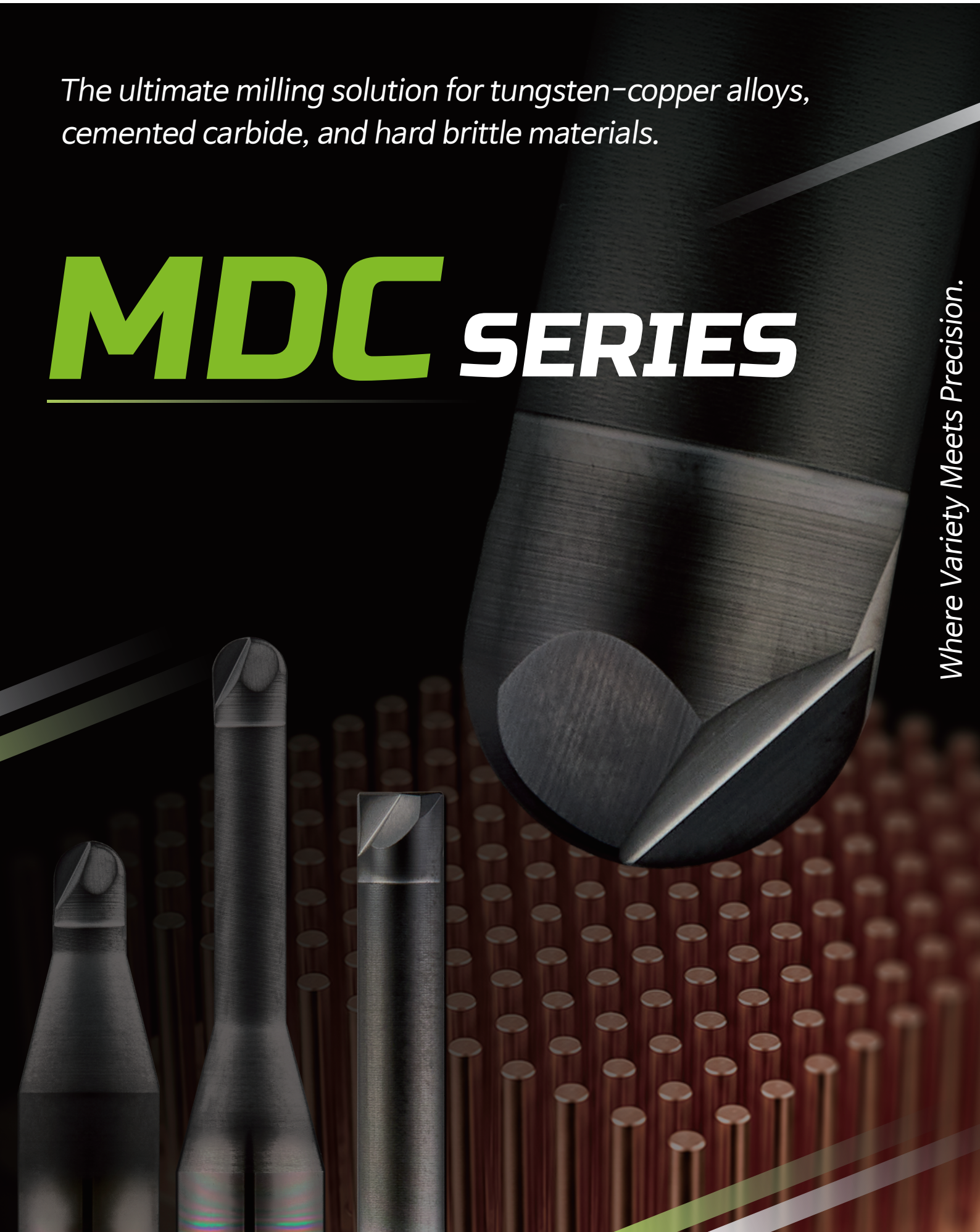
JJTOOLS

The ultimate milling solution for tungsten-copper alloys, cemented carbide, and hard brittle materials.

MDC SERIES

Where Variety Meets Precision.





Cutting Edge Tip Treatment!
절삭날 끝 처리!

Effectively suppresses chipping and step marks on machined surfaces.

가공 중 발생하는 날 깨짐(치핑) 및 가공면의 단차를 최대한 억제합니다.

Unique top groove design!
독특한 상부 홈 설계!

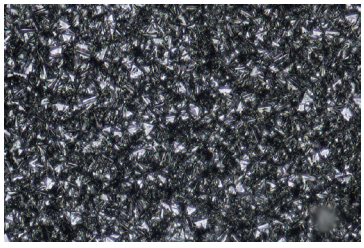
The Helix 0° SCBN geometry helps produce an excellent surface finish.

Helix 0° 각도의 SCBN 형상을 적용하여 뛰어난 정삭 가공면을 구현합니다.

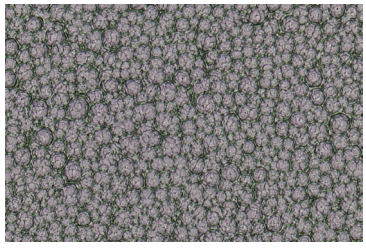
8-layer multifunctional coating!
8층 다기능 코팅 적용!

An 8-layer wear-resistant coating extends tool life, prevents peeling, and delivers excellent performance.

코팅 수명을 연장하고 박리 현상을 방지하기 위해 내마모성이 뛰어난 8층 다중 코팅을 적용했으며, 우수한 성능을 제공합니다.



Micro-diamond coating



Nano-diamond coating

Micro-diamond coating
마이크로 다이아몬드 코팅

With a hardness of 9,000 - 10,000 HV, the coating has a relatively rough surface with an average roughness of Ra 0.3 or higher.

경도는 9000~10000 Hv에 달하며, 코팅 표면은 상대적으로 거칩니다.
평균 표면 조도는 Ra 0.3 이상입니다.

Nano-diamond coating
나노 다이아몬드 코팅

With a hardness of 4,000 - 7,000 HV, the coating provides a very smooth surface finish with Ra 0.03 - 0.1.

경도는 4000~7000 Hv에 달하며, 코팅 표면은 매우 매끄럽습니다.
표면 조도는 Ra 0.03~0.1입니다.

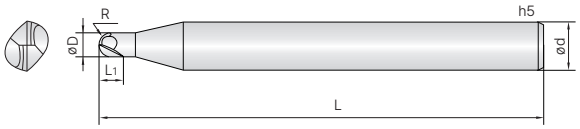
2MDCB

2Flute Diamond-Coated Ball End Mills for Tungsten Machining

2날 텅스텐 가공용 다이아몬드 코팅 볼 엔드밀

New





- **초경합금, 세라믹, 강화 플라스틱 등 다양한 피삭재 가공에 적합한 전용 엔드밀**
- 멀티 CVD 코팅 적용으로 우수한 내마모성과 공구 수명 향상
- 다양한 절삭 조건에 대응 가능한 폭넓은 규격 구성
- 높은 강성과 안정적인 절삭 성능 제공

- **Dedicated end mills suitable for machining various work materials, including cemented carbide, ceramics, and reinforced plasticsmaterials.**
- Multi-layer CVD coating provides excellent wear resistance and extended tool life
- Wide range of sizes available to support various cutting conditions
- High rigidity and stable cutting performance

2 | WC 미립자 | MDC DIA. Coating | ±0.01 (0.1 ~ 3R) | 0° Helix Angle | CUTTING DATA (5P)

D Size	D Tolerance
Ø0.2 ~ 6	+0 ~ -0.02mm

단위 : mm

Order Number	날경 Diameter R X D	날장 Length of cut L1	전장 Overall Length L	생크 Shank Dia d	비고
2MDCB 002 002 S04	0.1R X 0.2	0.2	40	4	
2MDCB 003 002 S04	0.15R X 0.3	0.2	40	4	
2MDCB 004 003 S04	0.2R X 0.4	0.3	40	4	
2MDCB 005 004 S04	0.25R X 0.5	0.4	40	4	
2MDCB 006 005 S04	0.3R X 0.6	0.5	40	4	
2MDCB 007 005 S04	0.35R X 0.7	0.5	40	4	
2MDCB 008 006 S04	0.4R X 0.8	0.6	40	4	
2MDCB 009 007 S04	0.45R X 0.9	0.7	40	4	
2MDCB 010 008 S04	0.5R X 1	0.8	40	4	
2MDCB 012 009 S04	0.6R X 1.2	0.9	40	4	
2MDCB 015 011 S04	0.75R X 1.5	1.1	40	4	
2MDCB 020 015 S04	1R X 2	1.5	40	4	
2MDCB 025 019 S04	1.25R X 2.5	1.9	40	4	
2MDCB 030 023 S06	1.5R X 3	2.3	40	4	
2MDCB 040 030 S06	2R X 4	3	45	6	
2MDCB 050 038 S06	2.5R X 5	3.8	45	6	
2MDCB 060 045 S06	3R X 6	4.5	45	6	

Order Number	날경 Diameter D X R	날장 Length of cut L1	전장 Overall Length L	생크 Shank Dia d	비고

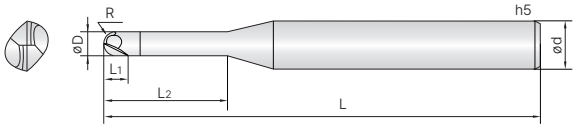
2MDCRB

2Flute Diamond-Coated Rib Ball End Mills for Tungsten Machining

2날 텅스텐 가공용 다이아몬드 코팅 리브 볼 엔드밀

New





- **초경합금, 세라믹, 강화 플라스틱 등 다양한 피삭재 가공에 적합한 전용 엔드밀**
- 멀티 CVD 코팅 적용으로 우수한 내마모성과 공구 수명 향상
- 다양한 절삭 조건에 대응 가능한 폭넓은 규격 구성
- 높은 강성과 안정적인 절삭 성능 제공

- **Dedicated end mills suitable for machining various work materials, including cemented carbide, ceramics, and reinforced plasticsmaterials.**
- Multi-layer CVD coating provides excellent wear resistance and extended tool life
- Wide range of sizes available to support various cutting conditions
- High rigidity and stable cutting performance



0.1 ~ 3R　　6P

D Size	D Tolerance
Ø0.2 ~ 6	+0 ~ -0.02mm

단위 : mm

Order Number	날경 Diameter R X D	날장 Length of cut L1	유효장 Effective Length L1	전장 Overall Length L	생크 Shank Dia d
2MDCRB 002 003 S04	0.1R X 0.2	0.2	0.3	45	4
2MDCRB 002 005 S04	0.1R X 0.2	0.2	0.5	45	4
2MDCRB 002 007 S04	0.1R X 0.2	0.2	0.7	45	4
2MDCRB 002 010 S04	0.1R X 0.2	0.2	1	45	4
2MDCRB 003 005 S04	0.15R X 0.3	0.2	0.5	45	4
2MDCRB 003 007 S04	0.15R X 0.3	0.2	0.7	45	4
2MDCRB 003 010 S04	0.15R X 0.3	0.2	1	45	4
2MDCRB 004 005 S04	0.2R X 0.4	0.3	0.5	45	4
2MDCRB 004 007 S04	0.2R X 0.4	0.4	0.7	45	4
2MDCRB 004 010 S04	0.2R X 0.4	0.3	1	45	4
2MDCRB 004 015 S04	0.2R X 0.4	0.3	1.5	45	4
2MDCRB 004 020 S04	0.2R X 0.4	0.3	2	45	4
2MDCRB 004 025 S04	0.2R X 0.4	0.3	2.5	45	4
2MDCRB 006 010 S04	0.3R X 0.6	0.5	1	45	4
2MDCRB 006 015 S04	0.3R X 0.6	0.5	1.5	45	4
2MDCRB 006 020 S04	0.3R X 0.6	0.5	2	45	4
2MDCRB 006 030 S04	0.3R X 0.6	0.5	3	45	4
2MDCRB 006 040 S04	0.3R X 0.6	0.5	4	45	4
2MDCRB 006 050 S04	0.3R X 0.6	0.5	5	45	4
2MDCRB 006 060 S04	0.3R X 0.6	0.5	6	45	4
2MDCRB 008 020 S04	0.4R X 0.8	0.6	2	45	4
2MDCRB 008 030 S04	0.4R X 0.8	0.6	3	45	4
2MDCRB 008 040 S04	0.4R X 0.8	0.6	4	45	4
2MDCRB 008 050 S04	0.4R X 0.8	0.6	5	45	4
2MDCRB 008 060 S04	0.4R X 0.8	0.6	6	45	4
2MDCRB 008 080 S04	0.4R X 0.8	0.6	8	45	4
2MDCRB 010 015 S04	0.5R X 1	0.8	1.5	45	4
2MDCRB 010 020 S04	0.5R X 1	0.8	2	45	4
2MDCRB 010 025 S04	0.5R X 1	0.8	2.5	45	4
2MDCRB 010 030 S04	0.5R X 1	0.8	3	45	4
2MDCRB 010 040 S04	0.5R X 1	0.8	4	45	4
2MDCRB 010 060 S04	0.5R X 1	0.8	6	45	4
2MDCRB 010 080 S04	0.5R X 1	0.8	8	45	4
2MDCRB 010 100 S04	0.5R X 1	0.8	10	45	4
2MDCRB 015 020 S04	0.75R X 1.5	1.2	2	45	4
2MDCRB 015 040 S04	0.75R X 1.5	1.2	4	45	4
2MDCRB 015 060 S04	0.75R X 1.5	1.2	6	45	4
2MDCRB 015 080 S04	0.75R X 1.5	1.2	8	45	4
2MDCRB 015 100 S04	0.75R X 1.5	1.2	10	45	4
2MDCRB 015 120 S04	0.75R X 1.5	1.2	12	45	4
2MDCRB 020 030 S04	1R X 2	1.5	3	45	4
2MDCRB 020 040 S04	1R X 2	1.5	4	45	4
2MDCRB 020 060 S04	1R X 2	1.5	6	45	4
2MDCRB 020 080 S04	1R X 2	1.5	8	45	4
2MDCRB 020 100 S04	1R X 2	1.5	10	45	4
2MDCRB 020 120 S04	1R X 2	1.5	12	45	4
2MDCRB 020 140 S04	1R X 2	1.5	14	45	4
2MDCRB 020 160 S04	1R X 2	1.5	16	45	4
2MDCRB 030 060 S06	1.5R X 3	2.3	6	55	6
2MDCRB 030 080 S06	1.5R X 3	2.3	8	55	6

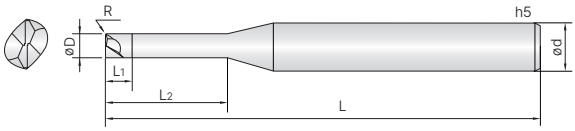
Order Number	날경 Diameter R X D	날장 Length of cut L1	유효장 Effective Length L1	전장 Overall Length L	생크 Shank Dia d
2MDCRB 030 100 S06	1.5R X 3	2.3	10	55	6
2MDCRB 030 120 S06	1.5R X 3	2.3	12	55	6
2MDCRB 030 140 S06	1.5R X 3	2.3	14	55	6
2MDCRB 040 080 S06	2R X 4	3	8	55	6
2MDCRB 040 100 S06	2R X 4	3	10	55	6
2MDCRB 040 150 S06	2R X 4	3	15	55	6
2MDCRB 050 100 S06	2.5R X 5	3.8	10	55	6
2MDCRB 050 150 S06	2.5R X 5	3.8	15	55	6
2MDCRB 060 100 S06	3R X 6	4.5	10	55	6
2MDCRB 060 150 S06	3R X 6	4.5	15	55	6

2MDCCR

2Flute Diamond Coated Corner Radius End mills for Tungsten Machining

2날 텅스텐 가공용 다이아몬드 코팅 코너 레디우스 엔드밀 New





- **초경합금, 세라믹, 강화 플라스틱 등 다양한 피삭재 가공에 적합한 전용 엔드밀**
- 멀티 CVD 코팅 적용으로 우수한 내마모성과 공구 수명 향상
- 다양한 절삭 조건에 대응 가능한 폭넓은 규격 구성
- 높은 강성과 안정적인 절삭 성능 제공

- **Dedicated end mills suitable for machining various work materials, including cemented carbide, ceramics, and reinforced plasticsmaterials.**
- Multi-layer CVD coating provides excellent wear resistance and extended tool life
- Wide range of sizes available to support various cutting conditions
- High rigidity and stable cutting performance



R0.03 ~ 0.1 7P

D Size	D Tolerance
Ø0.25 ~ 6	+0 ~ -0.02mm

단위 : mm

Order Number	날경 Diameter D X R	날장 Length of cut L1	유효장 Effective Length L1	전장 Overall Length L	생크 Shank Dia d
2MDCCR 0025 0003 005	0.25 X R0.03	0.2	0.5	45	4
2MDCCR 0025 0003 008	0.25 X R0.03	0.2	0.8	45	4
2MDCCR 0025 0005 005	0.25 X R0.05	0.2	0.5	45	4
2MDCCR 0025 0005 008	0.25 X R0.05	0.2	0.8	45	4
2MDCCR 003 0003 006	0.3 X R0.03	0.2	0.6	45	4
2MDCCR 003 0003 009	0.3 X R0.03	0.2	0.9	45	4
2MDCCR 003 0005 006	0.3 X R0.05	0.2	0.6	45	4
2MDCCR 003 0005 009	0.3 X R0.05	0.2	0.9	45	4
2MDCCR 005 0003 005	0.5 X R0.03	0.3	0.5	45	4
2MDCCR 005 0003 010	0.5 X R0.03	0.3	1	45	4
2MDCCR 005 0003 015	0.5 X R0.03	0.3	1.5	45	4
2MDCCR 005 0005 005	0.5 X R0.05	0.3	0.5	45	4
2MDCCR 005 0005 010	0.5 X R0.05	0.3	1	45	4
2MDCCR 005 0005 015	0.5 X R0.05	0.3	1.5	45	4
2MDCCR 006 0005 020	0.6 X R0.05	0.3	2	45	4
2MDCCR 008 0003 008	0.8 X R0.03	0.4	0.8	45	4
2MDCCR 008 0003 016	0.8 X R0.03	0.4	1.6	45	4
2MDCCR 008 0003 024	0.8 X R0.03	0.4	2.4	45	4
2MDCCR 008 0005 008	0.8 X R0.05	0.4	0.8	45	4
2MDCCR 008 0005 016	0.8 X R0.05	0.4	1.6	45	4
2MDCCR 008 0005 024	0.8 X R0.05	0.4	2.4	45	4
2MDCCR 008 001 008	0.8 X R0.1	0.4	0.8	45	4
2MDCCR 008 001 016	0.8 X R0.1	0.4	1.6	45	4
2MDCCR 008 001 024	0.8 X R0.1	0.4	2.4	45	4
2MDCCR 010 0003 010	1 X R0.03	0.5	1	45	4
2MDCCR 010 0003 020	1 X R0.03	0.5	2	45	4
2MDCCR 010 0003 040	1 X R0.03	0.5	4	45	4
2MDCCR 010 0003 060	1 X R0.03	0.5	6	45	4
2MDCCR 010 0005 010	1 X R0.05	0.5	1	45	4
2MDCCR 010 0005 012	1 X R0.05	0.5	1.2	45	4
2MDCCR 010 0005 020	1 X R0.05	0.5	2	45	4
2MDCCR 010 0005 040	1 X R0.05	0.5	4	45	4
2MDCCR 010 0005 060	1 X R0.05	0.5	6	45	4
2MDCCR 010 001 010	1 X R0.1	0.5	1	45	4
2MDCCR 010 001 020	1 X R0.1	0.5	2	45	4
2MDCCR 010 001 040	1 X R0.1	0.5	4	45	4
2MDCCR 010 001 060	1 X R0.1	0.5	6	45	4
2MDCCR 015 0003 015	1.5 X R0.03	0.8	1.5	45	4
2MDCCR 015 0003 030	1.5 X R0.03	0.8	3	45	4
2MDCCR 015 0005 015	1.5 X R0.05	0.8	1.5	45	4
2MDCCR 015 0005 030	1.5 X R0.05	0.8	3	45	4
2MDCCR 015 0001 015	1.5 X R0.1	0.8	1.5	45	4
2MDCCR 015 0001 030	1.5 X R0.1	0.8	3	45	4
2MDCCR 015 0001 040	1.5 X R0.1	0.8	4	45	4
2MDCCR 015 0001 060	1.5 X R0.1	0.8	6	45	4
2MDCCR 020 0003 020	2 X R0.03	1	2	45	4
2MDCCR 020 0003 040	2 X R0.03	1	4	45	4
2MDCCR 020 0003 060	2 X R0.03	1	6	45	4
2MDCCR 020 0003 080	2 X R0.03	1	8	45	4
2MDCCR 020 0003 100	2 X R0.03	1	10	45	4

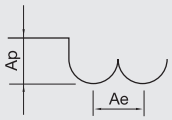
Order Number	날경 Diameter D X R	날장 Length of cut L1	유효장 Effective Length L1	전장 Overall Length L	생크 Shank Dia d
2MDCCR 020 0005 020	2 X R0.05	1	2	45	4
2MDCCR 020 0005 040	2 X R0.05	1	4	45	4
2MDCCR 020 0005 060	2 X R0.05	1	6	45	4
2MDCCR 020 0005 080	2 X R0.05	1	8	45	4
2MDCCR 020 0005 100	2 X R0.05	1	10	45	4
2MDCCR 020 001 020	2 X R0.1	1	2	45	4
2MDCCR 020 001 040	2 X R0.1	1	4	45	4
2MDCCR 020 001 060	2 X R0.1	1	6	45	4
2MDCCR 020 001 080	2 X R0.1	1	8	45	4
2MDCCR 020 001 100	2 X R0.1	1	10	45	4
2MDCCR 030 0003 060	3 X R0.03	1.5	6	55	6
2MDCCR 030 0003 080	3 X R0.03	1.5	8	55	6
2MDCCR 030 0003 100	3 X R0.03	1.5	10	55	6
2MDCCR 030 0003 120	3 X R0.03	1.5	12	55	6
2MDCCR 030 0003 140	3 X R0.03	1.5	14	55	6
2MDCCR 030 0005 060	3 X R0.05	1.5	6	55	6
2MDCCR 030 0005 080	3 X R0.05	1.5	8	55	6
2MDCCR 030 0005 100	3 X R0.05	1.5	10	55	6
2MDCCR 030 0005 120	3 X R0.05	1.5	12	55	6
2MDCCR 030 0005 140	3 X R0.05	1.5	14	55	6
2MDCCR 030 001 060	3 X R0.1	1.5	6	55	6
2MDCCR 030 001 080	3 X R0.1	1.5	8	55	6
2MDCCR 030 001 100	3 X R0.1	1.5	10	55	6
2MDCCR 030 001 120	3 X R0.1	1.5	12	55	6
2MDCCR 030 001 140	3 X R0.1	1.5	14	55	6
2MDCCR 040 0003 080	4 X R0.03	2	8	55	6
2MDCCR 040 0003 100	4 X R0.03	2	10	55	6
2MDCCR 040 0003 150	4 X R0.03	2	15	55	6
2MDCCR 040 0005 080	4 X R0.05	2	8	55	6
2MDCCR 040 0005 100	4 X R0.05	2	10	55	6
2MDCCR 040 0005 150	4 X R0.05	2	15	55	6
2MDCCR 040 001 080	4 X R0.1	2	8	55	6
2MDCCR 040 001 100	4 X R0.1	2	10	55	6
2MDCCR 040 001 150	4 X R0.1	2	15	55	6
2MDCCR 050 0003 100	5 X R0.03	2.5	10	55	6
2MDCCR 050 0003 150	5 X R0.03	2.5	15	55	6
2MDCCR 050 0005 100	5 X R0.05	2.5	10	55	6
2MDCCR 050 0005 150	5 X R0.05	2.5	15	55	6
2MDCCR 050 001 100	5 X R0.1	2.5	10	55	6
2MDCCR 050 001 150	5 X R0.1	2.5	15	55	6
2MDCCR 060 0003 100	6 X R0.03	3	10	55	6
2MDCCR 060 0003 150	6 X R0.03	3	15	55	6
2MDCCR 060 0005 100	6 X R0.05	3	10	55	6
2MDCCR 060 0005 150	6 X R0.05	3	15	55	6
2MDCCR 060 001 100	6 X R0.1	3	10	55	6
2MDCCR 060 001 150	6 X R0.1	3	15	55	6

2MDCB Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material	텅스텐 Tungsten				텅스텐 Tungsten				동텅스텐 Copper Tungsten			
경도 Hardness	HRA ≥ 90				HRA < 90				Cu-W			
반경 Radius	RPM	Feed	Ap Axial Depth	Ae Radial Depth	RPM	Feed	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
R 0.1	30000	110	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
R 0.15	30000	135	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.04
R 0.2	30000	160	0.02	0.09	0.02	0.09	0.02	0.09	0.02	0.09	0.02	0.09
R 0.25	30000	190	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.13
R 0.3	30000	215	0.03	0.15	0.03	0.15	0.03	0.15	0.03	0.15	0.04	0.16
R 0.35	30000	245	0.04	0.19	0.04	0.19	0.04	0.19	0.04	0.19	0.04	0.2
R 0.4	30000	270	0.04	0.21	0.04	0.21	0.04	0.21	0.04	0.21	0.05	0.22
R 0.45	30000	295	0.05	0.24	0.05	0.24	0.05	0.24	0.05	0.24	0.05	0.25
R 0.5	30000	325	0.06	0.28	0.06	0.28	0.39	0.08	0.39	0.08	0.04	0.09
R 0.6	27500	295	0.07	0.29	0.07	0.29	0.46	0.1	0.46	0.1	0.05	0.11
R 0.75	25000	270	0.08	0.3	0.08	0.3	0.58	0.13	0.58	0.13	0.07	0.15
R 1	20000	220	0.11	0.33	0.11	0.33	0.77	0.17	0.77	0.17	0.09	0.18
R 1.25	20000	220	0.13	0.33	0.13	0.33	0.88	0.2	0.88	0.2	0.11	0.22
R 1.5	20000	220	0.17	0.33	0.17	0.33	0.42	0.17	0.42	0.17	0.05	0.18
R 2	18000	200	0.19	0.35	0.19	0.35	0.55	0.22	0.55	0.22	0.07	0.24
R 2.5	16000	175	0.25	0.34	0.25	0.34	0.66	0.28	0.66	0.28	0.08	0.3
R 3	15000	165	0.33	0.33	0.33	0.33	0.72	0.31	0.72	0.31	0.09	0.34

절입량 Depth of Cut



Ap : Axial Depth 축 방향의 절입 깊이(mm)
Ae : Radial Depth 반경 방향의 절입 깊이(mm)
D : Outside Diameter 외경(mm)
n : Speed 회전 속도 (min^{-1})
Vf : Feed 이송 속도 (mm/min)

- 가공 진입시 가능한 피삭재 밖에서 진입 하십시오.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할 시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- 상기 절삭조건은 참고 수치이므로 실 가공시 가공형상 , 가공목적, 적용기계에 따라 조건변경 요망합니다.
- 진동이 적고 강성이 좋은 공작기계 사용 요망합니다 (Ø1 이하 사용시 진동 허용 관리 3μm이내일것.)
- 절삭 조건이 부족한 경우 비례하여 UP&DOWN 하여 설정하십시오.

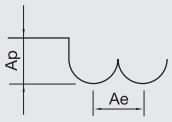
- When starting machining, enter from outside the workpiece whenever possible.
- If the machine tool or workpiece lacks rigidity and vibration occurs,
  reduce the spindle speed and feed rate in the cutting condition table by the same ratio.
- The cutting conditions above are reference values only. During actual machining,
  adjust the conditions according to the machining shape, machining purpose, and machine being used.
- Use a machine tool with minimal vibration and good rigidity. When using tools of Ø1 mm or smaller, vibration must be controlled within 3 μm.
- If the cutting conditions are insufficient, adjust them up or down proportionally.

2MDCRB Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material		텅스텐 Tungsten				텅스텐 Tungsten				동텅스텐 Copper Tungsten			
경도 Hardness		HRA ≥ 90				HRA < 90				Cu-W			
반경	유효장 Effective Length	RPM	Feed	Ap	Ae	RPM	Feed	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
R0.1	0.3	30000	110	0.01	0.01	30000	110	0.01	0.01	30000	104	0.01	0.01
R0.1	0.5	30000	90	0.01	0.01	30000	90	0.01	0.01	30000	104	0.01	0.01
R0.1	0.7	30000	70	0.01	0.01	30000	70	0.01	0.01	28500	98	0.01	0.01
R0.1	1	27000	55	0.01	0.01	27000	55	0.01	0.01	27000	86	0.01	0.01
R0.15	0.5	30000	135	0.02	0.03	30000	140	0.02	0.03	30000	130	0.02	0.03
R0.15	0.7	30000	110	0.02	0.02	30000	115	0.02	0.02	30000	130	0.02	0.03
R0.15	1	27000	85	0.01	0.02	27000	90	0.01	0.02	28500	123	0.02	0.03
R0.2	0.5	30000	160	0.02	0.09	30000	165	0.02	0.09	30000	158	0.02	0.08
R0.2	0.75	30000	135	0.02	0.07	30000	140	0.02	0.07	30000	158	0.02	0.08
R0.2	1	30000	110	0.02	0.06	30000	115	0.02	0.06	30000	158	0.02	0.08
R0.2	1.5	27000	90	0.01	0.05	27000	95	0.01	0.05	28500	149	0.02	0.07
R0.2	2	25500	75	0.01	0.05	25500	80	0.01	0.05	27000	131	0.01	0.06
R0.2	2.5	21000	65	0.01	0.04	21000	65	0.01	0.04	25500	119	0.01	0.05
R0.3	1	30000	215	0.03	0.15	30000	220	0.03	0.15	30000	212	0.03	0.14
R0.3	1.5	30000	170	0.03	0.12	30000	175	0.02	0.12	30000	212	0.03	0.14
R0.3	2	30000	140	0.02	0.1	30000	145	0.02	0.1	28500	200	0.03	0.13
R0.3	3	30000	130	0.02	0.09	30000	130	0.02	0.09	27000	176	0.03	0.11
R0.3	4	30000	110	0.02	0.08	30000	110	0.02	0.08	25500	160	0.02	0.1
R0.3	5	25500	110	0.02	0.08	25500	110	0.02	0.08	24000	141	0.02	0.09
R0.3	6	25500	110	0.02	0.08	25500	110	0.02	0.08	24000	141	0.02	0.09
R0.4	2	30000	270	0.04	0.21	30000	275	0.04	0.21	30000	266	0.04	0.19
R0.4	3	30000	215	0.03	0.17	30000	220	0.03	0.17	28500	251	0.04	0.18
R0.4	4	30000	160	0.02	0.13	30000	165	0.02	0.13	27000	221	0.03	0.15
R0.4	5	30000	135	0.02	0.11	30000	140	0.02	0.11	25500	201	0.03	0.13
R0.4	6	25500	135	0.02	0.11	25500	140	0.02	0.11	25500	201	0.03	0.13
R0.4	8	21000	110	0.02	0.08	21000	110	0.02	0.08	24000	177	0.03	0.12
R0.5	1.5	30000	325	0.06	0.28	30000	330	0.39	0.08	30000	315	0.03	0.08
R0.5	2	30000	260	0.05	0.22	30000	265	0.31	0.06	30000	315	0.03	0.08
R0.5	2.5	30000	260	0.05	0.22	30000	265	0.31	0.06	30000	315	0.03	0.08
R0.5	3	30000	260	0.05	0.22	30000	265	0.31	0.06	28500	298	0.03	0.07
R0.5	4	27000	225	0.04	0.2	27000	230	0.27	0.06	28500	298	0.03	0.07
R0.5	6	24000	195	0.04	0.17	24000	200	0.23	0.05	27000	262	0.03	0.06
R0.5	8	21000	160	0.03	0.14	21000	165	0.2	0.04	25500	238	0.02	0.05
R0.5	10	19500	145	0.03	0.13	19500	150	0.18	0.04	24000	210	0.02	0.05
R0.75	2	25000	270	0.08	0.3	19000	210	0.58	0.13	20000	212	0.06	0.13
R0.75	4	22500	190	0.06	0.21	17000	145	0.41	0.09	19000	200	0.05	0.12
R0.75	6	20000	160	0.05	0.18	15000	125	0.35	0.08	19000	200	0.05	0.12
R0.75	8	17500	135	0.04	0.15	13500	105	0.29	0.07	18000	176	0.05	0.11
R0.75	10	16000	120	0.04	0.14	12500	95	0.26	0.06	17000	160	0.04	0.09
R0.75	12	16000	120	0.04	0.14	12500	95	0.26	0.06	17000	160	0.04	0.09
R1	3	20000	220	0.11	0.33	12500	140	0.77	0.17	14000	148	0.07	0.15
R1	4	20000	220	0.11	0.33	12500	140	0.77	0.17	14000	148	0.07	0.15
R1	6	20000	200	0.1	0.3	12500	125	0.69	0.15	13300	140	0.07	0.14
R1	8	20000	175	0.09	0.26	12500	110	0.62	0.14	13300	140	0.07	0.14
R1	10	20000	155	0.08	0.23	12500	100	0.54	0.12	12600	124	0.06	0.13
R1	12	18000	130	0.07	0.2	11000	85	0.46	0.1	12600	124	0.06	0.13
R1	14	16000	110	0.06	0.17	10000	70	0.39	0.09	11900	112	0.05	0.11
R1	16	13000	75	0.04	0.12	8000	50	0.27	0.06	11900	112	0.05	0.11
R1	18	10000	55	0.03	0.08	6000	35	0.19	0.04	11200	99	0.05	0.1
R1	20	10000	45	0.02	0.07	6000	30	0.15	0.03	11200	99	0.05	0.1
R1.5	6	20000	220	0.17	0.33	9000	310	0.42	0.17	10000	270	0.04	0.15
R1.5	8	20000	220	0.17	0.33	9000	310	0.42	0.17	9500	255	0.04	0.14
R1.5	10	20000	200	0.15	0.3	9000	280	0.38	0.15	9500	255	0.04	0.14
R1.5	12	20000	175	0.14	0.26	9000	250	0.34	0.14	9500	255	0.04	0.14
R1.5	14	19000	175	0.14	0.26	8500	250	0.34	0.14	9000	225	0.03	0.13
R2	8	18000	200	0.19	0.35	7200	310	0.55	0.22	8000	302	0.06	0.2
R2	10	18000	200	0.19	0.35	7200	310	0.55	0.22	8000	302	0.06	0.2
R2	15	17000	160	0.15	0.28	7000	250	0.44	0.18	7600	285	0.05	0.19
R2.5	10	16000	175	0.25	0.34	6000	365	0.66	0.28	6700	356	0.06	0.26
R2.5	15	15000	140	0.2	0.27	5500	290	0.53	0.22	6400	336	0.06	0.24
R3	10	15000	165	0.33	0.33	5500	310	0.72	0.31	6000	306	0.07	0.29
R3	15	15000	130	0.26	0.26	5500	250	0.58	0.25	6000	306	0.07	0.29

절입량 Depth of Cut



Ap : Axial Depth 축 방향의 절입 깊이(mm)
Ae : Radial Depth 반경 방향의 절입 깊이(mm)
D : Outside Diameter 외경(mm)
n : Speed 회전 속도 (min^{-1})
Vf : Feed 이송 속도 (mm/min)

2MDCCR Cutting Condition

• RPM : rev./min • Feed : mm/min

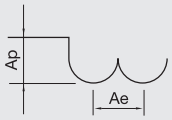
피삭재 Material		텅스텐 Tungsten				텅스텐 Tungsten				동텅스텐 Copper Tungsten			
경도 Hardness		HRA ≥ 90				HRA < 90				Cu-W			
외경 Outside Diameter	유효장 Effective Length	RPM	Feed	Ap	Ae	RPM	Feed	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
ø0.25	0.5	30000	220	0.014	0.2	30000	240	0.014	0.2	30000	255	0.02	0.21
ø0.25	0.8	30000	170	0.014	0.2	30000	185	0.014	0.2	30000	195	0.02	0.21
ø0.25	0.5	30000	170	0.018	0.2	30000	185	0.018	0.2	30000	195	0.02	0.21
ø0.25	0.8	30000	170	0.018	0.2	30000	185	0.018	0.2	30000	195	0.02	0.21
ø0.3	0.6	30000	175	0.015	0.2	30000	190	0.015	0.2	30000	200	0.03	0.21
ø0.3	0.9	30000	220	0.015	0.2	30000	240	0.015	0.2	30000	255	0.03	0.21
ø0.3	0.6	30000	175	0.02	0.2	30000	190	0.02	0.2	30000	200	0.03	0.21
ø0.3	0.9	30000	175	0.02	0.2	30000	190	0.02	0.2	30000	200	0.03	0.21
ø0.5	0.5	30000	190	0.015	0.3	30000	205	0.015	0.3	30000	220	0.04	0.31
ø0.5	1	30000	190	0.02	0.4	30000	205	0.02	0.4	30000	220	0.04	0.41
ø0.5	1.5	30000	190	0.02	0.4	30000	205	0.02	0.4	30000	220	0.04	0.41
ø0.5	0.5	30000	190	0.015	0.3	30000	205	0.015	0.3	30000	220	0.04	0.31
ø0.5	1	30000	190	0.02	0.4	30000	205	0.02	0.4	30000	220	0.04	0.41
ø0.5	1.5	30000	140	0.015	0.3	30000	150	0.015	0.3	30000	160	0.04	0.31
ø0.6	2	30000	220	0.02	0.4	30000	240	0.02	0.4	30000	255	0.05	0.41
ø0.8	0.8	30000	190	0.02	0.6	30000	205	0.02	0.6	30000	220	0.07	0.61
ø0.8	1.6	30000	190	0.02	0.6	30000	205	0.02	0.6	30000	220	0.07	0.61
ø0.8	2.4	30000	175	0.018	0.5	30000	190	0.018	0.5	30000	200	0.07	0.51
ø0.8	0.8	30000	190	0.025	0.6	30000	205	0.025	0.6	30000	220	0.07	0.61
ø0.8	1.6	30000	190	0.025	0.6	30000	205	0.025	0.6	30000	220	0.07	0.61
ø0.8	2.4	30000	175	0.023	0.5	30000	190	0.023	0.5	30000	200	0.07	0.51
ø0.8	0.8	30000	190	0.03	0.6	30000	205	0.03	0.6	30000	220	0.07	0.61
ø0.8	1.6	30000	190	0.03	0.6	30000	205	0.03	0.6	30000	220	0.07	0.61
ø0.8	2.4	30000	175	0.028	0.5	30000	190	0.028	0.5	30000	200	0.07	0.51
ø1	1	30000	190	0.02	0.8	30000	205	0.02	0.8	30000	220	0.06	0.81
ø1	2	30000	190	0.02	0.8	30000	205	0.02	0.8	30000	220	0.06	0.81
ø1	4	30000	155	0.016	0.6	30000	165	0.016	0.6	30000	180	0.05	0.61
ø1	6	25000	155	0.01	0.5	25000	165	0.01	0.5	25000	180	0.05	0.51
ø1	1	30000	190	0.025	0.8	30000	205	0.025	0.8	30000	220	0.06	0.81
ø1	1.2	30000	190	0.025	0.8	30000	205	0.025	0.8	30000	220	0.06	0.81
ø1	2	30000	190	0.025	0.8	30000	205	0.025	0.8	30000	220	0.06	0.81
ø1	4	30000	190	0.02	0.6	30000	205	0.02	0.6	30000	220	0.05	0.61
ø1	6	25000	155	0.012	0.5	25000	165	0.012	0.5	25000	180	0.05	0.51
ø1	1	30000	190	0.03	0.8	30000	205	0.03	0.8	30000	220	0.06	0.81
ø1	2	30000	190	0.03	0.8	30000	205	0.03	0.8	30000	220	0.06	0.81
ø1	4	30000	190	0.025	0.6	30000	205	0.025	0.6	30000	220	0.05	0.61
ø1	6	25000	155	0.015	0.5	25000	165	0.015	0.5	25000	180	0.05	0.51
ø1.5	1.5	25000	190	0.03	1.3	25000	205	0.03	1.3	25000	220	0.1	1.31
ø1.5	3	25000	190	0.03	1.3	25000	205	0.03	1.3	25000	220	0.1	1.31
ø1.5	1.5	25000	190	0.04	1.3	25000	205	0.04	1.3	25000	220	0.1	1.31
ø1.5	3	25000	190	0.04	1.3	25000	205	0.04	1.3	25000	220	0.1	1.31
ø1.5	1.5	25000	190	0.045	1.2	25000	205	0.045	1.2	25000	220	0.1	1.21
ø1.5	3	25000	190	0.045	1.2	25000	205	0.045	1.2	25000	220	0.1	1.21
ø1.5	4	20000	175	0.04	1	20000	190	0.04	1	20000	200	0.09	1.01
ø1.5	6	18000	160	0.035	0.9	18000	175	0.035	0.9	19000	185	0.09	0.91
ø2	2	20000	190	0.04	1.8	20000	205	0.04	1.8	20000	220	0.13	1.81
ø2	4	20000	190	0.04	1.8	20000	205	0.04	1.8	20000	220	0.13	1.81
ø2	6	20000	190	0.037	1.7	20000	205	0.037	1.7	20000	220	0.12	1.71
ø2	8	18000	190	0.025	1.3	18000	205	0.025	1.3	19000	220	0.12	1.31
ø2	10	16000	190	0.05	1.8	16000	205	0.05	1.8	17000	220	0.11	1.81
ø2	2	20000	190	0.05	1.8	20000	205	0.05	1.8	20000	220	0.13	1.81
ø2	4	20000	190	0.045	1.7	20000	205	0.045	1.7	20000	220	0.13	1.71
ø2	6	20000	190	0.04	1.5	20000	205	0.04	1.5	20000	220	0.12	1.51
ø2	8	18000	190	0.028	1.3	18000	205	0.028	1.3	19000	220	0.12	1.31
ø2	10	16000	190	0.045	1.5	16000	205	0.045	1.5	17000	220	0.11	1.51
ø2	2	20000	190	0.06	1.8	20000	205	0.06	1.8	20000	220	0.13	1.81
ø2	4	20000	190	0.06	1.8	20000	205	0.06	1.8	20000	220	0.13	1.81
ø2	6	20000	190	0.055	1.7	20000	205	0.055	1.7	20000	220	0.12	1.71
ø2	8	18000	190	0.033	1.3	18000	205	0.033	1.3	19000	220	0.12	1.31
ø2	10	16000	190	0.035	1.3	16000	205	0.035	1.3	17000	220	0.11	1.31
ø3	6	14300	200	0.036	2.12	12700	257	0.051	2.12	12100	285	0.06	2.12
ø3	8	14000	185	0.03	2.12	12500	234	0.043	2.12	11900	260	0.05	2.12
ø3	10	14000	170	0.027	2.12	12200	216	0.038	2.12	11600	240	0.045	2.12
ø3	12	13600	155	0.024	2.12	11800	198	0.034	2.12	11250	220	0.04	2.12
ø3	14	13300	140	0.021	2.12	11550	180	0.03	2.12	11000	200	0.035	2.12
ø3	6	14300	210	0.042	2.09	12700	270	0.06	2.09	12100	300	0.07	2.09
ø3	8	14000	195	0.036	2.09	12500	248	0.051	2.09	11900	275	0.06	2.09
ø3	10	14000	180	0.03	2.09	12200	225	0.043	2.09	11600	250	0.05	2.09

2MDCCR Cutting Condition

• RPM : rev./min • Feed : mm/min

피삭재 Material		텅스텐 Tungsten				텅스텐 Tungsten				동텅스텐 Copper Tungsten			
경도 Hardness		HRA ≥ 90				HRA < 90				Cu-W			
외경 Outside Diameter	유효장 Effective Length	RPM	Feed	Ap	Ae	RPM	Feed	Ap Axial Depth	Ae Radial Depth	RPM	FEED	Ap Axial Depth	Ae Radial Depth
ø3	12	13600	165	0.027	2.09	11800	207	0.038	2.09	11250	230	0.045	2.09
ø3	14	13300	150	0.024	2.09	11550	189	0.034	2.09	11000	210	0.04	2.09
ø3	6	14300	225	0.048	2.02	12700	288	0.068	2.02	12100	320	0.08	2.02
ø3	8	14000	210	0.042	2.02	12500	266	0.06	2.02	11900	295	0.07	2.02
ø3	10	14000	195	0.036	2.02	12200	243	0.051	2.02	11600	270	0.06	2.02
ø3	12	13600	180	0.033	2.02	11800	225	0.047	2.02	11250	250	0.055	2.02
ø3	14	13300	165	0.03	2.02	11550	207	0.043	2.02	11000	230	0.05	2.02
ø4	8	12500	270	0.048	2.84	10970	342	0.068	2.84	10450	380	0.08	2.84
ø4	10	12500	250	0.042	2.84	10740	315	0.06	2.84	10230	350	0.07	2.84
ø4	15	11800	230	0.036	2.84	10160	288	0.051	2.84	9680	320	0.06	2.84
ø4	8	12500	285	0.054	2.81	10970	360	0.077	2.81	10450	400	0.09	2.81
ø4	10	12500	265	0.048	2.81	10740	333	0.068	2.81	10230	370	0.08	2.81
ø4	15	11800	245	0.042	2.81	10160	306	0.06	2.81	9680	340	0.07	2.81
ø4	8	12500	305	0.06	2.74	10970	387	0.085	2.74	10450	430	0.1	2.74
ø4	10	12500	285	0.054	2.74	10740	360	0.077	2.74	10230	400	0.09	2.74
ø4	15	11800	265	0.048	2.74	10160	333	0.068	2.74	9680	370	0.08	2.74
ø5	10	11000	340	0.06	3.56	8790	428	0.085	3.56	8370	475	0.1	3.56
ø5	15	10450	310	0.054	3.56	8320	396	0.077	3.56	7920	440	0.09	3.56
ø5	10	11000	360	0.066	3.53	8790	450	0.094	3.53	8370	500	0.11	3.53
ø5	15	10450	330	0.06	3.53	8320	414	0.085	3.53	7920	460	0.1	3.53
ø5	10	11000	390	0.072	3.46	8790	486	0.102	3.46	8370	540	0.12	3.46
ø5	15	10450	360	0.066	3.46	8320	450	0.094	3.46	7920	500	0.11	3.46
ø6	10	10000	400	0.072	4.28	7810	513	0.102	4.28	7440	570	0.12	4.28
ø6	15	9500	360	0.066	4.28	7390	468	0.094	4.28	7040	520	0.11	4.28
ø6	10	10000	420	0.078	4.25	7810	540	0.111	4.25	7440	600	0.13	4.25
ø6	15	9500	380	0.072	4.25	7390	495	0.102	4.25	7040	550	0.12	4.25
ø6	10	10000	455	0.084	4.18	7810	585	0.119	4.18	7440	650	0.14	4.18
ø6	15	9500	420	0.078	4.18	7390	540	0.111	4.18	7040	600	0.13	4.18

절입량
Depth of Cut



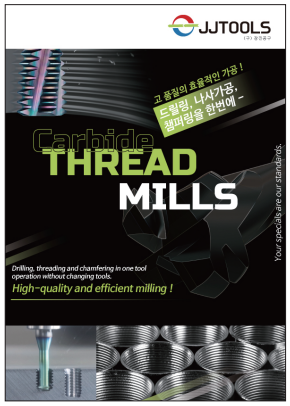
Ap : Axial Depth 축 방향의 절입 깊이(mm)
Ae : Radial Depth 반경 방향의 절입 깊이(mm)
D : Outside Diameter 외경(mm)
n : Speed 회전 속도 (min^{-1})
Vf : Feed 이송 속도 (mm/min)

- 가공 진입시 가능한 피삭재 밖에서 진입 하십시오.
- 공작기계와 가공물의 강성이 없는 경우 진동이 발생할 시 조건표에 회전속도와 이송속도를 같은 비율로 줄여서 적용합니다.
- 상기 절삭조건은 참고 수치이므로 실 가공시 가공형상 , 가공목적, 적용기계에 따라 조건변경 요망합니다.
- 진동이 적고 강성이 좋은 공작기계 사용 요망합니다 (Ø1 이하 사용시 진동 허용 관리 3μm이내일것.)
- 절삭 조건이 부족한 경우 비례하여 UP&DOWN 하여 설정하십시오.

- When starting machining, enter from outside the workpiece whenever possible.
- If the machine tool or workpiece lacks rigidity and vibration occurs, reduce the spindle speed and feed rate in the cutting condition table by the same ratio.
- The cutting conditions above are reference values only. During actual machining, adjust the conditions according to the machining shape, machining purpose, and machine being used.
- Use a machine tool with minimal vibration and good rigidity. When using tools of Ø1 mm or smaller, vibration must be controlled within 3 μm.
- If the cutting conditions are insufficient, adjust them up or down proportionally.

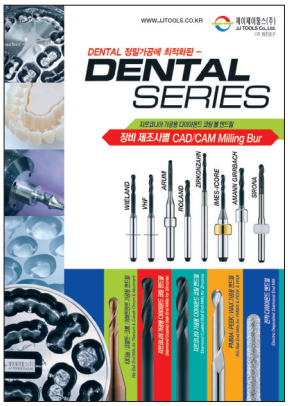














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공구 사용시 주의사항

- 공구가 사용중 파손되어 상해의 위험이 있으므로 보호안경 등 안전장비를 착용하고 사용해 주십시오
- 공구의 목적 외에 다른 용도로 사용하거나 전용장비가 아닌 장비에 장착하지 마시고 임의로 연삭, 변경하지 마십시오
- 제품 날부분의 손상을 방지하기 위해 가능한 비접촉 측정을 권고합니다.
- 공구의 체결이 정확히 되었는지 확인한 후 사용해 주십시오.
- 사용시 고열로 인한 스파크가 발생할 수 있습니다.
- 화재나 폭발 등 위험 인자를 제거하고 사용하십시오
- 제품 사용 전과 후에도 공구와 가공물의 치수를 반드시 확인해 주십시오
- 공구가 마모되거나 손상된 경우 사용을 중지해 주십시오
- 비정상적인 진동, 소음이 발생할 경우 시스템을 중지하고 진동, 소음의 원인을 확인하여 제거 하십시오.

Precautions When Using Tools

- Wear safety equipment such as protective eyewear to prevent the risk of injury in case the tool breaks during use.
- Do not use the tool for purposes other than its intended use, or install it on equipment that is not designed for it. Do not grind or modify it arbitrarily.
- To prevent damage to the cutting edge, it is recommended to use non-contact measurements whenever possible.
- Ensure proper attachment of the tool before use.
- Sparks may be generated due to high heat during use.
- Eliminate potential fire or explosion hazards before using.
- Before and after use, always check the dimensions of the tool and the workpiece.
- Discontinue use if the tool is worn or damaged.
- If abnormal vibration or noise occurs, stop the system and identify and eliminate the cause of the vibration or noise.

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ISO 9001 ISO 14001

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ISO 품질·환경 경영시스템 인증을 획득하였습니다.