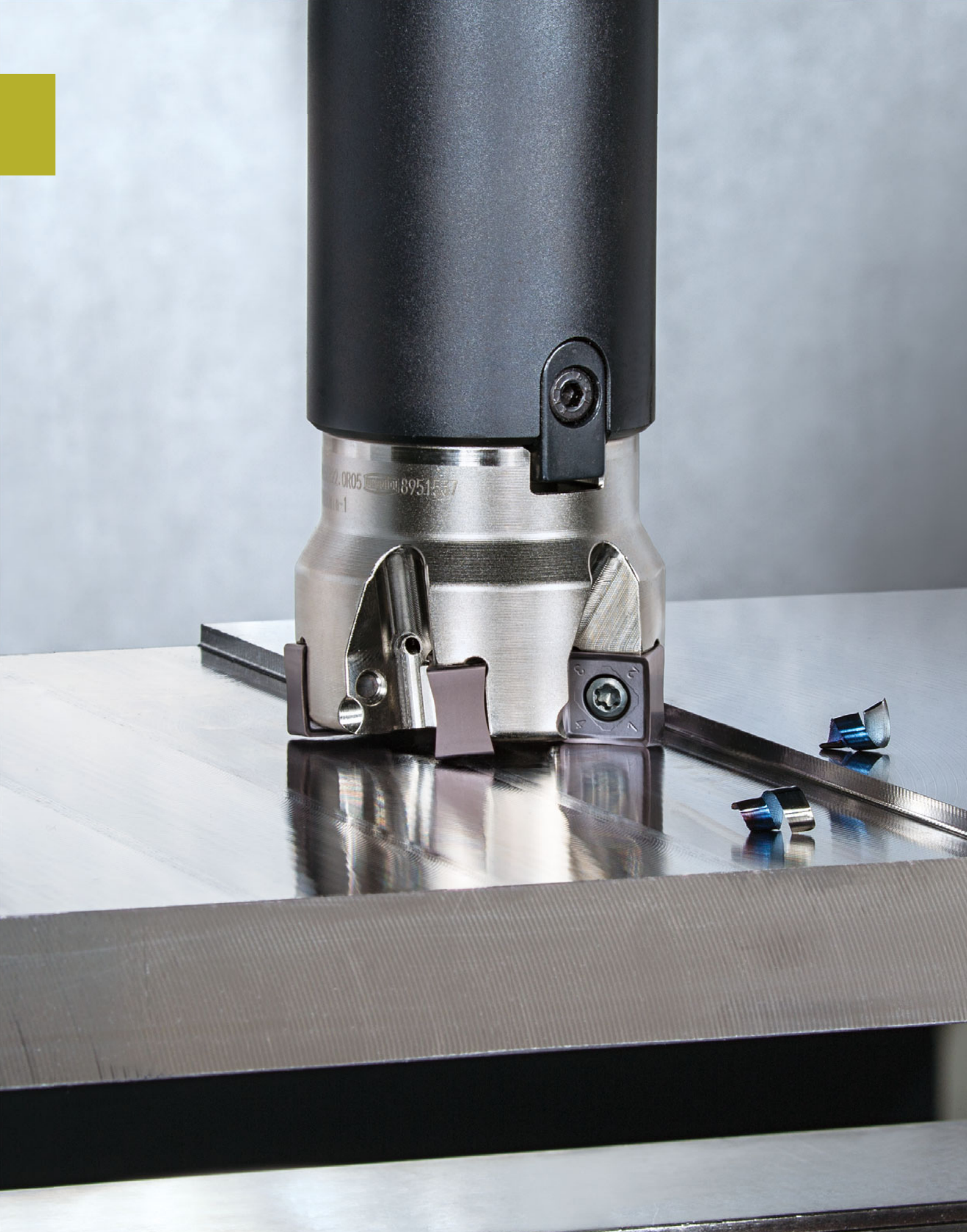


Face Milling Cutter with 8 Cutting Edge Insert for **Ultimate Clearance**





ACCELERATED MACHINING





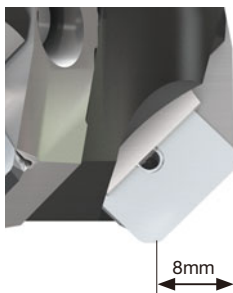
Milling cutter with 8 cornered insert for high utilization
in face milling operations

Improves surface finishing quality around fixtures, clamping systems, and side walls.

Face milling cutter with maximum clearance and economy

Designed to avoid tool interference in rough and finish face milling operations

Provides better clearance and economy

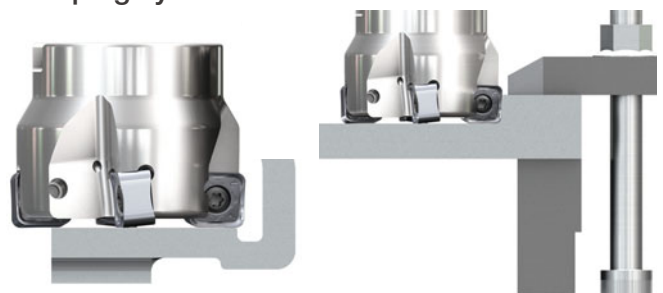


Conventional cutter
4 cutting edges



DOQ MILL
8 cutting edges

No interference with side walls, fixtures, and clamping systems



✓ Clear

✓ Clear

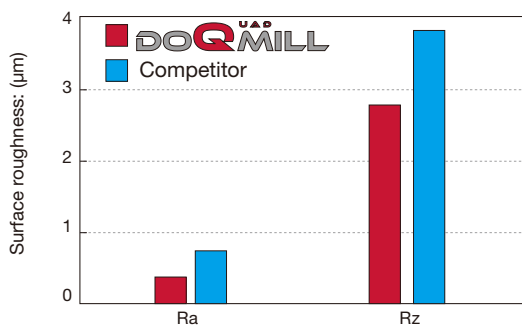
High accuracy

M4 clamp screw and optimized insert seat ensure secure insert retention



Wiper insert is also available for precision surface finish requirements

Available in R0.8 (with built-in wiper), R1.2, and R2.0

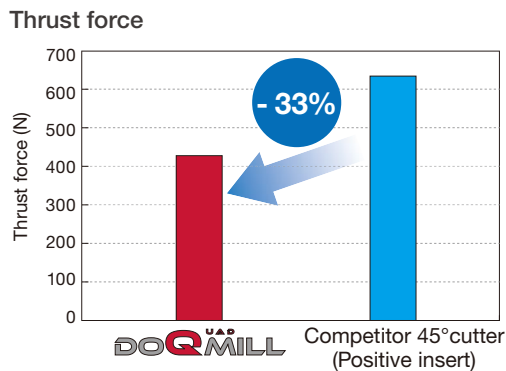
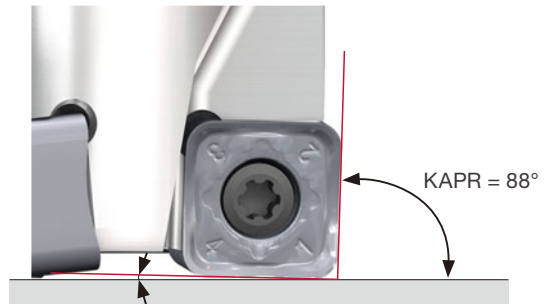


P Steel	Cutter	: THSN12M050B22.0R05 ($\phi = 50$ mm, z = 5)
	Insert	: SNMU120608HNEN-MM AH3135
	Workpiece material	: SCM440 (270HB)
	Cutting speed	: $V_c = 200$ m/min
	Feed per tooth	: $f_z = 0.15$ mm/t
	Depth of cut	: $a_p = 0.5$ mm
	Width of cut	: $a_e = 30$ mm
	Coolant	: Wet

Cutter design optimized for low cutting force and chattering prevention

■ The insert's cutting edge features a large rake angle which generates low cutting load, while the large entering angle reduces lifting of the workpiece to ensure stability.

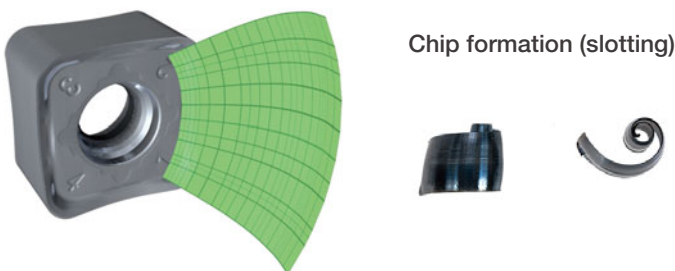
➔ Ideal for milling workpieces with thin wall/base or when the fixture is weak



P Steel Cutter : THSN12M050B22.0R05
 (ø = 50 mm, z = 1)
 Insert : SNMU120608HNEN-MM AH3135
 Workpiece material : S55C (200HB)
 Cutting speed : Vc = 150 m/min
 Feed per tooth : fz = 0.15 mm/t
 Depth of cut : ap = 3 mm
 Width of cut : ae = 30 mm
 Coolant : Wet

■ Stable cutting performance due to the concave shape cutting edges

Creates barrel-shape chips for effective chip evacuation, eliminating re-cutting in all operations including slotting.



P Steel Cutter : THSN12M050B22.0R05
 (ø = 50 mm, z = 5)
 Insert : SNMU120620EN-MM AH3135
 Workpiece material: SCM440 (270HB)
 Cutting speed : Vc = 200 m/min
 Feed per tooth : fz = 0.2 mm/t
 Depth of cut : ap = 9 mm
 Width of cut : ae = 50 mm
 Coolant : Dry

■ Reinforced insert with resistance to fracture



Comparison of insert toughness

Feed: fz (mm/tooth)

	0.1	0.2	0.3
DOQ MILL	OK	OK	OK
Competitor	OK	OK	Fractured

P Steel Cutter : THSN12M050B22.0R05
 (ø = 50 mm, z = 5)
 Insert : SNMU120620EN-MM AH3135
 Workpiece material: SCM440 (270HB)
 Cutting speed : Vc = 200 m/min
 Feed per tooth : fz = 0.1 - 0.3 mm/t
 Depth of cut : ap = 5 mm
 Width of cut : ae = 30 mm
 Coolant : Dry

Insert grades selection for various materials

- A total of four grades, including two CVD grades

AH3135



- PVD grade for high fracture resistance
- Most suitable for steel and stainless steel in general cutting parameters

AH120



- PVD grade with a well-balanced wear and fracture resistance
- Ideal for general machining of steel and stainless steel

T1215



- CVD grade with outstanding wear and chipping resistance
- Best for cast iron at high-speed machining

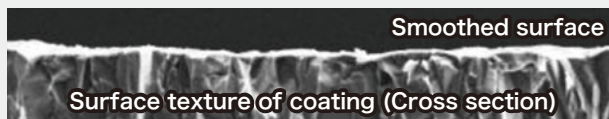
T3225



- CVD grade with excellent chipping and fracture resistance
- Most suited for steel and stainless steel at high-speed machining

Special Surface Technology

PREMIUMTEC

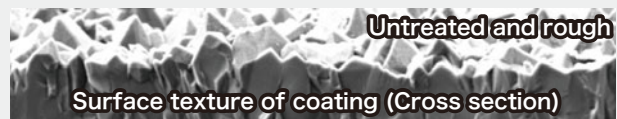


Indentation test on coating

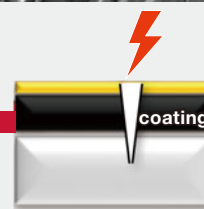
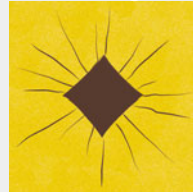


PremiumTec controls tensile residual stress and improves crack resistance.

Conventional item

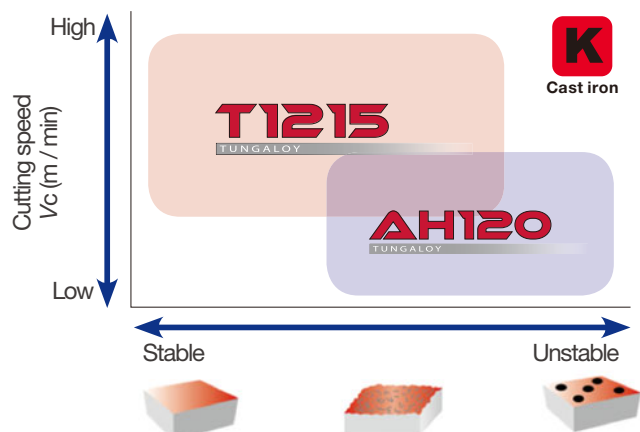
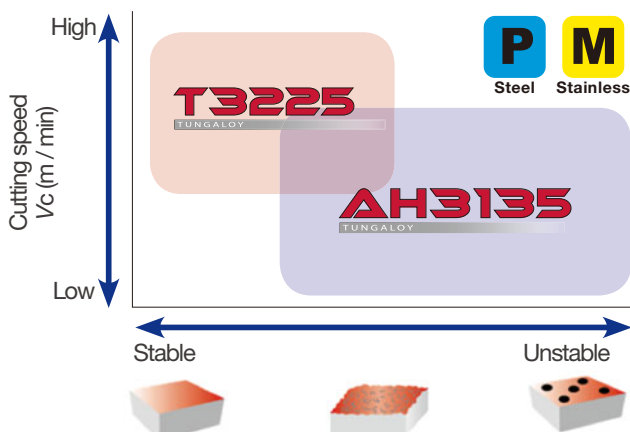


Indentation test on coating



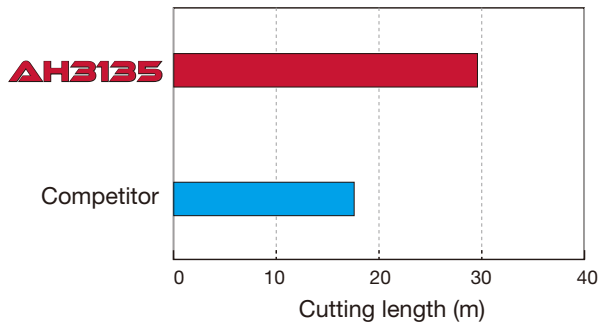
CVD coat by nature has high tensile residual stress allowing crack propagation easily.

PremiumTec technology enhances both smoothness and toughness on coating surface, improving resistance to chipping, built-up edge, and fracture.



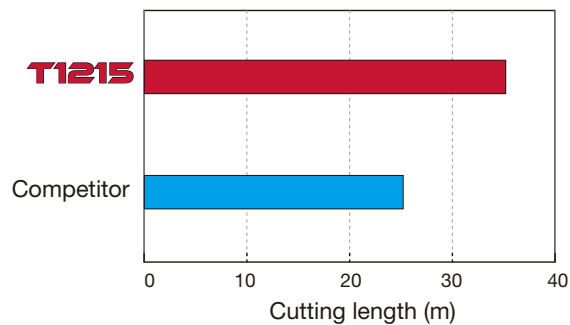
Tool life

- Tool life comparison in machining carbon steel



P Steel
 Cutter : THSN12M050B22.0R05
 ($\phi = 50$ mm, $z = 5$)
 Insert : SNMU120620EN-MM AH3135
 Workpiece material: SCM440 (270HB)
 Cutting speed : $V_c = 200$ m/min
 Feed per tooth : $f_z = 0.18$ mm/t
 Depth of cut : $a_p = 3$ mm
 Width of cut : $a_e = 30$ mm
 Coolant : Dry

- Tool life comparison in machining ductile cast iron

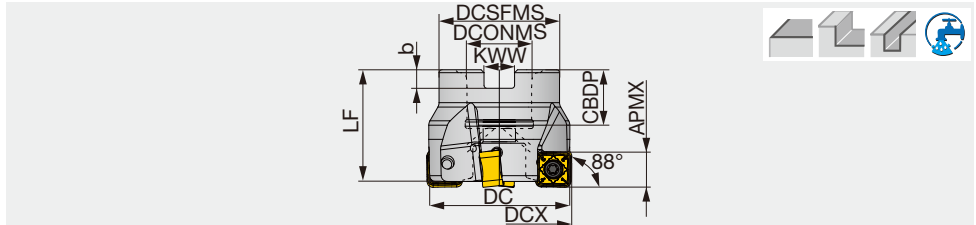


K Cast iron
 Cutter : THSN12M050B22.0R05
 ($\phi = 50$ mm, $z = 5$)
 Insert : SNMU120620EN-MM T1215
 Workpiece material: FCD600 (160HB)
 Cutting speed : $V_c = 350$ m/min
 Feed per tooth : $f_z = 0.12$ mm/t
 Depth of cut : $a_p = 3$ mm
 Width of cut : $a_e = 30$ mm
 Coolant : Dry

THSN12

88° face mills with double sided square inserts

GAMP = +3°, GAMF = -11°



Designation	APMX	DC	DCX	CICT	DCSFMS	LF	DCONMS	CBDP	KWW	b	WT(kg)	Air hole	Insert
THSN12M050B22.0R04	9.5	50	50.6	4	41	40	22	20	10.4	6.3	0.32	with	SNMU1206...
THSN12M050B22.0R05	9.5	50	50.6	5	41	40	22	20	10.4	6.3	0.32	with	SNMU1206...
THSN12M063B22.0R04	9.5	63	63.6	4	47	40	22	20	10.4	6.3	0.54	with	SNMU1206...
THSN12M063B22.0R06	9.5	63	63.6	6	47	40	22	20	10.4	6.3	0.52	with	SNMU1206...
THSN12J080B25.4R05	9.5	80	80.6	5	58	50	25.4	26	9.5	6	1.13	with	SNMU1206...
THSN12J080B25.4R08	9.5	80	80.6	8	58	50	25.4	26	9.5	6	1.15	with	SNMU1206...
THSN12M080B27.0R05	9.5	80	80.6	5	58	50	27	22	12.4	7	1.17	with	SNMU1206...
THSN12M080B27.0R08	9.5	80	80.6	8	58	50	27	22	12.4	7	1.14	with	SNMU1206...
THSN12J100B31.7R06	9.5	100	100.6	6	60	50	31.75	32	12.7	8	1.43	with	SNMU1206...
THSN12J100B31.7R08	9.5	100	100.6	8	60	50	31.75	32	12.7	8	1.39	with	SNMU1206...
THSN12M100B32.0R06	9.5	100	100.6	6	60	50	32	28.5	14.4	8	1.4	with	SNMU1206...
THSN12M100B32.0R08	9.5	100	100.6	8	60	50	32	28.5	14.4	8	1.38	with	SNMU1206...

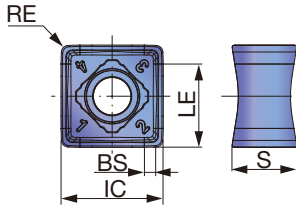
SPARE PARTS



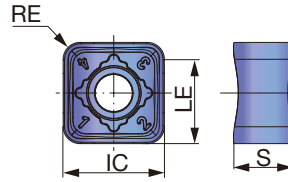
Designation	Clamping screw	Torx bit	Grip	Center bolt
THSN12M050...	CSPB-4	BLDIP15/S7	H-TB2W	CM10x30H
THSN12M063...	CSPB-4	BLDIP15/S7	H-TB2W	CM10x30H
THSN12J080...	CSPB-4	BLDIP15/S7	H-TB2W	CM12X30H
THSN12M080...	CSPB-4	BLDIP15/S7	H-TB2W	CM12X30H
THSN12J100...	CSPB-4	BLDIP15/S7	H-TB2W	TMBA-M16H
THSN12M100...	CSPB-4	BLDIP15/S7	H-TB2W	TMBA-M16H

INSERT

SNMU120608HNEN-MM



SNMU120612/20EN-MM



P Steel	☆	★	★	★
M Stainless		★		★
K Cast iron	★		★	
N Non-ferrous				
S Superalloys	★	☆		
H Hard materials				

★ : First choice
☆ : Second choice

Designation	RE	APMX	Coated				LE	S	IC	BS
			AH120	AH3135	T1215	T3225				
*SNMU120608HNEN-MM	0.8	9.5	●	●	●	●	9.8	7.5	12	1.4
*SNMU120612EN-MM	1.2	9.5		●	●		10.8	7.25	12	-
SNMU120620EN-MM	2.0	9.5		●	●		10	7	12	-

*To be released in 2019 January

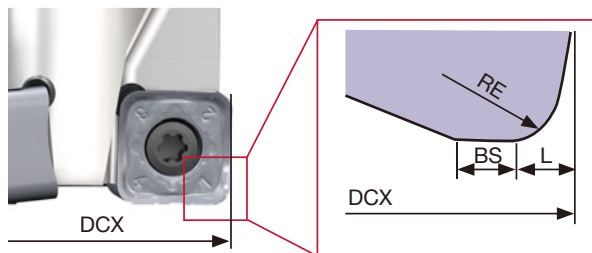
●: Line up

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness HB	Selection criteria	Recommended grade	Chip-breaker	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
P	Low carbon steels (S15C / C15E4 / C15E, etc.)	- 200 HB	First choice	AH3135	MJ	100 - 250	0.06 - 0.3
		- 200 HB	Priority on wear resistance	T3225	MJ	200 - 350	0.06 - 0.25
	High carbon steels, alloyed steels (S55C / C55, SCM440 / 42CrMo4, etc.)	- 300 HB	First choice	AH3135	MJ	100 - 250	0.06 - 0.3
		- 300 HB	Priority on wear resistance	T3225	MJ	180 - 300	0.06 - 0.25
	Prehardened steel (NAK80, PX5, etc.)	30 - 40 HRC	First choice	AH3135	MJ	100 - 200	0.06 - 0.25
		30 - 40 HRC	Priority on wear resistance	T3225	MJ	150 - 250	0.06 - 0.2
M	Austenitic stainless steel (SUS304 / X5CrNi18-9, SUS316 / X5CrNiMo17-12-3, etc.)	- 200 HB	First choice	AH3135	MJ	100 - 200	0.06 - 0.25
		- 200 HB	Priority on wear resistance	T3225	MJ	100 - 250	0.06 - 0.2
	Stainless cast steel (SCH20XNb / 1.4849 etc.)	-	First choice	T3225	MJ	60 - 120	0.06 - 0.2
		-	Priority on fracture resistance	AH3135	MJ	60 - 120	0.06 - 0.2
K	Grey cast iron (FC250 / 250 / GG25, etc.)	150 - 250 HB	First choice	T1215	MJ	100 - 350	0.06 - 0.3
		150 - 250 HB	Priority on fracture resistance	AH120	MJ	100 - 250	0.06 - 0.3
	Ductile cast iron (FCD600 / 600-3 / GGG60, etc.)	150 - 250 HB	First choice	T1215	MJ	100 - 350	0.06 - 0.25
		150 - 250 HB	Priority on fracture resistance	AH120	MJ	80 - 200	0.06 - 0.3
S	Titanium alloy (Ti-6Al-4V, etc.)	- 40 HRC	First choice	AH3135	MJ	30 - 60	0.06 - 0.2
	Heat resistant alloy (Inconel718, etc.)	- 40 HRC	First choice	AH120	MJ	10 - 40	0.04 - 0.16
H	Hardened steel (SKD61 / X40CrMoV5-1)	40 - 50 HRC	First choice	AH3135	MJ	80 - 130	0.04 - 0.16
	Hardened steel (SKD11 / X153CrMoV12, etc.)	50 - 60 HRC	First choice	AH120	MJ	50 - 70	0.02 - 0.08

Tool offset

To eliminate uncut amount in face milling operation, adjust the programming according to the offset (L) listed below.



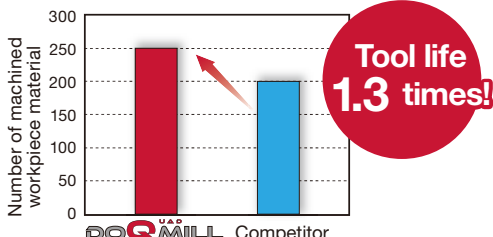
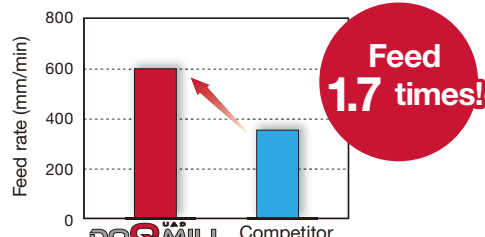


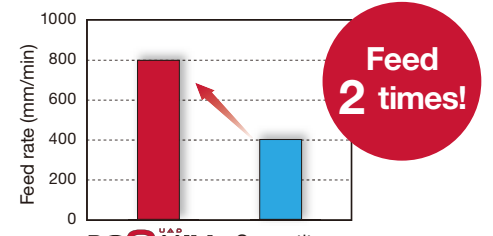
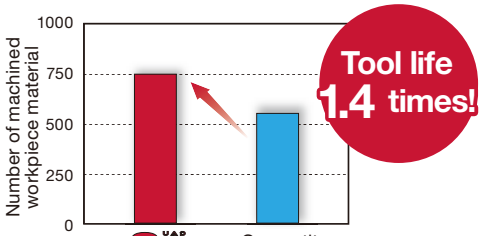


Designation	RE	BS	L
SNMU120608HNEN-MM	0.8	1.4	1.3
SNMU120612EN-MM	1.2	-	1.7
SNMU120620EN-MM	2	-	2.5

The following table shows the amount left over cut (t) when the cutter is considered as a shoulder milling cutter.

Designation / ap (mm)	1	2	3	4	5	6	7	8	9	9.5
SNMU120608HNEN-MM	0.01	0.04	0.05	0.05	0.07	0.09	0.14	0.2	0.27	0.27
SNMU120612EN-MM	-	0	0	0.01	0.02	0.05	0.09	0.15	0.22	0.25
SNMU120620EN-MM	-	0	0	0	0.02	0.05	0.09	0.15	0.22	0.25

PRACTICAL EXAMPLES

Workpiece type		Steering knuckle	Shaft
Cutter		THSN12M050B22.0R04 (ø50 mm, z = 4)	THSN12M050B22.0R04 (ø50 mm, z = 4)
Insert		SNMU120620EN-MM	SNMU120620EN-MM
Grade		AH3135 FCD450	AH3135 Alloy steel (35HRC)
Workpiece material		 K	 P
Cutting conditions	Cutting speed: Vc (m/min)	142	236
	Feed per tooth: fz (mm/t)	0.22	0.1
	Feed speed: Vf (mm/min)	800	600
	Depth of cut: ap (mm)	2	2
	Cutting width: ae (mm)	30	35
	Method of machining	Face milling	Face milling
Coolant	External	External	
Machine	Vertical M/C	Vertical M/C	
Results	 <p>Tool life 1.3 times!</p> <p>Despite poor workpiece rigidity, DoQuad-Mill provided low cutting load and tool life predictability.</p>	 <p>Feed 1.7 times!</p> <p>Robust DoQuad-Mill improved machining efficiency over the competitor's shoulder milling cutter.</p>	
	<p>Number of machined workpiece material</p> <p>Feed rate (mm/min)</p>		
Workpiece type		Shaft	Connecting rod
Cutter		THSN12M050B22.0R04 (ø50 mm, z = 4)	EHSN12M040C32.0R03 (Special tool, ø40, z = 3)
Insert		SNMU120620EN-MM	SNMU120620EN-MM
Grade		AH3135 Alloy steel	AH3135 Forged steel (28HRC)
Workpiece material		 P	 P
Cutting conditions	Cutting speed: Vc (m/min)	157	160
	Feed per tooth: fz (mm/t)	0.2	0.1
	Feed speed: Vf (mm/min)	800	382
	Depth of cut: ap (mm)	2	2
	Cutting width: ae (mm)	40	40
	Method of machining	Shoulder milling	Shoulder milling
Coolant	External supply	External supply	
Machine	Vertical M/C	Vertical M/C	
Results	 <p>Feed 2 times!</p> <p>Conventional shoulder mill could not improve feed due to insert fracture. DoQuad-Mill doubled feed thanks to its high cutting edge integrity.</p>	 <p>Tool life 1.4 times!</p> <p>Short insert life due to fracture was more common with conventional shoulder mill. DoQuad-Mill improved tool life thanks to its high cutting edge integrity.</p>	
	<p>Feed rate (mm/min)</p> <p>Number of machined workpiece material</p>		

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