	3.81	0.4 0.8	-	● ●	● ●	● ●
Stainless Steel Finishing									
	TNMG 160408HU 160412HU	9.525	4.76	3.81	0.8 1.2	-	● ●	● ●	● ●
Stainless Steel Medium-Roughing									
	TNMG 160404MQ 160408MQ	9.525	4.76	3.81	0.4 0.8	-	● ●	● ●	● ●
Stainless Steel Finishing-Medium									
	TNMG 160404MS 160408MS 160412MS	9.525	4.76	3.81	0.4 0.8 1.2	-	● ● ●	● ● ●	● ● ●
Stainless Steel Medium-Roughing									
	TNMG 160404MU 160408MU	9.525	4.76	3.81	0.4 0.8	-	● ●	● ●	● ●
Stainless Steel Medium-Roughing									
	TNMG 160404TK 160408TK	9.525	4.76	3.81	0.4 0.8	-	● ●	● ●	● ●
Stainless Steel Medium-Roughing									
	TNMG 160404\$-ST 160408\$-ST	9.525	4.76	3.81	0.4 0.8	-	● ●	● ●	● ●
Stainless Steel Medium-Roughing									
	TNGG 160404\$-S 160408\$-S	9.525	4.76	3.81	0.4 0.8	-			● ●
Finishing/Surface Roughness Oriented									

●:Std Stock

Stock Items

Shape	Description	Dimension (mm)					Stock Grades			Shape	Description	Dimension (mm)					Stock Grades					
							CVD Coated	PVD Coated											CVD Coated	PVD Coated		
		I.C.	Thickness	Hole	Corner-R	Relief Angle	CA 6515	CA 6525	PR 1125			I.C.	Thickness	Hole	Corner-R	Relief Angle	CA 6515	CA 6525	PR 1125			
	TNGG 160404\$-25R 160408\$-25R	9.525	4.76	3.81	0.4 0.8	-			●	●		WNMG 080404GU 080408GU	12.70	4.76	5.16	0.4 0.8	-	●	●	●	●	
Medium-Roughing Low cutting resistance											Stainless Steel Finishing											
	VNMG 160404 160408	9.525	4.76	3.81	0.4 0.8	-	●	●	●	●		WNMG 080408HU 080412HU	12.70	4.76	5.16	0.8 1.2	-	●	●	●	●	●
Roughing											Stainless Steel Medium-Roughing											
	VNMG 160404GU 160408GU	9.525	4.76	3.81	0.4 0.8	-	●	●	●	●		WNMG 080404MQ 080408MQ	12.70	4.76	5.16	0.4 0.8	-	●	●	●	●	●
Stainless Steel Finishing											Stainless Steel Finishing-Medium											
	VNMG 160404MQ 160408MQ	9.525	4.76	3.81	0.4 0.8	-	●	●	●	●		WNMG 080404MS 080408MS 080412MS	12.70	4.76	5.16	0.4 0.8 1.2	-	●	●	●	●	●
NEW											Stainless Steel Medium-Roughing											
	VNMG 160404MS 160408MS 160412MS	9.525	4.76	3.81	0.4 0.8 1.2	-	●	●	●	●		WNMG 080404MU 080408MU	12.70	4.76	5.16	0.4 0.8	-	●	●	●	●	●
Stainless Steel Finishing-Medium											Stainless Steel Medium-Roughing											
	VNMG 160404MU 160408MU	9.525	4.76	3.81	0.4 0.8	-	●	●	●	●		WNMG 080404TK 080408TK	12.70	4.76	5.16	0.4 0.8	-	●	●	●	●	●
Stainless Steel Medium-Roughing											Stainless Steel Medium-Roughing											
	WNMG 080404HQ 080408HQ	12.70	4.76	5.16	0.4 0.8	-	●	●	●	●		CCMT 060202HQ 060204HQ	6.35	2.38	2.8	0.2 0.4	7°	●	●	●	●	●
Medium-Roughing											Finishing-Medium											
	WNMG 080404PS 080408PS 080412PS	12.70	4.76	5.16	0.4 0.8 1.2	-	●	●	●	●		CCMT 09T302HQ 09T304HQ 09T308HQ	9.525	3.97	4.4	0.2 0.4 0.8	7°	●	●	●	●	●
Medium-Roughing											Finishing-Medium											
	WNMG 080408PT 080412PT	12.70	4.76	5.16	0.8 1.2	-	●	●	●	●		CCMT 060202GK 060204GK	6.35	2.38	2.8	0.2 0.4	7°	●	●	●	●	●
Medium-Roughing/High Feed											Finishing-Medium											
	WNMG 080404 080408 080412	12.70	4.76	5.16	0.4 0.8 1.2	-	●	●	●	●		CCMT 120404GK 120408GK 120412GK	12.70	4.76	5.5	0.4 0.8 1.2	7°	●	●	●	●	●
Roughing											Finishing-Medium											

Stock Items

Shape	Description	Dimension (mm)					Stock Grades			Shape	Description	Dimension (mm)					Stock Grades		
							CVD Coated	PVD Coated	CA 6515								CA 6525	PR 1125	CVD Coated
		I.C.	Thickness	Hole	Corner-R	Relief Angle	I.C.	Thickness				Hole	Corner-R	Relief Angle					
	CCMT 09T308	9.525	3.97	4.4	0.8	7°	●	●	●		VBMT 110304HQ 110308HQ	6.35	3.18	2.8	0.4 0.8	5°	●	●	●
Medium										Finishing-Medium									
	CPMH 080204HQ 080208HQ	7.94	2.38	3.5	0.4 0.8	11°	●	●	●		VBMT 160404HQ 160408HQ	9.525	4.76	4.4	0.4 0.8	5°	●	●	●
Finishing-Medium										Finishing-Medium									
	CPMH 090304HQ 090308HQ	9.525	3.18	4.5	0.4 0.8	11°	●	●	●		VCMT 080204HQ	4.76	2.38	2.3	0.4	7°	●	●	●
Medium										Finishing-Medium									
	CPMH 080204 080208	7.94	2.38	3.5	0.4 0.8	11°	●	●	●		WPMT 110204HQ	6.35	2.38	2.8	0.4	11°	●	●	●
Medium										Finishing-Medium									
	CPMH 090304 090308	9.525	3.18	4.5	0.4 0.8	11°	●	●	●		WPMT 160304HQ 160308HQ	9.525	3.18	4.4	0.4 0.8	11°	●	●	●
Medium										Finishing-Medium									
	DCMT 070202GK 070204GK 070208GK	6.35	2.38	2.8	0.2 0.4 0.8	7°	●	●	●		SPMR 090304 090308	9.525	3.18	-	0.4 0.8	11°	●	●	●
Finishing-Medium										Medium									
	DCMT 11T302GK 11T304GK 11T308GK	9.525	3.97	4.4	0.2 0.4 0.8	7°	●	●	●		SPMR 120304 120308	12.70	3.18	-	0.4 0.8	11°	●	●	●
Finishing-Medium										Medium									
	DCMT 070204HQ 070208HQ	6.35	2.38	2.8	0.4 0.8	7°	●	●	●		TPMR 110304HQ 110308HQ	6.35	3.18	-	0.4 0.8	11°	●	●	●
Finishing-Medium										Finishing-Medium									
	DCMT 11T302HQ 11T304HQ 11T308HQ	9.525	3.97	4.4	0.2 0.4 0.8	7°	●	●	●		TPMR 160304HQ 160308HQ	9.525	3.18	-	0.4 0.8	11°	●	●	●
Finishing-Medium										Finishing-Medium									
	TPMT 090204HQ	5.56	2.38	2.8	0.4	11°	●	●	●		TPMR 110304 110308	6.35	3.18	-	0.4 0.8	11°	●	●	●
Finishing-Medium										Medium									
	TPMT 110304HQ 110308HQ	6.35	3.18	3.3	0.4 0.8	11°	●	●	●		TPMR 160304 160308	9.525	3.18	-	0.4 0.8	11°	●	●	●
Finishing-Medium										Medium									
	TPMT 160304HQ 160308HQ	9.525	3.18	4.4	0.4 0.8	11°	●	●	●										
Finishing-Medium																			

Austenitic Stainless Steel(SUS304,SUS310S,SUS316)

Machinability (Hardest to cut)	<ul style="list-style-type: none"> •Significant work hardening, poor cutting performance, acceleration of wear at cutting edge (notching) •Heat conductivity is extremely poor (one-quarter of carbon steel), temperature at edge rises and likely to wear •Welding or built-up edge occurs easily, cutting resistance increases and edge breakage or chipping is likely •Chips tend to become longer and stronger, resulting in poor machinability
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<Recommended grade>

Classification	Grade	Cutting speed (m/min)				
		50	100	150	200	250
M15	CA65 ¹⁵			180 (120-240)		
M25	CA65 ²⁵		150 (80-220)			
M30	PR11 ²⁵		120 (70-160)			

<Recommended Chipbreaker>

Application ap (mm)	Continuous	Light Interruption	Interruption	Heavy Interruption
less than 1mm	MQ	MQ	MS	
more than 1mm	MS/MU	MS/MU		
less than 1mm	MQ	MQ	MS/MU	MS
more than 1mm	MS/MU	MS/MU		
less than 1mm	MQ	MQ	MS/MU	MS
more than 1mm	MS/MU	MS/MU		

Ferritic Stainless Steel(SUS405,SUS410L,SUS430)

Machinability	<ul style="list-style-type: none"> •Limited work hardening and more machinable than austenitic steel (less notching and burring) •Lower hardness due to ferritic structure (will not harden when quenched) •Heat conductivity is poor (half of carbon steel), temperature at edge rises and likely to wear
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<Recommended grade>

Classification	Grade	Cutting speed (m/min)				
		50	100	150	200	250
M15	CA65 ¹⁵			190 (130-250)		
M25	CA65 ²⁵		160 (90-230)			
M30	PR11 ²⁵		130 (80-170)			

<Recommended Chipbreaker>

Application ap (mm)	Continuous	Light Interruption	Interruption	Heavy Interruption
less than 1mm	MQ	MQ	MS	
more than 1mm	MS/MU	MS/MU		
less than 1mm	MQ	MQ	MS/MU	MS
more than 1mm	MS/MU	MS/MU		
less than 1mm	MQ	MQ	MS/MU	MS
more than 1mm	MS/MU	MS/MU		

Martensitic Stainless Steel(SUS403,SUS410,SUS420F)

Machinability	<ul style="list-style-type: none"> •Limited work hardening and more machinable than austenitic steel (less notching and burring) •High in hardness, likely to cause crater wear •Heat conductivity is poor (half of carbon steel), temperature at edge rises and likely to wear
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<Recommended grade>

Classification	Grade	Cutting speed (m/min)				
		50	100	150	200	250
M15	CA65 ¹⁵			190 (130-250)		
M25	CA65 ²⁵		160 (90-230)			

<Recommended Chipbreaker>

Application ap (mm)	Continuous	Light Interruption	Interruption	Heavy Interruption
less than 1mm	MQ	MQ	MS	
more than 1mm	MS/MU	MS/MU		
less than 1mm	MQ	MQ	MS/MU	MS
more than 1mm	MS/MU	MS/MU		

Precipitation hardening (PH) stainless steel(SUS630,SUS631)

Machinability (Hardest to cut)	<ul style="list-style-type: none"> •High tensile strength (approx. twice that of other stainless steels), high cutting resistance and hard to machine/low machinability •Heat conductivity is poor, temperature at edge rises and likely to wear
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<Recommended grade>

Classification	Grade	Cutting speed (m/min)				
		50	100	150	200	250
M15	CA65 ¹⁵		80 (50-110)			
M25	CA65 ²⁵		70 (40-100)			

<Recommended Chipbreaker>

Application ap (mm)	Continuous	Light Interruption	Interruption	Heavy Interruption
less than 1mm	MQ	MQ	MS	
more than 1mm	MS/MU	MS/MU		
less than 1mm	MQ	MQ	MS/MU	MS
more than 1mm	MS/MU	MS/MU		

■ Recommended Cutting Speeds

Stainless Steel Machining	Recommended Cutting Speed (Vc: m/min)		
	CA65 ¹⁵	CA65 ²⁵	PR11 ²⁵
	Continuous	Continuous / Interruption	Continuous / Interruption
Austenitic Stainless	180 (120-240)	150 (80-220)	120 (70-160)
Ferritic Stainless	190 (130-250)	160 (90-230)	130 (80-170)
Martensitic Stainless	190 (130-250)	160 (90-230)	-
Precipitation hardening Stainless	80 (50-110)	70 (40-100)	-

■ Trouble shooting

Case of troubles	Trouble shooting
Notching (breakage)	<ul style="list-style-type: none"> •Select grades with high flexural strength such as CA6525, PR1125 to lessen notching (breakage) •Select MU (MS) chipbreaker (with large rake angle, improved cutting performance and less work hardening)  <p>MS Chipbreaker MU Chipbreaker</p>
Burrs	<ul style="list-style-type: none"> •Make D.O.C. deeper than work-hardened layer from pre-process •Vary D.O.C. to disperse concentration of work-hardened layer at notched section •Increase the feed rate (higher than 0.1mm/rev), and lessen work hardening •Increase cutting edge angle to lessen concentration of load on the edge
Adhesion/Built-up edge	<ul style="list-style-type: none"> •Choose bright coating CA6515, CA6525 for surface smoothness •Select MS/MU chipbreaker with large rake angle •Increase the cutting speed, increase the coolant concentration
Crater wear	<ul style="list-style-type: none"> •Select SUS grades CA6515 and CA6525 •Select MU chipbreaker with large rake angle (to improve cutting performance and control rise in edge temperature) •Decrease the cutting speed to control the rise in edge temperature •Decrease the feed rate to reduce tool load
Chip control	<ul style="list-style-type: none"> •MS chipbreaker:First recommended chipbreaker form medium to roughing •MQ chipbreaker:Good chip control from finishing to medium  <p>MS Chipbreaker MQ Chipbreaker</p>