

**HGT**®

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*Create the largest profit.  
Improve and Elevate the Quality.*



HGT SOLID CARBIDE TOOLS



**HGT**®

HG TECHNOLOGY CO., LTD.  
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**HG TECHNOLOGY CO., LTD.**





## INTRODUCTION

### HG TECHNOLOGY CO., LTD.,

located at Changhua, Taiwan, dedicated to developing, designing, producing, and marketing cutting tools, comprises professionals with sophisticated processing experience that provide extensive services and ensure total customer satisfaction.

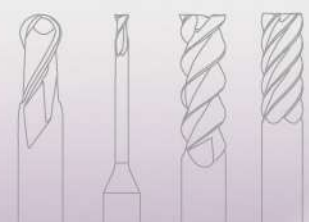
Our service range extensively covers 3C, semiconductor, medical care equipment, aerospace, and precision molding industries.

HG Technology continuously develops more advanced processing technologies based on the enterprise philosophy of extending the lifespan of tools, increasing work efficiencies, minimizing production costs in terms of wear and tear of tools, and maximizing customer benefits.

For HGT Cutting Tools, from material to finished products,

**HG Technology insists on utilizing the processes provided by the original European manufacturers for the production. We only use high quality and stable German Carbide Rods, German and Swiss 6-axis CNC Grinding machines, advanced Swiss Coating technologies, and sophisticated German Digital Measuring Instruments.**

With reasonable prices and stable quality, HG Technology has an expanding sales network that currently covers more than 30 countries throughout the world. Based on the enterprise philosophy of maximizing customer's benefits, HG Technology continuously refines itself and grows together with all its customers.



*Always improve and elevate the quality,  
in order let our customers keep the best competition.*

**HG TECHNOLOGY CO., LTD.**  
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### ITEM PAGE STRUCTURE

- Product Name ①
- Item Code ②
- Working Material ③
- Icons ④
- Product specification ⑤
- Product Image ⑥
- Product diagram ⑦
- Depth of cut ⑧
- Recommended cutting condition ⑨

**MAGIC CUT**  
**QBM**

Micro Diameter / Ball Nose / for H P K

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
QBM 0024	R0.1	0.4	50	4
QBM 0034	R0.15	0.6	50	4
QBM 0044	R0.2	0.8	50	4
QBM 0054	R0.25	1.0	50	4
QBM 0064	R0.3	1.2	50	4
QBM 0074	R0.35	1.4	50	4
QBM 0084	R0.4	1.6	50	4
QBM 0094	R0.45	1.8	50	4
QBM 0124	R0.6	2.4	50	4
QBM 0144	R0.7	2.8	50	4
QBM 0164	R0.8	3.2	50	4
QBM 0184	R0.9	3.6	50	4

Depth of cut























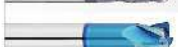
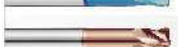










Recommended cutting condition for QBM






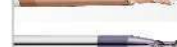
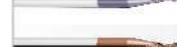

















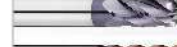











MATERIAL	Carbon Steels - Alloy Steels S15, FC, YC, 30M, S55C, S65C...		Alloy Steels - Tool Steels S2, S20M, S20H, S21H, S23H, HAWK...		Hardened Steels S21H	
	~HRC30		~HRC50		~HRC60	
RADII	SPEED (m/min)	FEED (mm/min)	SPEED (m/min)	FEED (mm/min)	SPEED (m/min)	FEED (mm/min)
R0.1	3200	500 - 600	3200	400 - 500	2500	300 - 400
R0.15	3200	500 - 600	3200	400 - 500	2500	300 - 400
R0.2	3200	500 - 600	3200	400 - 500	2500	300 - 400
R0.25	3200	600 - 700	3200	500 - 600	2500	400 - 500
R0.3	3200	600 - 700	3200	500 - 600	2500	400 - 500
R0.35	3200	700 - 800	3200	600 - 700	2500	500 - 600
R0.4	3200	900 - 1000	3200	800 - 900	2500	600 - 700
R0.45	3200	1000 - 1100	3200	900 - 1000	2500	800 - 700

### THE SYSTEM CODE INTRODUCES

<b>V</b>	<b>V70</b>	Hardened Steels HRC70 series	14
<b>Q</b>	<b>MAGIC CUT</b>	Magic cutting series	18
<b>S</b>	<b>SUPER MILL</b>	HSC & HHC series	45
<b>E</b>	<b>EFFICIENCY MILLS</b>	Efficiency end mills series	85
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<b>D</b>	<b>D MILL</b>	Aluminum & Copper cutting series	124
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<b>COM</b>	<b>COM.pro</b>	CFRP machining series	154
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<b>C</b>	<b>C.pro</b>	Chamfering series	168
<b>CD</b>	<b>CD</b>	Carbide drills series	173
<b>CR</b>	<b>CR</b>	Carbide reamers series	185



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<b>V</b>	<b>V70</b>	p. 14													
	 V70B <small>NEW</small>	p. 15	3~12	i-plus	○	○	○	○							
	 V70R <small>NEW</small>	p. 16	6~12	i-plus	○	○	○	○							
	 V70E <small>NEW</small>	p. 17	6~16	i-plus	○	○	○	○							
<b>Q</b>	<b>MAGIC CUT</b>	p. 18													
	 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	○	○	○								
	 QBLX/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	○	○	○								
	 QEBG	p. 31	4~12	Aldura	○	○	○								
	 QEBN	p. 32	3~20	nAcoB	○	○	○								
	 QEX	p. 33	3~20	i8	○	○	○								
	 QELB	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	○	○	○									
<b>S</b>	<b>SUPER MILL</b>	p. 45													
	 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		Page	Mill Dia.	Coating	HRC 45-55	HRC 55-60	HRC 60-65	Hardened Steels HRC 65-70	Cast Iron	Titanium Alloy	Stainless Steels	Aluminum Alloy	Copper Alloy	Graphite	Superalloy, Heat-resistant Steels
<b>E</b>	 SBB	p. 51	1~16	ALTiN	○	○			○				○		
	 SBLX/M/L	p. 52	1~20	ALTiN	○	○			○				○		
	 SBLX/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 <small>NEW</small>	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	○	○			○				○		
<b>EFFICIENCY MILLS</b>		p. 85													
 BM	p. 86	0.4~1.8	TiAlN	○				○				○			
 BS	p. 87	1~4	TiAlN	○				○				○			



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	Page	Mill Dia.	Coating	HRC 45-55	HRC 55-60	HRC 60-65	Hardened Steels HRC 65-70	Cast Iron	Titanium Alloy	Stainless Steels	Aluminum Alloy	Copper Alloy	Graphite	Superalloy, Heat-resistant Steels
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	⊙				○				○		
<b>I</b> <b>I.pro</b>	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 <small>NEW</small>	p. 122	3~20	G-plus	○					⊙	⊙			⊙	
SIRW <small>NEW</small>	p. 123	3~12	G-plus	○					⊙	⊙			⊙	
<b>D</b> <b>D MILL</b>	p. 124													
DB	p. 125	1~12									⊙			

CONTENTS

	Page	Mill Dia.	Coating	HRC 45-55	HRC 55-60	HRC 60-65	Hardened Steels HRC 65-70	Cast Iron	Titanium Alloy	Stainless Steels	Aluminum Alloy	Copper Alloy	Graphite	Superalloy, Heat-resistant Steels
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 <small>NEW</small>	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								⊙	⊙		
<b>G</b> <b>G.pro</b>	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										⊙	
<b>DT</b> <b>DEN.pro</b>	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												
<b>COM</b> <b>COM.pro</b>	p. 154													
CFPA	p. 155	6~12	Diamond											
CFRA	p. 156	6~12	Diamond											
<b>EX</b> <b>MAGIC SHANK</b>	p. 157													
EX2CS <small>NEW</small>	p. 158	10~20												
EX2SB <small>NEW</small>	p. 158	10~20	i8	⊙	⊙							○		
EX2SRD <small>NEW</small>	p. 159	10~20	i8	⊙	⊙							○		
EX2SEB <small>NEW</small>	p. 159	10~20	i8	⊙	⊙							○		



**CONTENTS**

		Page	Mill Dia.	Coating	HRC 45-55	HRC 55-60	HRC 60-65	Hardened Steels HRC 65-70	Cast Iron	Titanium Alloy	Stainless Steels	Aluminum Alloy	Copper Alloy	Graphite	Superalloy, Heat-resistant Steels
	EX2DPW NEW	p. 160	10~20									☉			
	EX2SIW NEW	p. 160	10~20	G-plus					☉	☉					☉
<b>T</b>	<b>T.pro</b>	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	☉				○	○	○	○	○	○	○
<b>C</b>	<b>C.pro</b>	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		☉				○	○	○	○	○	○	○
<b>CD</b>	<b>CD</b>	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	☉				☉				☉		
<b>CR</b>	<b>CR</b>	p. 185													
	CRA	p. 186	2~12		☉				☉				☉		

**TOLERANCE**

**Square End Mills** (mm)

Flute Dia.	Dia. Tolerance
1.0	0~-0.015
1.5	0~-0.015
2.0	0~-0.015
2.5	0~-0.015
3.0	0~-0.015
4.0	0~-0.015
5.0	0~-0.015
6.0	0~-0.015
8.0	0~-0.020
10.0	0~-0.020
12.0	0~-0.020
16.0	0~-0.020
20.0	0~-0.020

**Ball Nose End Mills** (mm)

Flute Dia.	R Tolerance
R0.5	±0.01
R1	±0.01
R1.5	±0.01
R2	±0.01
R2.5	±0.01
R3	±0.01
R4	±0.01
R5	±0.01
R6	±0.01
R8	±0.02
R10	±0.02

**Corner Radius End Mills** (mm)

Flute Dia.	R Tolerance
1.0	±0.01
2.0	±0.01
3.0	±0.01
4.0	±0.01
6.0	±0.01
8.0	±0.01
10.0	±0.01
12.0	±0.01
16.0	±0.015

**Shank** (mm)

Shank Dia. (h6)	Shank Tolerance
ø 3	0~-0.008
ø 4	0~-0.008
ø 6	0~-0.008
ø 8	0~-0.009
ø 10	0~-0.009
ø 12	0~-0.011
ø 16	0~-0.011
ø 20	0~-0.013

**Recommended Cutting Instructions**

1. In order to enhance processing efficiency and extend life of cutters, please use the balanced chucks with high rigidity and high accuracy.
2. Make overhang enough for processing. If it's necessary to extend the milling cutter, please be sure to reduce spindle speed and feed speed.
3. If there's abnormal sound or vibration during processing, please adjust cutting data to prevent cutters from being influenced or broken.
4. Please choose correct cutting oil to maximize efficiency.
5. 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°, 40°/43°)

**Work Material Hardness** (40, 55, 60, 65, 70)

**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: 3xD, 5xD, 8xD, DIN 6537, DIN 6539, h6, h7, 30°, 140°

Shank Diameter Tolerance: h6, h7

Cutting Flute Tolerance: 30°, 140°

Helix Angle: 30°, 140°

Tip Angle: 30°, 140°

### DEPTH OF CUT

**SIDE MILLING**

**SLOTING**

**RADIUS**

**PROFILING**

HRC45 ↓

HRC45 ↓

HRC45 ↓

HRC45 ↓

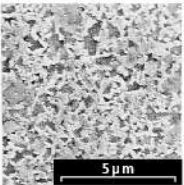
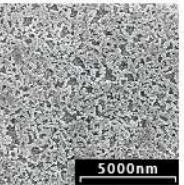
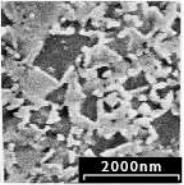
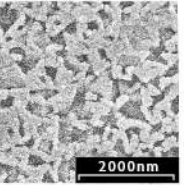
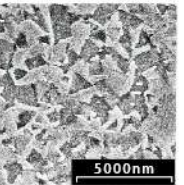
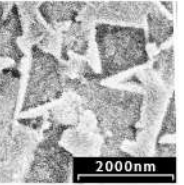
D1 6mm ↓ ap=1.5D ae=0.02D  
D1 6mm ↑ ap=1.5D ae=0.05D

ap 0.2D ae=D1

ap 0.04R ae 0.06R

ap 0.02R ae 0.02R

### SOLID CARBIDE

QMG		SMG		MG			
ISO-Classification		K10-K30		ISO-Classification		K40-K50	
Diameter	(mm)	1.2-32.2		Diameter	(mm)	1.2-42.2	
Co	(%)	9.0		Co	(%)	12.0	
WC+cr <sub>3</sub> c <sub>2</sub> +vc	(%)	91.0		WC+cr <sub>3</sub> c <sub>2</sub> +vc	(%)	88.0	
Density	(g/cm <sup>3</sup> )	14.40		Density	(g/cm <sup>3</sup> )	14.05	
HV <sub>30</sub>	(kg/mm <sup>2</sup> )	1920		HV <sub>30</sub>	(kg/mm <sup>2</sup> )	1680	
HRA	(ISO3738)	93.9		HRA	(ISO3738)	92.5	
K <sub>IC</sub>	(MNm <sup>-3/2</sup> )	9.3		K <sub>IC</sub>	(MNm <sup>-3/2</sup> )	10.0	
TRS	(N/mm <sup>2</sup> )	> 4000		TRS	(N/mm <sup>2</sup> )	> 4000	
	A	02			A	02	
Porosity	B	00		Porosity	B	00	
	C	00			C	00	
WC-grain size	(μm)	0.2-0.5		WC-grain size	(μm)	0.5	
							
							
Co %		9		Co %		12	
WC incl. Doping (%)		89.83		WC incl. Doping (%)		88	
Tungsten Carbide α		ø0.2μm		Tungsten Carbide α		ø0.4μm	
							
Co %		10		Co %		90	
WC incl. Doping (%)		90		WC incl. Doping (%)		90	
Tungsten Carbide α		ø0.6μm		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			Titanium and Ti alloys	Copper alloys
						Non-metallic



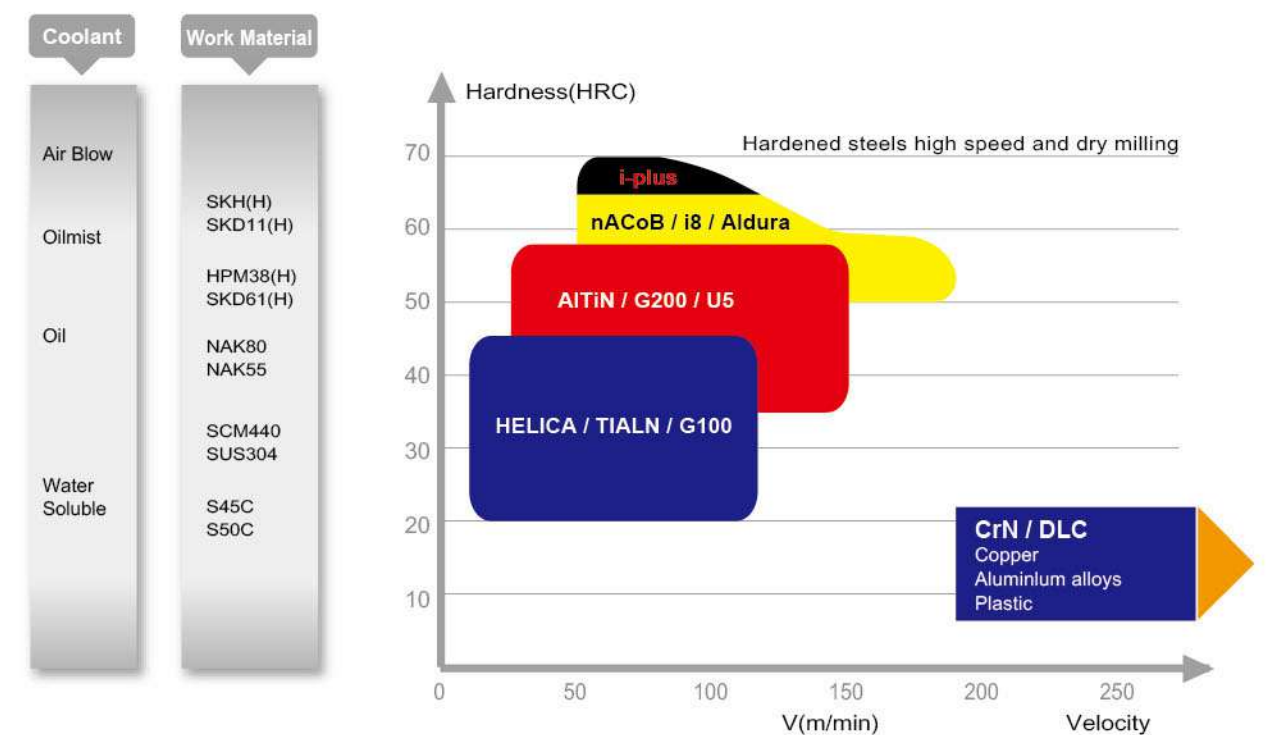
## HARD COATING PROPERTIES

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)





**V** V70

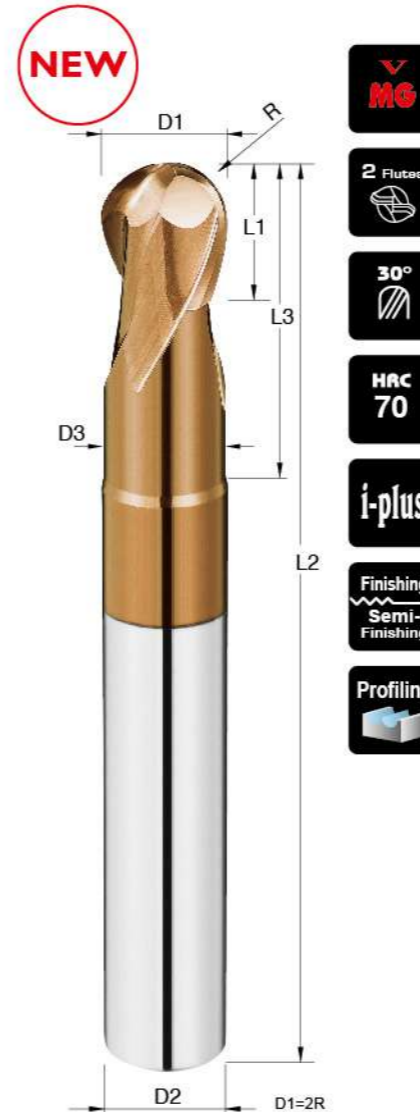
Hardened Steels HRC70 series

V70  
**V70B**

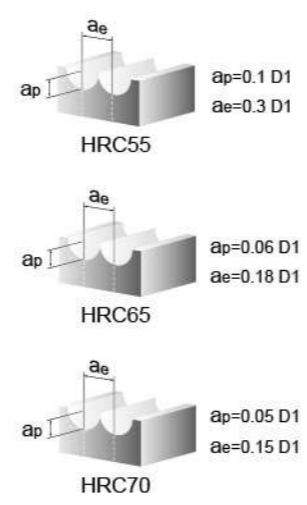
► Ball Nose / for **H** **P**

unit: mm

Order No.	Radius R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
V70B 0306	R1.5	2.90	3	8	50	6
V70B 0406	R2	3.88	4	10	50	6
V70B 0506	R2.5	4.80	5	13	50	6
V70B 0606	R3	5.80	6	15	50	6
V70B 0808	R4	7.70	8	20	60	8
V70B 1010	R5	9.60	10	25	75	10
V70B 1212	R6	11.50	12	30	75	12



▼ Depth of cut



▼ Recommended cutting condition for V70B

MATERIAL	Hardened Steels SKD61, SKT4		Hardened Steels SKD11, SKH51		Hardened Steels SKH, HAP	
	SPEED (min <sup>-1</sup> )	FEED mm/min	SPEED (min <sup>-1</sup> )	FEED mm/min	SPEED (min <sup>-1</sup> )	FEED mm/min
<b>R1.5</b>	22000	2200	18000	1800	10500	850
<b>R2</b>	16500	2200	13500	1800	8000	850
<b>R2.5</b>	13400	2200	11000	1850	6400	850
<b>R3</b>	11300	2300	9100	1850	5500	850
<b>R4</b>	8600	2350	7000	1900	4100	850
<b>R5</b>	7000	2350	5600	1900	3200	850
<b>R6</b>	5800	2300	4700	1850	2700	850



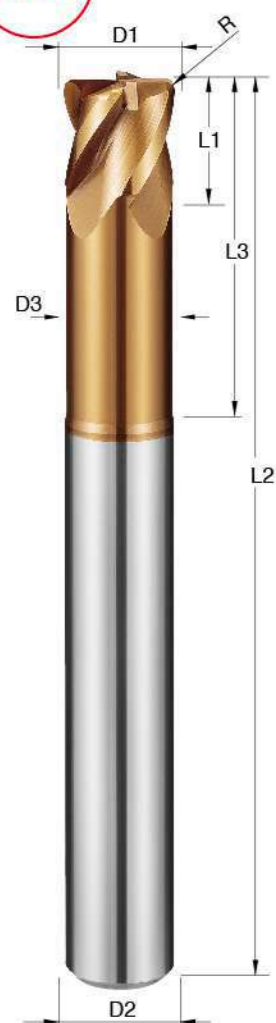
V70

## V70R

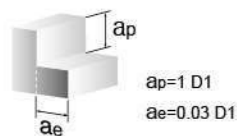
▶ Corner Radius / for **H** **P** unit: mm

Order No.	Diameter D1	Corner R R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
V70R 0605	6.0	0.5	5.80	6	18	50	6
V70R 0610	6.0	1.0	5.80	6	18	50	6
V70R 0805	8.0	0.5	7.70	8	24	60	8
V70R 0810	8.0	1.0	7.70	8	24	60	8
V70R 1005	10.0	0.5	9.60	10	30	75	10
V70R 1010	10.0	1.0	9.60	10	30	75	10
V70R 1020	10.0	2.0	9.60	10	30	75	10
V70R 1205	12.0	0.5	11.50	12	36	75	12
V70R 1210	12.0	1.0	11.50	12	36	75	12
V70R 1220	12.0	2.0	11.50	12	36	75	12

NEW



## ▼ Depth of cut



## ▼ Recommended cutting condition for V70R

MATERIAL	Hardened Steels SKD61, SKT4		Hardened Steels SKD11, SKH51		Hardened Steels SKS, SKH	
	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
HARDNESS	~HRC55		~HRC65		~HRC70	
Dia. (D1)	6	420	4000	260	3500	200
	8	400	3000	250	2700	180
	10	360	2400	240	2100	160
	12	360	2000	230	1800	150

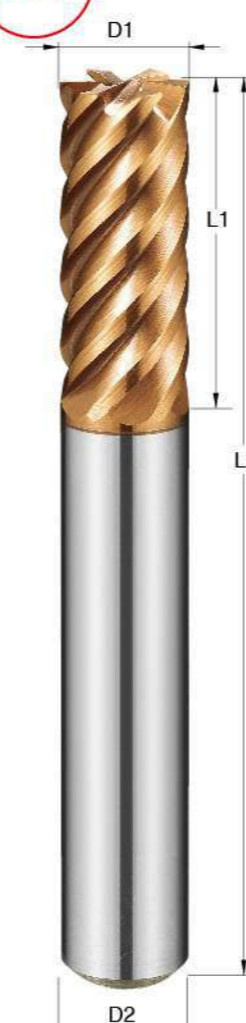
V70

## V70E

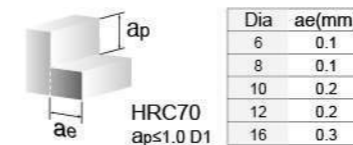
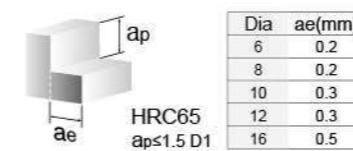
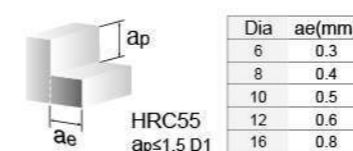
▶ Square / for **H** **P** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
V70E 0606	6.0	16	50	6
V70E 0808	8.0	20	60	8
V70E 1010	10.0	25	75	10
V70E 1212	12.0	30	75	12
V70E 1616	16.0	40	100	16

NEW



## ▼ Depth of cut



## ▼ Recommended cutting condition for V70E

MATERIAL	Hardened Steels SKD61, SKT4		Hardened Steels SKD11		Hardened Steels SKS, SKH	
	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
HARDNESS	~HRC55		~HRC65		~HRC70	
Dia. (D1)	6	4600	6400	2400	4200	1450
	8	4600	4800	2400	3200	1450
	10	4600	4000	2400	2600	1450
	12	3800	3200	1900	2200	1200
	16	2900	2400	1400	1600	900

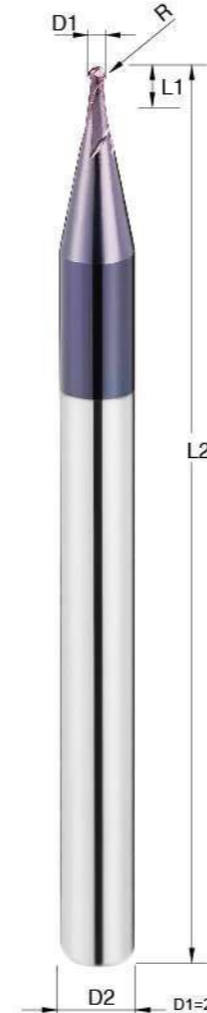


**Q MAGIC CUT**

Magic cutting series

MAGIC CUT

**QBM**

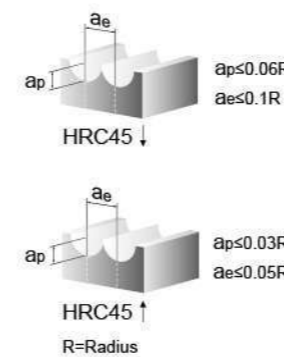


- MG**
- 2 Flutes
- 30°
- HRC 65
- Aldura
- Finishing  
Semi-Finishing
- Profiling

► Micro Diameter / Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
QBM 0024	R0.1	0.4	50	4
QBM 0034	R0.15	0.6	50	4
QBM 0044	R0.2	0.8	50	4
QBM 0054	R0.25	1.0	50	4
QBM 0064	R0.3	1.2	50	4
QBM 0074	R0.35	1.4	50	4
QBM 0084	R0.4	1.6	50	4
QBM 0094	R0.45	1.8	50	4
QBM 0124	R0.6	2.4	50	4
QBM 0144	R0.7	2.8	50	4
QBM 0164	R0.8	3.2	50	4
QBM 0184	R0.9	3.6	50	4

▼ Depth of cut



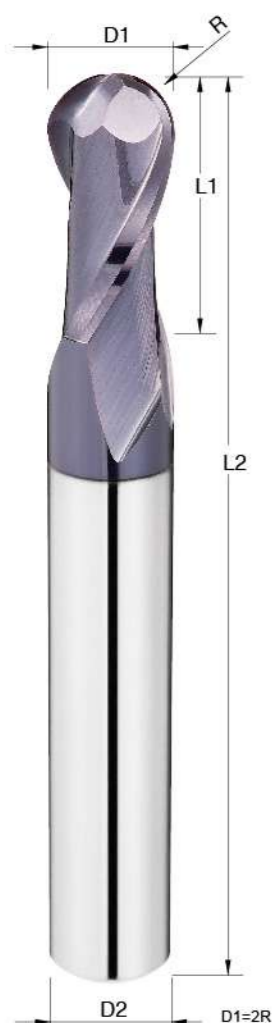
▼ Recommended cutting condition for QBM

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
RADIUS (R)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)	SPEED (min <sup>-1</sup> )	FEED (mm/min)
R0.1	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.15	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.2	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.25	32000	600 - 700	32000	500 - 600	25000	400 - 500
R0.3	32000	600 - 700	32000	500 - 600	25000	400 - 500
R0.35	32000	700 - 800	32000	600 - 700	25000	500 - 600
R0.4	32000	900 - 1000	32000	800 - 900	25000	600 - 700
R0.45	32000	1000 - 1100	32000	900 - 1000	25000	600 - 700



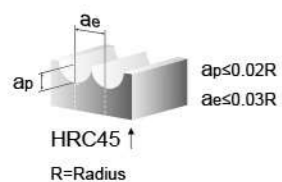
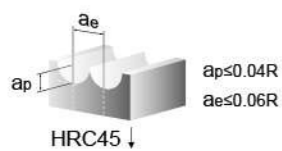
## MAGIC CUT

## QB

▶ Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
QB 0104	R0.5	2	50	4
QB 0106	R0.5	2	50	6
QB 0154	R0.75	3	50	4
QB 0156	R0.75	3	50	6
QB 0204	R1	4	50	4
QB 0206	R1	4	50	6
QB 0303	R1.5	6	50	3
QB 0304	R1.5	6	50	4
QB 0306	R1.5	6	50	6
QB 0404	R2	8	50	4
QB 0406	R2	8	50	6
QB 0506	R2.5	10	50	6
QB 0606	R3	12	50	6
QB 0808	R4	16	60	8
QB 1010	R5	20	75	10
QB 1212	R6	24	75	12
QB 1616	R8	32	100	16

## ▼ Depth of cut

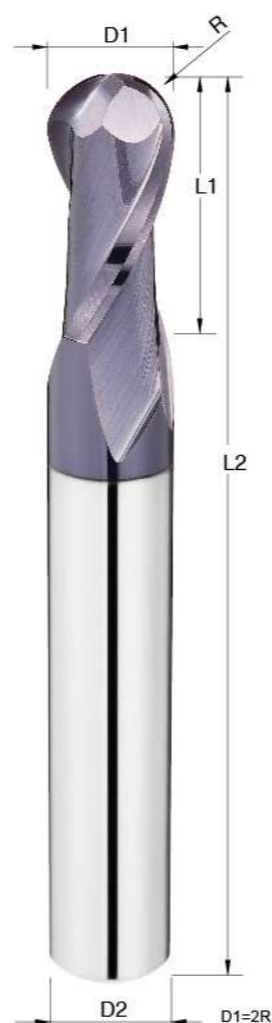


## ▼ Recommended cutting condition for QB

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	17000	5500	14000	5000	9000	1500
R4	12000	4000	9000	3000	6200	1400
R5	9000	3500	7000	2800	5200	900
R6	8000	2800	6500	1800	4300	800
R8	7000	2000	5000	1500	3300	700

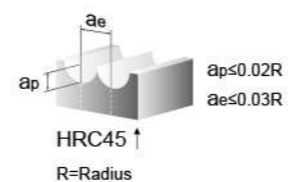
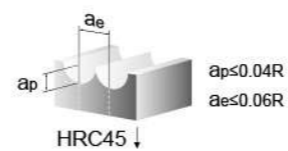
## MAGIC CUT

## QBG

▶ Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
QBG 0404	R2	8	50	4
QBG 0606	R3	12	50	6
QBG 0808	R4	16	60	8
QBG 1010	R5	20	75	10
QBG 1212	R6	24	75	12

## ▼ Depth of cut



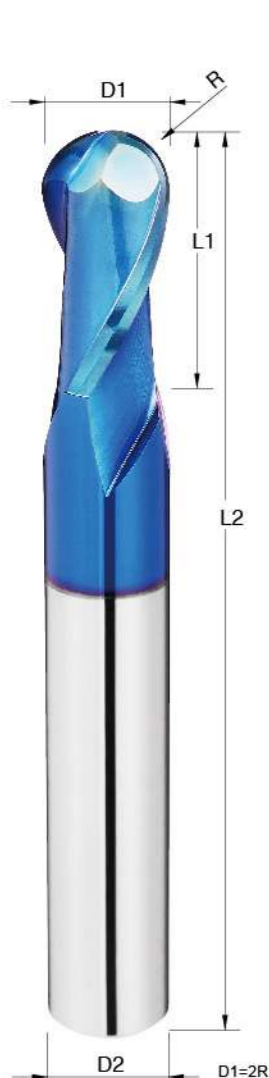
## ▼ Recommended cutting condition for QBG

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	17000	5500	14000	5000	9000	1500
R4	12000	4000	9000	3000	6200	1400
R5	9000	3500	7000	2800	5200	900
R6	8000	2800	6500	1800	4300	800
R8	7000	2000	5000	1500	3300	700



## MAGIC CUT

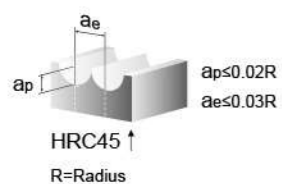
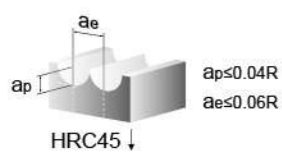
## QBN



► Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
QBN 0104	R0.5	2	50	4
QBN 0106	R0.5	2	50	6
QBN 0154	R0.75	3	50	4
QBN 0156	R0.75	3	50	6
QBN 0204	R1	4	50	4
QBN 0206	R1	4	50	6
QBN 0303	R1.5	6	50	3
QBN 0304	R1.5	6	50	4
QBN 0306	R1.5	6	50	6
QBN 0404	R2	8	50	4
QBN 0406	R2	8	50	6
QBN 0506	R2.5	10	50	6
QBN 0606	R3	12	50	6
QBN 0808	R4	16	60	8
QBN 1010	R5	20	75	10
QBN 1212	R6	24	75	12
QBN 1616	R8	32	100	16

## ▼ Depth of cut

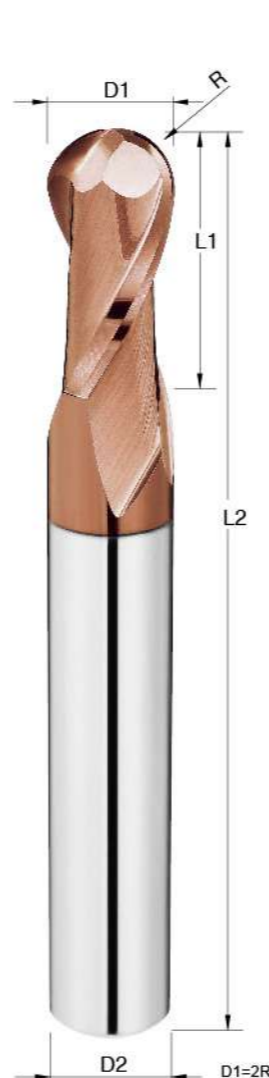


## ▼ Recommended cutting condition for QBN

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	17000	5500	14000	5000	9000	1500
R4	12000	4000	9000	3000	6200	1400
R5	9000	3500	7000	2800	5200	900
R6	8000	2800	6500	1800	4300	800
R8	7000	2000	5000	1500	3300	700

## MAGIC CUT

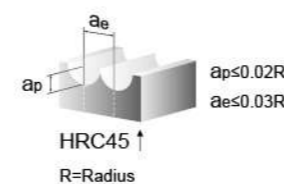
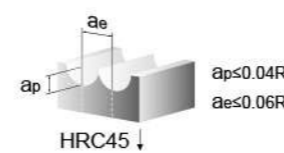
## QBX



► Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
QBX 0104	R0.5	2	50	4
QBX 0154	R0.75	3	50	4
QBX 0204	R1	4	50	4
QBX 0306	R1.5	6	50	6
QBX 0406	R2	8	50	6
QBX 0506	R2.5	10	50	6
QBX 0606	R3	12	50	6
QBX 0808	R4	16	60	8
QBX 1010	R5	20	75	10
QBX 1212	R6	24	75	12
QBX 1616	R8	32	100	16

## ▼ Depth of cut



## ▼ Recommended cutting condition for QBX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	17000	5500	14000	5000	9000	1500
R4	12000	4000	9000	3000	6200	1400
R5	9000	3500	7000	2800	5200	900
R6	8000	2800	6500	1800	4300	800
R8	7000	2000	5000	1500	3300	700

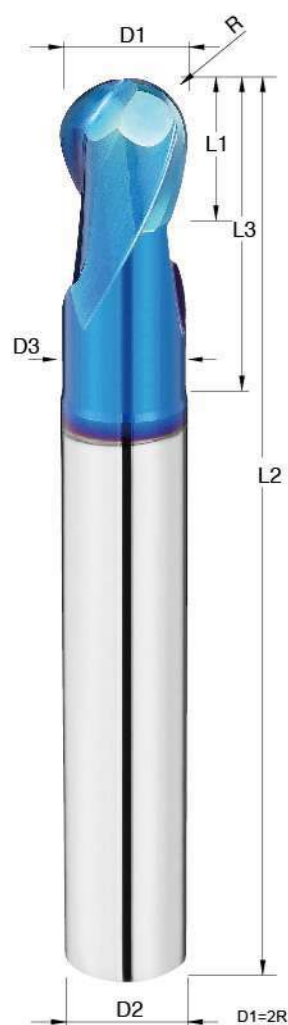


## MAGIC CUT

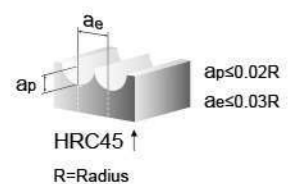
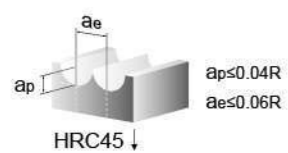
## QBHN

► Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
QBHN 0104	R0.5	0.95	1	3	50	4
QBHN 0154	R0.75	1.45	1	3	50	4
QBHN 0204	R1	1.92	2	5	50	4
QBHN 0306	R1.5	2.90	3	8	50	6
QBHN 0406	R2	3.88	4	10	50	6
QBHN 0506	R2.5	4.80	5	13	50	6
QBHN 0606	R3	5.80	6	15	50	6
QBHN 0808	R4	7.70	8	20	60	8
QBHN 1010	R5	9.60	10	25	75	10
QBHN 1212	R6	11.50	12	30	75	12



## ▼ Depth of cut



## ▼ Recommended cutting condition for QBHN

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	17000	5500	14000	5000	9000	1500
R4	12000	4000	9000	3000	6200	1400
R5	9000	3500	7000	2800	5200	900
R6	8000	2800	6500	1800	4300	800
R8	7000	2000	5000	1500	3300	700

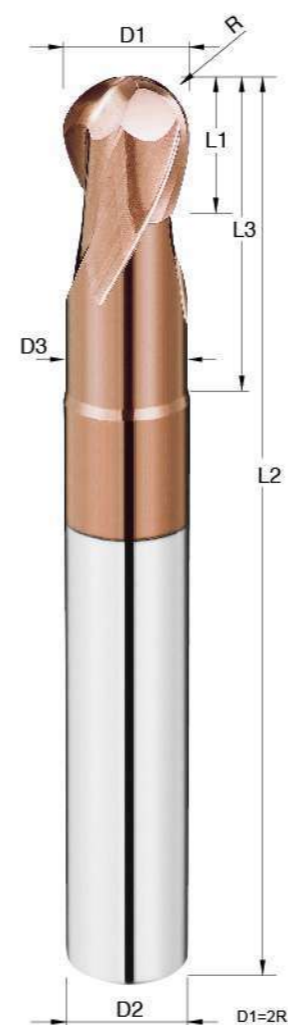
QBHN

## MAGIC CUT

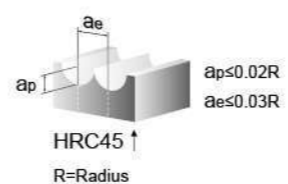
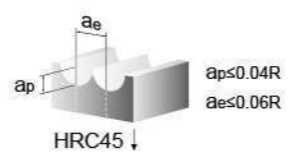
## QBHX

► Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
QBHX 0104	R0.5	0.95	1	3	50	4
QBHX 0154	R0.75	1.45	1	3	50	4
QBHX 0204	R1	1.92	2	5	50	4
QBHX 0306	R1.5	2.90	3	8	50	6
QBHX 0406	R2	3.88	4	10	50	6
QBHX 0506	R2.5	4.80	5	13	50	6
QBHX 0606	R3	5.80	6	15	50	6
QBHX 0808	R4	7.70	8	20	60	8
QBHX 1010	R5	9.60	10	25	75	10
QBHX 1212	R6	11.50	12	30	75	12



## ▼ Depth of cut



## ▼ Recommended cutting condition for QBHX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	17000	5500	14000	5000	9000	1500
R4	12000	4000	9000	3000	6200	1400
R5	9000	3500	7000	2800	5200	900
R6	8000	2800	6500	1800	4300	800
R8	7000	2000	5000	1500	3300	700

QBHX



MAGIC CUT

# QBLS.M.L

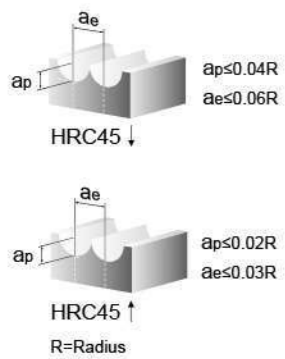


- MG**
- 2 Flutes
- 30°
- HRC 65
- ALTiN
- Finishing  
Semi-Finishing
- Profiling

▶ Long Shank / Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
QBLS 0206	R1	4	75	6
QBLS 0306	R1.5	6	75	6
QBLS 0406	R2	8	75	6
QBLS 0506	R2.5	10	75	6
QBLS 0606	R3	12	75	6
QBLS 0808	R4	16	75	8
QBLM 0606	R3	12	100	6
QBLM 0808	R4	16	100	8
QBLM 1010	R5	20	100	10
QBLM 1212	R6	24	100	12
QBLL 1010	R5	20	150	10
QBLL 1212	R6	24	150	12
QBLL 1616	R8	32	150	16
QBLL 2020	R10	40	150	20

▼ Depth of cut



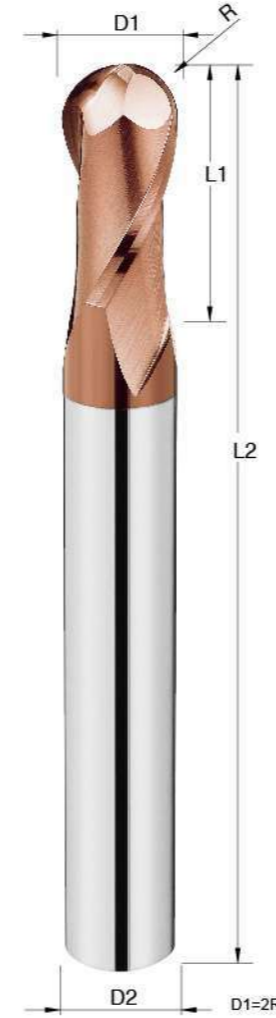
▼ Recommended cutting condition for QBLS. QBLM. QBLL

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	13000	3200	11000	2000	9000	1500
R4	9000	2300	8000	1500	6200	1400
R5	7500	1900	6500	1200	5200	900
R6	6300	1600	5500	1000	4300	800
R8	4500	1200	3800	800	3300	700

QBLS  
QBLM  
QBLL

MAGIC CUT

# QBLSX.MX.LX

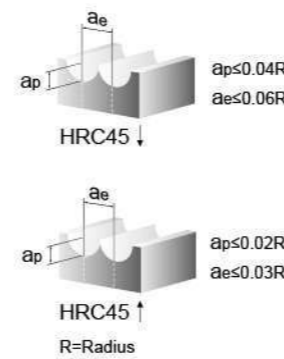


- MG**
- 2 Flutes
- 30°
- HRC 65
- i8
- Finishing  
Semi-Finishing
- Profiling

▶ Long Shank / Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
QBLSX 0206	R1	4	75	6
QBLSX 0306	R1.5	6	75	6
QBLSX 0406	R2	8	75	6
QBLSX 0506	R2.5	10	75	6
QBLSX 0606	R3	12	75	6
QBLSX 0808	R4	16	75	8
QBLMX 0606	R3	12	100	6
QBLMX 0808	R4	16	100	8
QBLMX 1010	R5	20	100	10
QBLMX 1212	R6	24	100	12
QBLLX 1010	R5	20	150	10
QBLLX 1212	R6	24	150	12
QBLLX 1616	R8	32	150	16
QBLLX 2020	R10	40	150	20

▼ Depth of cut



▼ Recommended cutting condition for QBLSX. QBLMX. QBLLX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	13000	3200	11000	2000	9000	1500
R4	9000	2300	8000	1500	6200	1400
R5	7500	1900	6500	1200	5200	900
R6	6300	1600	5500	1000	4300	800

QBLSX  
QBLMX  
QBLLX

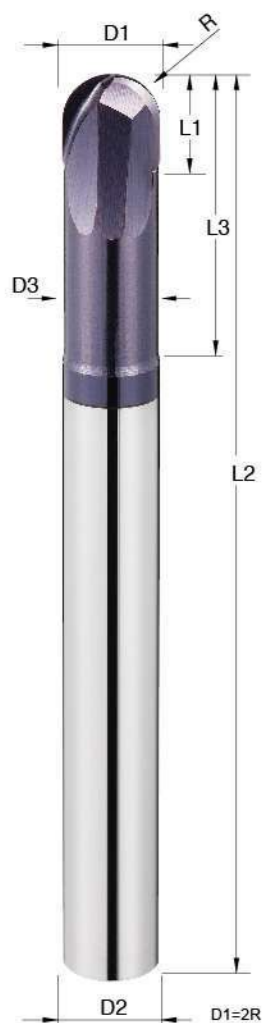
## MAGIC CUT

## QBP

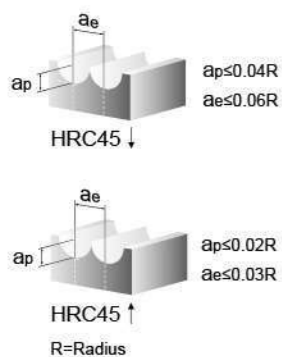
Power Ball Nose / for H P K

unit: mm

Order No.	Radius R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
QBP 0104	R0.5	0.95	1	3	50	4
QBP 0154	R0.75	1.45	2	5	50	4
QBP 0206	R1	1.92	3	6	50	6
QBP 0306	R1.5	2.90	4	8	50	6
QBP 0306A	R1.5	2.90	4	8	75	6
QBP 0406	R2	3.88	5	10	50	6
QBP 0406A	R2	3.88	5	10	75	6
QBP 0606	R3	5.80	6	12	50	6
QBP 0606A	R3	5.80	6	16	75	6
QBP 0808	R4	7.70	8	16	60	8
QBP 0808A	R4	7.70	8	25	100	8
QBP 1010	R5	9.60	10	20	75	10
QBP 1010A	R5	9.60	10	30	100	10
QBP 1212	R6	11.50	12	25	75	12
QBP 1212A	R6	11.50	12	35	100	12



## ▼ Depth of cut



## ▼ Recommended cutting condition for QBP

MATERIAL	Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Alloy Steels . Tool Steels SKD61		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Radius (R)	SPEED (min <sup>-1</sup> )	FEED (mm / min)	SPEED (min <sup>-1</sup> )	FEED (mm / min)	SPEED (min <sup>-1</sup> )	FEED (mm / min)
R1		45000	2000	18000	1500	12000	1200
R1.5		42000	2000	18000	1500	12000	1200
R2		15000	3000	18000	1500	12000	1200
R3		13000	5000	11000	3500	8000	1700
R4		9000	3000	8000	2000	4000	1400
R5		7500	2500	6500	1800	3500	1300

## MAGIC CUT

## QEM

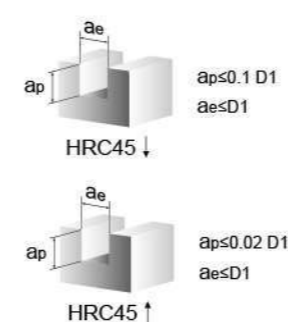
Micro Diameter / Square / for H P K

unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
QEM 0024	0.2	0.4	50	4
QEM 0034	0.3	0.6	50	4
QEM 0044	0.4	0.8	50	4
QEM 0054	0.5	1.0	50	4
QEM 0064	0.6	1.2	50	4
QEM 0074	0.7	1.4	50	4
QEM 0084	0.8	1.6	50	4
QEM 0094	0.9	1.8	50	4
QEM 0124	1.2	3.0	50	4
QEM 0144	1.4	3.0	50	4
QEM 0164	1.6	4.0	50	4
QEM 0184	1.8	5.0	50	4



## ▼ Depth of cut



## ▼ Recommended cutting condition for QEM

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED (mm / min)	SPEED (min <sup>-1</sup> )	FEED (mm / min)	SPEED (min <sup>-1</sup> )	FEED (mm / min)
0.2		40000	100 - 300	30000	80 - 250	15000	50 - 150
0.3		40000	100 - 350	30000	80 - 300	15000	50 - 200
0.4		40000	100 - 400	25000	80 - 350	10000	50 - 250
0.5		40000	100 - 500	25000	80 - 400	10000	50 - 250
0.6		38000	100 - 600	25000	80 - 500	8000	50 - 250
0.7		36000	100 - 700	20000	80 - 600	8000	50 - 250
0.8		34000	100 - 800	20000	80 - 700	8000	50 - 250
0.9		32000	100 - 1000	20000	80 - 800	8000	50 - 250



MAGIC CUT

# QEB

► Square / for **H P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
QEB 0104	1.0	3	50	4
QEB 0154	1.5	4	50	4
QEB 0204	2.0	6	50	4
QEB 0303	3.0	8	50	3
QEB 0304	3.0	8	50	4
QEB 0404	4.0	11	50	4
QEB 0506	5.0	13	50	6
QEB 0606	6.0	16	50	6
QEB 0808	8.0	20	60	8
QEB 1010	10.0	25	75	10
QEB 1212	12.0	30	75	12
QEB 1616	16.0	40	100	16
QEB 2020	20.0	45	100	20

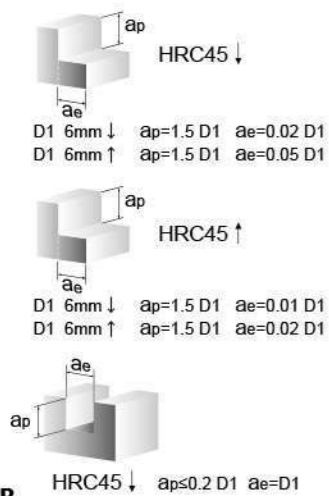


- MG**
- 4 Flutes
- 45°
- HRC 65
- ALTiN
- Finishing Semi-Finishing
- Side

▼ Recommended cutting condition for QEB

MATERIAL	Carbon Steels . Alloy Steels		Alloy Steels . Tool Steels		Hardened Steels		
	S45C, FC, FCD, SCM, S50C, SKS...		SCr, SNCM, SKD11, SKD61, NAK80...		SKD11		
HARDNESS	~HRC30		~HRC50		~HRC60		
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	
Side Milling	3	20000	2000	16000	1000	9000	500
	4	19000	2000	12000	1300	6000	550
	5	13000	1800	10000	1400	5000	500
	6	10000	3000	8000	1500	4500	700
	8	8000	3200	5000	1300	3500	600
	10	7000	3000	4500	1200	3000	500
Grooving	12	5000	2000	4000	1100	2000	500
	16	4000	1800	3500	1000	1800	450
	20	3500	1600	3000	1000	1300	450
	3	20000	2000	20000	1200	16000	1200
	4	16000	2000	16000	1200	12000	1300
	5	13000	1800	13000	1100	10000	1400
Grooving	6	10000	3000	10000	2100	8000	1500
	8	8000	2900	8000	1800	6000	1400
	10	7000	2800	6000	1700	5000	1300
	12	5000	2300	5500	1700	4500	1200
	16	3500	1800	4500	1800	3500	1200
	20	3000	1400	3000	1500	2600	1100

▼ Depth of cut



QEB

MAGIC CUT

# QEBG

► Square / for **H P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
QEBG 0404	4.0	11	50	4
QEBG 0606	6.0	16	50	6
QEBG 0808	8.0	20	60	8
QEBG 1010	10.0	25	75	10
QEBG 1212	12.0	30	75	12

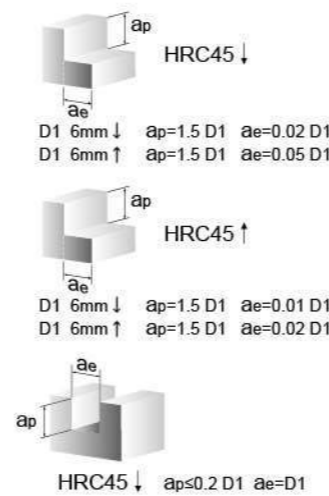


- MG**
- 4 Flutes
- 45°
- HRC 65
- Aldura
- Finishing Semi-Finishing
- Side

▼ Recommended cutting condition for QEBG

MATERIAL	Carbon Steels . Alloy Steels		Alloy Steels . Tool Steels		Hardened Steels		
	S45C, FC, FCD, SCM, S50C, SKS...		SCr, SNCM, SKD11, SKD61, NAK80...		SKD11		
HARDNESS	~HRC30		~HRC50		~HRC60		
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	
Side Milling	4	19000	2000	12000	1300	6000	550
	5	13000	1800	10000	1400	5000	500
	6	10000	3000	8000	1500	4500	700
	8	8000	3200	5000	1300	3500	600
	10	7000	3000	4500	1200	3000	500
	12	5000	2000	4000	1100	2000	500
Grooving	4	16000	2000	16000	1200	12000	1300
	5	13000	1800	13000	1100	10000	1400
	6	10000	3000	10000	2100	8000	1500
	8	8000	2900	8000	1800	6000	1400
	10	7000	2800	6000	1700	5000	1300
	12	5000	2300	5500	1700	4500	1200

▼ Depth of cut



QEBG

MAGIC CUT

# QEBN

► Square / for **H P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
QEBN 0304	3.0	8	50	4
QEBN 0404	4.0	11	50	4
QEBN 0506	5.0	13	50	6
QEBN 0606	6.0	16	50	6
QEBN 0808	8.0	20	60	8
QEBN 1010	10.0	25	75	10
QEBN 1212	12.0	30	75	12
QEBN 1616	16.0	40	100	16
QEBN 2020	20.0	45	100	20

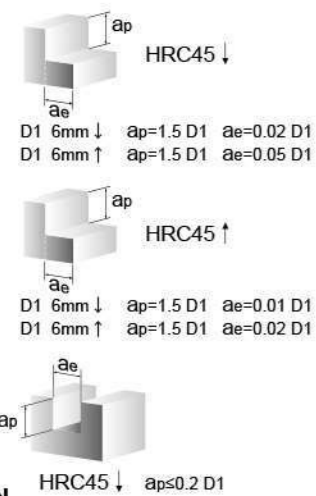


- MG**
- 4 Flutes
- 45°
- HRC 65
- nAcoB
- Finishing  
Semi-Finishing
- Side

▼ Recommended cutting condition for QEBN

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
Side Milling	3	20000	2000	16000	1000	9000	500
	4	19000	2000	12000	1300	6000	550
	5	13000	1800	10000	1400	5000	500
	6	10000	3000	8000	1500	4500	700
	8	8000	3200	5000	1300	3500	600
	10	7000	3000	4500	1200	3000	500
Grooving	12	5000	2000	4000	1100	2000	500
	16	4000	1800	3500	1000	1800	450
	20	3500	1600	3000	1000	1300	450
	3	20000	2000	20000	1200	16000	1200
	4	16000	2000	16000	1200	12000	1300
	5	13000	1800	13000	1100	10000	1400
	6	10000	3000	10000	2100	8000	1500
	8	8000	2900	8000	1800	6000	1400
	10	7000	2800	6000	1700	5000	1300
	12	5000	2300	5500	1700	4500	1200
16	3500	1800	4500	1800	3500	1200	
20	3000	1400	3000	1500	2600	1100	

▼ Depth of cut



MAGIC CUT

# QEX

► Square / for **H P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
QEX 0304	3.0	8	50	4
QEX 0404	4.0	11	50	4
QEX 0506	5.0	13	50	6
QEX 0606	6.0	16	50	6
QEX 0808	8.0	20	60	8
QEX 1010	10.0	25	75	10
QEX 1212	12.0	30	75	12
QEX 1616	16.0	40	100	16
QEX 2020	20.0	45	100	20

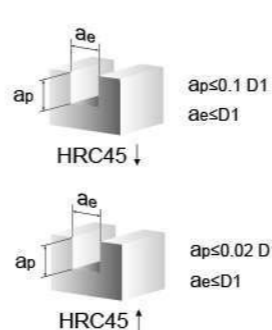


- MG**
- 4 Flutes
- 35°
- HRC 65
- i8
- Finishing  
Semi-Finishing
- Side

▼ Recommended cutting condition for QEX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
Side Milling	3	9000	600	5500	310	3500	220
	4	6000	600	5000	400	2200	220
	5	4800	750	4000	400	1700	240
	6	4500	800	3800	420	1600	300
	8	3500	820	2800	420	1000	300
	10	3000	820	1800	420	900	300
	12	2000	820	1600	350	800	300
	16	1500	650	1000	300	500	150
	20	1200	600	900	300	400	150

▼ Depth of cut



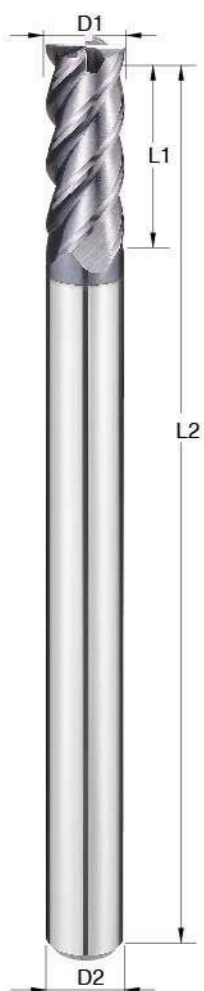


## MAGIC CUT

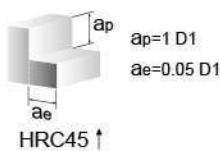
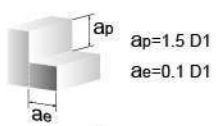
## QELB

▶ Long Shank / Square / for **H P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
QELB 0606	6.0	15	75	6
QELB 0606A	6.0	15	100	6
QELB 0808	8.0	20	100	8
QELB 1010	10.0	25	100	10
QELB 1212	12.0	30	100	12



## ▼ Depth of cut



## ▼ Recommended cutting condition for QELB

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	6	4500	800	3800	420	1600	300
	8	3500	820	2800	420	1000	300
	10	3000	820	1800	420	900	300
	12	2000	820	1600	350	800	300

## MAGIC CUT

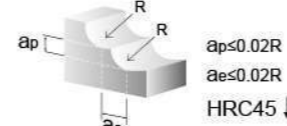
## QRD

▶ Corner Radius / for **H P K** unit: mm

Order No.	Diameter D1	Corner R R	Flute Length L1	O.A.L. L2	Shank Dia D2
QRD 0102	1.0	0.2	2	50	4
QRD 01502	1.5	0.2	3	50	4
QRD 01503	1.5	0.3	3	50	4
QRD 0202	2.0	0.2	4	50	4
QRD 0203	2.0	0.3	4	50	4
QRD 0205	2.0	0.5	4	50	4
QRD 0302	3.0	0.2	6	50	3
QRD 0305	3.0	0.5	6	50	3
QRD 0402	4.0	0.2	8	50	4
QRD 0405	4.0	0.5	8	50	4
QRD 0410	4.0	1.0	8	50	4
QRD 0605	6.0	0.5	12	50	6
QRD 0610	6.0	1.0	12	50	6
QRD 0805	8.0	0.5	16	60	8
QRD 0810	8.0	1.0	16	60	8
QRD 1005	10.0	0.5	20	75	10
QRD 1010	10.0	1.0	20	75	10
QRD 1020	10.0	2.0	20	75	10
QRD 1030	10.0	3.0	20	75	10
QRD 1205	12.0	0.5	24	75	12
QRD 1210	12.0	1.0	24	75	12
QRD 1220	12.0	2.0	24	75	12
QRD 1230	12.0	3.0	24	75	12



## ▼ Depth of cut



R=Corner R

## ▼ Recommended cutting condition for QRD

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	2	26000	1600	16500	1000	7500	300
	3	19000	1800	12000	1200	5400	360
	4	16000	3200	10000	1900	4800	480
	5	14000	3300	8000	2000	3800	500
	6	12000	3600	7200	2200	3500	650
	8	9600	4000	5600	2200	2700	750
	10	7000	3400	4400	1700	2100	650
	12	6000	2800	3600	1400	1800	600

## MAGIC CUT

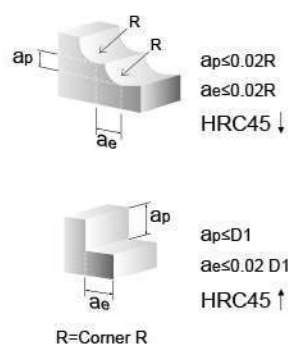
## QRDG

Corner Radius / for **H** **P** **K** unit: mm

Order No.	Diameter D1	Corner R R	Flute Length L1	O.A.L. L2	Shank Dia D2
QRDG 0405	4.0	0.5	8	50	4
QRDG 0605	6.0	0.5	12	50	6
QRDG 0610	6.0	1.0	12	50	6
QRDG 0805	8.0	0.5	16	60	8
QRDG 0810	8.0	1.0	16	60	8
QRDG 1005	10.0	0.5	20	75	10
QRDG 1010	10.0	1.0	20	75	10
QRDG 1205	12.0	0.5	24	75	12
QRDG 1210	12.0	1.0	24	75	12



## ▼ Depth of cut



## ▼ Recommended cutting condition for QRDG

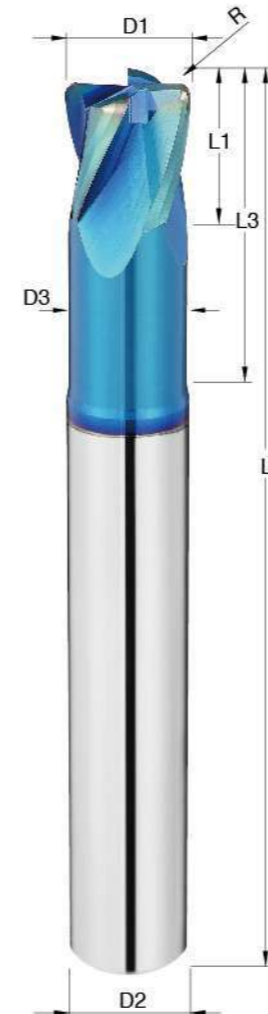
MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
4	16000	3200	10000	1900	4800	480	
6	12000	3600	7200	2200	3500	650	
8	9600	4000	5600	2200	2700	750	
10	7000	3400	4400	1700	2100	650	
12	6000	2800	3600	1400	1800	600	

## MAGIC CUT

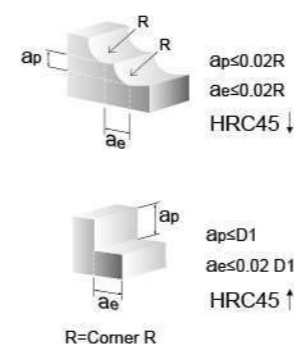
## QRHN

Corner Radius / for **H** **P** **K** unit: mm

Order No.	Diameter D1	Corner R R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
QRHN 0305	3.0	0.5	2.90	3	9	50	6
QRHN 0405	4.0	0.5	3.88	4	12	50	6
QRHN 0605	6.0	0.5	5.80	6	15	50	6
QRHN 0610	6.0	1.0	5.80	6	15	50	6
QRHN 0805	8.0	0.5	7.70	8	20	60	8
QRHN 0810	8.0	1.0	7.70	8	20	60	8
QRHN 1010	10.0	1.0	9.60	10	25	75	10
QRHN 1020	10.0	2.0	9.60	10	25	75	10
QRHN 1030	10.0	3.0	9.60	10	25	75	10
QRHN 1210	12.0	1.0	11.50	12	30	75	12
QRHN 1220	12.0	2.0	11.50	12	30	75	12



## ▼ Depth of cut



## ▼ Recommended cutting condition for QRHN

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
2	26000	1600	16500	1000	7500	300	
3	19000	1800	12000	1200	5400	360	
4	16000	3200	10000	1900	4800	480	
5	14000	3300	8000	2000	3800	500	
6	12000	3600	7200	2200	3500	650	
8	9600	4000	5600	2200	2700	750	
10	7000	3400	4400	1700	2100	650	
12	6000	2800	3600	1400	1800	600	



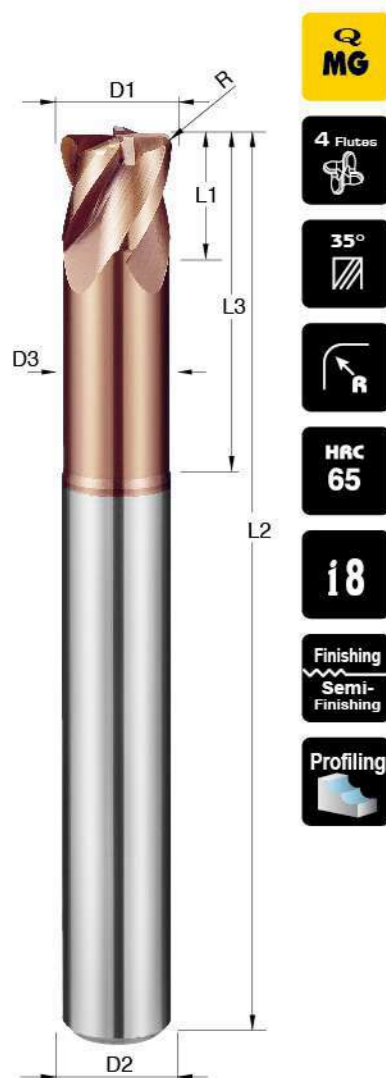
## MAGIC CUT

## QRHX

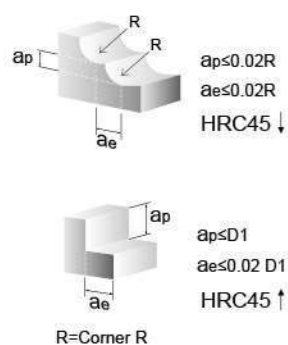
▶ Corner Radius / for **H** **P** **K**

unit: mm

Order No.	Diameter D1	Corner R R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
QRHX 0305	3.0	0.5	2.90	3	9	50	6
QRHX 0405	4.0	0.5	3.88	4	12	50	6
QRHX 0605	6.0	0.5	5.80	6	18	50	6
QRHX 0610	6.0	1.0	5.80	6	18	50	6
QRHX 0805	8.0	0.5	7.70	8	24	60	8
QRHX 0810	8.0	1.0	7.70	8	24	60	8
QRHX 1010	10.0	1.0	9.60	10	30	75	10
QRHX 1020	10.0	2.0	9.60	10	30	75	10
QRHX 1030	10.0	3.0	9.60	10	30	75	10
QRHX 1210	12.0	1.0	11.50	12	36	75	12
QRHX 1220	12.0	2.0	11.50	12	36	75	12



## ▼ Depth of cut



## ▼ Recommended cutting condition for QRHX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	2	26000	1600	16500	1000	7500	300
	3	19000	1800	12000	1200	5400	360
	4	16000	3200	10000	1900	4800	480
	5	14000	3300	8000	2000	3800	500
	6	12000	3600	7200	2200	3500	650
	8	9600	4000	5600	2200	2700	750
	10	7000	3400	4400	1700	2100	650
	12	6000	2800	3600	1400	1800	600

## MAGIC CUT

## QERC

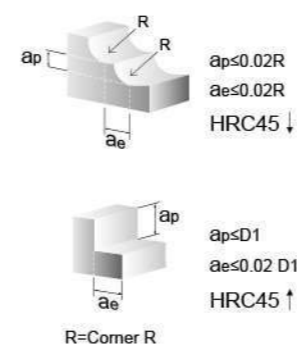
▶ Long Shank / Corner Radius / for **H** **P** **K**

unit: mm

Order No.	Diameter D1	Corner R R	Flute Length L1	O.A.L. L2	Shank Dia D2
QERC 0605	6.0	0.5	12	75	6
QERC 0605A	6.0	0.5	12	100	6
QERC 0610	6.0	1.0	12	75	6
QERC 0610A	6.0	1.0	12	100	6
QERC 0805	8.0	0.5	16	100	8
QERC 0810	8.0	1.0	16	100	8
QERC 1005	10.0	0.5	20	100	10
QERC 1010	10.0	1.0	20	100	10
QERC 1020	10.0	2.0	20	100	10
QERC 1205	12.0	0.5	24	100	12
QERC 1210	12.0	1.0	24	100	12
QERC 1220	12.0	2.0	24	100	12



## ▼ Depth of cut



## ▼ Recommended cutting condition for QERC

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	6	12000	3600	7200	2200	3500	650
	8	9600	4000	5600	2200	2700	750
	10	7000	3400	4400	1700	2100	650
	12	6000	2800	3600	1400	1800	600

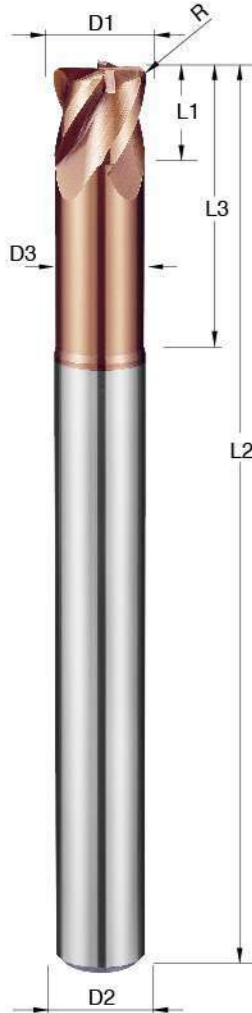


MAGIC CUT

# QRHLX

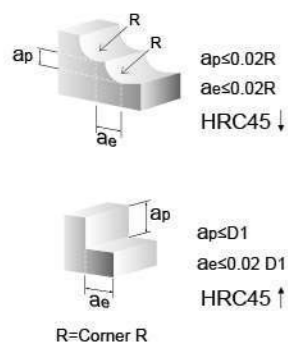
► Long Shank / Corner Radius / for **H P K** unit: mm

Order No.	Diameter D1	Corner R R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
QRHLX 0605	6.0	0.5	5.8	6	18	75	6
QRHLX 0610	6.0	1.0	5.8	6	18	75	6
QRHLX 0805	8.0	0.5	7.7	8	24	100	8
QRHLX 0810	8.0	1.0	7.7	8	24	100	8
QRHLX 1005	10.0	0.5	9.6	10	30	100	10
QRHLX 1010	10.0	1.0	9.6	10	30	100	10
QRHLX 1020	10.0	2.0	9.6	10	30	100	10
QRHLX 1205	12.0	0.5	11.5	12	36	100	12
QRHLX 1210	12.0	1.0	11.5	12	36	100	12
QRHLX 1220	12.0	2.0	11.5	12	36	100	12



- MG**
- 4 Flutes
- 35°
- R
- HRC 65
- i8
- Finishing / Semi-Finishing
- Profiling

▼ Depth of cut



▼ Recommended cutting condition for QRHLX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	6	12000	3600	7200	2200	3500	650
	8	9600	4000	5600	2200	2700	750
	10	7000	3400	4400	1700	2100	650
	12	6000	2800	3600	1400	1800	600

MAGIC CUT

# QBF

► Long Neck / Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
QBF 00504	R0.25	0.46	0.5	4	50	4
QBF 00506	R0.25	0.46	0.5	6	50	4
QBF 00604	R0.3	0.56	0.6	4	50	4
QBF 00606	R0.3	0.56	0.6	6	50	4
QBF 00806	R0.4	0.76	0.8	6	50	4
QBF 00808	R0.4	0.76	0.8	8	50	4
QBF 01006	R0.5	0.95	1.5	6	50	4
QBF 01008	R0.5	0.95	1.5	8	50	4
QBF 01010	R0.5	0.95	1.5	10	50	4
QBF 01012	R0.5	0.95	1.5	12	50	4
QBF 01208	R0.6	1.15	2	8	50	4
QBF 01212	R0.6	1.15	2	12	50	4
QBF 01508	R0.75	1.45	2	8	50	4
QBF 01512	R0.75	1.45	2	12	50	4
QBF 01516	R0.75	1.45	2	16	50	4
QBF 01520	R0.75	1.45	2	20	50	4
QBF 01608	R0.8	1.54	2.5	8	50	4
QBF 01612	R0.8	1.54	2.5	12	50	4
QBF 01616	R0.8	1.54	2.5	16	50	4
QBF 02008	R1	1.92	3	8	50	4
QBF 02012	R1	1.92	3	12	50	4
QBF 02016	R1	1.92	3	16	50	4
QBF 02020	R1	1.92	3	20	50	4
QBF 03008	R1.5	2.90	4	8	50	6
QBF 03010	R1.5	2.90	4	10	50	6
QBF 03016	R1.5	2.90	4	16	50	6
QBF 03020	R1.5	2.90	4	20	75	6
QBF 03025	R1.5	2.90	4	25	75	6
QBF 04010	R2	3.88	5	10	75	6
QBF 04015	R2	3.88	5	15	75	6
QBF 04020	R2	3.88	5	20	75	6
QBF 04025	R2	3.88	5	25	75	6
QBF 04030	R2	3.88	5	30	75	6

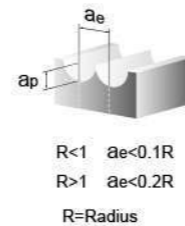


- MG**
- 2 Flutes
- 30°
- HRC 65
- ALTiN
- Finishing / Semi-Finishing
- Profiling

▼ Recommended cutting condition for QBF

MATERIAL	Alloy Steels . Tool Steels . Hardened Steels S45C, SCM, S50C, SKS, SCr, SNCM, SKD11, SKD61, NAK80				
	RADIUS (R)	EFFECTIVE LENGTH	SPEED (min <sup>-1</sup> )	FEED mm / min	DEPTH OF CUT $a_p$ (mm)
R0.25	4	4	30000 - 40000	200 - 650	0.015
	6	6	30000 - 40000	200 - 650	0.013
R0.3	4	4	27000 - 40000	180 - 650	0.025
	6	6	27000 - 40000	180 - 650	0.015
R0.4	6	6	25000 - 40000	400 - 750	0.025
	8	8	25000 - 40000	400 - 750	0.025
R0.5	6	6	20000 - 32000	300 - 750	0.04
	8	8	20000 - 32000	300 - 750	0.03
	10	10	20000 - 32000	300 - 750	0.025
	12	12	20000 - 32000	300 - 750	0.015
R0.6	8	8	22000 - 25000	500 - 600	0.05
	12	12	22000 - 25000	500 - 600	0.03
	16	16	22000 - 25000	500 - 600	0.03
R0.75	8	8	18000 - 20000	350 - 550	0.07
	12	12	18000 - 20000	350 - 550	0.04
	16	16	18000 - 20000	350 - 550	0.03
	20	20	18000 - 20000	350 - 550	0.02
R0.8	8	8	13000 - 18000	350 - 800	0.08
	12	12	13000 - 18000	350 - 800	0.06
	16	16	13000 - 18000	350 - 800	0.05
	20	20	13000 - 18000	350 - 800	0.05
R1.0	8	8	12000 - 17000	500 - 900	0.1
	12	12	12000 - 17000	500 - 900	0.1
	16	16	12000 - 17000	500 - 900	0.07
	20	20	12000 - 17000	500 - 900	0.04
	25	25	12000 - 17000	500 - 900	0.04
R1.5	8	8	8000 - 11000	500 - 700	0.17
	10	10	8000 - 11000	500 - 700	0.15
	16	16	8000 - 11000	500 - 700	0.14
	20	20	8000 - 11000	500 - 700	0.12
	25	25	8000 - 11000	500 - 700	0.1
R2.0	10	10	5000 - 8000	400 - 600	0.18
	15	15	5000 - 8000	400 - 600	0.17
	20	20	5000 - 8000	400 - 600	0.16
	25	25	5000 - 8000	400 - 600	0.15
	30	30	5000 - 8000	400 - 600	0.14

▼ Depth of cut





## MAGIC CUT

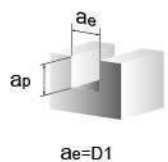
## QEFA

► Long Neck / Square / for **H P K** unit: mm



Order No.	Diameter D1	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
QEFA 00504	0.5	0.46	1	4	50	4
QEFA 00506	0.5	0.46	1	6	50	4
QEFA 00604	0.6	0.56	1.2	4	50	4
QEFA 00606	0.6	0.56	1.2	6	50	4
QEFA 00804	0.8	0.76	1.2	4	50	4
QEFA 00806	0.8	0.76	1.2	6	50	4
QEFA 00808	0.8	0.76	1.2	8	50	4
QEFA 01006	1.0	0.95	1.5	6	50	4
QEFA 01008	1.0	0.95	1.5	8	50	4
QEFA 01010	1.0	0.95	1.5	10	50	4
QEFA 01012	1.0	0.95	1.5	12	50	4
QEFA 01208	1.2	1.15	2	8	50	4
QEFA 01212	1.2	1.15	2	12	50	4
QEFA 01508	1.5	1.45	2	8	50	4
QEFA 01510	1.5	1.45	2	10	50	4
QEFA 01512	1.5	1.45	2	12	50	4
QEFA 01516	1.5	1.45	2	16	50	4
QEFA 01608	1.6	1.54	2.5	8	50	4
QEFA 01612	1.6	1.54	2.5	12	50	4
QEFA 01616	1.6	1.54	2.5	16	50	4
QEFA 02008	2.0	1.92	3	8	50	4
QEFA 02010	2.0	1.92	3	10	50	4
QEFA 02012	2.0	1.92	3	12	50	4
QEFA 02016	2.0	1.92	3	16	50	4
QEFA 02020	2.0	1.92	3	20	50	4
QEFA 02510	2.5	2.40	3	10	50	4
QEFA 02512	2.5	2.40	3	12	50	4
QEFA 02516	2.5	2.40	3	16	50	4
QEFA 02520	2.5	2.40	3	20	50	4
QEFA 03010	3.0	2.90	4	10	50	6
QEFA 03012	3.0	2.90	4	12	50	6
QEFA 03016	3.0	2.90	4	16	50	6
QEFA 03020	3.0	2.90	4	20	75	6
QEFA 03025	3.0	2.90	4	25	75	6

## ▼ Depth of cut



## ▼ Recommended cutting condition for QEFA

MATERIAL		Alloy Steels . Tool Steels . Hardened Steels S45C , SCM , S50C , SKS , Scr , SNCM , SKD11 , SKD61 , NAK80			
Dia.(D1)	EFFECTIVE LENGTH	SPEED (min <sup>-1</sup> )	FEED mm / min	DEPTH OF CUT ap (mm)	
1	4	25000	1500	0.05	
	6	25000	1500	0.03	
	10	25000	1500	0.01	
1.5	4	15000	1200	0.1	
	8	15000	1200	0.05	
	10	15000	1200	0.025	
	12	15000	1200	0.018	
2	8	12000	900	0.2	
	10	8800	700	0.12	
	12	7500	600	0.05	
	16	7000	500	0.02	
3	8	8000	600	0.5	
	12	8000	600	0.45	
	16	5500	450	0.18	
	20	4000	300	0.15	
	10	6000	400	0.7	
	16	6000	400	0.4	

## MAGIC CUT

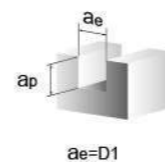
## QRFA

► Long Neck / Corner Radius / for **H P K** unit: mm



Order No.	Diameter D1	Corner R R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
QRFA 01004	1.0	0.1	0.95	1.0	4	50	4
QRFA 01006	1.0	0.1	0.95	1.0	6	50	4
QRFA 01008	1.0	0.1	0.95	1.0	8	50	4
QRFA 01010	1.0	0.1	0.95	1.0	10	50	4
QRFA 01504	1.5	0.2	1.45	1.5	4	50	4
QRFA 01506	1.5	0.2	1.45	1.5	6	50	4
QRFA 01508	1.5	0.2	1.45	1.5	8	50	4
QRFA 01510	1.5	0.2	1.45	1.5	10	50	4
QRFA 01512	1.5	0.2	1.45	1.5	12	50	4
QRFA 02008	2.0	0.2	1.92	2.0	8	50	4
QRFA 02010	2.0	0.2	1.92	2.0	10	50	4
QRFA 02012	2.0	0.2	1.92	2.0	12	50	4
QRFA 02016	2.0	0.2	1.92	2.0	16	50	4
QRFA 03008	3.0	0.2	2.90	3.0	8	50	6
QRFA 03010	3.0	0.2	2.90	3.0	10	50	6
QRFA 03012	3.0	0.2	2.90	3.0	12	50	6
QRFA 03016	3.0	0.2	2.90	3.0	16	50	6
QRFA 03020	3.0	0.2	2.90	3.0	20	50	6

## ▼ Depth of cut



## ▼ Recommended cutting condition for QRFA

MATERIAL		Alloy Steels . Tool Steels . Hardened Steels S45C , SCM , S50C , SKS , Scr , SNCM , SKD11 , SKD61 , NAK80			
Dia.(D1)	EFFECTIVE LENGTH	SPEED (min <sup>-1</sup> )	FEED mm / min	DEPTH OF CUT ap (mm)	
1	4	30000	2200	0.15	
	6	30000	2200	0.12	
	8	30000	2200	0.12	
	10	30000	2200	0.12	
1.5	4	25000	1800	0.20	
	6	25000	1800	0.18	
	8	25000	1800	0.15	
	10	25000	1800	0.15	
2	12	25000	1800	0.15	
	8	20000	1500	0.30	
	10	20000	1500	0.30	
3	12	20000	1500	0.25	
	16	20000	1500	0.25	
	8	12000	900	0.40	
	12	12000	900	0.40	
16	12000	900	0.30		
	20	12000	900	0.30	

## MAGIC CUT

## QRFB

► Long Neck / Corner Radius / for

H P K

unit: mm



Order No.	Diameter D1	Corner R R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
QRFB 01004	1.0	0.1	0.95	1.0	4	50	4
QRFB 01006	1.0	0.1	0.95	1.0	6	50	4
QRFB 01008	1.0	0.1	0.95	1.0	8	50	4
QRFB 01010	1.0	0.1	0.95	1.0	10	50	4
QRFB 01504	1.5	0.2	1.45	1.5	4	50	4
QRFB 01506	1.5	0.2	1.45	1.5	6	50	4
QRFB 01508	1.5	0.2	1.45	1.5	8	50	4
QRFB 01510	1.5	0.2	1.45	1.5	10	50	4
QRFB 01512	1.5	0.2	1.45	1.5	12	50	4
QRFB 02008	2.0	0.2	1.92	2.0	8	50	4
QRFB 02010	2.0	0.2	1.92	2.0	10	50	4
QRFB 02012	2.0	0.2	1.92	2.0	12	50	4
QRFB 02016	2.0	0.2	1.92	2.0	16	50	4
QRFB 03008	3.0	0.2	2.90	3.0	8	50	6
QRFB 03010	3.0	0.2	2.90	3.0	10	50	6
QRFB 03012	3.0	0.2	2.90	3.0	12	50	6
QRFB 03016	3.0	0.2	2.90	3.0	16	50	6
QRFB 03020	3.0	0.2	2.90	3.0	20	50	6

HGT

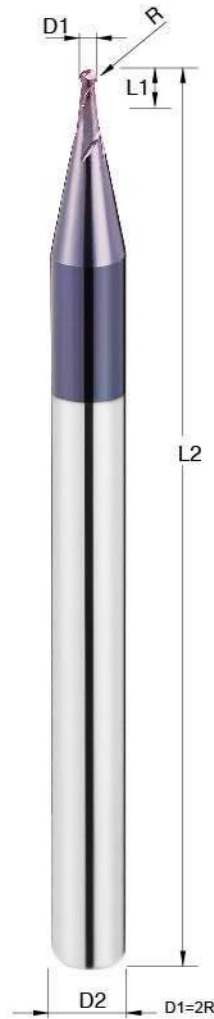
**S** SUPER MILL

HSC & HHC series



## SUPER MILL

## SBM

S  
MG

2 Flutes

30°

HRC  
60

ALTiN

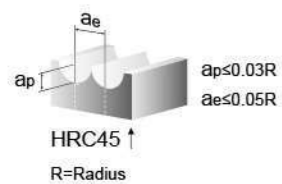
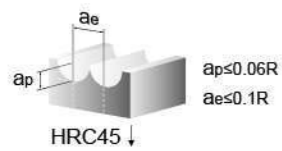
Finishing  
Semi-  
Finishing

Profiling

▶ Micro Diameter / Ball Nose / for H P K unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
SBM 0024	R0.1	0.4	50	4
SBM 0034	R0.15	0.6	50	4
SBM 0044	R0.2	0.8	50	4
SBM 0054	R0.25	1.0	50	4
SBM 0064	R0.3	1.2	50	4
SBM 0074	R0.35	1.4	50	4
SBM 0084	R0.4	1.6	50	4
SBM 0094	R0.45	1.8	50	4
SBM 0124	R0.6	2.4	50	4
SBM 0144	R0.7	2.8	50	4
SBM 0164	R0.8	3.2	50	4
SBM 0184	R0.9	3.6	50	4

## ▼ Depth of cut

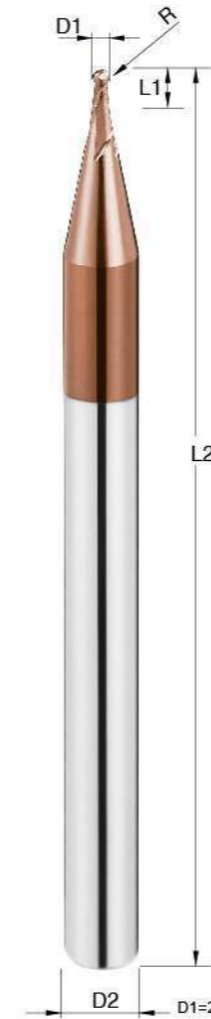


## ▼ Recommended cutting condition for SBM

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.1	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.15	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.2	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.25	32000	600 - 700	32000	500 - 600	25000	400 - 500
R0.3	32000	600 - 700	32000	500 - 600	25000	400 - 500
R0.35	32000	700 - 800	32000	600 - 700	25000	500 - 600
R0.4	32000	900 - 1000	32000	800 - 900	25000	600 - 700
R0.45	32000	1000 - 1100	32000	900 - 1000	25000	600 - 700

## SUPER MILL

## SBMX

S  
MG

2 Flutes

30°

HRC  
60

i8

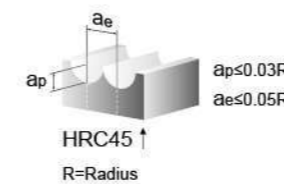
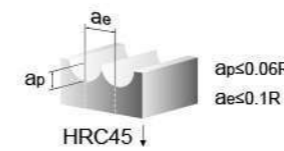
Finishing  
Semi-  
Finishing

Profiling

▶ Micro Diameter / Ball Nose / for H P K unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
SBMX 0024	R0.1	0.4	50	4
SBMX 0034	R0.15	0.6	50	4
SBMX 0044	R0.2	0.8	50	4
SBMX 0054	R0.25	1.0	50	4
SBMX 0064	R0.3	1.2	50	4
SBMX 0074	R0.35	1.4	50	4
SBMX 0084	R0.4	1.6	50	4
SBMX 0094	R0.45	1.8	50	4
SBMX 0124	R0.6	2.4	50	4
SBMX 0144	R0.7	2.8	50	4
SBMX 0164	R0.8	3.2	50	4
SBMX 0184	R0.9	3.6	50	4

## ▼ Depth of cut

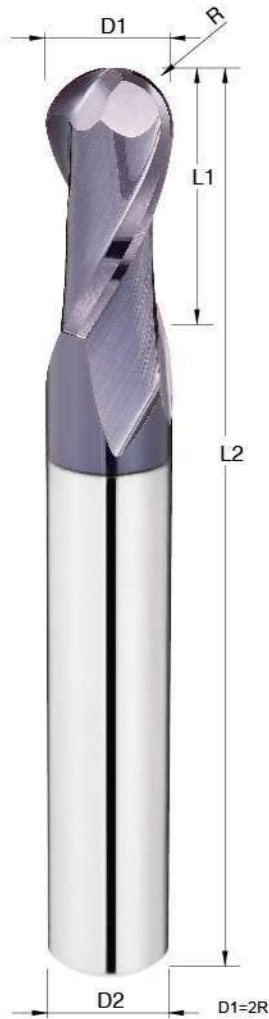


## ▼ Recommended cutting condition for SBMX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.1	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.15	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.2	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.25	32000	600 - 700	32000	500 - 600	25000	400 - 500
R0.3	32000	600 - 700	32000	500 - 600	25000	400 - 500
R0.35	32000	700 - 800	32000	600 - 700	25000	500 - 600
R0.4	32000	900 - 1000	32000	800 - 900	25000	600 - 700
R0.45	32000	1000 - 1100	32000	900 - 1000	25000	600 - 700

## SUPER MILL

## SB

S  
MG

2 Flutes

30°

HRC  
60

ALTiN

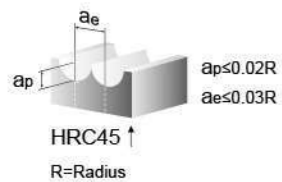
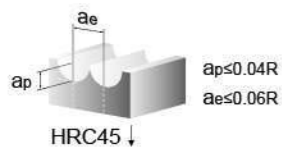
Finishing  
Semi-Finishing

Profiling

► Ball Nose / for **H** **P** **K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
SB 0104	R0.5	2	50	4
SB 0106	R0.5	2	50	6
SB 0154	R0.75	3	50	4
SB 0156	R0.75	3	50	6
SB 0204	R1	4	50	4
SB 0206	R1	4	50	6
SB 0254	R1.25	5	50	4
SB 0256	R1.25	5	50	6
SB 0303	R1.5	6	50	3
SB 0304	R1.5	6	50	4
SB 0306	R1.5	6	50	6
SB 0404	R2	8	50	4
SB 0406	R2	8	50	6
SB 0505	R2.5	10	50	5
SB 0506	R2.5	10	50	6
SB 0606	R3	12	50	6
SB 0808	R4	16	60	8
SB 1010	R5	20	75	10
SB 1212	R6	24	75	12
SB 1616	R8	32	100	16

## ▼ Depth of cut

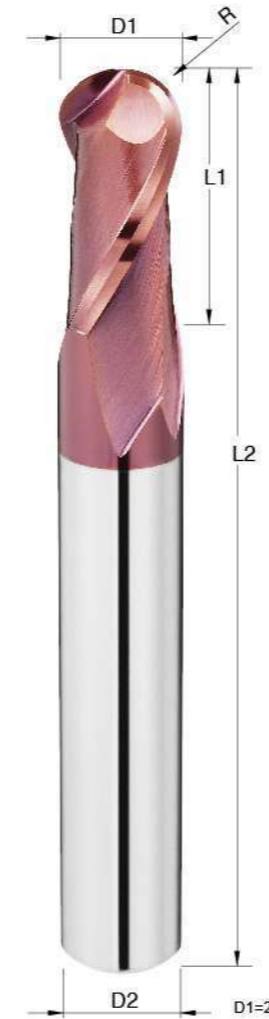


## ▼ Recommended cutting condition for SB

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.5	45000	2000	45000	1800	28000	1000
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	13000	3200	11000	2000	9000	1500
R4	9000	2300	8000	1500	6200	1400
R5	7500	1900	6500	1200	5200	900
R6	6300	1600	5500	1000	4300	800
R8	4500	1200	3800	800	3300	700

## SUPER MILL

## SBK

S  
MG

2 Flutes

30°

HRC  
60

G100

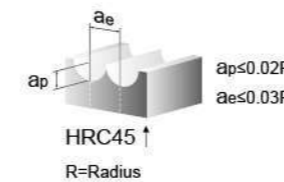
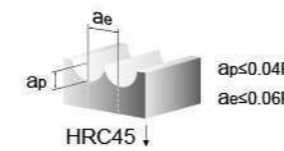
Finishing  
Semi-Finishing

Profiling

► Ball Nose / for **H** **P** **K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
SBK 0104	R0.5	2	50	4
SBK 0106	R0.5	2	50	6
SBK 0154	R0.75	3	50	4
SBK 0156	R0.75	3	50	6
SBK 0204	R1	4	50	4
SBK 0206	R1	4	50	6
SBK 0254	R1.25	5	50	4
SBK 0256	R1.25	5	50	6
SBK 0303	R1.5	6	50	3
SBK 0304	R1.5	6	50	4
SBK 0306	R1.5	6	50	6
SBK 0404	R2	8	50	4
SBK 0406	R2	8	50	6
SBK 0506	R2.5	10	50	6
SBK 0606	R3	12	50	6
SBK 0808	R4	16	60	8
SBK 1010	R5	20	75	10
SBK 1212	R6	24	75	12
SBK 1616	R8	32	100	16

## ▼ Depth of cut



## ▼ Recommended cutting condition for SBK

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.5	45000	2000	45000	1800	28000	1000
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	13000	3200	11000	2000	9000	1500
R4	9000	2300	8000	1500	6200	1400
R5	7500	1900	6500	1200	5200	900
R6	6300	1600	5500	1000	4300	800
R8	4500	1200	3800	800	3300	700



## SUPER MILL

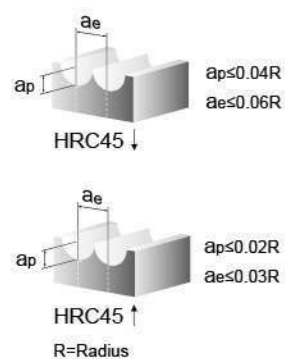
## SBX

► Ball Nose / for **H** **P** **K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
SBX 0104	R0.5	2	50	4
SBX 0154	R0.75	3	50	4
SBX 0204	R1	4	50	4
SBX 0306	R1.5	6	50	6
SBX 0406	R2	8	50	6
SBX 0506	R2.5	10	50	6
SBX 0606	R3	12	50	6
SBX 0808	R4	16	60	8
SBX 1010	R5	20	75	10
SBX 1212	R6	24	75	12
SBX 1616	R8	32	100	16



## ▼ Depth of cut



## ▼ Recommended cutting condition for SBX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.5	45000	2000	45000	1800	28000	1000
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	13000	3200	11000	2000	9000	1500
R4	9000	2300	8000	1500	6200	1400
R5	7500	1900	6500	1200	5200	900
R6	6300	1600	5500	1000	4300	800
R8	4500	1200	3800	800	3300	700

## SUPER MILL

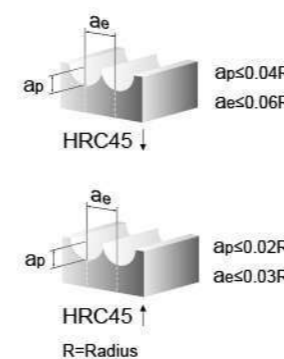
## SBB

► Ball Nose / for **H** **P** **K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
SBB 0104	R0.5	2	50	4
SBB 0154	R0.75	3	50	4
SBB 0204	R1	4	50	4
SBB 0254	R1.25	5	50	4
SBB 0304	R1.5	6	50	4
SBB 0404	R2	8	50	4
SBB 0506	R2.5	10	50	6
SBB 0606	R3	12	50	6
SBB 0808	R4	16	60	8
SBB 1010	R5	20	75	10
SBB 1212	R6	24	75	12
SBB 1616	R8	32	100	16



## ▼ Depth of cut



## ▼ Recommended cutting condition for SBB

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R2	15000	3000	14000	2600	10000	1700
R3	13000	4000	11000	2600	9000	1900
R4	9000	2900	8000	1900	6200	1800
R5	7500	2400	6500	1500	5200	1100
R6	6300	2100	5500	1300	4300	1000
R8	4500	1500	3800	1000	3300	900
R10	3700	1200	3200	750	2600	600

## SUPER MILL

## SBL.S.M.L

S  
MG

2 Flutes

30°

HRC  
60

ALTiN

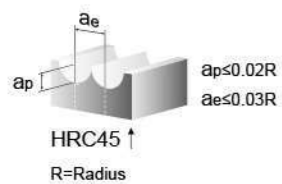
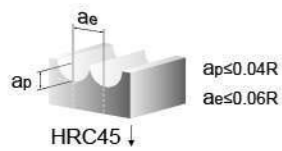
Finishing  
Semi-Finishing

Profiling

## ▶ Long Shank / Ball Nose / for H P K unit: mm

Order No.	Radius R	Flute Length L1	O.A.L L2	Shank Dia D2
SBLS 0104	R0.5	2	75	4
SBLS 0106	R0.5	2	75	6
SBLS 0154	R0.75	3	75	4
SBLS 0156	R0.75	3	75	6
SBLS 0206	R1	4	75	6
SBLS 0256	R1.25	5	75	6
SBLS 0303	R1.5	6	75	3
SBLS 0306	R1.5	6	75	6
SBLS 0404	R2	8	75	4
SBLS 0406	R2	8	75	6
SBLS 0506	R2.5	10	75	6
SBLS 0606	R3	12	75	6
SBLS 0808	R4	16	75	8
SBLM 0206	R1	4	100	6
SBLM 0306	R1.5	6	100	6
SBLM 0406	R2	8	100	6
SBLM 0606	R3	12	100	6
SBLM 0808	R4	16	100	8
SBLM 1010	R5	20	100	10
SBLM 1212	R6	24	100	12
SBLL 0606	R3	12	150	6
SBLL 0808	R4	16	150	8
SBLL 1010	R5	20	150	10
SBLL 1212	R6	24	150	12
SBLL 1616	R8	32	150	16
SBLL 2020	R10	40	150	20

## ▼ Depth of cut



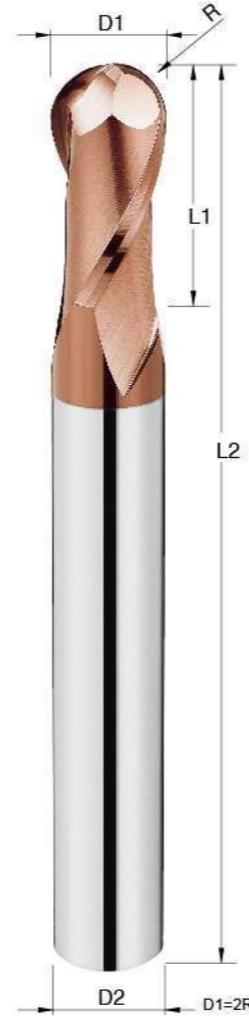
## ▼ Recommended cutting condition for SBLS. SBLM. SBLL

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.5	45000	2000	45000	1800	28000	1000
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	13000	3200	11000	2000	9000	1500
R4	9000	2300	8000	1500	6200	1400
R5	7500	1900	6500	1200	5200	900
R6	6300	1600	5500	1000	4300	800
R8	4500	1200	3800	800	3300	700

SBLS  
SBLM  
SBLL

## SUPER MILL

## SBL.SX.MX.LX

S  
MG

2 Flutes

30°

HRC  
60

i8

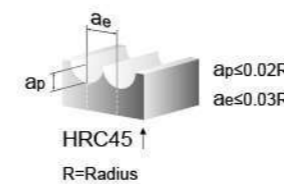
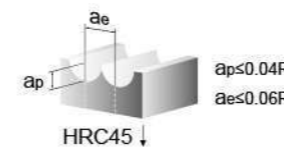
Finishing  
Semi-Finishing

Profiling

## ▶ Long Shank / Ball Nose / for H P K unit: mm

Order No.	Radius R	Flute Length L1	O.A.L L2	Shank Dia D2
SBLSX 0206	R1	4	75	6
SBLSX 0306	R1.5	6	75	6
SBLSX 0406	R2	8	75	6
SBLSX 0506	R2.5	10	75	6
SBLSX 0606	R3	12	75	6
SBLSX 0808	R4	16	75	8
SBLMX 0406	R2	8	100	6
SBLMX 0606	R3	12	100	6
SBLMX 0808	R4	16	100	8
SBLMX 1010	R5	20	100	10
SBLMX 1212	R6	24	100	12
SBLLX 0606	R3	12	150	6
SBLLX 0808	R4	16	150	8
SBLLX 1010	R5	20	150	10
SBLLX 1212	R6	24	150	12

## ▼ Depth of cut



## ▼ Recommended cutting condition for SBL.SX. SBL.MX. SBL.LX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.5	45000	2000	45000	1800	28000	1000
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	13000	3200	11000	2000	9000	1500
R4	9000	2300	8000	1500	6200	1400
R5	7500	1900	6500	1200	5200	900
R6	6300	1600	5500	1000	4300	800
R8	4500	1200	3800	800	3300	700

SBL.SX  
SBL.MX  
SBL.LX



## SUPER MILL

## SBC

▶ Taper Neck / Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2	Taper Angle β
SBC 0206	R1	4	75	6	3°
SBC 0206A	R1	4	75	6	5°
SBC 0306	R1.5	6	100	6	1.5°
SBC 0306A	R1.5	6	75	6	3°
SBC 0306B	R1.5	6	75	6	5°
SBC 0406	R2	8	100	6	1.5°
SBC 0406A	R2	8	100	6	3°
SBC 0406B	R2	8	75	6	5°
SBC 0608	R3	12	100	8	1.5°
SBC 0608A	R3	12	75	8	3°
SBC 0608B	R3	12	100	8	5°

S  
MG

2 Flutes

30°

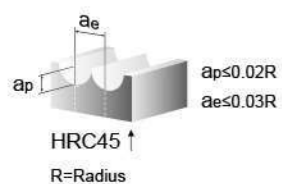
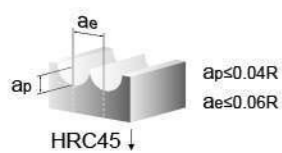
HRC  
60

ALTiN

Finishing  
Semi-Finishing

Profiling

## ▼ Depth of cut



## ▼ Recommended cutting condition for SBC

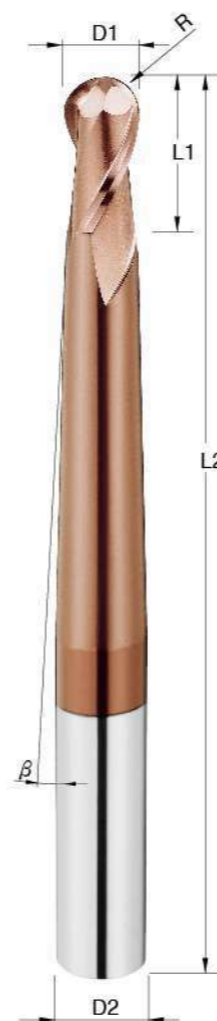
MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	13000	3200	11000	2000	9000	1500

## SUPER MILL

## SBCX

▶ Taper Neck / Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2	Taper Angle β
SBCX 0206	R1	4	75	6	3°
SBCX 0206A	R1	4	75	6	5°
SBCX 0306	R1.5	6	100	6	1.5°
SBCX 0306A	R1.5	6	75	6	3°
SBCX 0306B	R1.5	6	75	6	5°
SBCX 0406	R2	8	100	6	1.5°
SBCX 0406A	R2	8	100	6	3°
SBCX 0406B	R2	8	75	6	5°
SBCX 0608	R3	12	100	8	1.5°
SBCX 0608A	R3	12	75	8	3°
SBCX 0608B	R3	12	100	8	5°

S  
MG

2 Flutes

30°

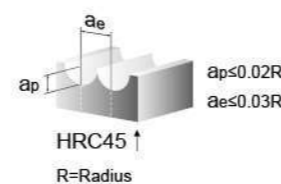
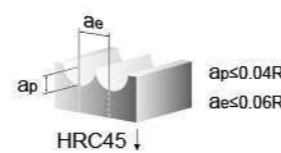
HRC  
60

i8

Finishing  
Semi-Finishing

Profiling

## ▼ Depth of cut



## ▼ Recommended cutting condition for SBCX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R1	23000	2000	22000	1800	16000	900
R1.5	16000	2000	15000	1800	11000	900
R2	15000	2400	14000	2000	10000	1300
R3	13000	3200	11000	2000	9000	1500

## SUPER MILL

## SEM

S  
MG

2 Flutes

35°

HRC  
60

ALTiN

Finishing  
Semi-  
Finishing

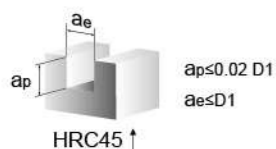
Slotting

Side

Micro Diameter / Square / for **H P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SEM 0024	0.2	0.4	50	4
SEM 0034	0.3	0.6	50	4
SEM 0044	0.4	0.8	50	4
SEM 0054	0.5	1.0	50	4
SEM 0064	0.6	1.2	50	4
SEM 0074	0.7	1.4	50	4
SEM 0084	0.8	1.6	50	4
SEM 0094	0.9	1.8	50	4
SEM 0124	1.2	3.0	50	4
SEM 0144	1.4	3.0	50	4
SEM 0164	1.6	4.0	50	4
SEM 0184	1.8	5.0	50	4

## ▼ Depth of cut



## ▼ Recommended cutting condition for SEM

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
0.2	40000	100 - 300	30000	80 - 250	15000	50 - 150	
0.3	40000	100 - 350	30000	80 - 300	15000	50 - 200	
0.4	40000	100 - 400	25000	80 - 350	10000	50 - 250	
0.5	40000	100 - 500	25000	80 - 400	10000	50 - 250	
0.6	38000	100 - 600	25000	80 - 500	8000	50 - 250	
0.7	36000	100 - 700	20000	80 - 600	8000	50 - 250	
0.8	34000	100 - 800	20000	80 - 700	8000	50 - 250	
0.9	32000	100 - 1000	20000	80 - 800	8000	50 - 250	

## SUPER MILL

## SEM X

S  
MG

2 Flutes

35°

HRC  
60

i8

Finishing  
Semi-  
Finishing

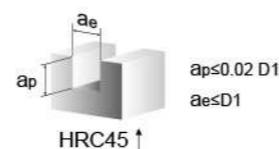
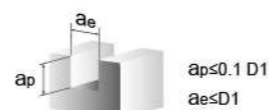
Slotting

Side

Micro Diameter / Square / for **H P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SEM X 0024	0.2	0.4	50	4
SEM X 0034	0.3	0.6	50	4
SEM X 0044	0.4	0.8	50	4
SEM X 0054	0.5	1.0	50	4
SEM X 0064	0.6	1.2	50	4
SEM X 0074	0.7	1.4	50	4
SEM X 0084	0.8	1.6	50	4
SEM X 0094	0.9	1.8	50	4
SEM X 0124	1.2	3.0	50	4
SEM X 0144	1.4	3.0	50	4
SEM X 0164	1.6	4.0	50	4
SEM X 0184	1.8	5.0	50	4

## ▼ Depth of cut



## ▼ Recommended cutting condition for SEM X

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
0.2	40000	100 - 300	30000	80 - 250	15000	50 - 150	
0.3	40000	100 - 350	30000	80 - 300	15000	50 - 200	
0.4	40000	100 - 400	25000	80 - 350	10000	50 - 250	
0.5	40000	100 - 500	25000	80 - 400	10000	50 - 250	
0.6	38000	100 - 600	25000	80 - 500	8000	50 - 250	
0.7	36000	100 - 700	20000	80 - 600	8000	50 - 250	
0.8	34000	100 - 800	20000	80 - 700	8000	50 - 250	
0.9	32000	100 - 1000	20000	80 - 800	8000	50 - 250	



## SUPER MILL

## SEA

► Square / for **H** **P** **K**

unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SEA 0104	1.0	3	50	4
SEA 0154	1.5	4	50	4
SEA 0204	2.0	6	50	4
SEA 0306	3.0	8	50	6
SEA 0406	4.0	11	50	6
SEA 0506	5.0	13	50	6
SEA 0606	6.0	16	50	6
SEA 0808	8.0	20	60	8
SEA 1010	10.0	25	75	10
SEA 1212	12.0	30	75	12
SEA 1616	16.0	40	100	16
SEA 2020	20.0	45	100	20

S  
MG

2 Flutes

35°

HRC  
60

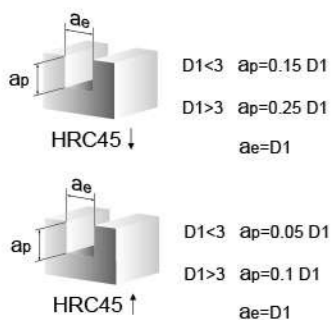
ALTiN

Finishing  
Semi-Finishing

Planing

Slotting

## ▼ Depth of cut



## ▼ Recommended cutting condition for SEA

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	1	20000	80	15000	45	11000	30
	1.5	13600	135	10000	60	9000	40
	2	9600	150	8500	50	6000	45
	3	6500	200	5800	75	4000	60
	4	5500	250	4000	80	3200	60
	5	4500	300	3000	80	2500	70
	6	4000	300	2500	80	2200	70
	8	3500	350	2200	90	1700	70
	10	3000	400	2000	90	1500	70
	12	2500	400	1500	100	1000	70
	16	2000	400	1200	100	800	70

## SUPER MILL

## SEB

► Square / for **H** **P** **K**

unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SEB 0104	1.0	3	50	4
SEB 0106	1.0	3	50	6
SEB 0154	1.5	4	50	4
SEB 0156	1.5	4	50	6
SEB 0204	2.0	6	50	4
SEB 0206	2.0	6	50	6
SEB 0254	2.5	8	50	4
SEB 0256	2.5	8	50	6
SEB 0303	3.0	8	50	3
SEB 0304	3.0	8	50	4
SEB 0306	3.0	8	50	6
SEB 0404	4.0	11	50	4
SEB 0406	4.0	11	50	6
SEB 0505	5.0	13	50	5
SEB 0506	5.0	13	50	6
SEB 0606	6.0	16	50	6
SEB 0808	8.0	20	60	8
SEB 1010	10.0	25	75	10
SEB 1212	12.0	30	75	12
SEB 1414	14.0	35	100	14
SEB 1616	16.0	40	100	16
SEB 1818	18.0	45	100	18
SEB 2020	20.0	45	100	20

S  
MG

4 Flutes

35°

HRC  
60

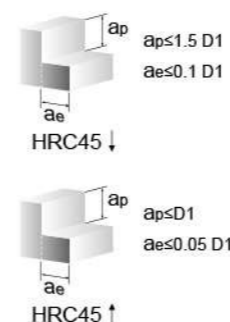
ALTiN

Finishing  
Semi-Finishing

Planing

Side

## ▼ Depth of cut



## ▼ Recommended cutting condition for SEB

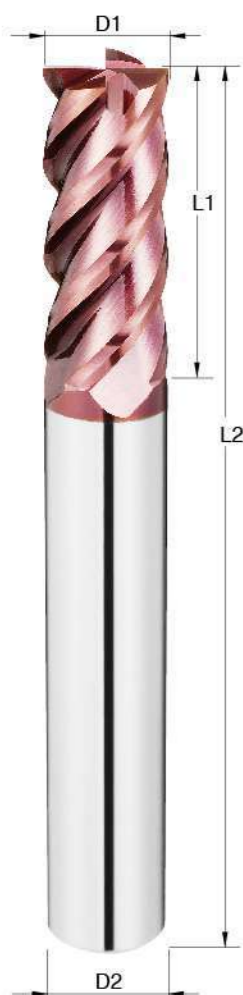
MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	1	22000	400	18000	200	9000	140
	1.5	12000	500	11000	280	5200	150
	2	10000	550	10000	280	4600	170
	3	9000	600	5500	310	3500	220
	4	6000	600	5000	400	2200	220
	5	4800	750	4000	400	1700	240
	6	4500	800	3800	420	1600	300
	8	3500	820	2800	420	1000	300
	10	3000	820	1800	420	900	300
	12	2000	820	1600	350	800	300
	16	1500	650	1000	300	500	150
	20	1200	600	900	300	400	150

## SUPER MILL

SEK

Square / for **H** **P** **K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SEK 0104	1.0	3	50	4
SEK 0154	1.5	4	50	4
SEK 0204	2.0	6	50	4
SEK 0306	3.0	8	50	6
SEK 0406	4.0	11	50	6
SEK 0506	5.0	13	50	6
SEK 0606	6.0	16	50	6
SEK 0808	8.0	20	60	8
SEK 1010	10.0	25	75	10
SEK 1212	12.0	30	75	12
SEK 1616	16.0	40	100	16
SEK 2020	20.0	45	100	20

S  
MG

4 Flutes

45°

HRC  
60

G100

Finishing  
Semi-Finishing

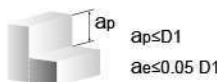
Planing

Side

## ▼ Depth of cut


 $a_p \leq 1.5 D1$   
 $a_e \leq 0.1 D1$ 

HRC45 ↓


 $a_p \leq D1$   
 $a_e \leq 0.05 D1$ 

HRC45 ↑

## ▼ Recommended cutting condition for SEK

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	1	22000	400	18000	200	9000	140
	1.5	12000	500	11000	280	5200	150
	2	10000	550	10000	280	4600	170
	3	9000	600	5500	310	3500	220
	4	6000	600	5000	400	2200	220
	5	4800	750	4000	400	1700	240
	6	4500	800	3800	420	1600	300
	8	3500	820	2800	420	1000	300
	10	3000	820	1800	420	900	300
	12	2000	820	1600	350	800	300
	16	1500	650	1000	300	500	150
	20	1200	600	900	300	400	150

## SUPER MILL

SEX

Square / for **H** **P** **K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SEX 0304	3.0	8	50	4
SEX 0404	4.0	11	50	4
SEX 0506	5.0	13	50	6
SEX 0606	6.0	16	50	6
SEX 0808	8.0	20	60	8
SEX 1010	10.0	25	75	10
SEX 1212	12.0	30	75	12
SEX 1616	16.0	40	100	16
SEX 2020	20.0	45	100	20

S  
MG

4 Flutes

35°

HRC  
60

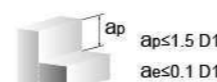
i8

Finishing  
Semi-Finishing

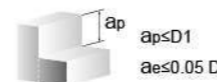
Planing

Side

## ▼ Depth of cut


 $a_p \leq 1.5 D1$   
 $a_e \leq 0.1 D1$ 

HRC45 ↓


 $a_p \leq D1$   
 $a_e \leq 0.05 D1$ 

HRC45 ↑

## ▼ Recommended cutting condition for SEX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	3	9000	600	5500	310	3500	220
	4	6000	600	5000	400	2200	220
	5	4800	750	4000	400	1700	240
	6	4500	800	3800	420	1600	300
	8	3500	820	2800	420	1000	300
	10	3000	820	1800	420	900	300
	12	2000	820	1600	350	800	300
	16	1500	650	1000	300	500	150
	20	1200	600	900	300	400	150

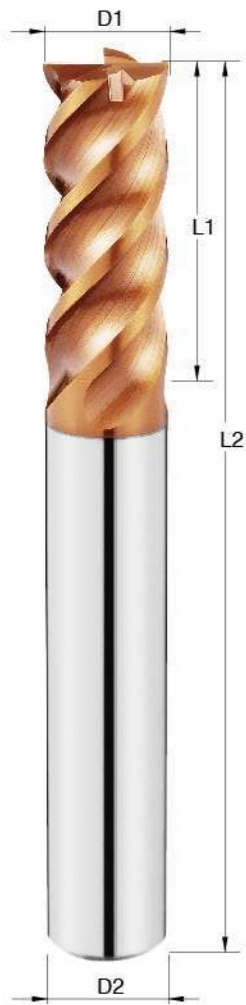


SUPER MILL

# SEP

► Power / Square / for **H P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SEP 0306	3.0	8	50	6
SEP 0406	4.0	11	50	6
SEP 0506	5.0	13	50	6
SEP 0606	6.0	16	50	6
SEP 0808	8.0	20	60	8
SEP 1010	10.0	25	75	10
SEP 1212	12.0	30	75	12
SEP 1616	16.0	40	100	16
SEP 2020	20.0	45	100	20



- S MG**
- 4 Flutes
- 45°
- HRC 60
- HELICA
- Roughing
- Planing
- Side
- Slotting

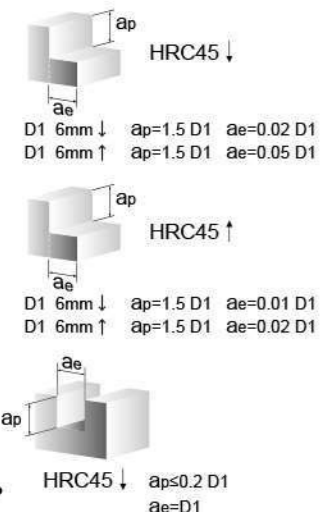
▼ Recommended cutting condition for SEP

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...	Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...	Hardened Steels SKD11			
HARDNESS	~HRC30	~HRC50	~HRC60			
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min

Side Milling	3	20000	2000	16000	1000	9000	500
	4	19000	2000	12000	1300	6000	550
	5	13000	1800	10000	1400	5000	500
	6	10000	3000	8000	1500	4500	700
	8	8000	3200	5000	1300	3500	600
	10	7000	3000	4500	1200	3000	500
	12	5000	2000	4000	1100	2000	500

Grooving	3	20000	2000	20000	1200	16000	1200
	4	16000	2000	16000	1200	12000	1300
	5	13000	1800	13000	1100	10000	1400
	6	10000	3000	10000	2100	8000	1500
	8	8000	2900	8000	1800	6000	1400
	10	7000	2800	6000	1700	5000	1300
	12	5000	2300	5500	1700	4500	1200

▼ Depth of cut



SUPER MILL

# SEW

► Square / for **H P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SEW 0306	3.0	8	50	6
SEW 0406	4.0	11	50	6
SEW 0506	5.0	13	50	6
SEW 0606	6.0	16	50	6
SEW 0808	8.0	20	60	8
SEW 1010	10.0	25	75	10
SEW 1212	12.0	30	75	12
SEW 1616	16.0	40	100	16
SEW 2020	20.0	45	100	20



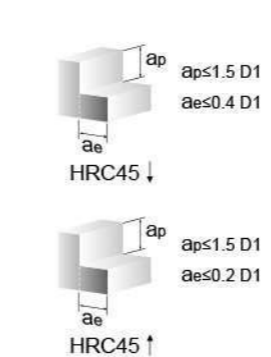
- S MG**
- 4 Flutes
- 35° / 38°
- α° ≠ β°
- HRC 60
- G300
- Finishing  
Semi-Finishing
- Planing
- Side
- Slotting

▼ Recommended cutting condition for SEW

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...	Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...	Hardened Steels SKD11			
HARDNESS	~HRC30	~HRC50	~HRC60			
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min

Side Milling	3	22000	1800	16000	1300	10000	800
	4	15000	1400	12000	1250	7000	700
	5	13000	1600	10000	1400	6000	650
	6	11500	1650	8500	1300	5000	800
	8	8000	1800	6500	1350	3500	700
	10	7000	1800	5000	1400	2800	750
	12	6000	1700	4000	1300	2300	650
	16	3560	1500	3000	1250	1800	700
	20	3000	1450	2500	1250	1500	780

▼ Depth of cut



## SUPER MILL

## SEPC

NEW

S  
MG

3 Flutes

45°

i8

Side

Slotting

Square / for H P K unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SEPC 0206	2.0	6	50	6
SEPC 0256	2.5	6	50	6
SEPC 0306	3.0	8	50	6
SEPC 0356	3.5	8	50	6
SEPC 0406	4.0	11	50	6
SEPC 0456	4.5	11	50	6
SEPC 0506	5.0	13	50	6
SEPC 0606	6.0	16	50	6
SEPC 0808	8.0	21	65	8
SEPC 1010	10.0	25	80	10
SEPC 1212	12.0	30	80	12

## Recommended cutting condition for SEPC

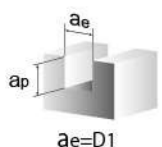
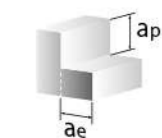
## Side Milling

Material	Carbon Steels/Alloy Steels/Cast Irons		Pre-Hardened Steels		Stainless Steels	
	SS/S45C/SCM/FC		SKD11/SKD61...		SUS304/SUS316L...	
Depth of cut	ap:1.0D1 ae:0.5D1		ap:1.0D1 ae:0.3D1		ap:1.0D1 ae:0.2D1	
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm/min	SPEED (min <sup>-1</sup> )	FEED mm/min	SPEED (min <sup>-1</sup> )	FEED mm/min
2	19100	860	12740	380	9550	430
2.5	15280	915	10200	300	7640	460
3	12740	955	8490	765	6370	570
3.5	10920	980	7280	655	5460	570
4	9550	1140	6370	760	4780	570
4.5	8490	1020	5660	760	4250	640
5	7640	1030	5090	680	3800	680
6	6370	1140	4250	640	3200	670
8	4780	1140	3180	480	2390	570
10	3820	1140	2550	460	1910	510
12	3180	950	2120	440	1590	470

## Slotting

Material	Carbon Steels/Alloy Steels/Cast Irons		Pre-Hardened Steels		Stainless Steels	
	SS/S45C/SCM/FC		SKD11/SKD61...		SUS304/SUS316L...	
Depth of cut	ap:1.0D1		ap:0.5D1		ap:0.3D1	
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm/min	SPEED (min <sup>-1</sup> )	FEED mm/min	SPEED (min <sup>-1</sup> )	FEED mm/min
2	19100	510	12740	300	9550	345
2.5	15280	640	10200	240	7640	370
3	12740	660	8490	530	6370	450
3.5	10920	680	7280	460	5460	450
4	9550	800	6370	530	4780	450
4.5	8490	710	5660	530	4250	510
5	7640	720	5090	470	3800	540
6	6370	800	4250	510	3200	530
8	4780	800	3180	380	2390	450
10	3820	800	2550	370	1910	400
12	3180	670	2120	350	1590	380

## Depth of cut



## SUPER MILL

## SELA

Long Shank / Square / for H P K unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SELA 0606	6.0	15	75	6
SELA 0606A	6.0	15	100	6
SELA 0808	8.0	20	100	8
SELA 1010	10.0	25	100	10
SELA 1010A	10.0	25	150	10
SELA 1212	12.0	30	100	12
SELA 1212A	12.0	30	150	12

S  
MG

2 Flutes

35°

HRC  
60

ALTiN

Finishing  
Semi-Finishing

Planing

Slotting

## Depth of cut



## Recommended cutting condition for SELA

MATERIAL	Carbon Steels . Alloy Steels		Alloy Steels . Tool Steels		Hardened Steels	
	S45C, FC, FCD, SCM, S50C, SKS...		SCr, SNCM, SKD11, SKD61, NAK80...		SKD11	
HARDNESS	~HRC30		~HRC50		~HRC60	
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
6	4000	300	2500	80	2200	70
8	3500	350	2200	90	1700	70
10	3000	400	2000	90	1500	70
12	2500	400	1500	100	1000	70



## SUPER MILL

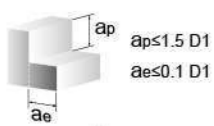
## SELB

▶ Long Shank / Square / for **H P K** unit: mm

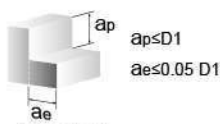
Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SELB 0303	3.0	8	75	3
SELB 0404	4.0	11	75	4
SELB 0606	6.0	15	75	6
SELB 0606A	6.0	15	100	6
SELB 0808	8.0	20	100	8
SELB 1010	10.0	25	100	10
SELB 1010A	10.0	25	150	10
SELB 1212	12.0	30	100	12
SELB 1212A	12.0	30	150	12
SELB 1616	16.0	40	150	16



## ▼ Depth of cut



HRC45 ↓



HRC45 ↑

## ▼ Recommended cutting condition for SELB

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	6	4500	800	3800	420	1600	300
	8	3500	820	2800	420	1000	300
	10	3000	820	1800	420	900	300
	12	2000	820	1600	350	800	300
	16	1500	650	1000	300	500	150

## SUPER MILL

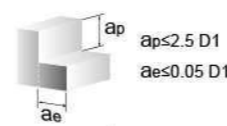
## SELD

▶ Long Flute / Square / for **H P K** unit: mm

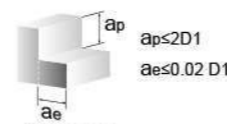
Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SELD 0404	4.0	25	75	4
SELD 0506	5.0	30	75	6
SELD 0606	6.0	30	75	6
SELD 0808	8.0	40	100	8
SELD 1010	10.0	40	100	10
SELD 1212	12.0	45	100	12



## ▼ Depth of cut



HRC45 ↓



HRC45 ↑

## ▼ Recommended cutting condition for SELD

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	4	2000	80	1700	70	700	30
	5	1800	110	1500	85	600	40
	6	1500	110	1400	75	550	50
	8	1300	110	1100	75	450	50
	10	1000	110	800	75	300	50
	12	900	110	700	75	250	40

## SUPER MILL

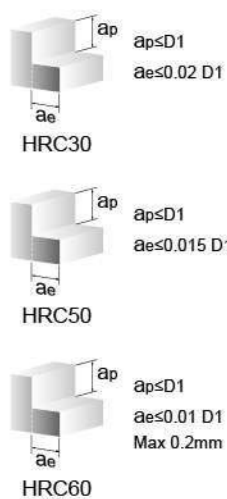
## SHA

► Square / for **H P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
SHA 0606	6.0	16	50	6
SHA 0808	8.0	20	60	8
SHA 1010	10.0	25	75	10
SHA 1212	12.0	30	75	12
SHA 1616	16.0	40	100	16



## ▼ Depth of cut



## ▼ Recommended cutting condition for SHA

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
6	12000	3000	8000	2000	5600	1400
8	9000	2400	6700	1900	3600	1200
10	6900	2100	5000	1600	3000	900
12	6000	2400	4300	1700	2400	1000
16	4500	2100	2500	1000	1600	700

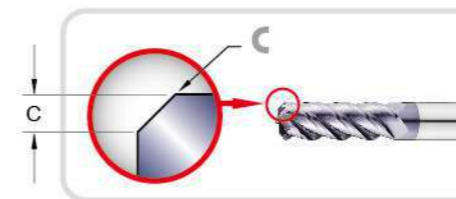
SHA

## SUPER MILL

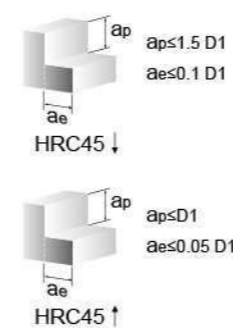
## SEZ

► Chamfer / Square / for **H P K** unit: mm

Order No.	Diameter D1	Chamfer C	Flute Length L1	O.A.L. L2	Shank Dia D2
SEZ 0405	4.0	0.5	11	50	6
SEZ 0410	4.0	1.0	11	50	6
SEZ 0605	6.0	0.5	16	50	6
SEZ 0610	6.0	1.0	16	50	6
SEZ 0805	8.0	0.5	20	60	8
SEZ 0810	8.0	1.0	20	60	8
SEZ 1005	10.0	0.5	25	75	10
SEZ 1010	10.0	1.0	25	75	10
SEZ 1020	10.0	2.0	25	75	10
SEZ 1205	12.0	0.5	30	75	12
SEZ 1210	12.0	1.0	30	75	12
SEZ 1220	12.0	2.0	30	75	12



## ▼ Depth of cut



## ▼ Recommended cutting condition for SEZ

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
4	6000	600	5000	400	2200	220
5	4800	750	4000	400	1700	240
6	4500	800	3800	420	1600	300
8	3500	820	2800	420	1000	300
10	3000	820	1800	420	900	300
12	2000	820	1600	350	800	300

SEZ



## SUPER MILL

## SRA

▶ Corner Radius / for **H** **P** **K** unit: mm

Order No.	Diameter D1	Corner R R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
SRA 0402	4.0	0.2	3.88	8	12	50	4
SRA 0405	4.0	0.5	3.88	8	12	50	4
SRA 0602	6.0	0.2	5.80	12	18	50	6
SRA 0605	6.0	0.5	5.80	12	18	50	6
SRA 0610	6.0	1.0	5.80	12	18	50	6
SRA 0803	8.0	0.3	7.70	16	24	60	8
SRA 0805	8.0	0.5	7.70	16	24	60	8
SRA 0810	8.0	1.0	7.70	16	24	60	8
SRA 1003	10.0	0.3	9.60	20	30	75	10
SRA 1005	10.0	0.5	9.60	20	30	75	10
SRA 1010	10.0	1.0	9.60	20	30	75	10
SRA 1020	10.0	2.0	9.60	20	30	75	10
SRA 1210	12.0	1.0	11.50	24	36	75	12
SRA 1220	12.0	2.0	11.50	24	36	75	12
SRA 1605	16.0	0.5	15.40	30	40	100	16
SRA 1610	16.0	1.0	15.40	30	40	100	16

S  
MG

2 Flutes

35°

R

HRC  
60

ALTiN

Finishing  
Semi-Finishing

Slotting

Profiling

## ▼ Depth of cut



HRC45 ↓



HRC45 ↑

## ▼ Recommended cutting condition for SRA

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
HARDNESS	~HRC30		~HRC50		~HRC60	
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
3	7600	180	4800	120	2900	50
4	6500	260	4000	160	2500	55
5	5500	270	3200	160	2000	60
6	4800	300	2900	170	1800	70
8	3700	325	2200	170	1500	85
10	2900	280	1700	140	1100	70
12	2400	230	1400	120	1000	65
16	1800	170	1100	90	700	45

SRA

70

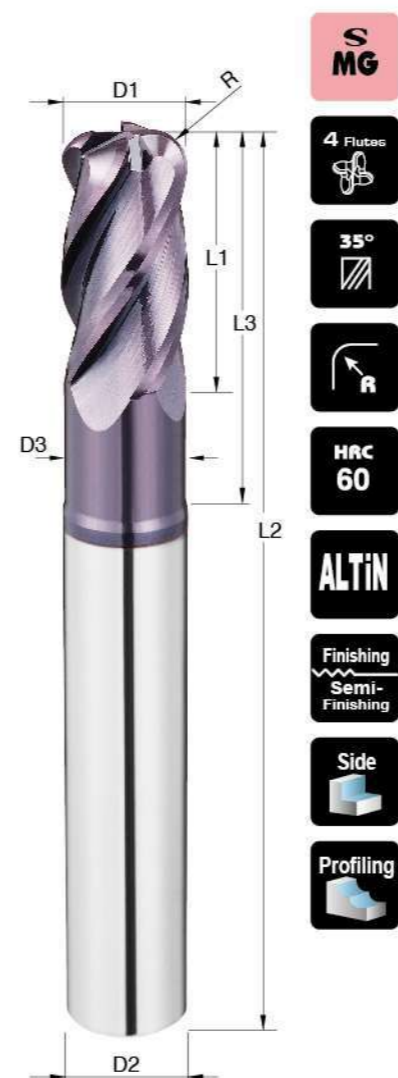
www.hgt.com.tw

## SUPER MILL

## SRB

▶ Corner Radius / for **H** **P** **K** unit: mm

Order No.	Diameter D1	Corner R R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
SRB 0402	4.0	0.2	3.88	8	12	50	4
SRB 0405	4.0	0.5	3.88	8	12	50	4
SRB 0602	6.0	0.2	5.80	12	18	50	6
SRB 0605	6.0	0.5	5.80	12	18	50	6
SRB 0610	6.0	1.0	5.80	12	18	50	6
SRB 0803	8.0	0.3	7.70	16	24	60	8
SRB 0805	8.0	0.5	7.70	16	24	60	8
SRB 0810	8.0	1.0	7.70	16	24	60	8
SRB 1005	10.0	0.5	9.60	20	30	75	10
SRB 1010	10.0	1.0	9.60	20	30	75	10
SRB 1020	10.0	2.0	9.60	20	30	75	10
SRB 1030	10.0	3.0	9.60	20	30	75	10
SRB 1205	12.0	0.5	11.50	24	36	75	12
SRB 1210	12.0	1.0	11.50	24	36	75	12
SRB 1605	16.0	0.5	15.40	30	40	100	16
SRB 1610	16.0	1.0	15.40	30	40	100	16

S  
MG

4 Flutes

35°

R

HRC  
60

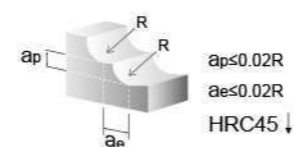
ALTiN

Finishing  
Semi-Finishing

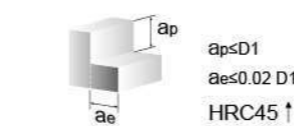
Side

Profiling

## ▼ Depth of cut



HRC45 ↓



HRC45 ↑

R=Corner R

## ▼ Recommended cutting condition for SRB

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
HARDNESS	~HRC30		~HRC50		~HRC60	
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
2	26000	1600	16500	1000	7500	300
3	19000	1800	12000	1200	5400	360
4	16000	3200	10000	1900	4800	480
5	14000	3300	8000	2000	3800	500
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600
16	4500	2000	2800	1000	1400	450

SRB

71

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SUPER MILL

# SRC

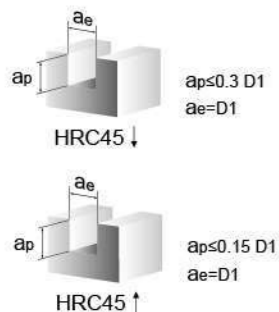
Corner Radius / for **H** **P** **K** unit: mm

Order No.	Diameter D1	Corner R R	Flute Length L1	O.A.L. L2	Shank Dia D2
SRC 0302	3.0	0.2	6	50	3
SRC 0305	3.0	0.5	6	50	3
SRC 0402	4.0	0.2	8	50	4
SRC 0405	4.0	0.5	8	50	4
SRC 0410	4.0	1.0	8	50	4
SRC 0602	6.0	0.2	12	50	6
SRC 0605	6.0	0.5	12	50	6
SRC 0610	6.0	1.0	12	50	6
SRC 0615	6.0	1.5	12	50	6
SRC 0620	6.0	2.0	12	50	6
SRC 0803	8.0	0.3	16	60	8
SRC 0805	8.0	0.5	16	60	8
SRC 0810	8.0	1.0	16	60	8
SRC 0815	8.0	1.5	16	60	8
SRC 0820	8.0	2.0	16	60	8
SRC 1003	10.0	0.3	20	75	10
SRC 1005	10.0	0.5	20	75	10
SRC 1010	10.0	1.0	20	75	10
SRC 1015	10.0	1.5	20	75	10
SRC 1020	10.0	2.0	20	75	10
SRC 1030	10.0	3.0	20	75	10
SRC 1205	12.0	0.5	24	75	12
SRC 1210	12.0	1.0	24	75	12
SRC 1215	12.0	1.5	24	75	12
SRC 1220	12.0	2.0	24	75	12
SRC 1230	12.0	3.0	24	75	12



- S** **MG**
- 2 Flutes
- 35°
- R
- HRC 60
- ALTiN
- Finishing / Semi-Finishing
- Slotting
- Profiling

▼ Depth of cut



▼ Recommended cutting condition for SRC

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	3	7600	180	4800	120	2900	50
	4	6500	260	4000	160	2500	55
	5	5500	270	3200	160	2000	60
	6	4800	300	2900	170	1800	70
	8	3700	325	2200	170	1500	85
	10	2900	280	1700	140	1100	70
	12	2400	230	1400	120	1000	65
	16	1800	170	1100	90	700	45

SUPER MILL

# SRD

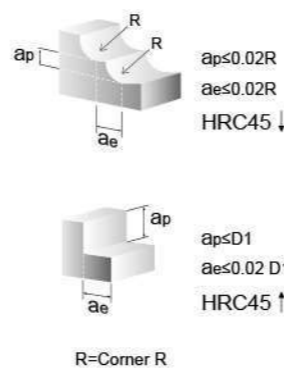
Corner Radius / for **H** **P** **K** unit: mm

Order No.	Diameter D1	Corner R R	Flute Length L1	O.A.L. L2	Shank Dia D2
SRD 01502	1.5	0.2	3	50	4
SRD 0202	2.0	0.2	4	50	4
SRD 0205	2.0	0.5	4	50	4
SRD 0302	3.0	0.2	6	50	3
SRD 0302.4	3.0	0.2	6	50	4
SRD 0303.4	3.0	0.3	6	50	4
SRD 0305	3.0	0.5	6	50	3
SRD 0305.4	3.0	0.5	6	50	4
SRD 0310.4	3.0	1.0	6	50	4
SRD 0402	4.0	0.2	8	50	4
SRD 0405	4.0	0.5	8	50	4
SRD 0410	4.0	1.0	8	50	4
SRD 0602	6.0	0.2	12	50	6
SRD 0603	6.0	0.3	12	50	6
SRD 0605	6.0	0.5	12	50	6
SRD 0610	6.0	1.0	12	50	6
SRD 0615	6.0	1.5	12	50	6
SRD 0620	6.0	2.0	12	50	6
SRD 0803	8.0	0.3	16	60	8
SRD 0805	8.0	0.5	16	60	8
SRD 0810	8.0	1.0	16	60	8
SRD 0815	8.0	1.5	16	60	8
SRD 0820	8.0	2.0	16	60	8
SRD 1003	10.0	0.3	20	75	10
SRD 1005	10.0	0.5	20	75	10
SRD 1010	10.0	1.0	20	75	10
SRD 1015	10.0	1.5	20	75	10
SRD 1020	10.0	2.0	20	75	10
SRD 1030	10.0	3.0	20	75	10
SRD 1205	12.0	0.5	24	75	12
SRD 1210	12.0	1.0	24	75	12
SRD 1215	12.0	1.5	24	75	12
SRD 1220	12.0	2.0	24	75	12
SRD 1230	12.0	3.0	24	75	12



- S** **MG**
- 4 Flutes
- 35°
- R
- HRC 60
- ALTiN
- Finishing / Semi-Finishing
- Side
- Profiling

▼ Depth of cut



▼ Recommended cutting condition for SRD

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	2	26000	1600	16500	1000	7500	300
	3	19000	1800	12000	1200	5400	360
	4	16000	3200	10000	1900	4800	480
	5	14000	3300	8000	2000	3800	500
	6	12000	3600	7200	2200	3500	650
	8	9600	4000	5600	2200	2700	750
	10	7000	3400	4400	1700	2100	650
	12	6000	2800	3600	1400	1800	600
	16	4500	2000	2800	1000	1400	450

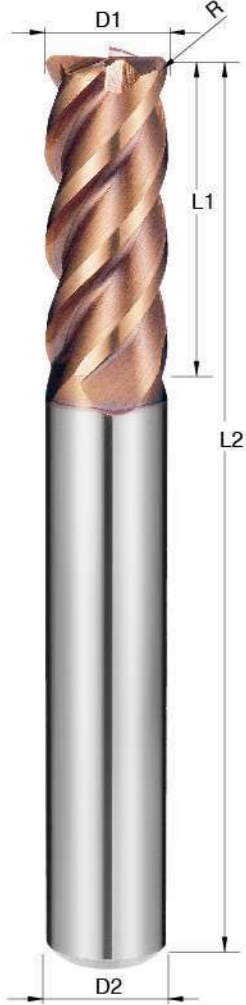


SUPER MILL

# SRDX

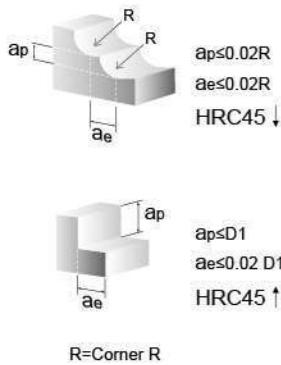
Corner Radius / for **H P K** unit: mm

Order No.	Diameter D1	Corner R R	Flute Length L1	O.A.L. L2	Shank Dia D2
SRDX 0302	3.0	0.2	6	50	3
SRDX 0305	3.0	0.5	6	50	3
SRDX 0402	4.0	0.2	8	50	4
SRDX 0405	4.0	0.5	8	50	4
SRDX 0605	6.0	0.5	12	50	6
SRDX 0610	6.0	1.0	12	50	6
SRDX 0805	8.0	0.5	16	60	8
SRDX 0810	8.0	1.0	16	60	8
SRDX 1005	10.0	0.5	20	75	10
SRDX 1010	10.0	1.0	20	75	10
SRDX 1020	10.0	2.0	20	75	10
SRDX 1030	10.0	3.0	20	75	10
SRDX 1205	12.0	0.5	24	75	12
SRDX 1210	12.0	1.0	24	75	12
SRDX 1220	12.0	2.0	24	75	12
SRDX 1230	12.0	3.0	24	75	12



- S MG**
- 4 Flutes
- 45°
- R
- HRC 60
- i8
- Finishing / Semi-Finishing
- Side
- Profiling

Depth of cut



Recommended cutting condition for SRDX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	2	26000	1600	16500	1000	7500	300
	3	19000	1800	12000	1200	5400	360
	4	16000	3200	10000	1900	4800	480
	5	14000	3300	8000	2000	3800	500
	6	12000	3600	7200	2200	3500	650
	8	9600	4000	5600	2200	2700	750
	10	7000	3400	4400	1700	2100	650
	12	6000	2800	3600	1400	1800	600
	16	4500	2000	2800	1000	1400	450

SUPER MILL

# SRK

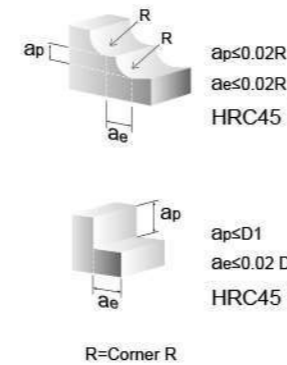
Corner Radius / for **H P K** unit: mm

Order No.	Diameter D1	Corner R R	Flute Length L1	O.A.L. L2	Shank Dia D2
SRK 0302	3.0	0.2	8	50	3
SRK 0305	3.0	0.5	8	50	3
SRK 0402	4.0	0.2	11	50	4
SRK 0405	4.0	0.5	11	50	4
SRK 0410	4.0	1.0	11	50	4
SRK 0602	6.0	0.2	16	50	6
SRK 0605	6.0	0.5	16	50	6
SRK 0610	6.0	1.0	16	50	6
SRK 0615	6.0	1.5	16	50	6
SRK 0620	6.0	2.0	16	50	6
SRK 0803	8.0	0.3	20	60	8
SRK 0805	8.0	0.5	20	60	8
SRK 0810	8.0	1.0	20	60	8
SRK 0815	8.0	1.5	20	60	8
SRK 0820	8.0	2.0	20	60	8
SRK 1003	10.0	0.3	25	75	10
SRK 1005	10.0	0.5	25	75	10
SRK 1010	10.0	1.0	25	75	10
SRK 1015	10.0	1.5	25	75	10
SRK 1020	10.0	2.0	25	75	10
SRK 1030	10.0	3.0	25	75	10
SRK 1205	12.0	0.5	30	75	12
SRK 1210	12.0	1.0	30	75	12
SRK 1215	12.0	1.5	30	75	12
SRK 1220	12.0	2.0	30	75	12
SRK 1230	12.0	3.0	30	75	12



- S MG**
- 4 Flutes
- 45°
- R
- HRC 60
- G100
- Finishing / Semi-Finishing
- Side
- Profiling

Depth of cut



Recommended cutting condition for SRK

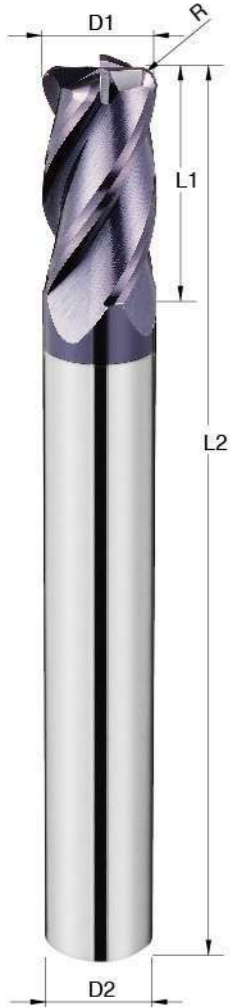
MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	2	26000	1600	16500	1000	7500	300
	3	19000	1800	12000	1200	5400	360
	4	16000	3200	10000	1900	4800	480
	5	14000	3300	8000	2000	3800	500
	6	12000	3600	7200	2200	3500	650
	8	9600	4000	5600	2200	2700	750
	10	7000	3400	4400	1700	2100	650
	12	6000	2800	3600	1400	1800	600
	16	4500	2000	2800	1000	1400	450

SUPER MILL

# SERC

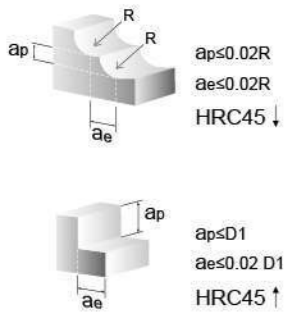
► Long Shank Corner Radius / for **H P K** unit: mm

Order No.	Diameter D1	Corner R	Flute Length L1	O.A.L. L2	Shank Dia D2
SERC 0605	6.0	0.5	12	75	6
SERC 0605A	6.0	0.5	12	100	6
SERC 0610	6.0	1.0	12	75	6
SERC 0610A	6.0	1.0	12	100	6
SERC 0805	8.0	0.5	16	100	8
SERC 0810	8.0	1.0	16	100	8
SERC 1005	10.0	0.5	20	100	10
SERC 1010	10.0	1.0	20	100	10
SERC 1020	10.0	2.0	20	100	10
SERC 1205	12.0	0.5	24	100	12
SERC 1210	12.0	1.0	24	100	12
SERC 1220	12.0	2.0	24	100	12



- S MG**
- 4 Flutes
- 35°
- R
- HRC 60
- ALTiN
- Finishing / Semi-Finishing
- Side
- Profiling

▼ Depth of cut



R=Corner R

▼ Recommended cutting condition for SERC

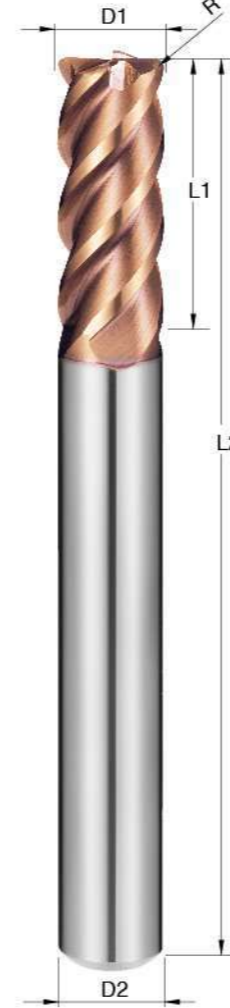
MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
HARDNESS	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600

SUPER MILL

# SERCX

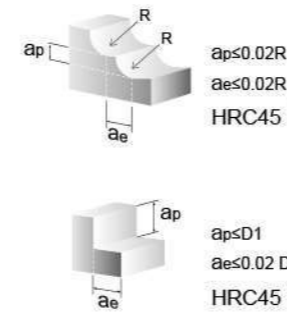
► Long Shank Corner Radius / for **H P K** unit: mm

Order No.	Diameter D1	Corner R	Flute Length L1	O.A.L. L2	Shank Dia D2
SERCX 0605	6.0	0.5	12	75	6
SERCX 0610	6.0	1.0	12	75	6
SERCX 0805	8.0	0.5	16	100	8
SERCX 0810	8.0	1.0	16	100	8
SERCX 1005	10.0	0.5	20	100	10
SERCX 1010	10.0	1.0	20	100	10
SERCX 1020	10.0	2.0	20	100	10
SERCX 1205	12.0	0.5	24	100	12
SERCX 1210	12.0	1.0	24	100	12
SERCX 1220	12.0	2.0	24	100	12



- S MG**
- 4 Flutes
- 45°
- R
- HRC 60
- i8
- Finishing / Semi-Finishing
- Side
- Profiling

▼ Depth of cut



R=Corner R

▼ Recommended cutting condition for SERCX

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
HARDNESS	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600

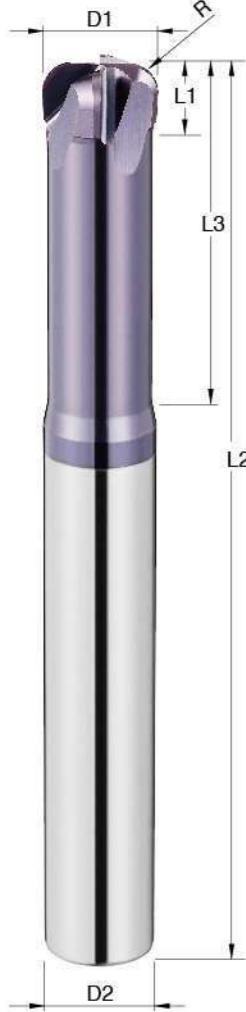


SUPER MILL

# SRP

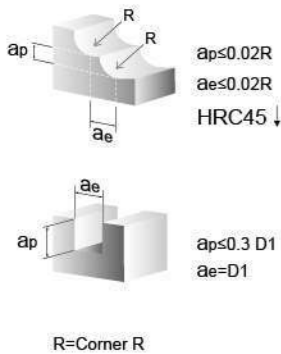
► Power Corner Radius / for **H P K** unit: mm

Order No.	Diameter D1	Corner R	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
SRP 0615	6.0	1.5	3	18	50	6
SRP 0615A	6.0	1.5	3	18	75	6
SRP 0820	8.0	2.0	4	24	60	8
SRP 0820A	8.0	2.0	4	24	100	8
SRP 1020	10.0	2.0	5	30	75	10
SRP 1020A	10.0	2.0	5	30	100	10
SRP 1230	12.0	3.0	6	36	75	12
SRP 1230A	12.0	3.0	6	36	100	12



- S** **MG**
- 4 Flutes
- 5°
- R
- HRC 60
- ALTiN
- Roughing
- Slotting
- Profiling

▼ Depth of cut



▼ Recommended cutting condition for SRP

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	6	12000	12000	8000	8000	5000	4000
	8	10000	10000	8000	8000	6000	4800
	10	7000	5000	6000	4000	4500	2000
	12	5000	7000	4000	5000	3000	3000

SUPER MILL

# SBF

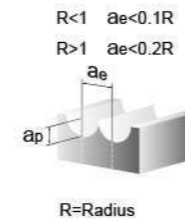
► Long Neck / Ball Nose / for **H P K** unit: mm

Order No.	Radius R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
SBF 00504	R0.25	0.46	0.5	4	50	4
SBF 00506	R0.25	0.46	0.5	6	50	4
SBF 00604	R0.3	0.56	0.6	4	50	4
SBF 00606	R0.3	0.56	0.6	6	50	4
SBF 00806	R0.4	0.76	0.8	6	50	4
SBF 00808	R0.4	0.76	0.8	8	50	4
SBF 01006	R0.5	0.95	1.5	6	50	4
SBF 01008	R0.5	0.95	1.5	8	50	4
SBF 01010	R0.5	0.95	1.5	10	50	4
SBF 01012	R0.5	0.95	1.5	12	50	4
SBF 01208	R0.6	1.15	2	8	50	4
SBF 01212	R0.6	1.15	2	12	50	4
SBF 01508	R0.75	1.45	2	8	50	4
SBF 01512	R0.75	1.45	2	12	50	4
SBF 01516	R0.75	1.45	2	16	50	4
SBF 01520	R0.75	1.45	2	20	50	4
SBF 01608	R0.8	1.54	2.5	8	50	4
SBF 01612	R0.8	1.54	2.5	12	50	4
SBF 01616	R0.8	1.54	2.5	16	50	4
SBF 02008	R1.0	1.92	3	8	50	4
SBF 02012	R1.0	1.92	3	12	50	4
SBF 02016	R1.0	1.92	3	16	50	4
SBF 02020	R1.0	1.92	3	20	50	4
SBF 03008	R1.5	2.90	4	8	50	6
SBF 03010	R1.5	2.90	4	10	50	6
SBF 03016	R1.5	2.90	4	16	50	6
SBF 03020	R1.5	2.90	4	20	75	6
SBF 03025	R1.5	2.90	4	25	75	6
SBF 04010	R2.0	3.88	5	10	75	6
SBF 04015	R2.0	3.88	5	15	75	6
SBF 04020	R2.0	3.88	5	20	75	6
SBF 04025	R2.0	3.88	5	25	75	6
SBF 04030	R2.0	3.88	5	30	75	6



- S** **MG**
- 2 Flutes
- 30°
- HRC 60
- ALTiN
- Finishing  
Semi-Finishing
- Profiling

▼ Depth of cut



▼ Recommended cutting condition for SBF

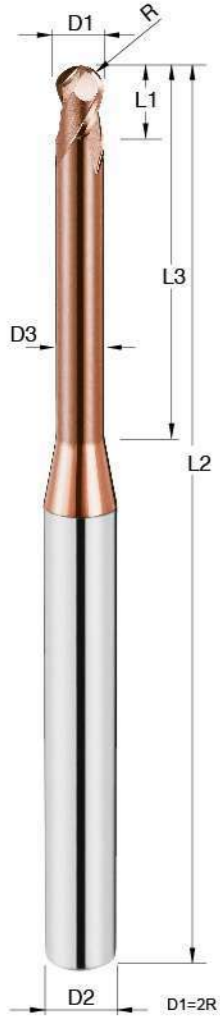
MATERIAL	Alloy Steels . Tool Steels . Hardened Steels S45C, SCM, S50C, SKS, SCr, SNCM, SKD11, SKD61, NAK80			
	RADIUS (R)	EFFECTIVE LENGTH	SPEED (min <sup>-1</sup> )	DEPTH OF CUT ap (mm)
R0.25	4	30000 - 40000	200 - 650	0.015
	6	30000 - 40000	200 - 650	0.013
R0.3	4	27000 - 40000	180 - 650	0.025
	6	27000 - 40000	180 - 650	0.015
R0.4	6	25000 - 40000	400 - 750	0.025
	8	25000 - 40000	400 - 750	0.025
R0.5	6	20000 - 32000	300 - 750	0.04
	8	20000 - 32000	300 - 750	0.03
	10	20000 - 32000	300 - 750	0.025
	12	20000 - 32000	300 - 750	0.015
R0.6	8	22000 - 25000	500 - 600	0.05
	12	22000 - 25000	500 - 600	0.03
R0.75	8	18000 - 20000	350 - 550	0.07
	12	18000 - 20000	350 - 550	0.04
	16	18000 - 20000	350 - 550	0.03
	20	18000 - 20000	350 - 550	0.02
R0.8	8	13000 - 18000	350 - 800	0.08
	12	13000 - 18000	350 - 800	0.06
	16	13000 - 18000	350 - 800	0.05
	20	13000 - 18000	350 - 800	0.05
R1.0	8	12000 - 17000	500 - 900	0.1
	12	12000 - 17000	500 - 900	0.1
	16	12000 - 17000	500 - 900	0.07
	20	12000 - 17000	500 - 900	0.04
R1.5	8	8000 - 11000	500 - 700	0.17
	10	8000 - 11000	500 - 700	0.15
	16	8000 - 11000	500 - 700	0.14
	20	8000 - 11000	500 - 700	0.12
	25	8000 - 11000	500 - 700	0.1
R2.0	10	5000 - 8000	400 - 600	0.18
	15	5000 - 8000	400 - 600	0.17
	20	5000 - 8000	400 - 600	0.16
	25	5000 - 8000	400 - 600	0.15
	30	5000 - 8000	400 - 600	0.14



SUPER MILL

# SBFX

▶ Long Neck / Ball Nose / for **H P K** unit: mm



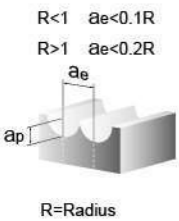
- S MG**
- 2 Flutes
- 30°
- HRC 60
- i8
- Finishing / Semi-Finishing
- Profiling

Order No.	Radius R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
SBFX 00504	R0.25	0.46	0.5	4	50	4
SBFX 00506	R0.25	0.46	0.5	6	50	4
SBFX 00604	R0.3	0.56	0.6	4	50	4
SBFX 00606	R0.3	0.56	0.6	6	50	4
SBFX 00806	R0.4	0.76	0.8	6	50	4
SBFX 00808	R0.4	0.76	0.8	8	50	4
SBFX 01006	R0.5	0.95	1.5	6	50	4
SBFX 01008	R0.5	0.95	1.5	8	50	4
SBFX 01010	R0.5	0.95	1.5	10	50	4
SBFX 01012	R0.5	0.95	1.5	12	50	4
SBFX 01208	R0.6	1.15	2	8	50	4
SBFX 01212	R0.6	1.15	2	12	50	4
SBFX 01508	R0.75	1.45	2	8	50	4
SBFX 01512	R0.75	1.45	2	12	50	4
SBFX 01516	R0.75	1.45	2	16	50	4
SBFX 01520	R0.75	1.45	2	20	50	4
SBFX 01608	R0.8	1.54	2.5	8	50	4
SBFX 01612	R0.8	1.54	2.5	12	50	4
SBFX 01616	R0.8	1.54	2.5	16	50	4
SBFX 02008	R1.0	1.92	3	8	50	4
SBFX 02012	R1.0	1.92	3	12	50	4
SBFX 02016	R1.0	1.92	3	16	50	4
SBFX 02020	R1.0	1.92	3	20	50	4
SBFX 03008	R1.5	2.90	4	8	50	6
SBFX 03010	R1.5	2.90	4	10	50	6
SBFX 03016	R1.5	2.90	4	16	50	6
SBFX 03020	R1.5	2.90	4	20	75	6
SBFX 03025	R1.5	2.90	4	25	75	6
SBFX 04010	R2.0	3.88	5	10	75	6
SBFX 04015	R2.0	3.88	5	15	75	6
SBFX 04020	R2.0	3.88	5	20	75	6
SBFX 04025	R2.0	3.88	5	25	75	6
SBFX 04030	R2.0	3.88	5	30	75	6

▼ Recommended cutting condition for SBFX

MATERIAL	Alloy Steels . Tool Steels . Hardened Steels S45C , SCM , S50C , SKS , SCr , SNCM , SKD11 , SKD61 , NAK80			
Radius(R)	EFFECTIVE LENGTH	SPEED (min <sup>-1</sup> )	FEED mm / min	DEPTH OF CUT ap (mm)
R0.25	4	30000 - 40000	200 - 650	0.015
	6	30000 - 40000	200 - 650	0.013
R0.3	4	27000 - 40000	180 - 650	0.025
	6	27000 - 40000	180 - 650	0.015
R0.4	6	25000 - 40000	400 - 750	0.025
	8	25000 - 40000	400 - 750	0.025
R0.5	6	20000 - 32000	300 - 750	0.04
	8	20000 - 32000	300 - 750	0.03
	10	20000 - 32000	300 - 750	0.025
	12	20000 - 32000	300 - 750	0.015
R0.6	8	22000 - 25000	500 - 600	0.05
	12	22000 - 25000	500 - 600	0.03
R0.75	8	18000 - 20000	350 - 550	0.07
	12	18000 - 20000	350 - 550	0.04
	16	18000 - 20000	350 - 550	0.03
	20	18000 - 20000	350 - 550	0.02
R0.8	8	13000 - 18000	350 - 800	0.08
	12	13000 - 18000	350 - 800	0.06
	16	13000 - 18000	350 - 800	0.05
	16	13000 - 18000	350 - 800	0.05
R1.0	8	12000 - 17000	500 - 900	0.1
	12	12000 - 17000	500 - 900	0.1
	16	12000 - 17000	500 - 900	0.07
	20	12000 - 17000	500 - 900	0.04
	20	12000 - 17000	500 - 900	0.04
R1.5	8	8000 - 11000	500 - 700	0.17
	10	8000 - 11000	500 - 700	0.15
	16	8000 - 11000	500 - 700	0.14
	20	8000 - 11000	500 - 700	0.12
	25	8000 - 11000	500 - 700	0.1
R2.0	10	5000 - 8000	400 - 600	0.18
	15	5000 - 8000	400 - 600	0.17
	20	5000 - 8000	400 - 600	0.16
	25	5000 - 8000	400 - 600	0.15
	30	5000 - 8000	400 - 600	0.14

▼ Depth of cut



SUPER MILL

# SEFA

▶ Long Neck / Square / for **H P K** unit: mm



- S MG**
- 2 Flutes
- 35°
- HRC 60
- ALTiN
- Finishing / Semi-Finishing
- Slotting

Order No.	Diameter D1	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
SEFA 01006	1.0	0.95	3	6	50	4
SEFA 01008	1.0	0.95	3	8	50	4
SEFA 01010	1.0	0.95	3	10	50	4
SEFA 01012	1.0	0.95	3	12	50	4
SEFA 01508	1.5	1.45	4	8	50	4
SEFA 01510	1.5	1.45	4	10	50	4
SEFA 01512	1.5	1.45	4	12	50	4
SEFA 01516	1.5	1.45	4	16	50	4
SEFA 02008	2.0	1.92	6	8	50	4
SEFA 02010	2.0	1.92	6	10	50	4
SEFA 02012	2.0	1.92	6	12	50	4
SEFA 02016	2.0	1.92	6	16	50	4
SEFA 02020	2.0	1.92	6	20	50	4
SEFA 02510	2.5	2.40	8	10	50	4
SEFA 02512	2.5	2.40	8	12	50	4
SEFA 02516	2.5	2.40	8	16	50	4
SEFA 02520	2.5	2.40	8	20	50	4
SEFA 03010	3.0	2.90	8	10	50	6
SEFA 03012	3.0	2.90	8	12	50	6
SEFA 03016	3.0	2.90	8	16	50	6
SEFA 03020	3.0	2.90	8	20	75	6
SEFA 03025	3.0	2.90	8	25	75	6

▼ Recommended cutting condition for SEFA

MATERIAL	Alloy Steels . Tool Steels . Hardened Steels S45C , SCM , S50C , SKS , SCr , SNCM , SKD11 , SKD61 , NAK80			
Dia.(D1)	EFFECTIVE LENGTH	SPEED (min <sup>-1</sup> )	FEED mm / min	DEPTH OF CUT ap (mm)
1	4	25000	1500	0.05
	6	25000	1500	0.03
	10	25000	1500	0.01
1.5	4	15000	1200	0.1
	8	15000	1200	0.05
	10	15000	1200	0.025
	12	15000	1200	0.018
	12	15000	1200	0.018
2	8	12000	900	0.2
	10	8800	700	0.12
	12	7500	600	0.05
	16	7000	500	0.02
	16	7000	500	0.02
3	10	8000	600	0.5
	12	8000	600	0.45
	16	5500	450	0.18
	20	4000	300	0.15
	25	6000	400	0.1
	25	6000	400	0.1

▼ Depth of cut





## SUPER MILL

## SEFAX

Long Neck / Square / for **H P K** unit: mm

Order No.	Diameter D1	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
SEFAX 01006	1.0	0.95	3	6	50	4
SEFAX 01008	1.0	0.95	3	8	50	4
SEFAX 01010	1.0	0.95	3	10	50	4
SEFAX 01012	1.0	0.95	3	12	50	4
SEFAX 01508	1.5	1.45	4	8	50	4
SEFAX 01510	1.5	1.45	4	10	50	4
SEFAX 01512	1.5	1.45	4	12	50	4
SEFAX 01516	1.5	1.45	4	16	50	4
SEFAX 02008	2.0	1.92	6	8	50	4
SEFAX 02010	2.0	1.92	6	10	50	4
SEFAX 02012	2.0	1.92	6	12	50	4
SEFAX 02016	2.0	1.92	6	16	50	4
SEFAX 02020	2.0	1.92	6	20	50	4
SEFAX 02510	2.5	2.40	8	10	50	4
SEFAX 02512	2.5	2.40	8	12	50	4
SEFAX 02516	2.5	2.40	8	16	50	4
SEFAX 02520	2.5	2.40	8	20	50	4
SEFAX 03010	3.0	2.90	8	10	50	6
SEFAX 03012	3.0	2.90	8	12	50	6
SEFAX 03016	3.0	2.90	8	16	50	6
SEFAX 03020	3.0	2.90	8	20	75	6
SEFAX 03025	3.0	2.90	8	25	75	6

S  
MG

2 Flutes

35°

HRC  
60

i8

Finishing  
Semi-Finishing

Slotting

## ▼ Depth of cut



## ▼ Recommended cutting condition for SEFAX

MATERIAL		Alloy Steels . Tool Steels . Hardened Steels S45C , SCM , S50C , SKS , SCr , SNCM , SKD11 , SKD61 , NAK80			
Dia. (D1)	EFFECTIVE LENGTH	SPEED (min <sup>-1</sup> )	FEED mm / min	DEPTH OF CUT ap (mm)	
1	4	25000	1500	0.05	
	6	25000	1500	0.03	
	10	25000	1500	0.01	
1.5	4	15000	1200	0.1	
	8	15000	1200	0.05	
	10	15000	1200	0.025	
2	8	12000	900	0.2	
	10	8800	700	0.12	
	12	7500	600	0.05	
3	10	8000	600	0.5	
	12	8000	600	0.45	
	16	5500	450	0.18	
20	4000	300	0.15		
	25	6000	400	0.1	

## SUPER MILL

## SEF

Long Neck / Corner Radius / for **H P K** unit: mm

Order No.	Diameter D1	Corner R R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
SEF 01004	1.0	0.1	0.95	1.0	4	50	4
SEF 01006	1.0	0.1	0.95	1.0	6	50	4
SEF 01008	1.0	0.1	0.95	1.0	8	50	4
SEF 01010	1.0	0.1	0.95	1.0	10	50	4
SEF 01504	1.5	0.2	1.45	1.5	4	50	4
SEF 01506	1.5	0.2	1.45	1.5	6	50	4
SEF 01508	1.5	0.2	1.45	1.5	8	50	4
SEF 01510	1.5	0.2	1.45	1.5	10	50	4
SEF 01512	1.5	0.2	1.45	1.5	12	50	4
SEF 02008	2.0	0.2	1.92	2.0	8	50	4
SEF 02010	2.0	0.2	1.92	2.0	10	50	4
SEF 02012	2.0	0.2	1.92	2.0	12	50	4
SEF 02016	2.0	0.2	1.92	2.0	16	50	4
SEF 03008	3.0	0.2	2.90	3.0	8	50	6
SEF 03010	3.0	0.2	2.90	3.0	10	50	6
SEF 03012	3.0	0.2	2.90	3.0	12	50	6
SEF 03016	3.0	0.2	2.90	3.0	16	50	6
SEF 03020	3.0	0.2	2.90	3.0	20	50	6

S  
MG

2 Flutes

35°

R

HRC  
60

ALTiN

Finishing  
Semi-Finishing

Slotting

Profiling

## ▼ Depth of cut



## ▼ Recommended cutting condition for SEF

MATERIAL		Alloy Steels . Tool Steels . Hardened Steels S45C , SCM , S50C , SKS , SCr , SNCM , SKD11 , SKD61 , NAK80			
Dia. (D1)	EFFECTIVE LENGTH	SPEED (min <sup>-1</sup> )	FEED mm / min	DEPTH OF CUT ap (mm)	
1	4	30000	2200	0.15	
	6	30000	2200	0.12	
	8	30000	2200	0.12	
	10	30000	2200	0.12	
1.5	4	25000	1800	0.20	
	6	25000	1800	0.18	
	8	25000	1800	0.15	
	10	25000	1800	0.15	
2	12	25000	1800	0.15	
	8	20000	1500	0.30	
	10	20000	1500	0.30	
	12	20000	1500	0.25	
3	16	20000	1500	0.25	
	8	12000	900	0.40	
	12	12000	900	0.40	
	16	12000	900	0.30	
20	12000	900	0.30		

## SUPER MILL

## SEFX

► Long Neck / Corner Radius / for **H** **P** **K** unit: mm

Order No.	Diameter D1	Corner R R	Neck Dia D3	Flute Length L1	Effective Length L3	O.A.L. L2	Shank Dia D2
SEFX 01004	1.0	0.1	0.95	1.0	4	50	4
SEFX 01006	1.0	0.1	0.95	1.0	6	50	4
SEFX 01008	1.0	0.1	0.95	1.0	8	50	4
SEFX 01010	1.0	0.1	0.95	1.0	10	50	4
SEFX 01504	1.5	0.2	1.45	1.5	4	50	4
SEFX 01506	1.5	0.2	1.45	1.5	6	50	4
SEFX 01508	1.5	0.2	1.45	1.5	8	50	4
SEFX 01510	1.5	0.2	1.45	1.5	10	50	4
SEFX 01512	1.5	0.2	1.45	1.5	12	50	4
SEFX 02008	2.0	0.2	1.92	2.0	8	50	4
SEFX 02010	2.0	0.2	1.92	2.0	10	50	4
SEFX 02012	2.0	0.2	1.92	2.0	12	50	4
SEFX 02016	2.0	0.2	1.92	2.0	16	50	4
SEFX 03008	3.0	0.2	2.90	3.0	8	50	6
SEFX 03010	3.0	0.2	2.90	3.0	10	50	6
SEFX 03012	3.0	0.2	2.90	3.0	12	50	6
SEFX 03016	3.0	0.2	2.90	3.0	16	50	6
SEFX 03020	3.0	0.2	2.90	3.0	20	50	6



## ▼ Depth of cut



## ▼ Recommended cutting condition for SEFX

MATERIAL		Alloy Steels . Tool Steels . Hardened Steels S45C, SCM, S50C, SKS, SCR, SNCM, SKD11, SKD61, NAK80		
Dia. (D1)	EFFECTIVE LENGTH	SPEED (min <sup>-1</sup> )	FEED mm / min	DEPTH OF CUT ap (mm)
1	4	30000	2200	0.15
	6	30000	2200	0.12
	8	30000	2200	0.12
	10	30000	2200	0.12
1.5	4	25000	1800	0.20
	6	25000	1800	0.18
	8	25000	1800	0.15
	10	25000	1800	0.15
	12	25000	1800	0.15
2	8	20000	1500	0.30
	10	20000	1500	0.30
	12	20000	1500	0.25
	16	20000	1500	0.25
3	8	12000	900	0.40
	12	12000	900	0.40
	16	12000	900	0.30
	20	12000	900	0.30

## E EFFICIENCY MILLS

Efficiency end mills series

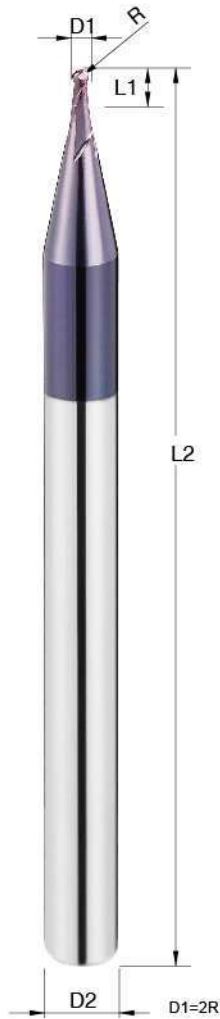


## EFFICIENCY MILLS

## BM

▶ Micro Diameter / Ball Nose / for **P** **K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
BM 0044	R0.2	0.8	50	4
BM 0054	R0.25	1.0	50	4
BM 0064	R0.3	1.2	50	4
BM 0074	R0.35	1.4	50	4
BM 0084	R0.4	1.6	50	4
BM 0094	R0.45	1.8	50	4
BM 0124	R0.6	2.4	50	4
BM 0144	R0.7	2.8	50	4
BM 0164	R0.8	3.2	50	4
BM 0184	R0.9	3.6	50	4



MG

2 Flutes

30°

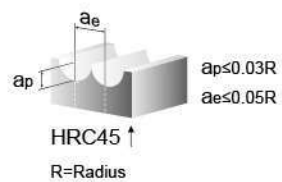
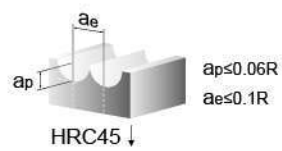
HRC 55

TiAlN

Finishing  
Semi-Finishing

Profiling

## ▼ Depth of cut



## ▼ Recommended cutting condition for BM

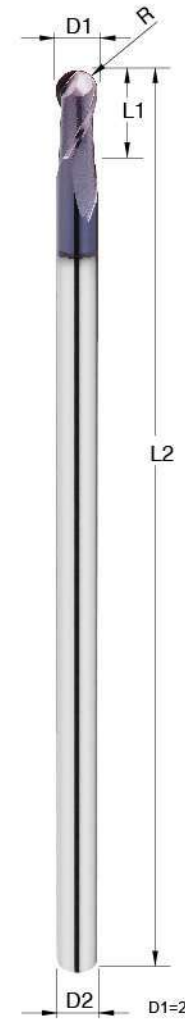
MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.1	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.15	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.2	32000	500 - 600	32000	400 - 500	25000	300 - 400
R0.25	32000	600 - 700	32000	500 - 600	25000	400 - 500
R0.3	32000	600 - 700	32000	500 - 600	25000	400 - 500
R0.35	32000	700 - 800	32000	600 - 700	25000	500 - 600
R0.4	32000	900 - 1000	32000	800 - 900	25000	600 - 700
R0.45	32000	1000 - 1100	32000	900 - 1000	25000	600 - 700

## EFFICIENCY MILLS

## BS

▶ Small Shank / Ball Nose / for **P** **K** unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
BS 0103	R0.5	2	50	3
BS 0153	R0.75	3	50	3
BS 0203	R1	4	50	3
BS 0253	R1.25	5	50	3
BS 0303	R1.5	6	50	3
BS 0303A	R1.5	6	75	3
BS 0303B	R1.5	6	100	3
BS 0404	R2	8	75	4
BS 0404A	R2	8	100	4



MG

2 Flutes

30°

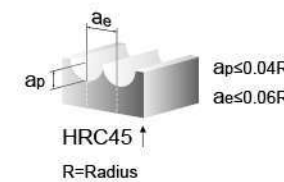
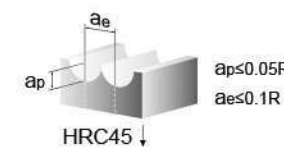
HRC 55

TiAlN

Finishing  
Semi-Finishing

Profiling

## ▼ Depth of cut

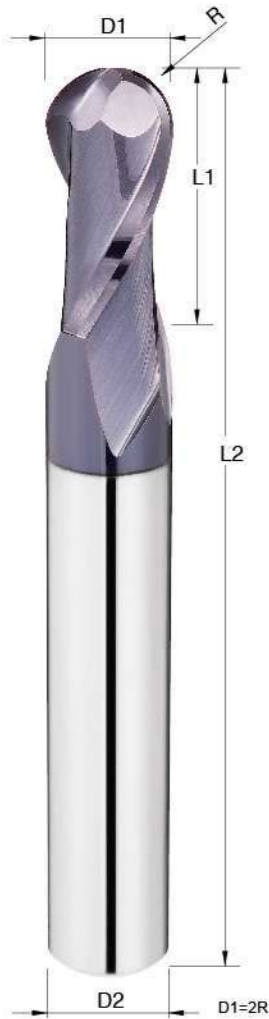


## ▼ Recommended cutting condition for BS

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.5	45000	800	35000	600	20000	200
R1	23000	800	18000	600	10000	200
R1.5	16000	1000	12000	600	6500	200
R2	12000	1000	9500	700	5000	300

## EFFICIENCY MILLS

## BA



MG

2 Flutes

30°

HRC 55

TiAlN

Finishing  
Semi-Finishing

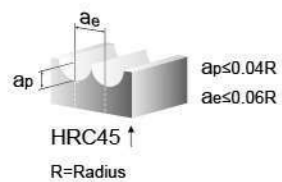
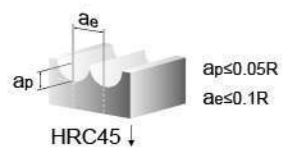
Profiling

▶ Ball Nose / for **P** **K**

unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
BA 0104	R0.5	2	50	4
BA 0154	R0.75	3	50	4
BA 0202	R1	4	50	2
BA 0204	R1	4	50	4
BA 0254	R1.25	5	50	4
BA 0304	R1.5	6	50	4
BA 0354	R1.75	7	50	4
BA 0404	R2	8	50	4
BA 0456	R2.25	9	50	6
BA 0505	R2.5	10	50	5
BA 0506	R2.5	10	50	6
BA 0556	R2.75	11	50	6
BA 0606	R3	12	50	6
BA 0707	R3.5	14	60	7
BA 0708	R3.5	14	60	8
BA 0808	R4	16	60	8
BA 0910	R4.5	18	75	10
BA 1010	R5	20	75	10
BA 1212	R6	24	75	12
BA 1616	R8	32	100	16
BA 2020	R10	40	100	20

## ▼ Depth of cut

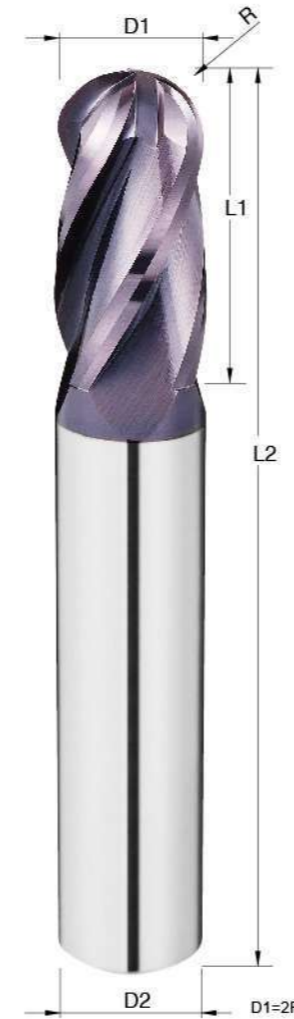


## ▼ Recommended cutting condition for BA

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.5	45000	800	35000	600	20000	200
R1	23000	800	18000	600	10000	200
R1.5	16000	1000	12000	600	6500	200
R2	12000	1000	9500	700	5000	300
R3	8000	1100	6000	700	3500	300
R4	6000	1200	5000	800	2500	350
R5	5000	1100	4000	800	2000	350
R6	4000	1000	3000	700	1500	300
R8	3000	1000	2000	700	1000	300

## EFFICIENCY MILLS

## BB



MG

4 Flutes

30°

HRC 55

TiAlN

Finishing  
Semi-Finishing

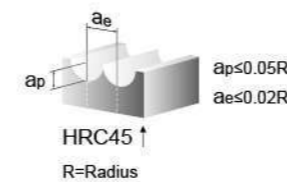
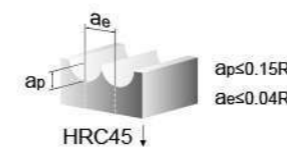
Profiling

▶ Ball Nose / for **P** **K**

unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
BB 0104	R0.5	2	50	4
BB 0154	R0.75	3	50	4
BB 0204	R1	4	50	4
BB 0254	R1.25	5	50	4
BB 0304	R1.5	6	50	4
BB 0404	R2	8	50	4
BB 0506	R2.5	10	50	6
BB 0606	R3	12	50	6
BB 0808	R4	16	60	8
BB 1010	R5	20	75	10
BB 1212	R6	24	75	12

## ▼ Depth of cut



## ▼ Recommended cutting condition for BB

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R2	12000	1200	9500	900	5000	400
R3	8000	1400	6000	900	3500	500
R4	6000	1600	5000	1000	2500	600
R5	5000	1400	4000	1000	2000	600
R6	4000	1200	3000	900	1500	500
R8	3000	1200	2500	900	1000	500
R10	2500	1000	2000	600	900	300



## EFFICIENCY MILLS

## BLS, BLM, BLL



MG

2 Flutes

30°

HRC 55

TiAlN

Finishing  
Semi-Finishing

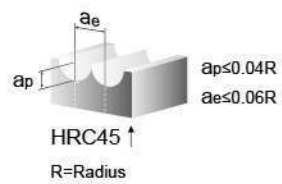
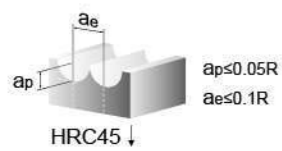
Profiling

## ▶ Long Shank / Ball Nose / for P K

unit: mm

Order No.	Radius R	Flute Length L1	O.A.L. L2	Shank Dia D2
BLS 0104	R0.5	2	75	4
BLS 0106	R0.5	2	75	6
BLS 0154	R0.75	3	75	4
BLS 0156	R0.75	3	75	6
BLS 0206	R1	4	75	6
BLS 0256	R1.25	5	75	6
BLS 0306	R1.5	6	75	6
BLS 0406	R2	8	75	6
BLS 0506	R2.5	10	75	6
BLS 0606	R3	12	75	6
BLM 0206	R1	4	100	6
BLM 0306	R1.5	6	100	6
BLM 0406	R2	8	100	6
BLM 0606	R3	12	100	6
BLM 0808	R4	16	100	8
BLM 1010	R5	20	100	10
BLM 1212	R6	24	100	12
BLL 0606	R3	12	150	6
BLL 0808	R4	16	150	8
BLL 1010	R5	20	150	10
BLL 1212	R6	24	150	12
BLL 1616	R8	32	150	16
BLL 2020	R10	40	150	20

## ▼ Depth of cut



## ▼ Recommended cutting condition for BLS, BLM, BLL

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Radius (R)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
R0.5	45000	800	35000	600	20000	200
R1	23000	800	18000	600	10000	200
R1.5	16000	1000	12000	600	6500	200
R2	12000	1000	9500	700	5000	300
R3	8000	1100	6000	700	3500	300
R4	6000	1200	5000	800	2500	350
R5	5000	1100	4000	800	2000	350
R6	4000	1000	3000	700	1500	300
R8	3000	1000	2000	700	1000	300

BLS  
BLM  
BLL

90

## EFFICIENCY MILLS

## EM



MG

2 Flutes

35°

HRC 55

TiAlN

Finishing  
Semi-Finishing

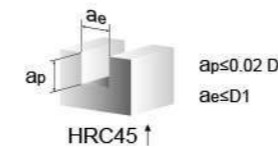
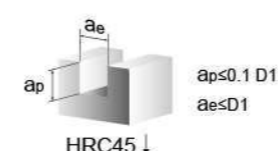
Slotting

## ▶ Micro Diameter / Square / for P K

unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
EM 0044	0.4	0.8	50	4
EM 0054	0.5	1.0	50	4
EM 0064	0.6	1.2	50	4
EM 0074	0.7	1.4	50	4
EM 0084	0.8	1.6	50	4
EM 0094	0.9	1.8	50	4
EM 0124	1.2	3.0	50	4
EM 0144	1.4	3.0	50	4
EM 0164	1.6	4.0	50	4
EM 0184	1.8	5.0	50	4

## ▼ Depth of cut



## ▼ Recommended cutting condition for EM

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11	
	~HRC30		~HRC50		~HRC60	
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
0.4	40000	100 - 400	25000	80 - 350	10000	50 - 250
0.5	40000	100 - 500	25000	80 - 400	10000	50 - 250
0.6	38000	100 - 600	25000	80 - 500	8000	50 - 250
0.7	36000	100 - 700	20000	80 - 600	8000	50 - 250
0.8	34000	100 - 800	20000	80 - 700	8000	50 - 250
0.9	32000	100 - 1000	20000	80 - 800	8000	50 - 250

EM

91

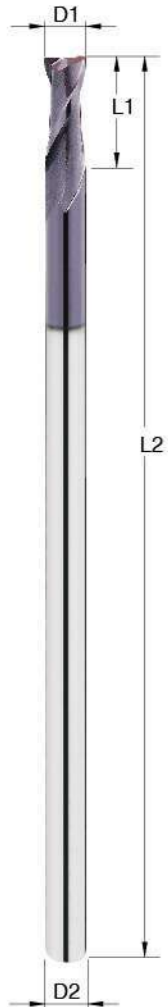
## EFFICIENCY MILLS

ES

► Small Shank / Square / for **P** **K**

unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
ES 0103	1.0	3	50	3
ES 0153	1.5	4	50	3
ES 0203	2.0	6	50	3
ES 0253	2.5	8	50	3
ES 0303	3.0	8	50	3
ES 0303A	3.0	8	75	3
ES 0303B	3.0	8	100	3
ES 0404	4.0	11	75	4
ES 0404A	4.0	11	100	4



MG

2 Flutes

35°

HRC  
55

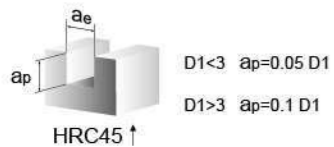
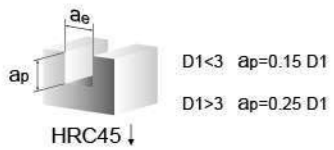
TiAlN

Finishing  
Semi-Finishing

Planing

Slotting

## ▼ Depth of cut



## ▼ Recommended cutting condition for ES

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
1	20000	80	15000	45	11000	30	
1.5	13600	135	10000	60	9000	40	
2	9600	150	8500	50	6000	45	
3	6500	200	5800	75	4000	60	
4	5500	250	4000	80	3200	60	

## EFFICIENCY MILLS

EA

► Square / for **P** **K**

unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
EA 0104	1.0	3	50	4
EA 0154	1.5	4	50	4
EA 0204	2.0	6	50	4
EA 0254	2.5	8	50	4
EA 0304	3.0	8	50	4
EA 0404	4.0	11	50	4
EA 0506	5.0	13	50	6
EA 0606	6.0	16	50	6
EA 0808	8.0	20	60	8
EA 1010	10.0	25	75	10
EA 1212	12.0	30	75	12
EA 1616	16.0	40	100	16
EA 2020	20.0	45	100	20



MG

2 Flutes

35°

HRC  
55

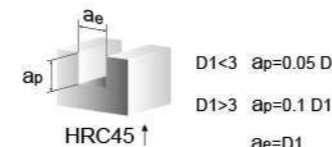
TiAlN

Finishing  
Semi-Finishing

Planing

Slotting

## ▼ Depth of cut



## ▼ Recommended cutting condition for EA

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
1	20000	80	15000	45	11000	30	
1.5	13600	135	10000	60	9000	40	
2	9600	150	8500	50	6000	45	
3	6500	200	5800	75	4000	60	
4	5500	250	4000	80	3200	60	
5	4500	300	3000	80	2500	70	
6	4000	300	2500	80	2200	70	
8	3500	350	2200	90	1700	70	
10	3000	400	2000	90	1500	70	
12	2500	400	1500	100	1000	70	
16	2000	400	1200	100	800	70	



EFFICIENCY MILLS

# EB



- MG**
- 4 Flutes
- 35°
- HRC 55
- TiAlN
- Finishing  
Semi-Finishing
- Planing
- Side

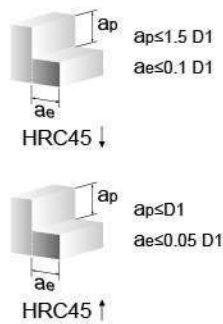
► Square / for **P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
EB 0104	1.0	3	50	4
EB 0154	1.5	4	50	4
EB 0202	2.0	6	50	2
EB 0204	2.0	6	50	4
EB 0254	2.5	8	50	4
EB 0303	3.0	8	50	3
EB 0304	3.0	8	50	4
EB 0404	4.0	11	50	4
EB 0505	5.0	13	50	5
EB 0506	5.0	13	50	6
EB 0606	6.0	16	50	6
EB 0707	7.0	18	60	7
EB 0808	8.0	20	60	8
EB 1010	10.0	25	75	10
EB 1212	12.0	30	75	12
EB 1414	14.0	35	100	14
EB 1616	16.0	40	100	16
EB 1818	18.0	45	100	18
EB 2020	20.0	45	100	20

▼ Recommended cutting condition for EB

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	1	22000	400	18000	200	9000	140
	1.5	12000	500	11000	280	5200	150
	2	10000	550	10000	280	4600	170
	3	9000	600	5500	310	3500	220
	4	6000	600	5000	400	2200	220
	5	4800	750	4000	400	1700	240
	6	4500	800	3800	420	1600	300
	8	3500	820	2800	420	1000	300
	10	3000	820	1800	420	900	300
	12	2000	820	1600	350	800	300
	16	1500	650	1000	300	500	150
	20	1200	600	900	300	400	150

▼ Depth of cut



EFFICIENCY MILLS

# EC/EP



- MG**
- 3 Flutes
- 45°
- HRC 55
- TiAlN
- Finishing  
Semi-Finishing
- Planing
- Slotting
- Profiling

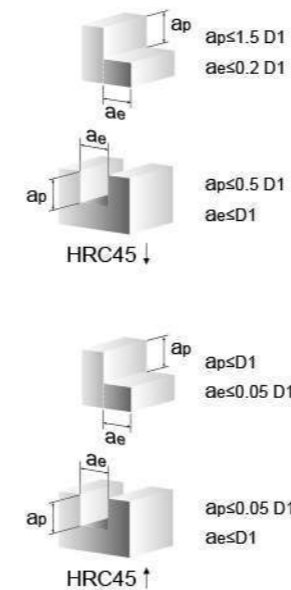
► Square / for **P K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
EC 0304	3.0	8	50	4
EC 0404	4.0	11	50	4
EC 0506	5.0	13	50	6
EC 0606	6.0	16	50	6
EC 0808	8.0	20	60	8
EC 1010	10.0	25	75	10
EC 1212	12.0	30	75	12
EC 1616	16.0	40	100	16
EC 2020	20.0	45	100	20
EP 0306	3.0	3	50	6
EP 0406	4.0	4	50	6
EP 0506	5.0	5	50	6
EP 0608	6.0	6	60	8
EP 0810	8.0	8	75	10
EP 1012	10.0	10	75	12

▼ Recommended cutting condition for EC / EP

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
HARDNESS	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
	3	8000	550(300)	5500	300(100)	3500	200 (95)
	4	6500	550(300)	4500	300(100)	2200	200 (95)
	5	5000	800(400)	3600	350(120)	1800	210(100)
	6	4000	800(400)	2800	350(120)	1500	210(110)
	8	3500	800(400)	2600	350(120)	1300	210(100)
	10	2500	800(400)	2000	350(120)	1100	210(100)
	12	1800	750(350)	1500	350(120)	700	210(100)
	16	1400	700(300)	1000	300(100)	500	170 (70)

▼ Depth of cut



( ) Grooving

## EFFICIENCY MILLS

## ED



MG

4 Flutes

45°

HRC 55

TiAlN

Finishing  
Semi-Finishing

Planing

Slotting

Profiling

► Square / for **P** **K** **M** **S** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
ED 0304	3.0	8	50	4
ED 0404	4.0	11	50	4
ED 0506	5.0	13	50	6
ED 0606	6.0	16	50	6
ED 0808	8.0	20	60	8
ED 1010	10.0	25	75	10
ED 1212	12.0	30	75	12
ED 1616	16.0	40	100	16

▼ Recommended cutting condition for ED

## Side Milling

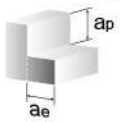
Material	Carbon Steels..		Stainless Steels		Titanium	
	SS/S45C/SCM/FC		SUS304/SUS316L		Ti6AL-4V	
Depth of cut	ap:1D1 ae:0.5D1		ap:1D1 ae:0.5D1		ap:1D1 ae:0.5D1	
Dia. (D1)	Speed (min <sup>-1</sup> )	Feed mm/min	Speed (min <sup>-1</sup> )	Feed mm/min	Speed (min <sup>-1</sup> )	Feed mm/min
3	12730	1020	8490	440	8490	440
4	9550	1150	6370	500	6370	500
5	7640	1220	5095	510	5095	510
6	6370	1220	4250	510	4250	510
8	4780	1150	3185	550	3185	550
10	3820	1220	2550	580	2550	580
12	3180	1020	2125	510	2125	510
16	2390	960	1595	450	1595	450

## Slotting

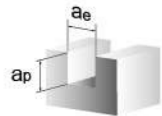
Material	Carbon Steels..		Stainless Steels		Titanium	
	SS/S45C/SCM/FC		SUS304/SUS316L		Ti6AL-4V	
Depth of cut	ap:1D1		ap:1D1		ap:1D1	
Dia. (D1)	Speed (min <sup>-1</sup> )	Feed mm/min	Speed (min <sup>-1</sup> )	Feed mm/min	Speed (min <sup>-1</sup> )	Feed mm/min
3	11450	590	7400	240	7400	240
4	8590	680	5600	250	5600	250
5	6870	750	4500	300	4500	300
6	5730	840	3700	330	3700	330
8	4300	820	2800	330	2800	330
10	3430	850	2200	340	2200	340
12	2860	760	1900	310	1900	310
16	2150	720	1400	280	1400	280

▼ Depth of cut

► Side Milling



► Slotting



## EFFICIENCY MILLS

## ELA



MG

2 Flutes

35°

HRC 55

TiAlN

Finishing  
Semi-Finishing

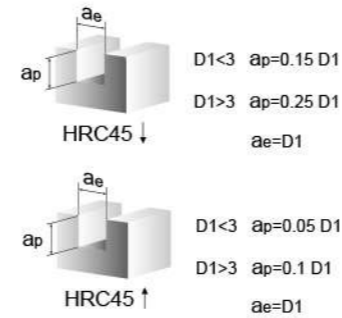
Planing

Slotting

► Long Shank / Square / for **P** **K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
ELA 0606	6.0	15	75	6
ELA 0606A	6.0	15	100	6
ELA 0808	8.0	20	100	8
ELA 1010	10.0	25	100	10
ELA 1010A	10.0	25	150	10
ELA 1212	12.0	30	100	12
ELA 1212A	12.0	30	150	12

▼ Depth of cut



▼ Recommended cutting condition for ELA

MATERIAL	Carbon Steels . Alloy Steels		Alloy Steels . Tool Steels		Hardened Steels	
	S45C, FC, FCD, SCM, S50C, SKS...		SCr, SNCM, SKD11, SKD61, NAK80...		SKD11	
HARDNESS	~HRC30		~HRC50		~HRC60	
Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
6	4000	300	2500	80	2200	70
8	3500	350	2200	90	1700	70
10	3000	400	2000	90	1500	70
12	2500	400	1500	100	1000	70
16	2000	400	1200	100	800	70



## EFFICIENCY MILLS

## ELB

► Long Shank / Square / for **P** **K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
ELB 0303	3.0	8	75	3
ELB 0404	4.0	11	75	4
ELB 0606	6.0	15	75	6
ELB 0606A	6.0	15	100	6
ELB 0808	8.0	20	100	8
ELB 1010	10.0	25	100	10
ELB 1010A	10.0	25	150	10
ELB 1212	12.0	30	100	12
ELB 1212A	12.0	30	150	12
ELB 1616	16.0	40	150	16



MG

4 Flutes

35°

HRC  
55

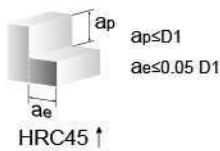
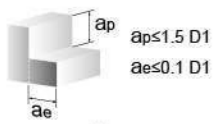
TiAlN

Finishing  
Semi-Finishing

Planing

Side

## ▼ Depth of cut



## ▼ Recommended cutting condition for ELB

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
6	4500	800	3800	420	1600	300	
8	3500	820	2800	420	1000	300	
10	3000	820	1800	420	900	300	
12	2000	820	1600	350	800	300	
16	1500	650	1000	300	500	150	
20	1200	600	900	300	400	150	

## EFFICIENCY MILLS

## ELC

► Long Flute / Square / for **P** **K** unit: mm

Order No.	Diameter D1	Flute Length L1	O.A.L. L2	Shank Dia D2
ELC 0204	2.0	12	50	4
ELC 0304	3.0	20	50	4
ELC 0404	4.0	25	75	4
ELC 0506	5.0	30	75	6
ELC 0606	6.0	30	75	6
ELC 0808	8.0	40	100	8
ELC 1010	10.0	40	100	10
ELC 1212	12.0	45	100	12



MG

2 Flutes

35°

HRC  
55

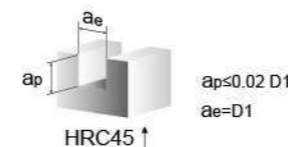
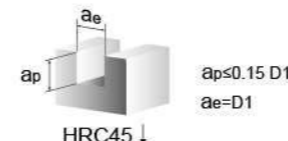
TiAlN

Finishing  
Semi-Finishing

Planing

Slotting

## ▼ Depth of cut



## ▼ Recommended cutting condition for ELC

MATERIAL	Carbon Steels . Alloy Steels S45C, FC, FCD, SCM, S50C, SKS...		Alloy Steels . Tool Steels SCr, SNCM, SKD11, SKD61, NAK80...		Hardened Steels SKD11		
	~HRC30		~HRC50		~HRC60		
	Dia. (D1)	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min	SPEED (min <sup>-1</sup> )	FEED mm / min
2	3000	25	1700	20	1000	15	
3	2300	35	1900	25	800	10	
4	2000	45	1600	35	650	15	
5	1800	40	1400	40	600	20	
6	1700	60	1300	50	550	25	
8	1300	60	1000	50	450	25	
10	1000	60	800	50	350	25	
12	800	60	700	50	300	25	