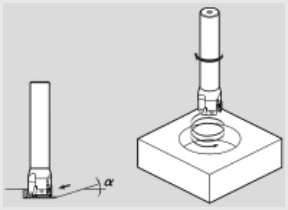
Ramping, Helical milling and Vertical milling

Ramping, Helical Milling

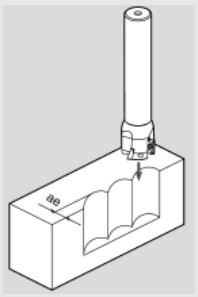
- **Ramping angle is recommended under α°.**
- **Refer each tools' cutting performance list for depth of helical milling per one revolution.**
  Use compressed air during machining.



Cutting Dia.	Applicable Inserts	Maximum ramping angle (α°)
ø16ø18	BDMT11T3 type BDGT11T3 type	3°
ø20		5°
ø22, ø25		2.5°
ø28~ø32		1.5°
ø40		0.7°
ø50 and over		Not recommended.
ø25	BDMT1704 type BDGT1704 type	8°
ø32		5°
ø40		2.5°
ø50 and over		Not recommended.

BDMT/BDGT1103 Type is not recommended for ramping and helical milling.

Vertical milling



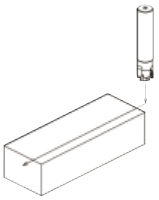
Cutting Dia.	Applicable Inserts	Maximum Width of Cut (ae)
ø16 ø18	BDMT11T3 type BDGT11T3 type	1.5mm
ø20 ~ ø160	BDMT11T3 type BDGT11T3 type	5mm
ø25 ~ ø160	BDMT1704 type BDGT1704 type	8mm

BDMT1103 Type is not recommended for vertical milling.

Case Studies

RC55 (Pre-hardened Tool Steel)

- Test piece (40~45HRC)
- Vc=50m/min (n=800min^{-1})
- apxae=2x14mm
- fz=0.125mm/t (Vf=300mm/min)
- Dry
- MEC20-S20-11T
- 3 flutes
- BDMT11T308ER-JT (PR830)



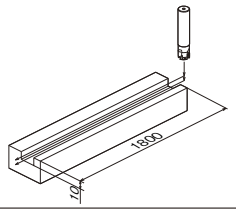
MEC	Chip Removal Amount = 71.3cm^3 (Sustainable)
Competitor's Endmill A	Chip Removal Amount = 2.9cm^3 (Chipping occurred)

Competitor's Endmill A [ø25 (2 flutes) Vc=40m/min fz=0.075mm/t apxae= 2x3mm] had chipping occurred in 10 minutes and had loud cutting sound. MEC could increase the feed rate, and the cutting edge remained in extremely good condition and is still sustainable for further machining.

(Evaluation by the user)

St42-2 (SS400)

- Plate
- Vc=88m/min (n=1400min^{-1})
- ap=5mm×2 passes
- fz=0.12mm/t (Vf=500mm/min)
- Dry
- MEC20-S20-11T
- 3 flutes
- BDMT11T308ER-JT (PR830)



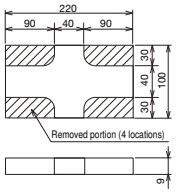
MEC	23pcs/edge
Competitor's Endmill B	10~11pcs/edge

MEC extended the tool life for more than twice.

(Evaluation by the user)

X5CrNi1810 (SUS304)

- Plate
- Vc=125m/min (n =1600min^{-1})
- ap =9.0mm
- fz =0.1mm/t (Vf=320mm/min)
- Dry
- MEC25- S25-17
- 2 flutes
- BDMT170408ER-JT (PR830)



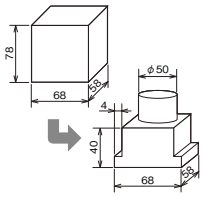
MEC	4pcs/edge or more
Competitor's Endmill C	1pcs/edge or less

Competitor's Endmill C (Slow Away Roughing Endmill) had high cutting resistance and had insert breakage, but MEC had no insert breakage and was still usable for further machining after machined 4 pieces (16 points).

(Evaluation by the user)

DAC10 (Hot Work Tool Steel)

- Mold
- Vc=130m/min (n =1040min^{-1})
- ap × ae =(~3)×(~5) (Varies depending on machining point)
- fz =0.18mm/t(Vf=936mm/min)
- Dry (Compressed Air)
- MEC40- S32-11T • 5 flutes
- BDMT11T308ER-JT (PR830)



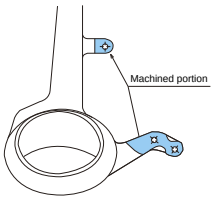
MEC	2 hours (Small Wear: Extendible)
Competitor's Endmill D	2 hours (halted due to insert breakage)

MEC had better cutting performance / insert life comparing to Competitor's Endmill D, and the insert had only small wear and was usable for further machining after used for machining of the same duration as Competitor's Endmill D. Competitor's Endmill D (6 flutes type) was used with Vf=936mm/min (fz=0.15mm/t).

(Evaluation by the user)

20CrMo4 (SCM420)

- Knuckle Steering
- Vc=150m/min (n=1,200min^{-1})
- ap=0.5~5mm (Shoulder-ing)
- fz=0.1mm/t (Vf=478mm/min)
- Dry
- MEC40-S32-17
- 4 flutes
- BDMT170408ER-JT (PR830)



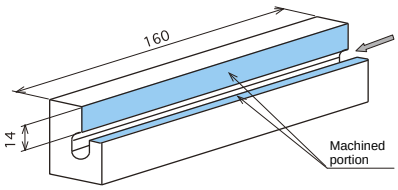
MEC	150pcs/edge
Competitor's Endmill E	40pcs/edge

MEC had a better finished surface comparing to Competitor's Endmill E and also improved the tool life by more than 3 times .

(Evaluation by the user)

Inconel

- Turbine parts
- Vc=15m/min (n=120min^{-1})
- ap=0.5mm
- fz=0.08mm/t (Vf=38mm/min)
- Wet
- MEC040R-17-4T-M
- 4 flutes
- BDMT170408ER-JS PR1025 (PR925)



MEC	9pcs/edge
Competitor's Endmill F	1pcs/edge or less

Competitor's Endmill H (Coated Insert) could not finish machining of 1 workpiece, but MEC could machine 9pcs/edge and the finished surface was good.

(Evaluation by the user)