

PC3700



Milling Inserts for Steel

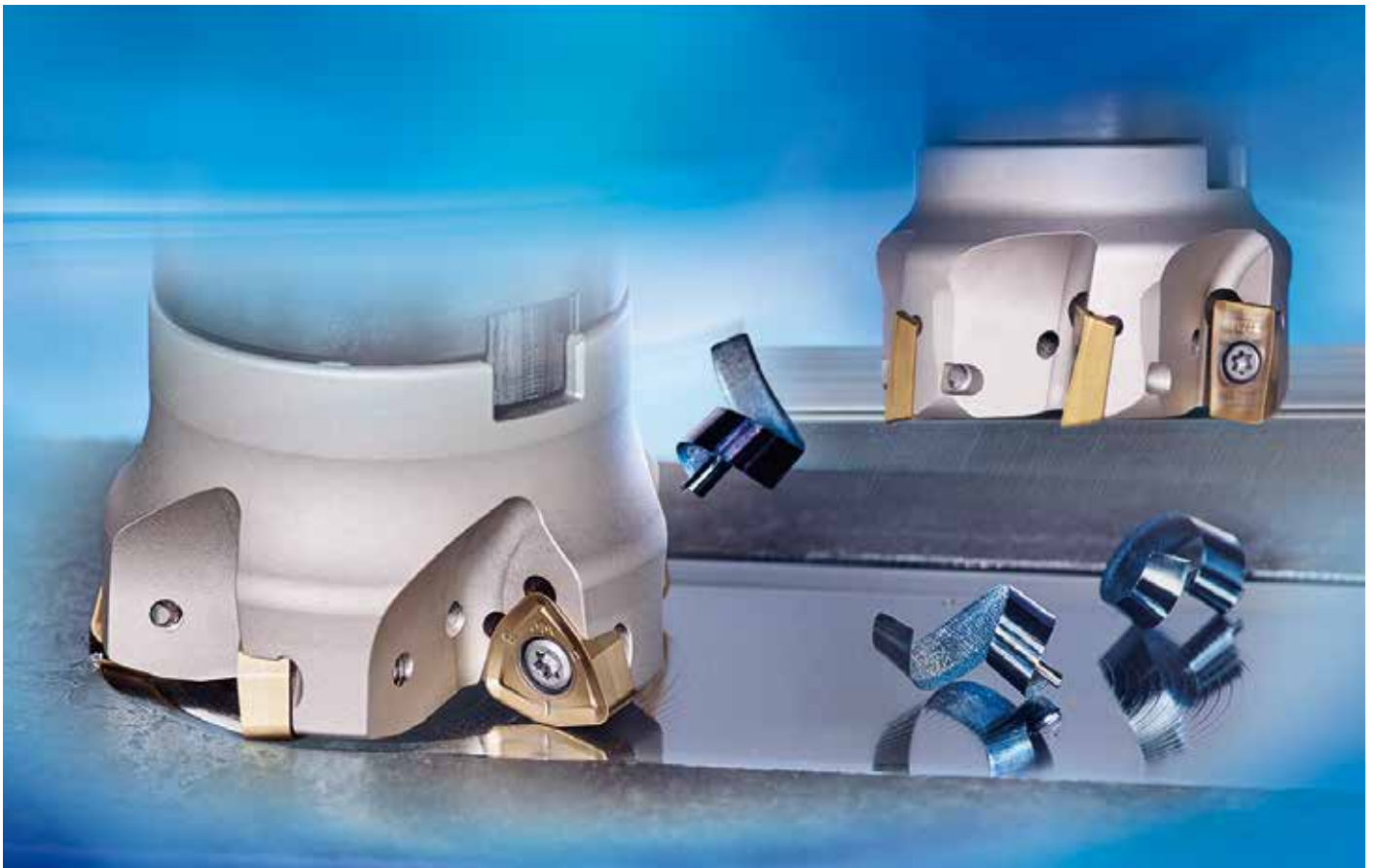
Milling grade specialized for steel.

- **High Feed and Speed Capability for Increased Productivity**

Excellent chip removal rate due to a tough substrate specialized for steel, and lubricative PVD coating of high-hardness

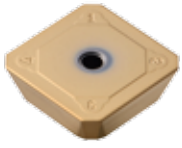
- **Excellent Tool Life**

A highly chipping-resistant grade for minimized deviation and extended tool life under various cutting conditions



PVD-Coated Insert Specialized for Milling Applications of Steel

PC3700



PC3700

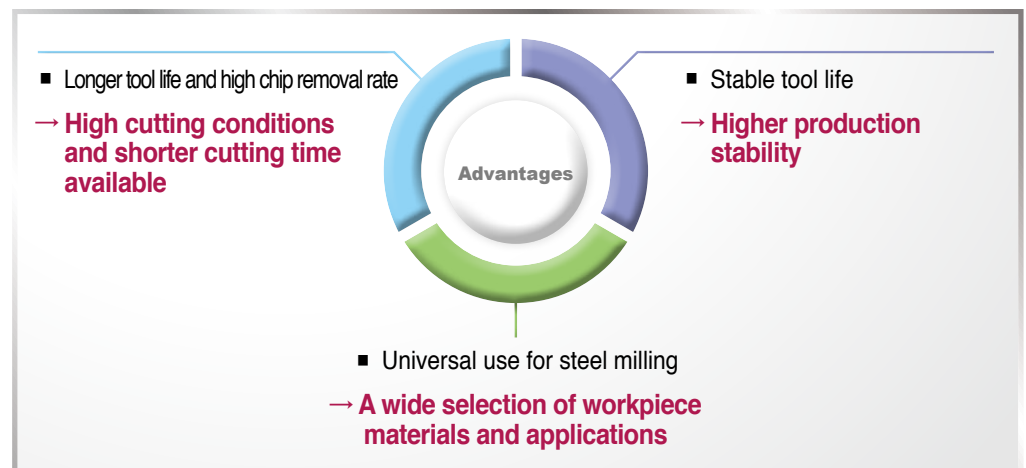
For general steel
milling

In general, the relief and ramped surfaces of tools get easily worn out when milling steel at high speeds. Also, chipping and tool breakage problems are frequently caused in deep milling at high feeds. Often in high-speed continuous machining, plastic deformation occurs. On the other hand, thermal cracking occurs in interrupted machining at high speeds, or in wet applications. Both lead to extremely reduced tool life. In addition, build-up edges tend to be formed when machining easily welded workpieces, which decreases tool life and lowers surface finish of workpieces. As such, it is hard to expect the life of insert considering various machining factors when it comes to the milling applications of steel.

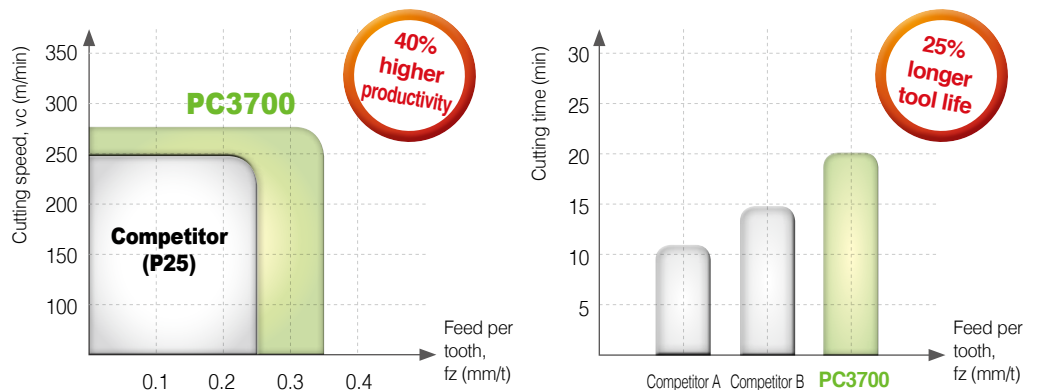
KORLOY newly developed PC3700, a unique milling grade specialized for steel to provide advanced performance and satisfactory efficiency. Compared to the existing PC3500 and PC3600 grades, the resistance of PC3700 to chipping and breakage has been significantly improved, and it ensures extended tool life as well as high productivity and stability.

The PC3700 features hard and lubricative coating with smooth surface so that chips can be evacuated easily at high speeds, and the wear of ramped and relief surfaced will be significantly reduced. It also has minimized build-up edge issues to prevent chipping and improve surface finish. As a highly tough substrate specialized for steel cutting, PC3700 inhibits thermal cracking in the interrupted or wet machining process. Furthermore, it provides great chipping and breakage resistance at high depth of cuts and high feeds, or under heavy cutting loads including pre-hardened steel machining.

PC3700 provides outstanding machining efficiency and production stability due to the stable tool life for every milling process from high-speed, high-feed and deep machining to continuous or interrupted machining of various steel workpieces.



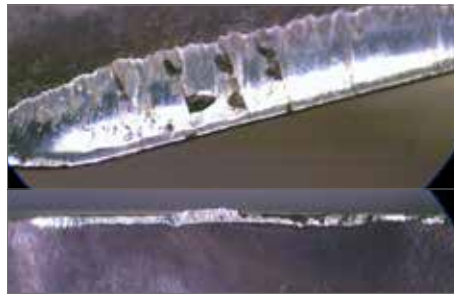
➡ Application Range



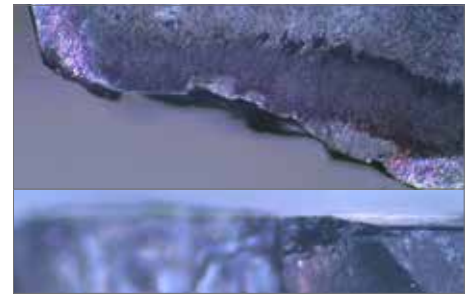
➡ Common Problems When Milling Steel

- Excessive wear at high speeds due to friction between tools and hot long chips
- Frequent breakage of cutting edges in high-feed machining, deep milling or mill scale machining

1. Excessive wear

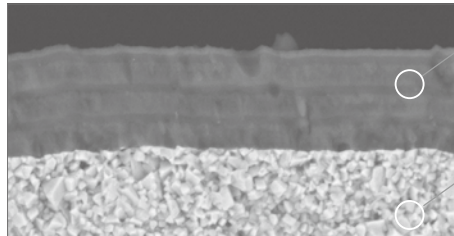


2. Unexpected breakage



➡ Development of PC3700

Substrate for general milling applications of steel and PVC coating treatment

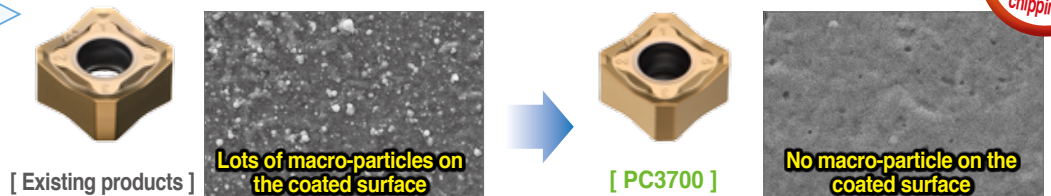


- Stronger resistance to welding and chipping due to the multi-layer coating technology with high hardness and lubricating treatment
- Ensuring general machinability due to wear and breakage resistant materials optimized for milling applications of steel

Excellent wear resistance and stable tool life

- Smooth surface due to special surface treatment
- Smooth chip evacuation, improved chipping resistance and surface finish of the workpiece

Special coating surface treatment



Stronger resistance to welding and chipping

[Evaluation of wear resistance]

- **Workpiece**
C45
- **Cutting conditions**
vc (m/min) = 210
fz (mm/t) = 1.45
ap (mm) = 1
ae (mm) = 20
- **Tools**
WNMX130520ZNN-MM
HRMDCM13063HR-5

[Evaluation of breakage resistance]

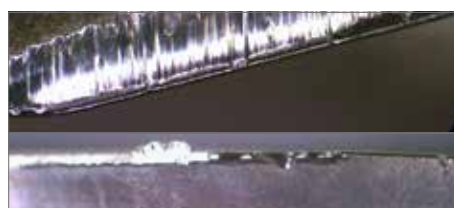
- **Workpiece**
42CrMo4
- **Cutting conditions**
vc (m/min) = 200
fz (mm/t) = 0.35
ap (mm) = 2
ae (mm) = 100
- **Tools**
SPKN1504EDSR-SU
EPNM5125R

➡ Development Effects

1. Higher wear resistance

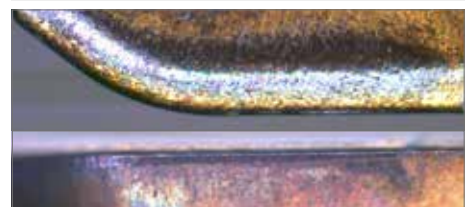


[PC3700]

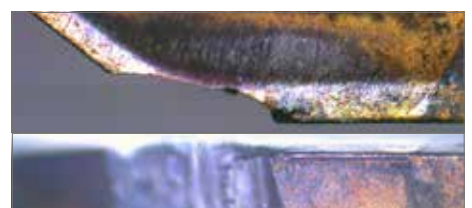


[Existing products]

2. Less unexpected breakage



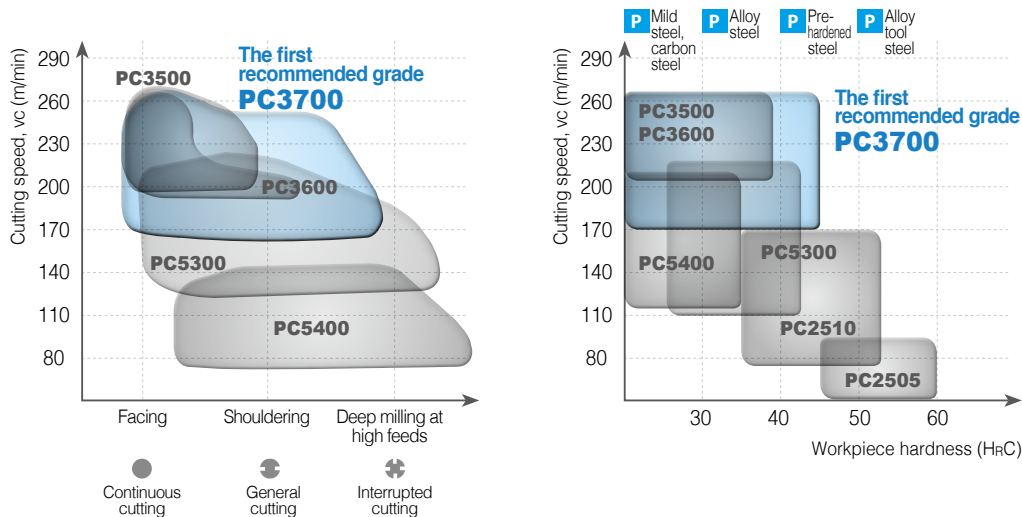
[PC3700]



[Competitor]

➤ Guideline for Grades Application

P Recommended grades and cutting conditions for p-type milling application



➤ Recommended Cutting Conditions

Workpiece			ISO (DIN *)	AISI	KS	Hardness (HRC)	Cutting conditions	
							vc (m/min)	fz (mm/t)
P	Carbon steel	Low carbon steel	C15E4 C25 C35	1015 1025 1035	SM15C SM25C SM35C	Lower than 10	100 - 200 - 300	Ⓕ 0.1 - 0.2 - 0.3 Ⓖ 0.1 - 0.2 - 0.3 Ⓗ 1.0 - 1.5 - 2.0
		High carbon steel	C45 C60 1SMn28	1045 1059 1213	SM45C SM58C SUM22	10 - 30	100 - 200 - 300	Ⓕ 0.1 - 0.2 - 0.3 Ⓖ 0.1 - 0.2 - 0.3 Ⓗ 1.0 - 1.5 - 2.0
	Alloy steel	Low alloy steel	- 42CrMo4 -	- 4140 -	SCM4105 SCM440 SCMnH1	Lower than 27	100 - 175 - 250	Ⓕ 0.1 - 0.2 - 0.3 Ⓖ 0.1 - 0.2 - 0.3 Ⓗ 1.0 - 1.5 - 2.0
		High alloy steel	210Cr12 X40CrMoV5-1 105V	D3 H13 W2-9 1/	STD1 STD61 STS43	Lower than 27	100 - 175 - 250	Ⓕ 0.1 - 0.2 - 0.3 Ⓖ 0.1 - 0.2 - 0.3 Ⓗ 1.0 - 1.5 - 2.0
	Die steel	General die steel	1.1210 (Improved) * 1.2738 (Improved) * X40CrMoV5-1	1050 (Improved) P20 (Improved) H13	KP1 KP4(M) SKD61	Lower than 40	100 - 175 - 250	Ⓕ 0.1 - 0.2 - 0.3 Ⓖ 0.1 - 0.2 - 0.3 Ⓗ 0.4 - 0.6 - 0.8
		Easily welding die steel	X100CrMoV5 1 * 10Ni3MnCuAl X30Cr13	D2 P21 (Improved) 420	SKD11 NAK80 STAVAX	Lower than 40	50 - 100 - 150	Ⓕ 0.1 - 0.15 - 0.25 Ⓖ 0.1 - 0.2 - 0.3 Ⓗ 0.4 - 0.6 - 0.8

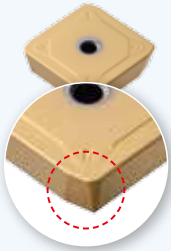
• Ⓕ Facing • Ⓖ Shouldering • Ⓗ High feed

➤ Grade Comparison

ISO	KORLOY	Competitor A	Competitor B	Competitor C	Competitor D	Competitor E	Competitor F
P25 ~ P35	PC3700 New PC3500 PC3600	MP3000	ACP200	IC380 IC950	PX0020	TT7080	DC9320 DC9300
P45	PC5300	F30M	ACP300	IC908	PR1125 PR1325	TT9030 TT9080	DP5320

Performance Evaluation

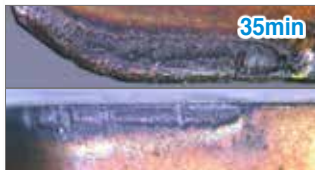
• Insert : SPKN-SU



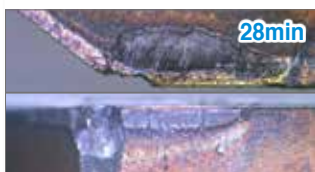
PC3700 Performance Evaluation (Mill-max)

- Workpiece C45
- Cutting conditions vc (m/min) = 250, fz (mm/t) = 0.2, ap (mm) = 2, ae (mm) = 100
- Tool Insert SPKN1504EDSR-SU
Holder EPNM5125R

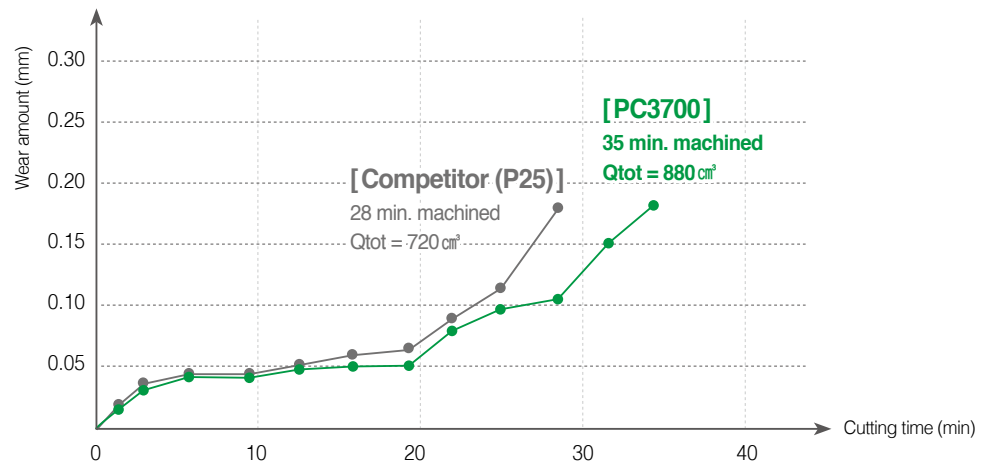
Chip removal rate (Q) = 25.5 cm³/min



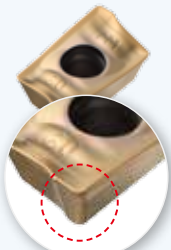
[PC3700]



[Competitor]



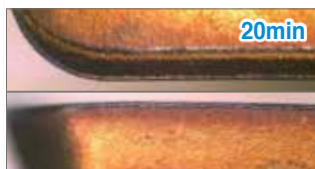
• Insert : APMT-MM



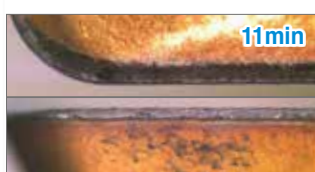
PC3700 Performance Evaluation (Alpha Mill)

- Workpiece 42CrMo4
- Cutting conditions vc (m/min) = 250, fz (mm/t) = 0.2, ap (mm) = 10, ae (mm) = 10
- Tool Insert APMT1604PDSR-MM
Holder AMCM3063HS

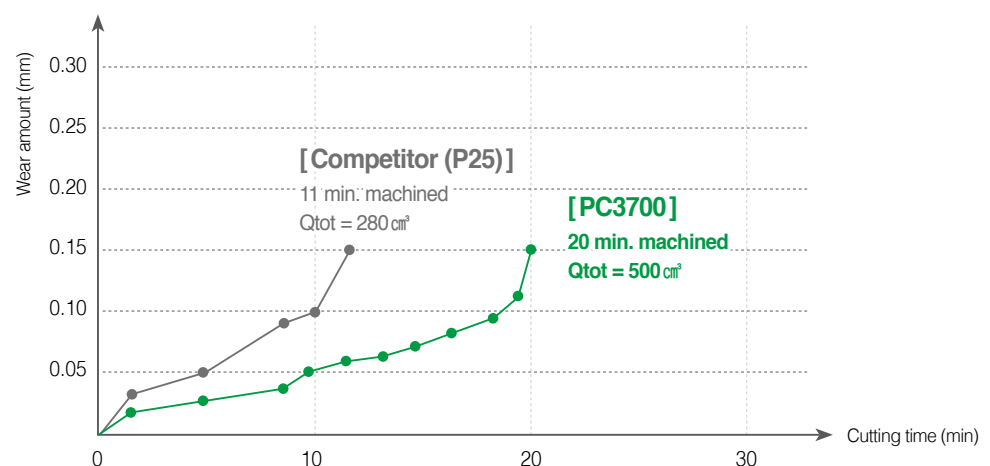
Chip removal rate (Q) = 25.3 cm³/min



[PC3700]

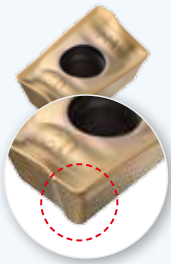


[Competitor]



Performance Evaluation

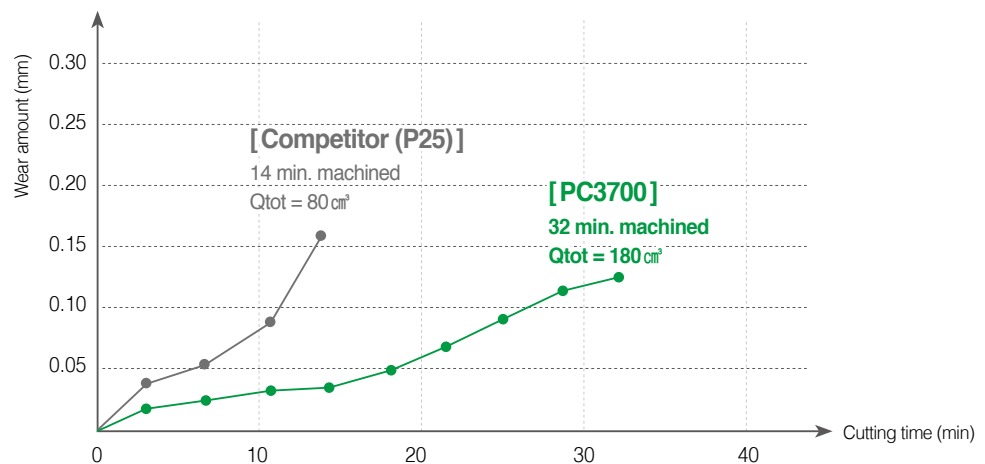
• Insert : APMT-MM



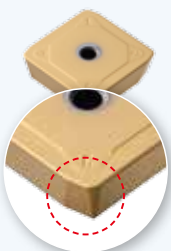
PC3700 Performance Evaluation (Alpha Mill)

- Workpiece 10Ni3MnCuAl
- Cutting conditions vc (m/min) = 110, fz (mm/t) = 0.2, ap (mm) = 10, ae (mm) = 5
- Tool Insert APMT1604PDSR-MM
Holder AMCM3063HS

Chip removal rate (Q) = 5.6 cm³/min



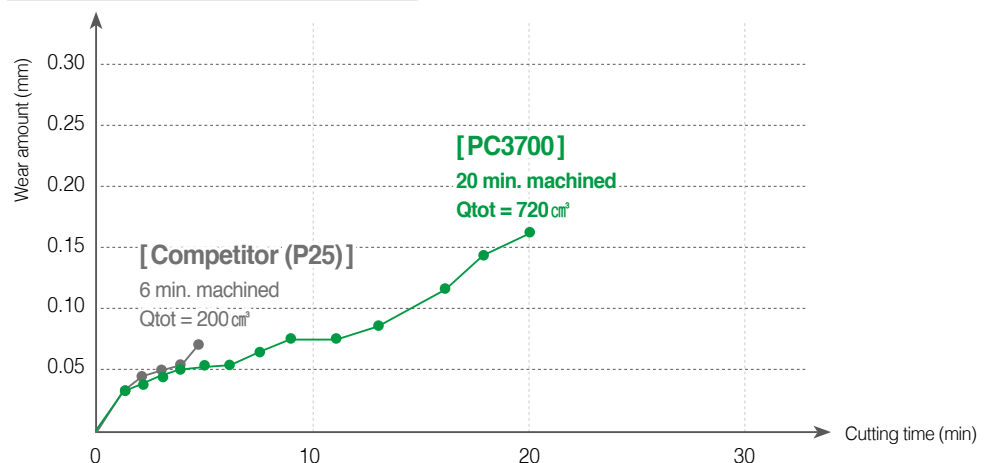
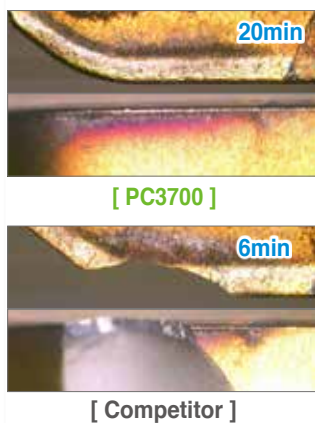
• Insert : SPKN-SU



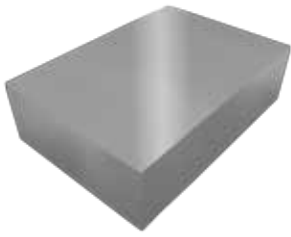
PC3700 Performance Evaluation (Mill-max)

- Workpiece 42CrMo4
- Cutting conditions vc (m/min) = 200, fz (mm/t) = 0.35, ap (mm) = 2, ae (mm) = 100
- Tool Insert SPKN1504EDSR-SU
Holder EPNM5125R

Chip removal rate (Q) = 35.7 cm³/min



➔ Application Examples



Die

- Workpiece 1.2738 (Improved) * (Mill scale) 1200 (w) x 1700 (l) x 490 (h)
- Cutting conditions vc (m/min) = 60, fz (mm/t) = 0.2~0.65, ap (mm) = 4.0, ae (mm) = 250, dry
- Tool Insert : SDKN1504AESN-SU (PC3700)
Holder : ADN5250R

PC3700

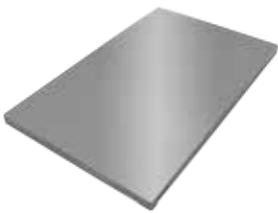
160% / Tool life

Competitor

100% / Tool life



➔ 60% longer tool life compared to the competitor



Die

- Workpiece C45 (Diaphragm, oxygen parting), 410 (w) x 640 (l) x 25 (h)
- Cutting conditions vc (m/min) = 40, fz (mm/t) = 0.12, ap (mm) = 3.0, ae (mm) = 160, dry
- Tool Insert : SDKN1504AESN-SU (PC3700)
Holder : ADN5250R

PC3700

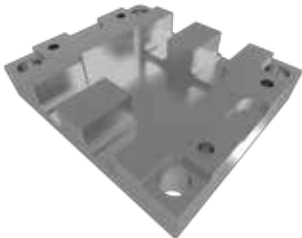
150% / Tool life

Competitor

100% / Tool life



➔ 50% longer tool life compared to the competitor



Die mold

- Workpiece 1.2738 (Improved) *
- Cutting conditions vc (m/min) = 140, fz (mm/t) = 1.27, ap (mm) = 1.3, ae (mm) = 50, dry
- Tool Insert : WNMX130520ZNN-MM (PC3700)
Holder : HRMDCM13063HR-5

PC3700

200% / Tool life

Competitor

100% / Tool life



➔ 100% longer tool life compared to the competitor



Automotive components

- Workpiece C45
- Cutting conditions vc (m/min) = 200, fz (mm/t) = 0.12, ap (mm) = 0.21, dry
- Tool Insert : APMT1604PDSR-MM (PC3700)
Holder : AMCM3040HS

PC3700

160% / Tool life

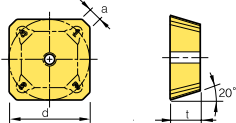
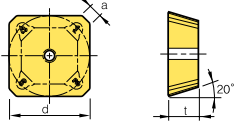
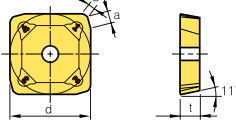
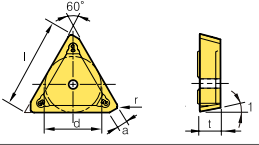
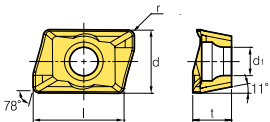
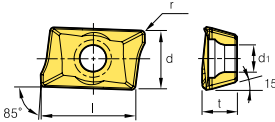
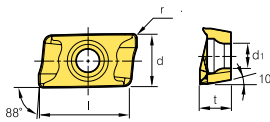
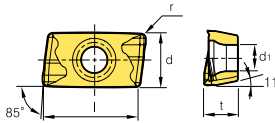
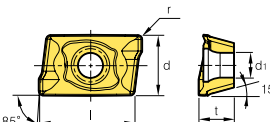
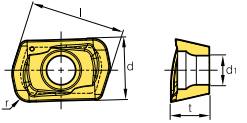
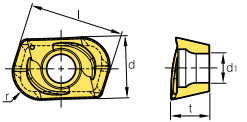
Competitor

100% / Tool life

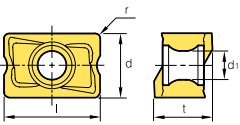
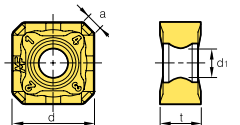
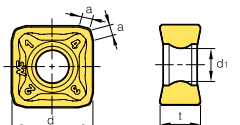
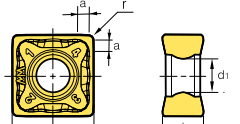
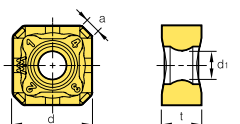
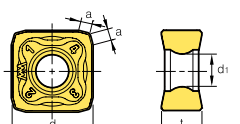
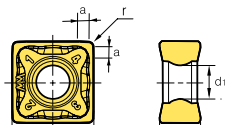
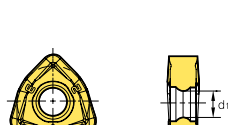


➔ 60% longer tool life compared to the competitor

* German(DIN)

Type	Designation			Coated	Dimensions (mm)							Figure
				PC3700	l	d	t	r	d ₁	a	b	
ISO		SDKN	1203AESN-SU	●	-	12.7	3.18	-	-	2.08	-	
			1504AESN-SU	●	-	15.875	4.76	-	-	2.10	-	
		SEKN	1203AFSN-SU	●	-	12.7	3.18	-	1.98	-	-	
			1504AFSN-SU	●	-	15.875	4.76	-	2.04	-	-	
		SPKN	1203EDSR-SU	●	-	12.7	3.18	-	-	1.66	0.92	
			1504EDSR-SU	●	-	15.875	4.76	-	-	1.62	0.93	
		TPKN	1603PDSR-SU	●	16.5	9.525	3.18	1.0	-	1.70	-	
			2204PDSR-SU	●	22.0	12.7	4.76	1.0	-	1.91	-	
Alpha Mill		APMT	0602PDSR-MM	●	6	4.24	2.6	0.2	2.0	-	-	
			0903PDSR-MM	●	9.4	6.21	3.6	0.4	2.8	-	-	
			11T3PDSR-MM	●	11.2	6.467	3.6	0.5	2.85	-	-	
			1604PDSR-MM	●	16.4	9.41	5.76	0.8	4.5	-	-	
			1806PDSR-MM	●	17.4	10.98	6.35	0.8	4.5	-	-	
HFM		LPMT	040210R-MF	●	6.4	4.2	2.6	1.0	2.0	-	-	
			040220R-MF	●	6.4	4.2	2.6	2.0	2.0	-	-	

● : Stock item

Type	Designation			Coated	Dimensions (mm)							Figure
				PC3700	l	d	t	r	d ₁	a	f	
RM4		LNMX	100608PNR-MM	●	10.0	6.5	6.5	0.8	3.5	-	-	
			151008PNR-MM	●	15.0	10.0	10.0	0.8	4.5	-	-	
RM8		SNMX	1206ANN-MF	●	-	12.7	6.35	-	4.5	2.35	-	
			1507ANN-MF	●	-	15.875	7.94	-	5.6	3.15	-	
		SNMX	1206ENN-MF	●	-	12.7	6.35	-	4.5	1.82	-	
			1507ENN-MF	●	-	15.875	7.94	-	5.6	2.66	-	
		SNMX	1206QNN-MF	●	-	12.7	6.35	-	5.2	2.36	-	
RM8		SNMX	1206ANN-MM	●	-	12.7	6.35	-	4.5	2.36	-	
			1507ANN-MM	●	-	15.875	7.94	-	5.6	3.15	-	
		SNMX	1206ENN-MM	●	-	12.7	6.35	-	5.2	1.85	-	
			1507ENN-MM	●	-	15.875	7.94	-	5.6	2.66	-	
		SNMX	1206QNN-MM	●	-	12.7	6.35	-	4.5	2.36	-	
HRMD		WNMX	060312ZNN-MM	●	-	6.35	3.18	1.2	2.86	-	1.2	
			09T316ZNN-MM	●	-	9.525	3.97	1.6	3.6	-	1.7	
			130520ZNN-MM	●	-	12.7	5.56	2.0	4.7	-	2.5	
			160720ZNN-MM	●	-	16.0	7.0	2.0	5.8	-	3.0	

● : Stock item

www.korloy.com



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