THE NEW VALUE FRONTIER

KYOCERA

고능률 엔드밀
MEC형 시리즈

High efficient MEC end mill series

평활한 벽면 Excellent Finished Wall

우수한 직각도 High Squareness

- MEGACOAT PR12시리즈 추가
  MEGACOAT PR12 series are now available
- 선단 교환식 MECH형 개발!!
  MECH Head Exchangeable Type is now available

ADVANCING PRODUCTIVITY

생산성 향상에 기여하는 교세라

■MEC형 시리즈 라인업 MEC endmill series lineup

MECH형 type 중절삭·고능률 가공 Heavy milling and High efficient machining

■특징 Advantages

1.우수한 칩 배출 Improved Chip Evacuation

2.고능률 가공 Efficient Machining

3.저저항 Low Cutting Force

4.떨림을 억제 Reduced chattering

니크팁에 의해 칩을 잘게 분단

Notched insert breaks chips into small pieces

피삭재 Work Material :SS400
Vc = 120 m/min
ap×ae=40mm×10mm,fz = 0.12mm/t
MECH032-S32-11-5-4T

중절삭 대응
For heavy milling

홀더 플루트부의 평커트에 의해 양호한 칩 배출을 가능하게 합니다.
Flute with flat-cut enables good chip evacuation

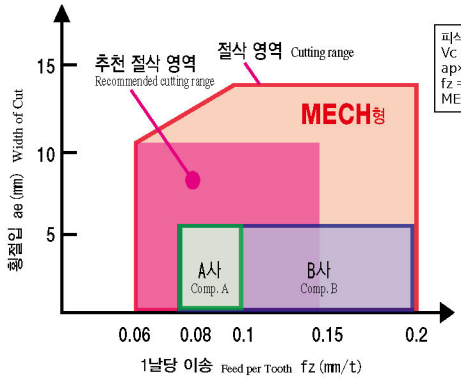
니크팁으로 가공시 저항을 저감·분산 시켜 떨림을 억제해 고능률 가공을 가능하게 합니다.
Notched insert reduces cutting force and chattering and enables efficient machining

선단날에 오일홀 있음 (엔드밀 타입만)
Coolant hole for bottom insert (endmill only)

큰 절입량으로 고능률 가공을 실현
Long depth of cut enable high efficiency machining

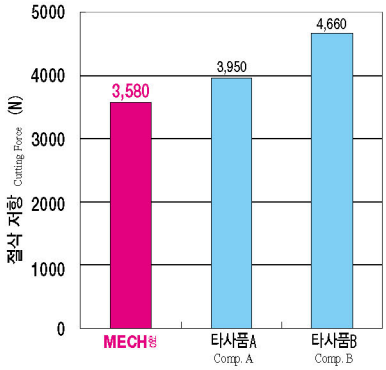
■저저항 Low cutting force

·니크팁에 의한 저저항 Low Cutting Force due to Notched Inserts



피삭재 Work Material:S50C
Vc = 120 m/min
ap×ae = 40 mm×5~13 mm
fz = 0.06 ~ 0.2 mm/t
MECH032-S32-11-5-4T

·절삭저항 비교 (주분력 비교) Cutting Force (principal force)



피삭재 Work Material:S50C
Vc = 120 m/min
ap×ae = 40mm×10 mm
fz = 0.1mm/t
MECH032-S32-11-5-4T

(당사 비교) Internal evaluation

■떨림을 억제 Reduced chattering

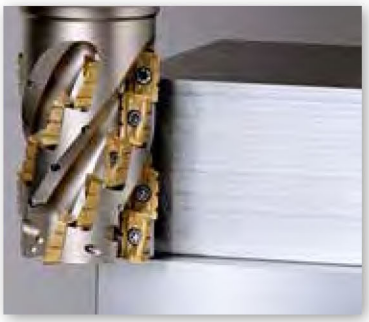
●가공면 (측면)비교

Comparison of surface wall

니크팁으로 가공시의 저항을 저감·분산시켜 떨림을 억제해 고이송을 가능하게 합니다.

Notched insert lowers and disperses cutting force, and enables high feed rates by reducing Chattering

평활한 가공면
Smooth surface of shoulder wall



MECH형 type

떨림이 발생
Chattering surface

타사품 A Comp.A

피삭재 Work Material:S50C
Vc=120m/min
fz=0.12mm/t
ap×ae=40×7mm

(당사 비교) Internal evaluation

■팁 재종에 PR1225, PR1230, PR1210 (MEGACOAT:PVD코팅) 을 추가

NEW NEW NEW

PR1225, PR1230 & PR1210 (MEGACOAT: PVD coated insert) is now available

●MEGACOAT

고경도/높은 내산화성에 의해 긴수명 고속가공을 실현

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

■선단 교환식 MECH형 NEW

MECH Head Exchangeable Type

●홀더의 런닝코스트 삭감

Cost reduction of tool holder

1) 홀더 선단부 (2단 절삭날까지) 가 본체와 분리 Holder head portion will be separated from the body (by second cutting edge)

2) 선단부가 파손되도 프론트피스만 교환가능 If holder head is damaged, front piece can be exchangeable.

분할 구조

Separate structure

조립 상태

Assembled status

MEC형 type 고능률 엔드밀 High efficient endmill

■특징 Advantages

1.저저항, 우수한 절삭성

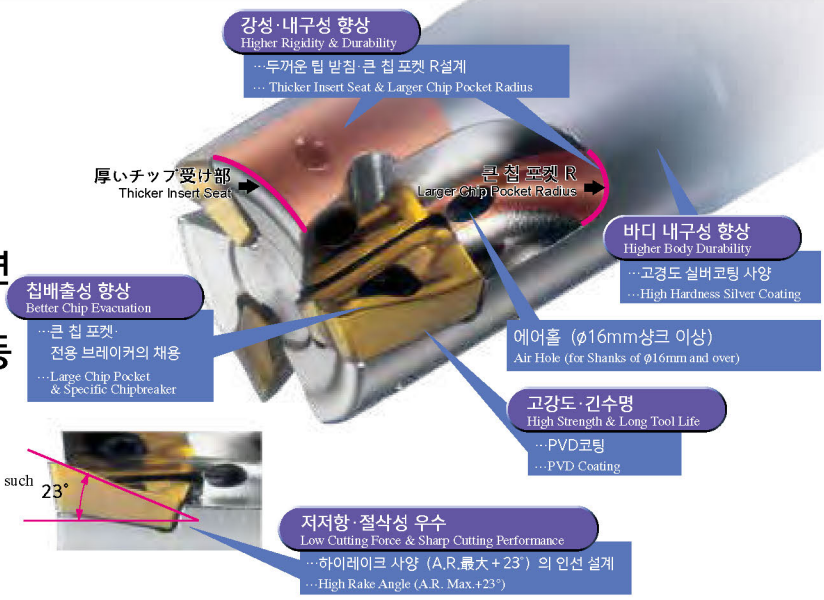
Low cutting force and sharp cutting performance

2.우수한 직각도/평활한 가공벽면

Perfect 90°shoulders, and smooth surface of shoulder wall

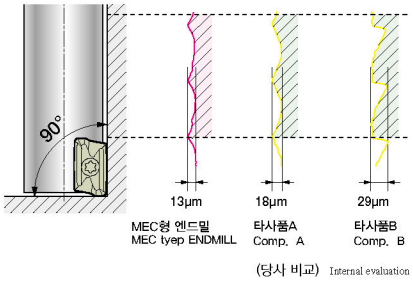
3.강·스텐레스·주철·알루미늄 등 폭넓은 워크 재질에 대응하는 풍부한 재종 레파토리

An extensive grade lineup applicable to a wide range of work materials, such as steel, stainless steel, cast iron and aluminum



● 직각도가 우수 Perfect 90° Shoulders

■가공면의 비교 Work Surface Comparison



● 가공 벽면 평활 Smooth Surface of Shoulder Wall

숄더링에 있어서의 다단 절입으로 단차가 적어 매끄러운 가공벽면과 우수한 직각도를 얻을 수 있습니다.

Smoothly finished shoulder wall and high squareness at shouldering with multipul passes

공구경 ø20 S50C Cutting Dia. 20mm / S50C
Vc=120m/min,ap×ae=5×10mm
fz=0.1mm/t, 건식 (외부 에어)
Dry(with compressed air)

(당사 비교) Internal evaluation

MECX형 type 고능률·저저항 엔드밀 High efficient and low cutting foce endmill

■특징 Advantages

소형 M/C에 최적
Recommended for small machines

1.다날 사양으로 고능률 가공을 실현

Efficient machining due to small diameter cutter that holds multiple inserts

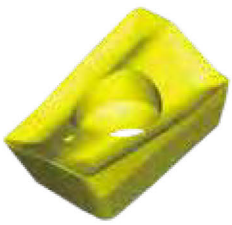
2.저저항·고강도 설계로 소형 머신에 최적

Recommended for small machines: low resistance and high strength design

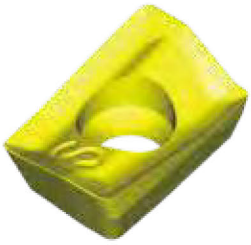
3.범용 JT브레이커와 저저항 JS브레이커로 광범위한 절삭 영역을 커버

Covers a broad range of applications with the multi-purpose JT chipbreaker and the low resistance JS chipbreaker

●브레이커 레파토리 Chipbreaker Lineup

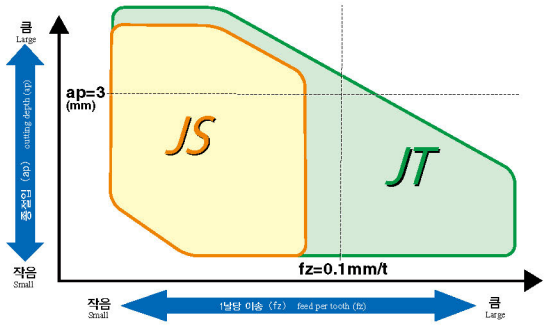


범용 JT브레이커
General JT Chipbreaker



저저항 JS브레이커
Low resistance JS Chipbreaker

●MECX 브레이커의 사용 구분 Selecting chipbreaker



● MEC/MECX형 레파토리 Lineup of MEC/MECX

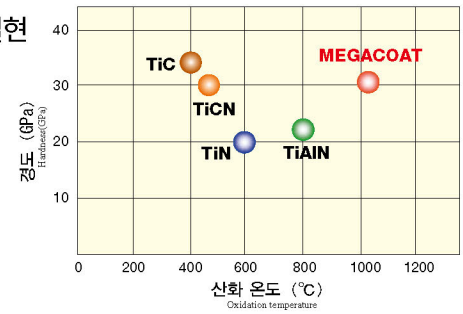
1. 재종 레파토리 (PVD코팅) Grade Lineup (PVD Coated Insert)

·팁 재종 레파토리에 MEGACOAT (PVD코팅) 의 「PR1225」와 「PR1210」을 추가
PR1225 and PR1210 (MEGACOAT: PVD coated insert) are now available

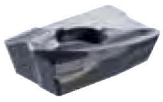
■MEGACOAT

·고경도/높은 내산화성에 의해 긴수명 고속 가공을 실현
Long tool life and high-speed milling due to high hardness and high oxidation resistance

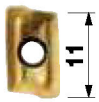
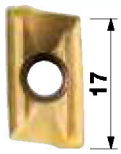
팁 재종 Insert grades	적용 피삭재 Workpiece
NEW PR1225	강·SUS Steel/Stainless steel
NEW PR1210	주철·티탄합금 Cast iron/Titanium alloy



2. 브레이커·코너R 레파토리 Chipbreaker lineup and Corner Radius variation

형상 shape	코너R (rε) Coner Radius / 규격 Description	코너R (rε) Coner Radius 0.2	0.4	0.8	1.2	1.6	2.0	2.4	3.1	4.0
범용 JT브레이커 General JT Chipbreaker	BDMT0703...ER-JT	●	●	●						
	BDMT1103...ER-JT	●	●	●						
	BDMT11T3...ER-JT	●	●	●	●	●	●	●	●	
	BDMT1704...ER-JT		●	●	●	●	●	●	●	●
저저항 JS브레이커 Low resistance JS Chipbreaker	BDMT0703...ER-JS	●	●	●						
	BDMT1103...ER-JS	●	●	●						
	BDMT11T3...ER-JS	●	●	●						
	BDMT1704...ER-JS		●	●						
알루미늄용 JA브레이커 JA Chipbreaker for Aluminum	BDGT11T3...FR-JA	●	●	●						
	BDGT1704...FR-JA		●	●			●		●	
 알루미늄용 다이아몬드 PCD for Aluminum	BDMT11T3...FR	●	●							
	BDMT1704...FR	●	●							

3. 다양한 레파토리 (MEC / MECX형의 사용구분) Various products lineup of MEC/MECX(Differrent useage of MEC and MECX)

MECX25-S25-07-7T	MEC25-S25-11T	MEC25-S25-17
MECX-07 Type	**MEC-11 Type**	**MEC-17 Type**
		
BDMT070304ER-JT	BDMT11T308ER-JT	BDMT170408ER-JT
①날수가 많아 테이블 이송이 올라가 고능률 가공이 가능 ②저저항·고강도 설계로 복합가공기나 소형 머신에 최적	①날장 11mm의 팁으로 저저항과 고강도를 양립 ②홀더 강도를 확보해, 1날당 이송을 올려 고능률 가공을 실현	①날장 17mm팁으로 큰 절입량이 가능
1) Multiple edges, capable of increasing table feed and high efficiency machining 2) Design with low resistance and high toughness, optimum for turning mill and small machines	1) Actualized low resistance and high toughness with an insert with 11mm edges 2) Actualized high efficiency machining by ensuring toolholder toughness and increasing edge contact	1) Substantial cut is available with an insert with 17mm edge length

●적합 팁 Applicable Insert

사용분류 기준 Guidance of usage choice	TN100M	PR1225	PR1230	PR1210	PR830	PR1025	PR905	GW25
탄소강·합금강 Carbon Steel·Alloy Steel	■	★	★		☆	☆		
금형강 Die Steel	■	★	★		☆	☆		
스텐레스강 Stainless steel		★			☆	☆		
회주철 Gray cast Iron				★			☆	
덕타일 주철 Ductile cast Iron				★			☆	
비철금속 Non Ferrous Iron								
내열합금 Heat resistance part		★				☆		
티탄합금 Titanium Alloy				★				
고경도재 Hardened Material		□	□		□			

★ : 황삭/제1추천(★ : Roughing/First Choice)
☆ : 황삭/제2추천(☆ : Roughing/Second Choice)
■ : 정삭/제1추천(■ : Finishing/First Choice)
□ : 정삭/제2추천(□ : Finishing/Second Choice)
(고경도재는 45HRC 이하의 경우)
(High Hardness material is applicable only under 45HRC)

규격 Description		치수 (mm) Dimension A	T	ød	W	rε	각도(°) Angle α	β	서멧트 Cermet TN100M (NEW)	MEGACOAT PR1225 (NEW)	PR1230 (NEW)	PR1210 (NEW)	PVD코팅 PVD Coated PR830	PR1025	PR905	초경 Carbide GW25	적합홀더 참고페이지 Ref. Page for Toolholder
BDMT 110302ER-JT		6.3	3.00	2.8	11.0	0.2	18°	15°		●		●	●		●		P15
BDMT 110304ER-JT						0.4				●		●	●		●		
BDMT 110308ER-JT						0.8				●		●	●		●		
BDMT 11T302ER-JT		6.7	3.80	2.8	11.0	0.2	18°	13°		●		●	●		●		P15 P16
11T304ER-JT						0.4			●	●		●	●		●		
11T308ER-JT						0.8			●	●		●	●		●		
11T312ER-JT						1.2				●		●	●		●		
11T316ER-JT						1.6				●		●	●		●		
11T320ER-JT						2.0				●		●	●		●		
11T324ER-JT						2.4				●		●	●		●		
11T331ER-JT						3.1				●		●	●		●		
BDMT 170404ER-JT		9.6	4.90	4.4	17.0	0.4	18°	13°		●		●	●		●		
170408ER-JT						0.8			●	●		●	●		●		
170412ER-JT						1.2				●		●	●		●		
170416ER-JT						1.6				●		●	●		●		
170420ER-JT						2.0				●		●	●		●		
170424ER-JT						2.4				●		●	●		●		
170431ER-JT						3.1				●		●	●		●		
170440ER-JT						4.0				●		●	●		●		
BDMT 110302ER-JS		6.3	3.00	2.8	11.0	0.2	18°	15°		●			●	●			P15
110304ER-JS						0.4				●			●	●			
110308ER-JS						0.8				●			●	●			
BDMT 11T302ER-JS		6.7	3.80	2.8	11.0	0.2	18°	13°		●			●	●			P15 P16
11T304ER-JS						0.4				●			●	●			
11T308ER-JS						0.8				●			●	●			
BDMT 170404ER-JS		9.6	4.90	4.4	17.0	0.4	18°	13°		●			●	●			
170408ER-JS						0.8				●			●	●			
2니크 2-Notched	BDMT 11T308ER-N2	6.7	3.80	2.8	11.0	0.8	18°	13°		●	●	●	●		●		P7 P8 P9 P10
3니크 3-Notched	BDMT 11T308ER-N3	6.7	3.80	2.8	11.0	0.8	18°	13°		●	●	●	●		●		
3니크 3-Notched	BDMT 170408ER-N3	9.6	4.90	4.4	17.0	0.8	18°	13°		●	●	●	●		●		
4니크 4-Notched	BDMT 170408ER-N4	9.6	4.90	4.4	17.0	0.8	18°	13°		●	●	●	●		●		

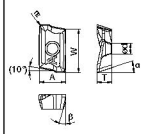
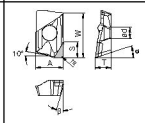
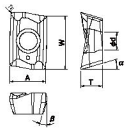
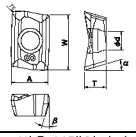
※브레이커 용도 : 범용 브레이커 (JT), 저저항 브레이커 (JS), 알루미늄·비철 브레이커
Chipbreaker Lineup: JT (general purpose), JS (low cutting force), JA (aluminum & non-ferrous)

팁의 판매 개수는 10개 포장 케이스입니다. Inserts are sold in 10 piece boxes.

● : 표준재고 ● : Standard Stock

●적합 팁 Applicable Insert

사용분류 기준 Guidance of usage choice		PR1225	PR1210	PR830	PR1025	PR905	GW25	KPD001	KPD230	적합홀더 참고페이지 Ref. Page for Toolholder
★ : 황삭/제1추천(★ : Roughing/First Choice) ☆ : 황삭/제2추천(☆ : Roughing/Second Choice) ■ : 정삭/제1추천(■ : Finishing/First Choice) □ : 정삭/제2추천(□ : Finishing/Second Choice) (고경도재는 45HRC 이하의 경우) (High Hardness material is applicable only under 45HRC)	탄소강·합금강 Carbon Steel·Alloy Steel	★		☆	☆					
	금형강 Die Steel	★		☆	☆					
	스텐레스강 Stainless steel	★		☆	☆					
	회주철 Gray cast Iron		★			☆				
	덕타일 주철 Ductile cast Iron		★			☆				
	비철금속 Non Ferrous Iron						★	□	■	
	내열합금 Heat resistance part	★			☆					
	티탄합금 Titanium Alloy		★				☆	□	■	
	고경도재 Hardened Material	□		□						

규격 Description			치수 (mm) Dimension A	T	ød	W	rε	S	각도(°) Angle α	β	MEGACOAT PR1225 NEW	PR1210 NEW	PVD코팅 PVD Coated PR830	PR1025	PR905	초경 Carbide GW25	다이아몬드 PCD KPD001	KPD230 NEW	적합홀더 참고페이지 Ref. Page for Toolholder
		BDGT 11T302FR-JA	6.7	3.80	2.8	11.0	0.2	-	18°	13°						●			P15 P16
		11T304FR-JA					0.4									●			
		11T308FR-JA					0.8									●			
		BDGT 170404FR-JA	9.6	4.90	4.4	17.0	0.4	-	18°	13°						●			
		170408FR-JA					0.8									●			
		170420FR-JA					2.0									●			
		170431FR-JA					3.1									●			
		BDMT 11T302FR	6.7	3.80	2.8	11.0	0.2	3.6	18°	13°							●	●	
		11T304FR					0.4										●	●	
		BDMT 170402FR	9.6	4.90	4.4	17.0	0.2	4.4	18°	13°							●	●	
		170404FR					0.4										●	●	
		BDMT 070302ER-JT	4.6	2.6	2.3	6.7	0.2	-	16°	15°	●	●	●	●	●				P23 P24
		070304ER-JT					0.4				●	●	●	●	●				
		070308ER-JT					0.8				●	●	●	●	●				
		BDMT 070302ER-JS	4.6	2.6	2.3	6.7	0.2	-	16°	15°	●		●	●	●				
		070304ER-JS					0.4				●		●	●	●				
		070308ER-JS					0.8				●		●	●	●				

※브레이커 용도 : 범용 브레이커 (ＪＴ), 저저항 브레이커 (ＪＳ), 알루미늄·비철 브레이커 (JA)
Chipbreaker Lineup: JT (general purpose), JS (low cutting force), JA (aluminum & non-ferrous)

●홀더 규격과 적합 팁 Toolholder and Applicable Insert

홀더 규격 Toolholder	적합 팁 Applicable Insert					비고 Remarks
MEC····-11	BDMT 1103○○ER-JT	BDMT 1103○○ER-JS	-	-	-	니크팁의 사용을 추천하지 않습니다. Using notched insert is not recommended.
MEC····-11T MEC··R-11	BDMT 11T3○○ER-JT	BDMT 11T3○○ER-JS	BDGT 11T3○○FR-JA	BDMT 11T3○○FR	BDMT11T308ER-N2 BDMT11T308ER-N3	
MEC····-17 MEC··R-17	BDMT 1704○○ER-JT	BDMT 1704○○ER-JS	BDGT 1704○○FR-JA	BDMT 1704○○FR	BDMT170408ER-N3 BDMT170408ER-N4	
MECH···11	BDMT 11T3○○ER-JT	BDMT 11T3○○ER-JS	BDGT 11T3○○ER-JA	-	BDMT11T308ER-N2 BDMT11T308ER-N3	니크팁이 제1추천입니다. Notched insert is first recommendation.
MECH···17	BDMT 1704○○ER-JT	BDMT 1704○○ER-JS	BDGT 1704○○FR-JA	-	BDMT170408ER-N3 BDMT170408ER-N4	
MECX···	BDMT 0703○○ER-JT	BDMT 0703○○ER-JS	-	-	-	-

■ MECH형 엔드밀 (선단날에 오일홀 타입) End Mill (Coolant hole for bottom insert)

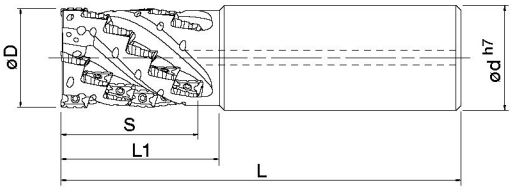


Fig.1

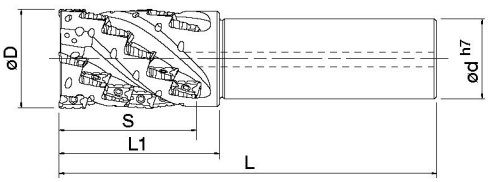


Fig.2

●치수 Toolholder Dimension

규격 Description		재고 Stock	날열 No. of Flute	단수 No. of Stage	날수 No. of Insert	치수(mm) Dimension(mm) øD	ød	L	L1	S	경사각(°) Rake Angle A.R. (MAX)	R.R.	형상 Shape	부품 Spare Parts 클램프 스크류 Clamp Screw	렌치 Wrench	소착 방지제 Anti-seize Compound	적합 팁 Applicable Insert ➔ P5 ➔ P11
MECH	025-S25-11-4-2T	●	2	4	8	25	25	120	46	37	+21°	-10°	Fig.1	SB-2555TRG	DTM-8	MP-1	BDMT11T308ER-N2 BDMT11T308ER-N3
	032-S32-11-5-2T	●		5	10	32	32	140	55	46	+23°	-9°					
	032-S32-11-5-4T	●	4		20												
	040-S32-11-6-4T	●		6	24	40		150	64	55		-8°	Fig.2				
	040-S42-11-6-4T	●					42	160					Fig.1				
	050-S42-11-7-4T	●		7	28	50		170	75	64		-7°	Fig.2				
	050-S42-11-7-6T	●	6		42												
MECH	040-S32-17-4-2T	●	2	4	8	40	32	160	73	59	+19°	-7°	Fig.2	SB-4070TRN	DTM-15	MP-1	BDMT170408ER-N3 BDMT170408ER-N4
	040-S42-17-4-2T	●					42	170					Fig.1				
	050-S42-17-5-4T	●	4	5	20	50		185	88	74			Fig.2				

추천 절삭조건 For recommended cutting conditions, see page ➔ P12

소착 방지제 (MP-1)는 팁을 고정할 때 클램프 스크류에 도포하여 주십시오. Coat Anti-seize Compound (MP-1) thinly on clamp screw when insert is fixed.

■ MECH형 쉘밀 (오일홀 없음) Shell Mill (No coolant hole)

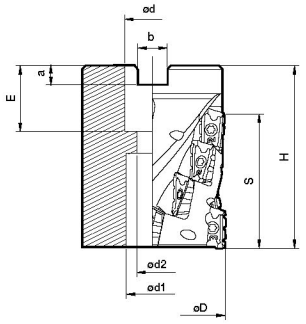


Fig.1

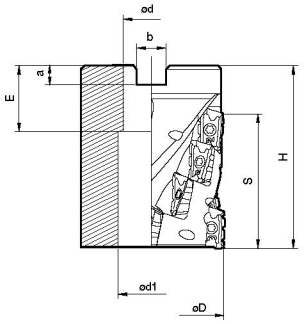


Fig.2

경사각(°) Rake Angle 규격 Description	A.R. (MAX)	R.R.
MECH•••-11-	+23°	-8°
MECH•••-17-	+19°	-7°

●치수 Toolholder Dimension

규격 Description		재고 Stock	날열 No. of Flute	단수 No. of Stage	날수 No. of Insert	치수(mm) Dimension(mm) øD	ød	ød1	ød2	H	E	a	b	S	형상 Shape	부품 Spare Parts 클램프 스크류 Clamp Screw	렌치 Wrench	소착 방지제 Anti-seize Compound	커터 장착 볼트 Mounting bolt	적합 팁 Applicable Insert ➔ P5 ➔ P11
MECH	040R-11-4-4T-M	●	4	4	16	40	16	15	9	50	19	5.6	8.4	37	Fig.1	SB-2555TRG	DTM-8	MP-1	HH8X25	BDMT11T308ER-N2 BDMT11T308ER-N3
	050R-11-5-6T-M	●	6	5	30	50	22	18	11	63	21	6.3	10.4	46					HH10X30	
MECH	050R-17-2-4T-M	●	4	2	8	50	22	18	11	52	21	6.3	10.4	30		SB-4070TRN	DTM-15	MP-1	HH10X30	BDMT170408ER-N3 BDMT170408ER-N4
	050R-17-4-4T-M	●	4	4	16					78				59					HH10X40	
	063R-17-3-4T-M	●	4	3	12	63	27	20	14	70	24	7	12.4	45					HH12X40	
	080R-17-4-6T-M	●	6	4	24	80	32	26	18	85	28	8	14.4	59					HH16X45	
	100R-17-4-6T-M	●	6	4	24	100	40	56	-	85	30	9	16.4	59	Fig.2				-	
MECH	063R-17-3-4T	●	4	3	12	63	25.4	20	14	70	26	6	9.5	45	Fig.1	SB-4070TRN	DTM-15	MP-1	HH12X40	
	080R-17-4-6T	●	6	4	24	80	31.75	26	18	85	32	8	12.7	59					HH16X45	
	100R-17-4-6T	●	6	4	24	100	38.1	56	-	85	38	10	15.9	59	Fig.2				-	

추천 절삭조건 For recommended cutting conditions, see page ➔ P12

소착 방지제 (MP-1)는 팁을 고정할 때 클램프 스크류에 도포하여 주십시오. Coat Anti-seize Compound (MP-1) thinly on clamp screw when insert is fixed.

● : 표준재고 ● : Standard Stock

■ MECH-BT50형 (아바 일체형 : 오일홀 없음)(Integral Arbor Type: No coolant hole)

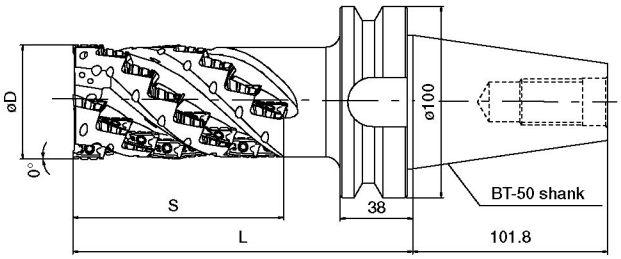


Fig.1

●치수 Toolholder Dimension

규격 Description		재고 Stock	날열 No. of Flute	단수 No. of Stage	날수 No. of Insert	치수(mm) Dimension(mm) øD	L	S	경사각(°) Rake Angle A.R. (MAX)	R.R.	형상 Shape	부품 Spare Parts 클램프 스크류 Clamp Screw	렌치 Wrench	소착 방지제 Anti-seize Compound	적합 팁 Applicable Insert ➔ P5 ➔ P11
MECH	050R11-8-4T-BT50	●	4	8	32	50	143	73	+23°	-7°	Fig.1	SB-2555TRG	DTM-8	MP-1	BDMT11T308ER-N2 BDMT11T308ER-N3
MECH	050R17-7-4T-BT50	●	4	7	28	50	173	104	+19°	-7°		SB-4070TRN	DTM-15	MP-1	BDMT170408ER-N3 BDMT170408ER-N4
	063R17-7-4T-BT50	●				63									
	080R17-7-4T-BT50	●				80									
	100R17-7-6T-BT50	●	6		42	100									

추천 절삭조건 For recommended cutting conditions, see page ➔ P12

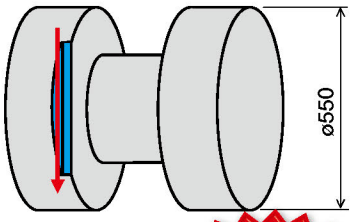
소착 방지제 (MP-1)는 팁을 고정할 때 클램프 스크류에 도포하여 주십시오. Coat Anti-seize Compound (MP-1) thinly on clamp screw when insert is fixed.

■가공 실예 – 생산성 향상·가공시간 단축을 실현– Case studies Achievement of productivity improvement and machining time reduction

S45C

- 선박용 연결 핀 Ship parts
- Vc=150m/min ($n=955min^{-1}$)
- ap x ae=70mm x 10mm
- fz=0.2mm/t
- Vf=764mm/min
- 건식 Dry
- MECH050-S42-17-5-4T
- 4날열 4 Flutes
- BDMT170408ER-N3
- BDMT170408ER-N4

PR830



생산성 향상 4.6배! Advancing Productivity

MECH 칩 배출량 Q=534cc/분 Chip removal Q=534cc/min.

타사품C Comp. C 칩 배출량 Q=115cc/분 Chip removal Q=115cc/min.

·타사품C의 칩 배출량 Q=115cc/분에 비해, MECH의 칩 배출량은 Q=534cc/분 으로 생산성이 4.6배 향상

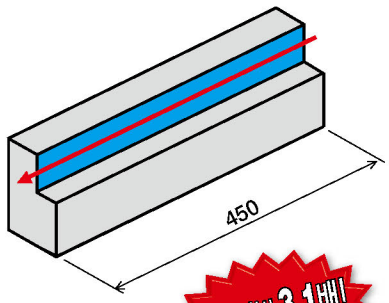
·Comp. C removed 115cc of chips per minute. In contrast, MECH removed 534cc per minute. Machining productivity improved to 4.6 times.

고객 평가 Evaluation by the customer

SS400

- 플레이트 Plate
- Vc=150m/min ($n=955min^{-1}$)
- ap x ae=70mm x 10mm
- fz=0.2mm/t
- Vf=760mm/min
- 건식 Dry
- MECH050-S42-17-5-4T
- 4날열 4 Flutes
- BDMT170408ER-N3
- BDMT170408ER-N4

PR830



생산성 향상 3.1배! Advancing Productivity

MECH 칩 배출량 Q=532cc/분 Chip removal Q=532cc/min.

타사품D Comp. D 칩 배출량 Q=170cc/분 Chip removal Q=170cc/min.

·타사품D의 칩 배출량 Q=170cc/분에 비해, MECH의 칩 배출량은 Q=532cc/분 으로 생산성이 3.1배 향상. 또, 가공 벽면도 우수

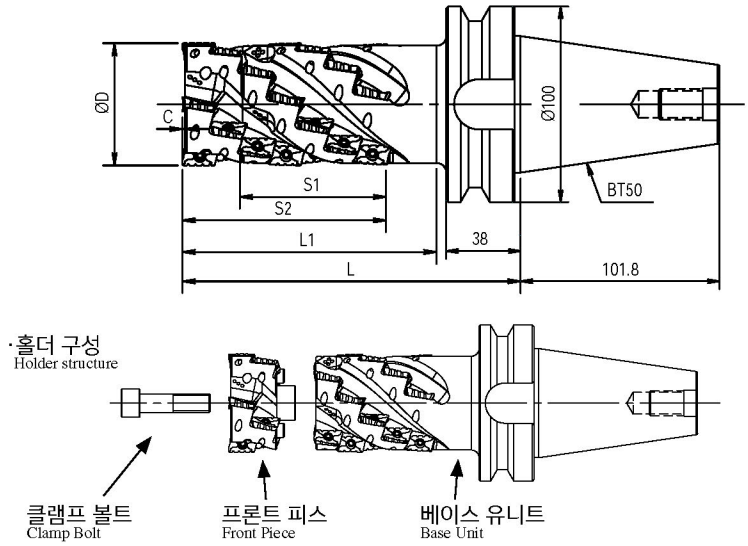
·Comp. D removed 170cc of chips per minute. In contrast, MECH removed 532cc per minute. Machining productivity improved to 3.1 times and finished wall condition was excellent.

고객 평가 Evaluation by the customer

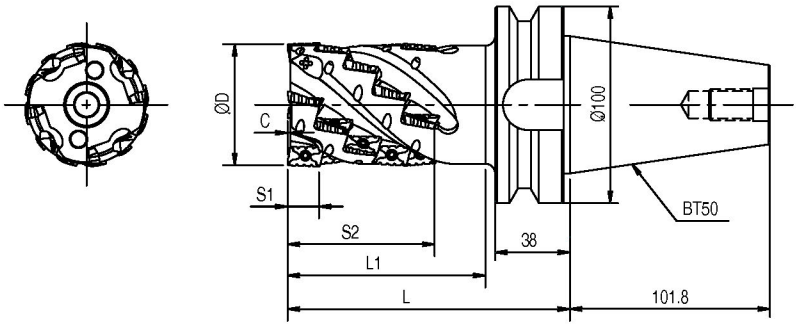
선단 교환식 MECH형 헬리컬 엔드밀 MECH Head Exchangeable Helical Endmill Type

■ MECH-BT50SA형(오일홀 없음) 아바 일체형 (베이스 유니트+프론트 피스 1개+클램프 볼트)

MECH-BT50SA (No coolant hole) Integral Arbor type (Base Unit+1Front Piece+Clamp Bolt)



■ MECH-BT50-A형(오일홀 없음) No coolant hole 베이스 유니트 Base Unit



●홀더 치수 Holder dimension

규격 Description			재고 Stock	날열 No. of Flute	단수 No. of Stage	날수 No. of Insert	치수(mm) Dimension(mm) øD	L	L1	C	S1	S2	경사각(°) Rake Angle A.R.	R.R.	무게(kg) Weight
NEW 아바 일체형 Integral Arbor type	MECH	050R11-4T-BT50SA	수	4	8	32	50	143	99	0.7	55	73	+23°	-7°	4.8
		063R17-4T-BT50SA	수		7	28	63	173	130	1.3	75	104	+19°	-7°	5.8
		080R17-4T-BT50SA	수				80								7.6
		100R17-6T-BT50SA	수	6	7	42	100								9.8
NEW 베이스 유니트 Base Unit	MECH	050R11-4T-BT50-A	수	4	6	24	50	125	81	0.7	10	55	+23°	-7°	4.6
		063R17-4T-BT50-A	수		5	20	63	143	100	1.3	16	75	+19°	-7°	5.4
		080R17-4T-BT50-A	수				80								6.8
		100R17-6T-BT50-A	수	6	5	30	100								8.5

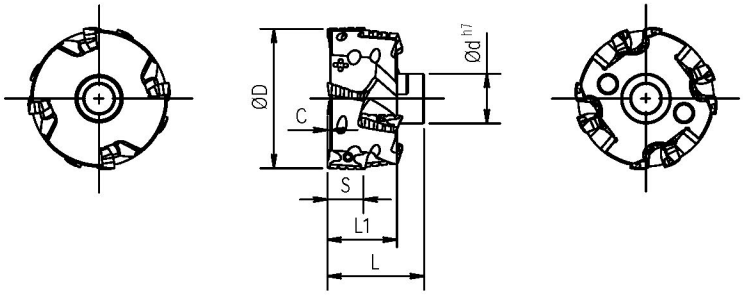
추천 절삭조건 For recommended cutting conditions, see page P12

●홀더 구성 Holder formation

엔드밀 규격 End Mill			베이스 유니트 ⇒ P9 Base Unit		프론트 피스 (1개) ⇒ P10 1Front Piece		클램프 볼트 Clamp Bolt
MECH	050R11-4T-BT50SA	=	MECH050R11-4T-BT50-A	+	MECH050R11-4T-F	+	HH12X35
	063R17-4T-BT50SA		MECH063R17-4T-BT50-A		MECH063R17-4T-F		HH12X40
	080R17-4T-BT50SA		MECH080R17-4T-BT50-A		MECH080R17-4T-F		HH16X40
	100R17-6T-BT50SA		MECH100R17-6T-BT50-A		MECH100R17-6T-F		HH20X40

수 : 주문사양 Made to order

■ MECH-F형 (오일홀 없음) No coolant hole 프론트 피스 Front Piece



●홀더 치수 Toolholder Dimensions

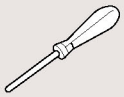
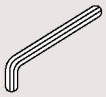
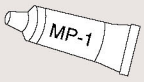
규격 Description		재고 Stock	날열 No. of Flute	단수 No. of Stage	날수 No. of Insert	치수(mm) Dimension(mm)						경사각(°) Rake Angle		무게(kg) Weight
						øD	ød	L	L1	C	S	A.R.	R.R.	
MECH	050R11-4T-F	●	4	2	8	50	22	32	18	0.7	10	+23°	-7°	0.2
NEW	063R17-4T-F	●				63	22	44	30	1.3	16	+19°	-7°	0.4
	080R17-4T-F	●				80	32							0.8
	100R17-6T-F	●	6	2	12	100	45							1.3

●적합 팁 Applicable Inserts

엔드밀 규격 End Mill		베이스 유니트 Base Unit	프론트 피스 Front Piece	적합 팁 ⇒ P5 Applicable Inserts
MECH	050R11-4T-BT50SA	MECH050R11-4T-BT50-A	MECH050R11-4T-F	BDMT11T308ER-N2 BDMT11T308ER-N3
	063R17-4T-BT50SA	MECH063R17-4T-BT50-A	MECH063R17-4T-F	
	080R17-4T-BT50SA	MECH080R17-4T-BT50-A	MECH080R17-4T-F	BDMT170408ER-N3 BDMT170408ER-N4
	100R17-6T-BT50SA	MECH100R17-6T-BT50-A	MECH100R17-6T-F	

· 니크팁을 사용하는 경우는 반드시 P11 를 참조하여 주십시오 . For installation of notched insert, make sure tosee P11

●부품 Spare Parts

규격 Description			부품 Spare Parts				
			클램프 스크류 Clamp Screw	렌치 (클램프 스크류用) Wrench (for Clamp Screw)	클램프 볼트 Clamp Bolt	렌치 (클램프 볼트용) Wrench (for Clamp Bolt)	소착 방지제 Anti-seize Compound
							
아바 일체형 (세트) Integral Arbor type (Unit)	MECH	050R11-4T-BT50SA	SB-2555TRG	DTM-8	HH12X35	LW-10	MP-1
		063R17-4T-BT50SA	SB-4070TRN	DTM-15	HH12X40	LW-10	
		080R17-4T-BT50SA			HH16X40	LW-14	
		100R17-6T-BT50SA			HH20X40	LW-17	
베이스 유니트 Base Unit	MECH	050R11-4T-BT50-A	SB-2555TRG	DTM-8	HH12X35	LW-10	
		063R17-4T-BT50-A	SB-4070TRN	DTM-15	HH12X40	LW-10	
		080R17-4T-BT50-A			HH16X40	LW-14	
		100R17-6T-BT50-A			HH20X40	LW-17	
프론트 피스 Front Piece	MECH	050R11-4T-F	SB-2555TRG	–	–	–	
		063R17-4T-F	SB-4070TRN				
		080R17-4T-F					
		100R17-6T-F					

·프론트 피스만 구입 할 경우, 렌치(클램프 스크류용) /클램프 볼트 및 렌치 (클램프 볼트용) 은 부속되어 있지 않습니다.
If front piece is only purchased, wrench (for clamp screw)/clamp bolt or wrench (for clamp bolt) is not attached.

소착 방지제 (MP-1)는 팁을 고정할 때 클램프 스크류에 도포하여 주십시오. •Coat Anti-seize Compound (MP-1) thinly on clamp screw when insert is fixed.

■ 팁 장착 개수 표

Number of Inserts Installed

규격 Description		날열 No. of Flute	날수 No.of Isert	장착 개수 No. of Inserts Installed			
				BDMT11T308ER-		BDMT170408ER-	
				N2	N3	N3	N4
MECH	025-S25-11-4-2T	2	8	4	4	-	-
	032-S32-11-5-2T		10	5	5		
	032-S32-11-5-4T	4	20	10	10		
	040-S32-11-6-4T		24	12	12		
	040-S42-11-6-4T						
	050-S42-11-7-4T		28	14	14		
	050-S42-11-7-6T	6	42	21	21		
MECH	040-S32-17-4-2T	2	8	-	-	4	4
	040-S42-17-4-2T						
	050-S42-17-5-4T	4	20			10	10
MECH	040R-11-4-4T-M	4	16	8	8	-	-
	050R-11-5-6T-M	6	30	15	15		
MECH	050R-17-2-4T-M	4	8	-	-	4	4
	050R-17-4-4T-M		16			8	8
	063R-17-3-4T-M		12			6	6
	080R-17-4-6T-M	6	24			12	12
	100R-17-4-6T-M						
MECH	063R-17-3-4T	4	12			6	6
	080R-17-4-6T	6	24			12	12
	100R-17-4-6T						
MECH	050R11-8-4T-BT50	4	32	16	16	-	-
	050R17-7-4T-BT50		28	-	-	14	14
	063R17-7-4T-BT50						
	080R17-7-4T-BT50						
	100R17-7-6T-BT50	6	42			21	21

규격 Description		날열 No. of Flute	날수 No.of Isert	장착 개수 No. of Inserts Installed			
				BDMT11T308ER-		BDMT170408ER-	
				N2	N3	N3	N4
MECH	050R11-4T-BT50SA	4	32	16	16	-	-
	063R17-4T-BT50SA	4	28	-	-	14	14
	080R17-4T-BT50SA						
	100R17-6T-BT50SA	6	42	-	-	21	21
MECH	050R11-4T-BT50-A	4	24	12	12	-	-
	063R17-4T-BT50-A	4	20	-	-	10	10
	080R17-4T-BT50-A						
	100R17-6T-BT50-A	6	30	-	-	15	15
MECH	050R11-4T-F	4	8	4	4	-	-
	063R17-4T-F	4	8	-	-	4	4
	080R17-4T-F						
	100R17-6T-F	6	12	-	-	6	6

■ 니크팁 장착상의 주의점

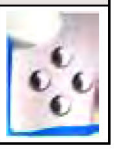
Precautions when installing inserts with notched.

1. 니크팁은 홀더 본체 1단째의 각점의 수와 팁 상면의 번호를 맞춰서 장착하여 주십시오.

Install notched inserts by matching the insert with the number of marks on the holder body.

< 팁 번호와 각점의 대응표 >

< Insert Number and Holder Marks >

팁 사이즈 Insert Size	11 Type		17 Type	
팁 번호 Insert Number	2	3	3	4
각 점 Marks				

※잘못된 장착으로의 사용은 홀더 파손의 원인이 됩니다.

※ Using the cutter with the inserts installed incorrectly will damage the holder.

2. 동일 날열에 장착한 니크팁은 상면 번호가 1단째와 같은 팁을 사용하여 주십시오. (그림-1, 그림-2, 그림-3 참조)

When installing notched inserts in flute line, ensure that the number on the insert is the same as the insert in first stage. See Fig.1, 2 and 3.

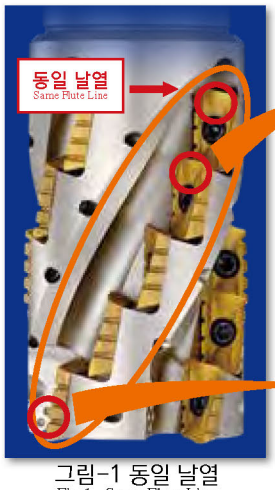


그림-1 동일 날열
Fig.1 Same Flute Line

그림-2 팁 번호
Fig.2 Insert Number

그림-3 각점
Fig.3 Marks

■ 추천 절삭조건 (니크팁을 사용) Recommended Cutting Conditions

피삭재 Workpiece Material	이송 (mm/t) Feed per tooth(mm/t)	추천 팁 재종 (절삭속도 m/min) Insert Grade (Cutting Speed : m/min)				
		MEGACOAT			PVD코팅 PVD Coated Carbide	
		PR1225	PR1230	PR1210	PR830	PR905
탄소강 (SxxC) Carbon Steel	0.08~0.1~0.15	☆ 120~180~250	★ 120~180~220	-	☆ 100~140~180	-
합금강 (SCM 등) Alloy Steel	0.08~0.1~0.15	☆ 100~160~220	★ 100~160~200	-	☆ 100~140~180	-
금형강 (SKD/NAK 등) Die Steel	0.08~0.1~0.15	☆ 80~140~180	★ 80~140~160	-	☆ 100~120~150	-
회주철 (FC) Gray Cast Iron	0.08~0.15~0.18	-	-	★ 120~180~250	-	☆ 100~140~180
덕타일 주철 (FCD) Nodular Cast Iron	0.08~0.15~0.18	-	-	★ 100~150~220	-	☆ 100~120~150
티탄합금 (Ti-6Al-4V) Titanium Alloy	0.08~0.1~0.15	-	-	★ 30~50~70	-	☆ 20~35~50

※ 티탄합금은 습식가공을 추천 Wet cut is recommended for Titanium Alloy

★:1차 추천 ☆:2차 추천
★:1st Recommendation ☆:2nd Recommendation

1. 상기 추천 절삭조건은 니크팁 사용시 입니다.
   Above recommended cutting condition is for notched insert applied case.
2. 니크 없는 팁을 사용하는 경우는, 종절입량 (ap) 및 횡절입량 (ae) 을 니크팁 사용시 60% 이하로 하여 주십시오.
   If non notched insert is used, ap and ae parameter is needed under 60% compared with notched insert.

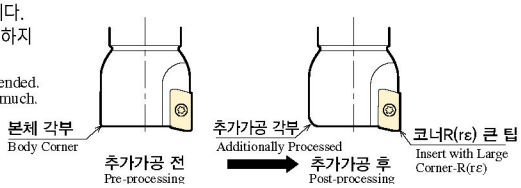
·JA브레이커 JA Chipbreaker

피삭재 Workpiece Material	이송 (mm/t) Feed per tooth(mm/t)	추천 팁 재종 (절삭속도 m/min) Insert Grade (Cutting Speed : m/min)
		초경 Carbide
		GW25
알루미늄 합금 (Si 13% 이하) Aluminum alloy(Si less 13%)	0.05~0.3	200~800
알루미늄 합금 (Si 13% 이상) Aluminum alloy(Si over 13%)	0.05~0.2	200~300

■ 코너R (rε) 1.6이상의 팁을 장착하는 경우 본체에 추가가공이 필요합니다. 아래표 치수를 기준으로 본체 각부에 추가가공을 하여 주십시오. (코너R 1.2 (rε) 이하의 경우 추가가공은 불필요)
When using an insert with corner-radius 1.6mm or larger, additional processing may be necessary. Apply additional processing to the body corner according to the chart. If corner-radius is 1.2mm, additional processing is not needed.

팁 코너R (rε) Insert Corner-R(rε)	본체 각부에 추가가공 치수 (mm) Additional Processing Dimension (mm) to Body Corner
1.6	R1.0
2.0	
2.4	R1.2
3.1	R1.6
4.0	R2.5

※본체 각부에의 후가공은 R형상을 추천합니다.
면취로 후가공을 하는 경우는 너무 과하게 하지 마십시오.
Round- shaped additional processing is recommended.
When applying chamfer, do not cut away too much.

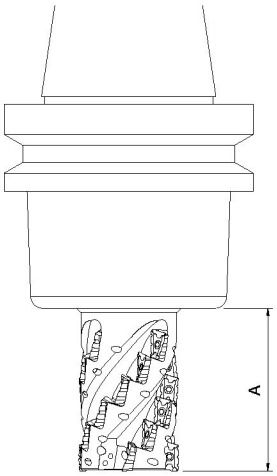


■절삭 능력 Cutting Performance (사용 기계 : AC15/18.5kW 상당의 머시닝센터 Used Machine:Machining center equivalent to AC15/18.5kw)

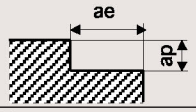
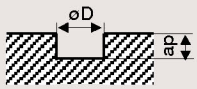
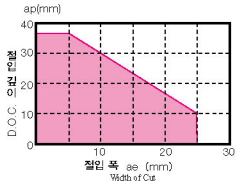
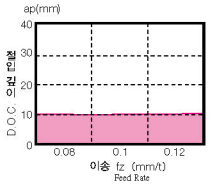
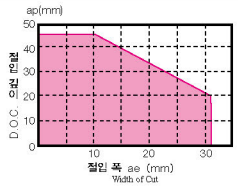
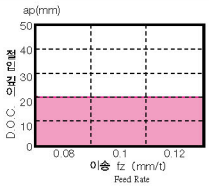
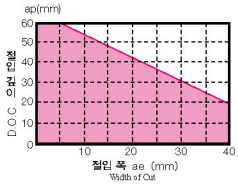
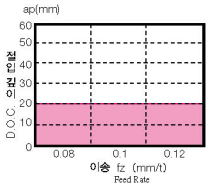
● MECH형 엔드밀 MECH Endmill Type

가공경 Cutting Dia.	규격 Description	홀더 돌출 치수A(mm) Overhang Length:A(mm)
ø25	MECH025-S25-11-4-2T	48
ø32	MECH032-S32-11-5-2T	57
	MECH032-S32-11-5-4T	
ø40	MECH040-S32-11-6-4T	65
	MECH040-S42-11-6-4T	
ø50	MECH050-S42-11-7-4T	76
	MECH050-S42-11-7-6T	
ø40	MECH040-S32-17-4-2T	74
	MECH040-S42-17-4-2T	
ø50	MECH050-S42-17-5-4T	89

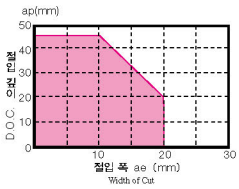
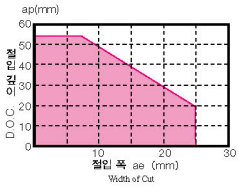
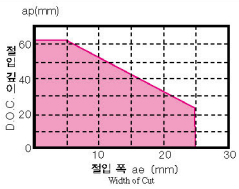
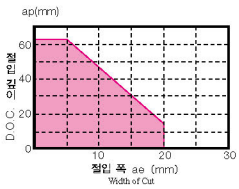
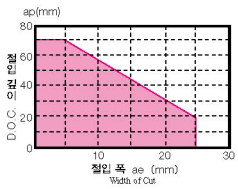
형상 Shape



2날열의 경우 2 Flute Type (피삭재 Work Material:S50C)

규격 Description	■숄더링의 경우 Shouldering	■홈가공의 경우 Grooving
		
	절삭속도 Cutting Speed : Vc=100~180m/min 이송 Feed : f z =0.08~0.15mm/t	절삭속도 Cutting Speed : Vc=100~120m/min 이송 Feed : f z =0.08~0.12mm/t
MECH025-S25-11-4-2T		
MECH032-S32-11-5-2T		
MECH040-S32-17-4-2T MECH040-S42-17-4-2T		

4날열/6날열의 경우 4 Flute / 6 Flute Type

MECH032-S32-11-5-4T	
MECH040-S32-11-6-4T MECH040-S42-11-6-4T	
MECH050-S42-11-7-4T	
MECH050-S42-11-7-6T	
MECH050-S42-17-5-4T	

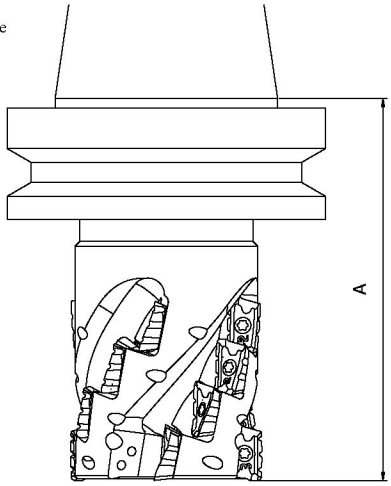
4날열/6날의 경우, 홈가공은 추천하지 않습니다. 4 Flute / 6 Flute Type are not recommended for grooving.

● MECH형 엔드밀 MECH Shell Mill Type

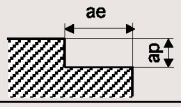
(피삭재 Work Material:S50C)

가공경 Cutting Dia.	규격 Description	홀더 돌출 치수A(mm) Overhang Length:A(mm)
ø40	MECH040R-11-4-4T-M	125
ø50	MECH050R-11-5-6T-M	123
	MECH050R-17-2-4T-M	112
	MECH050R-17-4-4T-M	138
ø63	MECH063R-17-3-4T-M	115
	MECH063R-17-3-4T	115
ø80	MECH080R-17-4-6T-M	130
	MECH080R-17-4-6T	130
ø100	MECH100R-17-4-6T-M	130
	MECH100R-17-4-6T	130

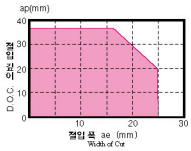
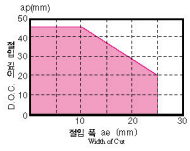
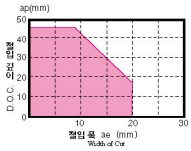
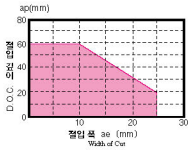
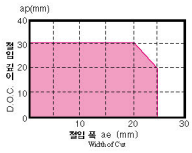
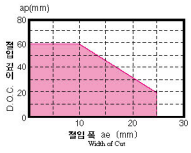
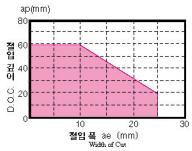
형상 Shape



■숄더링의 경우
Shouldering



절삭속도 Cutting Speed :Vc=100~180m/min
이송 Feed : f z =0.08~0.15mm/t

MECH040R -11-4-4T-M		MECH063R -17-3-4T-○	
MECH050R -11-5-6T-M		MECH080R -17-4-6T-○	
MECH050R -17-2-4T-M		MECH100R -17-4-6T-○	
MECH050R -17-4-4T-M			

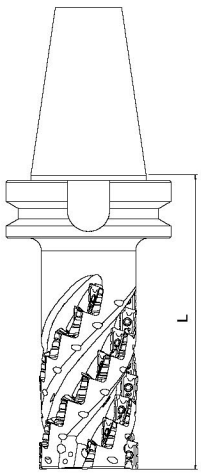
홈가공은 추천하지 않습니다.
Type are recommended for grooving.

● MECH-BT50형 (아바 일체형) MECH-BT50 Type (Integral Arbor type)
● MECH-BT50SA형 (선단 교환식·아바 일체형) MECH-BT50SA Type (Head Exchangeable / Integral Arbor type)

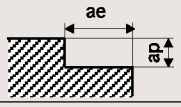
(피삭재 Work Material:S50C)

가공경 Cutting Dia.	규격 Description	홀더 돌출 치수L(mm) Overhang Length:L(mm)
ø50	MECH050R11-8-4T-BT50	143
	MECH050R11-4T-BT50SA	
	MECH050R17-7-4T-BT50	173
ø63	MECH063R17-7-4T-BT50	
	MECH063R17-4T-BT50SA	
ø80	MECH080R17-7-4T-BT50	
	MECH080R17-4T-BT50SA	
ø100	MECH100R17-7-6T-BT50	
	MECH100R17-6T-BT50SA	

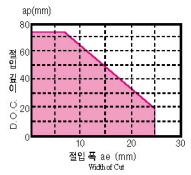
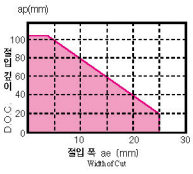
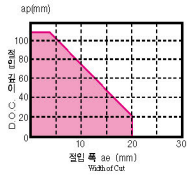
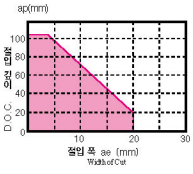
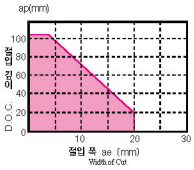
형상 Shape



■숄더링의 경우
Shouldering

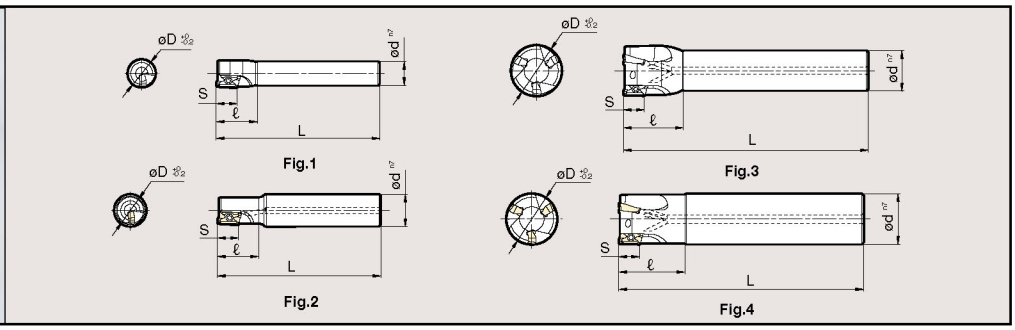


절삭속도 Cutting Speed :Vc=100~180m/min
이송 Feed : f z =0.08~0.15mm/t

MECH050R11 -8-4T-BT50 MECH050R11 -4T-BT50SA		MECH080R17 -7-4T-BT50 MECH080R17 -4T-BT50SA	
MECH050R17 -7-4T-BT50		MECH100R17 -7-6T-BT50 MECH100R17 -6T-BT50SA	
MECH063R17 -7-4T-BT50 MECH063R17 -4T-BT50SA			

홈가공은 추천하지 않습니다.
Type are recommended for grooving.

■MEC형 엔드밀 Endmill



●치수 Toolholder Dimension

	규격 Description		재고 Stock	날수 No.of Insert	치수(mm) Dimension(mm) øD	ød	L	ℓ	S	경사각(°) Rake Angle A.R. (MAX)	R.R.	쿨런트홀 Coolant Hole	형상 Shape	부품 Spare Parts 클램프 스크류 Clamp Screw	렌치 Wrench	적합 팁 Applicable Insert ➡ P5,P6	최대 회전수 (min⁻¹) Max. Revolution
보통 자루 Standard Shank	MEC	10-S10-11	●	1	10	10	80	17	10	+10°	-24°	무 No	Fig.1	SB-2545TR	DTM-8	BDMT1103	54,800
		10-S16-11	●			16						유 Yes	Fig.2				
		12-S10-11	●		12	10		20		+12°	-21°	무 No	Fig.1				50,800
		12-S12-11	●			12											
		12-S16-11	●			16						유 Yes	Fig.2				
		13-S12-11	●		13	12					-19°	무 No	Fig.1				49,200
		14-S12-11	●		14												47,700
		14-S16-11	●			16						유 Yes	Fig.2				
	MEC	16-S12-11T	●	2	16	12	100	23	10	+18°	-14°	무 No	Fig.1	SB-2555TRG	DTM-8	BDMT11T3 BDGT11T3	43,750
		17-S16-11T	●		17	16					-13°	유 Yes	Fig.3				43,500
		18-S16-11T	●		18					+19°							43,000
		19-S16-11T	●	3	19			26		+20°	-10°						42,000
		20-S16-11T	●		20		110										41,000
		21-S20-11T	●		21	20					-9°						40,300
		22-S20-11T	●		22					+21°	-10°						39,600
		24-S20-11T	●		24		120	29									38,200
		25-S20-11T	●		25												37,500
		28-S25-11T	●		28	25				+22°	-9°						35,800
		30-S25-11T	●	4	30		130	32		+23°							34,800
		32-S25-11T	●		32												33,900
		40-S32-11T	●	5	40	32	150	50			-8°						30,000
		50-S32-11T	●		50						-7°						22,500
배어울림 자루 Same Shank Size	MEC	16-S16-11T	●	2	16	16	100	30	10	+18°	-14°	유 Yes	Fig.4	SB-2555TRG	DTM-8	BDMT11T3 BDGT11T3	43,750
		20-S20-11T	●	3	20	20	110			+20°	-10°						41,000
		25-S25-11T	●		25	25	120	32		+21°							37,500
		32-S32-11T	●	4	32	32	130	40		+23°	-9°						33,900
롱 자루 Long Shank	MEC	20-S18-170-11T	●	2	20	18	170	30	10	+20°	-10°	유 Yes	Fig.3	SB-2555TRG	DTM-8	BDMT11T3 BDGT11T3	41,000
		20-S20-140-11T	●			20	140	60					Fig.4				
		20-S20-170-11T	●				170										
		22-S20-170-11T	●		22			30		+21°			Fig.3				39,600
		25-S23-210-11T	●		25	23	210	32									37,500
		25-S25-160-11T	●			25	160	60					Fig.4				
		25-S25-210-11T	●				210										
		28-S25-210-11T	●		28			32		+22°	-9°		Fig.3				35,800
		32-S30-250-11T	●		32	30	250	40		+23°							33,900
		32-S32-200-11T	●			32	200	65					Fig.4				
		32-S32-250-11T	●				250										
		35-S32-250-11T	●		35			40					Fig.3				32,600
		40-S32-240-11T	●		40		240	65			-8°						30,000
보통 Standard	MEC	25-S20-17	●	2	25	20	120	36	15.7	+16°	-11°	유 Yes	Fig.3	SB-4070TRN	DTM-15	BDMT1704 BDGT1704	35,000
		32-S25-17	●	3	32	25	130	40		+17°	-7°						30,000
		40-S32-17	●	4	40	32	150	50		+19°							25,000
		50-S32-17	●		50												17,000
배어울림 Same Size	MEC	25-S25-17	●	2	25	25	120	36	15.7	+16°	-11°	유 Yes	Fig.4	SB-4070TRN	DTM-15		35,000
		32-S32-17	●	3	32	32	130	40		+17°	-7°						30,000
롱 Long	MEC	25-S25-160-17	●	2	25	25	160	60	15.7	+16°	-11°	유 Yes	Fig.4	SB-4070TRN	DTM-15		35,000
		25-S25-210-17	●				210										
		28-S25-210-17	●		28			36					Fig.3				32,500
		32-S32-200-17	●		32	32	200	65		+17°	-7°		Fig.4				30,000
		32-S32-250-17	●				250										
		35-S32-250-17	●		35			40					Fig.3				27,700
		40-S32-240-17	●		40		240	65		+19°							25,000

■최대 회전수의 표기에 대해서 Maximum Revolution

엔드밀을 잘못하여 최고 회전수 이상으로 회전시키는 경우, 원심력에 의해 팁과 부품의 비산등이 발생하는 경우가 있습니다. P17의 경고를 참조하여 주십시오.

When running the endmill and cutter at the maximum revolution, the insert or holder may be damaged by centrifugal force. For more details, see "Warning" on page 17.

추천 절삭조건 For recommended cutting conditions, see page ➡ P17

●: 표준재고 ●: Standard Stock

■MEC형 페이스밀 Face Mill

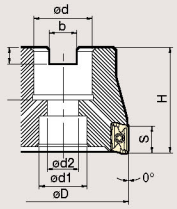


Fig.1

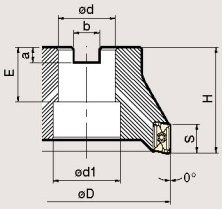
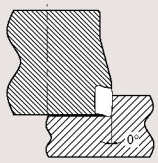


Fig.2

경사각 (°) Rake Angle
11타입 Type A.R.(MAX): +23° R.R. : -7°
17타입 Type A.R.(MAX): +19° R.R. : -7°



●치수 Toolholder Dimension

	규격 Description	재고 stock	날수 No. of Insert	치수 (mm) Dimension øD	ød	ød1	ød2	H	E	a	b	S	쿨런트 홀 Coolant Hole	형상 Shape	중량 (Kg) Weight	부품 Spare Parts: 클램프 스크류 Clamp Screw	부품 Spare Parts: 렌치 Wrench	최대 회전수 (min-1) Max.Revolution
표준타입 Standard	MEC 040R-11-5T-M	●	5	40	16	14	8.5	40	20	5.5	8.5	10	유 Yes	Fig.1	0.3	SB-2555TRG	DTM-8	30,000
	050R-11-5T-M	●	5	50	22	18	12		22	6.3	10.4				0.4			22,500
	063R-11-6T-M	●	6	63											0.6			20,500
	063R-11-6T	●	6	63	25.4	20	14	50	26	6	9.5				0.8			20,500
	080R-11-7T	●	7	80											1.0			18,500
	100R-11-9TN	●	9	100	31.75	26	17.6	63	32	8	12.7				1.8			17,000
	125R-11-11T	●	11	125	38.1	45	32		38	10	15.9				3.4			15,000
	160R-11-14T	●	14	160	50.8	70	–		47	10	19.1			Fig.2	4.4			13,900
다피치 타입 Fine pitch	MEC 050R-11-7T-M	●	7	50	22	18	12	40	22	6.3	10.4	10	유 Yes	Fig.1	0.4	SB-2555TRG	DTM-8	22,500
	063R-11-8T-M	●	8	63											0.6			20,500
	063R-11-8T	●	8	63	25.4	20	14	50	26	6	9.5				0.8			20,500
	080R-11-10T	●	10	80											1.0			18,500
표준타입 Standard	MEC 040R-17-4T-M	●	4	40	16	14	8.5	40	20	5.5	8.5	15.7	유 Yes	Fig.1	0.3	SB-4070TRN	DTM-15	25,000
	050R-17-4T-M	●	4	50	22	18	12		22	6.3	10.4				0.4			17,000
	063R-17-5T-M	●	5	63											0.6			14,500
	063R-17-5T	●	5	63	25.4	20	14	50	26	6	9.5				0.8			14,500
	080R-17-6T	●	6	80											1.0			12,000
	100R-17-7TN	●	7	100	31.75	26	17.6	63	32	8	12.7				1.8			10,500
	125R-17-9T	●	9	125	38.1	45	32		38	10	15.9				3.4			8,900
	160R-17-12T	●	12	160	50.8	70	–		47	10	19.1			Fig.2	4.5			7,400
다피치 타입 Fine pitch	MEC 050R-17-5T-M	●	5	50	22	18	12	40	22	6.3	10.4	15.7	유 Yes	Fig.1	0.4	SB-4070TRN	DTM-15	17,000
	063R-17-6T-M	●	6	63											0.6			14,500
	063R-17-6T	●	6	63	25.4	20	14	50	26	6	9.5				0.8			14,500
	080R-17-8T	●	8	80											1.0			12,000
	100R-17-9TN	●	9	100	31.75	26	17.6	63	32	8	12.7				1.8			10,500

추천 절삭조건 For recommended cutting conditions, see page ➔ P17

■최고 회전수의 표기에 대해 Maximum Revolution

엔드밀 및 커터를 잘못해 최대 회전수 이상으로 회전시켰을 경우, 원심력에 으해 팁이나 부품의 비산등이 생기는 경우가 있습니다. P17의 경고를 참조하여 주십시오.

When running the endmill and cutter at the maximum revolution, the insert or holder may be damaged by centrifugal force. For more details, see "Warning" on page 17.

●센터쓰루 에어 (쿨런트, 미스트) 사용상의 주의점

When using Center-through Air / Coolant /Mist

센터쓰루 에어(쿨런트, 미스트)를 사용하는 경우는 그것에 대응하는 아바를 사용하여 동봉되어 있는 아바 장착용 볼트(표-1)로 클램프 하여 주십시오.

If Center Through air (Coolant, Mist) is used, please use appropriate arbor and clamp with arbor bolt. (Table1)

표1 (Table1)

홀더 규격 Holder Description	아바 장착용 볼트 (부속품) Arbor attachment Bolt (Attachment)	렌치 Wrench
MEC040R·····-M	HH8×25H	LW-5 (이면폭5mm) Double width
MEC050R·····-M MEC063R·····-M	HH10×30H	LW-6 (이면폭6mm) Double width
MEC063R···· MEC080R····	HH12×35H	LW-8 (이면폭8mm) Double width
MEC100R·····-N	HH16×52H	LW-12 (이면폭 12mm) Double width
MEC125R····	HF20×53H	LW-14 (이면폭 14mm) Double width
MEC160R····	HF24×60H	LW-17 (이면폭 17mm) Double width

렌치는 부속이 아니므로 별도로 구입하여 주십시오.

Wrench is not included. Purchase separately.

●MEC형 페이스밀의 다단 절입에 의한 숄더링 정삭면에 대해서

MEC's surface finish when shouldering with multiple passes

MEC형 페이스밀에 의한 다단 절입에서 매끈한 가공 벽면을 얻기 위해서는 11T3타입은 절입량 ap=5.5mm이내, 1704타입은 절입량 ap=9mm이내로 하여 주십시오.

In order to obtain smoothly finished shoulder wall with multiple passes keep less than 5.5mm for 11T3 type and also keep less than 9mm for 1704 type.

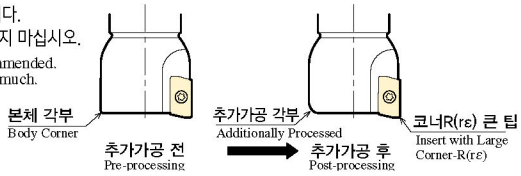
■ 코너R (rε) 1.6이상의 팁 장착의 경우, 본체에의 추가가공이 필요합니다. 아래표 치수를 참고하여 본체 각부에 추가가공을 하여 주십시오. (코너R1.2 (rε) 이하의 경우 추가가공 불필요)

When using an insert with corner-radius 1.6mm or larger, additional processing may be necessary. Apply additional processing to the body corner according to the chart. If corner-radius is 1.2mm, additional processing is not needed.

팁 코너R (rε) Insert Corner-R(rε)	본체 각부에의 추가가공 치수 (mm) Additional Processing Dimension (mm) to Body Corner
1.6	R1.0
2.0	
2.4	R1.2
3.1	R1.6
4.0	R2.5

※본체 각부에의 추가가공은 R형상을 추천합니다.
면취로 후가공을 하는 경우는 너무 과하게 하지 마십시오.

Round- shaped additional processing is recommended.
When applying chamfer, do not cut away too much.



● : 표준재고 ● : Standard Stock

■ 추천 절삭조건 Recommended Cutting Conditions

·JT브레이커 JT Chipbreaker

피삭재 Workpiece Material	이송 (mm/t) Feed per tooth(mm/t)		추천 팁 재종 (절삭속도 m/min) Insert Grade (Cutting Speed : m/min)				
	홀더 규격 Toolholder		써메트 Cermet	MEGACOAT		PVD코팅 PVD Coated Carbide	
	MEC10~MEC19	MEC20~MEC40 MEC40R~MEC160R	TN100M	PR1225	PR1210	PR830	PR905
스텐레스강 (SUS304 등) Stainless Steel	0.06~0.08~0.1	0.08~0.12~0.15	-	☆ 100~160~200	-	☆ 100~140~180	-
탄소강 (SxxC) Carbon Steel	0.06~0.1~0.15	0.08~0.15~0.25	☆ 120~160~200	★ 120~180~250	-	☆ 120~160~200	-
합금강 (SCM 등) Alloy Steel	0.06~0.1~0.12	0.08~0.15~0.2	☆ 100~140~180	★ 100~160~220	-	☆ 100~140~180	-
금형강 (SKD/NAK 등) Die Steel	0.06~0.08~0.1	0.08~0.12~0.2	☆ 80~120~150	★ 80~140~180	-	☆ 80~120~150	-
회주철 (FC) Gray Cast Iron	0.06~0.1~0.15	0.08~0.18~0.25	-	-	★ 120~180~250	-	☆ 100~140~180
덕타일 주철 (FCD) Nodular Cast Iron	0.06~0.08~0.1	0.08~0.15~0.2	-	-	★ 100~150~200	-	☆ 80~120~160
티탄합금 (Ti-6Al-4V) Titanium Alloy	0.06~0.08~0.1	0.08~0.15~0.2	-	-	★ 30~50~70	-	☆ 20~35~50

※ 티탄합금은 습식가공을 추천합니다. Wet cut is recommended for Titanium Alloy

★:1차 추천 ☆:2차 추천
★:1st Recommendation ☆:2nd Recommendation

·JS브레이커 JS Chipbreaker

피삭재 Workpiece Material	이송 (mm/t) Feed per tooth(mm/t)		추천 팁 재종 (절삭속도 m/min) Insert Grade (Cutting Speed : m/min)		
	홀더 규격 Toolholder		MEGACOAT	PVD코팅 PVD Coated Carbide	
	MEC10~MEC19	MEC20~MEC40 MEC40R~MEC160R	PR1225	PR830	PR1025
스텐레스강 (SUS304 등) Stainless Steel	0.06~0.08~0.1	0.08~0.1~0.12	★ 120~180~250	☆ 100~140~180	☆ 100~140~180
탄소강 (SxxC) Carbon Steel	0.06~0.1~0.12	0.08~0.15~0.18	★ 120~180~250	☆ 120~160~200	☆ 100~120~150
합금강 (SCM 등) Alloy Steel	0.06~0.08~0.1	0.08~0.12~0.15	★ 100~160~220	☆ 100~140~180	-
금형강 (SKD/NAK 등) Die Steel	0.06~0.08~0.1	0.08~0.1~0.12	★ 80~140~180	☆ 80~120~150	-

★:1차 추천 ☆:2차 추천
★:1st Recommendation ☆:2nd Recommendation

·JA브레이커 JA Chipbreaker

피삭재 Workpiece Material	이송 (mm/t) Feed per tooth(mm/t)	추천 팁 재종 (절삭속도 m/min) Insert Grade (Cutting Speed : m/min)
		초경 Carbide
		GW25
알루미늄 합금 (Si 13% 이하) Aluminum alloy(Si less 13%)	0.05~0.3	200~800
알루미늄 합금 (Si 13% 이상) Aluminum alloy(Si over 13%)	0.05~0.2	200~300

·다이아몬드PCD

피삭재 Workpiece Material	이송 (mm/t) Feed per tooth(mm/t)	추천 팁 재종 (절삭속도 m/min) Insert Grade (Cutting Speed : m/min)
		다이아몬드 PCD
		KPD230 (KPD001)
알루미늄 합금 (Si 13% 이하) Aluminum alloy(Si less 13%)	0.05~0.2	500~1,500
알루미늄 합금 (Si 13% 이상) Aluminum alloy(Si over 13%)	0.05~0.15	300~1,000

⚠경고 warning 아래 주의사항을 반드시 지켜 주십시오. 신체에 중대한 위험이 발생 할 가능성이 있습니다.
To avoid the significant hazard to you, we ask for your cooperation in carefully observing the following guidelines.

최고 회전수에 대한 주의사항 Warning about Maximum Revolution indicated on the Product

1. 카탈로그 및 제품에 게재되어 있는 최고 회전수를 초과한 회전수로 사용하지 마십시오. 팁과 부품의 비산, 혹은 바디의 파손이 발생할 가능성이 있습니다.
   If the tool is used over maximum recommended revolution the body of the tool may be broken by inserts and clamp screws which may be dispersed by centrifugal force.
2. 실제의 사용 회전수는 반드시 사용하는 팁의 추천 절삭조건 범위내로 설정하여 주십시오.
   Machine within the recommended cutting conditions of the insert.
3. 고속 회전 (10,000min^{-1} 이상) 에서 가공하는 경우는 공구 본체 아바의 조합을 우측표를 참고하여 밸런스 조정을 하여 주십시오.
   When using at higher revolution (over 10,000min^{-1}), refer to the table shown on the right to adjust the balance by combining MEC and suitable arbor.

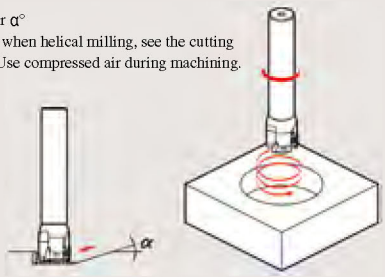
회전수 Max. Revolution (min^{-1})	JIS 등급 ISO 1940-1/8821 (JIS B0905)
~20,000	G16
~30,000	G6.3
30,000~	G2.5

●경사·헬리컬·버티컬 가공에 대해서 Note for Slant Milling, Helical Milling and Vertical Milling

경사 가공 · 헬리컬 가공
Slant Milling·Helical Milling

- 경사 가공의 각도는 α° 이하를 추천합니다.
- 헬리컬 가공 1회전당 경사 깊이는 각 공구의 절삭능력표를 참조하여 주십시오. 반드시, 에어블로우를 사용

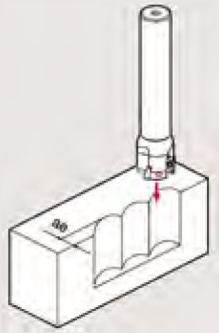
- Ramping Angle should be Under α°
- For plunge depth per revolution when helical milling, see the cutting performance data of each tool. Use compressed air during machining.



가공경 Cutting Dia.	적합 팁 규격 Applicable Insert	최대 경사각 (α°) Max.Ramping Angle(α°)
ø16~ø18	BDMT11T3 타입 BDGT11T3 타입	3°
ø19~ø21		5°
ø22~ø25		2.5°
ø28~ø32		1.5°
ø40		0.7°
ø50 이상 over		추천하지 않습니다. Not recommended
ø25	BDMT1704 타입 BDGT1704 타입	8°
ø32		5°
ø40		2.5°
ø50 이상 over		추천하지 않습니다. Not recommended

BDMT1103 타입은 경사가공·헬리컬 가공을 추천하지 않습니다.
BDMT1103 inserts are not recommended for Slant Milling or Helical Milling.

버티컬 가공
Vertical Milling



가공경 Cutting Dia.	적합 팁 규격 Applicable Insert	버티컬 최대 횡절입량 (ae) Max.W.O.C.(ae)
ø16 ~ ø19	BDMT11T3 타입 BDGT11T3 타입	1.5mm
ø20 ~ ø160	BDMT11T3 타입 BDGT11T3 타입	5mm
ø25 ~ ø160	BDMT1704 타입 BDGT1704 타입	8mm

BDMT1103 타입은 버티컬 가공을 추천하지 않습니다.
BDMT1103 inserts are not recommended for Vertical Milling.

●헬리컬 가공에 의한 최소 홀 가공경의 기준 Guidance of minimum cutting dia by helical machining.

MEC형	홀더 경 Holder Dia.	ø16	ø18	ø20	ø22	ø25	ø28	ø30	ø32	ø40	ø50
BD_T11T3 타입	헬리컬 가공에 의한 최소 홀 가공경의 기준 Guidance of minimum cutting dia by helical machining.	ø21	ø25	ø29	ø33	ø39	ø45	ø49	ø53	ø69	헬리컬 가공은 추천하지 않습니다. Helical machining is not recommended.
	헬리컬 가공 후, 바닥면을 평평하게 가공하는 경우의 최소 홀 가공경의 기준 Guidance of minimum cutting dia in case of flatting bottom after helical machining.	ø28	ø32	ø36	ø40	ø46	ø52	ø56	ø60	ø76	

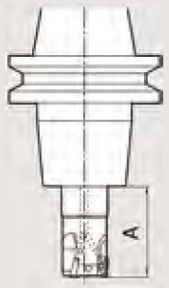
MEC형	홀더 경 Holder Dia.	ø25	ø32	ø40	ø50
BD_T1704 타입	헬리컬 가공에 의한 최소 홀 가공경의 기준 Guidance of minimum cutting dia by helical machining.	ø34	ø48	ø64	헬리컬 가공은 추천하지 않습니다. Helical machining is not recommended.
	헬리컬 가공 후, 바닥면을 평평하게 가공하는 경우의 최소 홀 가공경의 기준 Guidance of minimum cutting dia in case of flatting bottom after helical machining.	ø46	ø60	ø76	

●MEC형 엔드밀의 절삭능력 Cutting Performance of ULTRA HURRICANE ENDMILL

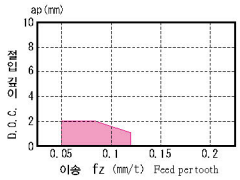
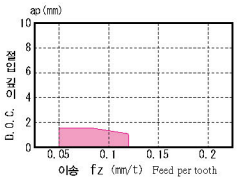
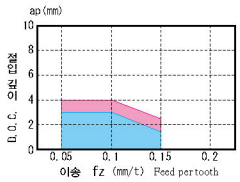
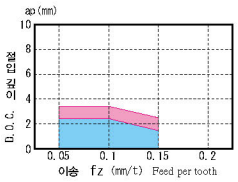
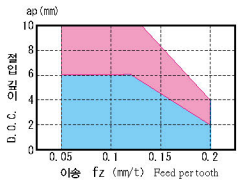
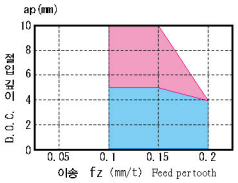
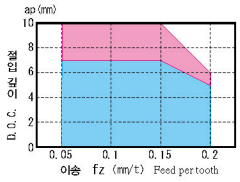
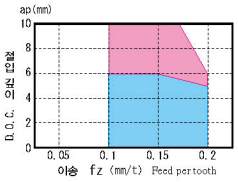
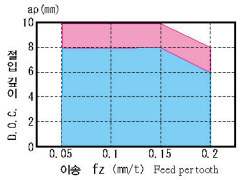
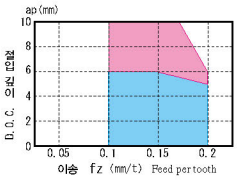
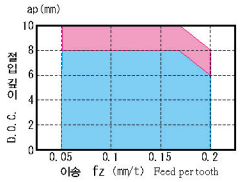
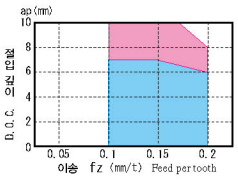
①절삭날 길이 10mm 홀더 (표준/동일경 샹크)
Cutting Edge Length 10mm (Standard/Same Size Shank)

가공경 Cutting Dia.	규격 Description	홀더 돌출 치수A (mm) Overhang Length	
ø10	MEC10-S10-11	17	-
ø12	MEC12-S16-11	20	30
ø16	MEC16-S16-11T	30	45
ø20	MEC20-S20-11T	30	45
ø25	MEC25-S25-11T	32	48
ø32	MEC32-S32-11T	40	60

형상 Shape



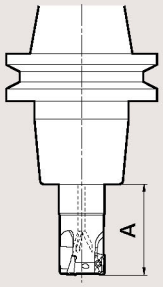
〔Vc=120m/min 피삭재 Work Material : S50C〕

규격 Description	■숄더링의 경우 At Shouldering (절입 폭 ae=øD/2일 때) Cutting depth (ae)=half of cutting dia.	■홈가공의 경우 At Slotting ■경사 가공·헬리컬 가공의 경우 At Slant/Helical Milling
MEC10-S10-11		
MEC12-S16-11		
MEC16-S16-11T		
MEC20-S20-11T		
MEC25-S25-11T		
MEC32-S32-11T		

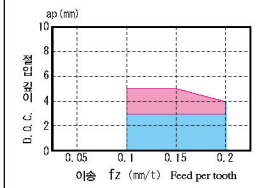
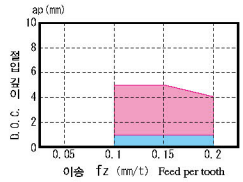
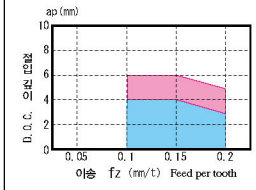
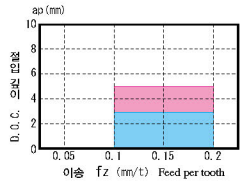
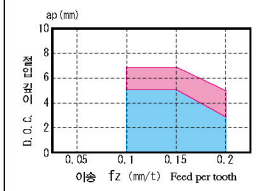
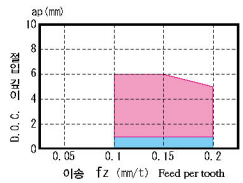
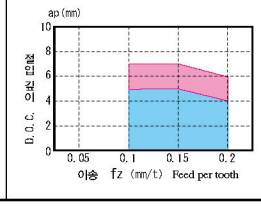
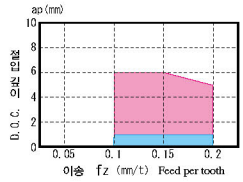
②절삭날 길이 10mm 홀더 (롱 샹크)
Cutting Edge Length 10mm (Long Shank)

가공경 Cutting Dia.	규격 Description	홀더 돌출 치수A (mm) Overhang Length	
ø20 롱샹크 Long Shank	MEC20-S20-140-11T	60	90
ø25 롱샹크 Long Shank	MEC25-S25-160-11T	60	100
ø32 롱샹크 Long Shank	MEC32-S32-200-11T	100	130
ø40 롱샹크 Long Shank	MEC40-S32-240-11T	100	130

형상 Shape



〔Vc=120m/min 피삭재 Work Material : S50C〕

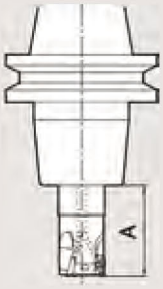
규격 Description	■숄더링의 경우 At Shouldering (절입 폭 ae=øD/2일 때) Cutting depth (ae)=half of cutting dia.	■홈가공의 경우 At Slotting ■경사 가공·헬리컬 가공의 경우 At Slant/Helical Milling
MEC20 -S20-140-11T 롱 샹크 Long Shank		
MEC25 -S25-160-11T 롱 샹크 Long Shank		
MEC32 -S32-200-11T 롱 샹크 Long Shank		
MEC40 -S32-240-11T 롱 샹크 Long Shank		

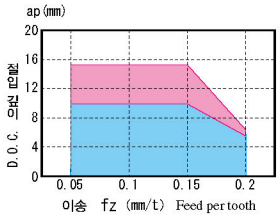
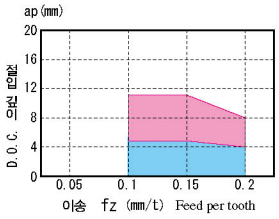
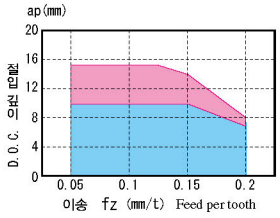
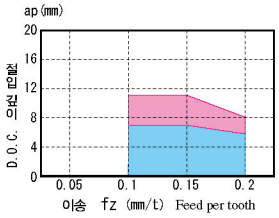
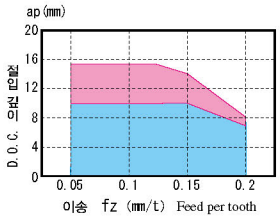
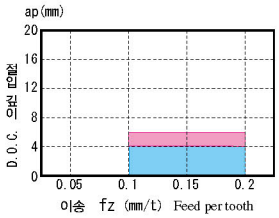
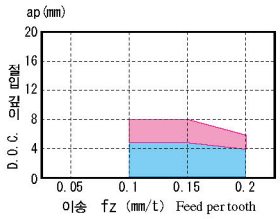
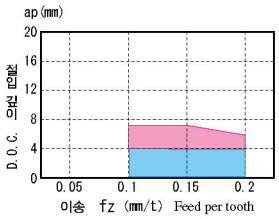
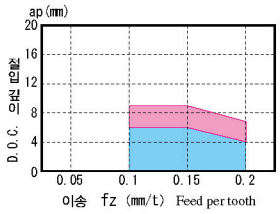
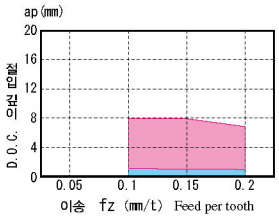
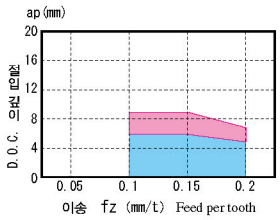
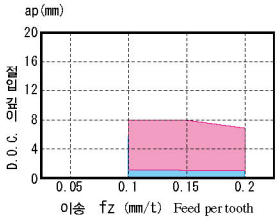
③절삭날 길이 15.7mm 홀더 Cutting Edge Length 15.7mm

〔Vc=120m/min 피삭재 Work Material : S50C〕

가공경 Cutting Dia.	규격 Description	홀더 돌출 치수A (mm) Overhang Length	
ø25	MEC25-S25-17	36	54
ø32	MEC32-S32-17	40	60
ø40	MEC40-S32-17	50	75
ø25 롱샹크 Long Shank	MEC25-S25-160-17	60	100
ø32 롱샹크 Long Shank	MEC32-S32-200-17	100	130
ø40 롱샹크 Long Shank	MEC40-S32-240-17	100	130

형상 Shape



규격 Description	■숄더링의 경우 At Shouldering (절입 폭 ae=øD/2일 때) Cutting depth (ae)=half of cutting dia.	■홈가공의 경우 At Slotting ■경사 가공·헬리컬 가공의 경우 At Slant/Helical Milling
MEC25-S25-17		
MEC32-S32-17		
MEC40-S32-17		
MEC25-S25-160-17 롱 샹크 Long Shank		
MEC32-S32-200-17 롱 샹크 Long Shank		
MEC40-S32-240-17 롱 샹크 Long Shank		

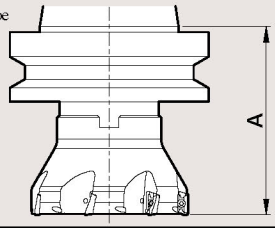
●MEC형 페이스밀의 절삭능력 Cutting Performance of ULTRA HURRICANE FACEMILL

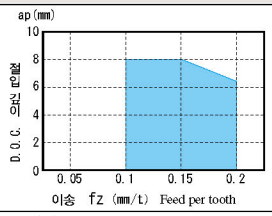
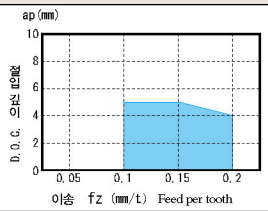
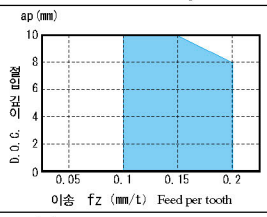
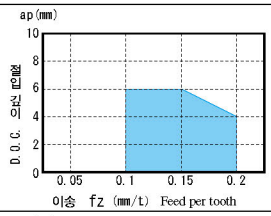
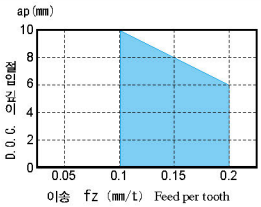
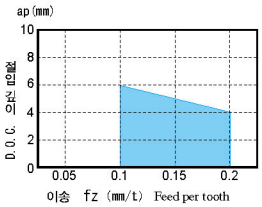
절삭날 길이 10mm 홀더 Cutting Edge Length 10mm

〔Vc=120m/min 피삭재 Work Material : S50C〕

가공경 Cutting Dia.	규격 Description	홀더 돌출 치수A (mm) Overhang Length
ø40	MEC040R-11-5T-M	115
ø50	MEC050R-11-○T-M	100
ø63	MEC063R-11-○T	95
	MEC063R-11-○T-M	
ø80	MEC080R-11-○T	95
ø100	MEC100R-11-9TN	108
ø125	MEC125R-11-11T	
ø160	MEC160R-11-14T	

형상 Shape



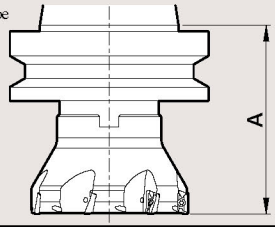
규격 Description	■숄더링의 경우 At Shouldering (절입 폭 ae=øD/2일 때) Cutting depth (ae)=half of cutting dia.	■홈가공의 경우 At Slotting
MEC040R -11-5T-M		
MEC050R -11-○T-M ~ MEC100R -11-9TN		
MEC125R -11-11T MEC160R -11-14T		

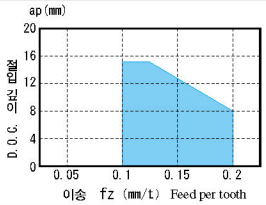
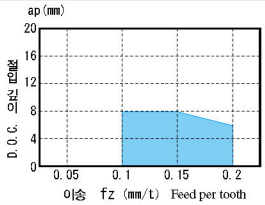
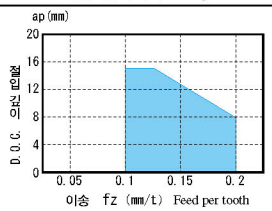
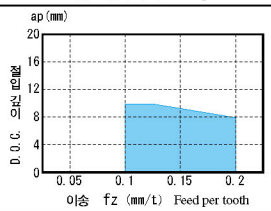
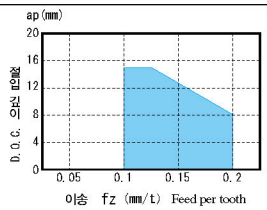
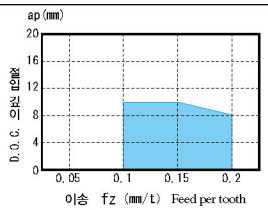
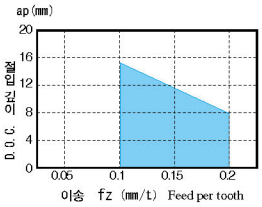
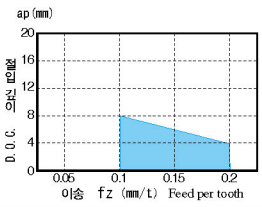
절삭날 길이 15.7mm 홀더 Cutting Edge Length 15.7mm

〔Vc=120m/min 피삭재 Work Material : S50C〕

가공경 Cutting Dia.	규격 Description	홀더 돌출 치수A (mm) Overhang Length
ø40	MEC040R-17-4T-M	115
ø50	MEC050R-17-○T-M	100
ø63	MEC063R-17-○T	95
	MEC063R-17-○T-M	
ø80	MEC080R-17-○T	95
ø100	MEC100R-17-○TN	108
ø125	MEC125R-17-9T	
ø160	MEC160R-17-12T	

형상 Shape

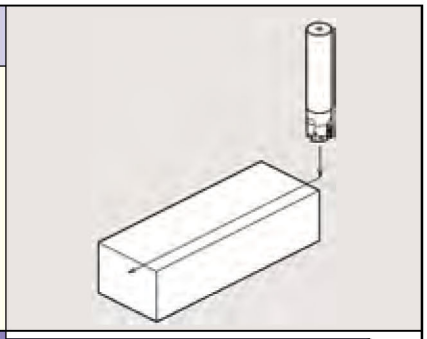


규격 Description	■숄더링의 경우 At Shouldering (절입 폭 ae=øD/2일 때) Cutting depth (ae)=half of cutting dia.	■홈가공의 경우 At Slotting
MEC040R -17-4T-M		
MEC050R -17-○T-M		
MEC063R -17-○T (-M) ~ MEC100R -17-○TN		
MEC125R -17-9T MEC160R -17-12T		

●가공 실예 Case Studies

RC55(프리하든 공구강)
Prehardened Tool Steel

·테스트 피스 Test Piece (54~56HRC)
·Vc=50m/min (n=800min⁻¹)
·ap x ae=2 x 14mm
· f z=0.125mm/t (Vf=300mm/min)
·건식 Dry
·MEC20-S20-11T
·3날 3teeth
·BDMT11T308ER-JT (PR830)



MEC	칩 제거량 = 71.3cm³ (계속 가능) Metal Removal Volume=71.3cm³(continuable)
타사 엔드밀E Competitor E	칩 제거량 = 2.9cm³ (칩핑 발생) Metal Removal Volume=2.9cm³(Chipping)

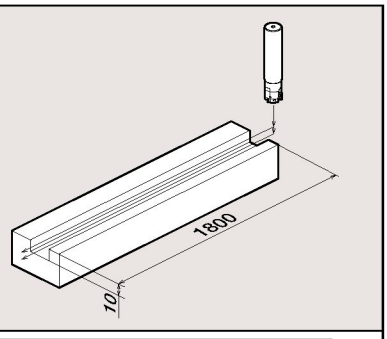
·타사 엔드밀E (ø25 (2날) Vc=40m/min f z=0.075mm/t apxae=2x3mm)은 10분에서
칩핑이 발생하고, 절삭음도 높음
·MEC는 이송을 올리는 것이 가능하고 10분 후에도 절삭날 상태가 대단히 양호하여 연속 사용 가능

·Comp. E(ø25:2 teeth) caused chipping after 10 minutes machining with the conditions of Vc=40m/min, fz=0.075mm/t, apxae=2×3mm, and it was noisy.
Also, higher feed rate was not possible, because it would cause breakage.
·MEC maintained a good edge condition even after 10 minutes and was still available for further machining.

(고객 평가) Evaluation from the user

SS400

·플레이트 Plate
·Vc=88m/min (n=1400min⁻¹)
·ap=5mm×2패스 Pass
· f z=0.12mm/t (Vf=500mm/min)
·건식 Dry
·MEC20-S20-11T
·3날 3teeth
·BDMT11T308ER-JT (PR830)



MEC	23개/코너 23 pcs/edge
타사 엔드밀F Competitor F	10~11개/코너 10~11 pcs/edge

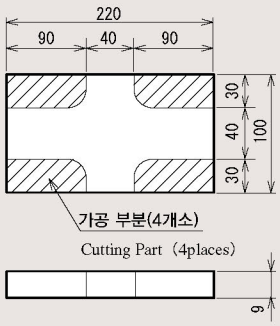
·MEC는 공구수명이 2배 이상으로 향상

·MEC doubled Competitor F's tool life under the same machining conditions.

(고객 평가) Evaluation from the user

SUS304

·플레이트 Plate
·Vc=125m/min (n =1600min⁻¹)
·ap =9.0mm
· f z =0.1mm/t (Vf=320mm/min)
·건식 Dry
·MEC25- S25-17
·2날 2 teeth
·BDMT170408ER-JT (PR830)



MEC	4개/코너 이상 4pcs/edge or over
타사 엔드밀G Competitor G	1개/코너 이하 Under 1pc/edge

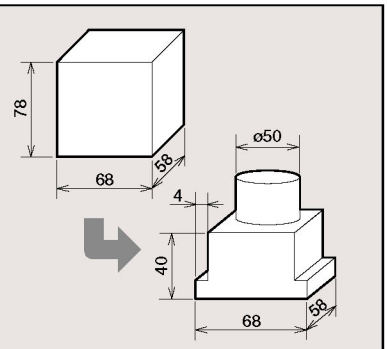
·타사 엔드밀G (인서트 엔드밀) 은 절삭저항이 크고, 팁 결속이 발생하였지만, MEC는 4개 16(개소) 가공하여도 결손없이 연속 가공이 가능

·Competitor G showed higher cutting forces and caused cracking to the cutting edge. MEC produced 4 pcs/edge without cracking.

(고객 평가) Evaluation from the user

DAC10 (열간 공구강)
(Hot Tool Steel)

·금형 Mold
·Vc=130m/min (n =1040min⁻¹)
·ap X ae = (~3) X (~5)
(가공개소에 의해 변동)
(depends on machined part)
· f z =0.18mm/t (Vf=936mm/min)
·건식 (에어 블로우) Dry (with air)
·MEC40- S32-11T
·5날 5 teeth
·BDMT11T308ER-JT (PR830)



MEC	2 시간 (마모 적음 : 연장 가능) 2 Hours (Less Wear/Can Continue)
타사 엔드밀H Competitor H	2 시간 (팁 결손에 의해 중지) 2 Hours (Cracking/Cannot Continue)

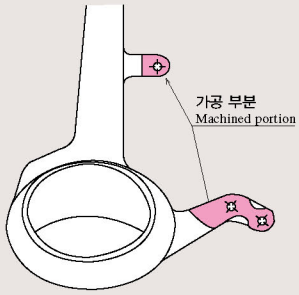
·MEC는 타사 엔드밀H에 비해, 절삭성/팁 수명 모두 양호하고, 타사 엔드밀H와 동시간 가공 후에도 팁 마모가 적어 계속 사용 가능.
·타사 엔드밀H (6날 사양) 는 Vf=936mm/min (f z=0.15mm/t) 에서 사용.

·MEC tool life was better than Competitor H. MEC's wear was less and able to machine further.
·Competitor mill had 6 teeth and its table feed rate was 936mm/min. (fz=0.15mm/t)

(고객 평가) Evaluation from the user

SCM420

·너클 스티어링 Knuckle Steering
·Vc=150m/min (n=1,200min⁻¹)
·ap=0.5~5mm (솔더링) (Corner Machining)
· f z=0.1mm/t (Vf=478mm/min)
·건식 Dry
·MEC40-S32-17
·4날 4 teeth
·BDMT170408ER-JT (PR830)



MEC	150개/코너 150pcs/edge
타사 엔드밀I Competitor I	40개/코너 40pcs/edge

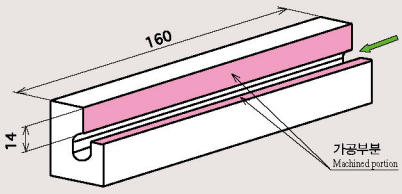
·MEC는 타사 엔드밀에 비해 정삭면이 우수하고, 공구수명도 3배이상 향상

·MEC surface finish was better than the Competitor endmill I and the tool life was over 300% longer.

(고객 평가) Evaluation from the user

인코넬
Inconel

·터빈 부품 Turbine Part
·Vc=15m/min (n=120min⁻¹)
·ap=0.5mm
· f z=0.08mm/t (Vf=38mm/min)
·습식 Wet
·MEC040R-17-4T-M
·4날 4 teeth
·BDMT170408ER-JS PR1025 (PR925)



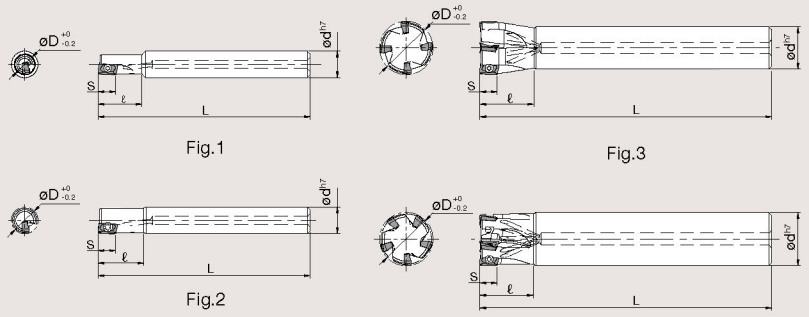
MEC	9개/코너 9pcs/edge
타사 엔드밀J Competitor J	1개 이하/코너 Less than 1pc / edge

·타사 엔드밀J (코팅 팁) 는 워크 1개의 가공이 불가능. MEC커터는 9개/코너의 가공이 가능하고 정삭면도 우수.

·Competitor J was not able to successfully machine one piece, but the MEC produced 9 pieces with good surface finishes.

(고객 평가) Evaluation from the user

■MECX형 엔드밀 Endmill



●엔드밀 치수 Endmill Dimension

규격 Description			재고 Stock	날수 No.of Insert	치수(mm) Dimension(mm) øD	ød	L	ℓ	S	경사각(°) Rake Angle A.R. (MAX)	R.R.	쿨런트 홀 Coolant Hole	형상 Shape	부품 Spare Parts 클램프 스크류 Clamp Screw	렌치 Wrench	적합 팁 Applicable Insert ➔ P6	최대 회전수 (min⁻¹) Max. Revolution
표준 샹크 Standard Shank	표준 날수 Standard	MECX 08-S10-07-1T	●	1	8	10	80	16	6	11.7	-24.0	유 Yes	Fig.1	SB-2035TRG	DTM-6	BDMT0703	48,100
		14-S12-07-2T	●	2	14	12		18		16.3	-12.1		Fig.3				44,800
		17-S16-07-3T	●	3	17	16	100	20			-11.0			SB-2042TRG			42,400
		18-S16-07-3T	●		18						-10.9						41,600
		20-S16-07-4T	●	4	20		110				-10.4						40,200
		21-S20-07-4T	●		21	20					-10.1						39,500
		25-S20-07-5T	●	5	25		120	25			-9.7						37,000
		26-S25-07-5T	●		26	25					-9.5						36,500
		33-S32-07-6T	●	6	33	32	130	30			-8.8						33,100
	다날 Fine pitch	MECX 20-S16-07-5T	●	5	20	16	110	20	6	16.3	-10.4	유 Yes	Fig.3	SB-2042TRG	DTM-6	BDMT0703	40,200
		25-S20-07-7T	●	7	25	20	120	25			-9.7						37,000
동일한 샹크 Same Shank Size	표준 날수 Standard	MECX 10-S10-07-1T	●	1	10	10	80	17	6	12.8	-18.7	유 Yes	Fig.2	SB-2035TRG	DTM-6	BDMT0703	47,100
		12-S12-07-2T	●	2	12	12		18		14.3	-13.7		Fig.4				46,200
		16-S16-07-3T	●	3	16	16	100	20		16.3	-11.3			SB-2042TRG			43,200
		20-S20-07-4T	●	4	20	20	110				-10.4						40,200
		25-S25-07-5T	●	5	25	25	120	25			-9.7						37,000
		32-S32-07-6T	●	6	32	32	130	30			-8.9						33,600
	다날 Fine pitch	MECX 16-S16-07-4T	●	4	16	16	100	20	6	16.3	-11.3	유 Yes	Fig.4	SB-2042TRG	DTM-6	BDMT0703	43,200
		20-S20-07-5T	●	5	20	20	110				-10.4						40,200
		25-S25-07-7T	●	7	25	25	120	25			-9.7						37,000
		32-S32-07-8T	●	8	32	32	130	30			-8.9						33,600
롱 샹크 Long Shank	표준 날수 Standard	MECX 17-S16-130-07-3T	●	3	17	16	130	20	6	16.3	-11.0	유 Yes	Fig.3	SB-2042TRG	DTM-6	BDMT0703	42,400
		21-S20-140-07-4T	●	4	21	20	140				-10.1						39,500
		26-S25-160-07-5T	●	5	26	25	160	25			-9.5						36,500
		33-S32-200-07-6T	●	6	33	32	200	30			-8.8						33,100

추천 절삭조건 For recommended cutting conditions, see page ➔ P25

■최고 회전수의 표기에 대해서 Maximum Revolution

엔드밀을 잘못하여 최고 회전수 이상으로 회전시키는 경우, 원심력에 의해 팁과 부품의 비산등이 발생하는 경우가 있습니다. P24의 경고를 참고하여 주십시오.

When running the endmill at the maximum recommended revolution, holder or insert breakage may occur due to the centrifugal force. Please see "Warning" on page 24.

■MECX형 엔드밀의 다단 절입에 의한 숄더링 정삭면에 대해서 For good shoulder finishes by MECX Endmill using multistage D.O.C

MECX형 엔드밀에 의한 다단절입에서 매끄러운 가공 벽면을 얻기 위해서는 1회당 절입량을 ap=5mm이내로 설정하여 주십시오.

In order to obtain smooth cutting wall surface by MECX multistage D.O.C, set D.O.C within ap=5 for each cut.

●: 표준재고 ●: Standard Stock

■MECX형 페이스밀 Face Mill

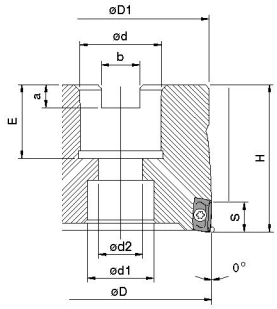


Fig.1

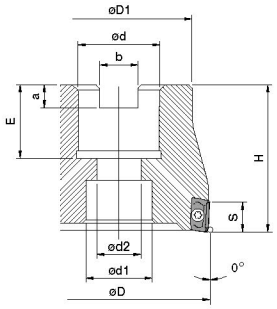
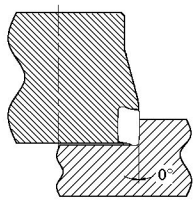


Fig.2



●페이스밀 치수 Face Mill Dimension

규격 Description		재고 Stock	날수 No.of Insert	치수(mm) Dimension(mm) øD	øD1	ød	ød1	ød2	H	E	a	b	S	경사각(°) Rake Angle A.R. (MAX)	R.R.	쿨런트 홀 Coolant Hole	형상 Shape	무게(Kg) Weight	부 품 Spare Parts 클램프 스크류 Clamp Screw	렌치 Wrench	최대 회전수 (min⁻¹) Max. Revolution
MECX	032R-07-8T-M	●	8	32	30	16	14	8.5	40	20	5.5	8.5	6	+7°	-8.9°	유 Yes	Fig.1	0.15	SB-2042TRG	DTM-6	33,600
	040R-07-10T-M	●	10	40	38	22	18	12		22	6.3	10.4			-8.4°			0.25			30,500
	050R-07-12T-M	●	12	50	40										-8.3°		Fig.2	0.35			27,700
	063R-07-14T-M	●	14	63											-7.9°			0.50			24,900

추천 절삭조건 For recommended cutting conditions, see page ➔ P25

■최고 회전수의 표기에 대해서 Maximum Revolution

엔드밀을 잘못하여 최고 회전수 이상으로 회전시키는 경우, 원심력에 의해 팁과 부품의 비산등이 발생하는 경우가 있습니다. P24의 경고를 참고하여 주십시오.

When running the endmill at the maximum recommended revolution, holder or insert breakage may occur due to the centrifugal force. Please see "Warning" on page 24.

■MECX형 페이스밀의 다단 절입에 의한 숄더링 정삭면에 대해서 For good shoulder finishes by MECX Face Mill multistage D.O.C

MECX형 페이스밀로 다단 절입시 매끄러운 가공 벽면을 얻기 위해서는, 1회당 절입량을 ap=5mm이내로 설정하여 주십시오.

In order to obtain smooth cutting wall surface by MECX multistage D.O.C, set D.O.C within ap=5 for each cut.

■MECX032R에는 아바 장착용 볼트 (HH8X25H) , MECX040R/050R/063R에는 아바 장착용 볼트 (HH10X30H) 가 부속입니다.

MECX032R comes with arbor screw (HH8X25H) and MECX040R/050R/063R come with arbor bolt (HH10X30H).

⚠주의 warning 아래 주의사항을 반드시 지켜주십시오. 신체에 중대한 위험이 발생 할 가능성이 있습니다.
Please strictly follow the instructions below. It may cause the serious physical damage.

최고 회전수에 대한 주의사항 Warning about Maximum Revolution indicated on the Product

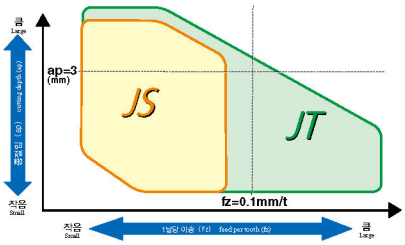
1. 카탈로그 및 제품에 게재되어 있는 최고 회전수를 초과한 회전수로 사용하지 마십시오. 팁과 부품의 비산, 혹은 바디의 파손이 발생할 가능성이 있습니다.
If the tool is used over maximum recommended revolution, the body of the tool may be broken by inserts and clamp screws which may be dispersed by centrifugal force.
2. 실제의 사용 회전수는 반드시 팁의 추천 절삭조건 범위내로 설정하여 주십시오.
Machine within the recommended cutting conditions of the insert.
3. 고속회전 (10,000min⁻¹이하) 에서 가공하는 경우는 공구 본체 아바의 조합을 우측표를 참고하여 밸런스 조정을 하여 주십시오.
When using at higher revolution (over 10,000min⁻¹), refer to the table shown on the right to adjust the balance by combining MEC and suitable arbor.

회전수 Max. Revolution (min⁻¹)	JIS등급 ISO 1940-1/8821 (JIS B0905)
~20,000	G16
~30,000	G6.3
30,000~	G2.5

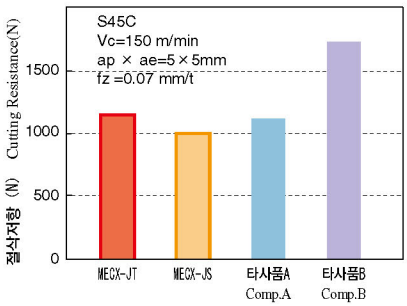
●적합 팁 Applicable Inserts

홀더 규격 Toolholder	적합 팁 ➔ P6 Applicable Inserts	
MECX…-07..	BDMT 0703 ○○ ER-JT	BDMT 0703 ○○ ER-JS

MECX형 용의 브레이커 선정
Chipbreaker choice of MECX Type



절삭저항 비교
Comparison of Cutting Resistance



■ 추천 절삭조건 Recommended Cutting Conditions

피삭재 Workpiece Material	이송(mm/t) Feed per tooth(mm/t)		추천 팁 재종 (절삭속도m/min) Insert Grade (Cutting Speed : m/min)				
	JS 브레이커 JS Chipbreaker	JT 브레이커 JT Chipbreaker	MEGACOAT		PVD코팅 PVD Coated Carbide		
			PR1225	PR1210	PR830	PR1025	PR905
스텐레스강 (SUS304등) Stainless Steel	0.03~0.04~0.05	0.05~0.06~0.07	★ 120~180~250	-	-	☆ 100~160~200	-
탄소강 (SxxC) Carbon Steel	0.04~0.08~0.1	0.06~0.1~0.12	★ 120~180~250	-	☆ 120~150~180	-	-
합금강 (SCM등) Alloy Steel	0.04~0.06~0.08	0.06~0.08~0.1	★ 100~160~220	-	☆ 100~140~180	-	-
금형강 (SKD/NAK등) Die Steel	0.04~0.06~0.08	0.06~0.08~0.1	★ 80~140~180	-	☆ 80~120~150	-	-
회주철 (FC) Gray Cast Iron	0.04~0.08~0.1	0.08~0.1~0.15	-	★ 120~180~250	-	-	☆ 100~140~180
덕타일 주철 (FCD) Nodular Cast Iron	0.04~0.06~0.08	0.08~0.1~0.12	-	★ 100~150~200	-	-	☆ 80~120~160
티탄합금 (Ti-6Al-4V) Titanium Alloy	0.04~0.06~0.08	0.08~0.1~0.12	-	★ 30~50~70	-	-	☆ 20~35~50

※ 티탄합금은 습식가공을 추천합니다. Wet cut is recommended for Titanium Alloy

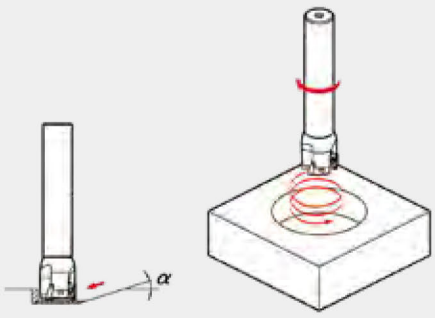
★:1차 추천 ☆:2차 추천
★:1st Recommendation ☆:2nd Recommendation

●경사가공·헬리컬가공 Note when Slant Milling·Helical Milling

경사가공·헬리컬 가공
Slant Milling·Helical Milling

● 경사가공의 각도는 α°이하를 추천합니다.
● 헬리컬가공 1회전당 경사 깊이는 각 공구의 절삭 능력표를 참고하여 주십시오. 반드시, 에어블로우를 사용해 주십시오.

● Ramping angle should be Under α°.
● For plunge depth per revolution at helical milling, see the cutting performance data for each tool. Use compressed air during machining



가공경 Cutting Dia.	적합 팁규격 Applicable Insert	최대 경사각 (α°) Max.Ramping Angle(α°)
ø8	BDMT0703 타입	비추천 Not recommended
ø10		1.5°
ø12,ø14		2°
ø16		3°
ø17,ø18		1.5°
ø20		2°
ø21		1.8°
ø25		1.3°
ø26		1.2°
ø32		0.8°
ø33		0.5°

●헬리컬가공의 최소 홀 가공경의 기준 Guidance of minimum cutting dia by helical machining.

MECX형	홀더경 Holder Dia.	ø8	ø10	ø12	ø14	ø16	ø17	ø18	ø20
BDMT0703타입	헬리컬 가공에 의한 최소 홀 가공경의 기준 Guidance of minimum cutting dia by helical machining.	헬리컬 가공은 추천하지 않습니다. Helical machining is not recommended.	ø14	ø18	ø22	ø26	ø28	ø30	ø34
	헬리컬 가공 후, 바닥면을 평평하게 가공하는 경우의 최소 홀 가공경의 기준 Guidance of minimum cutting dia in case of flatting bottom after helical machining.		ø17	ø21	ø25	ø29	ø31	ø33	ø37

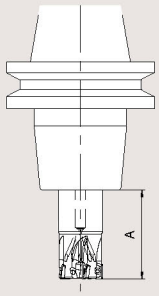
MECX型	홀더경 Holder Dia.	ø21	ø25	ø26	ø32	ø33
BDMT0703타입	헬리컬 가공에 의한 최소 홀 가공경의 기준 Guidance of minimum cutting dia by helical machining.	ø36	ø44	ø46	ø58	ø60
	헬리컬 가공 후, 바닥면을 평평하게 가공하는 경우의 최소 홀 가공경의 기준 Guidance of minimum cutting dia in case of flatting bottom after helical machining.	ø39	ø47	ø49	ø61	ø63

●MECX형 엔드밀의 절삭능력

Cutting Performance of MECX Type

가공경 Cutting Dia.	규격 Description	홀더 돌출 치수A (mm) Overhang Length A(mm)	
ø8	MECX08-S10-07-1T	16	-
ø10	MECX10-S10-07-1T	17	-
ø12	MECX12-S12-07-2T	18	30
ø16	MECX16-S16-07-3T	20	40
ø20	MECX20-S20-07-4T	20	40
ø25	MECX25-S25-07-5T	25	50
ø32	MECX32-S32-07-6T	30	50

형상 Shape



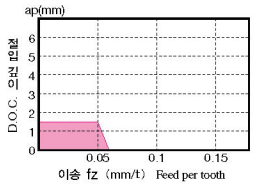
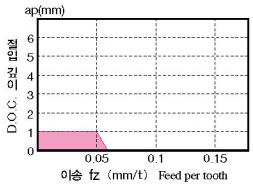
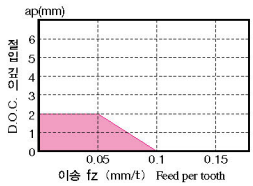
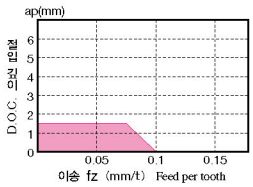
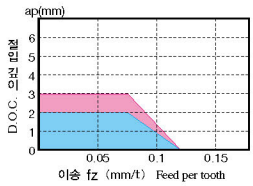
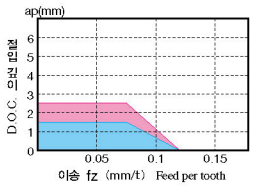
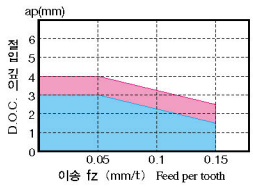
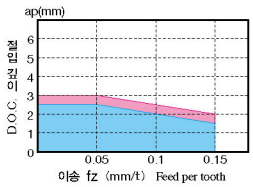
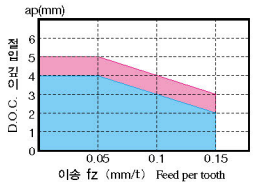
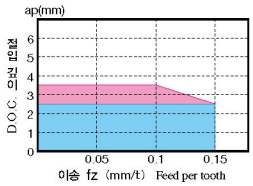
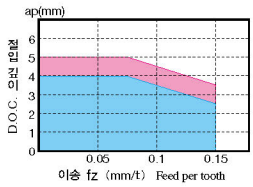
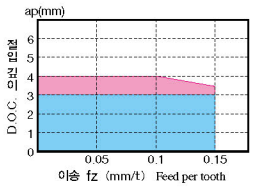
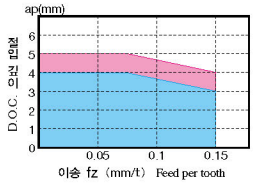
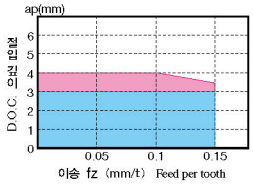
※ø8, ø10의 돌출량 연장에 의한 가공은 추천하지 않습니다.
* Machining by extending over hang of dia. 8mm and 10mm is not recommended.

※JS브레이커 사용시의 절삭조건에 대해서
*Cutting condition of JS Chipbreaker

①MECX08 ~ MECX12의 경우
In case of MECX08~MECX12
이송만 절삭능력표 보다 25%정도 낮춰 사용하여 주십시오.
Please decrease feed ratio about 25% according to cutting capability list.

②MECX16이상의 경우
In case of over MECX16
이송과 절입량을 동시에 절삭능력표보다 30%정도 낮춰 사용하여 주십시오.
Lower feed ratio and D.O.C about 30% at the same time according to cutting capability list.

〔Vc=150m/min 피삭재 Work Material : S50C〕

규격 Description	■숄더링의 경우 (절입폭 ae=øD/2일 때) At Shouldering	■홈가공의 경우 At Grooving ■경사가공·헬리컬가공의 경우 At Slant/Helical Milling
MECX08-S10-07-1T		
MECX10-S10-07-1T		
MECX12-S12-07-2T		
MECX16-S16-07-3T		
MECX20-S20-07-4T		
MECX25-S25-07-5T		
MECX32-S32-07-6T		

※상기 절삭능력표는 JT브레이커 (PR830) 에 의한 표준 날수 타입에서 적용범위를 나타내고 있습니다.
* Above cutting capability list illustrates application range of standard edge number of JT Chipbreaker (PR830)

다날 타입의 경우는 70%이하의 절입량에서 사용하여 주십시오.
Please use multiple edge type under 70% of D.O.C.

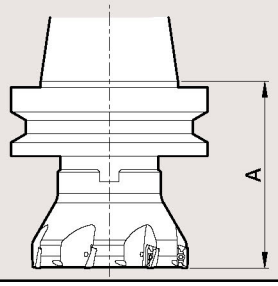
●MECX형 페이스밀의 절삭능력

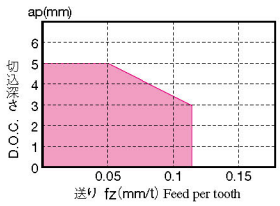
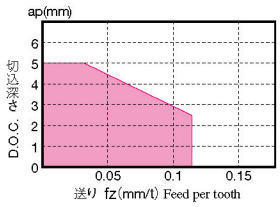
Cutting Performance of Face Mill

〔Vc=150m/min 피삭재 Work Material : S50C〕

가공경 Cutting Dia.	규격 Description	홀더 돌출 치수A (mm) Overhang Length A(mm)
ø32	MECX032R-07-8T-M	100
ø40	MECX040R-07-10T-M	
ø50	MECX050R-07-12T-M	
ø63	MECX063R-07-14T-M	

형상 Shape



규격 Description	■숄더링의 경우 (절입폭ae=øD/2일 때) At Shouldering
MECX032R-07-8T-M MECX040R-07-10T-M	
MECX050R-07-12T-M MECX063R-07-14T-M	

※JT브레이커를 사용하여 주십시오. Please select JT chipbreaker

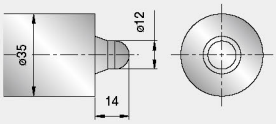
※홈가공은 추천하지 않습니다. Not recommended for grooving

●가공 실예 Case Studies

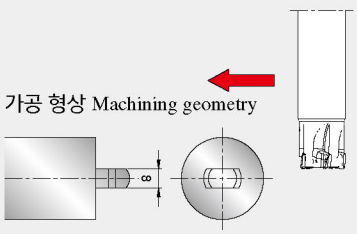
SCM435H

- 유압부품 Oil Pressure part
- Vc=160m/min (n=2,550min^{-1})
- ap x ae=1x12mm
- f z=0.1mm/t (Vf=1,275mm/min)
- 습식 Wet
- MECX20-S20-07-5T
- 5날열 5 edge lines
- BDMT070304ER-JT (PR830)

소재 형상 Material geometry



가공 형상 Machining geometry



•동일 절삭속도에서 가공하면, 타사품K (ø25-3날) 에 비해, MECX는 ø20-5날이기 때문에, 회전수가 올라가고, 날수도 많기 때문에 테이블 이송을 2배 이상으로 올릴 수 있어서 가공능률이 향상 됨.
또, MECX는 날수가 많음에도 불구하고 가공소음이 타사품K보다 조용함.

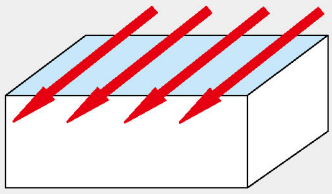
•Machining at the same cutting speed, as competitor K (Dia. 25mm-3 edges), MECX improved cutting efficiency because of increased feed rates and greater number of parts produced.

•MECX's cutting noise is smaller than competitor K.

(고객 평가) Evaluation from the user

S45C

- 플레이트 Plate
- Vc=220m/min (n=3,500min^{-1})
- ap x ae=1x20mm
- f z=0.12mm/t (Vf=2,100mm/min)
- 습식 Dry
- MECX20-S20-07-5T
- 5날열 5 edge lines
- BDMT070304ER-JT (PR830)



•타사품L (ø20-3날) 은 테이블 이송 Vf=1260mm/min에서 가공소음이 크고, 불안정해 한데 비해, MECX (ø20-5날) 은 저강성 기계에서도 테이블 이송 Vf=2100mm/min로의 가공이 가능하고 가공능률이 약 2배 향상.

•사용 기계 : BT30사양

•Competitor L (Dia.20-3 edges) with a table feed of 1260mm/min produces loud cutting noise, and it does not have much stability. While MECX (Dia.20-5 edges) is a low hardening machine, it is capable of handling a table feed of 2100mm/min and its finishing efficiency has almost doubled.

•BT30 applied machine

(고객 평가) Evaluation from the user

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

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