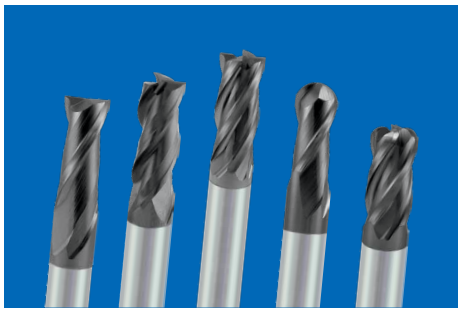
Index 索引

G450 Series



- For carbon steel, alloy steel & cast iron.
- General semi-finishing to medium cutting, HRC < 48.
- Positive rake angle and high rigidity design.
- 35° helix angle, TACO coating.

- 適用於碳鋼 , 合金鋼 & 鑄鐵
- 較一般速 , 半精加工至中加工
- 較鋒利刀口與高剛性設計
- 35°螺旋角 , 高鋁鈦塗層

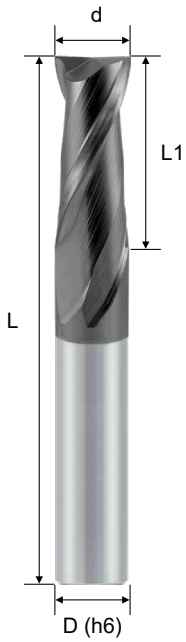
Appearance 外觀	Name 名稱	Code No. 編碼	Diameter 外徑	Helix 螺旋角	Coating 塗層	P	M	K	N	S	H	Page 頁碼
G450 Series for Carbon Steel / Alloy Steel / Cast Iron · General · Helix 35 適用碳鋼 / 合金鋼 / 鑄鐵 · 螺旋角 35												
	Square · Standard · 2F 平銑刀 · 標準型 · 2 刃	EPSSA	Ø1~Ø20	35°	TACO	●	●	●	○		○	B015
	Square · Standard · 3F 平銑刀 · 標準型 · 3 刃	EPSSA	Ø1~Ø20	35°	TACO	●	●	●	○		○	B016
	Square · Standard · 4F 平銑刀 · 標準型 · 4 刃	EPSSA	Ø1~Ø20	35°	TACO	●	●	●	○		○	B017
	Square · Short Flute · 4F 平銑刀 · 短刃型 · 4 刃	EPSHA	Ø3~Ø16	35°	TACO	●	●	●	○		○	B018
	Square · High Helix · 4F 平銑刀 · 高導高效能型 · 4 刃	EPSSB	Ø1~Ø16	45°	TACO	●	●	●	○		○	B019
	Square · Long Shank · 4F 平銑刀 · 長柄型 · 4 刃	EPSLA	Ø4~Ø12	35°	TACO	●	●	●	○		○	B020
	Ball Nose · Standard · 2F 球型銑刀 · 標準型 · 2 刃	EPBSA	0.5R~6R	35°	TACO	●	●	●	○		○	B021
	Corner Radius · Standard · 4F 圓鼻銑刀 · 標準型 · 4 刃	EPCSA	Ø1~Ø12	35°	TACO	●	●	●	○		○	B022

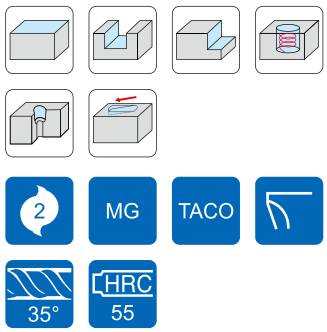
G450 - Square · Standard · 2F 平銑刀・標準型・2 刃

- General purpose milling for Stainless Steel, Alloy Steel, Carbon Steel.
- Semi-finishing for Mold Steel.
- TACO coating (Al, Ti, N) provide superior wear resistance.

EPSSA

P	M	K	N	S	H
●	●	●	○		○





d Tolerance	
d ≤ 6	0 ~ -0.02
6 < d ≤ 12	0 ~ -0.03
d > 12	0 ~ -0.04

Order No. 訂購編碼	Dia. (d)	CL (L1)	OAL (L)	Shank (D)	Flutes (Z)
EPSSA241000T	1	3	50	4	2
EPSSA241500T	1.5	4	50	4	2
EPSSA242000T	2	5	50	4	2
EPSSA242500T	2.5	6	50	4	2
EPSSA243000T	3	8	50	4	2
EPSSA243500T	3.5	9	50	4	2
EPSSA244000T	4	10	50	4	2
EPSSA204500T	4.5	11	50	6	2
EPSSA205000T	5	13	50	6	2
EPSSA205500T	5.5	14	50	6	2
EPSSA206000T	6	15	50	6	2
EPSSA206500T	6.5	16	60	8	2
EPSSA207000T	7	18	60	8	2
EPSSA208000T	8	20	60	8	2
EPSSA209000T	9	22	75	10	2
EPSSA210000T	10	25	75	10	2
EPSSA212000T	12	30	75	12	2
EPSSA214000T	14	30	75	14	2
EPSSA216000T	16	40	100	16	2
EPSSA218000T	18	40	100	20	2
EPSSA220000T	20	45	100	20	2

※ To choose uncoated tools for N material machining.

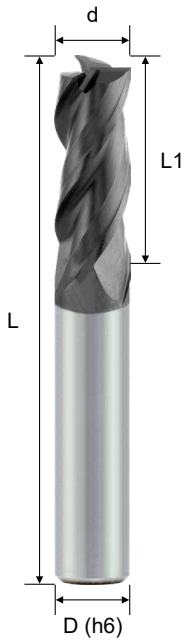
Cutting conditions：Page B218

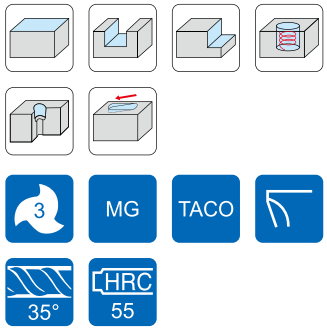
G450 - Square · Standard · 3F 平銑刀・標準型・3 刃

- General purpose milling for Stainless Steel, Alloy Steel, Carbon Steel.
- Semi-finishing for Mold Steel.
- TACO coating (Al, Ti, N) provide superior wear resistance.

EPSSA

P	M	K	N	S	H
●	●	●	○		○





d Tolerance	
d ≤ 6	0 ~ -0.02
6 < d ≤ 12	0 ~ -0.03
d > 12	0 ~ -0.04

Order No. 訂購編碼	Dia. (d)	CL (L1)	OAL (L)	Shank (D)	Flutes (Z)
EPSSA341000T	1	3	50	4	3
EPSSA341500T	1.5	4	50	4	3
EPSSA342000T	2	5	50	4	3
EPSSA342500T	2.5	6	50	4	3
EPSSA343000T	3	8	50	4	3
EPSSA344000T	4	10	50	4	3
EPSSA305000T	5	13	50	6	3
EPSSA306000T	6	15	50	6	3
EPSSA308000T	8	20	60	8	3
EPSSA310000T	10	25	75	10	3
EPSSA312000T	12	30	75	12	3
EPSSA314000T	14	30	75	14	3
EPSSA316000T	16	40	100	16	3
EPSSA320000T	20	45	100	20	3

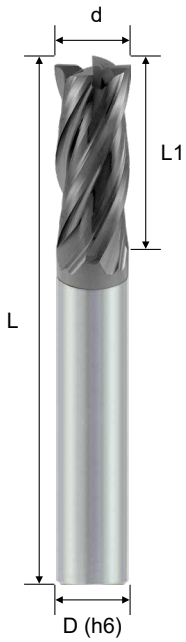
Cutting conditions：Page B218

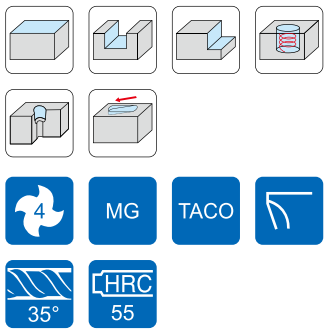
G450 - Square · Standard · 4F 平銑刀・標準型・4 刃

- General purpose milling for Stainless Steel, Alloy Steel, Carbon Steel.
- Semi-finishing for Mold Steel.
- TACO coating (Al, Ti, N) provide superior wear resistance.

EPSSA

P	M	K	N	S	H
●	●	●	○		○





d Tolerance	
d ≤ 6	0 ~ -0.02
6 < d ≤ 12	0 ~ -0.03
d > 12	0 ~ -0.04

Order No. 訂購編碼	Dia. (d)	CL (L1)	OAL (L)	Shank (D)	Flutes (Z)
EPSSA441000T	1	3	50	4	4
EPSSA441500T	1.5	4	50	4	4
EPSSA442000T	2	5	50	4	4
EPSSA442500T	2.5	6	50	4	4
EPSSA443000T	3	8	50	4	4
EPSSA444000T	4	10	50	4	4
EPSSA405000T	5	13	50	6	4
EPSSA406000T	6	15	50	6	4
EPSSA408000T	8	20	60	8	4
EPSSA410000T	10	25	75	10	4
EPSSA412000T	12	30	75	12	4
EPSSA414000T	14	30	75	14	4
EPSSA416000T	16	40	100	16	4
EPSSA420000T	20	45	100	20	4

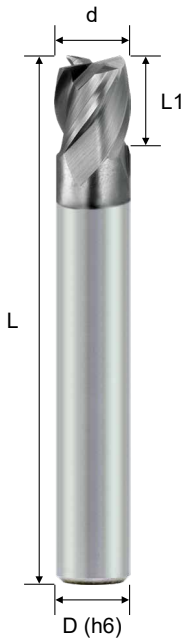
Cutting conditions：Page B218

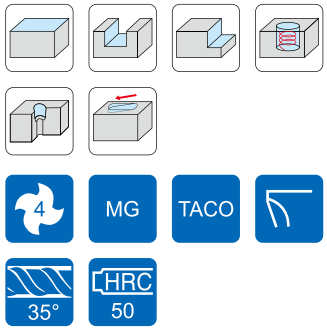
G450 - Square · Short Flute · 4F 平銑刀・短刃型・4 刃

- General purpose milling for Stainless Steel, Alloy Steel, Carbon Steel.
- Semi-finishing for Mold Steel.
- TACO coating (Al, Ti, N) provide superior wear resistance.

EPSHA

P	M	K	N	S	H
●	●	●	○		○





d Tolerance	
d ≤ 6	0 ~ -0.02
6 < d ≤ 12	0 ~ -0.03
d > 12	0 ~ -0.04

Order No. 訂購編碼	Dia. (d)	CL (L1)	OAL (L)	Shank (D)	Flutes (Z)
EPSHA443000T	3	3	50	4	4
EPSHA444000T	4	4	50	4	4
EPSHA404000T	4	4	50	6	4
EPSHA405000T	5	5	50	6	4
EPSHA406000T	6	7	50	6	4
EPSHA408000T	8	9	60	8	4
EPSHA410000T	10	11	75	10	4
EPSHA412000T	12	13	75	12	4
EPSHA414000T	14	15	75	14	4
EPSHA416000T	16	17	100	16	4

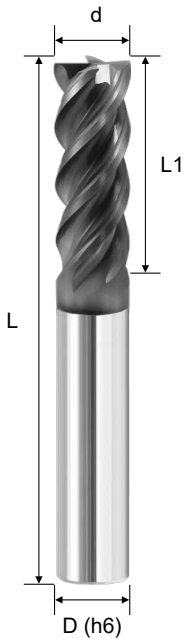
Cutting conditions：Page B218

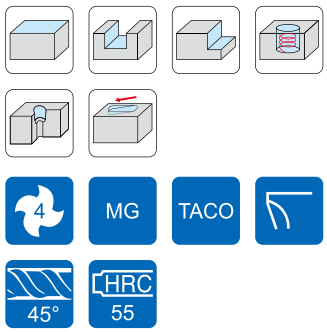
G450 - Square · High Helix · 4F 平銑刀・高導型・4 刃

- General purpose milling for Stainless Steel, Alloy Steel, Carbon Steel.
- U-flute design with high chips volume space and easy to remove chips.
- Semi-finishing for Mold Steel.
- TACO coating (Al, Ti, N) provide superior wear resistance.

EPSSB

P	M	K	N	S	H
●	●	●	○		○





d Tolerance	
d ≤ 6	0 ~ -0.02
6 < d ≤ 12	0 ~ -0.03
d > 12	0 ~ -0.04

Order No. 訂購編碼	Dia. (d)	CL (L1)	OAL (L)	Shank (D)	Flutes (Z)
ESSSB441000T	1	3	50	4	4
ESSSB442000T	2	5	50	4	4
ESSSB443000T	3	8	50	4	4
ESSSB444000T	4	10	50	4	4
ESSSB404000T	4	10	50	6	4
ESSSB405000T	5	13	50	6	4
ESSSB406000T	6	15	50	6	4
ESSSB408000T	8	20	60	8	4
ESSSB410000T	10	25	75	10	4
ESSSB412000T	12	30	75	12	4
ESSSB416000T	16	35	100	16	4

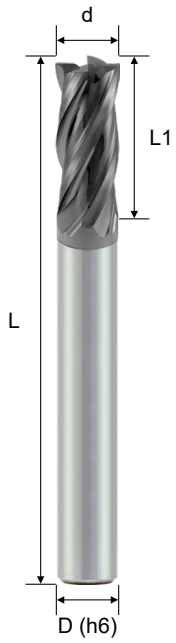
Cutting conditions：Page B257

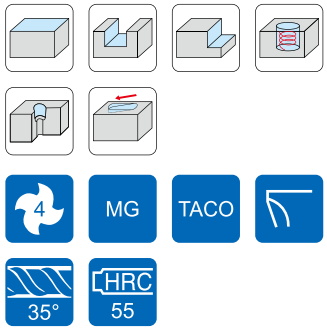
G450 - Square · Long Shank · 4F 平銑刀・長柄型・4 刃

- General purpose milling for Stainless Steel, Alloy Steel, Carbon Steel.
- Semi-finishing for Mold Steel.
- TACO coating (Al, Ti, N) provide superior wear resistance.

EPSLA

P	M	K	N	S	H
●	●	●	○		○





d Tolerance	
d ≤ 6	0 ~ -0.03
6 < d ≤ 12	0 ~ -0.04
d > 12	0 ~ -0.05

Order No. 訂購編碼	Dia. (d)	CL (L1)	OAL (L)	Shank (D)	Flutes (Z)
EPSLA444007T	4	10	75	4	4
EPSLA406007T	6	15	75	6	4
EPSLA408010T	8	20	100	8	4
EPSLA410010T	10	25	100	10	4
EPSLA412010T	12	30	100	12	4

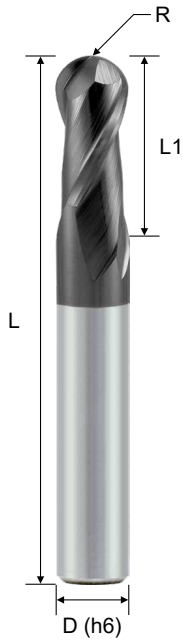
Cutting conditions：Page B221

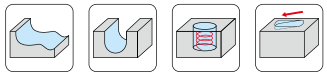
G450 - Ball Nose · Standard · 2F 球型銑刀・標準型・2 刃

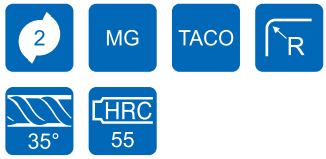
- General purpose milling for Stainless Steel, Alloy Steel, Carbon Steel.
- Semi-finishing for Mold Steel.
- TACO coating (Al, Ti, N) provide superior wear resistance.

EPBSA

P	M	K	N	S	H
●	●	●	○		○







R Tolerance	
R ≤ 3	±0.015
R > 3	±0.020

Order No. 訂購編碼	Radius (R)	Dia. (d)	CL (L1)	OAL (L)	Shank (D)	Flutes (Z)
EPBSA241000T	0.5R	1	2	50	4	2
EPBSA241500T	0.75R	1.5	3	50	4	2
EPBSA242000T	1.0R	2	4	50	4	2
EPBSA242500T	1.25R	2.5	5	50	4	2
EPBSA243000T	1.5R	3	6	50	4	2
EPBSA244000T	2.0R	4	8	50	4	2
EPBSA205000T	2.5R	5	10	50	6	2
EPBSA206000T	3.0R	6	12	50	6	2
EPBSA208000T	4.0R	8	16	60	8	2
EPBSA210000T	5.0R	10	20	75	10	2
EPBSA212000T	6.0R	12	24	75	12	2

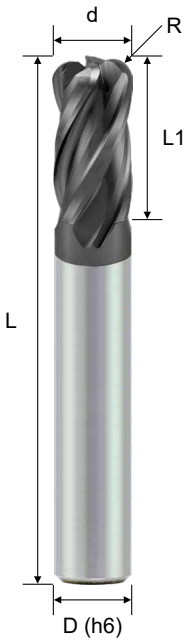
Cutting conditions：Page B223

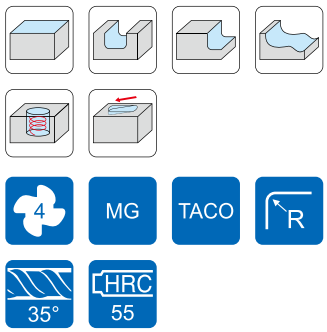
G450 - Corner Radius · Standard · 4F 圓鼻銑刀・標準型・4 刃

- General purpose milling for Stainless Steel, Alloy Steel, Carbon Steel.
- Semi-finishing for Mold Steel.
- TACO coating (Al, Ti, N) provide superior wear resistance.

EPCSA

P	M	K	N	S	H
●	●	●	○		○





Order No. 訂購編碼	Dia. (d)	Radius (R)	CL (L1)	OAL (L)	Shank (D)	Flutes (Z)
EPCSA441002T	1	0.2R	2	50	4	4
EPCSA441502T	1.5	0.2R	3	50	4	4
EPCSA442002T	2	0.2R	4	50	4	4
EPCSA443002T	3	0.2R	6	50	4	4
EPCSA443005T	3	0.5R	6	50	4	4
EPCSA444002T	4	0.2R	8	50	4	4
EPCSA444005T	4	0.5R	8	50	4	4
EPCSA406005T	6	0.5R	12	50	6	4
EPCSA406010T	6	1.0R	12	50	6	4
EPCSA408005T	8	0.5R	16	60	8	4
EPCSA408010T	8	1.0R	16	60	8	4
EPCSA410005T	10	0.5R	20	75	10	4
EPCSA410010T	10	1.0R	20	75	10	4
EPCSA412005T	12	0.5R	24	75	12	4
EPCSA412010T	12	1.0R	24	75	12	4

Cutting conditions：Page B226

d Tolerance	
d ≤ 6	0 ~ -0.02
6 < d ≤ 12	0 ~ -0.03
d > 12	0 ~ -0.04

R Tolerance	
R < 2	±0.015
R ≥ 2	±0.020

Recommended Cutting Conditions 建議切削參數

G550 Seires EPSSC2
G450 Seires EPSSA2

Material	CARBON STEEL / CAST IRON		ALLOY STEEL SCM, SKT, SKD		PREHARDENED STEEL NAK80 CENA1		HARDENED STEEL SKD61, SKD11		STAINLESS STEEL SUS304 316	
Hardness	HB 180~250		HRC 25~35		HRC 35~45		HRC 40~55		–	
Vc	120 m/min		95 m/min		79 m/min		48 m/min		79 m/min	
Dia. (d)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)
3mm	12700	380	10000	300	8386	251	5095	152	8386	251
4mm	9550	382	7560	302	6290	251	3820	152	6290	251
6mm	6370	445	5040	352	4200	294	2548	178	4200	294
8mm	4770	333	3780	264	3140	220	1910	133	3140	220
10mm	3820	230	3020	181	2515	150	1528	92	2515	150
12mm	3180	190	2520	151	2100	126	1274	76	2100	126
	ap = 0.5d ae = 1d		ap = 0.3d ae = 1d		ap = 0.5d ae = 1d		ap = 0.5d ae = 1d		ap = 0.5d ae = 1d	

G550 Seires EPSSC3, EPSSC4, EPSPC4
G450 Seires EPSSA3, EPSSA4, EPSHA4

Material	CARBON STEEL / CAST IRON		ALLOY STEEL SCM, SKT, SKD		PREHARDENED STEEL NAK80 CENA1		HARDENED STEEL SKD61, SKD11		STAINLESS STEEL SUS304 316	
Hardness	HB 180~250		HRC 25~35		HRC 35~45		HRC 40~55		–	
Vc	120 m/min		95 m/min		79 m/min		48 m/min		79 m/min	
Dia. (d)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)
3mm	12700	762	10000	600	8386	503	5095	305	8386	503
4mm	9550	764	7560	604	6290	503	3820	305	6290	503
6mm	6370	890	5040	705	4200	588	2548	356	4200	588
8mm	4770	668	3780	529	3140	440	1910	267	3140	440
10mm	3820	458	3020	362	2515	301	1528	183	2515	301
12mm	3180	380	2520	302	2100	252	1274	152	2100	252
	ap = 1d ae = 0.05d									

1.Use as highly rigid and accurate machine as possible.
2.If the rpm available is lower than the recommend condition, please reduce the feed rate to the same ratio.
3.Use long shank type please reduce the rpm and feed rate.
4.The Feed and RPM may be changed depending on the M/C conditions ,lubricating and cooling system.

Recommended Cutting Conditions 建議切削參數

G550 Seires EPSLC4
G450 Seires EPSLA4

Material	CARBON STEEL / CAST IRON		ALLOY STEEL SCM, SKT, SKD		PREHARDENED STEEL NAK80 CENA1		HARDENED STEEL SKD61, SKD11		STAINLESS STEEL SUS304 316	
Hardness	HB 180~250		HRC 25~35		HRC 35~45		HRC 40~55		–	
Vc	102 m/min		80 m/min		67 m/min		40 m/min		67 m/min	
Dia. (d)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)
3mm	10800	647	8500	510	7128	427	4330	260	7128	427
4mm	8118	649	4626	513	5346	427	3247	260	5346	427
6mm	5414	756	4284	600	3570	500	2165	302	3570	500
8mm	4054	568	3210	450	2670	340	1624	226	2670	340
10mm	3248	389	2568	307	2138	255	1298	155	2138	255
12mm	2700	323	2142	256	1785	214	1082	129	1785	214
	ap = 1d ae = 0.05d									

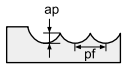
G550 Seires EPSRR4

Material	CARBON STEEL / CAST IRON		ALLOY STEEL SCM, SKT, SKD		PREHARDENED STEEL NAK80 CENA1		HARDENED STEEL SKD61, SKD11		STAINLESS STEEL SUS304 316	
Hardness	HB 180~250		HRC 25~35		HRC 35~45		HRC 40~55		–	
Vc	68 m/min		54 m/min		45 m/min		27 m/min		54 m/min	
Dia. (d)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)
6mm	3600	430	2880	295	2340	200	1440	85	2880	295
8mm	2700	430	2160	295	1800	200	1080	85	2160	295
10mm	2160	430	1710	295	1440	200	860	85	1710	295
12mm	1800	430	1440	295	1200	200	720	85	1440	295
	ap = 1d ae = 0.1d		ap = 1d ae = 0.1d		ap = 1d ae = 0.1d		ap = 1d ae = 0.2d		ap = 1d ae = 0.1d	

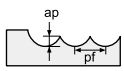
1.Use as highly rigid and accurate machine as possible.
2.If the rpm available is lower than the recommend condition, please reduce the feed rate to the same ratio.
3.Use long shank type please reduce the rpm and feed rate.
4.The Feed and RPM may be changed depending on the M/C conditions ,lubricating and cooling system.

Recommended Cutting Conditions 建議切削參數

G550 Seires EPBSC2
G450 Seires EPBSA2

Material	CARBON STEEL / CAST IRON		ALLOY STEEL / TOOL STEEL SCM, SKT, SKD		PREHARDENED STEEL NAK80 CENA1		HARDENED STEEL SKD61, SKD11		STAINLESS STEEL SUS304 316	
Hardness	HB 180~250		HRC 25~35		HRC 35~45		HRC 40~55		–	
Vc	120 m/min		95 m/min		79 m/min		48 m/min		79 m/min	
Radius (R)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)
1R	37470	936	29660	740	24660	616	14990	374	24660	616
2R	18730	1120	14830	890	12330	740	7490	450	12330	740
3R	12490	936	9890	740	8220	616	4995	374	8220	616
4R	9366	750	7415	593	6170	494	3750	300	6170	494
5R	7490	636	5930	504	4930	420	3000	255	4930	420
6R	6244	560	4940	444	4110	370	2500	225	4110	370
	ap = 0.07d pf = 0.1d									

G550 Seires EPBSC4

Material	CARBON STEEL / CAST IRON		ALLOY STEEL / TOOL STEEL SCM, SKT, SKD		PREHARDENED STEEL NAK80 CENA1		HARDENED STEEL SKD61, SKD11		STAINLESS STEEL SUS304 316	
Hardness	HB 180~250		HRC 25~35		HRC 35~45		HRC 40~55		–	
Vc	120 m/min		95 m/min		79 m/min		48 m/min		79 m/min	
Radius	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)
1R	37470	936	29660	740	24660	616	14990	374	24660	616
2R	18730	1120	14830	890	12330	740	7490	450	12330	740
3R	12490	936	9890	740	8220	616	4995	374	8220	616
4R	9366	750	7415	593	6170	494	3750	300	6170	494
5R	7490	636	5930	504	4930	420	3000	255	4930	420
6R	6244	560	4940	444	4110	370	2500	225	4110	370
	ap = 0.07d pf = 0.1d									

1.Use as highly rigid and accurate machine as possible.
2.If the rpm available is lower than the recommend condition, please reduce the feed rate to the same ratio.
3.Use long shank type please reduce the rpm and feed rate.
4.The Feed and RPM may be changed depending on the M/C conditions ,lubricating and cooling system.

Recommended Cutting Conditions 建議切削參數

G550 Seires EPCSC2

Material	CARBON STEEL / CAST IRON		ALLOY STEEL / TOOL STEEL SCM, SKT, SKD		PREHARDENED STEEL NAK80 CENA1		HARDENED STEEL SKD61, SKD11		STAINLESS STEEL SUS304 316	
Hardness	HB 180~250		HRC 25~35		HRC 35~45		HRC 40~55		–	
Vc	120 m/min		95 m/min		79 m/min		48 m/min		79 m/min	
Dia. (d)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)
3mm	12700	380	10000	300	8386	251	5095	152	8386	251
4mm	9550	382	7560	302	6290	251	3820	152	6290	251
6mm	6370	445	5040	352	4200	294	2548	178	4200	294
8mm	4770	333	3780	264	3140	220	1910	133	3140	220
10mm	3820	230	3020	181	2515	150	1528	92	2515	150
12mm	3180	190	2520	151	2100	126	1274	76	2100	126
	ap = 0.5d ae = 1d		ap = 0.3d ae = 1d		ap = 0.05d ae = 1d		ap = 0.05d ae = 1d		ap = 0.05d ae = 1d	

G550 Seires EPCSC4

G450 Seires EPCSA4

Material	CARBON STEEL / CAST IRON		ALLOY STEEL / TOOL STEEL SCM, SKT, SKD		PREHARDENED STEEL NAK80 CENA1		HARDENED STEEL SKD61, SKD11		STAINLESS STEEL SUS304 316	
Hardness	HB 180~250		HRC 25~35		HRC 35~45		HRC 40~55		–	
Vc	120 m/min		95 m/min		79 m/min		48 m/min		79 m/min	
Dia. (d)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)
3mm	12700	762	10000	600	8386	503	5095	305	8386	503
4mm	9550	764	7560	604	6290	503	3820	305	6290	503
6mm	6370	890	5040	705	4200	588	2548	356	4200	588
8mm	4770	668	3780	529	3140	440	1910	267	3140	440
10mm	3820	458	3020	362	2515	301	1528	183	2515	301
12mm	3180	380	2520	302	2100	252	1274	152	2100	252
	ap = 1d ae = 0.05d									

1.Use as highly rigid and accurate machine as possible.
2.If the rpm available is lower than the recommend condition, please reduce the feed rate to the same ratio.
3.Use long shank type please reduce the rpm and feed rate.
4.The Feed and RPM may be changed depending on the M/C conditions ,lubricating and cooling system.

Recommended Cutting Conditions 建議切削參數

M50X Seires ESSSB4
G450 Seires EPSSB4

WORKING MATERIAL	Carbon steel (S45C)		Alloy Steel (SKD)		Stainless steel (SUS304, SUS316)	
Vc	130 m/min		90 m/min		80 m/min	
Diameter (d)	RPM	fz (mm/z)	RPM	fz (mm/z)	RPM	fz (mm/z)
4mm	10350	0.020	7170	0.020	6370	0.020
6mm	6900	0.025	4780	0.025	4250	0.025
8mm	5180	0.035	3580	0.035	3190	0.035
10mm	4140	0.045	2870	0.040	2550	0.040
12mm	3450	0.055	2390	0.050	2120	0.050
16mm	2590	0.072	1790	0.064	1590	0.064
	ap = 1d ae = 0.1d					

M50X Seires ESSSW3, ESSSW4

WORKING MATERIAL	ALLOY STEEL / TOOL STEEL		ALLOY STEEL / TOOL STEEL		ALLOY STEEL / TOOL STEEL		HARDENED STEEL		STAINLESS STEEL		CAST IRON	
CODE	45C,S50C,SCM		SCM,SKT,SKD		SCM,SKT,SKD		SKT, SKD		SUS 304		FC / FCD	
HARDNESS	HRC < 20		HRC 20 ~ 30		HRC 30 ~ 40		HRC 45~45		–		–	
Vc	88 m/min		71 m/min		59 m/min		35 m/min		71 m/min		103 m/min	
DIAMETER (d)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)	RPM	Feed (mm/min)
1mm	26,000	190	22,230	140	18,720	100	10,400	40	22,230	165	32,760	240
2mm	14,040	235	11,232	160	9,360	110	5,616	45	11,232	185	16,380	270
3mm	9,828	270	7,488	175	6,084	120	3,900	55	7,488	205	11,232	310
4mm	7,020	260	5,616	175	4,680	120	2,808	50	5,616	205	8,424	310
5mm	5,850	270	4,446	175	3,744	120	2,340	55	4,446	205	6,552	300
6mm	4,680	260	3,744	175	3,042	120	1,872	50	3,744	205	5,616	310
8mm	3,510	260	2,808	175	2,340	120	1,404	50	2,808	205	4,212	310
10mm	2,808	260	2,223	175	1,872	120	1,131	50	2,223	205	3,276	300
12mm	2,340	260	1,872	175	1,560	120	936	50	1,872	205	2,808	310
14mm	2,340	300	1,768	195	1,482	135	936	60	1,768	230	2,600	335
16mm	2,028	300	2,730	345	1,300	135	819	60	2,730	400	2,340	345
18mm	2,028	305	1,378	175	1,144	120	819	60	1,378	205	2,080	310
20mm	1,560	260	1,248	175	1,040	120	624	50	1,248	205	1,820	300
	ap = 1d ae = 0.2d											