THE NEW VALUE FRONTIER

KYOCERA

고능률 페이스밀 High-Efficiency Facemill

MFPN형

저저항과 우수한 내결손성을 겸비 Low cutting force and excellent fracture resistance

5개의 특징 Five Advantages of BIG Pentagon

1. 5각형 / 10코너 팁의 황삭 범용 커터
   Roughing and general-purpose facemill with pentagonal and 10-cornered inserts
2. 헬리컬 절삭날 구조로 저저항
   Low cutting force due to helical cutting-edge design
3. 더블에지 구조로 결손을 억제
   Fractures suppressed with double-edge position
4. 3차원 브레이커로 칩처리 개선
   Chip evacuation improved with 3-dimensional chipbreaker
5. 메가코팅으로 긴 수명
   Long tool life with MEGACOAT carbide (MEGA coated carbide)

MFPN형 엔드밀
MFPN endmill with shank
신개발 Now on Sale

NEW

주철용 KPN형

1. MFPN의 성능을 유지하며 간편한 조작의 클램프 타입 채택
2. 와이퍼 인서트 적용으로 면조도 대폭 향상
3. 고이송용 타입도 레파토리화

신 브레이커
NEW chipbreaker

GL브레이커

ADVANCING PRODUCTIVITY

생산성 향상에 기여하는 교세라

빅 파이브
BIG 5
BIG 5 (Pentagon)

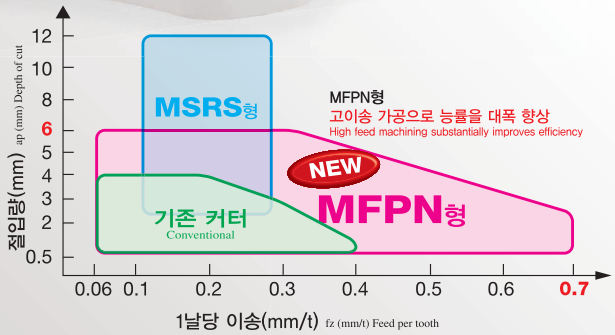
새로운 시대의 개척

5개의 특징 Five Advantages of BIG Pentagon

Pioneering a new era

1 5각형 / 10코너 팁의 황삭 범용 커터
Roughing and general-purpose facemill with pentagonal and 10-cornered inserts

고경제성 Economical



■구속안정성이 우수한 5각형 팁 양면 사양
Pentagonal double-sided tip excellent for constraining stability

■ 10코너 사양으로 코너당의 비용을 절감
10-cornered insert cuts cost per corner

2면 구속
Two-face restraint

절입각 45°
Cutting edge angle

주절삭날에 대면하는 2면 구속 방식 ⇨ 정도 안정
Highly stabilized accuracy due to two-face constraint facing the major cutting edge

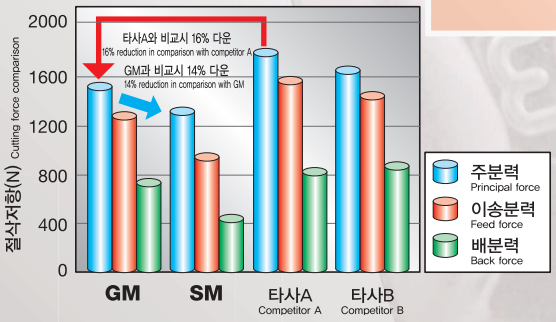
2 헬리컬 절삭날 구조로 저저항
Low cutting force due to helical cutting-edge design

신설계 New design

■저저항 헬리컬 절삭날로 떨림억제
Helical cutting-edge design with low cutting force reduces chattering

■헬리컬 절삭날 구조 Helical cutting-edge design
·A.R.최대 +10° 확보 High rake angle (A.R. Max. +10°)

●절삭저항 비교 Cutting force comparison



●절삭조건 Cutting conditions
피삭재 Workpiece : S50C
Vc=150m/min, fz=0.1mm/t, apxae=5x105 mm, 머신 Machine : M/C(BT50)

3 더블에지 구조로 결손을 적게
Fractures suppressed with double-edge position

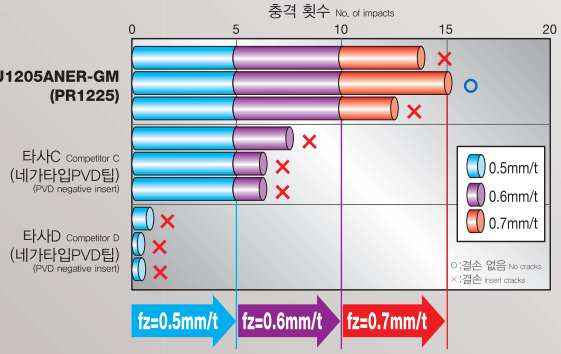
고강도 Toughness

■더블에지 구조 Double-edge position

제1주절삭날이 칩을 얇게 생성하여 충격부를 낮추고, 초기 절입시의 진동을 대폭 감소
Major cutting edge makes chips thin, thereby reducing impact load at entrance and exit of workpiece

더블에지 구조
Double-edge position

●내결손성 비교 Fracture resistance comparison



●절삭조건 Cutting conditions
워크 Workpiece : SCM440(38~42HS)
머신 Machine : BT50 M/C
Vc=100m/min, fz=0.5~0.7mm/t,
apxae=2x100mm(폭 20mm 홈) workpiece with 20mm width slot

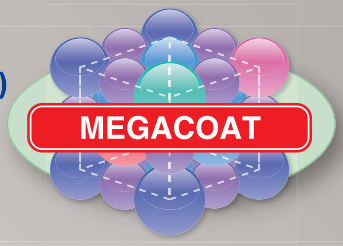
고능률 페이스밀

MFPN형

Milling-**F**acing **P**e**N**tagonal type

5 MEGACOAT로 긴 수명

Long tool life with MEGACOAT carbide (MEGA coated carbide)



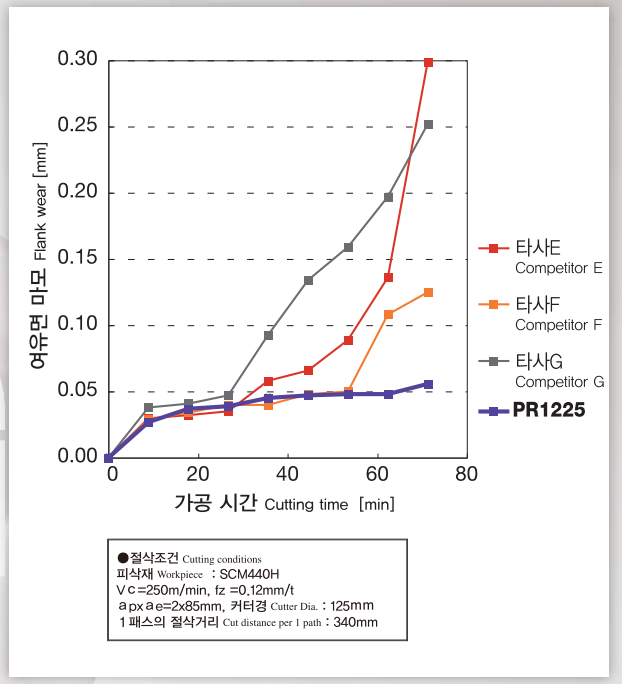
신재종 New grades

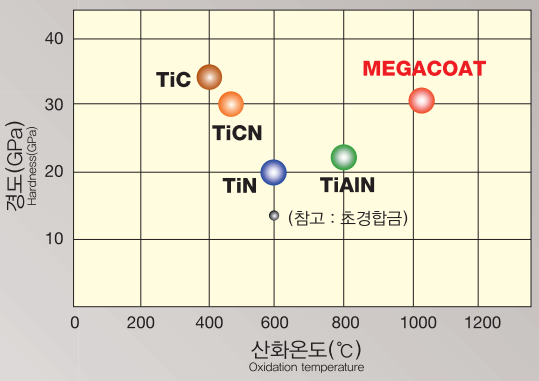
■MEGACOAT

· 고정도/높은 내산화성으로 긴 수명·고속가공을 실현

Long tool life and high-speed milling due to high hardness and high oxidation resistance

● 내마모성 비교 Wear comparison





팁 재종 Insert grades	적용 피삭재 Workpiece
PR1225	강 / SUS Steel/Stainless steel
PR1210	주철 / 티탄 Cast iron/Titanium alloy

4 3차원 브레이커로 칩처리 개선

3-dimensional chipbreaker improves chip evacuation

NEW브레이커 New chipbreaker

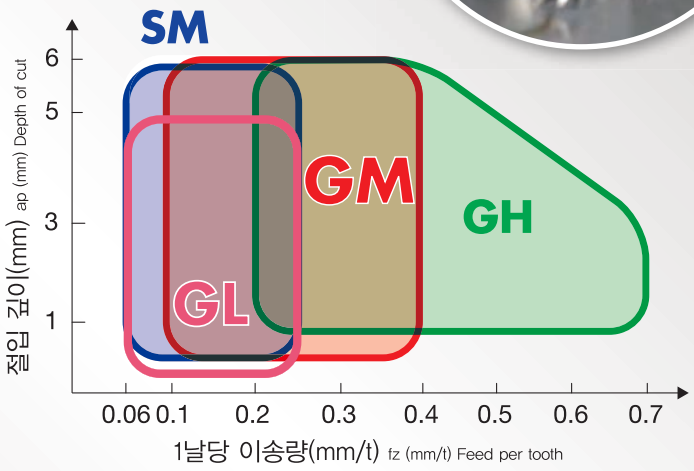
■부드러운 칩 배출로 칩의 엉킴을 억제

Smooth chip evaluation reduces chip-biting

· 4종류의 브레이커로 폭 넓은 가공조건에 대응

4-types of chipbreakers enable coverage of a wide range of milling conditions

브레이커 Chipbreaker	용도 Applications	형상 Shape
GM	범용 General	
SM	저저항용 Low cutting force	
GH	중절삭용 Heavy milling	
NEW GL	정삭면 중시 Heavy milling	



■MFPN45형

경사각(°) Rake Angle(°)	A.R.	R.R.
	max +10°	øD=63 -10° øD=80 -8° øD=100-250 -6°

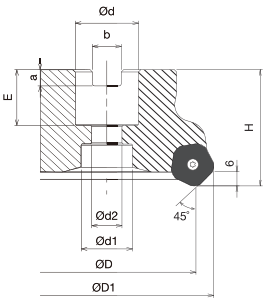


Fig.1

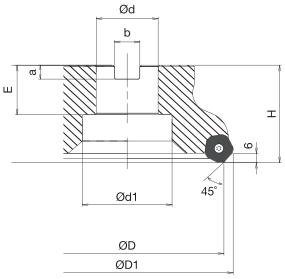


Fig.2

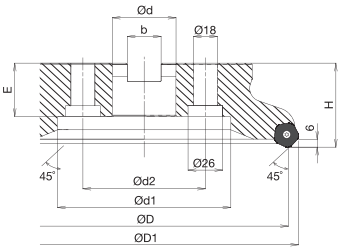


Fig.3

● 홀더 치수 Holder Dimension

규격 Description			재고 Stock	날수 No.of Insert	치수(mm) Dimension(mm)									형상 Shape	무게 (kg) Weight (kg)	시트 Shim
					øD	øD1	ød	ød1	ød2	H	E	a	b			
인치사양 Bore Dia. Inch spec	코스피치 Coarse pitch	MFPN 45080R-5T	●	5	80	93	25.4	22	13	50	27	6	9.5	Fig.1	1.1	유 Yes
		45100R-6T	●	6	100	113	31.75	48	-		32	8	12.7		1.4	
		45125R-7T	●	7	125	138	38.1	58		63	36	10	15.9	Fig.2	2.6	
		45160R-8T	●	8	160	173	50.8	72			38	11	19.1		4.0	
		45200R-10T	●	10	200	213	47.625	110	101.6		40	14	25.4	Fig.3	6.7	
		45250R-12T	●	12	250	263									9.4	
	크로스피치 Cross pitch	MFPN 45080R-6T	●	6	80	93	25.4	22	13	50	27	6	9.5	Fig.1	1.1	-
		45100R-8T	●	8	100	113	31.75	48	-		32	8	12.7		1.4	
		45125R-10T	●	10	125	138	38.1	58		63	36	10	15.9	Fig.2	2.7	
		45160R-12T	●	12	160	173	50.8	72			38	11	19.1		4.0	
		45200R-14T	●	14	200	213	47.625	110	101.6		40	14	25.4	Fig.3	6.9	
		45250R-16T	●	16	250	263									9.6	
	엑스트라 크로스피치 Extra cross pitch	MFPN 45080R-8T	●	8	80	93	25.4	22	13	50	27	6	9.5	Fig.1	1.1	-
		45100R-10T	●	10	100	113	31.75	48	-		32	8	12.7		1.3	
		45125R-13T	●	13	125	138	38.1	58		63	36	10	15.9	Fig.2	2.7	
		45160R-16T	●	16	160	173	50.8	72			38	11	19.1		4.0	
		45200R-18T	●	18	200	213	47.625	110	101.6		40	14	25.4	Fig.3	6.9	
		45250R-20T	●	20	250	263									9.6	
미리사양 mm spec	코스피치 Coarse pitch	MFPN 45063R-4T-M	●	4	63	76	22	19	11	40	21	6.3	10.4	Fig.1	0.5	유 Yes
		45080R-5T-M	●	5	80	93	27	22	13	50	24	7	12.4		1.1	
		45100R-6T-M	●	6	100	113	32	48	-		30	8	14.4	Fig.2	1.4	
		45125R-7T-M	●	7	125	138	40	58		63	32	9	16.4		2.6	
		45160R-8T-M	●	8	160	173		68	66.7					Fig.3	3.8	
		45200R-10T-M	●	10	200	213	60	110	101.6		40	14	25.7		6.4	
		45250R-12T-M	●	12	250	263									9.1	
	크로스피치 Cross pitch	MFPN 45063R-5T-M	●	5	63	76	22	19	11	40	21	6.3	10.4	Fig.1	0.5	-
		45080R-6T-M	●	6	80	93	27	22	13	50	24	7	12.4		1.0	
		45100R-8T-M	●	8	100	113	32	48	-		30	8	14.4	Fig.2	1.4	
		45125R-10T-M	●	10	125	138	40	58		63	32	9	16.4		2.5	
		45160R-12T-M	●	12	160	173		68	66.7					Fig.3	3.8	
		45200R-14T-M	●	14	200	213	60	110	101.6		40	14	25.7		6.5	
		45250R-16T-M	●	16	250	263									9.1	
	엑스트라 크로스피치 Extra cross pitch	MFPN 45063R-6T-M	●	6	63	76	22	19	11	40	21	6.3	10.4	Fig.1	0.5	-
		45080R-8T-M	●	8	80	93	27	22	13	50	24	7	12.4		1.1	
		45100R-10T-M	●	10	100	113	32	48	-		30	8	14.4	Fig.2	1.3	
		45125R-13T-M	●	13	125	138	40	58	-	63	32	9	16.4		2.6	
		45160R-16T-M	●	16	160	173		68	66.7					Fig.3	3.9	
		45200R-18T-M	●	18	200	213	60	110	101.6		40	14	25.7		6.6	
		45250R-20T-M	●	20	250	263									9.3	

●:표준재고 ●:Std. Stock

■부품 Spare Parts

●부품(인치/미리 공통) Spare parts (mm / inch common spec)

규 격 Description		부 품 Spare Parts						
		클램프 스크류 Clamp Screw	렌치 Wrench TT	렌치 Wrench DTM	시트 Shim	심 스크류 Shim Screw	렌치 Wrench	아바 장착용 볼트 Arbar Clamp Screw
코스피치 Coarse pitch	MFPN 45063R-4T-M	SB-50140TR	TT-15	-	MFPN-45	SPW-7050	LW-5	HH10x30
	MFPN 45080R-5T-(M)							HH12x40
	MFPN 45100R-6T-(M) ~ 45250R-12T-(M)							-
크로스피치 Cross pitch	MFPN 45063R-5T-M	SB-50140TR	TT-15	-	-	-	-	HH10x30
	MFPN 45080R-6T-(M)							HH12x40
	MFPN 45100R-8T-(M) ~ 45250R-16T-(M)							-
엑스트라 크로스피치 Extra cross pitch	MFPN 45063R-6T-M	SB-40140TRN	-	DTM-15	-	-	-	HH10x30
	MFPN 45080R-8T-(M)							HH12x40
	MFPN 45100R-10T-(M) ~ 45250R-20T-(M)							-

팁 클램프용 토르크 4.2Nm for Insert Clamp Recommended torque is 4.2 Nm.

팁 클램프용 토르크 6.0Nm for Insert Clamp Recommended torque is 6.0 Nm.

팁 클램프용 토르크 3.5Nm for Insert Clamp Recommended torque is 3.5 Nm.

■ 사용상의 주의(팁 교환 순서) Precautions for use (How to mount an insert)

1. 팁 장착부에 칩 등의 불순물을 제거하여 주십시오. Be sure to remove dust and chips from the insert mounting pocket.
2. 클램프 스크류는 구속면 방향에 주의해서 적절한 토르크로 조여주십시오.(그림1, 그림2 참고)
   After applying anti-seize compound, while pressing the insert against the constraint surfaces, put the screw into the hole of the insert and tighten the screw with appropriate torque. See Fig. 1 and Fig. 2.
   추천토르크 Recommended tightening torque ⇒ 코스피치 / 크로스피치사양(M5나사 사용)은 4.2N·m
   The torque for coarse pitch and cross pitch (using M5 screw) is 4.2 Nm.
   엑스트라 크로스피치사양(M4나사 사용)은 3.5N·m
   The torque for extra cross pitch (using M4 screw) is 3.5 Nm.
3. 장착부, 팁 좌면과 홀더의 지지좌면 및 구속면에 틈이 없도록 확인하여 주십시오.
   After tightening the screw, make sure that there is no clearance between the insert seat surface and the bearing surface of the holder and between the insert side surfaces and the constraint surface of the holder.
4. 팁의 코너 교체는 반시계방향으로 돌려서 교체하여 주십시오. 팁 상면에 코너번호가 있습니다. 정삭날 보호를 위해 번호순으로 사용하여 주십시오.
   To change the cutting edge of the insert, turn the insert counterclockwise (see Fig. 3). Insert corner identification number is stamped on the top surface of insert (Fig. 4). To protect the wiper edge, use the corners of insert in the sequence of corner numbers.

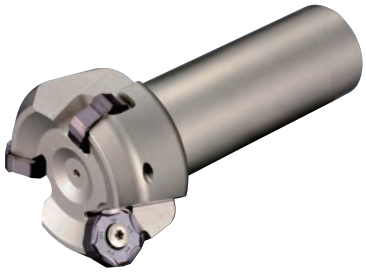
그림 1

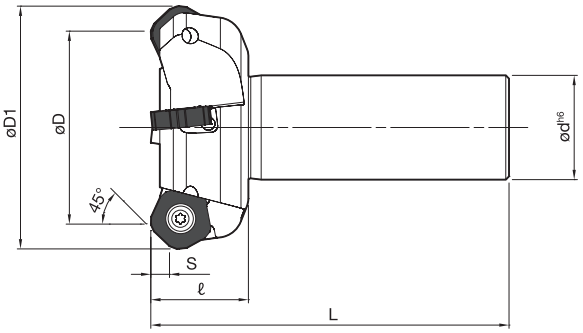
그림 2

그림 3

그림 4

■MFPN45형 NEW





* 최대절입량(S)은 GM/SM/GH 브레이커 장착시에는 6mm, GL 브레이커는 5mm 입니다.
Max ap (S) is 6mm for GM/SM/GH chipbreaker and 5mm for GL chipbreaker

● 홀더 치수 Holder Dimension

규 격 Description		재고 Stock	날수 No.of Insert	치수(mm) Dimension(mm)						경사각(°) Rake Angle(°)		부 품 Spare Parts		
				øD	øD1	ød	L	ℓ	S	A.R. (MAX)	R.R.	클램프 스크류 Clamp Screw	렌치 Wrench	소착방지제 Anti-seize Compound
MFPN	45050R-S32-3T	●	3	50	63	32	110	30	6 (5)	+10°	-12°	SB-50140TR	TT-15	MP–1
	45063R-S32-4T	●	4	63	76						-10°			
	45080R-S32-5T	●	5	80	93						-8°			

토르크 4.2Nm
Recommended torque is 4.2 Nm.

●:표준재고 ●:Std. Stock

■팁 규격 Insert description

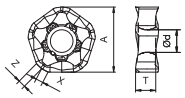
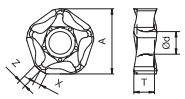
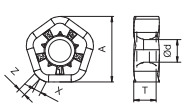
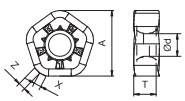
● 밀링팁(홀 있음)
Milling Inserts (with hole)

사용분류 기준
Classification of usage

★ : 황삭/제1추천 (★ Roughing / 1st Choice)
☆ : 황삭/제2추천 (☆ Roughing / 2nd Choice)
■ : 정삭/제1추천 (■ Finishing / 1st Choice)
□ : 정삭/제2추천 (□ Finishing / 2nd Choice)

(고경도는 45HRC 이하의 경우)
(Hardened material is applicable only under 45HRC)

P	강 Steel	★	
	금형강 Die Steel	★	
M	스텐레스강 Stainless Steel	★	
K	회주철 Gray Cast Iron		★
	덕타일 주철 Nodular Cast Iron		★
N	비철금속 Non-ferrous Material		☆
S	내열합금 Heat-resistant Alloy	★	
	티탄합금 Titanium alloy		★
H	고경도재 Hardened material		

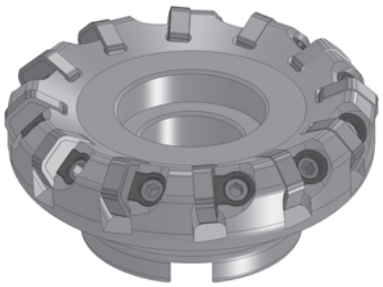
형 상 Shape 승수있는 팁은 우승수(R)를 나타냅니다. Handled insert indicates Right-Hand		규 격 Description	치 수 (mm) Dimension(mm)					MEGACOAT	
			A	T	ød	X	Z	PR1225	PR1210
범용 General		**PNMU 1205ANER-GM**	17.88	5.56	6.2	2.0	2.0	●	●
저저항형 Low cutting force		**PNMU 1205ANER-SM**						●	●
인선강화형(중삭용) Tough Edge (for heavy milling)		**PNMU 1205ANER-GH**	17.98	6.17				●	●
NEW 인선강화형(중삭용) Tough Edge (for heavy milling)		**PNMU 1205ANER-GL**	17.51	5.56		2.7	2.7	●	●

●:표준재고 ●:Std. Stock

●가공목적에 따른 커터, 팁 선택 기준 Reference for selecting a facemill and insert suitable for each milling purpose

가공 목적 Milling Purpose	커터 타입 Facemill-type			브레이커 Chipbreaker			
	코스피치 Coarse pitch	크로스피치 Cross pitch	엑스트라 크로스피치 Extra cross pitch	GM	SM	GH	GH
강 · 합금강의 가공 General milling for steel and alloy steel		○		○			
강 · 합금강의 가공(머신 강성, 클램프 강성이 약해 떨림이 생기기 쉬움) Steel and alloy steel (at chattering due to low rigidity machine or poor clamping power)	○				○		
런닝 코스트는 중시(ap=4 mm이상 fz=0.35mm/t 이상) Productivity oriented (Running cost decrease)	○					○	
스텐레스가공 Genral milling for stainless steel		○			○		
정삭면 중시 Surface finish oriented							○
스텐레스가공(머신강성, 클램프 강성이 약해 떨림이 생기기 쉬움) Stainless steel (at chattering due to low rigidity machine or poor clamping power)	○				○		
주철가공(가공능률을 높이고 싶을 때) Cast iron (for processing efficiency improvement)			○	○			
주철가공(ap=4 mm이상 fz=0.35mm/t 이상) Cast iron (Over ap=4 mm, over fz=0.35 mm/t)	○					○	

■KPN45형 NEW



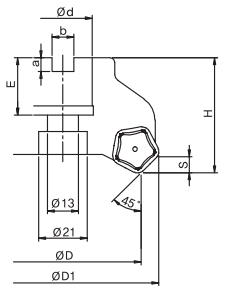


Fig.1

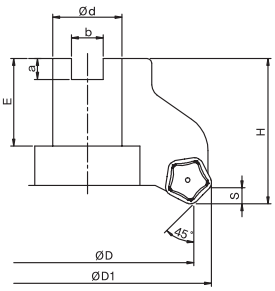


Fig.2

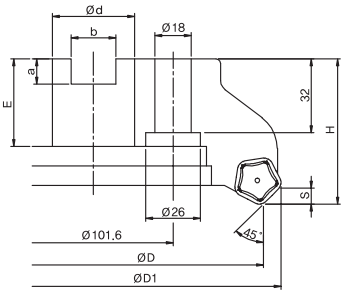


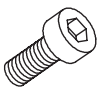
Fig.3

● 홀더 치수 Holder Dimension

규격 Description				재고 Stock	날수 No.of Insert	치수(mm) Dimension(mm)								형상 Shape	무게 (kg) Weight (kg)	아바 Abor
						øD	øD1	ød	H	E	S	a	b			
미리사양 mm spec	크로스피치 Cross pitch	KPN	45080R-8T	●	8	80	94	25.4	50	25	6	6	9.5	Fig.1	1.5	FMA25.4
			45100R-10T	●	10	100	114	31.75	50	32	6	8	12.7	Fig.2	2.1	FMA31.75
			45125R-12T	●	12	125	139	38.1	63	38	6	10	15.9	Fig.2	3.5	FMA38.1
			45160R-16T	●	16	160	174	50.8	63	38	6	11	19.05	Fig.2	5.5	FMA50.8
			45200R-20T	●	20	200	214	47.625	63	38	6	14	25.4	Fig.3	8.2	FMA47.625
			45250R-24T	●	24	250	264	47.625	63	38	6	14	25.4	Fig.3	13.4	FMA47.625
	엑스트라 크로스피치 Extra cross pitch	KPN	45080R-10T	●	10	80	94	25.4	50	25	6	6	9.5	Fig.1	1.5	FMA25.4
			45100R-12T	●	12	100	114	31.75	50	32	6	8	12.7	Fig.2	2.1	FMA31.75
			45125R-16T	●	16	125	139	38.1	63	38	6	10	15.9	Fig.2	3.5	FMA38.1
			45160R-22T	●	22	160	174	50.8	63	38	6	11	19.05	Fig.2	5.5	FMA50.8
			45200R-28T	●	28	200	214	47.625	63	38	6	14	25.4	Fig.3	8.2	FMA47.625
			45250R-34T	●	34	250	264	47.625	63	38	6	14	25.4	Fig.3	13.4	FMA47.625

●:표준재고 ●:Std. Stock

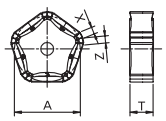
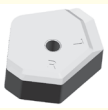
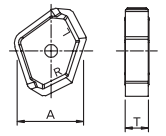
●부품 (인치 / 미리 공통) Spare parts (mm / inch common spec)

웨지	웨지 스크류	L-렌치	마운트 볼트
			 FOR KPN45080R
WS812	W8x19	TH-4	HH12X35

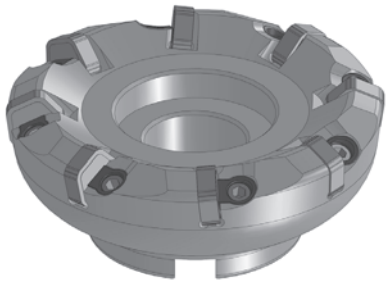
●추천조건 Recommended conditions

피삭재	절삭속도 (mm/min)	일반 가공	중·사상 가공
		날당 이송 (mm/ 날)	회전당 이송 (mm/rev)
회주철(FC)	150~250	0.1~0.4	1.0~6.0
덕타일 주철(FCD)	120~180	0.1~0.3	일반 팁 사이에 와이퍼 팁 1~4개를 장착하여 절입 깊이 0.5mm이하 조건으로 설정하여 주십시오.

● 밀링팁 Milling Inserts

팁 구분	규격	재종	형상				
			A	T	W	Z	
NEW 일반 팁	PNMF1706-HR	PK9905	16.5	6	1.5	1.5	
NEW 와이퍼 팁	 PNCF1706-W	PK9905	16.5	6			

■KPNS64○○○R-○○T형 NEW



※ KPNS 64 형은 코너각 64° 타입 입니다.

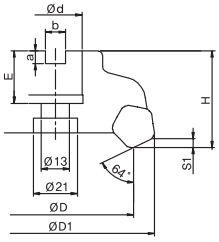


Fig.1

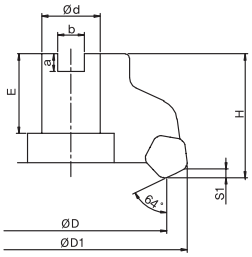


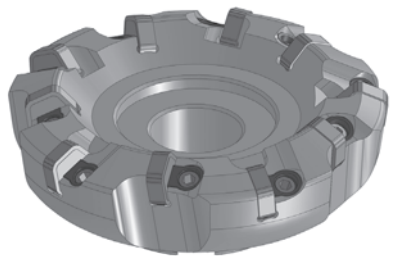
Fig.2

● 홀더 치수 Holder Dimension

규 격 Description		재고 Stock	날수 No.of Insert	치수(mm) Dimension(mm) øD	øD1	ød	H	S1	E	a	b		형상 Shape	무게 (kg) Weight (kg)	아바 Abor
KPNS	64080R-6T	●	6	80	98	25.4	50	3	25	6	9.5		Fig.1	1.6	FMA25.4
	64100R-8T	●	8	100	118	31.75	50	3	32	8	12.7		F1g.2	2.2	FMA31.75
	64125R-10T	●	10	125	143	38.1	63	3	38	10	15.9		F1g.3	3.9	FMA38.1

●:표준재고 ●:Std. Stock

■KPNB64○○○R-○T형 NEW



※ KPNB 64 형은 코너각 64° 타입 입니다.

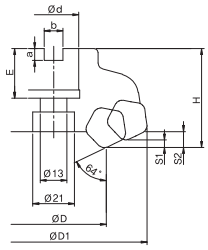


Fig.3

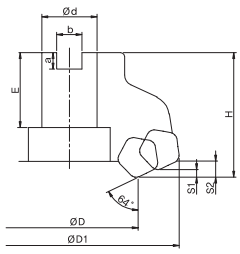


Fig.4

● 홀더 치수 Holder Dimension

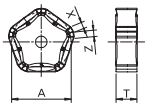
규 격 Description		재고 Stock	날수 No.of Insert	총 날수 Total No.of Insert	치수(mm) Dimension(mm) øD	øD1	ød	H	S1	E	a	b		형상 Shape	무게 (kg) Weight (kg)	아바 Abor
KPNB	64080R-4T	●	4	8	80	112	25.4	50	3	6.5	25	6	9.5	Fig.3	2.0	FMA25.4
	64100R-5T	●	5	10	100	132	31.75	50	3	6.5	32	8	12.7	Fig.4	2.6	FMA31.75
	64125R-6T	●	6	12	125	157	38.1	63	3	6.5	38	10	15.9	Fig.4	4.4	FMA38.1

●:표준재고 ●:Std. Stock

●부품 (인치 / 미리 공통) Spare parts (mm / inch common spec)

웨지	웨지 스크류	L-렌치	마운트 볼트
			FOR KPN64080R
WS812	W8x19	TH-4	HH12X35

● 밀링팁 Milling Inserts

팁 구분	규격	재종	형상 A	T	W	Z	
NEW 일반 팁	PNMF1706-HR	PK9905	16.5	6	1.5	1.5	

●추천조건 Recommended conditions

피삭재	절삭속도 (mm/min)	날당 이송 (mm/ 날)	회전당 이송 (mm/rev)
회주철(FC)	150~250	0.3~0.8	KPNB64 품목은 F값(분당 이송) 계산시 유효 날수 기준으로 설정하여 주십시오.
덕타일 주철(FCD)	120~180	0.2~0.6	

가공실예 Case studies

SS400

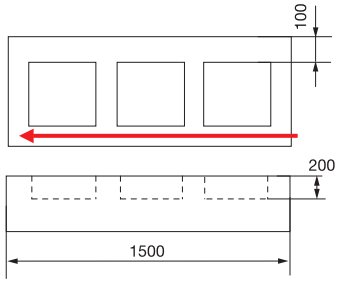
- 건설부품 Construction machine part
- Vc=170m/min
- apxae= 4 x10mm
- fz=0.3mm/ t
- Vf=1350mm/min
- 건식 DRY
- 커터

MFPN45125R-10T
(10날 10 edges)

- 인서트

PNMU1205ANER-GM
(PR1225)

정면가공(일부 단속있음)
Face milling (with meltdown surface)



MFPN 커터 (PR1225)	3 개/코너 pcs/edge (공구수명 3 배 3 times longer tool life)
타사H Competitor H	1 개/코너 pcs/edge

- MFPN커터는 칩의 엉킴과 인선 결손이 없이 안정가공이 가능
- 타사 커터에 비해 떨림이 적고 공구수명도 3배로 향상

•MFPN facemill enables stable milling due to reduced chip-biting and edge cracks
•MFPN facemill, no chattering, showed 3 times longer tool life than competitor

(고객평가) Evaluation by the user

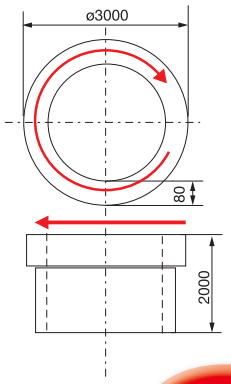
FCD450

- 파이프 Pipe
- Vc=180m/min
- apxae=2x80mm
- fz=0.44mm/t
- Vf=2010mm/min
- 건식 DRY
- 커터

MFPN45125R-10T
(10날 10 edges)

- 인서트

PNMU1205ANER-GM
(PR1210)



MFPN 커터 (PR1210)	3 개/코너 pcs/edge (공구수명1.5배 1.5 times longer tool life)
타사I Competitor I	2 개/코너 pcs/edge

- MFPN커터는 타사에 비해 공구수명이 1.5배 향상
- 이송조건이 기존절삭조건보다 올라갔으므로 가공시간이 1개당 1분간 단축되어 가공능률이 1.3배 향상

•MFPN facemill showed 1.5 times longer tool life than the competitor
•High feed rate of MFPN allowed 1.3 times higher milling efficiency compared to the competitor

(고객평가) Evaluation by the user

합금강 Alloy steel

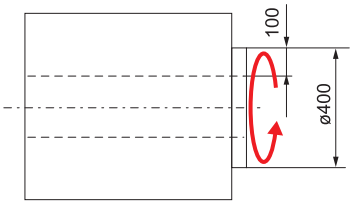
- 건설부품 Construction machine part
- Vc=175m/min
- apxae=1.5x100mm
- fz=0.19mm/t
- Vf=790mm/min
- 건식 DRY
- 커터

MFPN45160R-12T
(12날 12 edges)

- 인서트

PNMU1205ANER-GM
(PR1225)

총절입량 : 15mm
Total D.O.C.



MFPN커터 (PR1225)	2개/코너 pcs/edge (공구수명2배 2 times longer tool life)
타사J Competitor J	1 개/코너 pcs/edge

- MFPN커터는 타사커터보다 공구수명이 2배 향상
- 타사커터는 칩의 엉킴으로 팁 결손이 발생, MFPN커터는 결손없이 안정가공
- 테이블 이송이 기존의 2배로 올라, 가공능률도 2배 향상

•MFPN facemill showed 2 times longer tool life than competitor
•Competitor caused cracks by chip-biting. MFPN facemill had no cracks and allowed stable milling
•MFPN facemill enabled twice the table feed rate compared with the competitor. Milling efficiency improved two-fold.

(고객평가) Evaluation by the user

FCD600

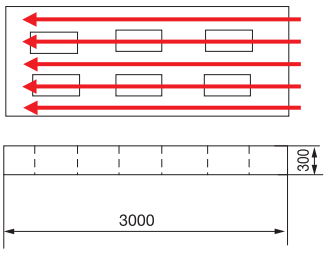
- Press die
- Vc=130m/min
- apxae=6x500mm
- fz=0.15mm/t
- Vf=460mm/min
- 건식 DRY
- 커터

MFPN45160R-12T
(12날 12 edges)

- 인서트

PNMU1205ANER-GM
(PR1210)

정면가공 Face milling



MFPN커터 (PR1225)	가공시간128분 Cutting time 128 minutes (가공능률1.2배 Milling efficiency increased 1.2 times)
타사K Competitor K	가공시간167분 Cutting time 167 minutes

- 워크를 가공 할 때의 안정성이 대폭향상, 진동도 매우 적음
- 안정적인 컬로 엉킴없이 칩을 배출
- 기존공구로는 Vc=110m/min으로 가공했으나 MFPN형에서는 Vc=130m/min으로 올려 가공, 같은 가공량으로 1.2배의 가공능률 향상

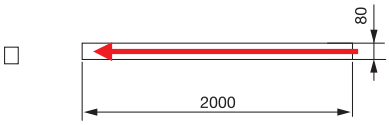
•Highly stable milling into the entrance of workpiece and less vibration than the competitor
•Cleanly curled chips which barely cause chip-biting
•Cutting speed has been changed Vc=110 m/min of conventional competitor's to Vc=130 m/min, thereby the milling efficiency of MFPN increased 1.2 times

(고객평가) Evaluation by the user

■가공실예 Case studies

SS400

- 플레이트 Plate
- Vc=230m/min
- apxae=5.0x80mm
- fz=0.19mm/t
- Vf=1090mm/min
- 건식 DRY
- 커터
- MFPN45160R-12T
(12날 12 edges)
- 인서트
PNMU1205ANER-SM
(PR1225)



가공능률2.6배
Milling efficiency increased 2.6 times

MFPN커터 (PR1225)	가공시간 7.3분 Cutting time 7.3 minutes (4패스 4 passes)
타사L (황삭용) Competitor L (for roughing)	가공시간 19분 Cutting time 19 minutes (4패스 4 passes)

- 종래의 8날사양에 4날을 추가하여 1날당 이송을 1.3배로 해도 진동이 적고 안정 절삭이 가능
- 절삭 후 워크의 발열이 적고 버가 없는 광택면을 얻을 수 있다.
- 조건을 올림에 따라 가공능률이 2.6배 향상

•MFPN facemill causes no vibration, enabling stable milling, even though the number of cutting edges of facemill has been increased by 4 and the feed per tooth has been increased by 1.3 times

•Does not generate much heat after milling and obtains the lustrous surface finish without burrs

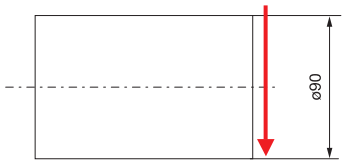
•Milling efficiency increased 2.6 times with the high cutting conditions

(고객평가) Evaluation by the user

합금강 Alloy steel

- 파이프(단면가공) Shaft (End face milling)
- Vc=140m/min
- apxae=0.4x50mm
- fz=0.19mm/t
- Vf=635mm/min
- 건식 DRY
- 커터
MFPN45080R-6T
(6날 12 edges)
- 인서트
PNMU1205ANER-SM
(PR1225)

단면가공 End face milling



- 기존공구에서는 떨림이 발생했으나, MFPN에서는 떨림이 전혀 없어 안정가공이 가능
- 테이블이송을 기존보다 1.9배 높여도 팁 마모량이 적고 파손 발생도 없음
- 가공능률, 공구수명 모두 향상

•Although the conventional tool causes chattering, MFPN facemill suppresses chattering, enabling stable milling

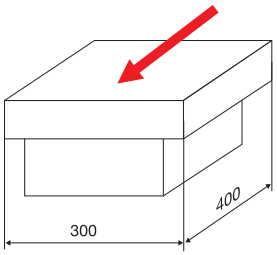
•Even if the feed rate is raised to 1.9 times, the insert wears less and there is no cracks on the insert

•Both the milling efficiency and the tool life have been improved

(고객평가) Evaluation by the user

SCM415

- 플레이트
- Vc=180m/min
- apxae=3x80mm
- fz=0.15mm/t
- Vf=690mm/min
- 건식 DRY
- 커터
MFPN45125R-10T
(10날 10 edges)
- 인서트
PNMU1205ANER-GM
(PR1225)



【기존공구 Conventional】
Vc=140m/min
apxae=3x80mm
fz=0.11mm/t
(Vf=230mm/min)

- 종래품보다 절삭속도, 이송조건 을 높여도 공구수명은 변하지 않으며 가공능률은 1.8배 향상
- 워크가공시 진동과 절삭음이 적음

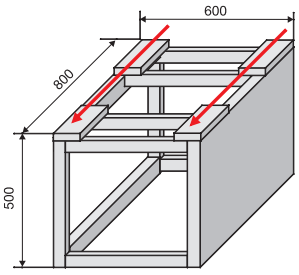
•Even if the cutting speed and feed rate are raised up to the level of the conventional tool, the tool life of MFPN remains unchanged and milling efficiency increases by 2.6 times

•MFPN vibrates less right at entrance and exit on workpiece with reduced cutting sound

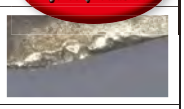
(고객평가) Evaluation by the user

SUS304

- 케이스 Case
- Vc=90m/min
- apxae=0.4x50mm
- fz=0.19mm/t
- Vf=410mm/min
- 건식 DRY
- 커터
MFPN45080R-6T
(6날 6 edges)
- 인서트
PNMU1205ANER-SM
(PR1225)



가공능률1.5배
Milling efficiency increased 1.5 times

MFPN커터 (PR1225)	1.5개/코너 pcs/edge	
타사M (황삭용) Competitor M (for roughing)	1개/코너 pcs/edge	

- 워크강성이 매우 낮고 절삭속도, 절입, 이송을 높일 수 없는 상태였지만, MFPN형 커터는 떨림의 발생없이 안정된 가공이 가능하여 공구수명도 1.5배 향상함

•Even when the cutting depth, cutting speed and feed rate cannot be raised due to the low rigidity of a workpiece, MFPN facemill enables stable milling without chattering and also has an improved tool life of 1.5 times

(고객평가) Evaluation by the user

추천조건 Recommended conditions

피삭재 Work Piece Material	팁 재종 Insert Grade	절삭속도(m/min) Cutting Speed(m/min)	브레이커 Chipbreaker	1 날당 이송량(mm/t) 0.06 0.1 0.2 0.3 0.4 0.5 0.6 0.7
탄소강 Carbon Steel SxxC	PR1225	120~**180**~250	GM★	0.1 **0.2** 0.4
			SM☆	0.06 **0.12** 0.25
			GH	0.2 **0.4** 0.7
			GL	0.06 **0.12** 0.25
합금강 Alloy Steel SCM등	PR1225	100~**160**~220	GM★	0.1 **0.2** 0.4
			SM☆	0.06 **0.12** 0.25
			GH☆	0.2 **0.4** 0.6
			GL	0.06 **0.12** 0.25
금형강 Die Steel SKD/NAK등	PR1225	80~**140**~180	GM★	0.1 **0.2** 0.35
			SM☆	0.06 **0.1** 0.2
			GH☆	0.2 **0.35** 0.5
			GL	0.06 **0.1** 0.2
스텐레스강 Stainless Steel SUS304등	PR1225	100~**150**~200	GM☆	0.1 **0.2** 0.4
			SM★	0.06 **0.12** 0.25
			GL	0.06 **0.12** 0.25
회주철 Gray Cast Iron FC	PR1210	120~**180**~250	GM★	0.1 **0.2** 0.4
			SM	0.06 **0.12** 0.25
			GH☆	0.2 **0.4** 0.7
			GL	0.06 **0.12** 0.25
덕타일 주철 Nodular Cast Iron FCD	PR1210	100~**150**~200	GM★	0.1 **0.2** 0.35
			SM	0.06 **0.1** 0.2
			GH☆	0.2 **0.35** 0.5
			GL	0.06 **0.1** 0.2
티탄합금 Titanium Alloy	PR1210	30~**50**~70	SM★	0.06 **0.08** 0.15
			GL	0.06 **0.08** 0.15
커터사양	코스피치사양(시트있음) Coarse pitch (with shim)			
	크로스피치사양(시트없음) (GH브레이커는, fz=0.4mm/t 이하를 추천) Cross pitch (without shim) (For GH chipbreaker, recommend under fz=0.4 mm/t.)			
	엑스트라 크로스피치사양(시트없음) GH브레이커의 사용은 추천하지 않습니다.) Extra cross pitch (without shim) The use of the GH breaker is not recommended.			

※절삭조건 중 굵은 글씨는 추천 조건의 중심치를 나타냅니다.
The bold-faced number indicates a center value of recommended condition.

★제1추천 ☆제2추천 ★:1st Recommendation ☆:2nd Recommendation

절삭공구에 관한 기술적인 상담은
032-821-8365
FAX:032-821-8369
●근무시간 9:00~12:30 · 13:30~17:30
●토요일 · 일요일 · 공휴일 등은 쉽니다.
한국교세라정공(주) 영업본부

KYOCERA
한국교세라정공(주)
인천광역시 남동구 고잔동 638-1,
남동공단 69BL 2LT, 우:405-817
TEL:032-821-8365 FAX:032-821-8369
http://www.kptk.co.kr