

EXSAP 11&17

EXSAP-11&17 (Face mills , End mills)

MSX-11&17 (Modular Heads)



What's the Features of -17?

- *Economical double Side Insert (4 corners)*
- *High Efficient Machining*
with **Max.15mm ap.**
- *Apply for Roughing to Semi finishing*

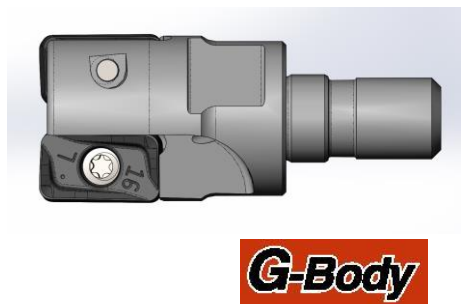
MSX
EXSAP(End mill)

φ25～φ40

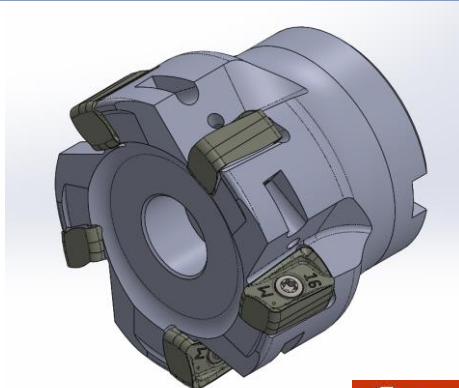
EXSAP(Face mill)

φ50～φ125

Tolerance of Dia. 0.05～0.15mm(Modular heads)
0.05～0.15mm(Face Mill)

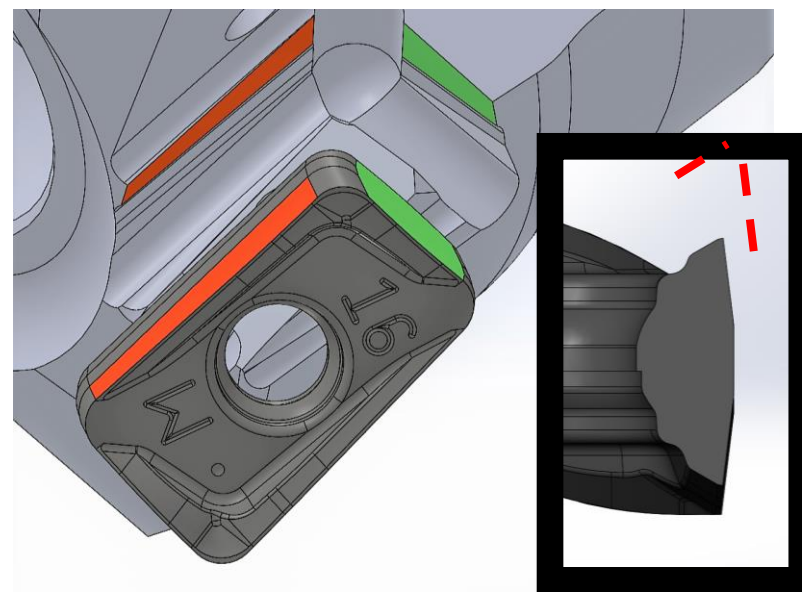


G-Body



G-Body

Achieved high efficient machining in roughing due to combinations of 3D chip breaker with low cutting force and negative relief.
The dovetail structure prevents the inserts from floating.



What's the Features of -11?

- *Economical double Side Insert (4 corners)*
- *High Efficient Machining*
with **Max. 10mm ap.**
- *Apply for Roughing to Semi finishing*

MSX-11
EXSAP(End mill)

φ16~φ40

EXSAP-11
(Face mill)

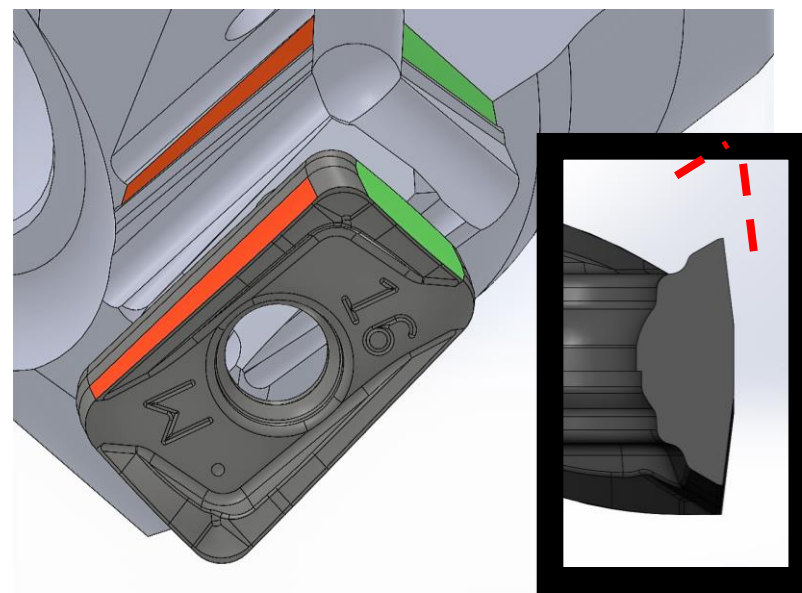
φ50~φ80

Tolerance of Dia. 0~0.1mm(Modular heads)
 0~0.12-0.14mm(Face Mill)

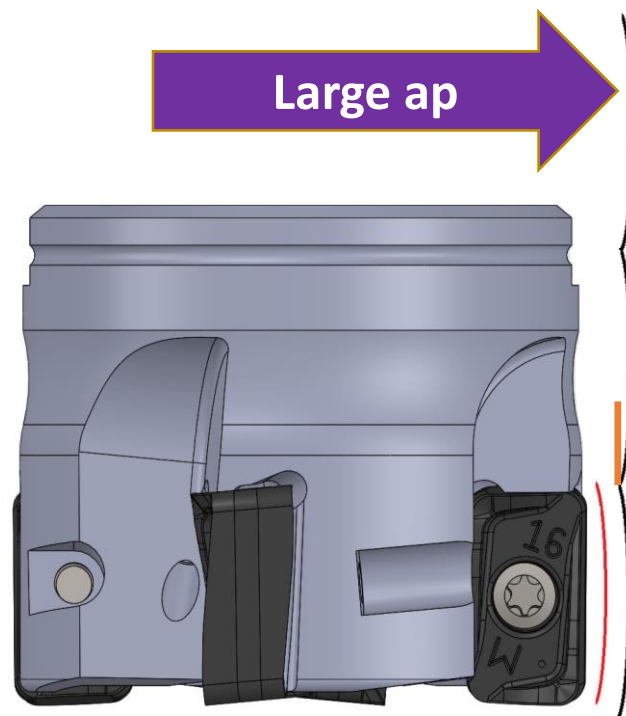


NP-Body

*Achieved high efficient machining
in roughing due to combinations
of 3D chip breaker with low cutting
force and negative relief.
The dovetail structure prevents
the inserts from floating.*



What's the Features?



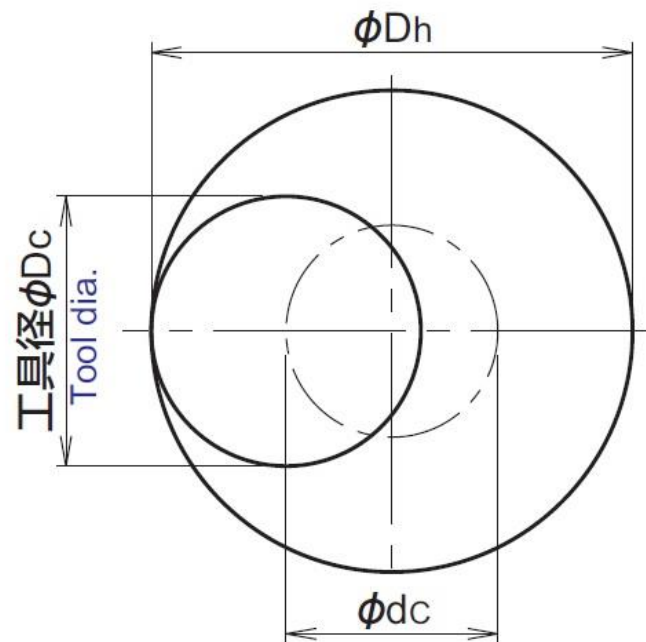
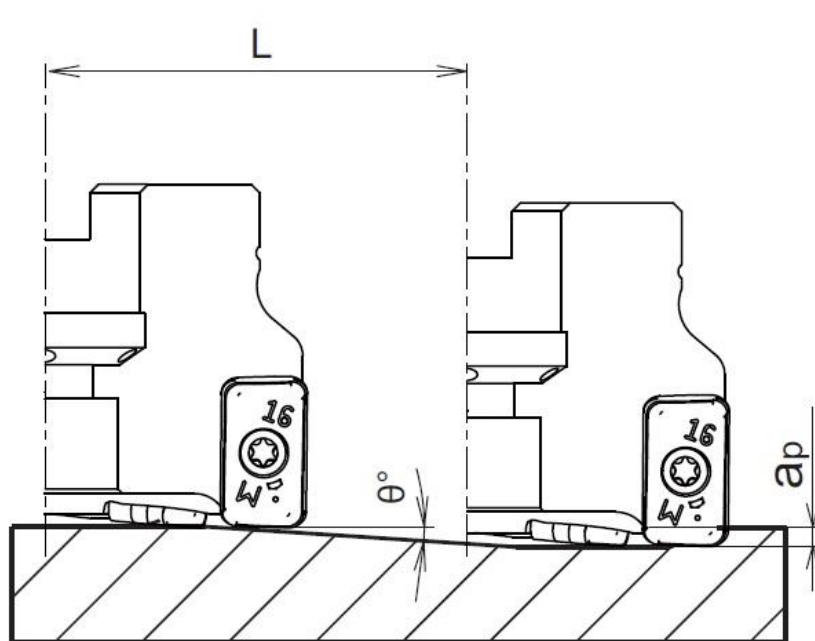
Due to arc-geometry on the periphery cutting edge, the cusp height can be smaller even in case of large ap.

Small cusp height

Achieves high efficient & high precision machining for side wall.

What's the Features?

- Possible to ramping and helical interpolation.



Ramping angle

“-17” : 0.15° (Dia.φ80) ~ 0.7° (Dia.φ25)
 “-11” : 0.15° (Dia.Φ52) ~ 1° (Dia.Φ16)

Insert lineup(-17)

Type of corner radius :
R0.4 , R0.8, R1.6 ,R2.0 & R3.0



ZNGU170904ZER-PM
ZNGU170908ZER-PM
ZNGU170916ZER-PM
ZNGU170920ZER-PM
ZNGU170930ZER-PM

Insert Grade

JC8050

Carbon Steel
Mold Steel
(Below 35HRC)

JC8118

Hardened Die Steel
(Below 50HRC)
Cast iron
High Strength Stainless Steel

Inserts lineup(-11)

Type of corner radius :
R0.4 , R0.8 , R1.6 , R2.0 & R3.0



JC8118,8050

NEW



JC7550,JC7518
DS150,DS118

ZNGU110504ZER-PM
ZNGU110508ZER-PM
ZNGU110516ZER-PM
ZNGU110520ZER-PM
ZNGU110530ZER-PM

ZNGU110504ZER-SL
ZNGU110508ZER-SL
ZNGU110516ZER-SL

Insert Grade

JC8050

Carbon Steel
Mold Steel(Below 35HRC)

JC8118

Hardened Die Steel(Below 50HRC)
Cast iron

JC7550,JC7518

Stainless Steel

DS150

Titanium

DS118

Inconel

MSX



EXSAP

EXSAP



Modular heads

Φ25	MSX-2025-M12
Φ26	MSX-2026-M12
Φ28	MSX-2028-M12
Φ30	MSX-2030-M12
Φ32	MSX-2032-M16 MSX-3032-M16
Φ33	MSX-3033-M12
Φ35	MSX-3035-M12
Φ40	MSX-4040-M16

End mills

Φ25	EXSAP-2025-60-S25 EXSAP-2025-100-S25
Φ32	EXSAP-2032-70-S32 EXSAP-2032-120-S32 EXSAP-3032-70-S32 EXSAP-3032-120-S32

Face mills

Φ50	EXSAP-4050R-22 EXSAP-5050R-22
Φ52	EXSAP-5052R-22
Φ63	EXSAP-5063R-22
Φ80	EXSAP-7080R EXSAP-7080R-27
Φ100	EXSAP-7100R EXSAP-7100R-32
Φ125	EXSAP-8125R EXSAP-8125R-40

Bodies lineup(-11)

Modular heads

MSX-2016-11-M8

MSX-3020-11-M10

MSX-3025-11-M12

MSX-4030-11-M16

MSX-4032-11-M16

MSX-5040-11-M16



Face mills

EXSAP-6040R-11-16

EXSAP-7050R-11-22

EXSAP-7052R-11-22

EXSAP-7063R-11-22

EXSAP-7063R-11-27

EXSAP-8080R-11-27



End mills

EXSAP-2016-11-30-S16

EXSAP-2016-11-50-S16

EXSAP-3020-11-50-S20

EXSAP-3020-11-80-S20

EXSAP-3025-11-60-S25

EXSAP-3025-11-100-S25

EXSAP-4030-11-70-S32

EXSAP-4030-11-120-S32

EXSAP-4032-11-70-S32

EXSAP-4032-11-120-S32

EXSAP-5040-11-50-S32

EXSAP-5040-11-50L-S32

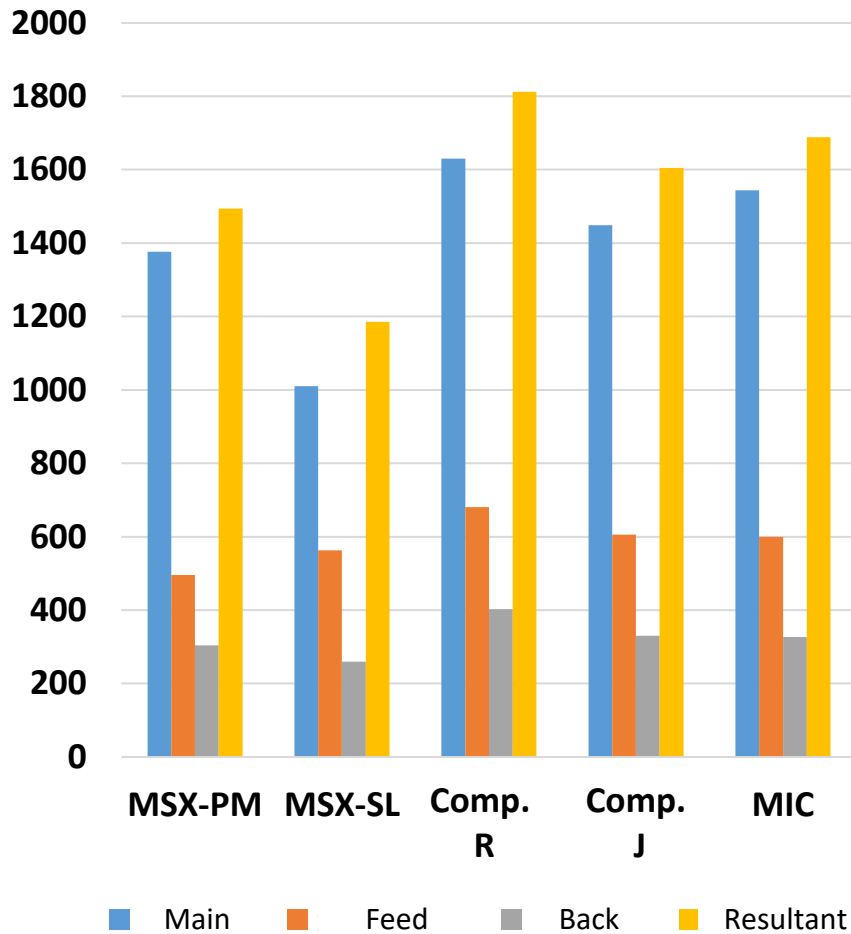


Cutting force comparison(64 Titanium)

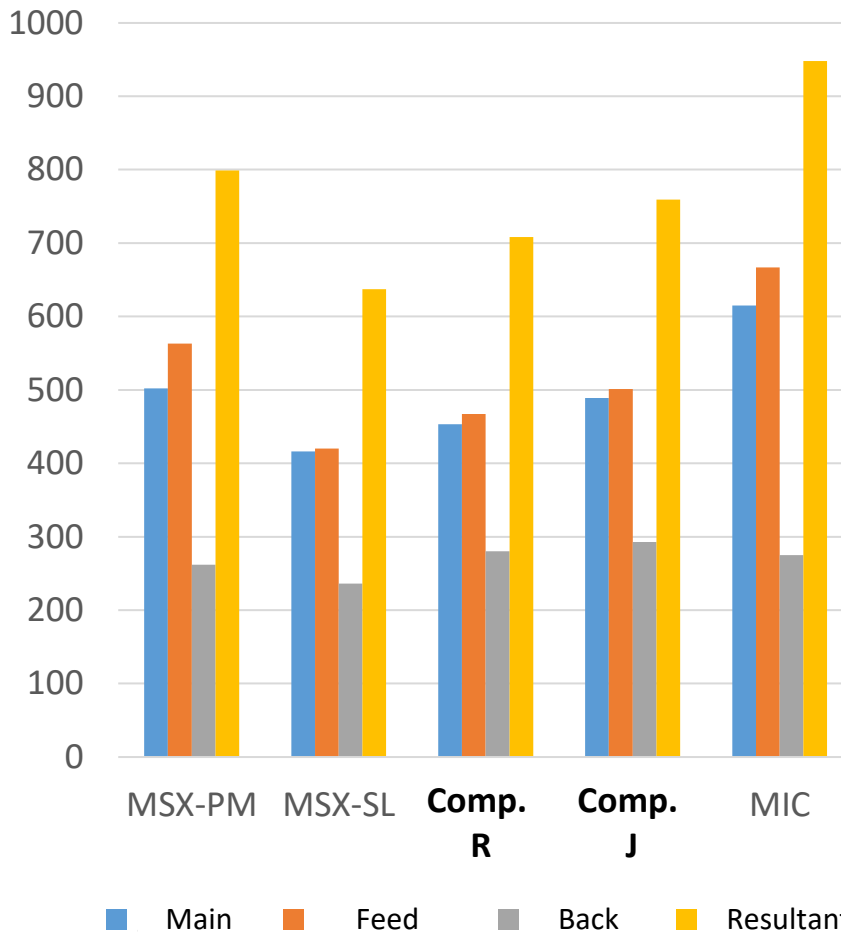
Shoulder milling : $\phi 16\text{mm}$, $V_c=60\text{m/min}$, $f_z=0.1\text{mm/t}$, $A_p=5\text{mm} \times 4$, $A_e=1\text{mm}$, 1N, Down cut, Air blow

Face milling : $\phi 16\text{mm}$, $V_c=60\text{m/min}$, $f_z=0.1\text{mm/t}$, $A_p=1\text{mm}$, $A_e=10\text{mm}$, 1N, Down cut, Air blow

6AL-4V-Ti Shoulder milling



6AL-4V-Ti Face milling



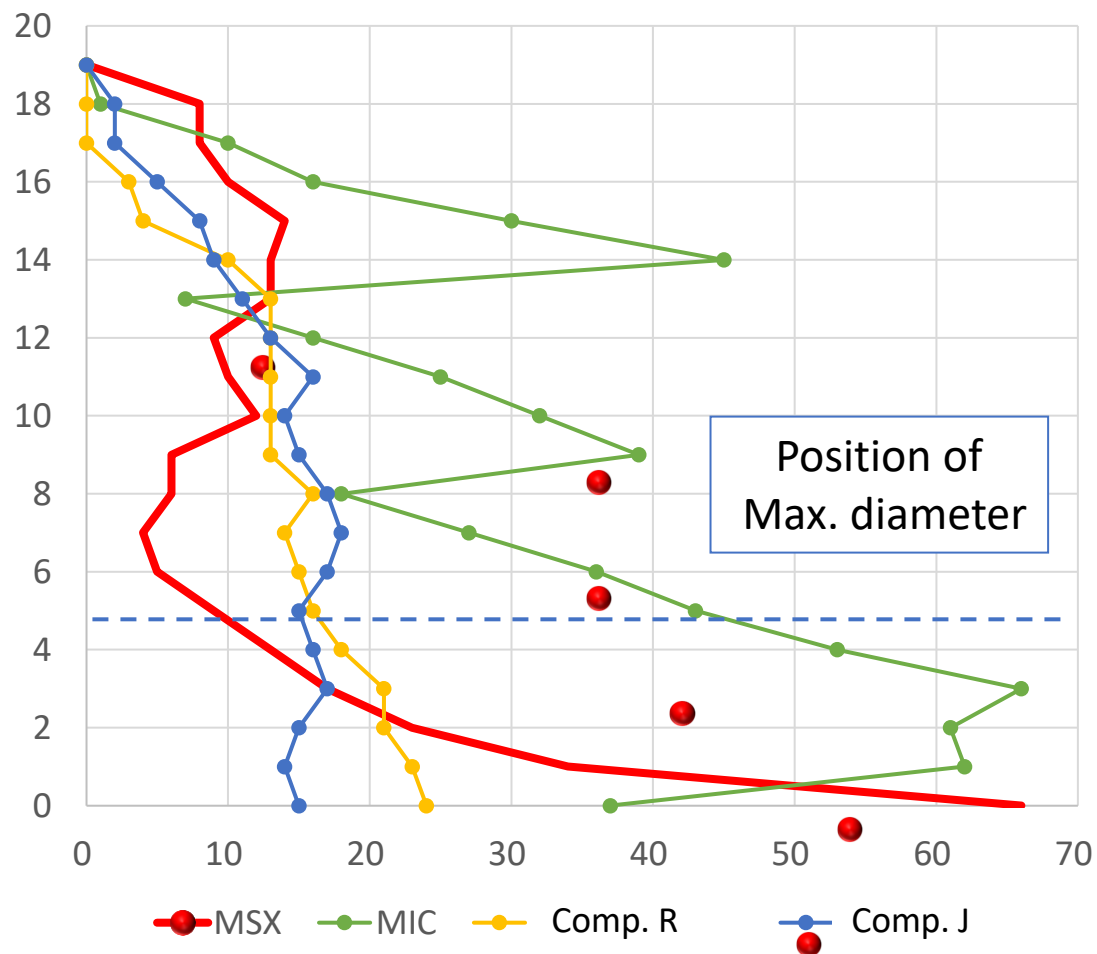
Percentage of the resultant force of each tool when the resultant force of MIC is 100%

	Shoulder	Face
MSX-PM	89%	84%
MSX-SL	70%	67%
Comp. R	107%	75%
Comp. J	95%	80%

Verticalness comparison (64 Titanium)

Shoulder Milling : $\phi 16\text{mm}$, $V_c=60\text{m/min}$, $f_z=0.1\text{mm/t}$, $A_p=5\text{mm} \times 4$, $A_e=1\text{mm}$, 1N, Down cut, Air blow

←Work Mat'l Verticalness on 6AL-4V-Ti



Verticalness above the position of Max. diameter

MSX-SL

14 μm

MIC

45 μm

Comp. R

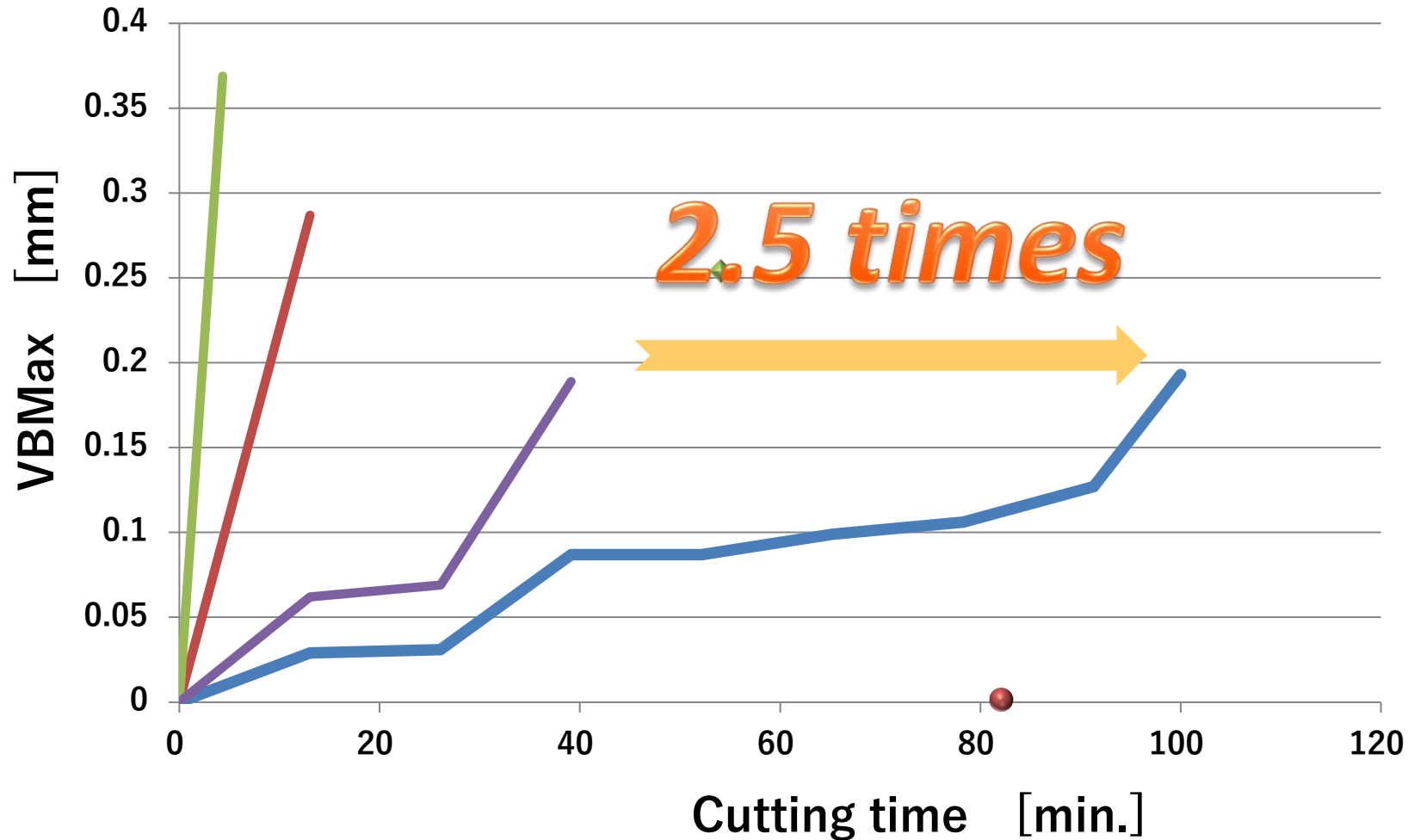
16 μm

Comp. J

18 μm

Tool life comparison(Face milling:P21 40HRC)

$\phi 50\text{mm}$, $V_c=120\text{m/min}$, $f_z=0.15\text{mm/t}$, $a_p=2\text{mm}$, $a_e=35\text{mm}$, 1N, Down cut, $\ell=75\text{mm}$, Air blow(External)



DIJET PM (JC8118)

DIJET SL (JC7550)

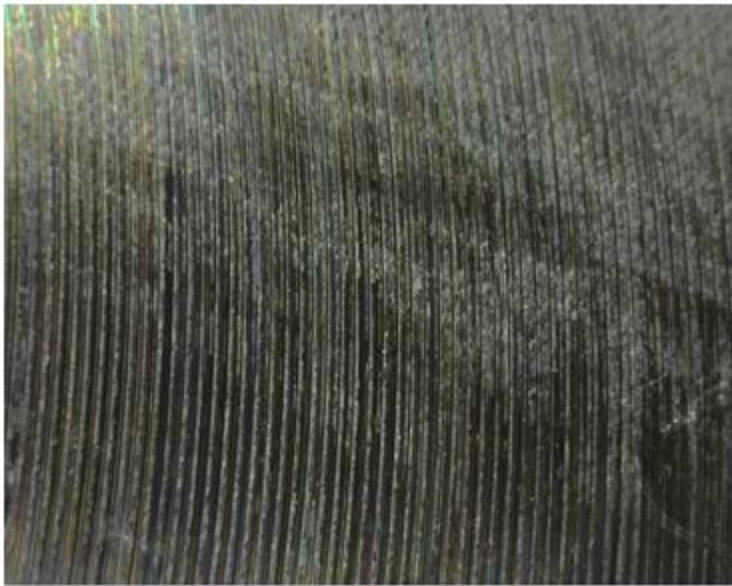
Comp. J (PR1525)

Comp. R (KC725M)



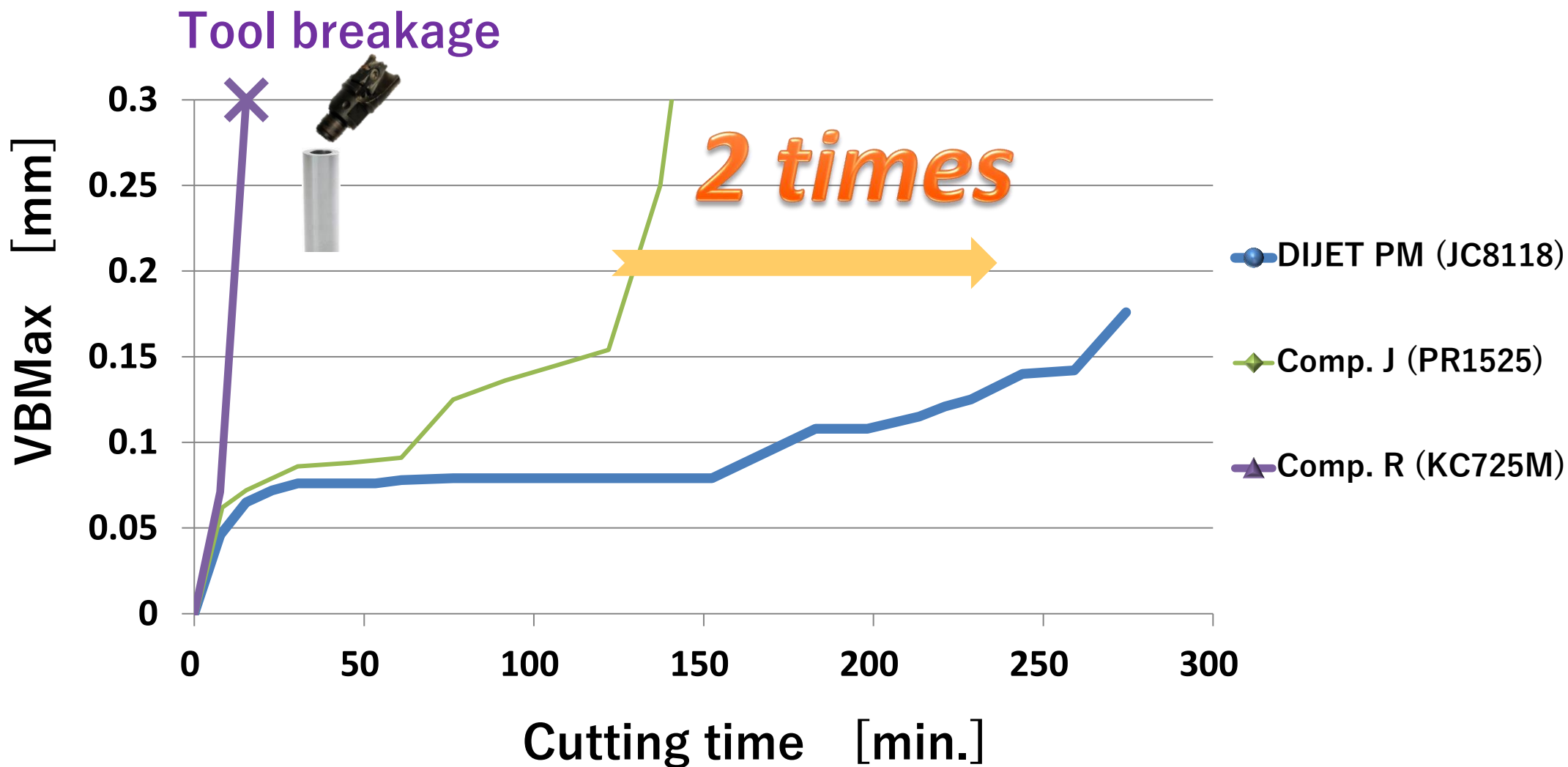
Tool life comparison(Face milling:P21 40HRC)

$\phi 50\text{mm}$, $V_c=120\text{m/min}$, $f_z=0.15\text{mm/t}$, $a_p=2\text{mm}$, $a_e=35\text{mm}$, 1N, Down cut, $\ell=75\text{mm}$, Air blow(External)

DIJET(PM)	Comp. J	Comp. R
		
$R_a=0.24\ \mu\text{m}$	$R_a=0.27\ \mu\text{m}$	$R_a=0.49\ \mu\text{m}$
$R_z=1.41\ \mu\text{m}$	$R_z=1.71\ \mu\text{m}$	$R_z=3.03\ \mu\text{m}$

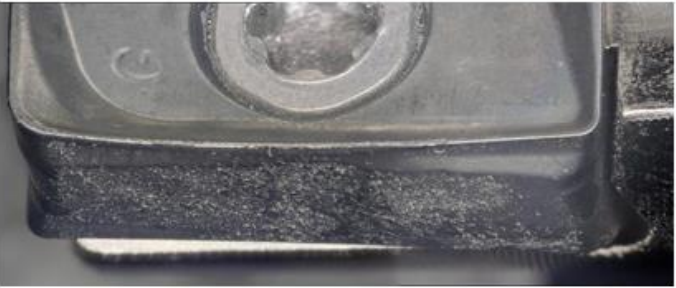
Tool life comparison(Shoulder milling:P21 40HRC)

Φ50mm, Vc=110m/min, fz=0.15mm/t, **ap=8mm, ae=1mm**, 1N, Down cut, ℓ=55~60mm, Air blow(Internal)



Tool life comparison(Shoulder milling:P21 40HRC)

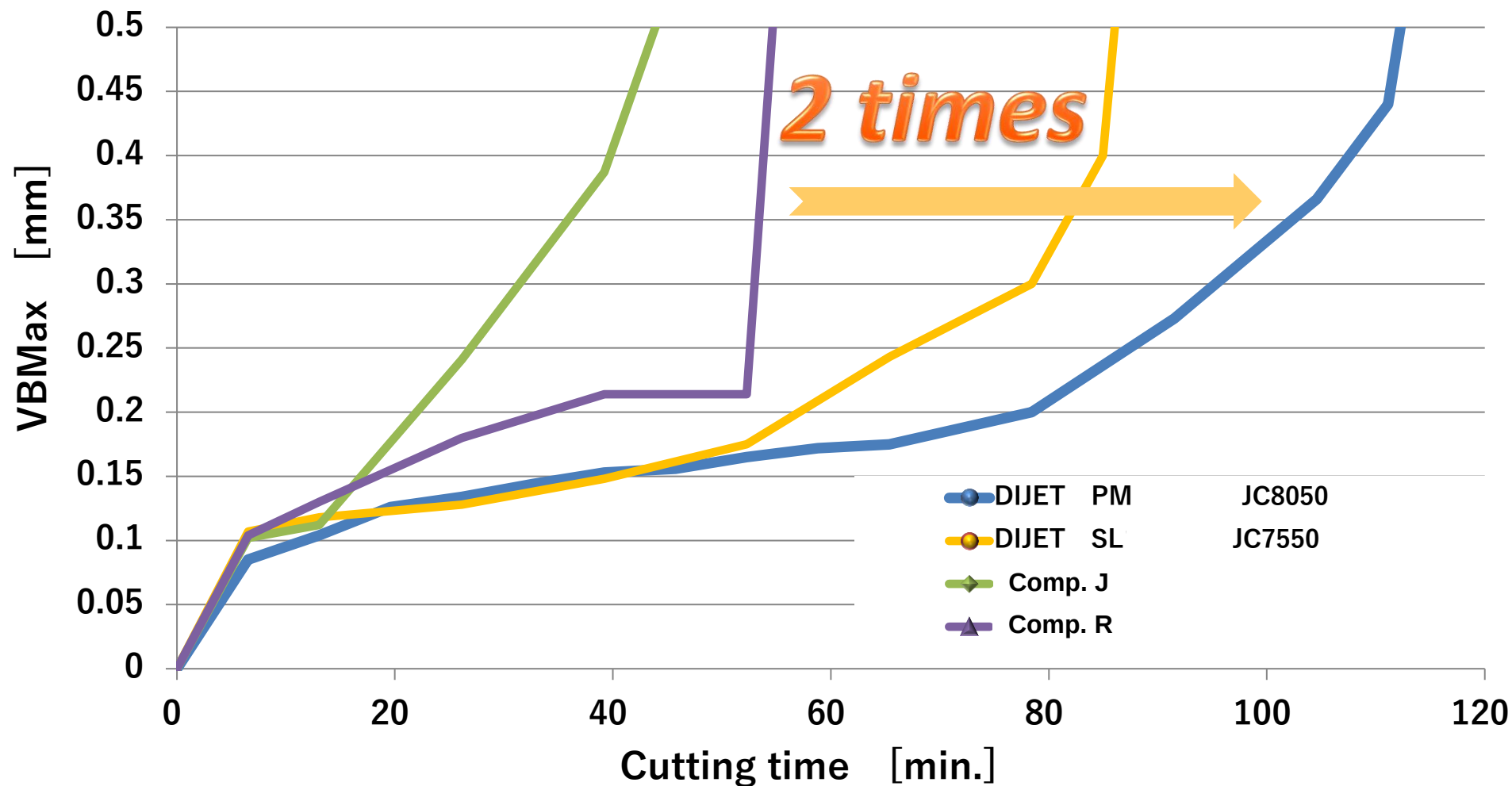
Φ50mm, Vc=110m/min, fz=0.15mm/t, **ap=8mm**, **ae=1mm**, 1N, Down cut, ℓ=55~60mm, Air blow(Internal)

Number of pass	10 PASS	90 PASS	190 PASS
Cutting length	5m	45m	95m
Cutting time	15 Min.	137 Min.	290 Min.
DIJET PM			
Comp. J			Wear of Tip > Notch wear 
Comp. R		The center of cutting edge is worn The chips at the end of tool life are slightly divided.	

Breakage

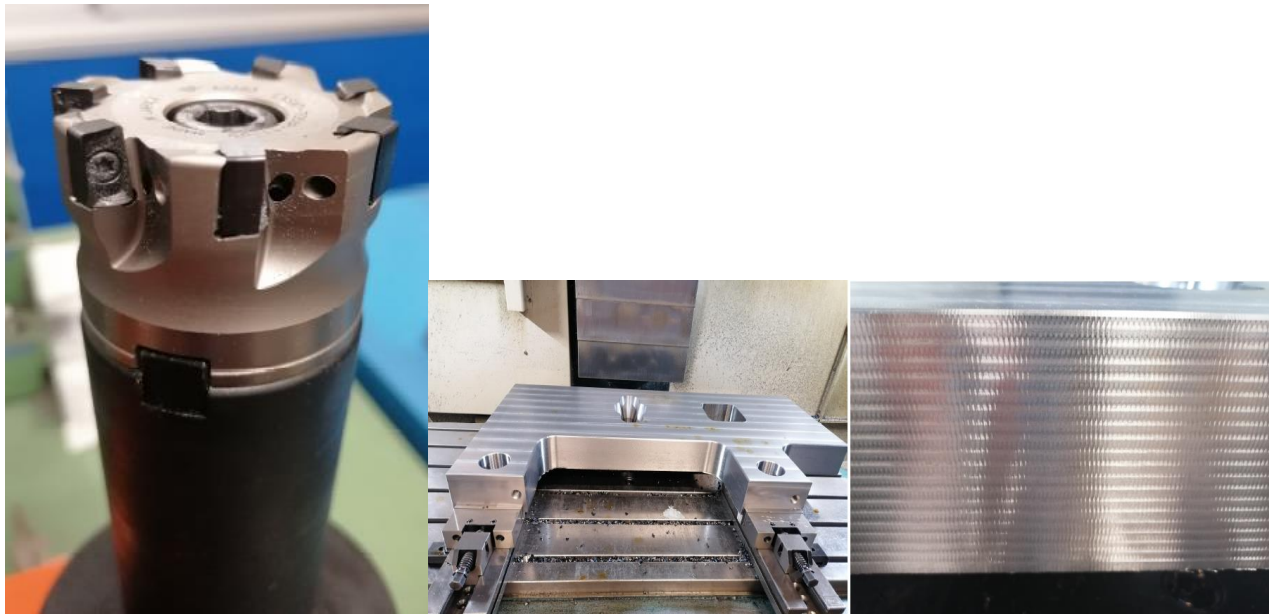
Tool life comparison(Face milling:304 Stainless)

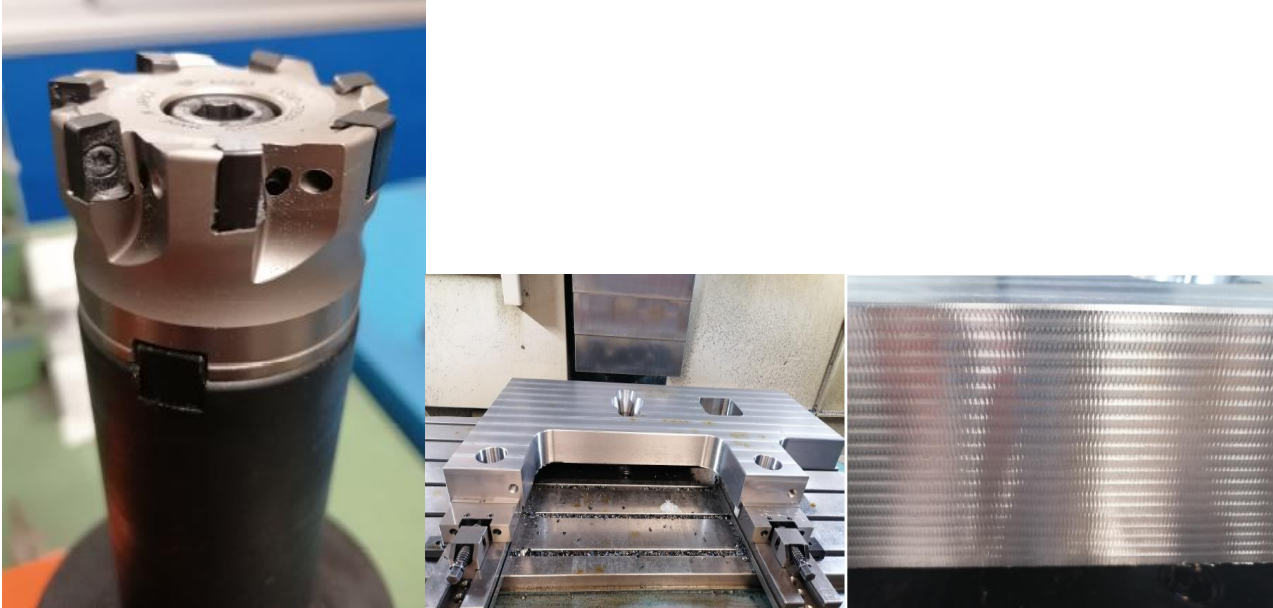
$\phi 50\text{mm}$, $V_c=120\text{m/min}$, $f_z=0.2\text{mm/t}$, $a_p=3\text{mm}$, $a_e=35\text{mm}$, 1N, Down cut, $\ell=145\text{mm}$, Air blow(Internal)





Body EXSAP-7050R-11-22 Insert (Grade) ZNGU110508ZER-PM (JC8050) Wear or Chipping Normal wear Note The conventional product machined only 1 part, but this product can machine 3 parts. By reducing the cutting speed, it is possible to machine 4 parts.	Work	Part name	Super Duplex
		Material	F55 stainless
		Hardness	32HRC
	Tool	Tool	Φ50mm
	Cutting conditions	Cutting speed	95m/min (600rpm)
		Feed speed	700mm/min (0.15mm/t)
		Ap	5mm
		Ae	6mm
		Coolant	Walter-Soluble(Internal)



		Work	Part name	Plate
			Material	S45C,1045
			Hardness	200HB
		Tool	Tool	Φ50mm
		Cutting conditions	Cutting speed	140m/min (900rpm)
Feed speed	1,400mm/min (0.23mm/t)			
Ap	10mm			
Ae	1mm			
Coolant	Air blow(Internal)			
Body	EXSAP-7050R-11-22			
Insert (Grade)	ZNGU110508ZER-PM (JC8050)			
Wear or Chipping	Normal wear			
Note	Can be machined even under high load condition such as ap=10mm,ae=1mm.			



Overhang length : 76mm

 Overhang length : 76mm		Work	Part name	Parts
			Material	Incoloy a286
			Hardness	
		Tool	Tool	Φ50.8mm
		Cutting conditions	Cutting speed	38 m/min (238 min-1)
			Feed speed	36.3 mm/min (0.03mm/t)
Ap	3.2 mm			
Ae	25.4 mm			
Coolant	Wet(External)			
Body	EXSAP-5200R-11-075			
Insert (Grade)	ZNGU110508ZER-SL (JC7518)			
Wear or Chipping	Normal wear			
Note	Tool life was about 60 minutes. EXSAP cuts cycle time in half and doubles tool life compared to conventional solid carbide end mills.			