Optimized insert design for maximum drilling efficiency

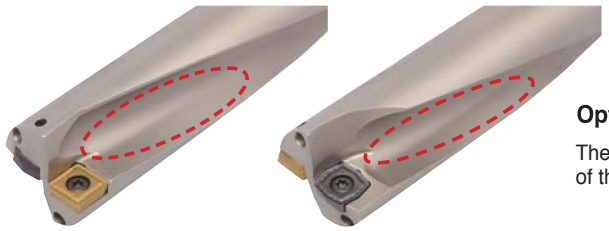
King Drill

Code system of holder

K	5D	200	25	□	–	07
KING/KORLOY	Aspect ratio (L/D)	Drill Dia.	One decimal place marked	Shank shape		Inscribed circle of insert
	2D, 2.5D, 3D, 3.5D, 4D, 4.5D, 5D	Ø20.0 (One decimal place marked)	Ø20, Ø25 Ø32, Ø40	No mark: Flange Shank, Weldone HP: Flange Shank, Weldon, PT Tap F1: Flange Shank, Whistle Notch F2: Flange Shank, Without Side Lock S: Straight Shank, Weldone S1: Straight Shank, Whistle Notch S2: Straight Shank, Without Side Lock M0, M1, M2, M3...: MT0, MT1, MT2, MT3... H63, H100: HSK63, HSK100 B30, B40, B50: BT30, BT40, BT50		05, 06, 07, 09 11 13, 15, 18

Features

- Optimized design of inserts for maximum drilling efficiency
- Excellent cutting performance and chip control due to the optimized geometry and chip breaker of both inserts, central & peripheral
- Different inserts, optimized for the central and peripheral insert locations in order to maximize cutting tool life



Optimized flute system - 2 coolant holes applied

The optimized shape of the flute increases the rigidity of the drill body and improves chip evacuation

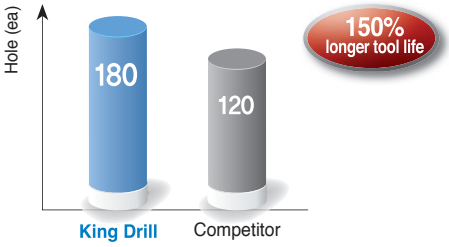
Features of chip breaker

Chip breaker	PD		LD		ND		RD
Features	- Universal - At medium speed and medium feed		- Superior chip control for machining mild steel and stainless steel - Light cutting (at low ~ medium speed and low feed)		- Sharp cutting edge for aluminum machining - Insert surface buffed for high quality result - E Class Tolerance		- Improved chipping resistance - Excellent performance in case of frequent fracture and chipping on the cutting edge
Insert	Peripheral insert	Central insert	Peripheral insert	Central insert	Peripheral insert	Central insert	Central insert
Shape							
Grades for workpiece	NC5330: P, M, K PC3500: P PC5300: P, M, K, S PC6510: K	PC5300: P, M, K, S	PC5335: P, M		H01: N		PC5300: P,M,K,S

Application examples

- **Use** Track link bush
- **Cutting conditions** vc (m/min) = 120, fn (mm/rev) = 0.1
  Through coolant system
- **Tools** **inserts** SPMT07T208-PD (PC3500)
  XOMT07T205-PD (PC5300)
  Holder K5D20025-07
- **Machine** Drilling machine

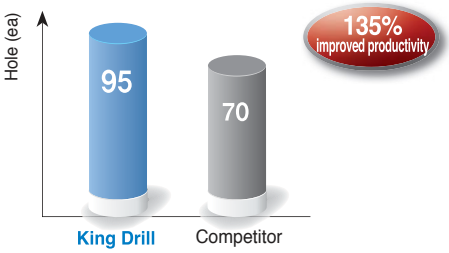
■ **Test result**



• Superior surface finish and chip evacuation

- **Use** Track link bush
- **Workpiece** SCM415H
- **Cutting conditions** King Drill: vc (m/min) = 140, fn (mm/rev) = 0.12
  Competitor: vc (m/min) = 125, fn (mm/rev) = 0.1
- **Tools** **inserts** SPMT090308-PD (PC3500)
  XOMT090305-PD (PC3500)
  Holder K3D27032-09
- **Machine** MCT

■ **Test result**



• Increased productivity due to higher capabilities for cutting conditions compared to the competitor

Recommended cutting condition

Workpiece				Insert			vc (m/min)	Depth of cut = 2D, 3D, 4D Feed rate (mm/rev) per drill dia. (mm)				
ISO		Workpiece	Hardness (HB)	Chip breaker	Grade Central	Grade Peripheral		Ø12~Ø16	Ø17~Ø23	Ø24~Ø29	Ø30~Ø42	Ø43~Ø60
P	Carbon steel	Low carbon steel	80~180	LD	PC5335	PC5335	120 (60~170)	0.04~0.08	0.04~0.08	0.04~0.08	0.04~0.08	0.04~0.08
				PD/RD	PC5300	PC3500	150 (120~180)					
						NC5330	180 (140~220)					
		High carbon steel	180~280	PD	PC5300	PC3500	120 (90~150)	0.04~0.10	0.04~0.12	0.05~0.16	0.06~0.16	0.06~0.18
						NC5330	150 (110~190)	0.04~0.06	0.04~0.07	0.04~0.08	0.04~0.08	0.04~0.08
	Alloy steel	Low alloy steel	140~260	LD	PC5335	PC5335	120 (60~160)	0.06~0.10	0.06~0.10	0.06~0.12	0.06~0.14	0.06~0.14
				PD	PC5300	PC3500	150 (120~170)	0.06~0.12	0.06~0.12	0.06~0.14	0.06~0.16	0.06~0.16
						NC5330	180 (140~210)	0.06~0.08	0.06~0.08	0.06~0.10	0.06~0.12	0.06~0.12
		Hardened low alloy steel	200~400	PD	PC5300	PC5300	100 (50~150)	0.04~0.10	0.06~0.10	0.06~0.12	0.06~0.14	0.06~0.14
		High alloy steel	260~320	PD	PC5300	PC3500	100 (50~160)	0.05~0.11	0.05~0.11	0.05~0.13	0.05~0.15	0.05~0.15
		Hardened high alloy steel	300~450	PD	PC5300	PC5300	70 (30~120)	0.04~0.08	0.06~0.08	0.06~0.10	0.06~0.12	0.06~0.12
M	Stainless steel	Stainless steel	135-275	LD	PD5335	PC5335	120 (80~140)	0.04~0.07	0.04~0.07	0.04~0.07	0.04~0.08	0.04~0.08
				PD	PC5300	PC5300	130 (100~160)	0.04~0.07	0.04~0.07	0.04~0.07	0.04~0.08	0.04~0.08
K	Cast iron	Gray cast iron	150~230	PD	PC5300	PC6510	190 (150~250)	0.04~0.12	0.05~0.14	0.06~0.18	0.10~0.22	0.10~0.26
		Ductile cast iron	150~230	PD	PC5300	PC6510	130 (100~160)	0.04~0.07	0.04~0.08	0.04~0.10	0.05~0.12	0.05~0.12
S	Heat resisting alloy	Ni-heat resisting alloy	130~400	PD	PC5300	PC5300	50 (30~100)	0.04~0.10	0.04~0.10	0.04~0.10	0.04~0.10	0.04~0.10
		Ti-heat resisting alloy	130~400	LD	PC5335	PC5335	60 (40~80)	0.04~0.08	0.04~0.10	0.06~0.12	0.06~0.14	0.06~0.16
				PD	PC5300	PC5300	60 (40~80)	0.04~0.08	0.04~0.10	0.06~0.12	0.06~0.14	0.06~0.16
		High hardened steel	over 400	PD	PC5300	PC5300	40 (20~80)	0.04~0.05	0.04~0.06	0.04~0.08	0.04~0.08	0.04~0.08
N	Aluminium	Aluminium	30~150	ND	H01	H01	300 (250~400)	0.05~0.14	0.06~0.16	0.10~0.20	0.10~0.22	0.12~0.25
		Alloyed copper	150-160	ND	H01	H01	250 (200~300)	0.05~0.14	0.06~0.16	0.10~0.20	0.10~0.22	0.12~0.25

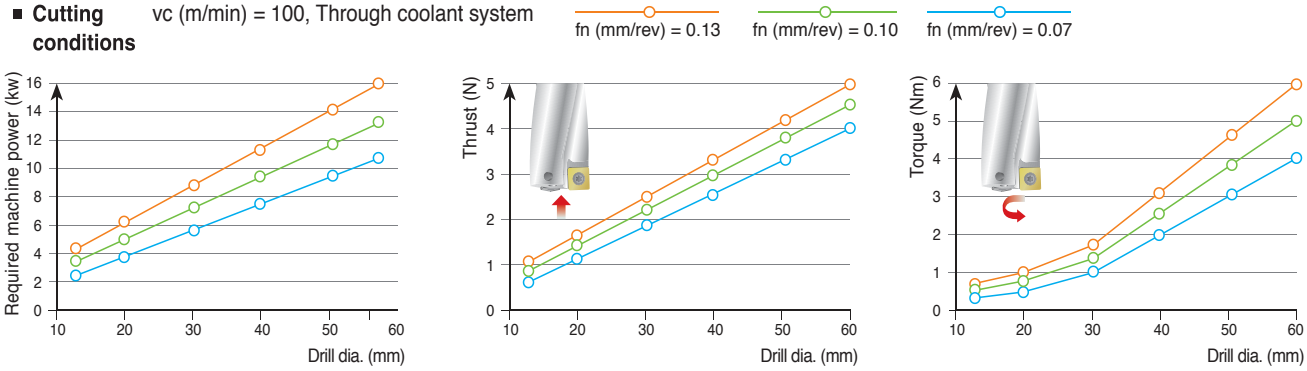
• The Max. feed of 5D holders is 70%~80% of the max. conditions of 2D/3D/4D holders
• In interrupted machining part, reduce 30~50% of feed from the above machining around interrupted part

Required machine power

- The graphs below show the cutting force required in drilling
- Machining with the King Drill and a machine with high rigidity and power

■ **Workpiece** SCM440 (240HB)

■ **Cutting conditions** vc (m/min) = 100, Through coolant system

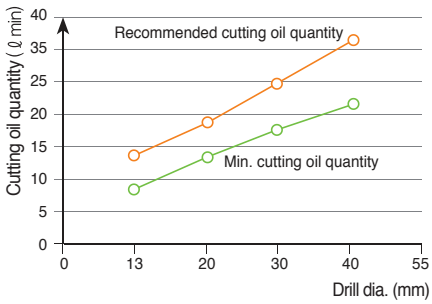


Cutting oil quantity

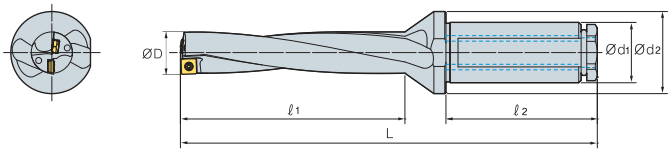
■ **Workpiece** SCM440 (240HB)

■ **Cutting conditions** vc (m/min) = 100, Through coolant system

- The data of the graph above could be changed depending on workpiece and cutting condition



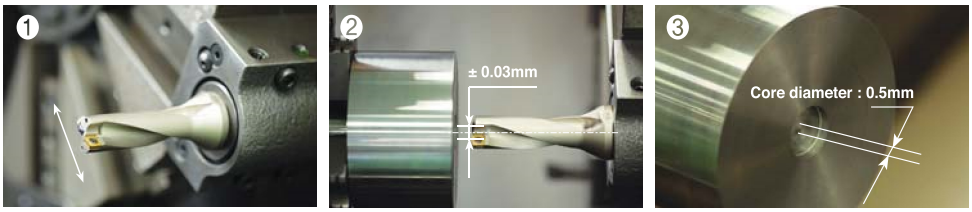
Drill tolerance and hole tolerance



(mm)

Drill dia.		Ø12~Ø29	Ø30~Ø45	Ø46~Ø60.5
2D~3D	Drill tolerance (ØD)	0~ –0.15	0~ –0.15	0~ –0.15
	Hole tolerance	+0.2~ –0.1	+0.25~ –0.1	+0.28~ –0.1
4D~5D	Drill tolerance (ØD)	0~ –0.15	0~ –0.15	0~ –0.15
	Hole tolerance	+0.25~ –0.05	+0.3~ –0.05	+0.33~ –0.05

Notice for setting the drill in the lathe

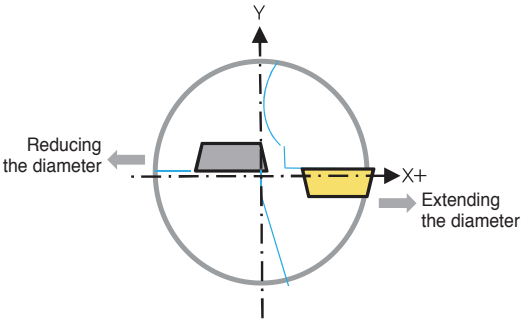


- Set the peripheral insert parallel to the X axis. (based on the side lock)
- If the machined core is 0.5mm after machining 5mm, that is the proper setting

※ Please make sure that the location of the side lock could be different depending on manufacturers of machine

Range of adjusting machining diameter in the lathe

- In machining in the lathe, the King Drill can extend and reduce the machining diameter by adjusting the x-axis. Please refer to the table showing the range of adjusting drilling diameter below
- The more the drilling diameter is extended or reduced, the more the drill loses drilling balance. In this case, reduce the feed or cutting speed in machining
- Reducing the machining diameter excessively could damage the holder



(mm)

Drill dia. (Ø)	Range of adjusting drilling diameter (Ø)	Drill dia. (Ø)	Range of adjusting drilling diameter (Ø)	Drill dia. (Ø)	Range of adjusting drilling diameter (Ø)	Drill dia. (Ø)	Range of adjusting drilling diameter (Ø)
12.0	11.7~12.4	24.5	23.9~25.1	37.0	36.3~37.7	49.5	48.7~50.2
12.5	12.2~12.9	25.0	24.4~25.6	37.5	36.8~38.2	50.0	49.2~50.7
13.0	12.7~13.4	25.5	24.9~26.1	38.0	37.3~38.7	50.5	49.7~51.2
13.5	13.2~13.9	26.0	25.4~26.6	38.5	37.8~39.2	51.0	50.2~51.7
14.0	13.6~14.5	26.5	25.9~27.1	39.0	38.3~39.7	51.5	50.7~52.2
14.5	14.1~15.0	27.0	26.4~27.6	39.5	38.8~40.2	52.0	51.2~52.7
15.0	14.6~15.5	27.5	26.9~28.1	40.0	39.3~40.7	52.5	51.7~53.2
15.5	15.1~16.0	27.8	27.4~28.6	40.5	39.8~41.2	53.0	52.2~53.7
16.0	15.6~16.5	28.5	27.9~29.1	41.0	40.3~41.7	53.5	52.7~54.2
16.5	16.0~17.0	29.0	28.4~29.6	41.5	40.8~42.2	54.0	53.2~54.7
17.0	16.5~17.5	29.5	28.9~30.1	42.0	41.3~42.7	54.5	53.7~55.2
17.5	17.0~18.0	30.0	29.3~30.7	42.5	41.8~43.2	55.0	54.2~55.7
18.0	17.5~18.5	30.5	29.8~31.2	43.0	42.2~43.7	55.5	54.7~56.2
18.5	18.0~19.0	31.0	30.3~31.7	43.5	42.7~44.2	56.0	55.2~56.7
19.0	18.5~19.5	31.5	30.8~32.2	44.0	43.2~44.7	56.5	55.7~57.2
19.5	19.0~20.0	32.0	31.3~32.7	44.5	43.7~45.2	57.0	56.2~57.7
20.0	19.4~20.6	32.5	31.8~33.2	45.0	44.2~45.7	57.5	56.7~58.2
20.5	19.9~21.1	33.0	32.3~33.7	45.5	44.7~46.2	58.0	57.2~58.7
21.0	20.4~21.6	33.5	32.8~34.2	46.0	45.2~46.7	58.5	57.7~59.2
21.5	20.9~22.1	34.0	33.3~34.7	46.5	45.7~47.2	59.0	58.2~59.7
22.0	21.4~22.6	34.5	33.8~35.2	47.0	46.2~47.7	59.5	58.7~60.2
22.5	21.9~23.1	35.0	34.3~35.7	47.5	46.7~48.2	60.0	59.2~60.7
23.0	22.4~23.6	35.5	34.8~36.2	48.0	47.2~48.7	60.5	59.7~61.2
23.5	22.9~24.1	36.0	35.3~36.7	48.5	47.7~49.2		
24.0	23.4~24.6	36.5	35.8~37.2	49.0	48.2~49.7		

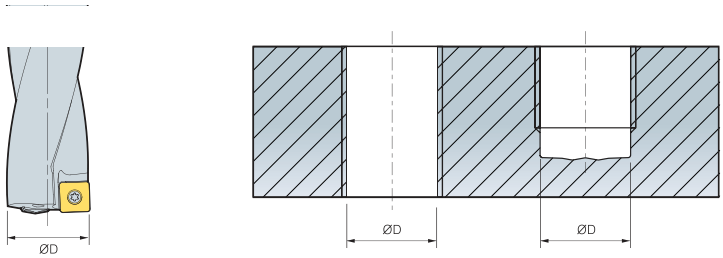
Insert and parts

Drill dia. (mm)	Peripheral insert	Central insert	Screw	Wrench	Torque (Nm)
Ø12.0~Ø13.5	SP□T040204-□□	XO□T040204-□□	FTNA0204	TW06P	0.4
Ø13.6~Ø16.0	SP□T050204-□□	XO□T050204-□□	FTNA0204	TW06P	0.4
Ø16.1~Ø19.5	SP□T060205-□□	XO□T060204-□□	FTKA02206S	TW07P	0.8
Ø19.6~Ø23.5	SP□T07T208-□□	XO□T07T205-□□	FTKA02565	TW07S	0.8
Ø23.6~Ø29.5	SP□T090308-□□	XO□T090305-□□	FTKA0307	TW09S	1.2
Ø29.6~Ø35.5	SP□T11T308-□□	XO□T11T306-□□	FTKA03508	TW15S	3
Ø35.6~Ø42.5	SP□T130410-□□	XO□T130406-□□	FTKA0410	TW15S	3
Ø42.6~Ø50.5	SP□T15M510-□□	XO□T15M508-□□	FTNC04511	TW20S	5
Ø50.6~Ø60.5	SP□T180510-□□	XO□T180508-□□	FTNA0511	TW20-100	5

- In clamping an insert, please clean the tip seat and apply CASMOLY1000 on the screw
- Please make sure to use a Korloy-produced wrench and screw only

King Drill - for machining a tap foundation hole

- There are two types of specifications of tap, metric and inch. The King Drill is available for machining both thru tap and blind tap



Thru tap Blind tap

(mm)

Tap type	Thread	ØD	Designation	Reference
Metric	M14 x 2.0	12.0	K3D12020-04	G14
	M16 x 2.0	14.0	K3D14020-05	G14
	M18 x 2.5	15.5	K3D15520-05	G14
	M20 x 2.5	17.5	K3D17525-06	G14
	M22 x 2.5	19.5	K3D19525-06	G14
	M24 x 3.0	21.0	K3D21025-07	G14
	M27 x 3.0	24.0	K3D24032-09	G14
	M30 x 3.5	26.5	K3D26532-09	G14
	M33 x 4.0	29.0	K3D29032-09	G14
	M36 x 4.0	32.0	K3D32032-11	G15
	M39 x 4.0	35.0	K3D35032-11	G15
	M42 x 4.5	37.5	K3D37540-13	G15
Inch	9/16-12 UNC	12.2	K3D12220-04	G14
	5/8-11 UNC	13.5	K3D13520-04	G14
	3/4-10 UNC	16.5	K3D16525-06	G14
	7/8-9 UNC	19.5	K3D19525-06	G14
	9/16-18 UNF	12.9	K3D12920-04	G14
	5/8-18 UNF	14.5	K3D14520-05	G14
	3/4-16 UNF	17.5	K3D17525-06	G14