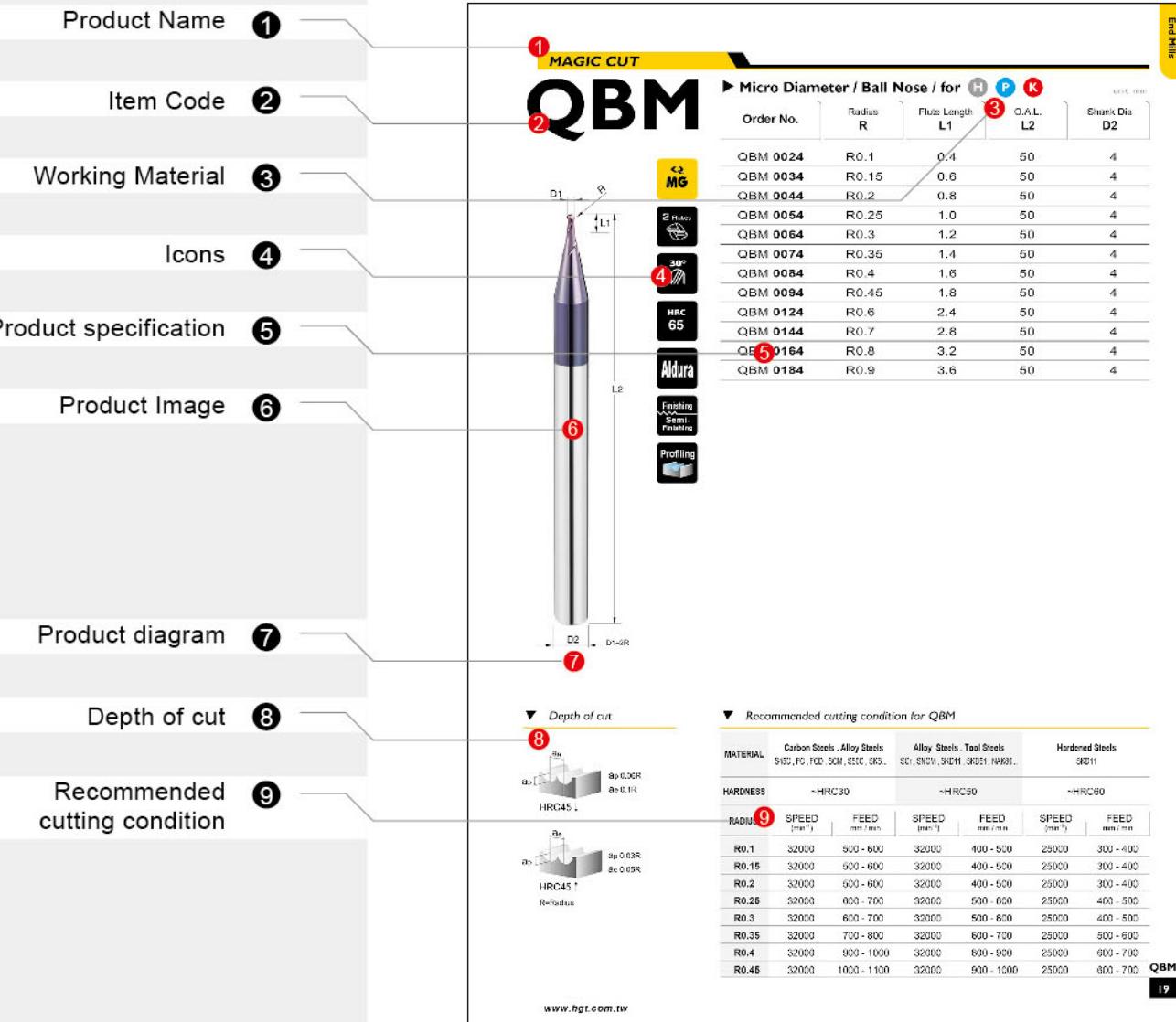


ITEM PAGE STRUCTURE**THE SYSTEM CODE INTRODUCES**

V70	Hardened Steels HRC70 series	14
Q	MAGIC CUT	18
S	SUPER MILL	HSC & HHC series 45
E	EFFICIENCY MILLS	Efficiency end mills series 85
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G	G.pro	Graphite cutting series 138
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EX	MAGIC SHANK	Magic shank series 157
T	T.pro	Thread milling series 162
C	C.pro	Chamfering series 168
CD	CD	Carbide drills series 173
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CONTENTS

V

V70

V70B	NEW	p. 15	3~12	i-plus	○ ○ ○ ○	
V70R	NEW	p. 16	6~12	i-plus	○ ○ ○ ○	
V70E	NEW	p. 17	6~16	i-plus	○ ○ ○ ○	

Q

MAGIC CUT

QBM		p. 19	0.2~1.8	Aldura	○ ○ ○	
QB		p. 20	1~16	ALTiN	○ ○ ○ ○	
QBG		p. 21	4~12	Aldura	○ ○ ○ ○	
QBN		p. 22	1~16	nAcoB	○ ○ ○ ○	
QBX		p. 23	1~16	i8	○ ○ ○ ○	
QBHN		p. 24	1~12	nAcoB	○ ○ ○ ○	
QBHX		p. 25	1~12	i8	○ ○ ○ ○	
QBLS/M/L		p. 26	2~20	ALTiN	○ ○ ○ ○	
QBLSX/MX/LX		p. 27	2~20	i8	○ ○ ○ ○	
QBP		p. 28	1~12	ALTiN	○ ○ ○ ○	
QEM		p. 29	0.2~1.8	Aldura	○ ○ ○ ○	
QEB		p. 30	1~20	ALTiN	○ ○ ○ ○	
QEGB		p. 31	4~12	Aldura	○ ○ ○ ○	
QEBN		p. 32	3~20	nAcoB	○ ○ ○ ○	
QEX		p. 33	3~20	i8	○ ○ ○ ○	
QUELB		p. 34	6~12	ALTiN	○ ○ ○ ○	
QRD		p. 35	1~12	ALTiN	○ ○ ○ ○	
QRDG		p. 36	4~12	Aldura	○ ○ ○ ○	
QRHN		p. 37	3~12	nAcoB	○ ○ ○ ○	
QRHX		p. 38	3~12	i8	○ ○ ○ ○	
QERC		p. 39	6~12	ALTiN	○ ○ ○ ○	
QRHLX		p. 40	6~12	i8	○ ○ ○ ○	
QBF		p. 41	0.5~4	ALTiN	○ ○ ○ ○	
QEFA		p. 42	0.5~3	Aldura	○ ○ ○ ○	
QRFA		p. 43	1~3	Aldura	○ ○ ○ ○	
QRFB		p. 44	1~3	Aldura	○ ○ ○ ○	

S

SUPER MILL

SBM		p. 46	0.2~1.8	ALTiN	○ ○ ○ ○	
SBMX		p. 47	0.2~1.8	i8	○ ○ ○ ○	
SB		p. 48	1~16	ALTiN	○ ○ ○ ○	
SBK		p. 49	1~16	G100	○ ○ ○ ○	
SBX		p. 50	1~16	i8	○ ○ ○ ○	

CONTENTS

E

SBB	p. 51	1~16	ALTiN	○ ○ ○ ○		
SBLS/M/L	p. 52	1~20	ALTiN	○ ○ ○ ○		
SBLSX/MX/LX	p. 53	2~12	i8	○ ○ ○ ○		
SBC	p. 54	2~6	ALTiN	○ ○ ○ ○		
SBCX	p. 55	2~6	i8	○ ○ ○ ○		
SEM	p. 56	0.2~1.8	ALTiN	○ ○ ○ ○		
SEMX	p. 57	0.2~1.8	i8	○ ○ ○ ○		
SEA	p. 58	1~20	ALTiN	○ ○ ○ ○		
SEB	p. 59	1~20	ALTiN	○ ○ ○ ○		
SEK	p. 60	1~20	G100	○ ○ ○ ○		
SEX	p. 61	3~20	i8	○ ○ ○ ○		
SEP	p. 62	3~20	HELICA	○ ○ ○ ○		
SEW	p. 63	3~20	G300	○ ○ ○ ○		
SEPC	NEW	p. 64	2~12	i8	○ ○ ○ ○	○ ○ ○ ○
SELA	p. 65	6~12	ALTiN	○ ○ ○ ○		
SELB	p. 66	3~16	ALTiN	○ ○ ○ ○		
SELD	p. 67	4~12	ALTiN	○ ○ ○ ○		
SHA	p. 68	6~16	ALTiN	○ ○ ○ ○		
SEZ	p. 69	4~12	ALTiN	○ ○ ○ ○		
SRA	p. 70	4~16	ALTiN	○ ○ ○ ○		
SRB	p. 71	4~16	ALTiN	○ ○ ○ ○		
SRC	p. 72	3~12	ALTiN	○ ○ ○ ○		
SRD	p. 73	1.5~12	ALTiN	○ ○ ○ ○		
SRDX	p. 74	3~12	i8	○ ○ ○ ○		
SRK	p. 75	3~12	G100	○ ○ ○ ○		
SERC	p. 76	6~12	ALTiN	○ ○ ○ ○		
SERCX	p. 77	6~12	i8	○ ○ ○ ○		
SRP	p. 78	6~12	ALTiN	○ ○ ○ ○		
SBF	p. 79	0.5~4	ALTiN	○ ○ ○ ○		
SBFX	p. 80	0.5~4	i8	○ ○ ○ ○		
SEFA	p. 81	1~3	ALTiN	○ ○ ○ ○		
SEFAX	p. 82	1~3	i8	○ ○ ○ ○		
SEF	p. 83	1~3	ALTiN	○ ○ ○ ○		
SEFX	p. 84	1~3	i8	○ ○ ○ ○		
EFFICIENCY MILLS						
BM	p. 85					
BS	p. 86	0.4~1.8	TiAlN	○ ○ ○ ○		
BS	p. 87	1~4	TiAlN	○ ○ ○ ○		

CONTENTS

					Superalloy. Heat-resistant Steels
					Graphite
					Copper Alloy
BA	p. 88	1~20	TiaLN	◎	
BB	p. 89	1~12	TiaLN	◎	
BLS/M/L	p. 90	1~20	TiaLN	◎	
EM	p. 91	0.4~1.8	TiaLN	◎	
ES	p. 92	1~4	TiaLN	◎	
EA	p. 93	1~20	TiaLN	◎	
EB	p. 94	1~20	TiaLN	◎	
EC/EP	p. 95	3~20	TiaLN	◎	
ED	p. 96	3~16	TiaLN	◎	
ELA	p. 97	6~12	TiaLN	◎	
ELB	p. 98	3~16	TiaLN	◎	
ELC	p. 99	2~12	TiaLN	◎	
ELD	p. 100	2~20	TiaLN	◎	
EH	p. 101	6~20	TiaLN	◎	
EHL	p. 102	6~20	TiaLN	◎	
EG	p. 103	6~20	TiaLN	◎	
EGA	p. 104	6~20	TiaLN	◎	
ETL	p. 105	1~4	TiaLN	◎	
ET	p. 106	0.5~10	TiaLN	◎	
ERA	p. 108	3~12	TiaLN	◎	
ERB	p. 109	3~12	TiaLN	◎	
ERC	p. 110	6~12	TiaLN	◎	
BF	p. 111	1~4	TiaLN	◎	
EFA	p. 112	1~3	TiaLN	◎	
I.pro	p. 113				◎
SBBI	p. 114	3~12	G300	○	◎
SEI	p. 115	3~20	G300	○	◎
SEPS	p. 116	3~20	HELICA	○	◎
SEPI	p. 117	3~20	G300	○	◎
SIB	p. 118	3~20	G300	○	◎
SHAI	p. 119	6~16	G300	○	◎
SEGI	p. 120	6~20	G300	○	◎
SRIP	p. 121	3~12	G300	○	◎
SIW NEW	p. 122	3~20	G-plus	○	◎
SIRW NEW	p. 123	3~12	G-plus	○	◎
D MILL	p. 124				◎
DB	p. 125	1~12			

CONTENTS

				Superalloy, Heat-resistant Steels
				Graphite
				Copper Alloy
DEA	p. 126	1~16		
DEB	p. 127	1~16		
DEC	p. 128	2~20		
DED	p. 129	2~20		
DEDP	p. 130	2~20	DLC	
DEL	p. 131	2~20		
DEPW NEW	p. 132	3~20		
DEG	p. 133	6~16		
DFR	p. 134	6~20		
DRC	p. 135	3~16		
DBX	p. 136	1~12	CRN	○
DEDX	p. 137	2~20	CRN	○
G.pro	p. 138			
SGBB	p. 139	4~12	Diamond	○
SGBF	p. 140	4~12	Diamond	○
SGEB	p. 141	4~12	Diamond	○
SGRD	p. 142	4~12	Diamond	○
SGRB	p. 143	4~12	Diamond	○
SGBS	p. 144	1.0~4.0	Diamond	○
SGES	p. 145	1.0~4.0	Diamond	○
SGRS	p. 146	1.0~4.0	Diamond	○
DEN.pro	p. 147			
TOBF	p. 148	0.6~3.0	Diamond	
TTBF	p. 149	0.8~3.0	G300	
TTFA	p. 150	0.5~2.5	G300	
TTRA	p. 151	1.0~2.5	G300	
TTRB	p. 151	2.0~4.0	G300	
TCBF	p. 152	0.8~3.0	Diamond	
TWBF	p. 153	0.8~3.0		
COM.pro	p. 154			
CFPA	p. 155	6~12	Diamond	
CFRA	p. 156	6~12	Diamond	
MAGIC SHANK	p. 157			
EX2CS NEW	p. 158	10~20		
EX2SB NEW	p. 158	10~20	i8	○ ○
EX2SRD NEW	p. 159	10~20	i8	○ ○
EX2SEB NEW	p. 159	10~20	i8	○ ○

CONTENTS

		Page	Mill Dia.	Coating	Coating	HRC 45-55	HRC 55-60	HRC 60-65	Titanium Alloy	Stainless Steels	Aluminum Alloy	Copper Alloy	Graphite	Superalloy, Heat-Resistant Steels	
T	EX2DPW NEW	P. 160	10~20							◎					
	EX2SIW NEW	P. 160	10~20	G-plus						◎	◎			◎	
	T.pro	P. 162													
	EMT	P. 163	P0.5-P2.5	G100	◎				○	○	○	○	○	○	
	EMTW	P. 164	P0.5-P2.5	G100	◎				○	○	○	○	○	○	
	EMTH	P. 165	P0.7-P2.5	G100	◎				○	○	○	○	○	○	
	EMTS	P. 166	P0.5-P1.25	i8	◎				○	○	○	○	○	○	
	EMTF	P. 167	P0.5-P1.75	G100	◎				○	○	○	○	○	○	
C	C.pro	P. 168													
	ECM	P. 169	4~12	TiAlN	◎				○	○	○	○	○	○	
	ECMP NEW	P. 170	4~12	i8	◎				○	○	○	○	○	○	
	ECMV NEW	P. 171	4~12	i8	◎				○	○	○	○	○	○	
	ECR/EMCR	P. 172	1~12		◎				○	○	○	○	○	○	
CD	CD	P. 173													
	ESD	P. 174	3~20		◎				○	○	○	○	○	○	
	ESD2	P. 174	3~20		◎				○	○	○	○	○	○	
	ESDC	P. 175	3~20	TiAlN	◎				○	○	○	○	○	○	
	ESDA	P. 175	3~20	TiAlN	◎				○	○	○	○	○	○	
	ESDS	P. 176	6~20	TiAlN	◎				○	○	○	○	○	○	
	ESDL	P. 176	6~20	TiAlN	◎				○	○	○	○	○	○	
	CCD	P. 177	0.5~5		◎				○	○	○	○	○	○	
	CCDA	P. 177	0.5~5		◎				○	○	○	○	○	○	
	CD	P. 178	2~13	TiAlN	◎				○			○			
	CDA	P. 179	3~20	TiAlN	◎				○			○			
	CDB	P. 180	3~20	TiAlN	◎				○			○			
	CDC	P. 181	3~12	TiAlN	◎				○			○			
	CDAC	P. 182	3~20	i8	◎				○			○			
	CDBC	P. 183	3~20	i8	◎				○			○			
	CDCC	P. 184	3~10	i8	◎				○			○			
CR	CR	P. 185													
	CRA	P. 186	2~12		◎				○			○			

TOLERANCE

Square End Mills (mm)		Ball Nose End Mills (mm)		Corner Radius End Mills (mm)		Shank (mm)	
Flute Dia.	Dia. Tolerance	Flute Dia.	R Tolerance	Flute Dia.	R Tolerance	Shank Dia. (h6)	Shank Tolerance
1.0	0~ -0.015	R0.5	±0.01	1.0	±0.01	ø 3	0~ -0.008
1.5	0~ -0.015	R1	±0.01	2.0	±0.01	ø 4	0~ -0.008
2.0	0~ -0.015	R1.5	±0.01	3.0	±0.01	ø 6	0~ -0.008
2.5	0~ -0.015	R2	±0.01	4.0	±0.01	ø 8	0~ -0.009
3.0	0~ -0.015	R2.5	±0.01	6.0	±0.01	ø 10	0~ -0.009
4.0	0~ -0.015	R3	±0.01	8.0	±0.01	ø 12	0~ -0.011
5.0	0~ -0.015	R4	±0.01	10.0	±0.01	ø 16	0~ -0.011
6.0	0~ -0.015	R5	±0.01	12.0	±0.01	ø 20	0~ -0.013
8.0	0~ -0.020	R6	±0.01	16.0	±0.015		
10.0	0~ -0.020	R8	±0.02				
12.0	0~ -0.020	R10	±0.02				
16.0	0~ -0.020						
20.0	0~ -0.020						

Recommended Cutting Instructions

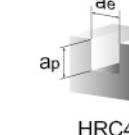
- In order to enhance processing efficiency and extend life of cutters, please use the balanced chucks with high rigidity and high accuracy.
- Make overhang enough for processing. If it's necessary to extend the milling cutter, please be sure to reduce spindle speed and feed speed.
- If there's abnormal sound or vibration during processing, please adjust cutting data to prevent cutters from being influenced or broken.
- Please choose correct cutting oil to maximize efficiency.
- The result of cutting data depends on working materials, machines, work clips, programming and etc. Cutting data are for reference. You may increase cutting data starting from 50%.

ICONS**Flutes****Helix Angle** (0°, 5°, 7°, 25°, 30°, 35°, 45°, 55°)**Work Material Hardness** (40, 55, 60, 65)**Coating****Roughing Pitch****Corner Radius** (0.1, 0.2, 0.3, 0.5, 1, 1.5, 2)**Tip Angle** (60°, 90°, 120°)**Applications****Statistics For Drills**

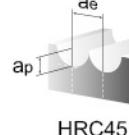
Drills Type Drills Type Drills Type DIN Code DIN Code Shank Diameter Tolerance Cutting Flute Tolerance Helix Angle Tip Angle

DEPTH OF CUT**SIDE MILLING**

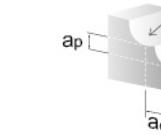
D1 6mm ↓ ap=1.5D ae=0.02D
D1 6mm ↑ ap=1.5D ae=0.05D

SLOTTING

ap 0.2D ae=D1

RADIUS

ap 0.04R ae 0.06R

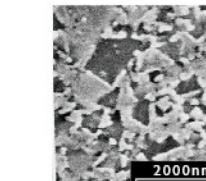
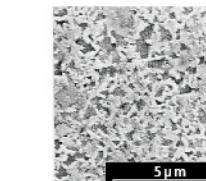
PROFILING

ap 0.02R ae 0.02R

SOLID CARBIDE

QMG MG

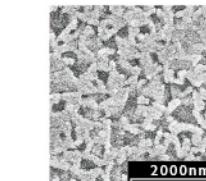
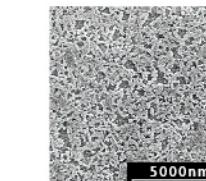
ISO-Classification		K10-K30
Diameter	(mm)	1.2-32.2
Co	(%)	9.0
W/C+cr ₃ c ₂ +vc	(%)	91.0
Density	(g/cm ³)	14.40
HV ₃₀	(kg/mm ²)	1920
HRA	(ISO3738)	93.9
K _{IC}	(MNm ^{-3/2})	9.3
TRS	(N/mm ²)	> 4000
	A	02
Porosity	B	00
	C	00
WC-grain size	(μm)	0.2-0.5



Co % 9
WC incl. Doping (%) 89.83
Tungsten Carbide α ø0.2μm

SMG MG

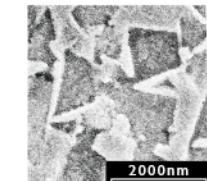
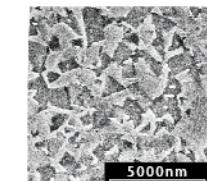
ISO-Classification		K40-K50
Diameter	(mm)	1.2-42.2
Co	(%)	12.0
W/C+cr ₃ c ₂ +vc	(%)	88.0
Density	(g/cm ³)	14.05
HV ₃₀	(kg/mm ²)	1680
HRA	(ISO3738)	92.5
K _{IC}	(MNm ^{-3/2})	10.0
TRS	(N/mm ²)	> 4000
	A	02
Porosity	B	00
	C	00
WC-grain size	(μm)	0.5



Co % 12
WC incl. Doping (%) 88
Tungsten Carbide α ø0.4μm

MG MG

ISO-Classification		K40-K50
Diameter	(mm)	1.2-42.2
Co	(%)	10.0
W/C+cr ₃ c ₂ +vc	(%)	90.0
Density	(g/cm ³)	14.5
HV ₃₀	(kg/mm ²)	1610
HRA	(ISO3738)	92.3
K _{IC}	(MNm ^{-3/2})	10.5
TRS	(N/mm ²)	> 4000
	A	02
Porosity	B	00
	C	00
WC-grain size	(μm)	0.6



Co % 10
WC incl. Doping (%) 90
Tungsten Carbide α ø0.6μm

WORK MATERIAL

ISO	H	P	K	M	S	N
MATERIAL	Hardened steel	Low alloy steel	Cast iron	Stainless steel	High temp. alloys	Aluminum alloy
		High alloy steel, cast steel, tool steel			Copper alloys	
					Titanium and Ti alloys	
					Non-metallic	

HARD COATING PROPERTIES

Coating Type	Symbol Color	Nanohardness(GPa)	Thickness (μm)	Friction Coefficient	Max usage Temp(°C)	Coating Temp(°C)
TiALN	BLACK	30	1 - 4	0.4	800	450 ↑
AlTiN	BLACK	38	1 - 4	0.6	900	450 ↑
nACoB	BLUE	45	1 - 4	0.45	1200	400 ↑
HELICA	COPPER	30	1 - 4	0.25	1000	480 ↑
CrN	METAL-SILVER	18	1 - 7	0.4	700	200 - 400
DLC	BLACK	20	1 - 3	0.15	400	150 - 250
G100	BURGUNDY-VIOLET	33	1 - 4	0.3	500	
G300	SOFT GOLD	35	1 - 4	0.4	800	
i8	GOLD-BRASS	47	1 - 4	0.45	900	
Aldura	BLACK	32	1 - 4	0.35	1100	
G-plus	WHITE GOLD		1 - 4	0.25	550	
i-plus	COPPER		1 - 3	0.3	1200	

**COATING APPLICATIONS**

Coating Type	Symbol Color	Introduce coating on different materials
TiALN	BLACK	General steel for wet cutting (HRC35-45)
AlTiN	BLACK	High Hard steel for Dry cutting (HRC45-65)
nACoB	BLUE	High Hard steel for Dry cutting (HRC55-65)
HELICA	COPPER	General steel, Cast iron, with special flute design and work on Stainless steel(EX: SEPS)
CrN	METAL-SILVER	Copper Alloy
DLC	BLACK	Aluminum Alloy
G100	BURGUNDY-VIOLET	General steel for wet cutting (HRC35-45)
G300	SOFT GOLD	Tough material, ex: Titanium Alloy, Nickel Alloy ,Stainless steel and Heat-resistant alloy
i8	GOLD-BRASS	High Hard steel for Dry and wet cutting(HRC55-65)
Aldura	BLACK	High Hard steel for Dry cutting (HRC55-65)
Diamond	BLACK GRAY	Graphite, Zirconium Oxide
G-plus	WHITE GOLD	Tough material, ex: Titanium Alloy, Nickel Alloy ,Stainless steel and Heat-resistant alloy
i-plus	COPPER	High Hard steel for Dry and wet cutting(HRC70)

