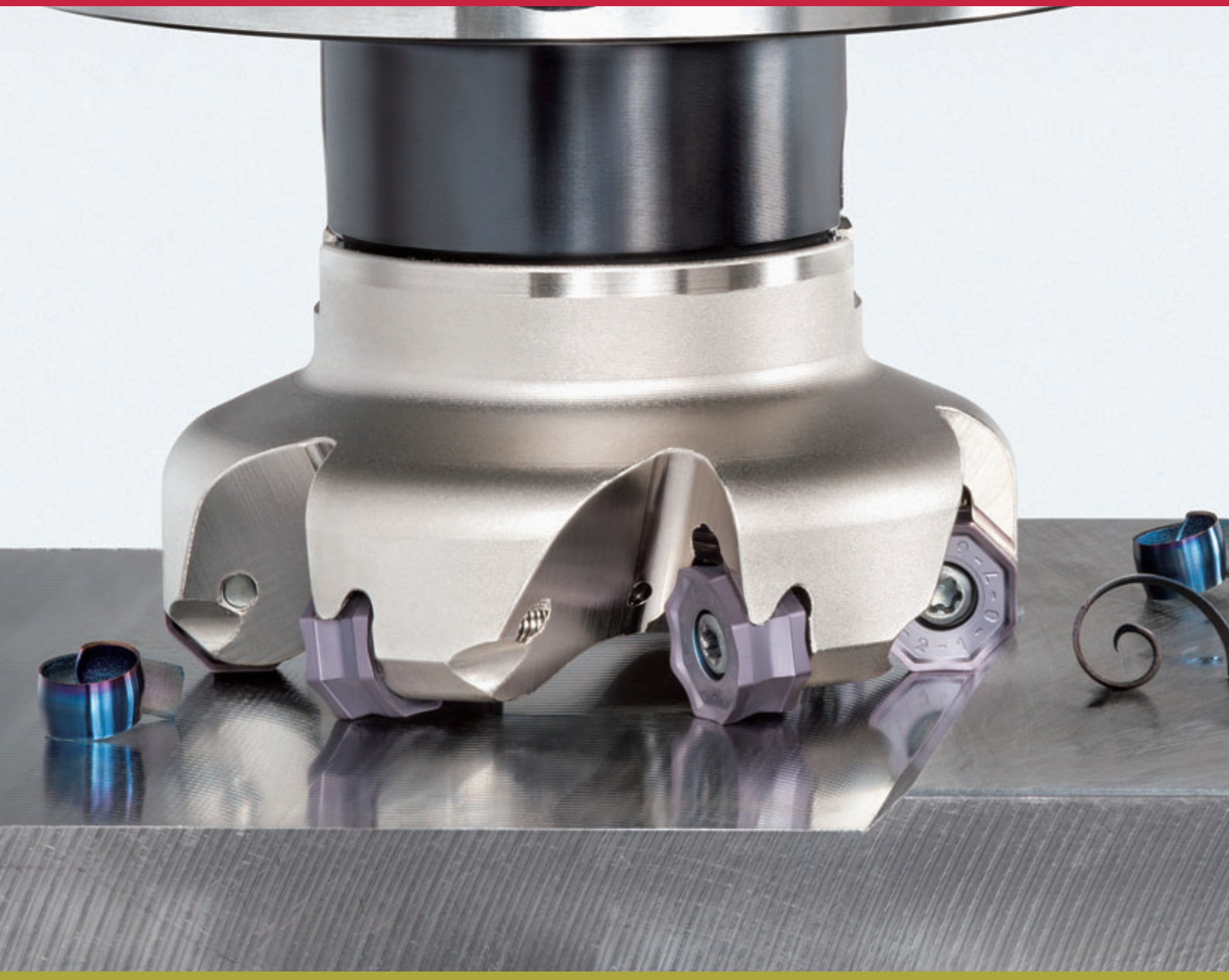
MillLine

DOTRIPLE-MILL

www.tungaloy.com

Tungaloy Report No. 503-G

Dovetail insert clamping gurantees **high productivity**



Member IMC Group Tungaloy


ACCELERATED MACHINING

MillLine

DoTriple-Mill

TUNGALOY

TUNG FORCE MILL

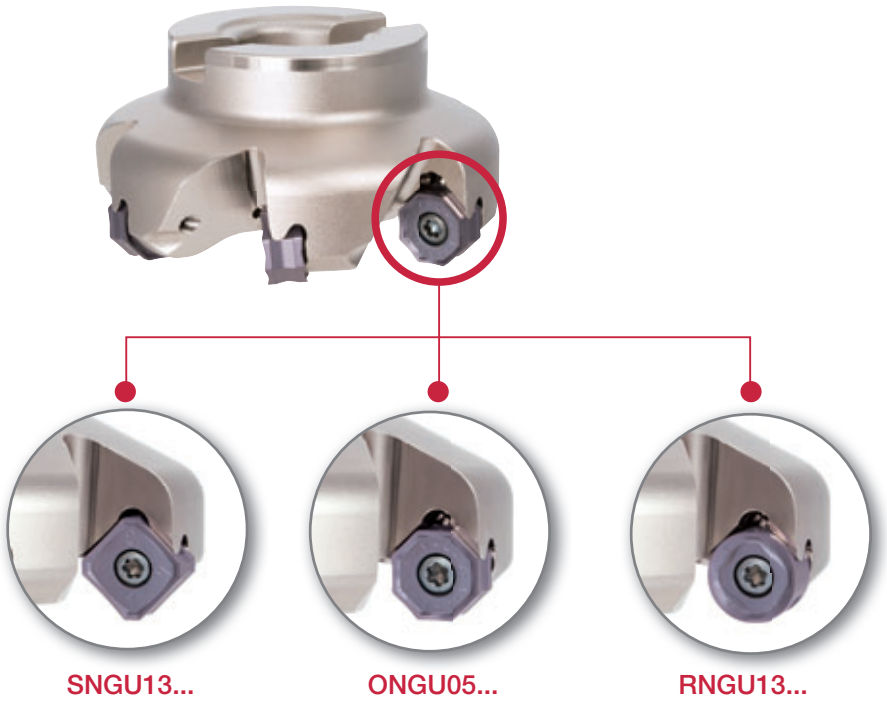
ACCELERATED MACHINING

DoTriple-Mill features an improved dovetail clamping structure and offers triple advantage of using square, octagonal, and round inserts in the same pocket.

3 types of inserts with triple advantage in **productivity, cost, and surface quality**

Versatility

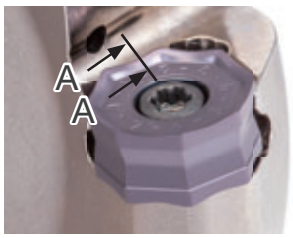
3 types of double sided inserts fit in the same pocket

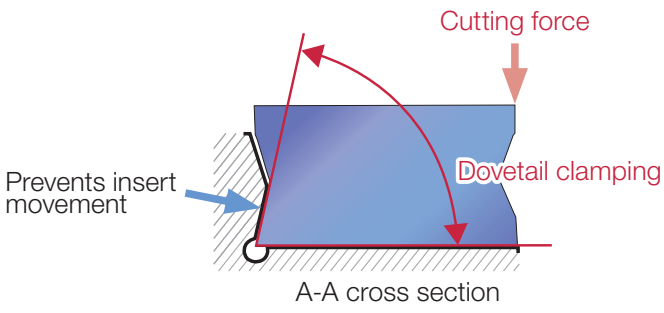


Rigid clamping

Dovetail structure provides high clamping rigidity with only one screw

- Improved performance especially in machining high-temperature materials
- Extended tool life

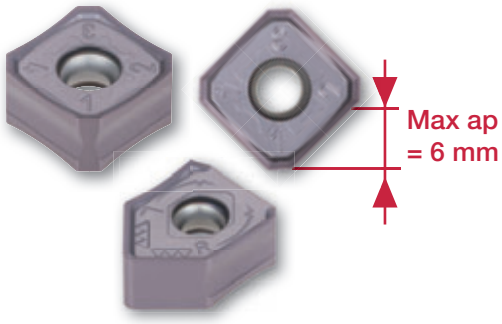




Inserts

8-cornered square insert for larger depth of cut

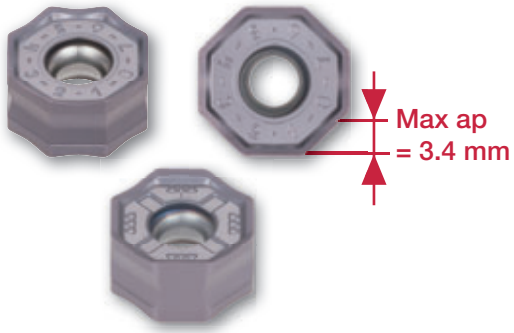
- Concave cutting edge creates compact barrel-shaped chips.
- Large rake angle on the cutting edge reduces cutting force.
- Optimized cutting edge geometry for machining stainless steel with high nickel/chrome content.
- With a 4-cornered (2RH & 2LH) wiper insert (SNGU-W) effective in machining, high surface quality is delivered.



Max ap = 6 mm

16-cornered octagonal insert for economic advantage

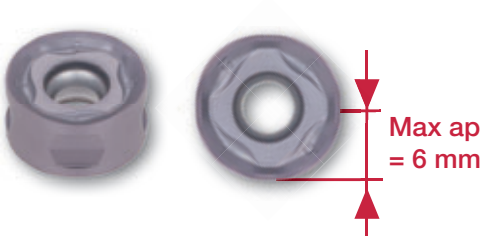
- Concave cutting edge creates compact barrel-shaped chips.
- Large rake angle on the cutting edge reduces cutting force.
- Self-wiper edge for each cutting edge improves surface finish.
- With a 8-cornered wiper insert ONGU-W effective in machining, high surface quality is delivered.



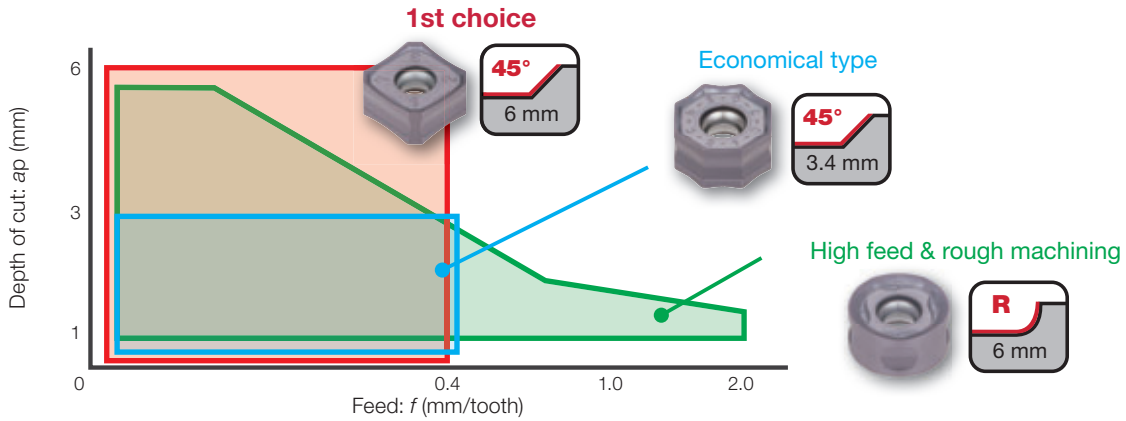
Max ap = 3.4 mm

8-cornered round insert for rough machining

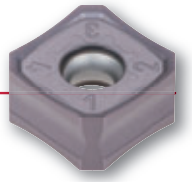
- Helical cutting edge reduces cutting force.
- Round shape and strengthened cutting edge are suitable for roughing operation with large depth of cut and high-feed operation with small depth of cut.



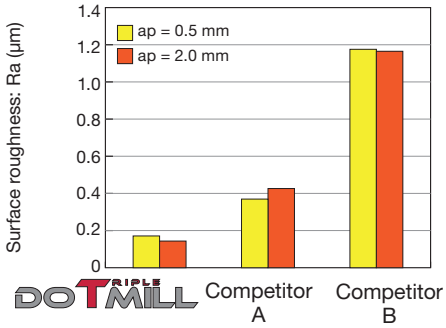
APPLICATION AREA



CUTTING PERFORMANCE OF SNGU INSERT



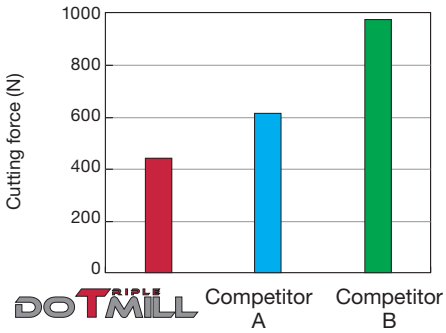
Surface roughness



P

Cutter	: TASN13M100B32.0R08 (ø*D*c = 100 mm, z = 1)
Insert	: SNGU1307ANEN-MJ
Workpiece material	: S55C / C55
Cutting speed	: *V*c = 200 m/min
Feed per tooth	: *f*z = 0.2 mm/t
Depth of cut	: *a*p = 0.5 / 2.0 mm
Width of cut	: *a*e = 75 mm
Coolant	: Wet

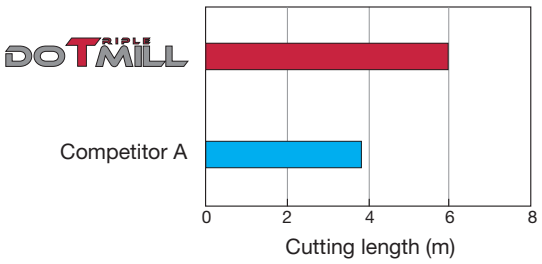
Cutting force



P

Cutter	: TASN13M100B32.0R08 (ø*D*c = 100 mm, z = 1)
Insert	: SNGU1307ANEN-MJ
Workpiece material	: S55C / C55
Cutting speed	: *V*c = 200 m/min
Feed per tooth	: *f*z = 0.2 mm/t
Depth of cut	: *a*p =2.0 mm
Width of cut	: *a*e = 75 mm
Coolant	: Dry

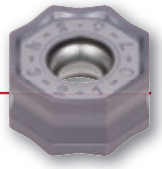
Tool life in machining stainless steel



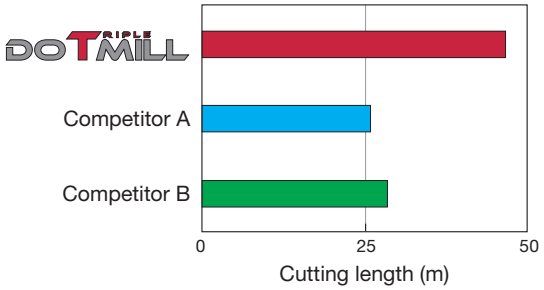
M

Cutter	: TASN13M100B32.0R08 (ø*D*c = 100 mm, z = 1)
Insert	: SNGU1307ANEN-MJ
Workpiece material	: SUS304 / X5CrNi18-9
Cutting speed	: *V*c = 150 m/min
Feed per tooth	: *f*z = 0.15 mm/t
Depth of cut	: *a*p =3.0 mm
Width of cut	: *a*e = 75 mm
Coolant	: Dry

CUTTING PERFORMANCE OF ONGU INSERT



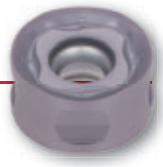
Tool life in machining steel



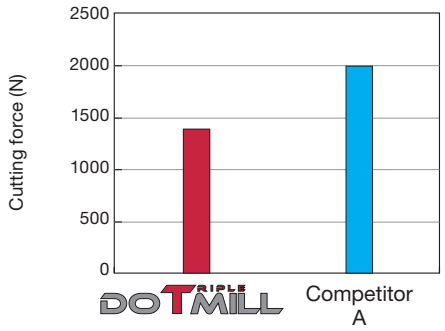
P

Cutter : TASN13M100B32.0R08 (ø*D*c = 100 mm, z = 1)
Insert : ONGU0507ANEN-MJ
Workpiece material : S55C / C55
Cutting speed : *V*c = 200 m/min
Feed per tooth : *f*z = 0.2 mm/t
Depth of cut : *a*p = 2.0 mm
Width of cut : *a*e = 75 mm
Coolant : Dry

CUTTING PERFORMANCE OF RNGU INSERT



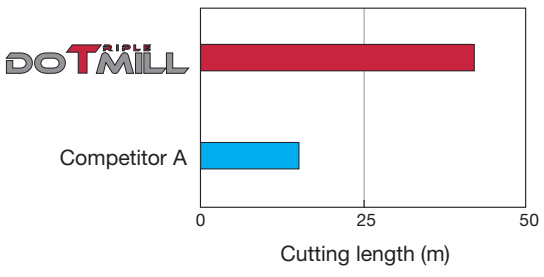
Cutting force



P

Cutter : TASN13M100B32.0R08 (ø*D*c = 100 mm, z = 1)
Insert : SNGU1307ANEN-MJ
Workpiece material : S55C / C55
Cutting speed : *V*c = 200 m/min
Feed per tooth : *f*z = 0.2 mm/t
Depth of cut : *a*p =2.0 mm
Width of cut : *a*e = 75 mm
Coolant : Dry

Tool life in machining steel



P

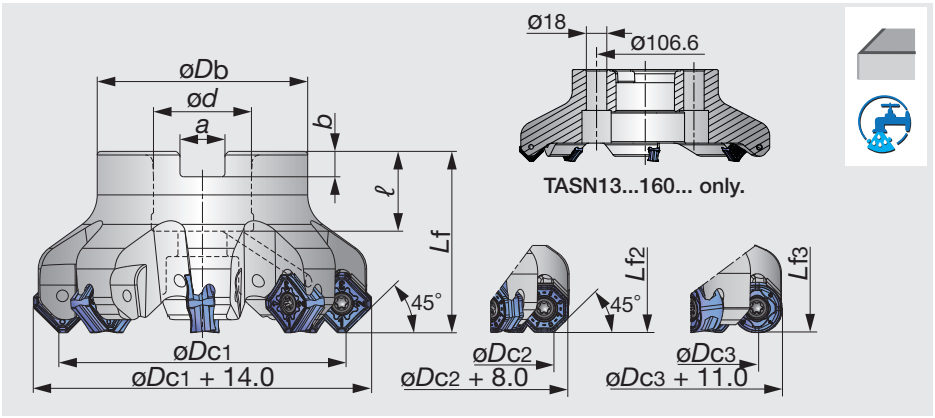
Cutter : TASN13M100B32.0R08 (ø*D*c = 100 mm, z = 1)
Insert : SNGU1307ANEN-MJ
Workpiece material : SCM440 / 42CrMo4
Cutting speed : *V*c = 160 m/min
Feed per tooth : *f*z = 0.2 mm/t
Depth of cut : *a*p =2.0 mm
Width of cut : *a*e =105 mm
Coolant : Dry

DOTRIPLE MILL
TUNGALOY

Face milling cutter with double-sided square, octagonal, and round inserts

CUTTER - BORE TYPE

DoTriple-Mill TASN13



Right hand (R) shown.

Designation	øDc1	øDc2	øDc3	z	øDb	Lf1	Lf2	Lf3	ød	ℓ	a	b	Kg	C.bolt
TASN13M050B22.0R04	50.0	53.0	49.1	4	41	40.0	38.5	38.5	22.000	20.00	10.40	6.30	0.40	CM10X30H
TASN13M050B22.0R05	50.0	53.0	49.1	5	41	40.0	38.5	38.5	22.000	20.00	10.40	6.30	0.40	CM10X30H
TASN13M063B22.0R05	63.0	66.0	62.1	5	47	40.0	38.5	38.5	22.000	20.00	10.40	6.30	0.70	CM10X30H
TASN13M063B22.0R06	63.0	66.0	62.1	6	47	40.0	38.5	38.5	22.000	20.00	10.40	6.30	0.60	CM10X30H
TASN13M080B27.0R05	80.0	83.0	79.1	5	58	50.0	48.5	48.5	27.000	22.00	12.40	7.00	1.10	CM12X30H
TASN13M080B27.0R08	80.0	83.0	79.1	8	58	50.0	48.5	48.5	27.000	22.00	12.40	7.00	1.10	CM12X30H
TASN13J080B25.4R05	80.0	83.0	79.1	5	58	50.0	48.5	48.5	25.400	26.00	9.50	6.00	1.20	CM12X30H
TASN13J080B25.4R08	80.0	83.0	79.1	8	58	50.0	48.5	48.5	25.400	26.00	9.50	6.00	1.10	CM12X30H
TASN13M100B32.0R06	100.0	103.0	99.1	6	60	50.0	48.5	48.5	32.000	28.50	14.40	8.00	1.40	TMBA-M16H
TASN13M100B32.0R08	100.0	103.0	99.1	8	60	50.0	48.5	48.5	32.000	28.50	14.40	8.00	1.40	TMBA-M16H
TASN13J100B31.7R06	100.0	103.0	99.1	6	60	50.0	48.5	48.5	31.750	32.00	12.70	8.00	1.40	TMBA-M16H
TASN13J100B31.7R08	100.0	103.0	99.1	8	60	50.0	48.5	48.5	31.750	32.00	12.70	8.00	1.40	TMBA-M16H
TASN13M125B40.0R07	125.0	128.0	124.1	7	71	63.0	61.5	61.5	40.000	32.00	16.40	9.00	2.20	TMBA-M20H
TASN13M125B40.0R10	125.0	128.0	124.1	10	71	63.0	61.5	61.5	40.000	32.00	16.40	9.00	2.30	TMBA-M20H
TASN13J125B38.1R07	125.0	128.0	124.1	7	80	63.0	61.5	61.5	38.100	38.00	15.90	10.00	2.60	TMBA-M20H
TASN13J125B38.1R10	125.0	128.0	124.1	10	80	63.0	61.5	61.5	38.100	38.00	15.90	10.00	2.70	TMBA-M20H
TASN13M160B40.0R08	160.0	163.0	159.1	8	100	63.0	61.5	61.5	40.000	29.00	16.40	9.00	4.10	-
TASN13M160B40.0R12	160.0	163.0	159.1	12	100	63.0	61.5	61.5	40.000	29.00	16.40	9.00	4.20	-
TASN13J160B50.8R08	160.0	163.0	159.1	8	100	63.0	61.5	61.5	50.800	38.00	19.00	11.00	4.10	-
TASN13J160B50.8R12	160.0	163.0	159.1	12	100	63.0	61.5	61.5	50.800	38.00	19.00	11.00	4.20	-

Extra close-pitch cutters

Designation	øDc1	øDc2	øDc3	z	øDb	Lf1	Lf2	Lf3	ød	ℓ	a	b	Kg	C.bolt
TASN13M063B22.0R08	63.0	66.0	62.1	8	47	40.0	38.5	38.5	22.000	20.00	10.40	6.30	0.60	CM10X30H
TASN13M080B27.0R10	80.0	83.0	79.1	10	58	50.0	48.5	48.5	27.000	22.00	12.40	7.00	1.20	CM12X30H
TASN13J080B25.4R10	80.0	83.0	79.1	10	58	50.0	48.5	48.5	25.400	26.00	9.50	6.00	1.20	CM12X30H
TASN13M100B32.0R12	100.0	103.0	99.1	12	60	50.0	48.5	48.5	32.000	28.50	14.40	8.00	1.40	TMBA-M16H
TASN13J100B31.7R12	100.0	103.0	99.1	12	60	50.0	48.5	48.5	31.750	32.00	12.70	8.00	1.40	TMBA-M16H
TASN13M125B40.0R14	125.0	128.0	124.1	14	71	63.0	61.5	61.5	40.000	32.00	16.40	9.00	2.50	TMBA-M20H
TASN13J125B38.1R14	125.0	128.0	124.1	14	80	63.0	61.5	61.5	38.100	38.00	15.90	10.00	2.90	TMBA-M20H

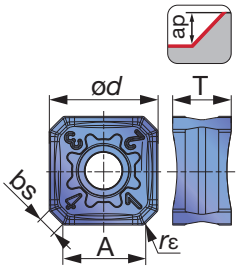
SPARE PARTS



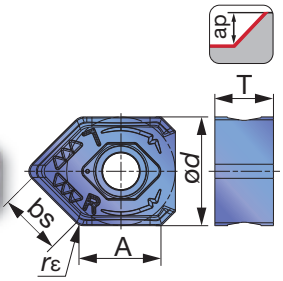
Designation	Clamping screw	Wrench	
		Torx Bit	Grip
TASN13... ($\varnothing Dc_1 \leq 125$ mm)	CSPB-4	BLDIP15/S7	H-TB2W
TASN13... ($\varnothing Dc_1 = 160$ mm)	CSPB-4	BLDIP15/M7	H-TB2W

INSERT

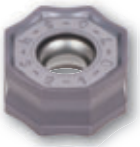
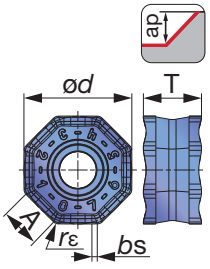
SNGU-MJ

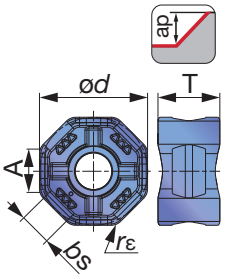
SNGU-W

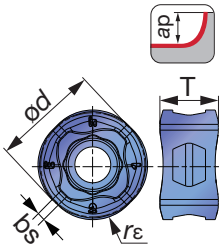
ONGU-MJ

ONGU-W

RNGU-MJ

Designation	Max. ap	A	ød	T	rε	bs	AH3135					AH120				
SNGU1307ANEN-MJ	6	9.4	13	7	0.5	2	●	●		○	○	○		●	●	●
SNGU1307ANEN-W	6	9.6	13	7	1.2	7.5	●	●		○	○	○		●	●	●
ONGU0507ANEN-MJ	3.4	4.9	13	7	0.8	0.7	●	●		○	○	○		●	●	●
ONGU0507ANEN-W	3.4	5	13	7.4	1.6	3.9	●	●		○	○	○		●	●	●
RNGU1307ZNER-MJ	6	--	13	7.1	6	1	●	●		○	○	○		●	●	●
							P	M	K	S	H	P	M	K	S	H

● First choice

STANDARD CUTTING CONDITIONS

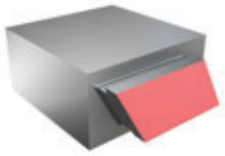
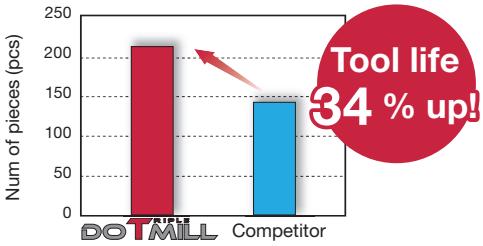
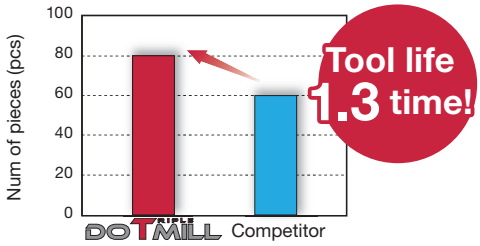
SNGU13 / ONGU05

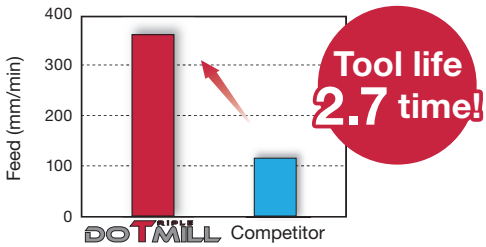
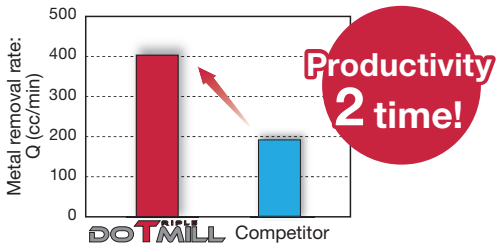
ISO	Workpiece materials		Hardness	Priority	Grades	Chip-breaker	Cutting speed *Vc* (m/min)	Feed per tooth *fz* (mm/t)
P	Low carbon steel (C15, etc.)		- 300 HB	First choice	AH3135	MJ	100 - 250	0.1 - 0.5
P	High carbon and alloy steel (S55C / C55, SCM440 / 42CrMo4, etc.)		- 300 HB	First choice	AH3135	MJ	100 - 250	0.1 - 0.4
P	Prehardened steel (NAK80, PX5, etc.)		30 - 40 HRC	First choice	AH3135	MJ	100 - 200	0.1 - 0.4
M	Stainless steel (SUS304 / X5CrNi18-9, SUS316 / X5CrNiMo17-12-3, etc.)		-	First choice	AH3135	MJ	100 - 200	0.1 - 0.35
K	Gray cast iron (FC250 / 250, etc.)		150 - 250 HB	First choice	AH120	MJ	100 - 250	0.1 - 0.5
K	Ductile cast iron (400-15, FCD600 / 600-3, etc.)		150 - 250 HB	First choice	AH120	MJ	80 - 200	0.1 - 0.5
S	Titanium alloys (Ti-6Al-4V, etc.)		-	First choice	AH3135	MJ	30 - 60	0.1 - 0.3
S	Heat-resistant alloys (Inconel718, etc.)		-	First choice	AH120	MJ	10 - 40	0.05 - 0.15
H	Hardened steel	(SKD61 / X40CrMoV5-1, etc.)	40 - 50 HRC	First choice	AH3135	MJ	80 - 130	0.1 - 0.2
H	Hardened steel	(SKD11 / X153CrMoV12, etc.)	50 - 60 HRC	First choice	AH120	MJ	50 - 70	0.03 - 0.1

RNGU13

ISO	Workpiece materials		Hardness	Grades	Cutting speed *Vc* (m/min)	Feed per tooth *fz* (mm/t)
P	Carbon steel (S45C / C45, S55C / C55, etc.)		200 - 300 HB	AH3135	100 - 250	*ap* = 6 mm : 0.1 - 0.3 *ap* = 2 mm : 0.4 - 0.8 *ap* = 1 mm : 0.8 - 1.5
P	Alloy steel (SCM440 / 42CrMo4, SCr145, etc.)		150 - 300 HB	AH3135	100 - 250	*ap* = 6 mm : 0.1 - 0.3 *ap* = 2 mm : 0.4 - 0.8 *ap* = 1 mm : 0.8 - 1.5
P	Prehardened steel (NAK80, PX5, etc.)		30 - 40 HRC	AH3135	100 - 200	*ap* = 6 mm : 0.1 - 0.3 *ap* = 2 mm : 0.4 - 0.8 *ap* = 1 mm : 0.8 - 1.5
M	Stainless steel (SUS304 / X5CrNi18-9, SUS316 / X5CrNiMo17-12-3, etc.)		- 200 HB	AH3135	100 - 200	*ap* = 6 mm : 0.1 - 0.25 *ap* = 2 mm : 0.3 - 0.7 *ap* = 1 mm : 0.6 - 1.3
K	Gray cast iron (FC250 / 250, etc.)		150 - 250 HB	AH120	100 - 250	*ap* = 6 mm : 0.1 - 0.3 *ap* = 2 mm : 0.4 - 0.8 *ap* = 1 mm : 0.8 - 1.5
K	Ductile cast iron (400-15, FCD600 / 600-3, etc.)		150 - 250 HB	AH120	80 - 200	*ap* = 6 mm : 0.1 - 0.3 *ap* = 2 mm : 0.4 - 0.8 *ap* = 1 mm : 0.8 - 1.5
S	Titanium alloys (Ti-6Al-4V, etc.)		- 40 HRC	AH3135	30 - 60	*ap* = 1 mm : 0.15 - 0.8
S	Heat-resistant alloys (Inconel, Hastelloy, etc.)		- 40 HRC	AH120	10 - 40	*ap* = 1 mm : 0.05 - 0.3
H	Hardened steel	(SKD61 / X40CrMoV5-1, etc.)	40 - 50 HRC	AH3135	80 - 130	*ap* = 1 mm : 0.1 - 0.25
H	Hardened steel	(SKD11 / X153CrMoV12, etc.)	50 - 60 HRC	AH120	50 - 70	*ap* = 0.5 mm : 0.03 - 0.1

PRACTICAL EXAMPLES

	Workpiece type	Turbine blade	Turbine housing
	Cutter	TASN13J100B31.7R08 (ø100, z = 8)	TASN13M100B32.0R08 (ø100, z = 8)
	Insert	ONGU0507ANEN-MJ	SNGU1307ANEN-MJ
	Grade	AH3135	AH3135
	Workpiece material	10705BU (Stainless steel)	GX40CrNiSiNb22-10
		 M	 M
Cutting conditions	Cutting speed: *Vc* (m/min)	79	94
	Feed per tooth: *fz* (mm/t)	0.10	0.17
	Feed speed: *Vf* (m/min)	201	408
	Depth of cut: *ap* (mm)	2.0	3.5
	Width of cut: *ae* (mm)	-	80
	Machining	Face milling (Roughing)	Face milling
	Coolant	External	External
	Machine	Horizontal M/C, BT50	Vertical M/C
	Results	 With DoTripleMill, the tool life is increased by 34% compared to the competitor.	 DoTripleMill extends tool life by 1.3 times compared with the competitor.

	Workpiece type	Turbine housing	Pallete
	Cutter	TASN13M125B40.0R10 (ø125, z = 10)	TASN13J160B50.8R08 (ø160, z = 8)
	Insert	SNGU1307ANEN-MJ	RNGU1307ZNER-MJ
	Grade	AH3135	AH120
	Workpiece material	Hi Si FCD	FC300
		 K	 K
Cutting conditions	Cutting speed: *Vc* (m/min)	196	200
	Feed per tooth: *fz* (mm/t)	0.08	0.3
	Feed speed: *Vf* (m/min)	400	955
	Depth of cut: *ap* (mm)	1.3	5
	Width of cut: *ae* (mm)	100	84
	Machining	Face milling (Roughing)	Face milling (Roughing)
	Coolant	External	Dry
	Machine	Vertical M/C, BT50	Horizontal M/C, BT50
	Results	 Due to DoTripleMill's low cutting force, the feed rate is maximized despite the weak fixture setting of the component.	 Tough RNGU insert offers stable and highly efficient machining even on the cast surface.

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