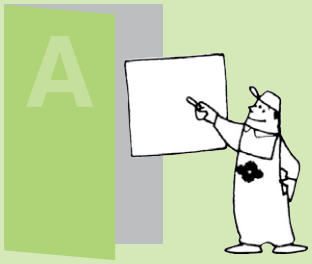
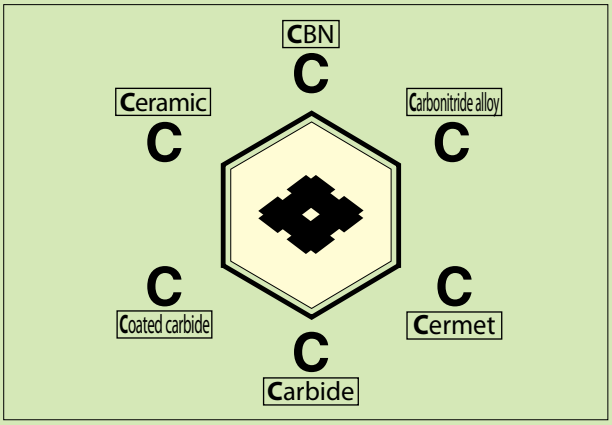
Grades A

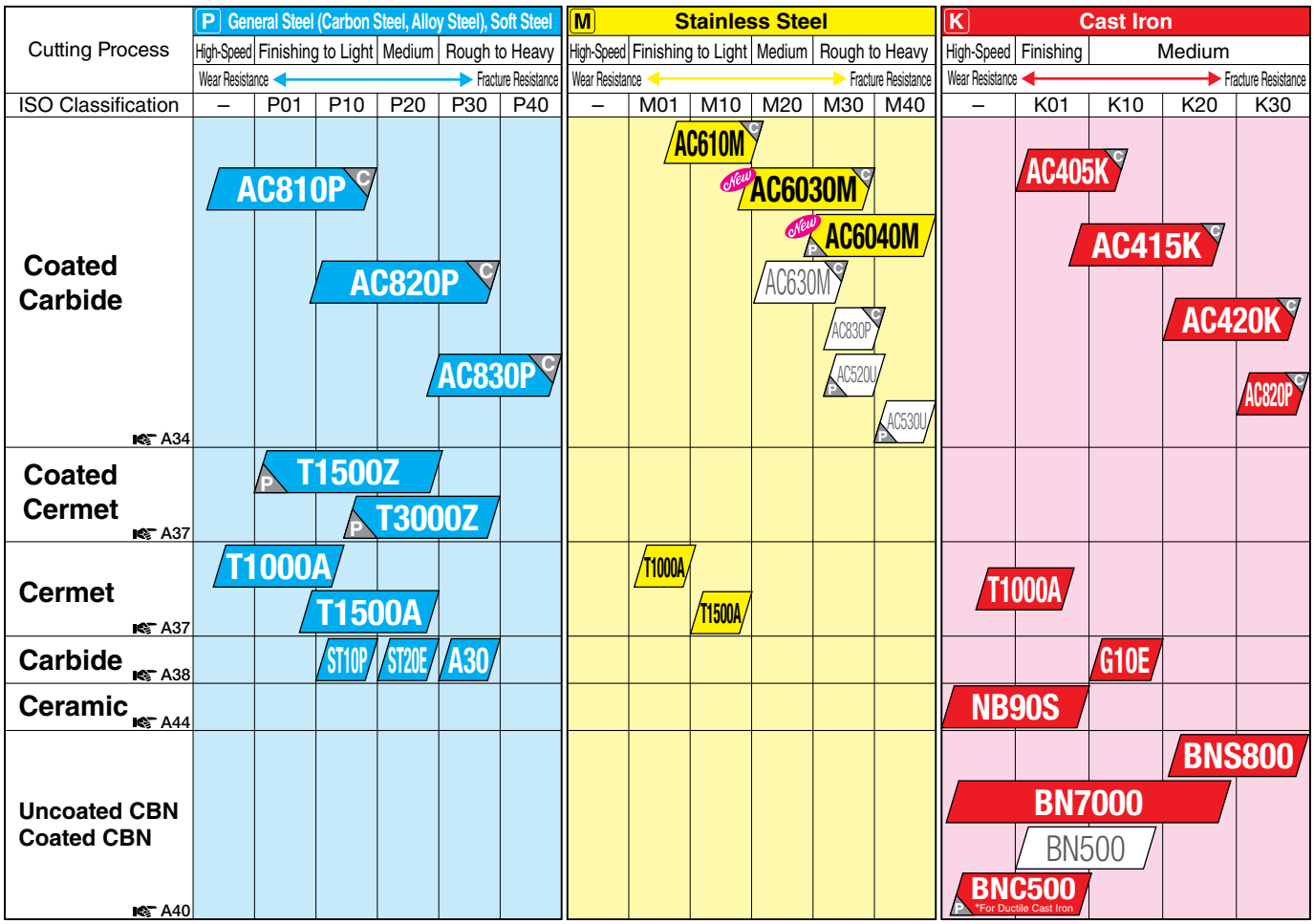
A1 to A45

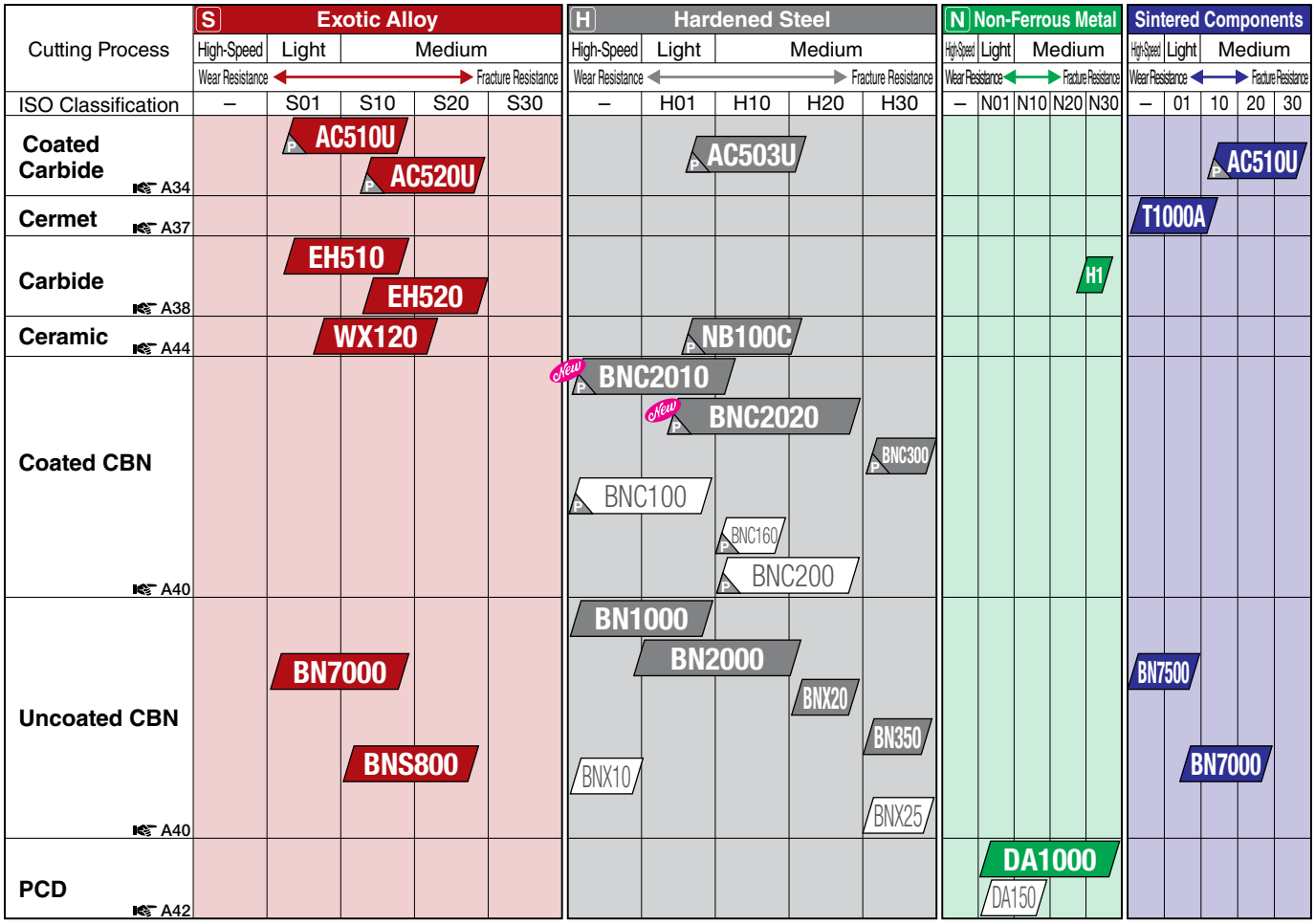




Selection of Sumitomo Grades (Turning)

Selection Guide by Work Material and Cutting Process





: 1st Recommendation : 2nd Recommendation : CVD Coating : PVD Coating Blank: Uncoated

Selection of Sumitomo Grades (Milling)

P General Steel (Carbon Steel, Alloy Steel), Soft Steel

Cutting Process	High-Speed	Finishing to Light		Medium	Rough to Heavy	
	Wear Resistance ←					→ Fracture Resistance
ISO Classification	–	P01	P10	P20	P30	P40
Coated Carbide (A34)		ACP100				
			ACP200			
					ACP300	
Cermet (A37)		T250A				
				T4500A		
Carbide (A38)				A30N		
Ceramic (A44)						
Uncoated CBN Coated CBN (A40)						

M Stainless Steel

Cutting Process	High-Speed	Finishing to Light		Medium	Rough to Heavy	
	Wear Resistance ←					→ Fracture Resistance
ISO Classification	–	M01	M10	M20	M30	M40
Coated Carbide (A34)		New ACM100				
			New ACM200			
				New ACM300		
			ACK300			
			ACP300			
Cermet (A37)			T250A			
				T4500A		
Carbide (A38)					A30N	
Ceramic (A44)						
Uncoated CBN Coated CBN (A40)						

K Cast Iron

Cutting Process	High-Speed	Finishing	Medium		
	Wear Resistance ←				→ Fracture Resistance
ISO Classification	–	K01	K10	K20	K30
Coated Carbide (A34)				ACK200	
					ACK300
Cermet (A37)					
Carbide (A38)			G10E		
Ceramic (A44)	NB90M				
Uncoated CBN Coated CBN (A40)					BNS800
			BN7000		

S Exotic Alloy

Cutting Process	High-Speed	Finishing to Light		Medium	Rough to Heavy	
	Wear Resistance ←					→ Fracture Resistance
ISO Classification	–	S01	S10	S20	S30	S40
Coated Carbide (A34)		New ACM100				
			New ACM200			
				New ACM300		
		ACK300				
Carbide (A38)			EH520			
Uncoated CBN (A40)						
PCD (A42)						

H Hardened Steel

Cutting Process	High-Speed	Light	Medium		
	Wear Resistance ←				→ Fracture Resistance
ISO Classification	–	H01	H10	H20	H30
Coated Carbide (A34)					
Carbide (A38)					
Uncoated CBN (A40)			BN7000		
		BN350			
PCD (A42)					

N Non-Ferrous Metal

Cutting Process	High-Speed	Light	Medium		
	Wear Resistance ←				→ Fracture Resistance
ISO Classification	–	N01	N10	N20	N30
Coated Carbide (A34)			DL1000		
Carbide (A38)				H1	
Uncoated CBN (A40)					
PCD (A42)	DA1000				

1st Recommendation / 2nd Recommendation ▽: CVD Coating △: PVD Coating Blank: Uncoated

Grade Comparison Chart

■ Coated

Application	Classification	Grade	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Hitachi	Sandvik	Kennametal	Dijet	Valenite	SECO Tools	WALTER	ISCAR
Turning	P Steel	P05	**AC810P**	UE6105	T9105	CA510 CA5505	HG8010	GC4205	KCP05 KC9105	JC110V	VP5515 VP1510	TP0500	WPP05	IC8005 IC428
		P10	**AC810P** **AC820P**	UE6110	T9115	CA515 CA5515	HG8010	GC4315 GC4215	KCP10 KC9110	JC110V JC215V	SV310 SV315 SV515	TP1500	WPP10S WPP10	IC8150 IC9015
		P20	**AC820P**	MC6025 UE6020	T9125	CA525 CA5525	IP2000 HG8025 GM25	GC4325 GC4225	KCP25 KC9125	JC215V	SV315 SV325 VP5525	TP2500	WPP20S WPP20	IC8250 IC9015
		P30	**AC830P** **AC630M**	UE6035 VP15TF	T9135	CA530 CA5535	IP3000 GM8035	GC4235	KCP30 KC9140	JC215V JC325V	VP5535 SV325 SV230	TP3500	WPP30S WPP30	IC8350 IC8025
		P40	**AC830P** **AC630M**	UE6035 UH6400	T9135	PR660	IP3000 GM8035	GC4235	KC9140	JC325V JC450V	SV235 V1N VP5535	TP3500	WTN53	IC8350 IC8025
	M Stainless Steel	M10 S10	**AC610M** **AC510U**	MC7015 US7020 MP9005 US905 VP05RT VP10RT	T9115 AH110 AH905	CA6515 PR915 PR1025 PR1215 PR1225	IP050S IP100S	GC2015 GC1105 GC1115	KCM15 KC5510 KCU10	JC605X JC5003 JC110V	SV310 SV315 VC929	TP1500 TS2000	WSM10	IC807 IC8025 IC907
	M Stainless Steel S Exotic Alloy	M20 S20	**AC6030M** **AC610M** **AC520U**	MC7025 US7020 MP9015 VP20MF UP20M	T6120 T6020 T9125 AH630 AH120 AH725	CA6525 PR915 PR930 PR1025 PR1125 PR1215 PR1225	IP100S HG8025	GC2025 GC1125	KCM25 KC5525 KCU25 KC5020	JC110V JC5015 JC8015 JC525X	VPS525 VC901 SV230	TP2500 TM2000 TS2500	WSM20 WMP20S	IC808 IC8080 IC908
	S Exotic Alloy	M30	**AC6030M** **AC6040M** **AC630M** **AC830P** **AC530U**	MC7025 MC7035 US735 VP15TF VP20MF	AH725 T6130 T6030 AH630 AH645	CA6525 PR1125	GM8035 GX30	GC2035	KCM35 KC9240	JC5015 JC8015 JC525X	VC901 V1N	TP3500 TM4000	WSM30	IC8080 IC830
		M40	**AC6040M** **AC530U**	MC7035 US735 VP15TF	AH645	PR1125	GX30	GC235			V1N	TM4000		IC830 IC928
	K Cast Iron	K05	**AC405K**	MC5005 UC5105 UC5115	T5105 T5115	CA4505 CA4010	HG3305 HX3305	GC3205	KCK05	JC105V JC050W	SV405 SV510	TK1000 TK1001	WAK10 WKK10S	IC5005
		K10	**AC415K**	MC5005 MC5015 UC5105 UC5115	T5115 T5125	CA4505 CA4515 CA4115	HX3305 HG3305 HG3315 HX3315	GC3210	KCK15	JC105V	SV410 SV515	TK1000 TK1001	WAK10 WAK20 WKK10S WKK20S	IC5010 IC5100
		K20	**AC420K**	MC5015 UC5115 VP15TF UE6110	T5125 T9125	CA4515 CA4120 CA4115	HX3315 HG3315 HG8010	GC3215	KCK20	JC215V	SV415 SV515	TK2000 TK2001	WAK20 WAK30 WKK20S	IC8150
Milling	P Steel	P10	**ACP100**	FH7020 F7030	T3130 T3030		JP4005 JP4020	GC4220 GC4230	KC715M KC930M KC935M	JC8003 JC730	V1N	T250M T350M MP1500 MP2500	WKP25 WKP25S WPP20 WKP35S	IC4100 IC520M IC4050 DT7150
		P20	**ACP200**	VP15TF VP20RT	AH9030 AH120 AH725	PR1525 PR1225 PR830	JS4045 GX2140	GC1010 GC1025 GC2040 GC4240	KTPK20 KCPM20	JC6235 JC5040 JC8015 JC5015 JC5118	VC935	MP3000 F25M F30M	WSM20	IC808 IC810 IC380
		P30	**ACP300**	VP30RT	AH3035 AH130 AH140 SH730	PR1525 PR1230	JS4060 JX1045 JX1060 CY150 CY250	GC1030 GC2030	KCPK30 KCMP30 KC725 KC730 KC735	JC5040 JC8050		MM4500 F40M	WSM30 WSM35 WSP45S WSP45	IC830 IC928 IC330
	M Stainless Steel	M10	**ACM100** **ACK300**			PR1025 PR1225	JX1020 CY9020 JP4020	GC1025 GC1030	KC522M					
		M20	**ACM200**	F7030 VP15TF VP20RT	GH330 AH330 AH120 AH130	PR1525 PR1025 PR1225	JX1015 CY150 CY15	GC2030	KC730M KC525M	JC5015 JC5030 JC5040		F25M F30M	WSM35 WXM35	IC908 IC928
		M30	**ACM300**	F7030 VP30RT MP7030	AH130 AH140	CA6535 PR1535	JX1045 JX1060 GX2160	GC2040	KC994M KC725M	JC5015 JC5030 JC5040	VC935	F30M F40M	WSM35 WXM35	IC328 IC330 IC830
	K Cast Iron	K20	**ACK200**	MC5020 F5010 F5020	T1115	PR905	JP4020	GC3220 GC3020 GC3040 K15W K20D K20W	KCK15 KCK20 KC915M KC930M KC935M	JV608X JC600 JC605W JC610 JC8003	VN5	MK1500 MK3000 T150M	WAK15 WKK25 WKP25S	IC5100 DT7150
		K30	**ACK300**	VP15TF VP20RT	AH725 AH120 AH110 AH330 GH110 GH130	PR1510 PR1210	GX2140 JS4045 JX1045 CY150 CY250	GC1010 GC1020 GC1025 GC1030	KTPK20 KCPK30 KC510M KC520M KC525M	JC6235 JC5003 JC5015 JC5080 JC8015	VC928	MK2050 MK2000 MH1000	WKP35S WPP20	IC830 IC810 IC908 IC910 IC928 IC950

Grade Comparison Chart

■ Cermet

Application	Classification	Grade	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Hitachi	Sandvik	Kennametal	Dijet	Valenite	SECO Tools	WALTER	ISCAR
Turning	P Steel	P10	**T1000A T110A**	AP25N★ NX2525	GT720★ NS520	TN30 PV30★ TN6010 PV7010★	CZ25★	CT5015	KT125 HTX KT1120	LN10 CX50	VC605			IC20N IC520N
		P20	**T1500A T1500Z★ T2000Z★**	AP25N★ NX2525 NX3035	NS530 GT530★ NS730 GT730★ NS9530 GT9530★	TN60 TN6020 PV60★ PV7020★ PV7025★	CH550	GC1525★	KT6215 KT315★ KT175 KT5020★	CX50 CX75	VC610	CM CMP C15M TP1020		IC30N IC530N
		P30	**T3000Z★**	NX3035 MP3025★		PV7025★ PV90★				CX90 CX99				
	K Cast Iron	K10	**T1000A T110A**	AP25N★ NX2525	GT720★ NS520	TN30 PV30★ TN6010 PV7005★ PV7010★		CT5015	KT125 HTX	LN10 CX50	VC605			
Milling	P Steel		**T250A T4500A**	NX4545 VP45N★	NS540 NS740	TC60M TN100M	MZ1000★ MZ2000★ MZ3000★	CT530	KT530M★	CX90	VC630	C15M		IC30N

★ Coated Cermet Inserts

■ Carbide

Classification	Grade	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Hitachi	Sandvik	Kennametal	Dijet	SECO Tools	ISCAR
P Steel	P10	**ST10P**				WS10	S1P		SRT		
	P20	**ST20E**	UTi20T	UX30		EX35	SMA	K125M	SR20		IC07 IC50M
	P30	**A30 A30N**	UTi20T	UX30	PW30	EX40	SM30		DX30		IC54 IC28
	P40	**ST40E**				EX45	S6		SR30		IC54 IC28
M Stainless Steel	M10	**U10E EH510**				WA10B	H10A	KU10,K313 K68,KYSM10	UMN	890	IC07,IC20 IC08
	M20	**U2 EH520**	UTi20T	UX30			H13A	K313 K68	DX25 UMS	HX 883	IC07,IC20 IC08
	M30	**A30 A30N**	UTi20T	UX30			H10F SM30		UMS UM40		IC28
K Cast Iron	K01	**H2 H1**	HTi05T			WH01 WH05		KU10,K313 K68,K115M	KG03		IB50,IB85 IS8
	K10	**H1 EH10 EH510**	HTi10	TH10	KW10 GW15	WH10	H13A	KU10,K313 K68,K115M K110M KY3500	KG10 KT9 CR1	890	IB50,IB85 IB55,IB90 IC20,IS8
	K20	**G10E EH20 EH520**	UTi20T	UX30	GW25	WH20	H13A	KMF KY3500 KYHS10	KT9 CR1 KG20	890 883 HX	IC20 IS8
	K30	**G10E**	UTi20T			WH30		KY3500	KG30	883	
S Exotic Alloy	—	**EH510 EH520**	RT9005 RT9010 MT9015 TF15	TH10 KS20	SW05,SW10 SW25,KW10 GW15	WH10	H10A H10F H13A	KU10,K313 K68,KMF K110M,KYHS10 K1025(KMF)	KG10 KG20	HX H25	ID5,IB85 IC20,IC07 IC08,IC28
Fine-grained Carbide		**F0**	SF10,MF07 MF10	F,MD1508 MD08F		NM08			FB05,FB10 FZ05		IC07
		F1,AFU XF1	HTi10 MF20	M,MD10 MD05F,MD07F	FW30	NM15	6UF,8UF PN90,H6FF		FZ10,FB15 FZ15	890	IC07
		AF0,AF1 SF2	TF15 MF30	EM10,MD20 MD15		BRM20 EF20N	12UF		FB20,FZ15 FB15	890 883	IC08
		A1		UM		NM25	N6F H10F		FZ20 FB20	883	IC08

■ Ceramic

Classification	Sumitomo Electric	Tungaloy	Kyocera	Sandvik	Kennametal	Dijet	Nippon Tungsten	NTK
H Hardened Steel	**NB100C**	WG300 LX11	A66N A65 KT66	GC6050 CC650 CC670	KY1615 KY4300	CA100	NPC-A2 WIN	HC4,HC7 ZC7,WA1
S Exotic Alloy	**WX120**	WG300	CF1	CC6060 CC6065 CC670	KY4300 KY1540	CA200	WHISKAL	WA1 SX9
K Cast Iron	**NB90S NB90M**	LX11,LX21 CXC73,FX105 CX710	A65,A66N KA30,KS500 KS6000,KT66	CC620,CC650 CC6090 GC1690	KY1615,KY1310 KY1320,KY3500 KY4300	CA010 CS100	NAICON-NXA NAICON-NX	HC1,HW2,HC2,HC6 HC7,WA1,SX1,SX2 SP2,SX9,SX8

(Note) The data on pages A4 and A5 was collected from the various published catalogues therefore the information may not be updated.

Grade Comparison Chart

■ CBN

Classification	Grade	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Hitachi	Sandvik	Kennametal	Dijet	SECO Tools
K Cast Iron	K01	**BNC500* BN7000 BN500**	MB710	BX930 BX870 BX910	KBN60M		CB7525 CB7925	KB1340	JBN795	
	K10	**BN7000 BN500**	MB710 MB730	BX950	KBN900	BH200	CB7525 CB7925		JBN330	CBN200,CBN300 CBN300P,CBN400C
	K20	**BN7000 BNS800**	MBS140	BXC90 BX90S	KBN900	BH250				CBN200,CBN300 CBN300P,CBN400C
	K30	**BNS800**		BXC90 BX90S				KB5630		CBN500
N Non-Ferrous Metal	N01	**BN700 BN7000**								
S Exotic Alloy	S01	**BN7000**	MB730	BX470 BX480 BX950	KBN65M KBN70M			KB5630 KB1340		
H Hardened Steel	H01	**BNC2010 BNC2020 BNC100 BN1000 BN2000 BNX10**	MBC010 MB810	BXM10 BX310	KBN05M PT600M	BH100		KB5610		CBN10 CBN100 CBN060K
	H10	**BNC2010 BNC2020 BNC160 BNC200 BN2000**	MBC020 BC8020 MB820	BXM20 BX330	KBN25M	BH150	CB7015	KB5610 KB5625	JBN300	CBN10,CBN100 CBN150,CBN060K CBN160C
	H20	**BNC2020 BNC200 BNX20**	MBC020 BC8020 MB825	BXC50 BX360	KBN35M KBN900	BH250	CB7025 CB20	KB5625 KB5630	JBN245	CBN150 CBN160C
	H30	**BNC300 BN350 BNX25**	MB835 BC8020	BX380			CB7525	KB5630		

* For cutting ductile cast iron

■ Polycrystalline Diamond

Classification	Grade	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Sandvik	Kennametal	Dijet	SECO Tools
N Non-Ferrous Metal	N01	**DA1000 DA150**	MD205	DX180 DX160	KPD001	CD05 CD10	KD1400	JDA30 JDA735	
	N10	**DA1000 DA150**	MD205 MD220	DX140	KPD001 KPD010 KPD230	CD1810	KD1400 KD1425		PCD05 PCD10
	N20	**DA1000**	MD220 MD230	DX120	KPD230		KD1400 KD1425	JDA10 JDA715	PCD05 PCD20
	N30	**DA1000**	MD230	DX110			KD1400		PCD05 PCD30 PCD30M

(Note) The above data was collected from the various published catalogues therefore the information may not be updated.

■ Negative

Classification	Application	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Hitachi	Sandvik	Kennametal	SECO Tools	WALTER	ISCAR
P Steel	Fine Finishing	**FA**	FH	TF	GP		QF	FF	FF1		SF
		FL	FS,FY	NS,ZF	XP,XF	FE				FP5	
	Finishing	**LU**	SA,SY	SS,NM	XQ,CQ	BE	LC	FN		NF3	
		SU	SH	TS,TSF,11	PP,HQ	CE,B,BH	XF,MF		MF2		NF,TF
	Wiper Edge	**LUW**		AFW	WP		WL,WP				
		SEW	SW	ASW	WQ		WF,WMX	FW	W-MF2	NF	WF
	Finishing to Light	**SE,SX**	LP	AS,ZM,27	CJ,XS	AB,CT	PF,KF	LF	MF5	MP3,NS6	F3P
	Medium	**GU**(UG)	MA,MV	TM,37	HS,PS	AH	XM,QM	P,MG	M3		HT,M4M,GN
		GE,UX	MH,MP	DM,CM	PQ,CS,GS,PT	AE,AY	PM,SM,KM	MN		MP5,NM4,NM6	
	Wiper Edge	**GUW**	MW				WM	MW	W-M3	NM	HTW,M4MW,WG
	Rough	**MU,ME**	RP,GH	TH	HT,GT,PH	RE,AR	MG-PR,XMR,KR	RP	M5,MR7	RP5,NM7,NM9	M3P,NR
		MX	HAS,MT	CH				RN			
	Heavy	**HG**	HA,HZ,HX,HBS	THS,TU,57	PX,HX	TE,UE	MM-PR,QR	RM,MR	R4,R5,R6	NR6,NRF	NM,HR
		HP	HH,HXD	65			HR,SR	RH	R7	NR8	
		HU,HW	HV,HDS			H					
		HF	HCS	TUS		HX,HE	MR		RR9	NRR	R3P,T3P
M Stainless Steel	Finishing	**SU,EF**	LM,SH	SS	MQ,GU	SE,MP	MF	FP,FS,LF	MF2	NF4	
	Light to Medium	**EX,EG**	GM,MS	SF,SA	SU,MS,MU	PV	23	MS	MF1,M1		TF,VL
	Medium	**GU**	MM	SM	HU	DE	MM	MP	MF3,M3	NM4	M3M,PP
	Rough	**HM**	ES,1M,2M	S	ST					NR4	
		EM,MU	RM,GH	SH	TK		MR		M5,MR3		MR,MH
K Cast Iron	Light	**UZ**	LK,MA,MK,SW	CM,CF	Standard	V,VA	KF	UN	M5	NM5	GN
	Medium	**GZ**(UX)	GK,RK,GH,MW	Standard,CH,33	ZS,GC	Y,RE	KM,KR	UM	MR7		
N Non-Ferrous Metal	Finishing	**AX**		P	A3,AH			MS,GP			
S Exotic Alloy	Finishing	**EF**	LS,FJ				SF			NFT	
	Medium	**EG,EX**	MS,MJ	HMM,SA			SM			NMT	
	Rough	**MU**	RS,GJ				SMR			NRT	
H Hardened Steel	Finishing	**GH,FV**★									
	Light	**LV**★									
	Carburized Layer Removal	**SV**★									

( ) indicates a discontinued item. ★ Sintered body chipbreakers

■ Positive

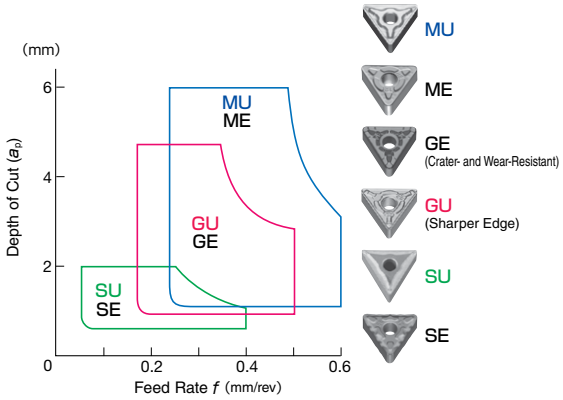
Classification	Application	Sumitomo Electric	Mitsubishi	Tungaloy	Kyocera	Hitachi	Sandvik	Kennametal	SECO Tools	WALTER	ISCAR
P Steel	Finishing	**FC**	FJ,AM	01	CF,GF		UM		GT-F1	PF5	
		FB,LU(FP,FK)	FP,FM,FV,SQ	PSF,PF,23,SS,JSS	GP,XP	JQ,MP	PF,UF,MF,KF	11,UF	FF1	PF4	PF
	Wiper Edge	**LUW**	SW				WF	FW	W-F1	PF	WF
M Stainless Steel		**SDW**					WK				
	Finishing to Light	**SI**	SMG	JS	CK						
K Cast Iron	Light	**LB,SU**(SK,SF)	LP,LM,SV,MQ	PSS,PS,24,TS,TJS	HQ,XQ,GK	JE	PM,UM,MM	LF	F1	PS5	SM,14
		SC			MF,GQ						
	Light to Medium	**MU**	MP,MM,MK,MV	PM			PR,UR,MR,KR	MF	F2	PM5	17,19
N Non-Ferrous Metal	Finishing	**AG,AW,AY**	AZ	AL,PP	AH,A3		AL	HP	AL	PM2	AS,AF
	Finishing to Light	**LD**★**,GD**★									
H Hardened Steel	Finishing	**FV**★									
	Light	**LV**★									

( ) indicates a discontinued item. ★ Sintered body chipbreakers

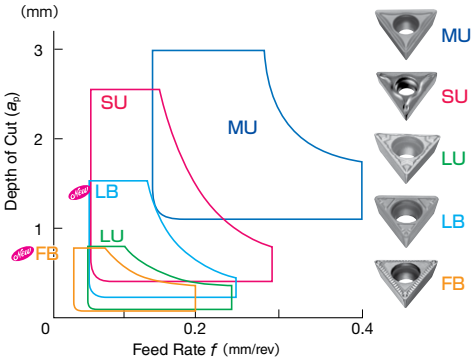
(Note) The above data was collected from the various published catalogues therefore the information may not be updated.

Main Chipbreakers

Negative Type

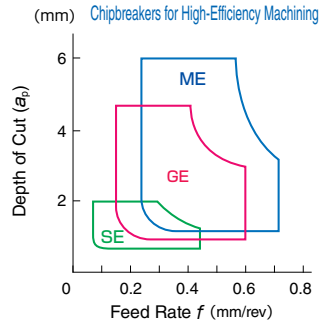


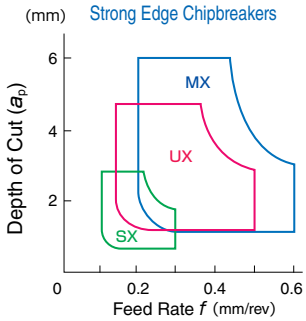
Positive Type

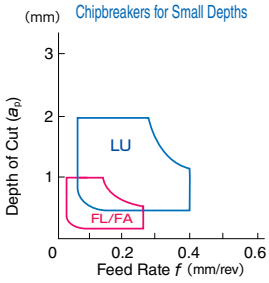


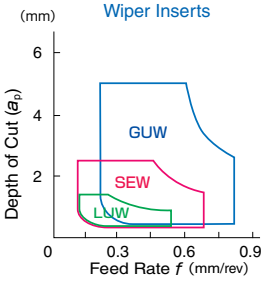
Sub-Chipbreakers

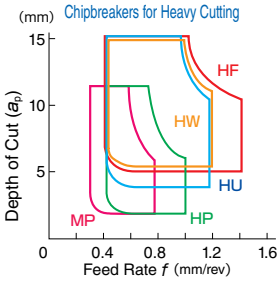
Negative Type





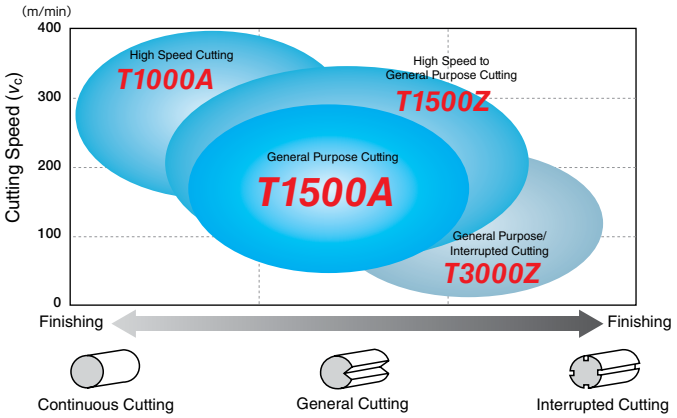




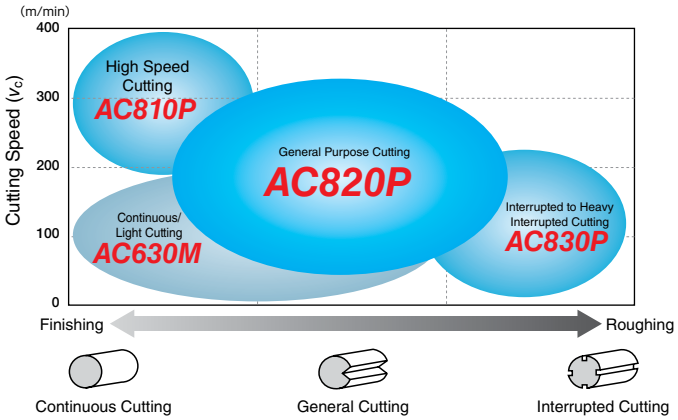


Grades

● Fine Finishing To Finishing



● Finishing to Rough Cutting



P Steel Recommended Cutting Conditions

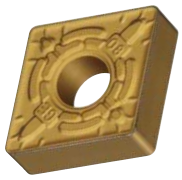
(Red text indicates 1st recommendation.)

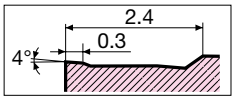
Work Material	Cutting Process	Chipbreaker	Grade	Cutting Conditions (Min. - Optimum - Max.)		
				Depth of Cut a_p(mm)	Feed Rate f(mm/rev)	Cutting Speed V_c(m/min)
Soft Steel	Fine Finishing	FL	**T1500Z**	0.2-**0.6**-1.0	0.05-**0.15**-0.25	100-**250**-400
	Finishing	LU	**AC810P**	0.5-**1.0**-1.5	0.1-**0.25**-0.4	260-**340**-420
	Medium	**GU**	**AC820P**	1.0-**2.5**-4.0	0.2-**0.35**-0.5	200-**260**-320
	Rough	MU	**AC830P**	2.0-**4.0**-6.0	0.3-**0.45**-0.6	140-**180**-220
Medium Carbon Steel	Fine Finishing	FL	**T1500Z**	0.2-**0.6**-1.0	0.05-**0.15**-0.25	100-**200**-300
	Finishing	LU	**AC810P**	0.5-**1.0**-1.5	0.1-**0.25**-0.4	210-**275**-340
	Medium	**GU**	**AC820P**	1.0-**2.5**-4.0	0.2-**0.35**-0.5	150-**190**-230
	Rough	MU	**AC830P**	2.0-**4.0**-6.0	0.3-**0.45**-0.6	110-**135**-160
High Carbon Steel	Fine Finishing	FL	**T1500Z**	0.2-**0.6**-1.0	0.05-**0.15**-0.25	50-**150**-250
	Finishing	LU	**AC810P**	0.5-**1.0**-1.5	0.1-**0.25**-0.4	170-**225**-280
	Medium	**GU**	**AC820P**	1.0-**2.5**-4.0	0.2-**0.35**-0.5	130-**165**-200
	Rough	MU	**AC830P**	2.0-**4.0**-6.0	0.3-**0.45**-0.6	90-**120**-150

Breaker

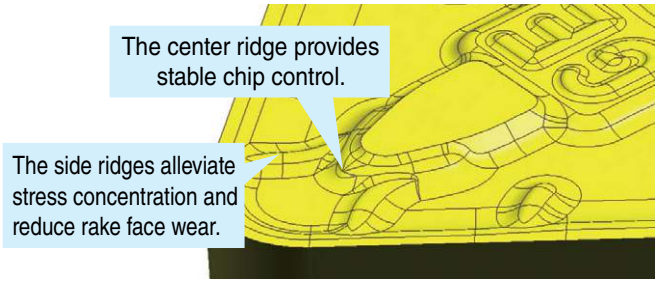
General Purpose GE Type Chipbreaker

Achieves high efficiency and longer tool life with reduced rake face wear.
Delivers stable chip control from shallow cutting depths onwards.



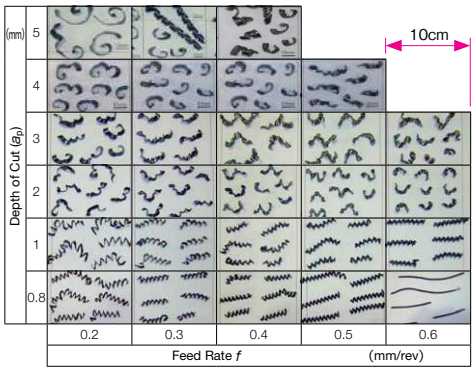


Cross Section of Chipbreaker



GE Type Chip Control

Work Material:SCM415 Cutting Conditions:v_c=200m/min Dry



Wear Resistance

Work Material:SCM435 Cutting Conditions:v_c=250m/min f=0.4mm/rev a_p=2.0mm

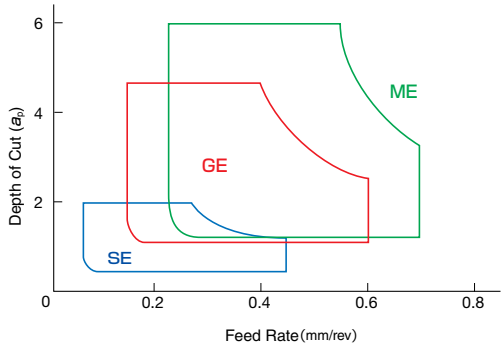

GE Type Chipbreaker

Conventional Chipbreaker

Reduces rake face wear (crater wear and chipbreaker wear). Achieves longer tool life and reduces machining costs.

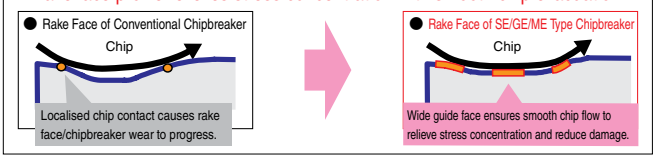
Shared Features of the High Efficiency Chipbreaker Series

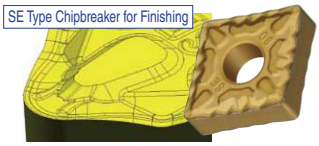
Application Range



Characteristics

Rake face profile relieves stress concentration with smooth chip evacuation





Grades

High Speed Cutting General Purpose Cutting Interrupted Cutting

AC810P / AC820P / AC830P

AC800P Series covers a wide range of machining applications from high speed to interrupted cutting.

- All grades feature Super FF Coat, which has excellent wear and chipping resistance.
- Versatile GE Type chipbreaker suited to high-feed applications. High efficiency, long tool life.

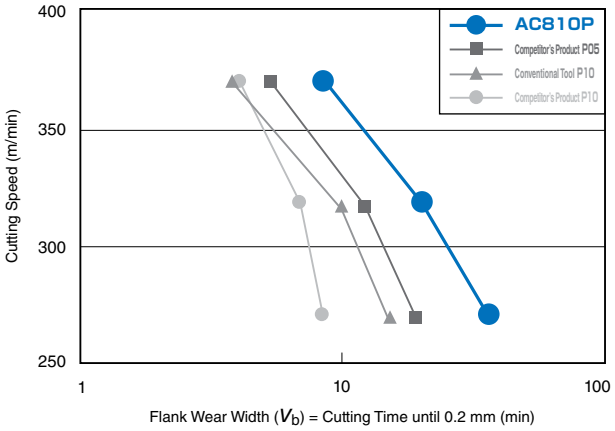
AC810P : In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a tough, thick Alumina coating enhanced by newly developed grain growth control technology, excellent wear resistance and long tool life in high-speed, high-feed cutting.

AC820P : In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a high-density structured FF-Al_2O_3 layer using new smooth surface treatment technology, and also employs coating thickness control technology to achieve excellent versatility, stability, and long tool life.

AC830P : In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a strengthened FF-Al_2O_3 layer using new stress control technology, and moreover provides excellent reliability and wear- resistance in heavy interrupted cutting to achieve long tool life.

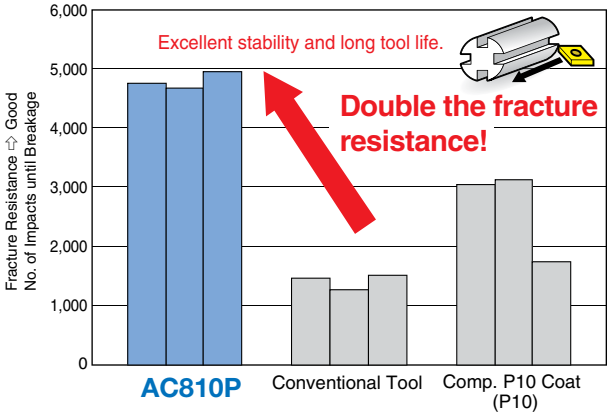
AC810P Cutting Performance

● **Continuous Cutting** (V-T chart)



Work Material: SCM435 (Continuous) Insert: CNMG120408N-GU
Cutting Conditions: v_c=270 to 370m/min f=0.3mm/rev a_p=1.5mm Wet

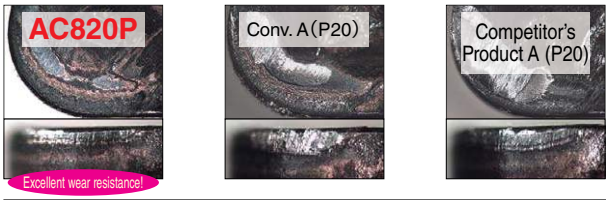
● **Interrupted Cutting**



Work Material: SCM435 (Interrupted) Insert: CNMG120408N-GU
Cutting Conditions: v_c=330 to 350m/min f=0.19 to 0.22mm/rev a_p=1.5mm Wet

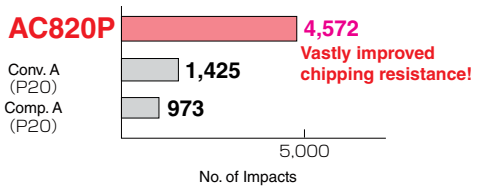
AC820P Cutting Performance

● Continuous Cutting



Work Material: S45C (Continuous) Insert: CNMG120408N-GE
Cutting Conditions: v_c=270m/min f=0.4mm/rev a_p=1.2mm Wet T=21min

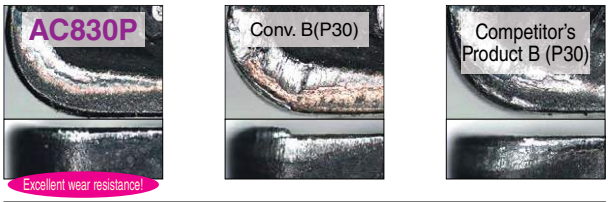
● Interrupted Cutting



Work Material: SCM435 (Interrupted) Insert: CNMG120408N-GE
Cutting Conditions: v_c=350m/min f =0.2mm/rev a_p=1.5mm Wet

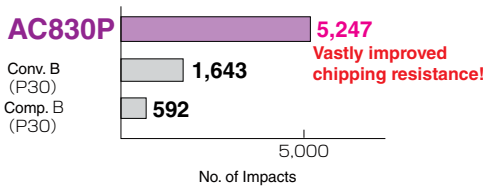
AC830P Cutting Performance

● Continuous Cutting



Work Material: SCM435 (Continuous) Insert: CNMG120408N-GU
Cutting Conditions: v_c=240m/min f=0.3mm/rev a_p=1.5mm Wet T=18min

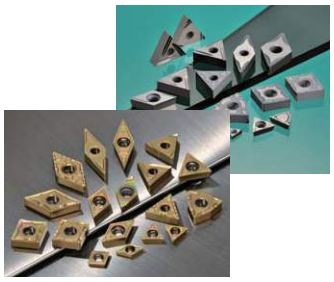
● Interrupted Cutting



Work Material: SCM435 (Interrupted) Insert: CNMG120408N-GU
Cutting Conditions: v_c=250m/min f =0.24mm/rev a_p=1.5mm Wet

Grades

Uncoated Cermet **T1000A / T1500A** / Coated Cermet **T1500Z**



T1000A : A high hardness cermet that combines excellent wear resistance and toughness. Achieves high tolerances in continuous cutting of steel and finishing of powdered metal and cast iron.

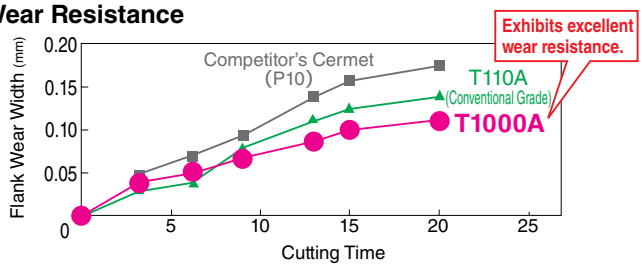
T1500A : A general purpose cermet made from hard grains with different grain sizes and functionality that provides a good balance of wear resistance and toughness. Also achieves good surface finish.

T1500Z : Employs Brilliant Coat PVD coating with excellent lubricity to provide better wear resistance and stable finished surfaces in low-cutting-speed applications such as those involving small workpieces or low carbon steel.

Performance

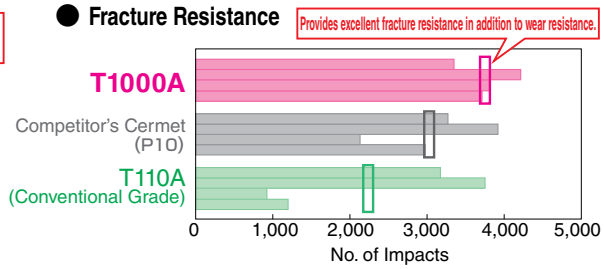
T1000A Performance

Wear Resistance



Work Material : SCM435 Insert : CNMG120408N-SU
Cutting Conditions: v_c=320m/min f=0.20mm/rev a_p=1.5mm Dry

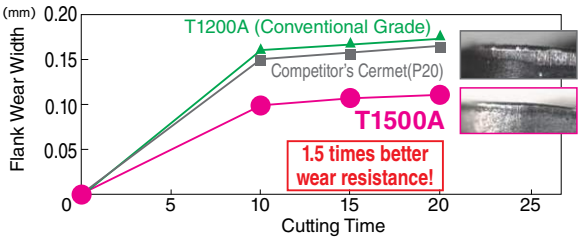
Fracture Resistance



Work Material : SCM435 Insert : CNMG120408N-SU
Cutting Conditions: v_c=230m/min f=0.20mm/rev a_p=1.0mm Wet

T1500A Performance

Wear Resistance



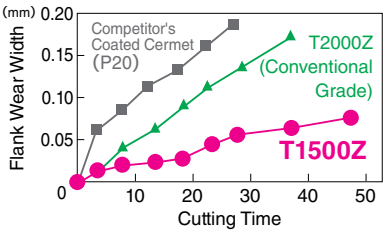
Work Material : SCM435 Insert : CNMG120408N-SU
Cutting Conditions: v_c=230m/min f=0.20mm/rev a_p=1.0mm Wet

Machined Surface Finish

Work Material : S45C Insert : DNMG150404N-LU
Cutting Conditions: v_c=150m/min f=0.12mm/rev a_p=0.1mm Wet

T1500Z Performance

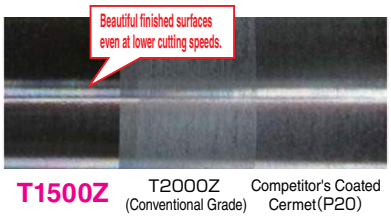
Wear Resistance



Work Material : SCM435 Insert : CNMG120408N-SU
Cutting Conditions: v_c=230m/min f=0.20mm/rev a_p=1.0mm Wet

Machined Surface Finish

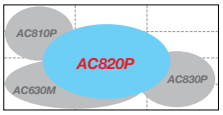
Work Material : SNCM220H Insert : DNMG150408N-SU
Cutting Conditions: v_c=150m/min f=0.20mm/rev a_p=1.0mm Wet



Work Material : STKM13A Insert : CNMG120408N-SU
Cutting Conditions: v_c=100m/min f=0.15mm/rev a_p=1.0mm Wet

Recommended Cutting Conditions

Work Material	Cutting Process	Chipbreaker	Grades	Cutting Conditions (Min. - Optimum - Max.)		
				Depth of Cut a_p(mm)	Feed Rate f (mm/rev)	Cutting Speed V_c(m/min)
Soft Steel (SS41 and others)	Fine Finishing	FA/FL	T1500Z	0.2-**0.5**-1.0	0.05-**0.15**-0.25	150-**280**-400
	Finishing	LU	T3000Z	0.3-**1.0**-1.8	0.08-**0.20**-0.35	150-**280**-400
Alloy Steel Carbon Steel (S45C, SCM435, and others)	Fine Finishing	FA/FL	T1500A	0.2-**0.5**-1.0	0.05-**0.15**-0.25	100-**200**-300
	Finishing	SU/SE	T1500A	0.5-**1.0**-2.0	0.08-**0.20**-0.35	100-**200**-300
	Medium	GU	T1500Z	0.8-**2.2**-4.0	0.15-**0.25**-0.50	100-**200**-300
High Carbon Steel Carbon Steel (SCM440H and others)	Fine Finishing	FA/FL	T1000A	0.2-**0.5**-1.0	0.05-**0.15**-0.25	50-**150**-250
	Finishing	SU/SE	T1500Z	0.5-**1.0**-2.0	0.08-**0.20**-0.35	50-**150**-250
	Medium	GU	T1500Z	0.8-**2.2**-4.0	0.15-**0.25**-0.50	50-**150**-250

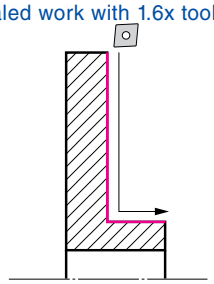


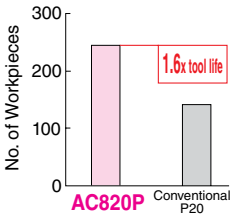
Application Examples

AC820P

S48C Turbine Hub

Good stability and wear resistance in rough cutting of mill-scaled work with 1.6x tool life.

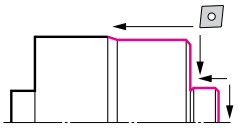


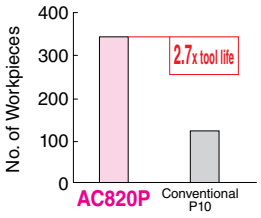


Insert: CNMG120408N-GE (AC820P)
Cutting Conditions: v_c=210m/min f=0.3mm/rev a_p=1.0mm Wet

SCr420H Output Shaft

Good wear resistance in high-speed conditions and 2.7x tool life.

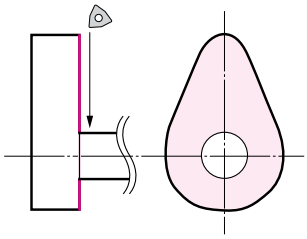


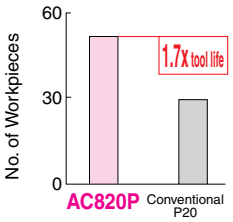


Insert: CNMG120408N-SX (AC820P)
Cutting Conditions: v_c= up to 400m/min f=0.25mm/rev a_p=0.5 to 1.2mm Wet

SCM435 Balancer

High reliability in interrupted cutting with 1.7x tool life.

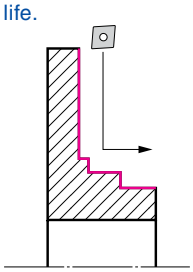


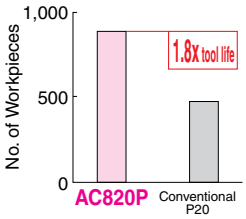


Insert: WNMG080408N-GU (AC820P)
Cutting Conditions: v_c=220m/min f=0.18mm/rev a_p=10mm Wet

SCM415 Turbine Hub

Low alloy steel and good finishing. Stable cutting with 1.8x tool life.

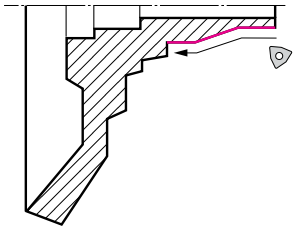


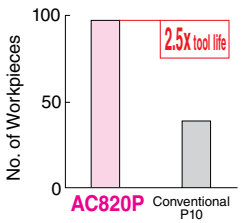


Insert: CNMG120408N-GU (AC820P)
Cutting Conditions: v_c=200m/min f=0.25mm/rev a_p=2.0mm Wet

S48C Compact Knuckle

No sudden breakages and significantly improved stability with 2.5x tool life.

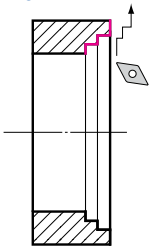


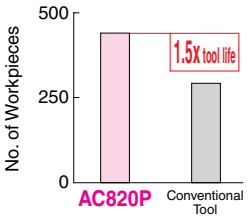


Insert: WNMG080412N-LU (AC820P)
Cutting Conditions: v_c=192m/min f=0.45mm/rev a_p=1.0 to 2.0mm Wet

S45C Ring

Good wear resistance in rough cutting of mill-scaled work and 1.5x tool life.

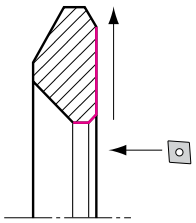


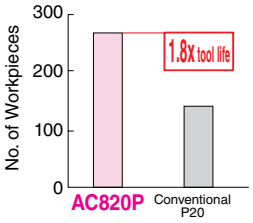


Insert: DNMG150412N-SX (AC820P)
Cutting Conditions: v_c=200m/min f=0.15-0.35mm/rev a_p=1.0 to 2.0mm Wet

SCM425 Gear

Good wear resistance in high-feed conditions with 1.8x tool life.

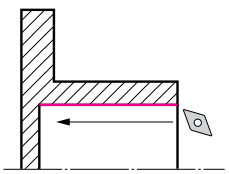


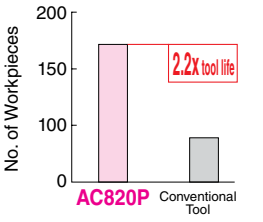


Insert: CNMG120408N-MU (AC820P)
Cutting Conditions: v_c=220m/min f=0.5mm/rev a_p=5mm Wet

S35C Carrier Flange

Positive type with good wear resistance and 2.2x tool life.





Insert: DCMT11T308N-SU (AC820P)
Cutting Conditions: v_c=180m/min f=0.17mm/rev a_p=1mm Wet

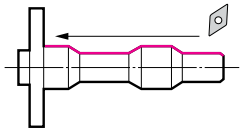
Application Examples

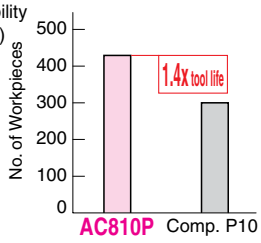
AC810P

SCr415 Hub

Good tool life in rough cutting of mill-scaled work.

In rough cutting of mill-scaled work, AC810P provides superior wear resistance and cutting edge stability compared to competitor's grade(P10 coating) and has achieved 1.4 times longer tool life.



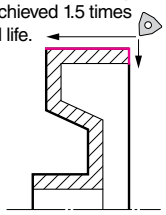


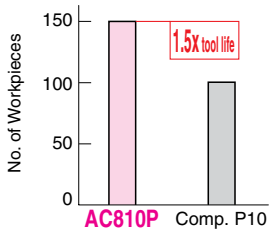
Insert: DNMG150612N-GE (AC810P)
Cutting Conditions: v_c=204m/min f=0.35 to 0.45mm/rev a_p=1.5 to 3.0mm Wet

S45C Hub

Good tool life in rough cutting of mill-scaled work.

In rough cutting of mill-scaled work, AC810P provides superior wear resistance compared to competitor's grade (P10 coating) and has achieved 1.5 times longer tool life.



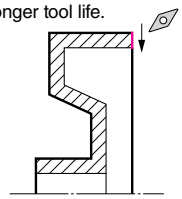


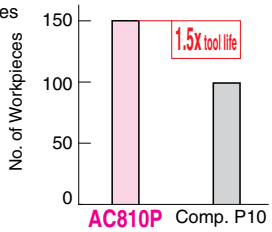
Insert: WNMG080412N-GU (AC810P)
Cutting Conditions: v_c=250m/min f=0.4mm/rev a_p=1.5mm Wet

S45C Hub

Long tool life and stable cutting edge.

AC810P gives higher cutting edge stability than competitor's grade (P10 coating) and achieves 1.5 times longer tool life.



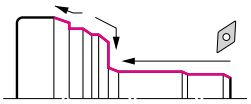


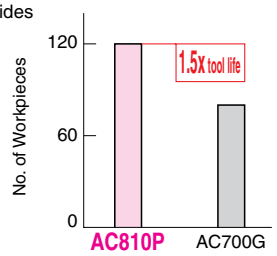
Insert: VBMT160408N-SU (AC810P)
Cutting Conditions: v_c=240m/min f=0.25mm/rev a_p=0.7mm Wet

S45C CVJ Outer Race

Long tool life in high speed machining applications.

In high-speed dry machining, AC810P provides superior wear resistance compared to conventional grade (AC700G) and has achieved 1.5 times longer tool life.



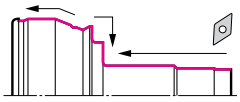


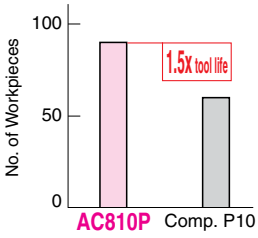
Insert: DNMG150612N-LU (AC810P)
Cutting Conditions: v_c=350m/min f=0.20 to 0.45mm/rev a_p=0.4 to 0.5mm Dry

S53C CVJ Outer Race

Long tool life in dry cutting applications.

In dry machining, AC810P provides superior wear resistance compared to competitor's grade (P10 coating) and has achieved 1.5 times longer tool life.



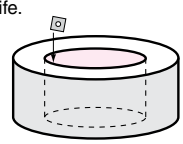


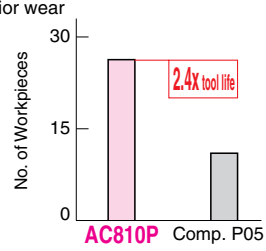
Insert: DNMG150612N-GE (AC810P)
Cutting Conditions: v_c=270m/min f=0.35 to 0.38mm/rev a_p=1.5mm Dry

S45C Coupling

On par with P05 grade.

In high-feed cutting, AC810P provides superior wear resistance compared to competitor's grade (P05 coating) and has achieved 2.4 times longer tool life.





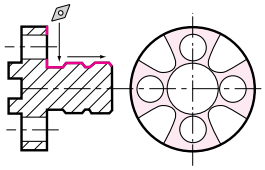
Insert: SNMG150616N-MU (AC810P)
Cutting Conditions: v_c=175m/min f=0.66mm/rev a_p=2.6mm Wet

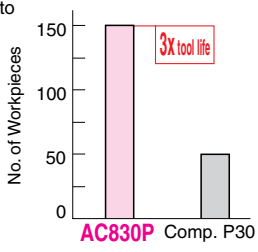
AC830P

S55C Hub Unit

Long tool life in both interrupted and continuous cutting!

AC830P offers reduced chipping compared to competitor's grade (P30) in both continuous and interrupted cutting to give 3x tool life.



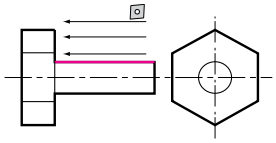


Insert: DNMG150412N-UX (AC830P)
Cutting Conditions: v_c=150m/min f=0.25mm/rev a_p=1.0mm Wet

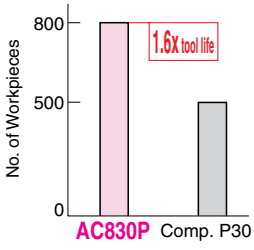
SS400 Bolt

Long tool life in both interrupted and continuous cutting!

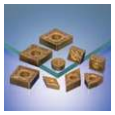
AC830P offers superior chipping and wear resistance compared to competitor's grade (P30) and has 1.6x tool life.

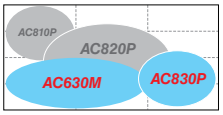


Shaping a hexagonal bar



Insert: CNMG120408N-GU (AC830P)
Cutting Conditions: v_c=170m/min f=0.25mm/rev a_p=2.5mm Wet





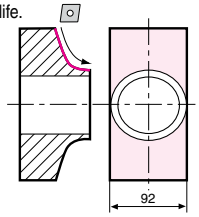
Application Examples

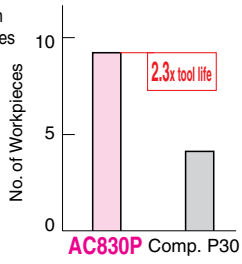
AC830P

S50C Machine Component

Improved efficiency and long tool life.

AC830P provides cutting speed that is 25% faster than competitor's grade (P30 coating) and achieves 2.3 times longer tool life.



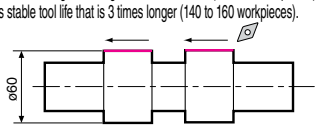


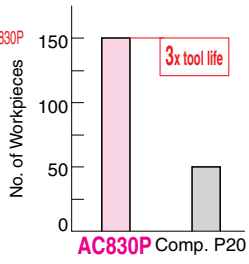
Insert : CNMG120412N-MU (AC830P)
Cutting Conditions : v_c=120 to 150m/min f=0.25mm/rev a_p=1.5mm Wet

SCM415 Cam Shaft

On par with P20 grade.

In comparison to competitor's grade (P20 coating) which suffered from sudden breakages leading to unstable tool life (30 to 70 workpieces), AC830P provides stable tool life that is 3 times longer (140 to 160 workpieces).



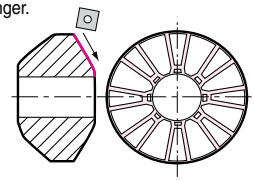


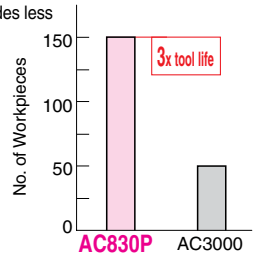
Insert : DNMG150408N-GU (AC830P)
Cutting Conditions : v_c=220m/min f=0.25mm/rev a_p=1.0mm Wet

SCr420 Pinion Gear

Stable, long tool life in heavy interrupted cutting.

In heavy interrupted cutting of gears, AC830P provides less abnormal damage compared to conventional grade (AC3000) and has achieved stable tool life that is 3 times longer.



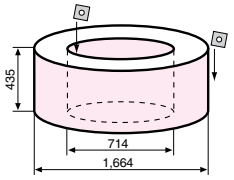


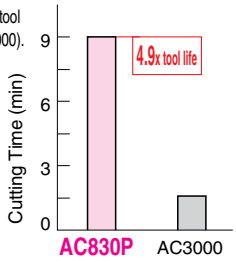
Insert : SNMG120412N-UX (AC830P)
Cutting Conditions : v_c=170m/min f=0.35mm/rev a_p=1.5mm Wet

SNCM420 Large Gear for Construction Equipment

Stable, long tool life in heavy cutting.

In heavy cutting with varying cut depths, AC830P achieves stable tool life that is 4.9 times longer compared to conventional grade (AC3000).



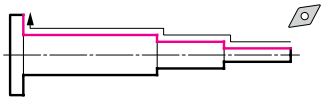


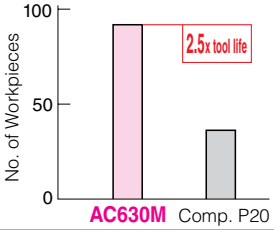
Insert : SNMM190616N-HG (AC830P)
Cutting Conditions : v_c=115m/min f=0.8mm/rev a_p=5 to 10mm Wet

AC630M

SNCM439 Shaft

AC630M suppresses vibration and has 2.5x tool life of competitor's P20 grade.

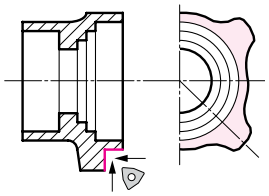


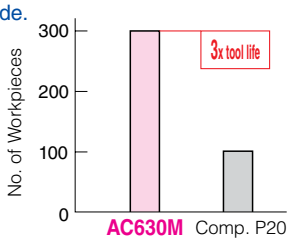


Insert : DNMG150404N-EX（AC630M）
Cutting Conditions : v_c=180m/min f=0.18mm/rev a_p=0.5mm Wet

S53C Hub

AC630M has no chipping during light interrupted cutting and has 3x tool life of competitor's P20 grade.



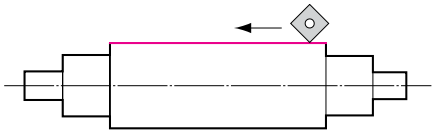


Insert : WNMG080412N-GU（AC630M）
Cutting Conditions : v_c=180m/min f=0.35mm/rev a_p=0.8mm Wet

AC900G

Alloy Steel Forged Steel Roll

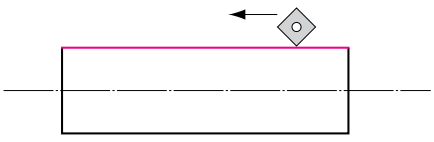
Reduced cutting resistance during rough cutting of mill-scaled work and improved feed rate have improved efficiency by 1.5x.



Insert : SNMM310924N-HW（AC900G）
Cutting Conditions : v_c=98m/min f=1.2mm/rev a_p=15 to 20mm Wet

Alloy Steel Axle

Stable tool life on rough, mill-scaled work.

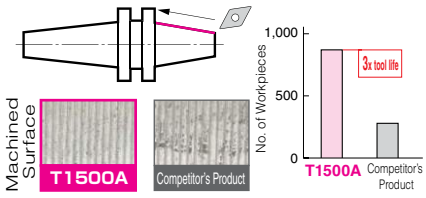


Insert : SNMM310924N-MP（AC900G）
Cutting Conditions : v_c=50m/min f=1.0mm/rev a_p=15 to 21mm Dry

Application Examples

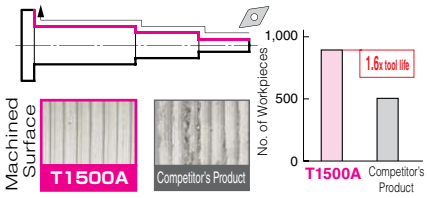
T1500A (M Class Insert)

SCM415 Arbour



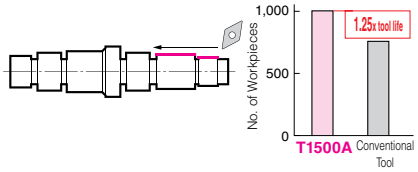
Insert : DNMG150408N-LU (T1500A)
Cutting Conditions : v_c=200m/min f=0.25mm/rev
a_p=0.3mm Wet

SCM435 Shaft



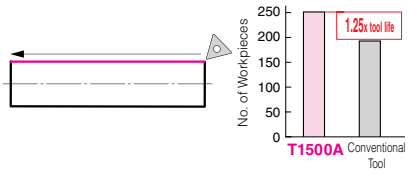
Insert : DNMG150408N-SU (T1500A)
Cutting Conditions : v_c=200m/min f=0.18mm/rev
a_p=0.15mm Wet

SCM435 Gear Shaft



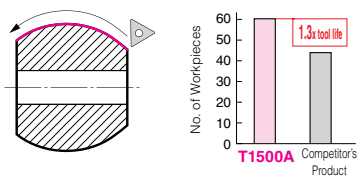
Insert : DNMG150404N-LU (T1500A)
Cutting Conditions : v_c=90 to 140m/min f=0.15mm/rev
a_p=0.25mm Wet

S45C Shaft



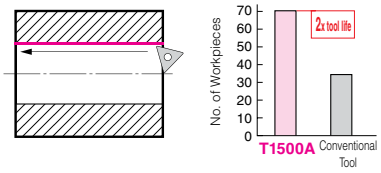
Insert : TNMG160404N-FL (T1500A)
Cutting Conditions : v_c=200m/min f=0.12mm/rev
a_p=0.35mm Wet

SUS316 Valve



Insert : TNMG160408N-SU (T1500A)
Cutting Conditions : v_c=140m/min f=0.12mm/rev
a_p=0.15mm Wet

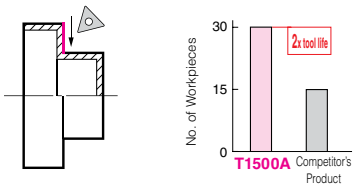
STKM13A Machine Component



Insert : TNMG160404N-SU (T1500A)
Cutting Conditions : v_c=150m/min f=0.07mm/rev
a_p=0.1mm Wet

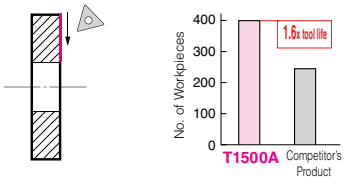
T1500A (G Class Insert)

SAPH400 Automotive Component



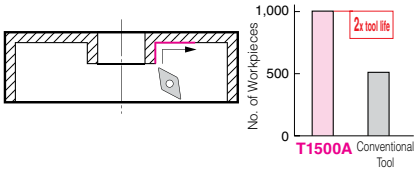
Insert : TNGG160402L-UM (T1500A)
Cutting Conditions : v_c=180m/min f=0.25mm/rev
a_p=0.25mm Wet

S45C Transmission Part



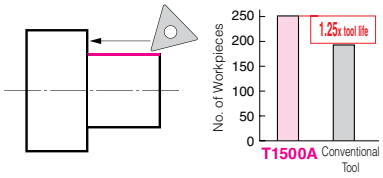
Insert : TNGG160402L-FY (T1500A)
Cutting Conditions : v_c=300m/min f=0.05mm/rev
a_p=0.1mm Wet

SPH440 Drum Brake Component



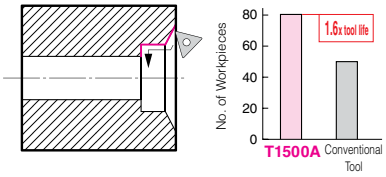
Insert : DNGG150404R-UM (T1500A)
Cutting Conditions : v_c=280m/min f=0.07mm/rev
a_p=0.25mm Wet

SCM435 Pump Part



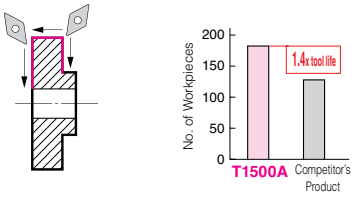
Insert : TNGG160404R-UM (T1500A)
Cutting Conditions : v_c=100m/min f=0.25mm/rev
a_p=1.0mm Wet

S45C Sleeve

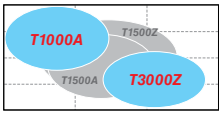


Insert : TPGT110304L-SD (T1500A)
Cutting Conditions : v_c=200m/min f=0.15mm/rev
a_p=0.2mm Wet

S45C Machine Component



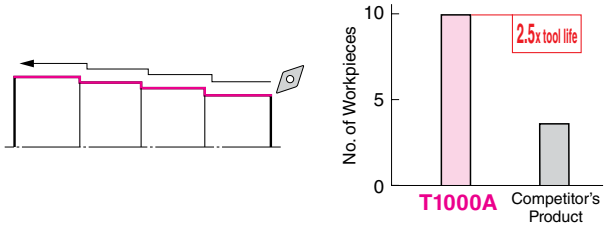
Insert : DCGT070202L-FX (T1500A)
Cutting Conditions : v_c= to 240m/min f=0.03mm/rev
a_p=0.05mm Wet



Application Examples

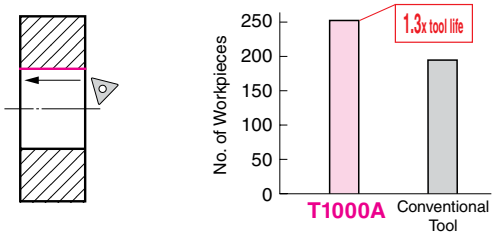
T1000A

SCM440 Shaft



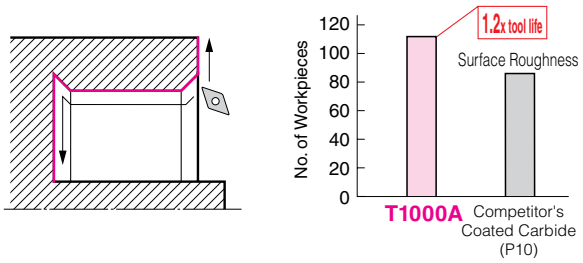
Insert: DNMG150408N-SU (T1000A)
Cutting Conditions: v_c=180m/min, f=0.10 to 0.25mm/rev, a_p=0.4mm, Wet

S45C Flange



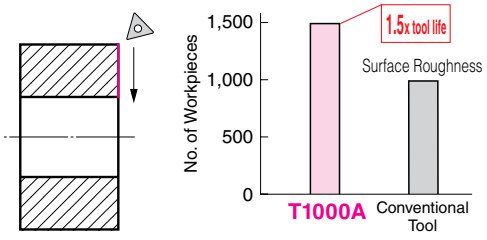
Insert: TPGT110304L-SD (T1000A)
Cutting Conditions: v_c=180m/min, f=0.08mm/rev, a_p=0.15mm, Wet

S30C Automotive Component



Insert: DCMT070208N-SU (T1000A)
Cutting Conditions: v_c=230m/min, f=0.05mm/rev, a_p=0.3 to 0.7mm, Wet

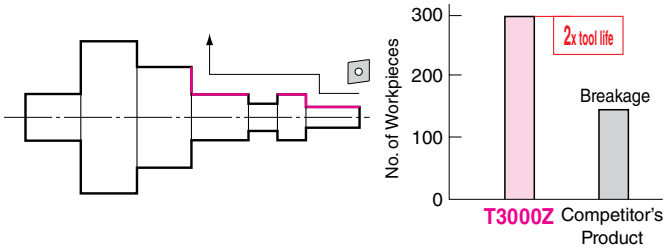
S25C Automotive Component



Insert: TNGG160404L-FX (T1000A)
Cutting Conditions: v_c=80 to 170m/min, f=0.10mm/rev, a_p=0.2mm, Dry

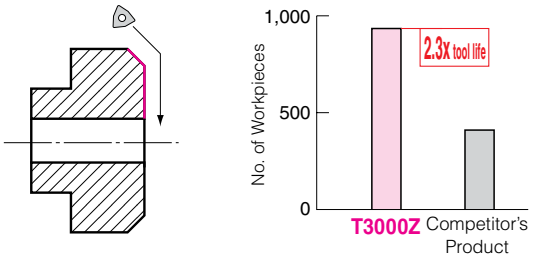
T3000Z

S48C Shaft (Interrupted Cutting)



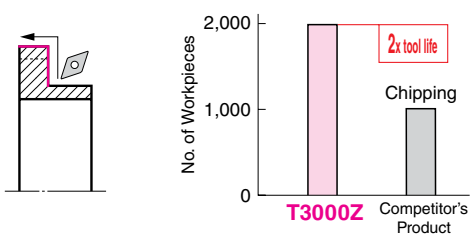
Insert: CNMG120408N-SX (T3000Z)
Cutting Conditions: v_c=220m/min, f=0.25mm/rev, a_p=1.8mm, Wet

SCr420H Cone Clutch



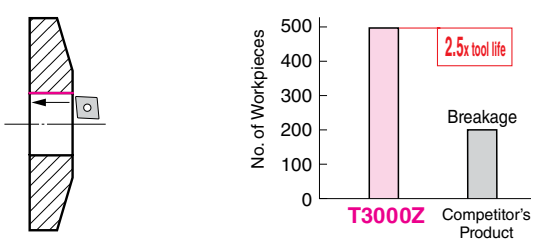
Insert: WNMG080408N-LU(T3000Z)
Cutting Conditions: v_c=200m/min, f=0.20mm/rev, a_p=1.0mm, Wet

SCr420H Clutch Gear (Interrupted Cutting)



Insert: DNMG150408N-LU (T3000Z)
Cutting Conditions: v_c=200m/min, f=0.3mm/rev, a_p=0.3 to 0.5mm, Wet

S45C Machine Component

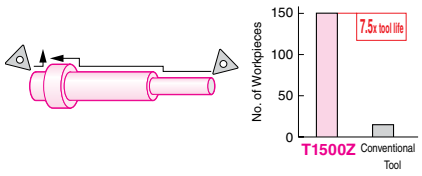


Insert: CPMT090304N-SU (T3000Z)
Cutting Conditions: v_c=100m/min, f=0.20mm/rev, a_p=1.0mm, Wet

Application Examples

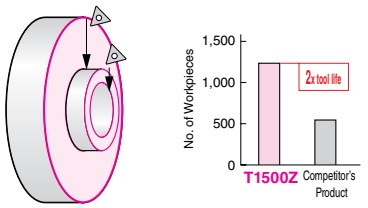
T1500Z

SCM415 Shaft



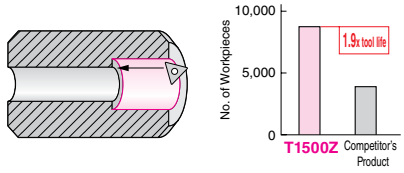
Insert: TNMG160408N-SU (T1500Z)
Cutting Conditions: v_c=220m/min, f=0.26 to 0.34mm/rev, a_p=0.2 to 0.25mm, Wet

SCM420H Automotive Component



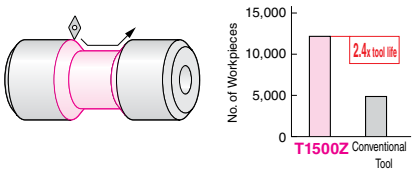
Insert: TNMG160408N-LU (T1500Z)
Cutting Conditions: v_c=200m/min, f=0.15mm/rev, a_p=1.0mm, Wet

S48C Guide



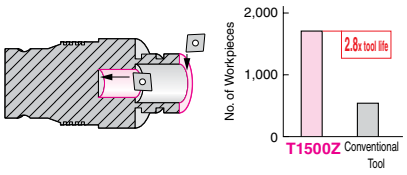
Insert: TPMT090204N-LU (T1500Z)
Cutting Conditions: v_c=162m/min, f=0.13mm/rev, a_p=0.55mm, Wet

S45C Sleeve



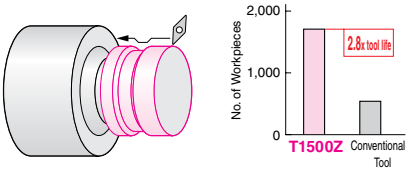
Insert: DCMT11T304N-LU (T1500Z)
Cutting Conditions: v_c=230m/min, f=0.10mm/rev, a_p=0.50mm, Wet

S43C Lower Shaft



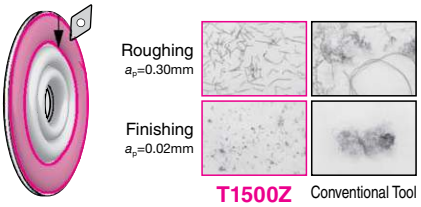
Insert: CPGT080208N-SD (T1500Z)
Cutting Conditions: v_c=140m/min, f=0.15mm/rev, a_p=0.5mm, Wet

S43C Machine Component



Insert: VNMG160408N-FL (T1500Z)
Cutting Conditions: v_c=180m/min, f=0.2mm/rev, a_p=0.2 to 0.9mm, Wet

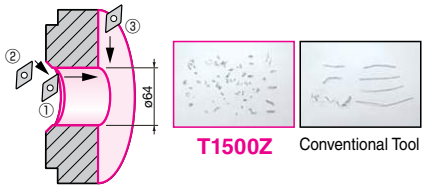
SAPH440 (Press Material) Piston Component



Criteria：Undulation of Finished Surface

Insert：DCMT11T308N-FB（T1500Z）
Cutting Conditions：v_c=360m/min f=0.14mm/rev
a_p=Rough：0.30mm Finishing：0.02mm Wet

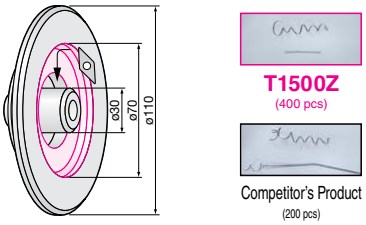
SCMr420H Clutch Component



Criteria：Surface Properties (Clouding and Exit Burrs)

Insert：DCMT11T304N-FB（T1500Z）
Cutting Conditions：v_c=220m/min f=① 0.15 ② 0.12
③ 0.18mm/rev a_p=0.25mm Wet

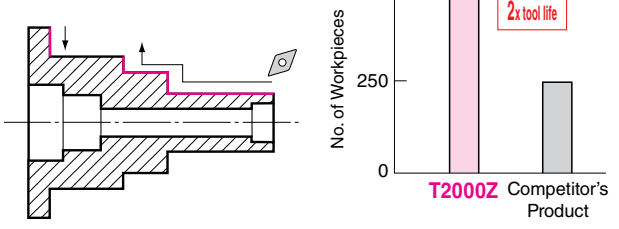
S45C Hub



Insert：VBMT160408N-LB（T1500Z）
Cutting Conditions：v_c=240m/min f=0.25 to 0.28mm/rev
a_p=0.6mm Wet

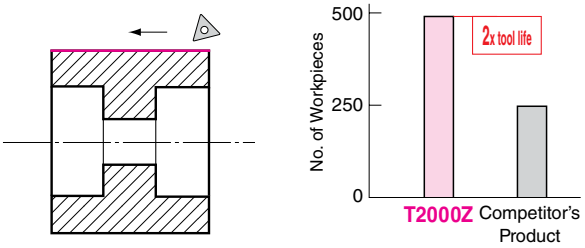
T2000Z

S45C Flange



Insert: DNMG150408N-SU (T2000Z)
Cutting Conditions: v_c=200m/min, f=0.28mm/rev, a_p=1.5mm, Wet

S45C Gear (Interrupted Cutting)



Insert: TNGG160404R-UM (T2000Z)
Cutting Conditions: v_c=300m/min, f=0.15mm/rev, a_p=2.0mm, Wet

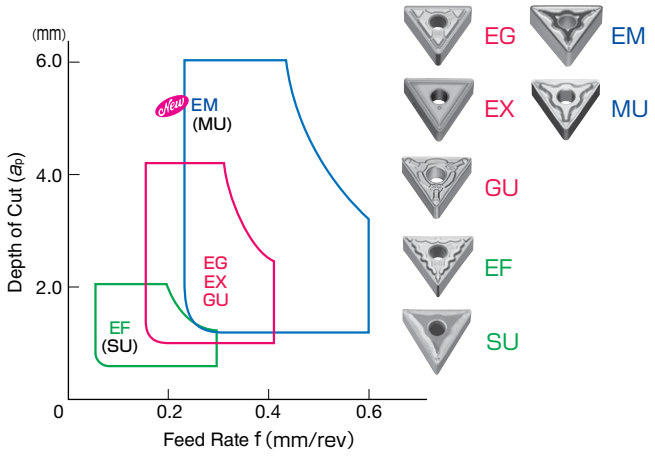
Stainless Steel

M Stainless Steel

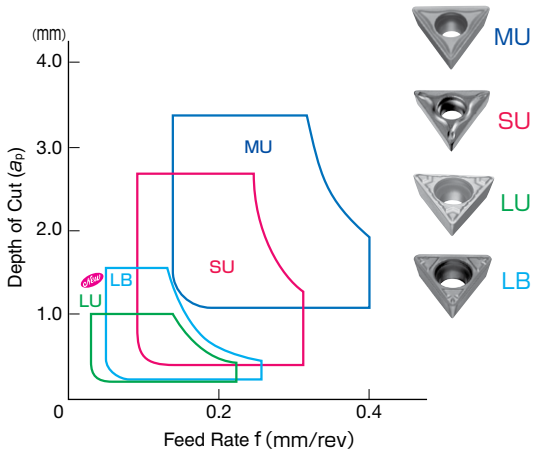
Turning Insert Selection Guide / Recommended Cutting Conditions

Chipbreakers

Negative Type

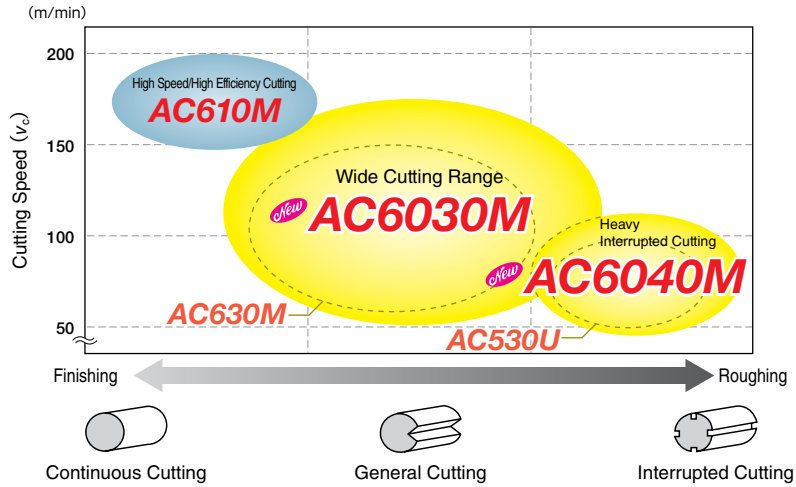


Positive Type



Refer to the chapter on Small Tools (page D7) for the Chipbreaker Selection Guide for ground inserts (G Class) inserts.

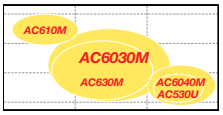
Grades



M Stainless Steel Recommended Cutting Conditions

(Red text indicates 1st recommendation.)

Work Material			Cutting Process	Chipbreaker	Grade	Cutting Conditions Min. - Optimum - Max.		
						Depth of Cu a_p(mm)	Feed Rate f(mm/rev)	Cutting Speed V_c(m/min)
Cr-based	Ferritic	SUS405, SUS410L, SUS430, SUS430F, SUS434, SUS447FJ1	Finishing	EF(SU)	**AC610M**	0.5-**1.5**-2.0	0.05-**0.15**-0.25	170-**225**-300
			Medium	EG·EX·GU	**AC6030M**	1.0-**2.5**-4.0	0.10-**0.25**-0.40	140-**180**-235
			Rough	EM(MU)	**AC6040M**	1.5-**3.5**-6.0	0.20-**0.35**-0.60	120-**150**-180
	Martensitic	SUS403, SUS410, SUS420J2,SUS420F, SUS440F	Finishing	EF(SU)	**AC6030M**	0.5-**1.5**-2.0	0.05-**0.15**-0.25	120-**175**-230
			Medium	EG·EX·GU	**AC6030M**	1.0-**2.5**-4.0	0.10-**0.25**-0.40	100-**140**-180
			Rough	EM(MU)	**AC6040M**	1.5-**3.5**-6.0	0.20-**0.35**-0.60	80-**120**-160
Cr/Ni-based	Austenitic	SSU304, SUS304L, SUS316, SUS316L, SUS303, SUS321	Finishing	EF(SU)	**AC6030M**	0.5-**1.5**-2.0	0.05-**0.15**-0.25	90-**115**-140
			Medium	EG·EX·GU	**AC6030M**	1.0-**2.5**-4.0	0.10-**0.25**-0.40	70- **90**-110
			Rough	EM(MU)	**AC6040M**	1.5-**3.5**-6.0	0.20-**0.35**-0.60	50- **75**-100
	Two-Phase Austenitic/ Ferritic	SUS329J1, SUS329J3L, SSU329J4L	Finishing	EF(SU)	**AC6030M**	0.5-**1.5**-2.0	0.05-**0.15**-0.25	90-**115**-140
			Medium	EG·EX·GU	**AC6030M**	1.0-**2.5**-4.0	0.10-**0.25**-0.40	70- **90**-110
			Rough	EM(MU)	**AC6040M**	1.5-**3.5**-6.0	0.20-**0.35**-0.60	50- **75**-100
	Deposition Hardened Structures	SUS630, SUS631, SUS632J1	Finishing	EF(SU)	**AC6030M**	0.5-**1.5**-2.0	0.05-**0.15**-0.25	90-**115**-140
			Medium	EG·EX·GU	**AC6030M**	1.0-**2.5**-4.0	0.10-**0.25**-0.40	70- **90**-110
			Rough	EM(MU)	**AC6040M**	1.5-**3.5**-6.0	0.20-**0.35**-0.60	50- **75**-100



Grades

New AC6030M / New AC6040M / AC610M /AC630M / AC520U / AC530U

AC6030M : Employs Absotech Platinum, a new CVD coating.The first recommended grade for general machining of stainless steel that drastically reduces the occurrence of abnormal damage, which is a problem in stainless steel machining, and achieves long and stable machining thanks to the improved coating strength and excellent adhesion.

AC6040M : Employs Absotech Bronze, a new PVD coating, and exclusive tough carbide substrate.The first recommended grade for interrupted machining of stainless steel that drastically improves the reliability in unstable machining thanks to the excellent adhesion and peel-off resistance of the new PVD coating as well as the improved fracture resistance of the exclusive carbide substrate.

AC610M : High hardness carbide substrate coupled with Super FF Coat. For high efficiency machining with superior wear resistance.

AC630M : High toughness carbide substrate coupled with Super FF Coat. A general purpose grade with sharp cutting edges for superior stability.

AC520U : Tough carbide grade that utilises the high wear resistant Super ZX Coat for excellent stability

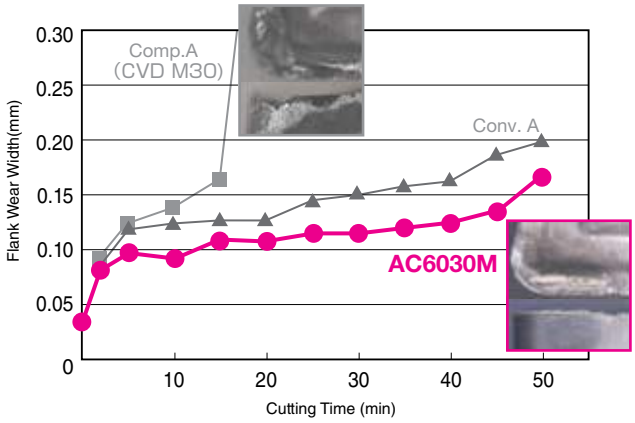
AC530U : Tough grade with long tool life and high efficiency for precision machining of stainless steel and small components.

From page D6

Performance

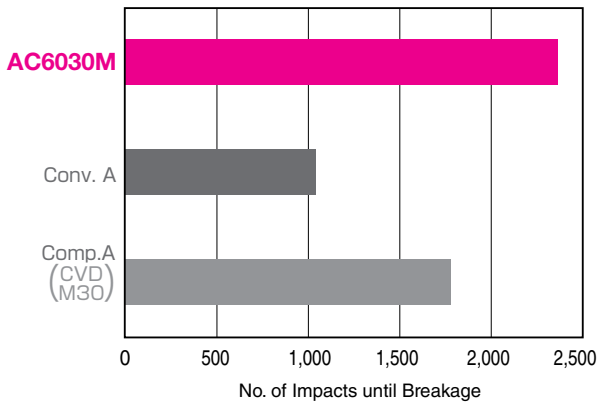
New AC6030M Cutting Performance

● Continuous Cutting



Work Material : SUS316 Insert : CNMG120408N-EX
Cutting Conditions : v_c=200m/min f=0.2mm/rev a_p=2.0mm Wet

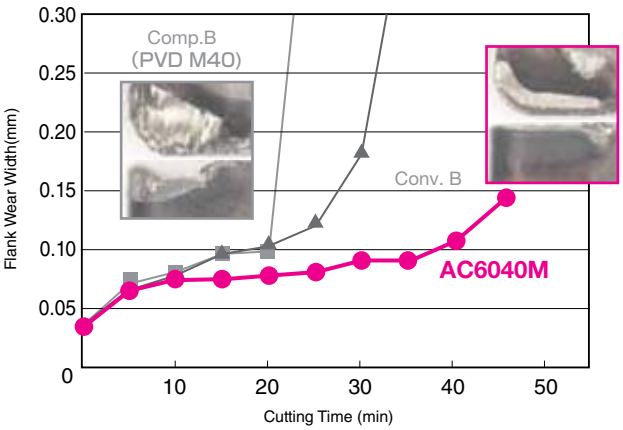
● Interrupted Cutting



Work Material : SUS316 Insert : CNMG120408N-GU
Cutting Conditions : v_c=100m/min f=0.1mm/rev a_p=1.0mm Wet

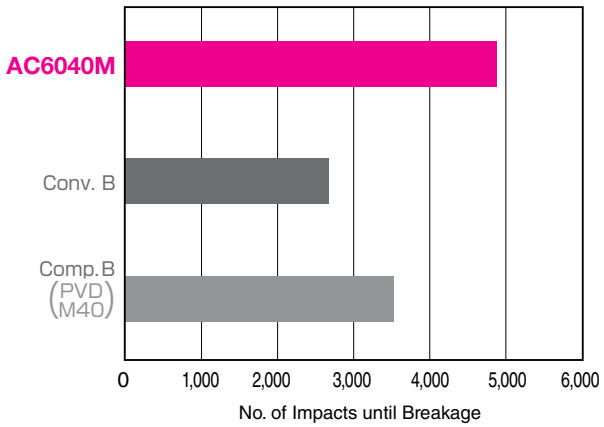
New AC6040M Cutting Performance

● Continuous Cutting

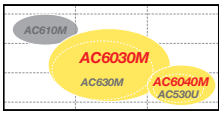


Work Material : SUS316 Insert : CNMG120408N-GU
Cutting Conditions : v_c=150m/min f=0.2mm/rev a_p=2.0mm Wet

● Interrupted Cutting



Work Material : SUS316 Insert : CNMG120408N-GU
Cutting Conditions : v_c=230m/min f=0.23mm/rev a_p=0.80mm Dry

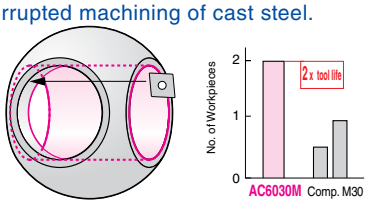


Application Examples

New AC6030M

【SCS13 Valve Ball】

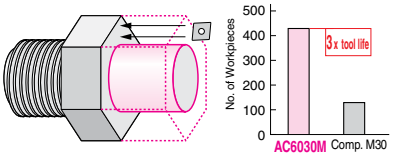
Achieves stable, 2 times longer tool life in interrupted machining of cast steel.



Insert : CNMG120412N-EM (AC6030M)
Cutting Conditions : v_c=100m/min f=0.30 to 0.35mm/rev
a_p=2.5mm Wet

【SUS304 Joint Component】

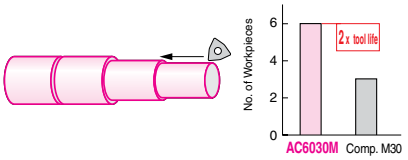
Enables roughing to finishing from hexagonal bars with one grade and achieves 3 times longer tool life.



Insert : CNMG120412N-GU (AC6030M)
Cutting Conditions : v_c=50 to 75m/min f=0.16mm/rev
a_p=2.0mm Wet

【SUS304 Shaft】

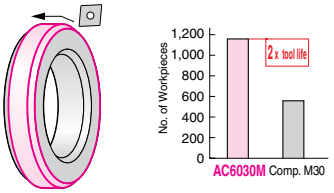
Achieves 2 times longer tool life thanks to excellent wear resistance.



Insert : WNMG080408N-EX (AC6030M)
Cutting Conditions : v_c=60 to 70m/min f=0.32mm/rev
a_p=3.0mm Wet

【SUS430 Motorcycle Component】

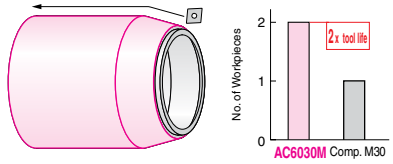
Provides stable machined surface quality and achieves 2 times longer tool life thanks to excellent adhesion resistance.



Insert : CNMG120404N-EF (AC6030M)
Cutting Conditions : v_c=120m/min f=0.10mm/rev
a_p=0.8 to 1.5mm Wet

【SCS11 Pump Part】

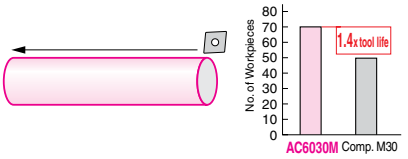
Provides 2.5 times efficiency (V_c=60: 100m/min. f=0.2: 0.3mm/rev) and 2 times longer tool life.



Insert : CNMG120408N-EG (AC6030M)
Cutting Conditions : v_c=100m/min f=0.3mm/rev
a_p=0.5mm Wet

【SUS304 Shaft】

Achieves 1.4 times longer tool life thanks to excellent wear resistance.

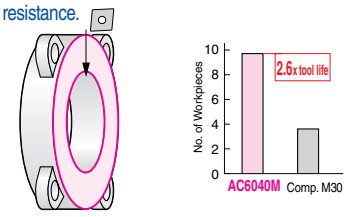


Insert : CNMG120408N-GU (AC6030M)
Cutting Conditions : v_c=160m/min f=0.25mm/rev
a_p=3.0mm Wet

New AC6040M

【SCS14 Flange】

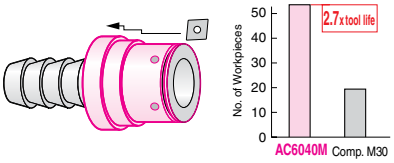
Achieves 2.6 times longer tool life thanks to excellent fracture resistance.



Insert : CNMG120408N-GU (AC6040M)
Cutting Conditions : v_c=200 to 360m/min f=0.12mm/rev
a_p=0.4mm Wet

【SUS304 Nipple】

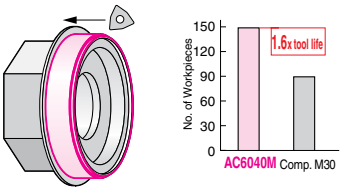
Achieves 2.7 times longer tool life thanks to excellent adhesion resistance.



Insert : CNMG120408N-GU (AC6040M)
Cutting Conditions : v_c=150m/min f=0.15mm/rev
a_p=1.5mm Wet

【SCS14 Valve Joint】

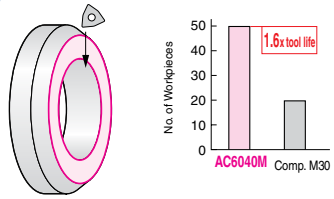
Achieves 1.6 times longer tool life thanks to excellent crater wear resistance.



Insert : WNMG080408N-EX (AC6040M)
Cutting Conditions : v_c=130 to 160m/min f=0.10mm/rev
a_p=0.7mm Wet

【SCS13 Flange Joint Component】

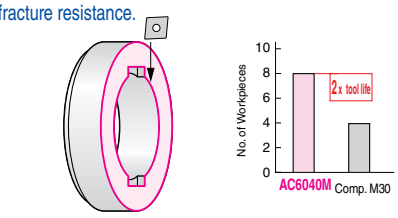
Provides stable machined surfaces and achieves 1.6 times longer tool life thanks to excellent wear resistance.



Insert : WNMG080408N-EX (AC6040M)
Cutting Conditions : v_c=140 to 200m/min f=0.08mm/rev
a_p=0.5mm Wet

【SCS13 Coupling】

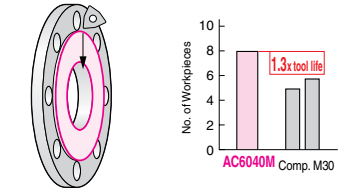
Achieves 2 times longer tool life thanks to excellent fracture resistance.



Insert : CNMG120408N-EG (AC6040M)
Cutting Conditions : v_c=70 to 180m/min f=0.14mm/rev
a_p=2.5mm Wet

【 SUS14 Valve Flange】

Achieves over 1.3 times longer stable tool life thanks to excellent fracture resistance.



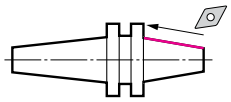
Insert : WNMG080408N-GU (AC6040M)
Cutting Conditions : v_c=180 to 340m/min f=0.15mm/rev
a_p=0.4mm×4pass Wet

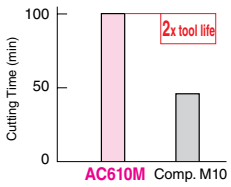
Application Examples

AC610M

SUS304 Arbour

AC610M has good wear resistance with 2x tool life of competitor's.

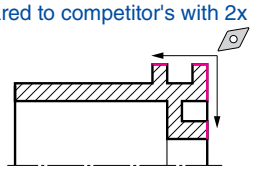


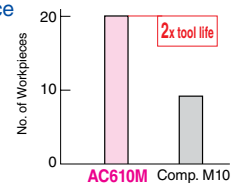


Insert : DNMG150408N-EX (AC610M)
Cutting Conditions : v_c=210m/min f=0.3mm/rev a_p=2.0mm Wet

SUS410 Sleeve

AC610M features superior wear resistance compared to competitor's with 2x tool life.



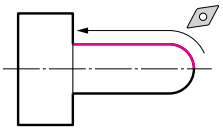


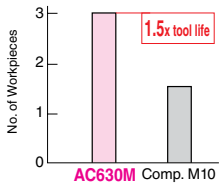
Insert : DNMG150408N-GU (AC610M)
Cutting Conditions : v_c=215m/min f=0.35mm/rev a_p=0.85mm Wet

AC630M

SUS304 Machine Component

AC630M enables stable cutting without breakages with 1.5x the tool life of competitor's grade.

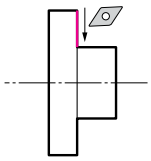


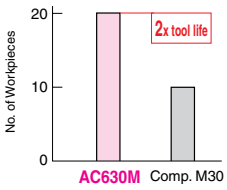


Insert : DNMG150408N-EX (AC630M)
Cutting Conditions : v_c=130m/min f=0.4mm/rev a_p=0.5mm Wet

SUS316L Automotive Component

AC630M enables stable cutting even in light interrupted cutting with 2x the tool life of competitor's grade.

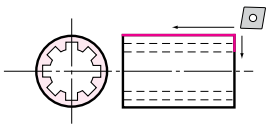


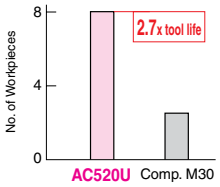


Insert : DNMG150408N-GU (AC630M)
Cutting Conditions : v_c=150m/min f=0.15mm/rev a_p=1.6mm Wet

AC520U

SUS304 Machine Component

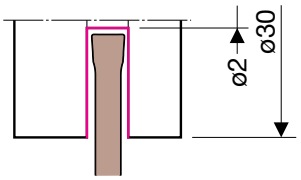




Insert : CNMG120408N-EX (AC520U)
Cutting Conditions : v_c=150m/min f=0.2mm/rev a_p=2.0mm Wet

Grooving SUS304 Measuring Component

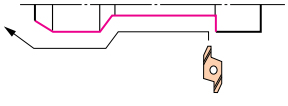
Enables stable machining without chattering thanks to excellent chip control performance and a high rigidity holder.

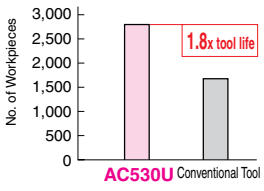


Insert : GCM N3002-GG (AC520U) Toolholder : GNDL R2525M-320
Cutting Conditions : v_c=60m/min f=0.025mm/rev a_p=2.0mm Wet Cutting edge : 3mm

AC530U

SUS416 Pulley Shaft

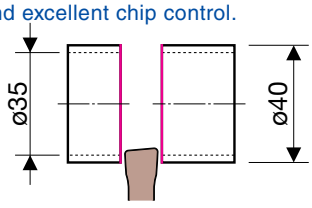




Insert : BTR3515 (AC530U)
Cutting Conditions : v_c=60 to 90m/min f=0.04mm/rev a_p=1.5 to 2.5mm Wet

Cutting Off Round Hollow SUS303 Pipe

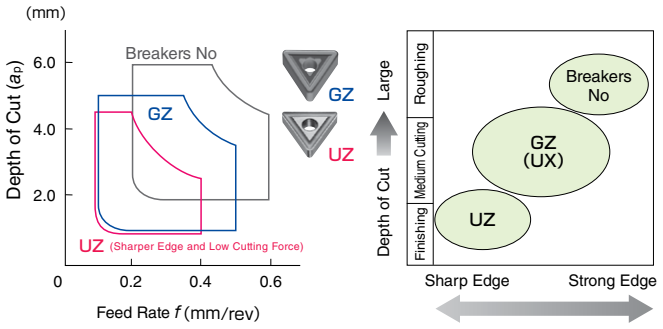
Enables stable machining thanks to superior cutting performance and excellent chip control.



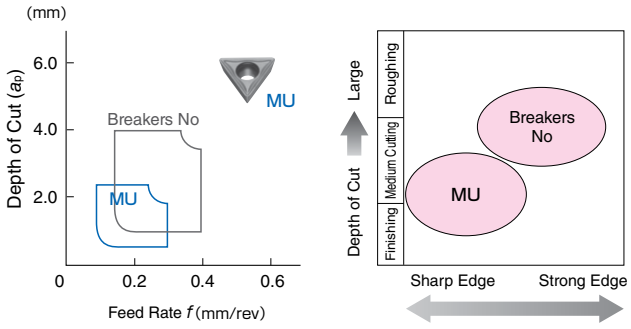
Insert : GCMR2002-CG-05 (AC530U) Toolholder : GNDL R2020K-220
Cutting Conditions : v_c=140m/min (n=1,000rpm) f=0.03mm/rev Wet Cutting edge : 2mm

Chipbreakers

Negative Type



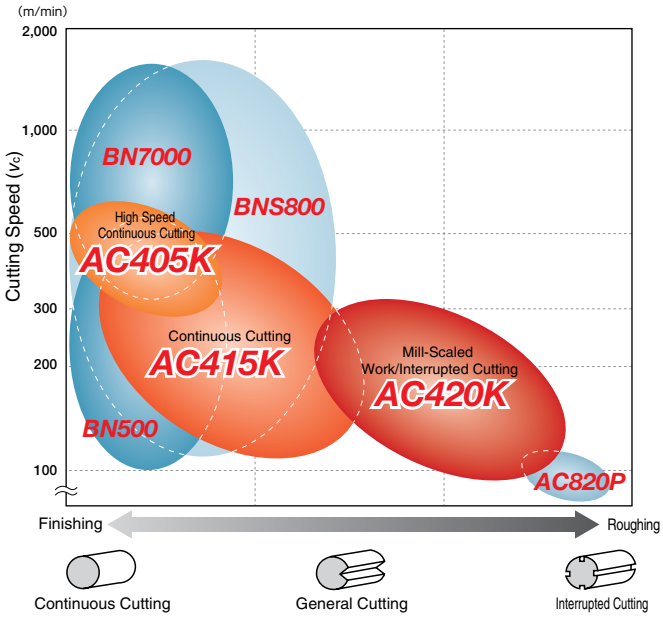
Positive Type



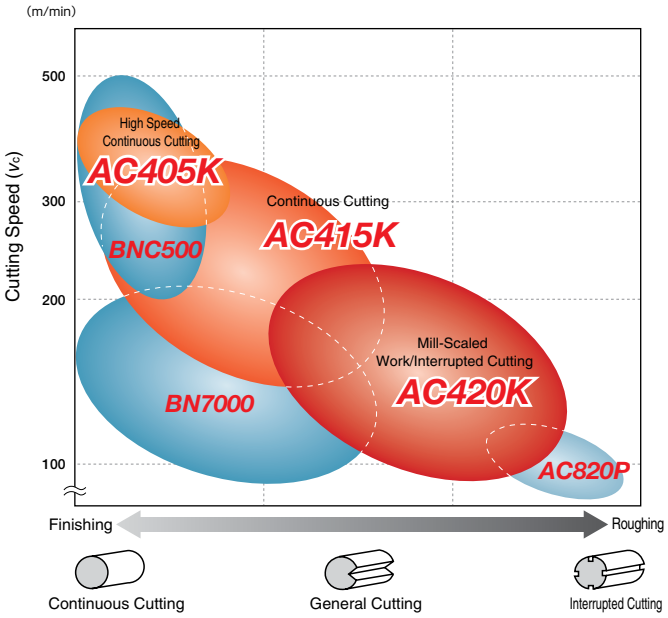
Grades

CBN Coated SUMIBORON BNC500 / SUMIBORON BN500 / SUMIBORON BN7000 / SUMIBORON BN700 / SUMIBORON BNS800 ··· Page L18

● FC (Grey Cast Iron)



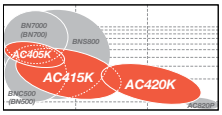
● FCD (Ductile Cast Iron)



K Cast Iron Recommended Cutting Conditions

(Red text indicates 1st recommendation.)

Application	Cutting Process	Chipbreakers	Grades	FC (Grey Cast Iron) Min. - **Optimum** - Max.		FCD (Ductile Cast Iron) Min. - **Optimum** - Max.	
				Feed Rate f(mm/rev)	Cutting Speed V_c(m/min)	Feed Rate f(mm/rev)	Cutting Speed V_c(m/min)
High Speed Cutting	Continuous to General	No	**BN7000**	0.1-**0.2**-0.5	500-**1,500**-2,000	0.1-**0.20**-0.4	80-**150**-200
	Continuous	No	**BNC500**	—	—	0.1-**0.20**-0.4	200-**350**-500
Finishing	Continuous	UZ	AC405K	0.1-**0.25**-0.4	230-**400**-570	0.1-**0.25**-0.4	170-**350**-500
	General	**UZ**	**AC415K**	0.1-**0.25**-0.4	200-**350**-500	0.1-**0.25**-0.4	150-**300**-450
	Interrupted	GZ	AC415K	0.1-**0.30**-0.5	150-**275**-400	0.1-**0.30**-0.5	150-**250**-350
Light Interrupted Medium	Continuous	GZ	AC405K	0.1-**0.30**-0.5	170-**315**-460	0.1-**0.30**-0.5	170-**285**-400
	General	**GZ**	**AC415K**	0.1-**0.30**-0.5	150-**275**-400	0.1-**0.30**-0.5	150-**250**-350
	Interrupted	GZ	AC420K	0.1-**0.30**-0.5	100-**200**-300	0.1-**0.30**-0.5	80-**150**-220
Roughing (Mill-Scaled Work)	Continuous	GZ	AC415K	0.1-**0.30**-0.5	150-**275**-400	0.1-**0.30**-0.5	150-**250**-350
	General	**GZ**	**AC420K**	0.1-**0.30**-0.5	100-**200**-300	0.1-**0.30**-0.5	80-**150**-220
	Interrupted	No	AC420K	0.2-**0.35**-0.6	100-**175**-250	0.2-**0.35**-0.6	80-**130**-180



Grades

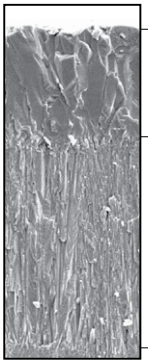
High Speed Continuous Cutting / General Purpose / Mill-Scaled Work/Interrupted Cutting

AC405K / AC415K / AC420K

AC405K : Suitable for high-speed continuous cutting. Excellent resistance to wear and plastic deformation.
AC415K : First recommended grade for cast iron turning. Provides stability and long tool life in a wide range of processes.
AC420K : Superior fracture resistance provides excellent stability in interrupted unstable cutting and when cutting mill-scaled work.

● Improvements to super FF-TiCN coating grain and hardness provide significantly improved wear resistance.
Newly developed stress control technology enhances micro-grained α Alumina (FF-Al_2O_3) coating for superior reliability.

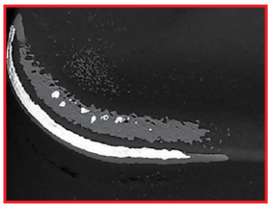
● Coating Structure



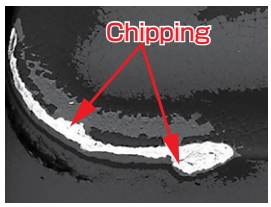
Micro-grained α Alumina (FF-Al_2O_3)
Improved adhesion and peel-off

Super FF-TiCN
Ultra-fine grained, ultra-hard TiCN coating increases wear resistance 1.5 times.

Coating stress control technology reduces abnormal damage caused by chipping.

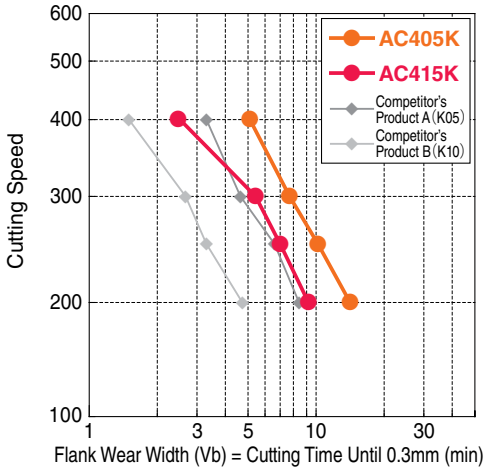


AC400K Series Coating



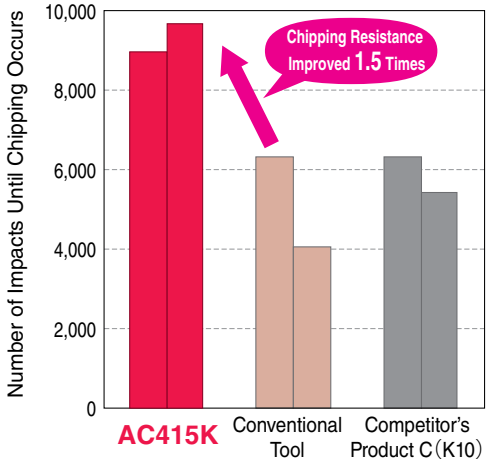
Conventional Coating

AC405K/AC415K Wear Resistance



Work Material : FCD450(Round Bar) Insert : CNMG120408N-GZ
Cutting Conditions : v_c=200 to 400m/min f=0.30mm/rev a_p=1.5mm Wet

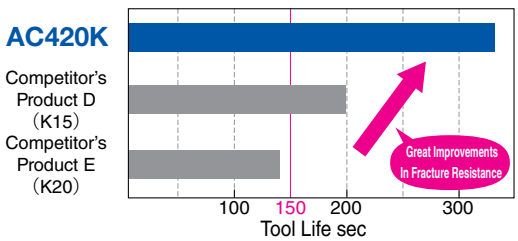
AC415K Chipping Resistance



Work Material : FCD450 Insert : CNMG120408N-GZ
Cutting Conditions : v_c=300m/min f=0.25mm/rev a_p=1.5mm Wet

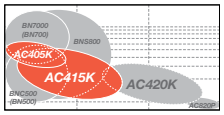
AC420K Fracture Resistance

FCD450 Grooved (Heavy Interrupted Acceleration Test)



Edge Wear Comparison (After 150 s)

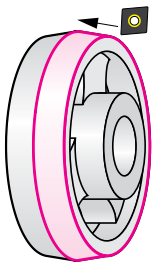
Work Material : FCD450 Toolholder : PCLNR2525-43 Insert : CNMG120408N-GZ
Cutting Conditions : v_c=350m/min f=0.25mm/rev a_p=1.5mm Wet

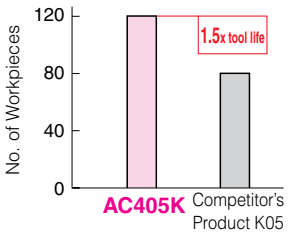


AC405K

FC200 Compressor Component (Pulley)

AC405K achieves 1.5 times longer tool life through improved wear resistance.

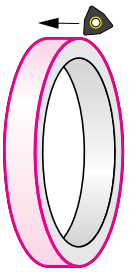


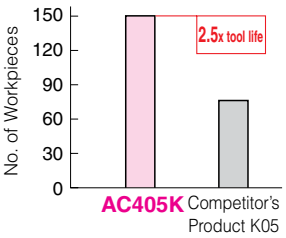


Insert: CNMG120412N-GZ (AC405K)
Cutting Conditions: v_c=500m/min, f=0.25mm/rev, Up to a_p= to 2.0mm, Dry

FCD650 Ring

Thanks to reduced chipping and improved wear resistance, AC405K eliminates problems with unstable tool life and achieves 2.5 times longer stable tool life.

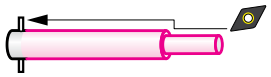


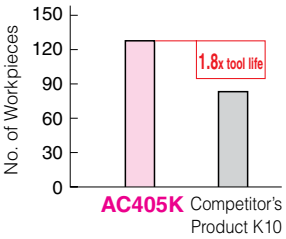


Insert: WNMG080408N-UZ (AC405K)
Cutting Conditions: v_c=340m/min, f=0.3mm/rev, a_p=0.2mm, Wet

FCD700 Input Shaft

Thanks to reduced chipping and improved wear resistance, AC405K achieves 1.8 times longer tool life.

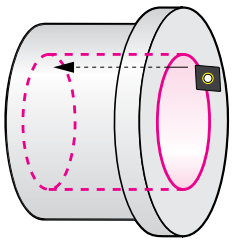


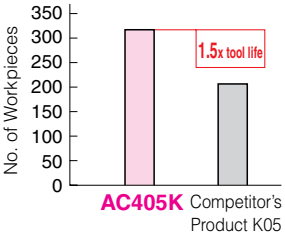


Insert: DNMG150408N-UZ (AC405K)
Cutting Conditions: v_c=200m/min, f=0.45mm/rev, a_p=0.25 to 0.40mm, Wet

FCD450 Sleeve

Excellent wear resistance achieves 1.5 times longer tool life in continuous hole finishing applications.
The number of tool compensations required has also been halved.



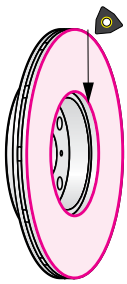


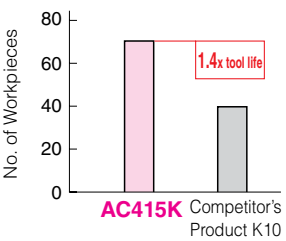
Insert: CNMG120408N-UZ (AC405K)
Cutting Conditions: v_c=300m/min, f=0.20mm/rev, a_p=0.5mm, Wet

AC415K

FC200 Brake Disc

AC415K achieves 1.4 times longer tool life through improved wear resistance.

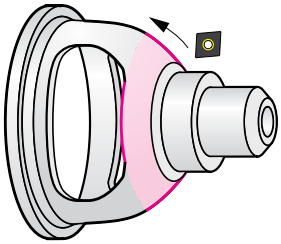


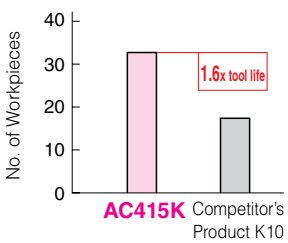


Insert: WNMA080412 (AC415K)
Cutting Conditions: v_c=450m/min, f=0.25mm/rev, a_p= Up to 1.5mm, Dry

FCD450 Differential Case

Thanks to reduced chipping and improved wear resistance, AC415K eliminates problems with unstable tool life and achieves 1.6 times longer tool life.



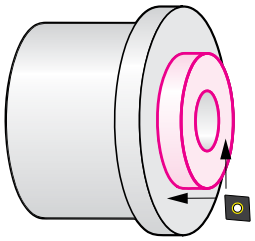


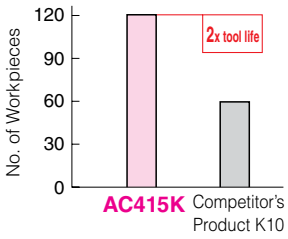
Insert: CNMG120408N-GZ (AC415K)
Cutting Conditions: v_c=240m/min, f=0.3mm/rev, a_p=2.0 to 3.0mm, Wet

AC415K

FCD500 Hub

AC415K delivers 2 times longer tool life in light interrupted cutting of mill-scaled work thanks to improved chipping and wear resistance.

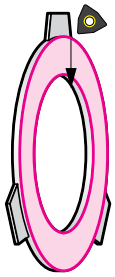


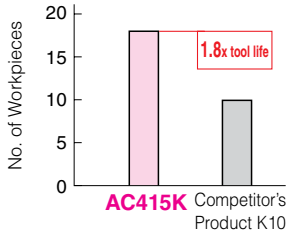


Insert: CNMA120408 (AC415K)
Cutting Conditions: v_c=230m/min, f=0.2 to 0.3mm/rev, a_p=1.5 to 2.0mm, Wet

FC250 Pressure Plate

Reduces occurrence of sudden breakages and achieves 1.8 times longer stable tool life in heavy interrupted cutting.



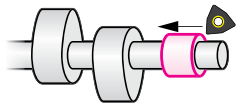


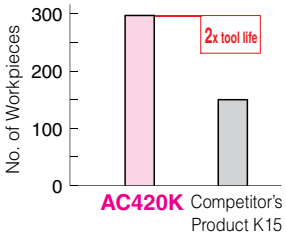
Insert: WNMA080412 (AC415K)
Cutting Conditions: v_c=230m/min, f=0.30mm/rev, a_p=1.5 to 2.5mm, Dry

AC420K

FCD700 Cam Shaft

AC420K delivers 2 times longer tool life when cutting hardened steel and mill-scaled work.

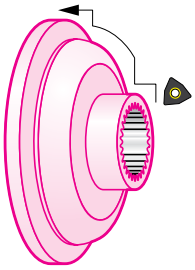


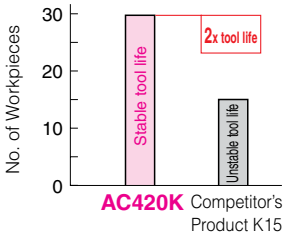


Insert: WNMA080408 (AC420K)
Cutting Conditions: v_c=100 to 250m/min, f=0.15 to 0.30mm/rev, a_p=1.0mm, Wet

FCD450 Drive Sprocket

AC420K delivers 2 times longer stable tool life in unstable machining of mill-scaled work.

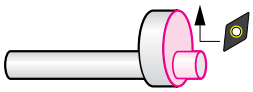


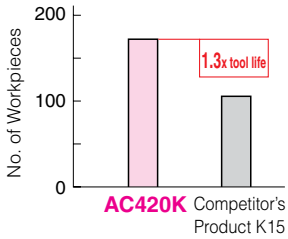


Insert: WNMA080412 (AC420K)
Cutting Conditions: v_c=200m/min, f=0.32mm/rev, a_p=3.0mm, Wet

FCD500 Shaft

AC420K delivers 1.3 times longer stable tool life in heavy interrupted cutting.

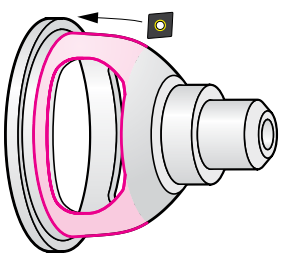


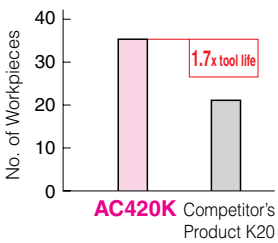


Insert: DNMG150412N-GZ (AC420K)
Cutting Conditions: v_c=100 to 270m/min, f=0.15 to 0.40mm/rev, a_p=1.5mm, Wet

FCD450 Differential Case

Reduces occurrence of sudden breakages and achieves 1.7 times longer stable tool life in heavy interrupted cutting.



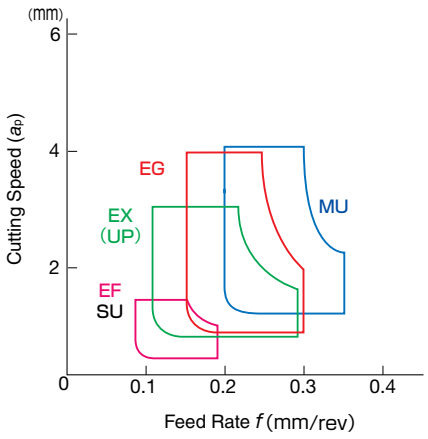


Insert: CNMA120408 (AC420K)
Cutting Conditions: v_c=250m/min, f=0.30mm/rev, a_p=2.0 to 3.0mm, Wet

Turning Insert Selection Guide / Recommended Cutting Conditions

Chipbreakers

Negative Type



Grades

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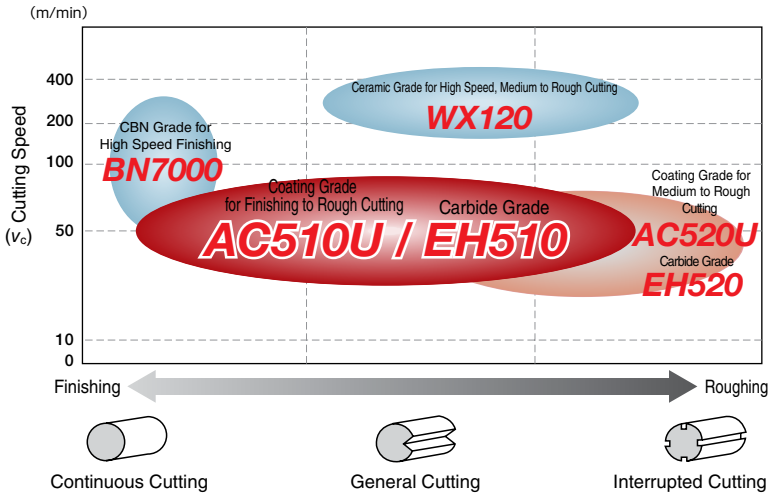
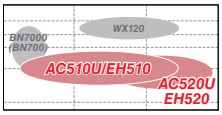
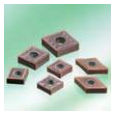


S Exotic Alloy Recommended Cutting Conditions

(Red text indicates 1st recommendation.)

Work Material	Cutting Process	Chipbreakers	Grades	Cutting Conditions (Min. - **Optimum** - Max.)		
				Depth of Cut a_p (mm)	Feed Rate f (mm/rev)	Cutting Speed V_c (m/min)
Heat-Resistant Alloy (Ni-based Material, Fe-based Material, Co-based Material)	Finishing	**EF**(SU)	**AC510U**	0.2-**0.5**-1.5	0.1-**0.12**-0.2	50-**60**-90
	Light	EX	**AC510U**	0.5-**1.0**-3.0	0.1-**0.20**-0.3	40-**50**-80
	Medium	**EG**	**AC510U**	0.5-**2.0**-4.0	0.15-**0.25**-0.3	40-**50**-80
	Rough	MU	**AC520U**	1.0-**2.0**-4.0	0.2-**0.25**-0.35	30-**45**-60
Titanium Alloy (Pure Titanium (99.5%), $\alpha + \beta$ Alloy)	Finishing	**EF**(SU)	**EH510** (**AC510U**)	0.2-**0.5**-1.5	0.1-**0.15**-0.2	50-**65**-80
	Light	EX	**AC510U**	0.5-**1.0**-2.5	0.1-**0.20**-0.25	40-**55**-70
	Medium	**EG**	**EH510** (**AC510U**)	0.5-**2.0**-3.5	0.15-**0.25**-0.3	40-**55**-70
	Rough	MU	**AC520U**	1.0-**2.0**-3.5	0.2-**0.25**-0.3	30-**40**-50





Grades AC510U / AC520U / EH510 / EH520

● PVD (Super ZX Coat) grade with excellent wear and thermal resistance.

AC510U : Excellent sharpness and reliability. A general purpose grade suitable for a wide range of applications from roughing to finishing.

AC520U : Excellent fracture resistance. A tough grade that is perfect for heavy interrupted cutting and mill-scaled work.

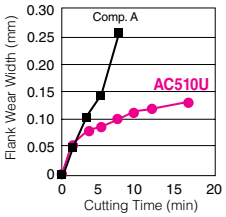
● Carbides with excellent thermal, wear, and fracture resistance for use with titanium alloys.

EH510 : General purpose grade for titanium machining that features excellent wear and thermal resistance. For applications from roughing to finishing.

EH520 : Tough grade for titanium machining with excellent fracture and thermal resistance. Perfect for interrupted cutting and mill-scaled work.

AC510U Cutting Performance

● Turning of Thermal Resistant (Ni-based) Alloys



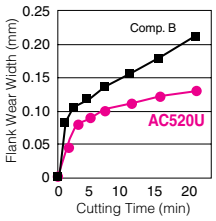
Half the wear of competitor's grade with 2x tool life!

AC510U Comp. A

Work Material: Inconel 718 (45HRC)
Insert: CNMG120408N-EX (AC510U)
Cutting Conditions: v_c=80m/min f=0.12mm/rev a_p=0.8mm Wet

AC520U Cutting Performance

● Turning of Thermal Resistant (Fe-based) Alloys



Stable turning with no notch wear!

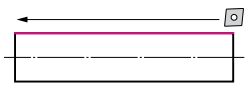
AC520U Comp.B

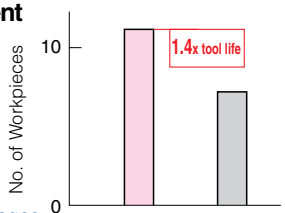
Work Material: Heat resistant ferrous alloy
Insert: CNMG120408N-MU (AC520U)
Cutting Conditions: v_c=40m/min f=0.2mm/rev a_p=2.0mm Wet

Application Examples

AC510U/EH510

Inconel 718 Shaft Component

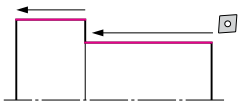


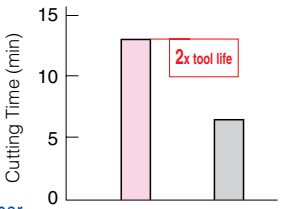


Stable, long tool life with no breakages. Small chips.

Insert: CNMG120408N-EG(AC510U)
Cutting Conditions: v_c=45m/min f=0.23mm/rev a_p=2mm Wet

Titanium Ti-6Al-4V

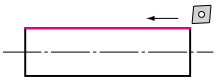


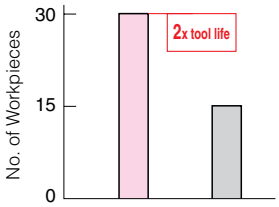


Tool life doubled with reduced crater wear. Now with drastically improved chip control.

Insert: CNMG120412N-EG(EH510)
Cutting Conditions: v_c=65m/min f=0.2mm/rev a_p=2.5mm Wet

Inconel 718 Pin

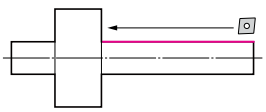


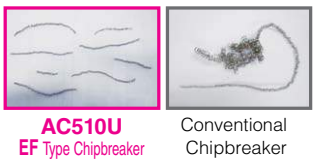


Achieving 1.3x higher efficiency and stable tool life with cutting speeds of 40m/min as compared to 30m/min for conventional grades.

Insert: CNMG120408N-EX(AC510U)
Cutting Conditions: v_c=40m/min f=0.25mm/rev a_p=2.0mm Wet

Inconel 718 Shaft Component





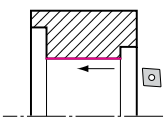
AC510U EF Type Chipbreaker | Conventional Chipbreaker

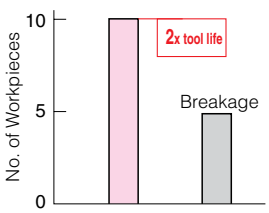
Drastically improved chip control. Eliminate final polishing process without damaging work.

Insert: CNMG120408N-EF(AC510U)
Cutting Conditions: v_c=45m/min f=0.1mm/rev a_p=0.25mm Wet

AC520U

Inconel 718 Machine Component

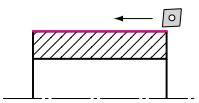


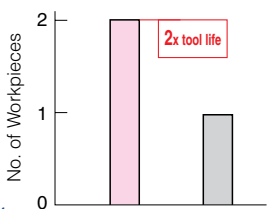


Stable, long tool life with no breakage.

Insert: CNMG120412N-MU(AC520U)
Cutting Conditions: v_c=35m/min f=0.2mm/rev a_p=2.5mm Wet

Stellite Machine Component



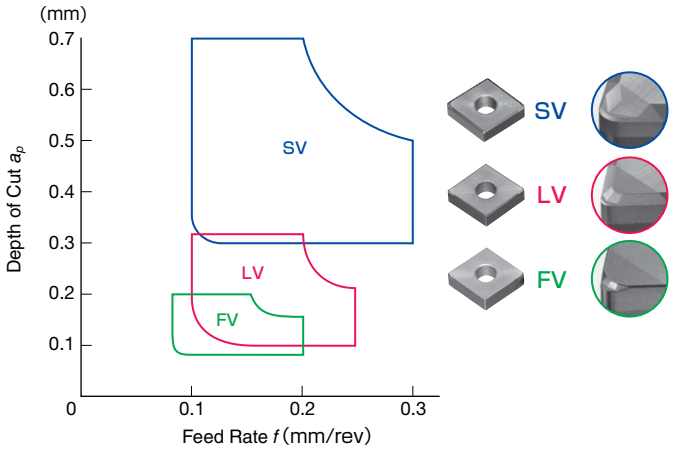


Achieving 1.5x higher efficiency with cutting speeds of 30m/min as compared to 20m/min for conventional grades.

Insert: CNMG120408N-EX(AC520U)
Cutting Conditions: v_c=30m/min f=0.1mm/rev a_p=1.0mm Wet

Chipbreakers

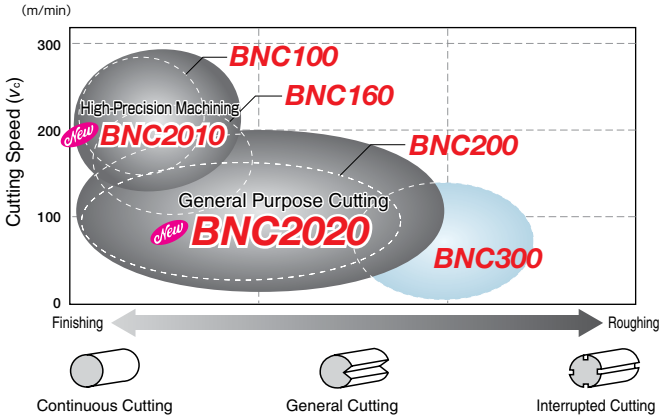
LV Type/FV Type Chipbreaker : For chip control during finishing of hardened steel
SV Type Chipbreaker : For chip control during carburized layer removal



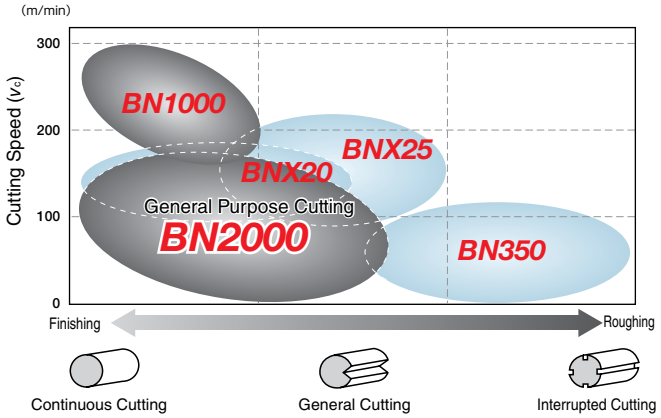
SUMIBORON Break Master ••• Page L24

Grades

● Coated SUMIBORON



● Uncoated SUMIBORON



SUMIBORON ••• Page L2

H Hardened Steel Recommended Cutting Conditions

(Red text indicates 1st recommendation.)

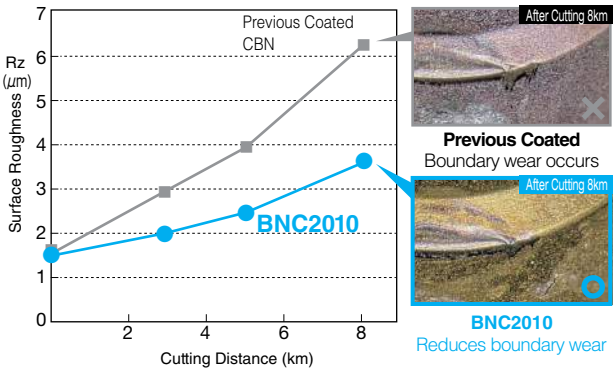
Cutting Process	Grade	Cutting Conditions (Min. - **Optimum** - Max.)		
		Depth of Cut a_p(mm)	Feed Rate f(mm/rev)	Cutting Speed V_c(m/min)
Continuous Cutting	**BNC2010**	0.03-**0.20**-0.35	0.03-**0.10**-0.20	120-**200**-300
	BNC100	0.03-**0.20**-0.30	0.03-**0.10**-0.20	120-**200**-300
	BN1000	0.03-**0.15**-0.20	0.03-**0.10**-0.15	100-**150**-300
	BNX10	0.03-**0.10**-0.20	0.03-**0.10**-0.15	120-**180**-300
General Turning	**BNC2020**	0.03-**0.30**-0.50	0.03-**0.20**-0.40	50-**130**-220
	BNC160	0.03-**0.20**-0.35	0.03-**0.10**-0.25	120-**180**-220
	BNC200	0.03-**0.30**-0.50	0.03-**0.10**-0.30	50-**130**-220
	BN2000	0.03-**0.20**-0.30	0.03-**0.10**-0.20	50-**100**-200
	BNX20	0.03-**0.20**-0.35	0.03-**0.15**-0.30	70-**130**-170
Interrupted Cutting	**BNC300**	0.03-**0.20**-0.30	0.03-**0.10**-0.20	50-**100**-150
	BN350	0.03-**0.20**-0.30	0.03-**0.10**-0.20	50-**100**-150
	BNX25	0.03-**0.20**-0.50	0.03-**0.15**-0.30	120-**160**-220

Grades — New BNC2010 / New BNC2020

BNC2010 : For high-precision finishing requiring good surface roughness and dimensional accuracy.
Enables stable machining and provides excellent surface roughness thanks to superior boundary wear resistant coating and CBN substrate.

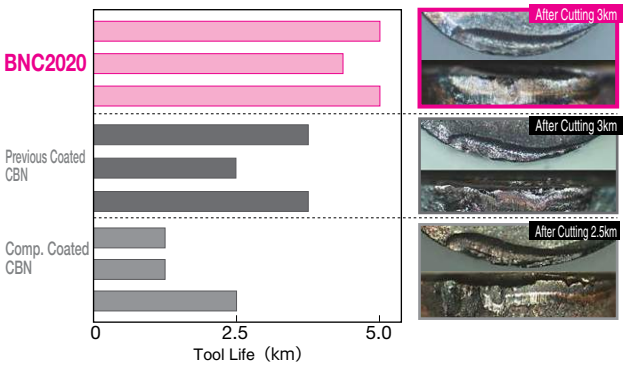
BNC2020 : General purpose grade suitable for typical hardened steel machining applications.
Achieves long tool life thanks to highly-wear-resistant and highly-adhesive coating and tough CBN substrate.

● BNC2010 Cutting Performance



Work Material : SCM415 58-62HRC (Continuous)
Insert : 4NC-DNGA150408 Edge Treatment : S01225
Cutting Conditions : v_c=160m/min f=0.08mm/rev a_p=0.1mm Wet

● BNC2020 Cutting Performance



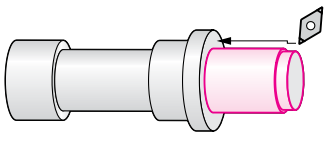
Work Material : SCM415-5V 58-62HRC (Interrupted Cutting)
Insert : 4NC-CNGA120412 Edge Treatment : S01225
Cutting Conditions : v_c=130m/min f=0.1mm/rev a_p=0.6mm Dry

Application Examples

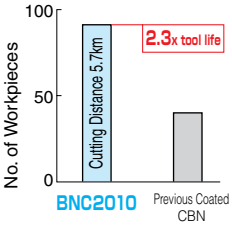
New BNC2010

【Continuous External Turning of Main Shaft】(58 to 60HRC)

BNC2010 provides excellent wear resistance and achieves excellent surface roughness.



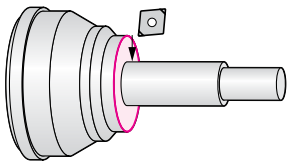
Surface Roughness Ra=0.6μm



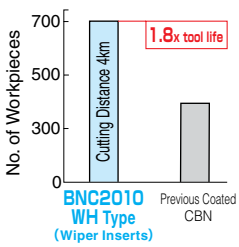
Insert : 4NC-DNGA150408 (BNC2010)
Cutting Conditions : v_c=200m/min f=0.10mm/rev a_p=0.35mm Dry

【Facing of CVJ Outer Race】(58 to 60HRC)

BNC2010 with a WH type wiper insert maintains excellent surface roughness for a long time.



Surface Roughness Rz=1.6μm

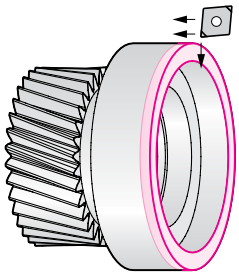


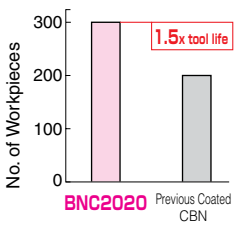
Insert : 2NC-CNGA120412WH (BNC2010)
Cutting Conditions : v_c=150m/min f=0.2mm/rev a_p=0.2mm Dry

New BNC2020

【Carburized Layer Removal for Sun Gear】(58 to 60HRC)

BNC2020 achieves long tool life in high load cutting.

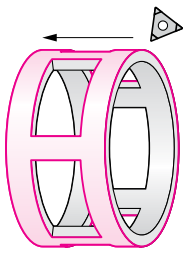


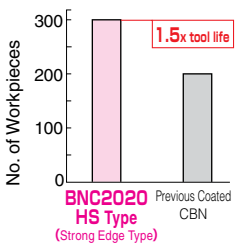


Insert : 4NC-CNGA120408 (BNC2020)
Cutting Conditions : v_c=100m/min f=0.15mm/rev a_p=0.50mm Wet

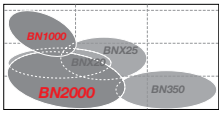
【Interrupted Machining of CVJ Cage Window】(58 to 60HRC)

BNC2020 strong edge HS type provides stable performance in interrupted cutting.





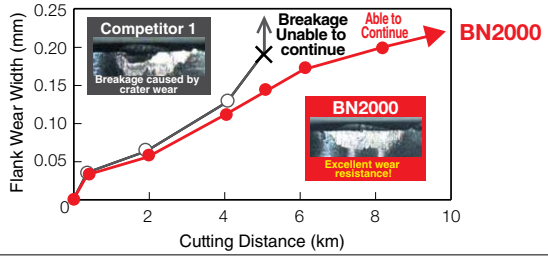
Insert : 3NC-TNGA160420HS (BNC2020)
Cutting Conditions : v_c=120m/min f=0.1mm/rev a_p=0.15mm Dry

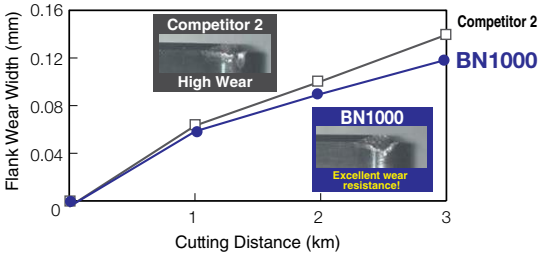
Grades BN2000 / BN1000

BN2000: General purpose grade suitable for typical hardened steel machining applications.
Provides a high degree of fracture and wear resistance.
BN1000: For high speed machining. BN1000 provides the highest wear resistance of all uncoated SUMIBORON grades.
Features improved fracture resistance while still placing a priority on wear resistance.

● Wear Resistance (Continuous Cutting)



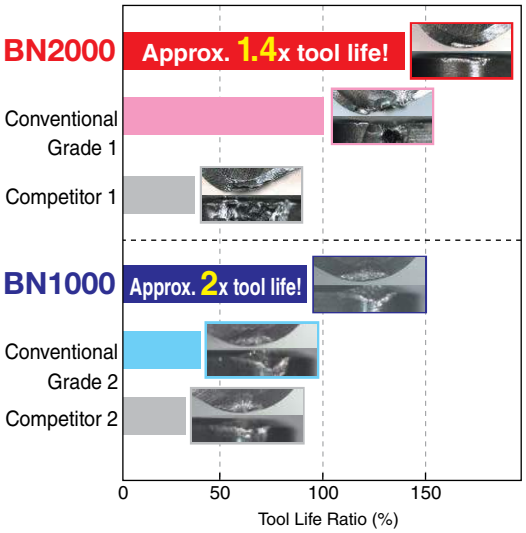
Work Material: SCM415H Round Bar (58-62HRC)
Cutting Conditions: v_c=100m/min f=0.1mm/rev a_p=0.2mm Dry



Work Material: SUJ2 Round Bar (58-62HRC)
Cutting Conditions: v_c=150m/min f=0.1mm/rev a_p=0.2mm Dry

● Chipping Resistance (Interrupted Cutting)

(Comparison based on conventional BN2000 as 100%.)



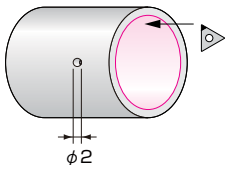
Work Material: SCM415H 8V Grooved Material (58-62HRC)
Insert: 2NU-CNGA120408
Cutting Conditions: v_c=150m/min f=0.1mm/rev a_p=0.2mm Dry

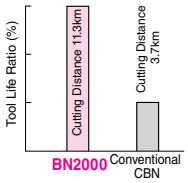
Application Examples

BN2000

SCM415H Clutch Component

Employs BN2000 for superior fracture resistance compared to conventional grade and longer tool life.

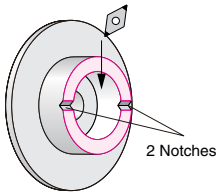


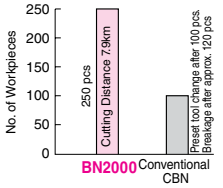


Insert: NU-TPGW110308(BN2000)
Cutting Conditions: v_c=135m/min f=0.08mm/rev a_p=0.15mm Dry

SCM415H CVT Pulley Slide

Whereas conventional products required replacement after 100 workpieces (preset tool change,) BN2000 has no breakage after 250 workpieces.

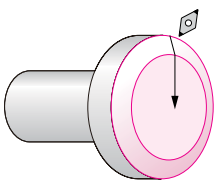


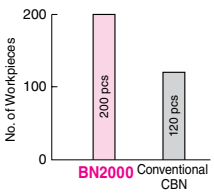


Insert: 2NU-DNGA150408(BN2000)
Cutting Conditions: v_c=150m/min f=0.1mm/rev a_p=0.2mm Dry

SKD11 Plunger

Long tool life and more stable surface roughness than coated CBN at extremely low cutting speeds.



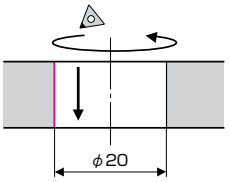


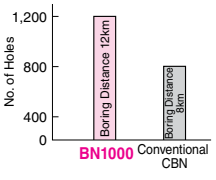
Insert: 2NU-DNGA150408(BN2000)
Cutting Conditions: v_c=0 to 100m/min f=0.03 to 0.25mm/rev a_p=0.04mm Dry

BN1000

SUJ2 Internal Boring

BN1000 ensures less friction than conventional grades and achieves long tool life.





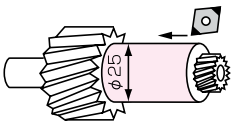
Insert: NU-TPGW110304(BN1000)
Cutting Conditions: v_c=120m/min f=0.06mm/rev a_p=0.2mm Wet

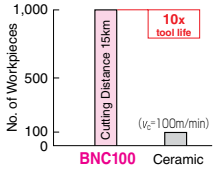
Application Examples — BNC100 / BNC160 / BNC200 / BNC300 / BNX10 / BNX20 / BNX25 / BN350

BNC100

Shaft Component (Carburised Material 58-62HRC)

BNC100 provides 1.5x cutting speed and 10x tool life.





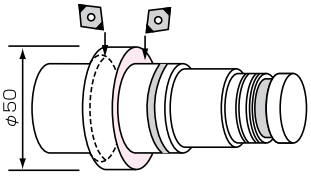
Continuous Turning Of Hardened Steel

Insert: 4NC-CNGA120408(BNC100)
Cutting Conditions: v_c=150m/min f=0.1mm/rev a_p=0.15mm Wet

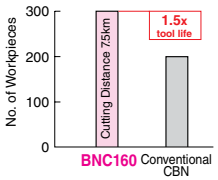
BNC160

Shaft Component (Carburised Material 58-62HRC)

BNC160 has excellent wear resistance while LS type gives best surface roughness stability in machining at Rz = 1.6 μm, and achieves 1.5x tool life.



Surface Roughness Rz=1.6μm



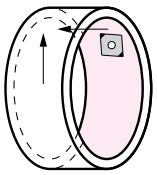
Face Finishing of Hardened Steel

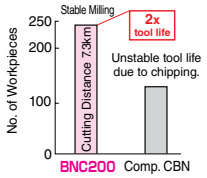
Insert: 4NC-CNGA120408LS(BNC160)
Cutting Conditions: v_c=200m/min f=0.05mm/rev a_p=0.1mm Dry

BNC200

Bearing Steel (62HRC)

Provides superior stability and 2 times longer tool life than competitor's CBN.



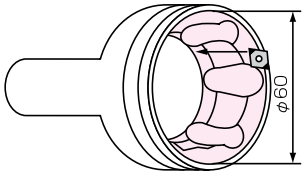


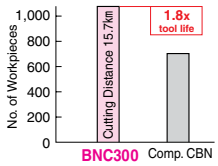
Insert: 4NC-CNGA120412(BNC200)
Cutting Conditions: v_c=150m/min f=0.15mm/rev a_p=0.25mm Dry

BNC300

CVJ Component (Induction-Hardened Steel 58-63HRC)

BNC300HS has no chipping, gives stable performance for 900 workpieces, and now has an extended preset tool life that is 1.8 times longer.





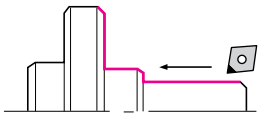
Boring of Hardened Steel

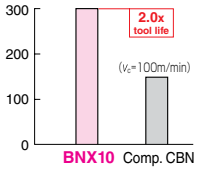
Insert: 4NC-DNGA150412HS(BNC300)
Cutting Conditions: v_c=100m/min f=0.12mm/rev a_p=0.2mm Dry

BNX10

S30C Shaft Component (60HRC)

Double the efficiency and more than double the tool life of competitor's CBN.



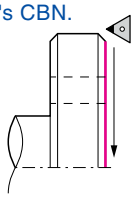


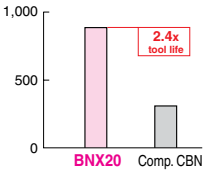
Insert: NU-CNMA120412(BNX10)
Cutting Conditions: v_c=200m/min f=0.08mm/rev a_p=0.15mm Wet

BNX20

SCM415 Flange Component (62HRC)

Better wear resistance and 2.4 times longer tool life than competitor's CBN.



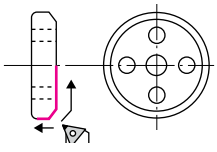


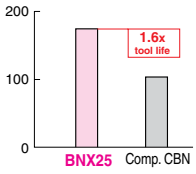
Insert: NU-TNMA160408(BNX20)
Cutting Conditions: v_c=150m/min f=0.1mm/rev a_p=0.12mm Dry

BNX25

SCM420 Gear Component (60HRC)

Lower variance and 1.6 times longer tool life than competitor's CBN.



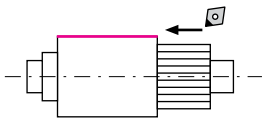


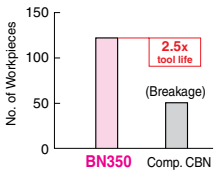
Insert: NS-TNMA160408(BNX25)
Cutting Conditions: v_c=150m/min f=0.12mm/rev a_p=0.2mm Dry

BN350

SCr420H Gear Shaft Component (58-62HRC)

Better fracture resistance and 2.5 times longer tool life than competitor's CBN.

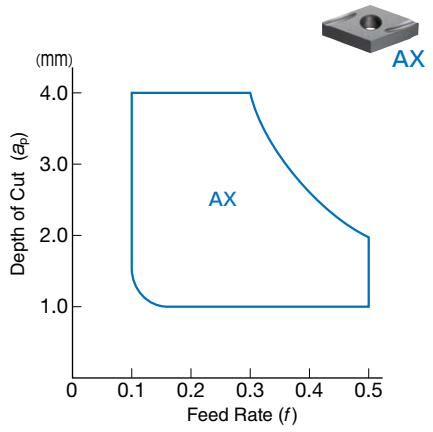




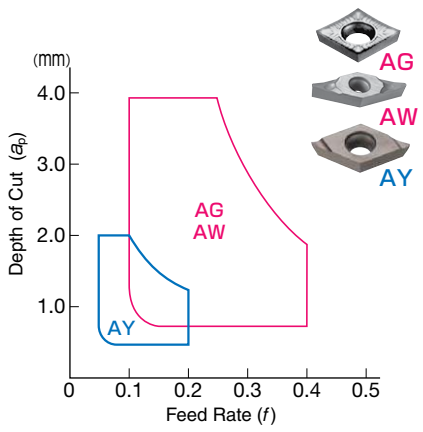
Insert: NU-CNMA120412(BN350)
Cutting Conditions: v_c=125m/min f=0.15mm/rev a_p=0.3mm Dry

Chipbreakers

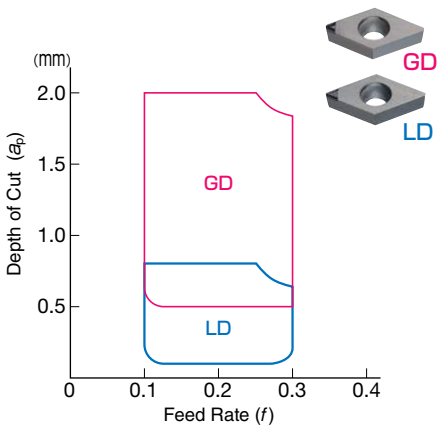
Negative Type



Positive Type

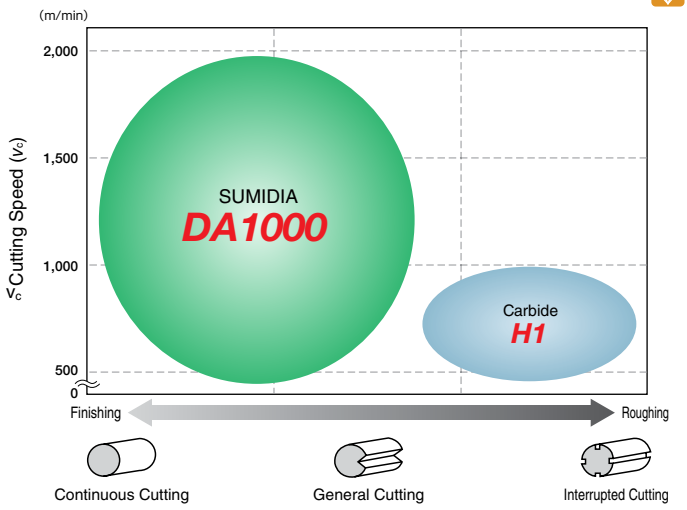


Negative Type (PCD)



Grades

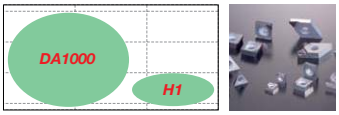
PCD SUMIDIA DA1000 ··· Page M3



Recommended Cutting Conditions

(Red text indicates 1st recommendation.)

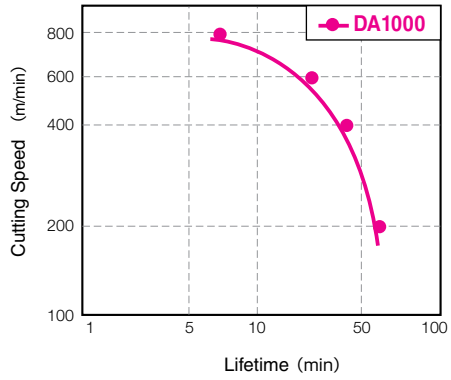
Cutting Process	Category	Grades	Cutting Conditions (Min. - **Optimum** - Max.)		
			Depth of Cut a_p (mm)	Feed Rate f (mm/rev)	Cutting Speed V_c (m/min)
Continuous Cutting General Turning Interrupted Cutting	SUMIDIA	**DA1000**	0.1-**0.5**-3.0	0.05-**0.10**-0.20	Up to 2,000
		DA2200	0.1-**0.5**-3.0	0.05-**0.10**-0.20	Up to 2,000
		DA150	0.1-**0.5**-3.0	0.05-**0.10**-0.20	Up to 2,000
		DA90	0.1-**0.5**-3.0	0.05-**0.10**-0.20	Up to 2,000
	Carbide	**H1**	0.3-**1.0**-5.0	0.1-**0.20**-0.5	Up to 1,000



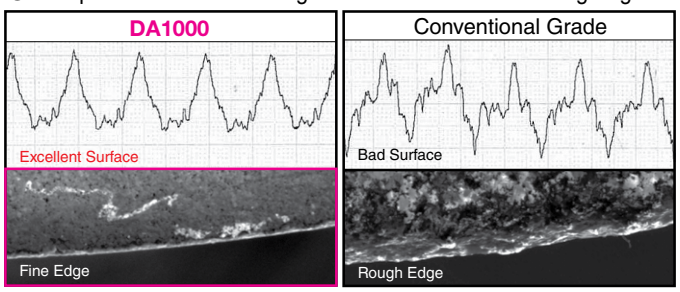
Grades DA1000

- Ultra-high-density, sintered ultra-fine diamond particles
- Significantly improved surface roughness on machined surfaces
- World's best wear resistance and strength
- Suitable for use with all aluminium and non-ferrous alloys

DA1000 Wear Resistance

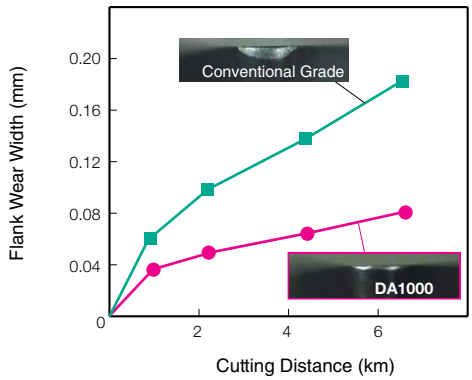


Comparison of Surface Roughness of Nose Radius Cutting Edge



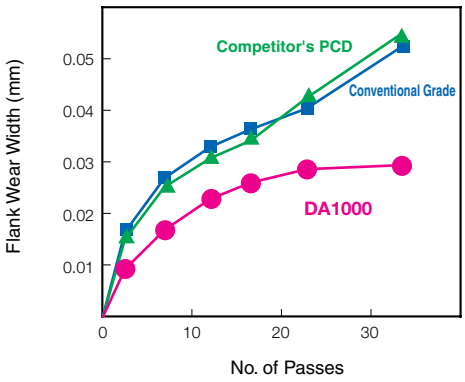
Insert: TPGW160308
Cutting Conditions: v_c=1,000m/min f=0.15mm/rev a_p=0.2mm Wet

Wear Resistance in Turning Applications



Insert: TPGN160304
Cutting Conditions: v_c=800m/min f=0.12mm/rev a_p=0.5mm Wet

Wear Resistance in Milling Applications



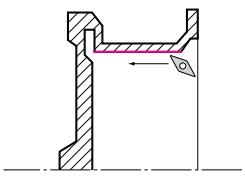
Insert: NF-SNEW1204ADFR
Cutting Conditions: v_c=2,000m/min f=0.15mm/rev a_p=3.0mm Wet

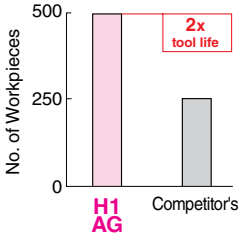
Application Examples

H1 + AG Type Breakers

ADC12 Aluminium Wheel

Excellent adhesion resistance.
Longer tool life.



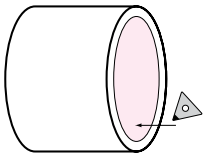


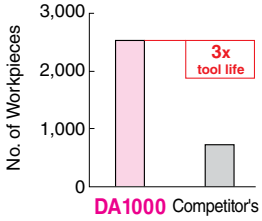
Insert: VCGT160408N-AG(H1)
Cutting Conditions: v_c=2,200m/min f=0.25mm/rev a_p=2.0mm Wet

DA1000

Copper Alloy Bush

Stable surface roughness with no edge breakage (3.2S).
Tool life improved to 3x that of conventional models.





Insert: NF-TPGN160308(DA1000)
Cutting Conditions: v_c=300m/min f=0.07mm/rev a_p=0.08mm Wet

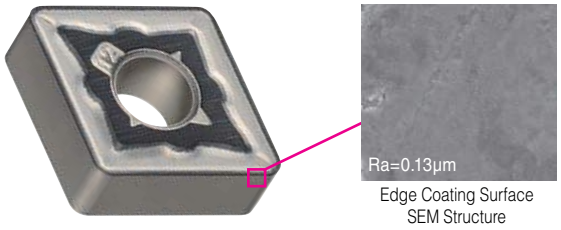
Coated Carbide

Coating Series

Sumitomo Electric Hardmetal's Coating Series are high-quality, high-performance indexable grades that combines a proprietary, special ultra-hard carbide substrate with a multi-layered coating that provides excellent wear and heat resistance plus superior adhesion strength. Utilised in high-speed, high-efficiency applications on a wide range of work material including, steel, cast iron, and exotic alloys.

Characteristics

Absotech Platinum — New — CVD

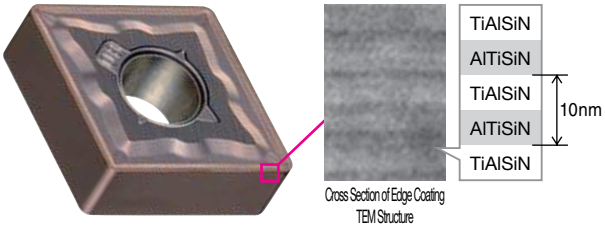


Achieves a good balance between drastically-improved coating strength and excellent surface smoothness and enables stable machining thanks to newly-developed boride-based titanium compound coating.

- Achieves over 2 times chipping resistance compared with conventional coating thanks to the improved coating strength.
- Drastically improves the adhesion resistance and reduces the occurrence of abnormal damage thanks to excellent surface smoothness.
- Improves the corner visibility with a unique appearance tone.

■ Adopted Grades : (For Stainless Steel Turning) AC6030M

Absotech Bronze — New — PVD

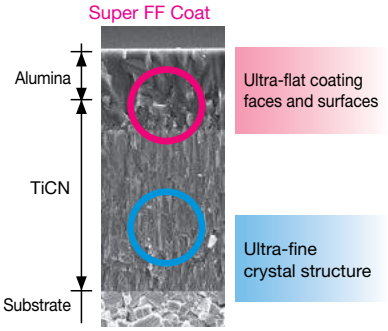


Improves the stability of cutting edges by following our unique ultra-multi-layered thin coating structure, which is applied to Super ZX Coating, and by employing a highly-heat-resistant coating with a new composition, as well as improving the adhesion strength between the carbide substrate and coating.

- Achieves wear resistance and oxidation resistance by employing a TiAlSiN-based ultra-multi-layered coating structure with a new composition.
- Drastically improves the peel-off resistance of the coating by improving the boundary control technology between the carbide substrate and coating.
- Achieves over 2 times greater fracture resistance in stainless steel machining compared with conventional grades.

■ Adopted Grades : (For Stainless Steel Turning) AC6040M

Super FF Coat — CVD

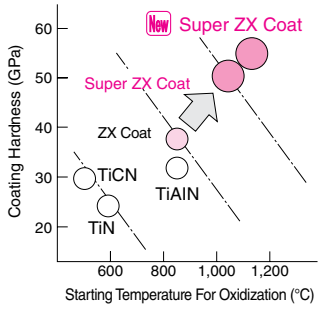


Our unique CVD process achieves ultra-flat boundary faces between coating layers and super ultra-fine coating particles.

- Smooth coating surface provides excellent adhesion and chipping resistance. Improved coating adhesion strength.
- Harder than conventional coatings with huge improvements in wear resistance.
- High speed, high efficiency machining of more than 1.5 times that of conventional grades is possible.
- Achieving more than double the tool life of conventional grades under conventional cutting conditions.

■ Adopted Grades : (For Steel Turning) AC810P, AC820P, AC830P
(For Cast Iron Turning) AC405K, AC415K, AC420K
(For Stainless Steel Turning) AC610M, AC630M
(For Milling) ACP100, ACK200

NEW Super ZX Coat / Super ZX Coat — PVD



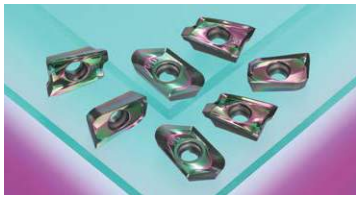
Utilising our proprietary thin layer coating technology and advanced nanotechnology, high coating hardness and excellent oxidation resistance are achieved by a coating structure that consist of approximately 1,000 alternating, nanometre-level-thin (1 nanometre = 1 billionth of a metre) layers.

- Coating hardness increased by 40% and starting temperature for start of oxidization increased by 200°C compared to conventional grades.
- At least 1.5x improvement in high-speed and high-efficiency cutting compared to conventional grades
- Achieving more than double the tool life of conventional grades under conventional cutting conditions.

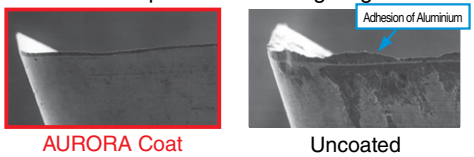
■ Adopted Grades : (For Turning) AC503U, AC510U, AC520U, AC530U
(For Milling) ACK300, ACP200, ACP300

AURORA Coat (DLC:**D**iamond **L**ike **C**arbon) — PVD

Using our proprietary PVD process technology, we have developed a hydrogen-free DLC coating that is extremely hard and smooth.



● ADC12 Comparison of Cutting Edge Adhesion After Cutting



Work Material : ADC12
Cutting Conditions : V_C : 300m/min
f_z : 0.15mm/t
a_p=a_e : 5mm Dry

- Second only to diamond in terms of hardness, this smooth coating has a low coefficient of friction and provides excellent adhesion resistance to deliver better-quality machined surfaces.
- Can be used for high-speed, high-efficiency cutting of aluminium alloys, copper alloys, resins, and more.

■ Adopted Grades (For Milling) DL1000
(For Endmilling) DL1000, DL1200
(For Drilling) DL1300, DL1500

Characteristic Values

For Turning(CVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (μm)	Characteristics	Old Grades
P Steel	**AC810P**	91.0	2.2	Super FF Coat	18	A P10 grade with excellent wear resistance that utilises a special carbide substrate with Super FF Coat for high to medium speed cutting.	AC700G
	AC820P	90.1	2.2	Super FF Coat	14	A P20 grade that features stability and longer tool life. Employs special carbide substrate and Super FF Coat to improve on P20 wear and fracture resistance.	AC2000
	AC830P	89.4	2.6	Super FF Coat	8	Stable long-life grade employs special tough, carbide substrate and Super FF Coat. Improves on P30 grade fracture resistance and approaches P20 grade in terms of wear resistance.	AC3000
	AC630M	89.5	2.7	Super FF Coat	5	Superior performance in continuous and light cutting, and other low-speed applications that require sharp edges.	AC230
M Stainless Steel	**AC610M**	91.0	2.2	Super FF Coat	5	A high efficiency M10 grade featuring improved wear resistance during stainless steel cutting. Employs special, ultra-hard substrate and thin Super FF Coat.	—
	New **AC6030M**	89.5	2.7	Absotech Platinum	5	The first recommended grade for general machining of stainless steel that drastically reduces the occurrence of abnormal damage in stainless steel machining and achieves long and stable tool life by employing a new coating: Absotech Platinum.	—
	AC630M	89.5	2.7	Super FF Coat	5	A general purpose grade featuring improved wear and fracture resistance during stainless steel cutting. Utilises a special tough carbide substrate with a thin Super FF Coat.	AC304
K Cast Iron	**AC405K**	92.0	2.4	Super FF Coat	18	Employs an ultra-hard substrate and ultra-hard Super FF Coating to provide excellent resistance to wear and plastic deformation. Suitable for high-speed continuous cutting of cast iron.	AC410K
	AC415K	91.1	2.5	Super FF Coat	18	Employs a special dedicated ultra-hard substrate that is also suitable for interrupted cutting and ultra-hard Super FF Coating to provide stability and long tool life in a wide range of processes. First recommended grade for cast iron turning.	AC410K
	AC420K	91.1	2.5	Super FF Coat	12	A new, extremely versatile grade that can be used for rough, interrupted cutting of ductile and grey cast iron. Employs special, ultra-hard carbide substrate and Super FF Coat to provide stability and long tool life.	AC700G
	AC820P	90.1	2.2	Super FF Coat	14	A grade suited to heavy interrupted cutting of ductile cast iron.	AC2000

For Milling(CVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (μm)	Characteristics	Old Grades
P Steel	**ACP100**	89.3	3.1	Super FF Coat	6	A grade that employs a tough carbide substrate and thin-layer Super FF Coating to provide superior thermal crack and wear resistance in high-speed milling of steel.	AC230
M Stainless Steel	New **ACM200**	89.8	3.4	Super FF Coat	6	A grade ideal for hardened steel machining that provides excellent wear and heat resistance by employing a newly-developed ultra-hard carbide and Super FF Coating.	AC230
K Cast Iron	**ACK200**	91.7	2.5	Super FF Coat	6	A grade that employs a tough carbide substrate and thin-layer Super FF Coating to provide superior thermal crack and wear resistance for high-speed milling.	AC211

Coated Carbide

PVD Coating Series

Characteristic Values

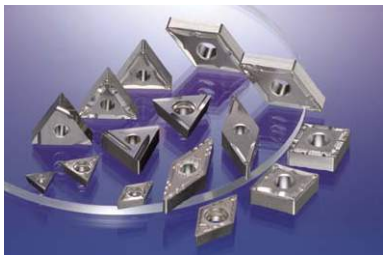
For Turning (PVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Characteristics	Old Grades
P Steel	**T1500Z** (Cermet)	92.0	2.2	Brilliant Coat*	3	• Brilliant Coat* PVD coating gives excellent lubricity for higher quality machining. General-purpose coated cermet grade that can maintain high-quality machined surfaces and also gives excellent wear resistance.	T2000Z
	T3000Z (Cermet)	91.3	2.4	ZX Coat	3	• An ultra-reliable coating grade with tough cermet substrate.	—
	AC530U	91.4	3.3	Super ZX Coat	3	• For interrupted and general steel cutting. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.	ACZ310
	AC520U	91.7	3.0	Super ZX Coat	3	• Interrupted machining and stainless steel machining. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a super tough substrate for excellent fracture resistance.	EH520Z EH20Z
M Stainless Steel	New **AC6040M**	91.6	3.8	Absotech Bronze	3	• The first recommended grade for interrupted machining of stainless steel that drastically improves the reliability in unstable machining thanks to the excellent adhesion and peel-off resistance of the new Absotech Bronze PVD coating, as well as the improved fracture resistance of the exclusive ultra-hard carbide substrate.	AC530U
	AC530U	91.4	3.3	Super ZX Coat	3	• Heavy interrupted machining and stainless steel machining. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.	ACZ310
K Cast Iron	**AC510U**	92.6	2.6	Super ZX Coat	3	• General to interrupted machining of cast iron and ductile cast iron. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.	EH510Z EH10Z
S Exotic Alloy	**AC510U**	92.6	2.6	Super ZX Coat	3	• Finishing to medium cutting of exotic alloys. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. Superior wear and heat resistance, and stable, long tool life.	EH510Z EH10Z
	AC520U	91.7	3.0	Super ZX Coat	3	• Medium to rough cutting of exotic alloys. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. Superior wear and heat resistance, and stable, long tool life even in interrupted cutting.	EH520Z EH20Z
H Hardened Steel	**AC503U**	93.2	1.7	Super ZX Coat	3	• For hardened steel. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with an ultra-hard substrate for excellent wear resistance.	—
Small Product Machining	**ACZ150**	91.4	3.3	ZX Coat	1	• For small tools, and high-precision finishing to general finishing applications. • TiN ultra-thin coating and fine-grained, super tough substrate combine to give good edge sharpness and superior cut finish.	—

For Milling (PVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Characteristics	Old Grades
P Steel	**ACP200**	89.5	3.2	(New) Super ZX Coat	3	• For general machining of general and die steel. • Employs PVD coating consisting of multiple nanometer-thin layers.A general grade that achieves a good balance between fracture resistance and wear resistance when combined with an exclusive tough substrate.	ACZ330
	ACP300	89.3	3.1	(New) Super ZX Coat	3	• For interrupted machining and stainless steel machining. • Employs PVD coating consisting of multiple nanometer-thin layers.Provides excellent fracture resistance when combined with an ultra-tough substrate.	ACZ350
M Stainless Steel	New **ACM100**	91.4	3.3	(New) Super ZX Coat	3	• A grade that provides excellent wear resistance by employing an ultra-hard fine-grained carbide and New Super ZX Coating.	ACZ310
	New **ACM300**	89.8	3.4	(New) Super ZX Coat	3	• The first recommended grade for stainless steel machining that achieves a good balance between wear resistance and fracture resistance by employing a newly-developed ultra-hard carbide and New Super ZX Coating.	—
K Cast Iron	**ACK300**	91.4	3.3	(New) Super ZX Coat	3	• For general and interrupted machining of cast iron and ductile cast iron. • Employs PVD coating consisting of multiple nanometer-thin layers.Provides excellent fracture resistance when combined with a fine-grained tough substrate.	ACZ310
N Non-Ferrous Metal	**DL1000**	92.9	2.1	AURORA Coat (DLC Coat)	0.5	• For machining of non-ferrous metals including aluminum and copper alloy as well as resin. • Coated with DLC, which provides a low friction coefficient and excellent adhesion resistance.	—

*There may be minor differences in the colour tone/lustre of Brilliant Coat grades due to the interference of light. Such differences have no effect on performance.



Various grades and expanded lineup of catalogue items meet a wide range of finishing needs.

Lineup includes wear-resistant T1000A, general purpose T1500A, general purpose coated cermet T1500Z, and tough T3000Z grades.
Expanded lineup of catalogue items for a wide variety of finishing applications.

Characteristics

Uncoated Cermet

T1000A (Exclusive Grade)

Exclusive cermet grade with excellent wear resistance

- Improved wear and fracture resistance.
- Solid solution hard phase reduces reaction with steel.
- Perfect for high-speed continuous finishing of steel, cast iron, and powdered metal.

T1500A (New General Purpose Grade)

General purpose coated cermet grade that employs new Brilliant Coat* PVD coating with excellent lubricity

- Excellent wear resistance provides long tool life.
- Reduces adhesion of work material for beautiful finished surfaces.

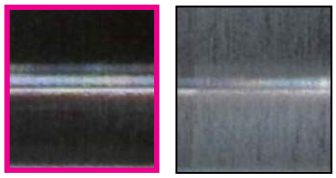
Coated Cermet

T1500A (General Purpose Grade)

General purpose cermet grade that provides both wear and fracture resistance with better quality finished surfaces

- Mixing hard phases of different functionality, grain size, and compositions improves balance of wear and fracture resistance.
- Improved edge treatment technology provides beautiful finished surfaces.

Surface Finish Comparison



T1500Z — Excellent Wear Resistance — Glossy Finished Surfaces — Reduced Blemishes

Conventional Coated Cermet

Work Material : STKM13A
Insert : CNMG120408N-LU
Cutting Conditions : v_c=100m/min
f=0.15mm/rev
a_p=1.0mm Wet

Characteristic Values

For Turning

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (μm)	Characteristics	Old Grades
P Steel	**T1000A**	93.3	1.8	—	—	Uncoated cermet grade with excellent wear resistance that provides good cost efficiency. Demonstrates excellent wear resistance in continuous finishing applications, and stable finishing of cast iron and sintered alloy as well as steel.	T110A
	T1500A	92.0	2.2	—	—	A general purpose grade that employs a substrate with improved balance of fracture and wear resistance to deliver superior finished surfaces in a wide variety of cutting conditions.	T1200A
	T1500Z	92.0	2.2	PVD Brilliant Coat*	3	Brilliant Coat's* new PVD coating gives excellent lubricity for higher quality machining. General-purpose coated cermet grade that can maintain high-quality machined surfaces and also gives excellent wear resistance.	T2000Z
	T3000Z	91.3	2.4	PVD ZX Coat	3	An ultra-reliable coating grade with tough cermet substrate.	—
K Cast Iron	**T1000A**	93.3	1.8	—	—	Exclusive uncoated cermet grade with excellent cost efficiency suitable for cast iron finishing, which requires high hardness.	T110A

For Milling

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (μm)	Characteristics	Old Grades
P Steel M Stainless Steel	**T1500A**	92.0	2.2	—	—	A general-purpose grade that employs a substrate with an improved balance between fracture and wear resistance to deliver superior finished surfaces in a wide variety of cutting conditions.	T1200A
	T250A	91.4	2.1	—	—	Tough cermet grade with enhanced crack spread resistance.	—
	T4500A	91.0	2.3	—	—	Cermet grade with excellent fracture resistance and reduced occurrence of thermal cracking.	—

*There may be minor differences in the colour tone/lustre of Brilliant Coat grades due to the interference of light. Such differences have no effect on performance.

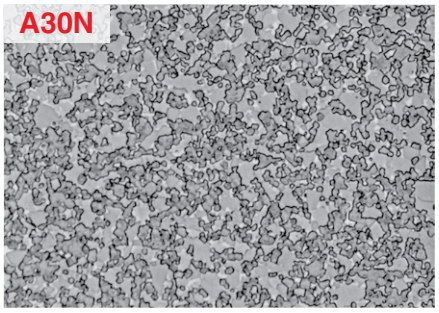
Carbide

Igetalloy (Carbide for Cutting Tools)

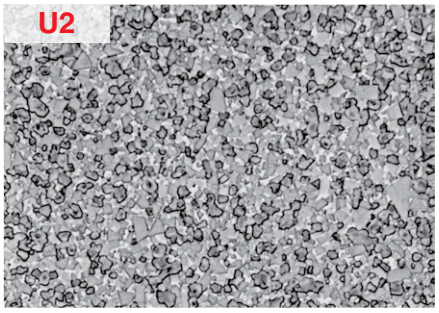
Igetalloy carbides have a solid history and a wide variety of grades to suit many different applications. They are widely used and appreciated for their superior performance.

The Igetalloy line-up consists of carbide cutting tools with various characteristics that correspond to the uses of the tools. This is possible by varying the tool components: the WC structure (which is the main component) and the additive amount of carbides such as TiC, TaC, and Co (which is the binder). The wide selection of Igetalloy provides excellent wear resistance and toughness in various cutting conditions.

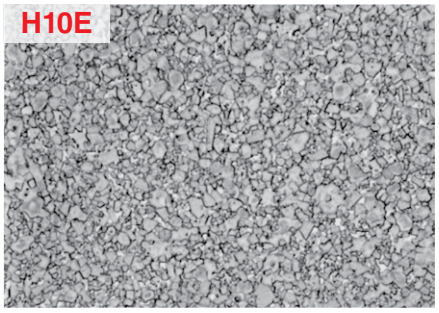
● For Steel



● For Stainless Steel



● For Cast Iron



Characteristic Values

Application	Grade	Hardness (HRA)	TRS (GPa)	Thermal Conductivity (W/m·°C)	Young Modulus (GPa)	Compressive Strength (GPa)	Linear-Thermal Expansion Coefficient (X 10^{-6}/°C)
P Steel	**ST10P**	92.1	1.9	25	470	4.9	6.2
	ST20E	91.8	1.9	42	550	4.8	5.2
	A30	91.3	2.1	35	520	–	5.2
	A30N	91.2	2.2	35	520	–	–
	ST40E	90.4	2.6	75	–	–	–
M Stainless Steel	**U10E**	92.4	1.8	–	460	5.9	–
	EH510	92.6	2.6	76	–	–	–
	U2	91.5	2.2	88	–	–	–
	EH520	91.7	3.0	78	–	–	–
	A30	91.3	2.1	35	520	–	5.2
	A30N	91.0	2.4	35	–	–	–
K Cast Iron	**BL130**	94.3	2.9	56	–	–	–
	H2	93.2	1.8	105	600	6.1	4.4
	H1	92.9	2.1	109	650	6.1	4.7
	EH10	92.4	3.4	105	640	–	4.5
	EH510	92.6	2.6	76	–	–	–
	H10E	92.3	2.0	67	–	–	–
	EH20	91.3	3.5	105	620	–	4.5
	EH520	91.7	3.0	78	–	–	–
	G10E	91.1	2.2	105	620	5.7	–
N Non-Ferrous Metal	**H1**	92.9	2.1	109	650	6.1	4.7
S Exotic Alloy	**EH510**	92.6	2.6	76	–	–	–
	EH520	91.7	3.0	78	–	–	–

Igetalloy (Micro-Fine Grained Carbide)

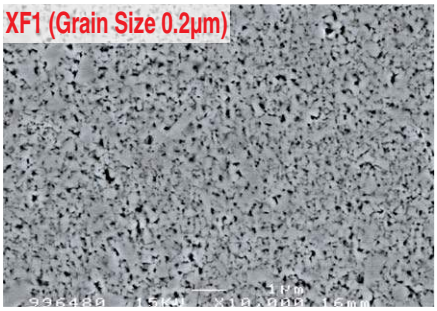
The Igetalloy micro-fine grained carbide series provides world class levels of micro-fine grain structure and delivers superior performance in small drills and other tools.

Igetalloy micro-fine grained carbides feature a WC structure of between 0.2 to 1μm, and are extremely strong and hard. They also provide excellent sharpness and superb surface quality on worked surfaces.

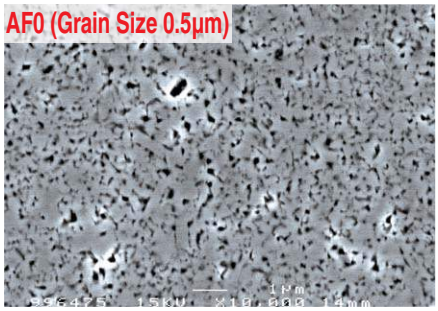
These features give excellent performance in a variety of applications from ø0.1mm PCB drills and endmill materials, to tthin slitting blades and precision dies.

● Ultra-fine Grain

XF1 (Grain Size 0.2μm)

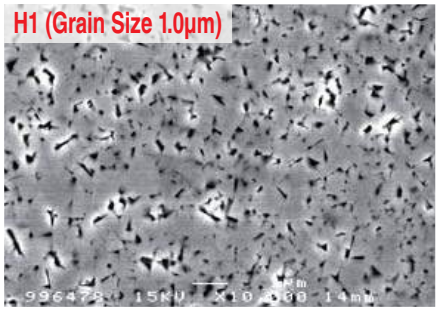


AF0 (Grain Size 0.5μm)



● Fine-grained Carbide

H1 (Grain Size 1.0μm)



Characteristic Values

Class	Grade	Properties					Characteristics	Applications
		Grain Size (μm)	CO Content (wt%)	TRS (GPa)	Hardness (HRA)	Hardness HV (GPa)		
Ultra-fine Grain	**XF1**	0.2	9.0	4.0	93.5	19.2	World's smallest grained carbide.	Micro drills, Small diameter drills
	AF1	0.5	12.0	4.4	92.5	17.3	World's toughest ultra-fine grained carbide.	Micro drills, Mini tools, Punches
	AF0	0.5	10.0	4.1	93.0	18.0	High toughness and wear resistant ultra-fine grained carbide.	Micro drills, Routers
	AFU	0.5	8.0	3.8	93.6	19.4	Enhanced wear resistant ultra-fine grained carbide.	Micro drills, Endmills for ultra-hard materials
Micro-fine Grained Carbide	**A1**	0.7	13.0	3.2	91.4	15.6	Tough micro-grained carbide.	Endmills, Taps, Drills for cast iron, Punches
	KH12	0.7	10.0	4.0	92.4	17.2	Micro-fine grained carbide with good balance of hardness and toughness.	Endmills, Drills for steel
	F0	0.7	5.0	2.0	93.6	20.1	Superior wear resistant micrograined carbide.	Micro drills, Routers
Fine-grained Carbide	**KH03**	1.0	10.0	3.3	91.4	15.2	Fine-grained carbide with good hardness and toughness.	Dies, Drills, Endmills
	KH05	1.0	13.0	3.5	90.4	13.6	High toughness fine grained carbide.	Dies
	H1	1.0	5.0	2.1	92.9	17.7	Superior wear resistant finegrained carbide.	Drills for cast iron, Reamers
	EH10	1.2	6.0	3.4	92.4	17.3	Fine-grained carbide with good balance of hardness and toughness. Fine-grained carbide.	Drills for exotic alloy, Reamers
	ZF16	1.0	6.0	3.5	93.0	18.6	Wear and chipping resistant fine-grained carbide for high speed machining.	Micro drills

Carbide Materials··· ☞ From pages K2

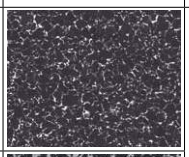
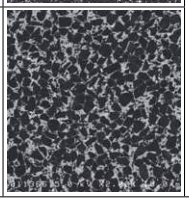
CBN

SUMIBORON Series
Coated SUMIBORON Series

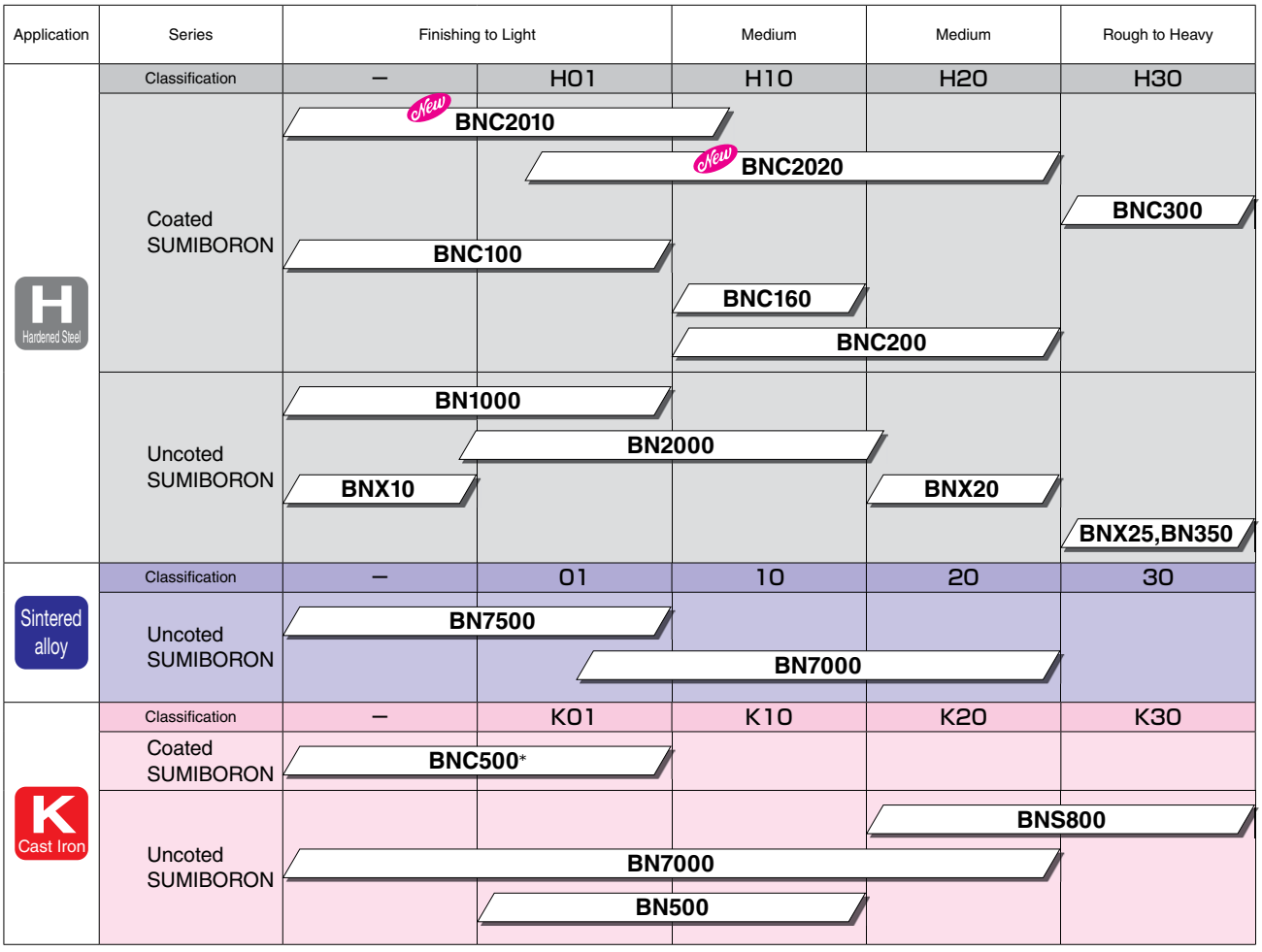
High hardness and heat resistance for cutting high hardness steel and hard cast iron. Long tool life with high-speed finishing of grey cast iron.

In 1977, Sumitomo Electric Hardmetal successfully developed a revolutionary CBN sintered tool - SUMIBORON. The main component in SUMIBORON is Cubic Boron Nitride with a special ceramic binder sintered under super high pressure and temperature. As compared to other conventional tool materials, CBN has higher hardness and excellent heat resistance. With these distinct characteristics, SUMIBORON can perform machining of hardened steel, high hardness cast iron and exotic metals where previously only grinding was done. Furthermore, excellent efficiency and longer tool life can also be achieved from high speed machining of cast irons.

Characteristics

Classifications	Structure	CBN Content	Hardness (GPa)	Grades	Application	Characteristics
Mainly CBN grains fused together		High ↕ Low	44 ↕ 21	BN700 BN7000 BN7500 BNS800	Carbide Chilled cast iron Ni-Hard cast iron Heat-resistant alloy, Cast iron Sintered ferrous alloy	・High carbon content. Structure consists of strongly fused CBN grains. ・Suited to cutting cast iron, heat-resistant alloy, ultra-hard alloy, and other hard materials.
Mainly CBN grains held together with a binder				BN500・BNC500 BN1000・BN2000 BN350・BNX10 BNX20・BNX25 BNC2010・BNC2020 BNC100・BNC160 BNC300・BNC200	Alloy steel Case hardened steel Carbon tool steels Bearing steel, Die steel Ductile cast iron	・CBN grains are fused together strongly with a special ceramic binder. ・Strong CBN binding force gives superior wear resistance and toughness when cutting hardened steel and cast iron.

Grade Range Map



*For Ductile Cast Iron

Characteristic Values

Class	Grade	Binder	Carbon Content (%)	Grain Size (μm)	Hardness HV (GPa)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Characteristics
H Hardened Steel	New BNC2010	TiCN	50 to 55	2	30 to 32	1.10 to 1.20	TiCN multi-layered	1.5	Improves the wear resistance of coating and substrate and stably achieves excellent surface roughness.
	New BNC2020	TiN	70 to 75	5	34 to 36	1.20 to 1.30	TiAlN multi-layered	1.5	Provides long tool life in general and high-efficiency cutting thanks to tough substrate coated with a highly wear-resistant and highly adhesive layer.
	BNC300	TiN	60 to 65	1	33 to 35	1.15 to 1.25	TiAlN	1	Suited for finishing when there is a combination of continuous and interrupted cutting.
	BNC100	TiN	40 to 45	1	29 to 32	1.05 to 1.15	TiAlN/TiCN	2	Highly wear resistant coating makes this grade suited for high speed finishing.
	BNC160	TiN	60 to 65	3	31 to 33	1.10 to 1.20	TiAlN/TiCN	2	Stable, high precision finishing of hardened steel.
	BNC200	TiN	65 to 70	4	33 to 35	1.15 to 1.25	TiAlN	2	Tough substrate with high wear resistant coating provide longer tool life.
	BN1000	TiCN	40 to 45	1	27 to 31	0.90 to 1.00	—	—	Ultimate wear and fracture resistance. Suited to high-speed cutting.
	BN2000	TiN	50 to 55	2	31 to 34	1.05 to 1.15	—	—	A general purpose grade for hardened steel that provides a high degree of fracture and wear resistance.
	BNX20	TiN	55 to 60	3	31 to 33	0.95 to 1.10	—	—	Crater resistant grade, suitable for high efficiency cutting under high temperature conditions.
	BN350	TiN	60 to 65	1	33 to 35	1.20 to 1.30	—	—	High cutting edge strength, suited to heavy interrupted cutting.
	BNX10	TiCN	40 to 45	3	27 to 31	0.80 to 0.90	—	—	Optimum wear resistance. Suited to continuous, high-speed cutting.
	BNX25	TiN	65 to 70	4	29 to 31	1.00 to 1.10	—	—	Excellent fracture resistance during high speed cutting. Suited to high speed interrupted cutting of hardened steel.
Sintered alloy	BN7500	Co Compound	90 to 95	1	41 to 44	1.40 to 1.50	—	—	Maintains optimum cutting edge sharpness. Suited for finishing of sintered alloy.
	BN7000	Co Compound	90 to 95	2	41 to 44	1.30 to 1.40	—	—	Improved wear and fracture resistance in rough cutting of sintered components.
K Cast Iron	BNS800	Al Alloy	85 to 90	8	39 to 42	0.95 to 1.10	—	—	100% solid CBN structure with good thermal impact resistance.
	BN7000	Co Compound	90 to 95	2	41 to 44	1.30 to 1.40	—	—	Improved wear and fracture resistance in rough cutting of cast iron and exotic alloy.
	BN500	TiC	65 to 70	6	32 to 34	1.00 to 1.10	—	—	Optimized for cast iron cutting. Maintains good wear and fracture resistance.
	BNC500 (For Ductile Cast Iron)	TiC	60 to 65	4	32 to 34	1.00 to 1.10	TiAlN	2	Substrate with excellent wear resistance and coating makes this grade suited for hard-to-cut cast iron.

CBN SUMIBORON / Coated SUMIBORON Series ••• From page L2

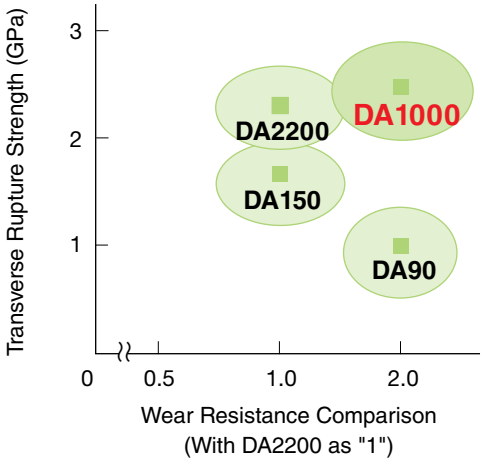
Polycrystalline Diamond SUMIDIA Series

Excellent wear resistance, longer tool life, and high-speed, high-efficiency, high-precision cutting of non-ferrous metals and non-metals.

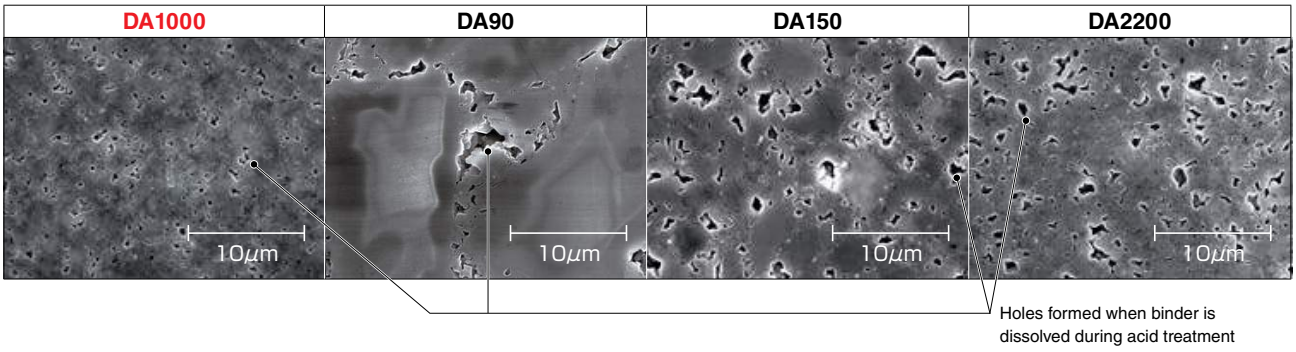
SUMIDIA is a polycrystalline diamond material made from sintered diamond powder that was first created using our proprietary technology in 1978.
SUMIDIA's superior wear resistance achieves longer tool life, high speed, high efficiency and high precision in non-metal cutting and non-ferrous metal applications including aluminium, copper, magnesium and zinc alloys.

Characteristics DA1000

The DA1000 utilises Sumitomo Electric Hardmetal's proprietary sintering technology to achieve a high-density sintered material made of ultra-fine diamond particles that has superior wear and fracture resistance and longer tool life.



Polycrystalline Diamond Subjected to Acid Treatment



Grade Range Map

Class	Series	Finishing to Light		Medium	Rough to Heavy
	Classification	N01	N10	N20	N30
N Non-Ferrous Metal	SUMIDIA	DA1000			
			DA2200		
			DA150		
		DA90			

Characteristic Values

Class	Grade	Binder	Carbon Content (%)	Grain Size (μm)	Hardness HV (GPa)	TRS (GPa)	Characteristics
N Non-Ferrous Metal	**DA1000**	Co	90 to 95	Up to 0.5	110 to 120	≈ 2.60	High density sintered material made of ultra-fine diamond particles that demonstrates optimum wear and fracture resistance, and edge sharpness.
	DA2200	Co	85 to 90	0.5	90 to 100	≈ 2.45	Sintered material made of ultra-fine diamond particles that demonstrates optimum wear and fracture resistance, and edge sharpness.
	DA150	Co	85 to 90	5	100 to 120	≈ 1.95	Sintered material made of fine diamond particles that provides a good balance of workability and wear resistance.
	DA90	Co	90 to 95	50	100 to 120	≈ 1.10	Sintered material made of coarse diamond particles with high diamond content and excellent wear resistance.

PCD SUMIDIA Series ••• ☞ From page M2

Ceramic

Advanced Ceramic

Superb wear and crater resistance for ultra-high speed machining.

Sumitomo Electric Hardmetal's "Advanced Ceramic" is created through a unique process that ensures excellent sharpness, making possible stable ultra-high speed cutting of cast iron, and cutting of heat-resistant alloys and ultra-hard rolled materials.

Grade Range Map

For Turning

For Turning	High-Speed	Finishing to Light		Medium	Rough to Heavy	
	—	01	10	20	30	40
K Cast Iron	NB90S					
S Exotic Alloy			WX120			
H Hardened Steel		NB100C				

For Milling

For Milling	High-Speed	Finishing to Light		Medium	Rough to Heavy	
	—	01	10	20	30	40
K Cast Iron	NB90M					

Characteristic Values

For Turning

Class	Grade	Hardness (HRA)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Characteristics
K Cast Iron	NB90S	94.8	0.9	—	—	Contains Al_2O_3 and carbide. Suitable for medium to finishing of cast iron.
S Exotic Alloy	WX120	90.0	1.2	—	—	Enhanced with SiC whiskers. For heat-resistant alloy and ultra-hard roll cutting.
H Hardened Steel	NB100C	95.0	1.0	TiAlN	2	Ultra-strong. Contains Al_2O_3 and ZX Coat. Continuous low-speed turning of hardened steel.

For Milling

Class	Grade	Hardness (HRA)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Characteristics
K Cast Iron	NB90M	94.5	0.7	—	—	Contains Al_2O_3 and tough carbide. For high speed finish milling of cast iron.

■ Material Properties

Material		Specific Gravity	Micro Vickers Hardness (mHv) (GPa)	Young Modulus (GPa)	Thermal Conductivity (W/m·°C)	Linear-Thermal Expansion Coefficient (X 10^{-6}/°C)	Melting Point (°C)
Tungsten Carbide	**WC**	15.6	21	690	126	5.1	2,900
Titanium Carbide	**TiC**	4.94	31	450	17	7.6	3,200
Tantalum Carbide	**TaC**	14.5	18	280	21	6.6	3,800
Nobium Carbide	**NbC**	8.2	20	340	17	6.8	3,500
Titanium Nitrate	**TiN**	5.43	20	260	29	9.2	2,950
Aluminium Oxide	**Al_2O_3**	3.98	29	410	29	8.5	2,050
Silicon Nitride	**Si_3N_4**	3.17	25	310	29	3.0	>1,900 (decomposes)
Cubic Boron Nitride	**cBN**	3.48	44	700	1,300	4.7	—
Diamond	**C**	3.52	>90	970	2,100	3.1	—
Cobalt	**Co**	8.9	—	100 to 180	69	12.3	1,495
Nickel	**Ni**	8.9	—	200	92	13.3	1,455
Carbide	**WC-5% Co**	15.0	18	630	79	5.0	—
	WC-10% Co	14.6	14	580	75	5.0	—
	WC-20% Co	13.5	10	530	67	6.0	—
High Speed Steel		8.7	8	210	17	11.0	—