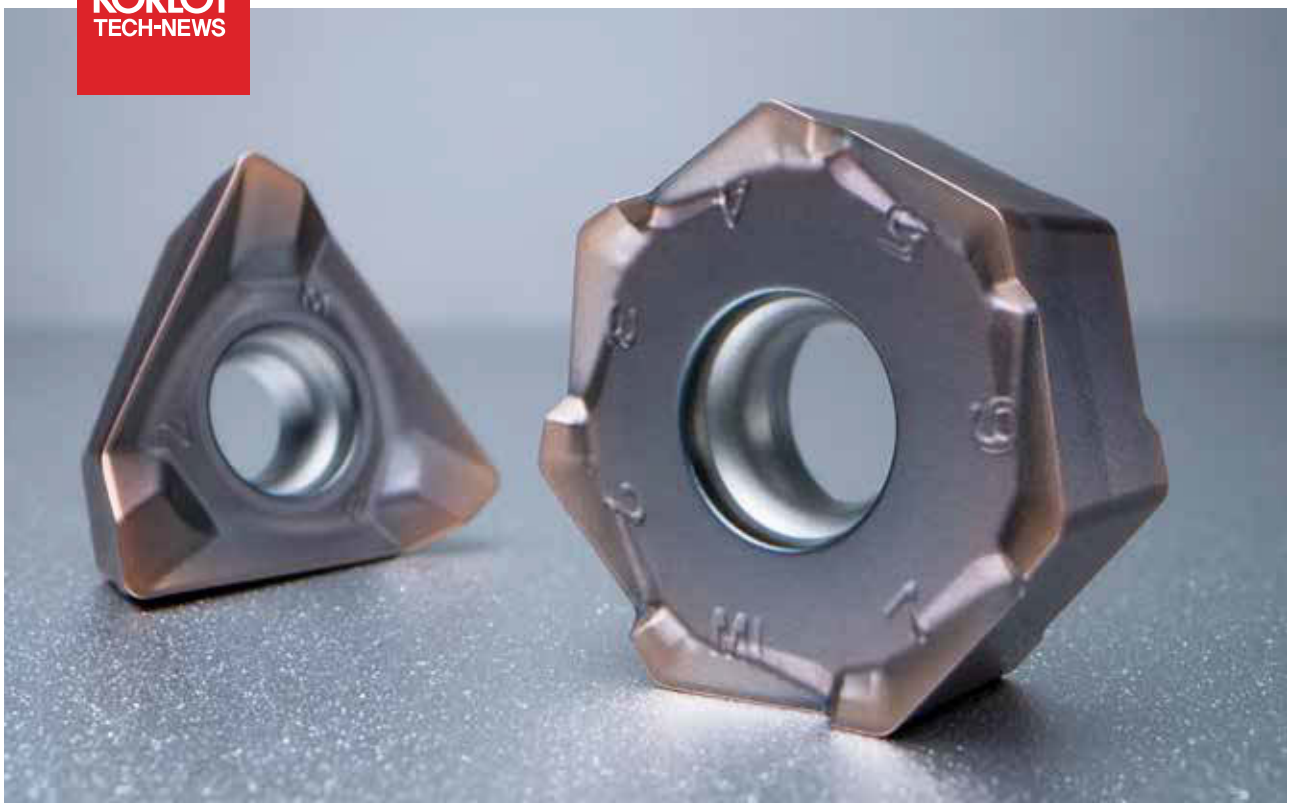
PVD insert for cast iron Milling

PC6100

KORLOY TECH-NEWS



- PVD Ion plus-Tech™ provides long tool life and stability
- Optimal substrate for cast iron cutting with coating adherence technology ensures regular tool life

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TECH-NEWS

PVD insert for cast iron Milling

PC6100

In cast iron machining, the formation of short, broken chips results in a lower load on the rake faceof the insert, leading to slower wear progression. However, the relief surface, which comes into directcontact with the work-piece, experiences longer friction time and therefore wears out relatively quickly. Especially, nodular graphite cast iron, compared to gray cast iron, has high hardness and high toughnesscharacteristics. During machining, it forms built-up edges and adhesion on the surface of the insert, causing uneven chipping. Additionally, to remove the dust generated during machining, wet machinings mainly used. The cutting fluid rapidly cools the heated insert, repeatedly subjecting the cutting edgesurface to significant thermal shock, which causes thermal cracks and coating delamination on the cuttingedge.

KORLOY launched **PC6100**, a grade for cast iron milling that can enhance productivity.

The **PC6100** applies a new coating technology called **Ion Plus-Tech™**, which suppresses layer delaminationand thermal crack formation, providing excellent tool life and reliability. Additionally, by using a substrateoptimized for cast iron machining, it offers superior wear resistance and impact resistance.

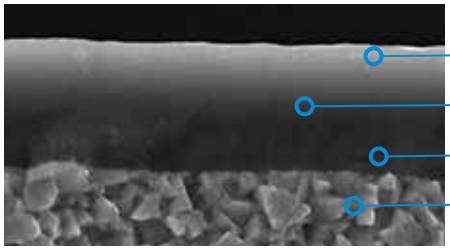
Through this, **PC6100** demonstrates excellent perfor-mance in cast iron machining under variousconditions, and particularly in ductile cast iron machining, you will experience superior tool life andmachining reliability.

Good wear resistance and adherence of layer
- Individual PVD coating technology Ion Plus-Tech™

Reduced chipping and unexpected fracture
- Coating surface treatment

Stable tool life
- Optimal wear resistance and fracture resistance substrate for cast iron cutting

Features

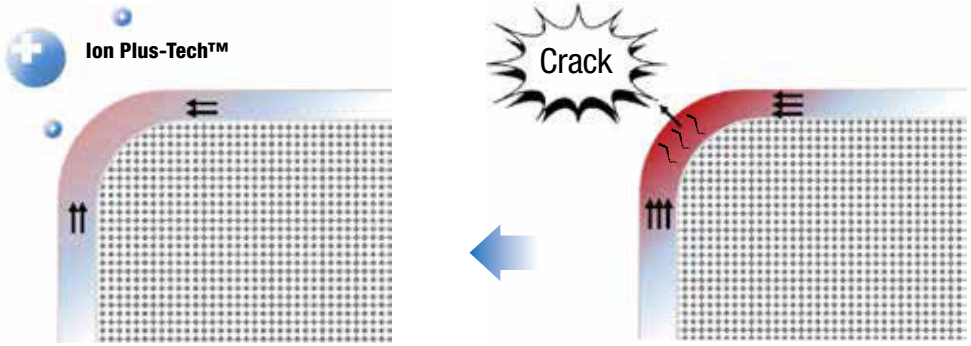


- Applying coating surface reinforced technology on the cutting edge
- Applying high thermal crack resistance coating
- Enhanced adherence on the cutting edge
- Applying optimal wear resistance and fracture resistance in cast iron cutting

- Optimally designed PVD coating grade in cast iron milling
- Applying Ion Plus-Tech™ increasing hardness and adherence of layer ensures wear resistance and thermal crack resistance
- Coating surface treatment technology prevents chipping and unexpected fracture
- The optimal substrate for cast iron cutting enhances wear resistance and fracture resistance

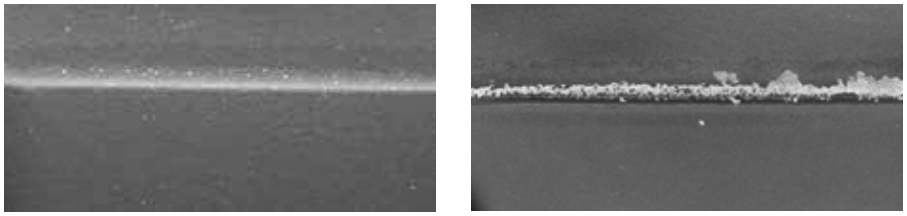
Applying Ion Plus-Tech™

- Ion Plus-Tech™: Exclusive PVD plasma coating reinforced technology increases adherence of layer and hardness



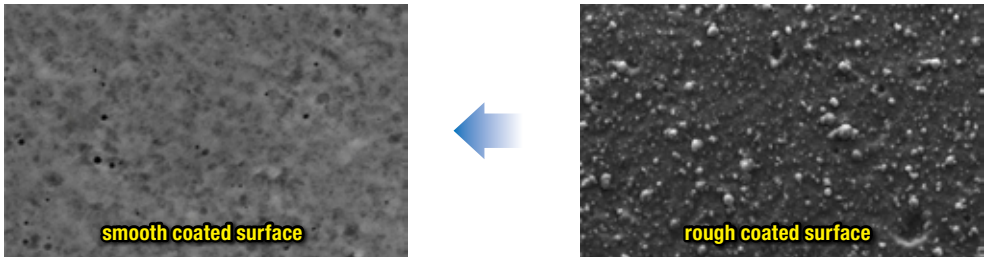
Ion Plus-Tech™ Existing

Effect of applying Ion Plus-Tech™ (wear in cutting)



Applied Unapplied

Applying smooth coating surface treatment technology



PC6100 Existing

☑ Recommended cutting conditions

Workpiece			ISO	KS	Specific cutting force (N/mm2)	Brinell hardness (HB)	Recommended cutting condition		
ISO	Workpiece materials						PC6100	Facing / shouldering	High feed cutting
							vc (m/min)	fz (mm/t)*	
K	Gray cast iron	Low Tensile	150 250	GC150 GC250	900	≤ 212 ≤ 248	130	0.3	1.3
							210	**0.2**	**0.8**
							280	0.1	0.3
		High Tensile	300 350	GC300 GC350	1100 1300	≤ 262 ≤ 277	160	0.3	1.3
							200	**0.2**	**0.8**
							240	0.1	0.3
	Ductile cast iron	Ferritic	400 500	GCD400 GCD500	1200	-210 170-241	130	0.3	1.3
							160	**0.2**	**0.8**
							190	0.1	0.3
		Pearlitic	600 700	GCD600 GCD700	1440 1650	192-269 229-302	100	0.3	1.3
							120	**0.2**	**0.8**
							150	0.1	0.3

*: The recommended feed conditions could be different depending on items

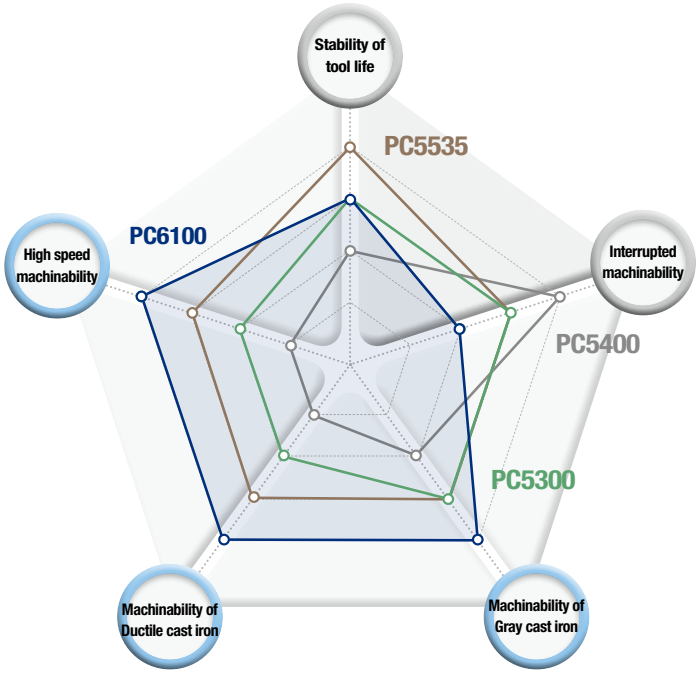
Application guide - Engine block

Specification	General cutting	For medium interrupted	For high interrupted cutting
Grade	**PC6100**	**PC6100**	**PC5535**
Workpiece materials	Gray cast iron, Ductile cast iron	Gray cast iron, Ductile cast iron	Gray cast iron, Ductile cast iron
Cutting type	General cutting for wide area of workpiece	Interrupted cutting for various cutting types	Unstable cutting with high interruption
Cutting part	Top & Bottom face 	Front & Rear face 	Bosses 

Application guide - Crank shaft, Knuckle, and Caliper housing

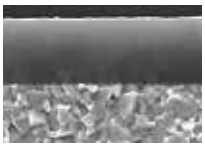
Specification	Crank shaft	Knuckle		Caliper housing	
Grade	**PC6100**	**PC6100**	**PC5535**	**PC6100**	**PC5535**
Workpiece materials	Ductile cast iron	Ductile cast iron		Ductile cast iron	
Cutting type	High speed and dry cutting	High speed and interrupted cutting	Medium and low speed, interrupted cutting	High speed and interrupted cutting	Medium and low speed, interrupted cutting
Cutting part					

Grade selection guide for cast iron milling



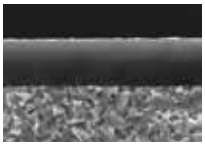
PC6100 new

- Good for high speed and high feed cutting
- For universal cutting
- 1st recommended grade



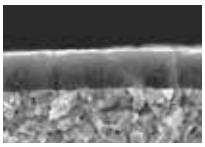
PC5535

- High stable tool life
- For Medium interrupted cutting - interrupted cutting
- 2nd recommended grade



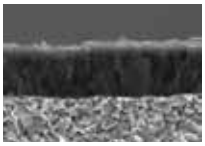
PC5300

- Balanced chipping resistance and wear resistance
- For Medium interrupted cutting - interrupted cutting



PC5400

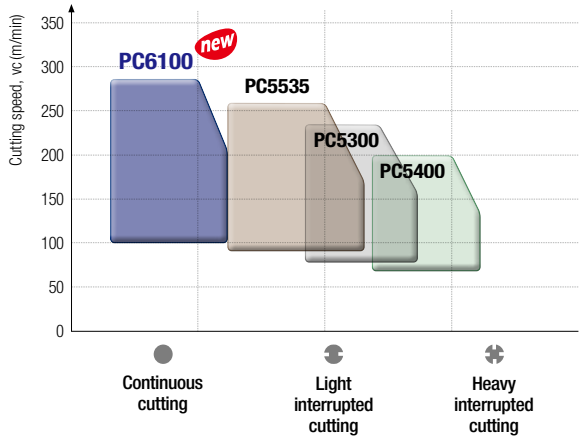
- Good chipping resistance and fracture resistance
- For interrupted cutting



Grade	Stability of tool life	Interrupted machinability	Machinability of Gray cast iron	Machinability of Ductile cast iron	High speed machinability
PC6100 new	★★★	★★	★★★★	★★★★	★★★★
PC5535	★★★★	★★★	★★★	★★★	★★★
PC5300	★★★	★★★	★★★	★★	★★
PC5400	★★	★★★★	★★	★	★

Application range

K Cast iron



Performance evaluation

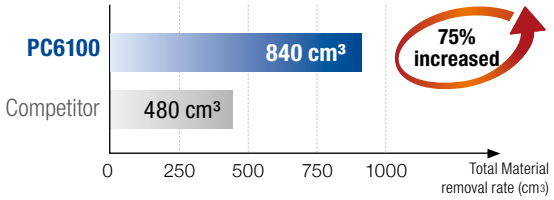
Ductile cast iron (600)

Cutting conditions vc = 200 m/min · fz = 0.2 mm/t · ap = 2.0 mm · wet

Tool **Insert** SNMX1206ANN-MF (PC6100) **Holder** RM8ACM4125HR-M

PC6100

Competitor



- Material removal rate Q (cm^3/min): 40
- Cutting time (min): 21

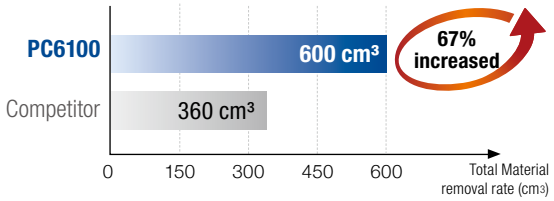
Ductile cast iron (600)

Cutting conditions vc = 150 m/min · fz = 0.2 mm/t · ap = 2.0 mm · wet

Tool **Insert** ADKT170608PESR-MF (PC6100) **Holder** AMXS032R-3W32-125-AD17

PC6100

Competitor



- Material removal rate Q (cm^3/min): 30
- Cutting time (min): 21

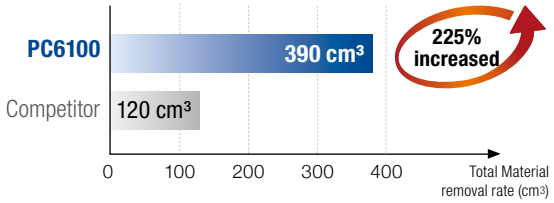
Ductile cast iron (450)

Cutting conditions vc = 250 m/min · fz = 0.28 mm/t · ap = 2.0 mm · wet

Tool **Insert** SNMX1206ANN-MF (PC6100) **Holder** RM8ACM4125HR-M

PC6100

Competitor



- Material removal rate Q (cm^3/min): 50
- Cutting time (min): 7.8

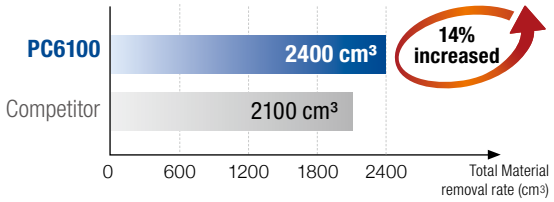
Gray cast iron (250)

Cutting conditions vc = 230 m/min · fz = 0.26 mm/t · ap = 2.0 mm · wet

Tool **Insert** SNMX1206ANN-MF (PC6100) **Holder** RM8ACM4125HR-M

PC6100

Competitor



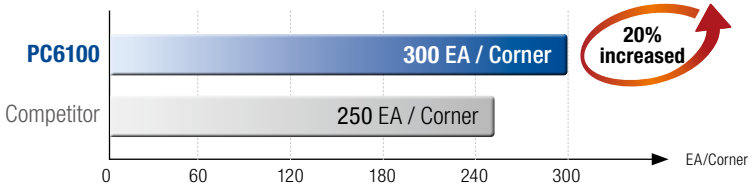
- Material removal rate Q (cm^3/min): 46
- Cutting time (min): 52.2

Application examples

Bimaterial (Gray cast iron + Aluminum)

Workpiece use	Cylinder block (Automobile)
Cutting conditions	vc (m/min) = 314, fz (mm/t) = 0.1, ap (mm) = 0.75, wet
Tool	**Insert** SNEX1206QNN-MF (PC6100) **Holder** RM8QCM4100HR-H

Type	Facing	Interruption	Continuous
Overhang	Short	Clamping	Stable

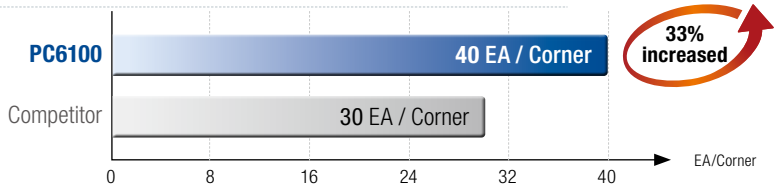


» Cutting 20% more than competitive

Ductile cast iron (500)

Workpiece use	Caliper housing (Automobile)
Cutting conditions	vc (m/min) = 180, fz (mm/t) = 0.17, ap (mm) = 2.5, wet
Tool	**Insert** OFKR0704SN-MF (PC6100) **Holder** AFOM5080R

Type	Facing	Interruption	Low interruption
Overhang	Short	Clamping	Stable

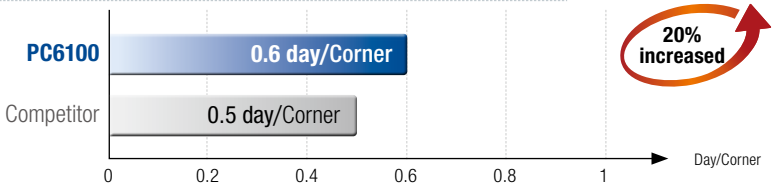


» Cutting 33% more than competitive

Ductile cast iron (450)

Workpiece use	Bearing cap
Cutting conditions	vc (m/min) = 176, fz (mm/t) = 0.24, ap (mm) = 3.5, wet
Tool	**Insert** SNMX1206ANN-MM (PC6100) **Holder** RM8AC4080HR

Type	Facing	Interruption	Continuous
Overhang	Short	Clamping	Normal

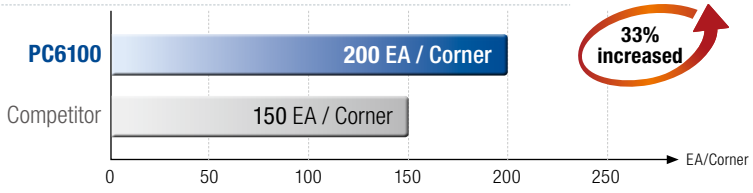


» Cutting 20% more than competitive

Ductile cast iron (450)

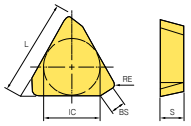
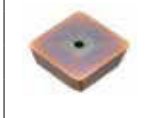
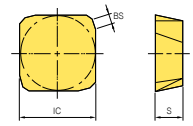
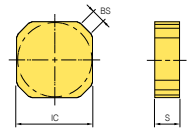
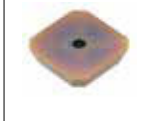
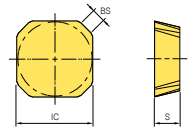
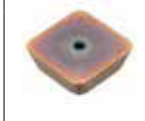
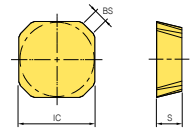
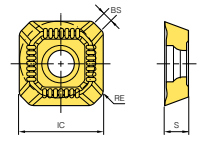
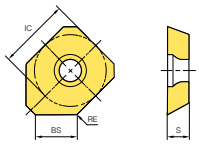
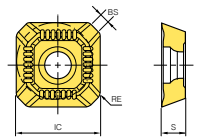
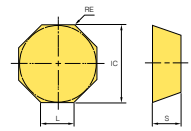
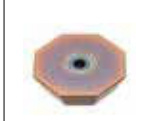
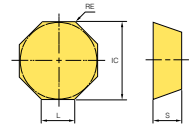
Workpiece use	Knuckle (Automobile)
Cutting conditions	vc (m/min) = 200, fz (mm/t) = 0.15, ap (mm) = 1, wet
Tool	**Insert** SNEX120620-MF (PC6100) **Holder** RM8QCM4080HR-SN12-Z6

Type	Shouldering	Interruption	Medium interruption
Overhang	Short	Clamping	Unstable



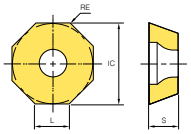
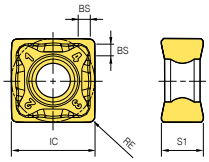
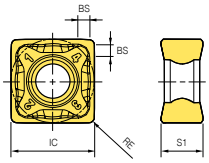
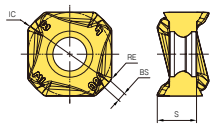
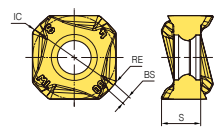
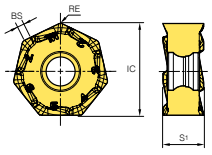
» Cutting 33% more than competitive

Stock items

Type	Picture	Designation		PC6100	Dimension (mm)							Geometry
					INSL	IC	S	RE	BS	APMX	KAPR	
Mill Max		TPCN	1603PDER-RH	●	16.5	9.525	1.59	0.8	1.5	13	90	
			1603PDSR-RH	●	16.5	9.525	2.38	0.8	1.5	13	90	
			2204PDER-RH	●	22	12.7	4.76	0.8	1.79	18	90	
			2204PDSR-RH	●	22	12.7	4.76	0.8	1.79	18	90	
		SPCN	1203EDER-RH	●	12.7	12.7	3.18	0.8	1.63	9	75	
			1203EDSR-RH	●	12.7	12.7	3.18	0.8	1.63	9	75	
			1504EDER-RH	●	15.875	15.875	4.76	-	1.64	12	75	
			1504EDSR-RH	●	15.875	15.875	4.76	-	1.64	12	75	
		SNKN	1204ENN	●	12.7	12.7	4.76	-	1.26	-	75	
		SECN	1203AFEN-RH	●	12.7	12.7	3.18	0.8	2.36	5.5	45	
			1504AFSN-RH	●	15.875	15.875	4.76	1.0	2.4	7.5	45	
		SDCN	1504AESN-RH	●	15.875	15.875	4.76	1	1.43	8	45	
			1504AEEN-RH	●	15.875	15.875	4.76	1	1.43	8	45	
FMA		SEXT	0903AGSN-MM	●	9.525	9.525	3.18	0.8	1.44	4	45	
			0903AGSN-MF	●	9.525	9.525	3.18	0.8	1.44	4	45	
			14M4AGSN-MM	●	14	14	4	0.8	1.81	6.5	45	
			14M4AGSN-MF	●	14	14	4	0.8	1.81	6.5	45	
		SEEW	14M4AGTN-W	●	14	14	4	0.8	1.81	6.5	45	
		SEET	0903AGSN-MM	●	9.525	14	4	0.8	1.81	6.5	45	
			0903AGSN-MF	●	9.525	9.525	3.18	0.8	1.44	4	45	
			14M4AGSN-MM	●	14	14	4	0.8	1.81	6.5	45	
			14M4AGSN-MF	●	14	9.525	3.18	0.8	1.44	4	45	
Double Mill		OFKR	0704SN-MM	●	17.941	18	4.76	0.5	1.8	7.4	90	
		OFCN	0704SN	●	18.02	18	4.86	0.5	1.8	7.4	90	

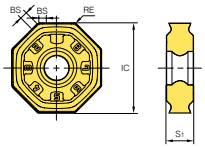
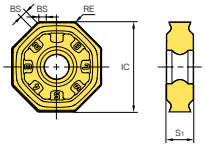
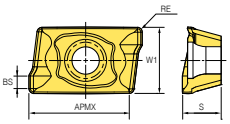
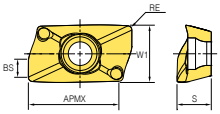
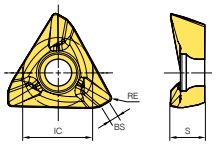
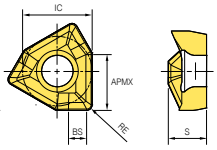
▲: Stock item Europe ●: Stock item Korea ○: Production on demand

Stock items

Type	Picture	Designation		PC6100	Dimension (mm)							Geometry
					INSL	IC	S	RE	BS	APMX	KAPR	
Double Mill		OFKT	05T3SN-MF	●	12.724	12.7	3.85	0.5	1.5	5.2	90	
RM8		SNMX	120612-MF	●	12.7	12.7	6.35	1.2	-	11.5	88	
			120612-MM	●	12.7	12.7	6.35	1.2	-	11.5	88	
			1206ANN-MF	●	12.7	12.7	6.35	0.8	1.56	6	45	
			1206ANN-MM	●	12.7	12.7	6.35	0.8	1.56	6	45	
			1206ENN-MF	●	12.7	12.7	6.35	1	1.32	9	75	
			1206ENN-MM	●	12.7	12.7	6.35	1	1.32	9	75	
			1206QNN-MF	●	12.7	12.7	6.35	0.8	1.394	11.5	88	
			1206QNN-MM	●	12.7	12.7	6.35	0.8	1.394	11.5	88	
			1507ANN-MF	●	15.875	15.875	7.94	0.8	2.36	7.5	45	
			1507ANN-MM	●	15.875	15.875	7.94	0.8	2.36	7.5	45	
			1507ENN-MF	●	15.875	15.875	7.94	1	2.16	11	75	
			1507ENN-MM	●	15.875	15.875	7.94	1	2.16	11	75	
		SNEX	120612-MF	●	12.7	12.7	6.35	1.2	-	11.5	88	
			120612-MM	●	12.7	12.7	6.35	1.2	-	11.5	88	
			1206ANN-MF	●	12.7	12.7	6.35	0.8	1.56	6	45	
			1206ANN-MM	●	12.7	12.7	6.35	0.8	1.56	6	45	
			1206ANN-W	●	12.7	12.7	6.35	1	7.63	6	45	
			1206ENN-MF	●	12.7	12.7	6.35	1	1.32	9	75	
			1206ENN-MM	●	12.7	12.7	6.35	1	1.32	9	75	
			1206QNN-MF	●	12.7	12.7	6.35	0.8	1.394	11.5	88	
			1206QNN-MM	●	12.7	12.7	6.35	0.8	1.394	11.5	88	
			1507ANN-MF	●	15.875	15.875	7.94	0.8	2.36	7.5	45	
			1507ANN-MM	●	15.875	15.875	7.94	0.8	2.36	7.5	45	
			1507ENN-MF	●	15.875	15.875	7.94	1	2.16	11	75	
			1507ENN-MM	●	15.875	15.875	7.94	1	2.16	11	75	
RM8-X		SNMX	140808ANER-MM	●	-	14	6.56	0.8	1.21	5.5	45	
		SAGX	140808ANER-ML	●	-	14	6.56	0.8	1.21	5.5	45	
			140808ANER-MM	●	-	14	6.56	0.8	1.21	5.5	45	
RM14		XNMX	0606XNR-ML	●	14.665	14	6.5	0.8	1.0	3.5	51.4	
			0606XNR-MM	●	14.665	14	6.5	0.8	1.0	3.5	51.4	

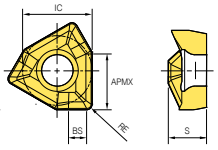
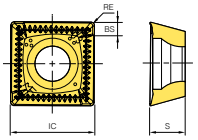
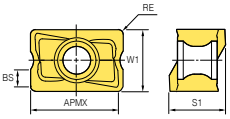
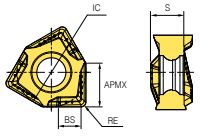
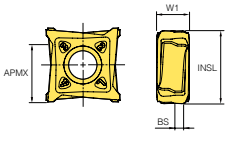
▲: Stock item Europe ●: Stock item Korea ○: Production on demand

Stock items

Type	Picture	Designation		PC6100	Dimension (mm)							Geometry
					INSL	IC/W1	S	RE	BS	APMX	KAPR	
RM16		ONMX	060608-MF	●	-	16	6	0.8	-	4	45	
			060608-MM	●	-	16	6	0.8	-	4	45	
			0606ANN-MF	●	-	16	6	0.8	1.035	4	45	
			0606ANN-MM	●	-	16	6	0.8	1.035	4	45	
			080608-MF	●	-	16	6	0.8	-	4	45	
			080608-MM	●	-	20.2	6	0.8	-	5.5	45	
			0806ANN-MF	●	-	20.2	6	0.8	1.531	5.5	45	
			0806ANN-MM	●	-	20.2	6	0.8	1.531	5.5	45	
		ONHX	060608-MM	●	-	16	6	0.8	-	4	45	
			060608-W	●	-	16	6	0.8	6.036	4	45	
			0606ANN-MF	●	-	16	6	0.8	1.035	4	45	
			0606ANN-MM	●	-	16	6	0.8	1.035	4	45	
			080608-MF	●	-	20.2	6	0.8	-	5.5	45	
			080608-MM	●	-	20.2	6	0.8	-	5.5	45	
			0806ANN-MF	●	-	20.2	6	0.8	1.531	5.5	45	
			0806ANN-MM	●	-	20.2	6	0.8	1.531	5.5	45	
Alpha Mill		APMT	0602PDSR-MM	●	6.79	4.24	2.6	0.4	0.9	6	90	
			0903PDSR-MM	●	10.84	6.21	3.6	0.4	0.9	9.4	90	
			11T3PDSR-MF	●	12.045	6.467	3.6	0.5	1.2	11.2	90	
			11T3PDSR-MM	●	12.045	6.467	3.6	0.5	1.2	11.2	90	
			1604PDSR-MF	●	17.62	9.41	5.76	0.8	1.1	16.4	90	
			1604PDSR-MM	●	17.62	9.41	5.76	0.8	1.1	16.4	90	
			1806PDSR-MF	●	18.7	10.98	6.35	0.8	2.2	17.4	90	
			1806PDSR-MM	●	18.7	10.98	6.35	0.8	2.2	17.4	90	
Alpha Mill-X		ADKT	10T304PEER-ML	●	11.7	6.424	3.819	0.4	0.96	9.5	90	
			10T304PESR-MM	●	11.7	6.424	3.819	0.4	0.96	9.5	90	
			120408PESR-ML	●	14.5	7.813	4.824	0.8	1.71	11.5	90	
			120408PESR-MM	●	14.5	7.813	4.824	0.8	1.71	11.5	90	
			120412PESR-MM	●	14.5	7.813	4.824	1.2	1.21	11.5	90	
			120416PESR-MM	●	14.5	7.813	4.824	1.6	0.85	11.5	90	
			170608PESR-ML	●	19.665	10.843	6.529	0.8	3.5	16.5	90	
			170608PESR-MM	●	19.665	10.843	6.529	0.8	3.3	16.5	90	
Triple Milll		TNKT	110508PESR-MM	●	8	8	4.5	0.8	1.299	8	90	
			160608PESR-MM	●	11.5	11.7	5.5	0.8	1.517	11.5	90	
			200708PESR-MM	●	15.5	14.5	7	0.8	2	15.5	90	
RM3		XNKT	060405PNER-ML	●	-	6.5	4	0.5	1.3	5.7	90	
			060405PNSR-MM	●	-	6.5	4	0.5	1.3	5.7	90	
			060408PNER-ML	●	-	6.5	4	0.8	1.1	5.7	90	
			060408PNSR-MM	●	-	6.5	4	0.8	1.1	5.7	90	
			080508PNER-ML	●	-	10	5.5	0.8	2.2	8.2	90	

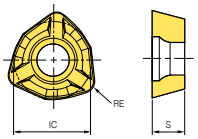
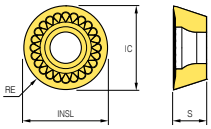
▲: Stock item Europe ●: Stock item Korea ○: Production on demand

Stock items

Type	Picture	Designation		PC6100	Dimension (mm)							Geometry
					INSL	IC/W1	S	RE	BS	APMX	KAPR	
RM3		XNKT	080508PNSR-MM	●	-	10	5.5	0.8	2.2	8.2	90	
			120608PNER-ML	●	-	13	6.5	0.8	2.76	12	90	
			120608PNSR-MM	●	-	13	6.5	0.8	2.76	12	90	
FMP		SDXT	09M405L-MM	●	-	9.525	3.923	0.5	0	7	90	
			09M405R-MF	●	-	9.525	3.923	0.5	0	7	90	
			09M405R-MM	●	-	9.525	3.923	0.5	0	7	90	
			130508R-MF	●	-	13.5	5.56	0.8	0	11	90	
			130508R-MM	●	-	9.525	3.923	0.3	0	7	90	
RM4		LNEX	100605PNL-MM	●	9	6.5	6.5	0.5	1.7	9	90	
			100605PNR-MF	●	9	6.5	6.5	0.5	1.7	9	90	
			100605PNR-MM	●	9	6.5	6.5	0.5	1.7	9	90	
			100608PNR-MM	●	9	6.5	6.5	0.8	1.4	9	90	
			151004PNR-MF	●	14	10	10	0.4	3.1	14	90	
			151004PNR-MM	●	14	10	10	0.4	3.1	14	90	
			151008PNL-MM	●	14	10	10	0.8	2.7	14	90	
			151008PNR-MF	●	14	10	10	0.8	2.7	14	90	
			151008PNR-MM	●	14	10	10	0.8	2.7	14	90	
			151016PNR-MF	●	14	10	10	1.6	1.9	14	90	
		LNMX	100605PNL-MM	●	9	6.5	6.5	0.5	1.7	9	90	
			100605PNR-MF	●	9	6.5	6.5	0.5	1.7	9	90	
			100605PNR-MM	●	9	6.5	6.5	0.5	1.7	9	90	
			100608PNR-MF	●	9	6.5	6.5	0.8	1.4	9	90	
			151004PNR-MF	●	14	10	10	0.4	3.1	14	90	
			151004PNR-MM	●	14	10	10	0.4	3.1	14	90	
			151008PNR-MF	●	14	10	10	0.8	2.7	14	90	
			151008PNR-MM	●	14	10	10	0.8	2.7	14	90	
			151016PNR-MF	●	14	10	10	1.6	1.9	14	90	
			151016PNR-MM	●	14	10	10	1.6	1.9	14	90	
RM6		WNGX	040304PNER-ML	●	-	7	3.46	0.4	1.6	4.3	90	
			040304PNSR-MM	●	-	7	3.46	0.4	1.6	4.3	90	
			080608PNER-ML	●	-	13	6.4	0.8	3.7	8.2	90	
			080608PNSR-MM	●	-	13	6.4	0.8	3.7	8.2	90	
TP8P		SOKX	1406XPNR-ML	●	14.47	12.05	6.56	0	1.35	11	90	
			140608PNR-ML	●	14.47	12.05	6.56	0.8	1.69	11	90	

▲: Stock item Europe ●: Stock item Korea ○: Production on demand

Stock items

Type	Picture	Designation		PC6100	Dimension (mm)							Geometry
					INSL	IC	S	RE	BS	APMX	KAPR	
HRM		WDKT	080316ZDSR-MH	●	1	8	3.18	1.6	-	1	15	
			10T320ZDSR-MH	●	1.5	10	3.97	2	-	1.5	15	
			130520ZDSR-MH	●	2	13	5.56	2	-	2	15	
			150625ZDSR-MH	●	2.5	15	6.35	2.5	-	2.5	15	
FMR		RDKT	10T3M0-MM	●	-	10	3.97	-	-	-	-	
			1204M0-MM	●	-	12	4.76	-	-	-	-	

▲: Stock item Europe ●: Stock item Korea ○: Production on demand

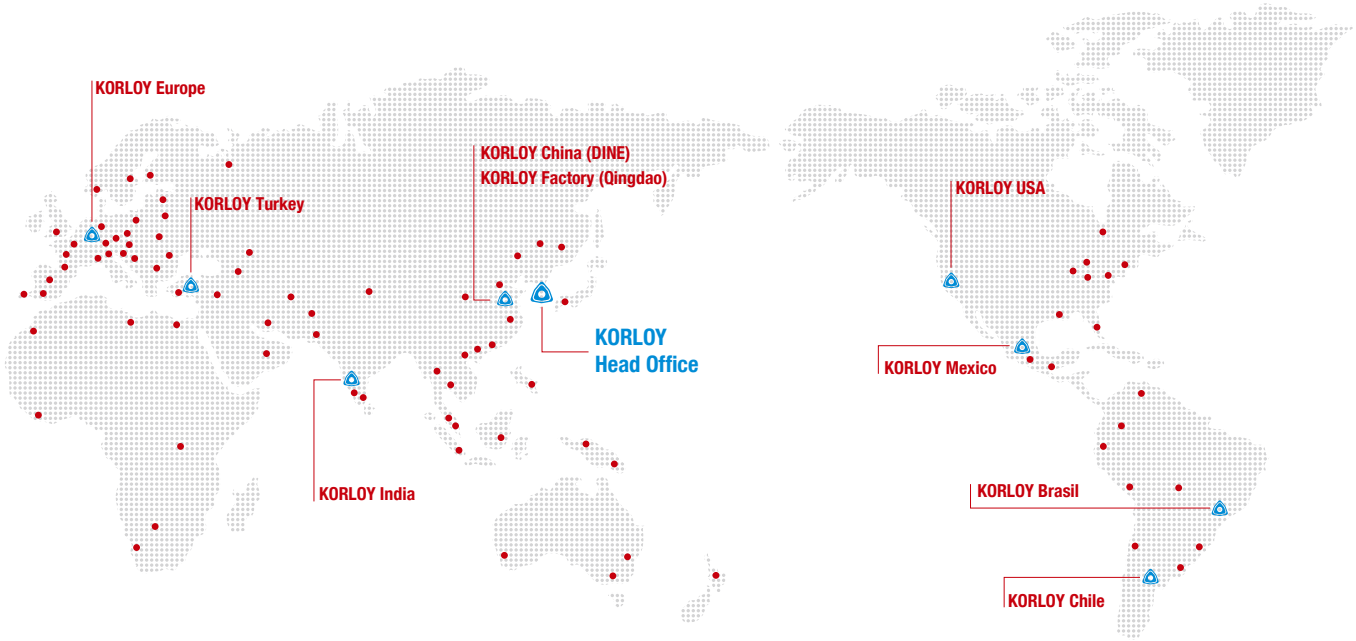
⚠ For the safe metalcutting

- Use safety supplies such as protective gloves to prevent possible injury while touching the edge of tools.
- Use safety glasess or safety cover to hedge possible dangers. Inappropriate usage or excessive cutting condition may lead tool's breakage or even the fragment's scattering.
- Clamp the workpiece tightly enough to prevent its movement while its machining.

Properly manage the tool change phase because the inordinately used tool can be easily broken under the excessive cutting load or severe wear, and it may threat the operator's safety.

- Use safety cover because chips evacuated during cutting are hot and sharp and may cause burns and cuts. To remove chips safely, stop machining, put on protective gloves, and use a hook or other tools.
- Prepare for fire prevention measures as the use of the non-water soluble cutting oil may cause fire.
- Use safety cover and other safety supplies because the spare parts or the inserts can be pulled out due to centrifugal force while high speed machining.

Notes



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