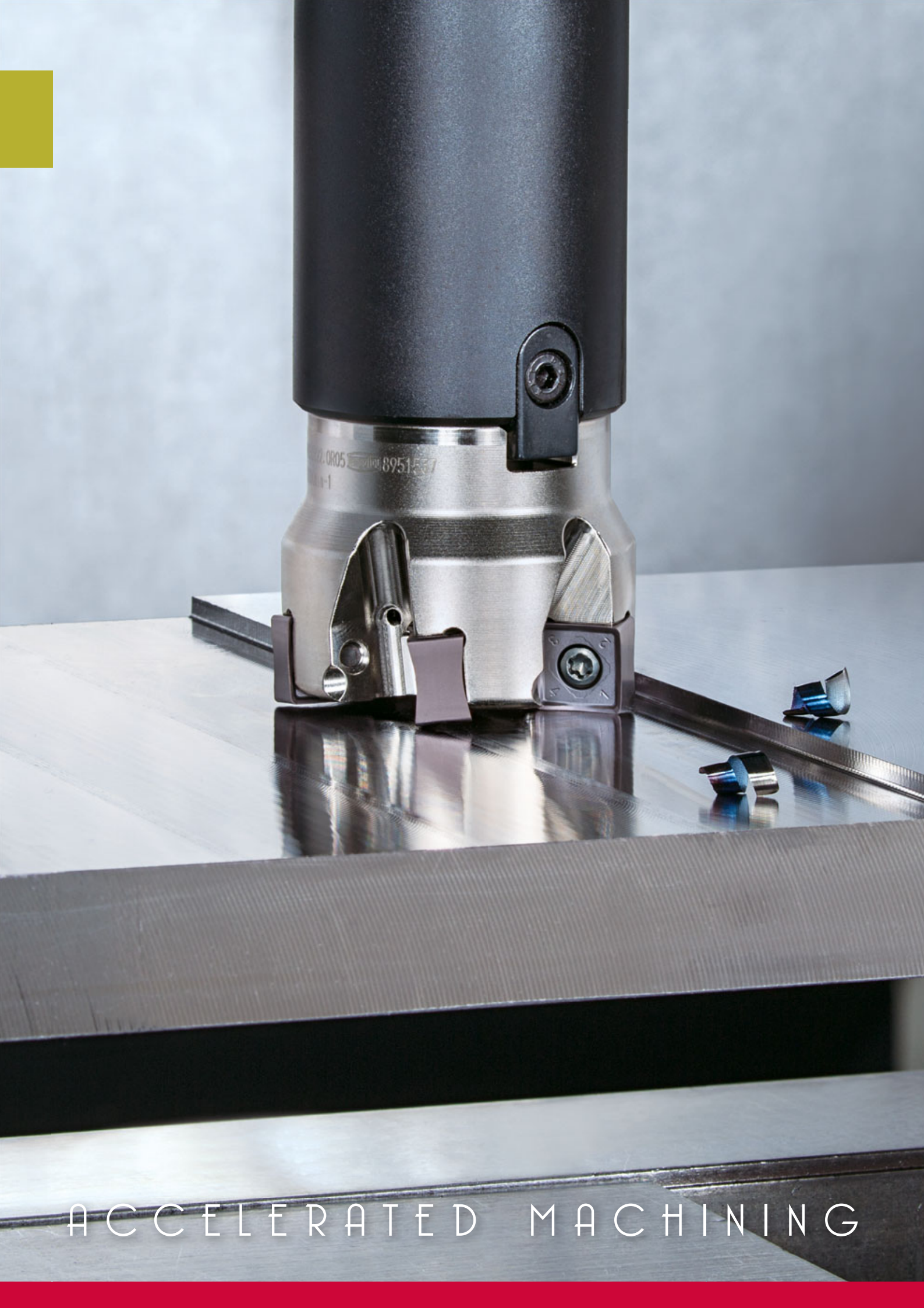


Face Milling Cutter with 8 Cutting Edge Insert for **Ultimate Clearance**





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.

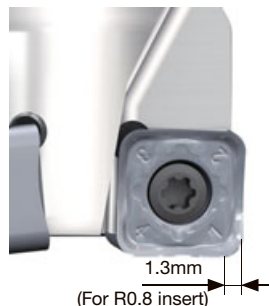
Face milling cutter with maximum clearance and economy

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

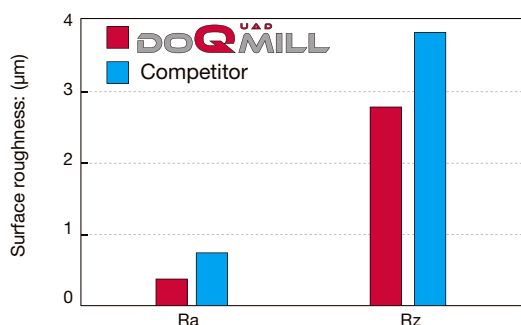
High accuracy

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

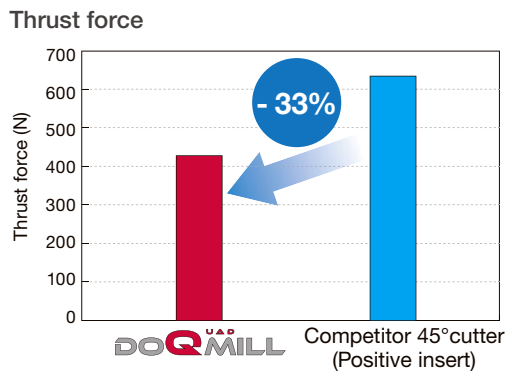
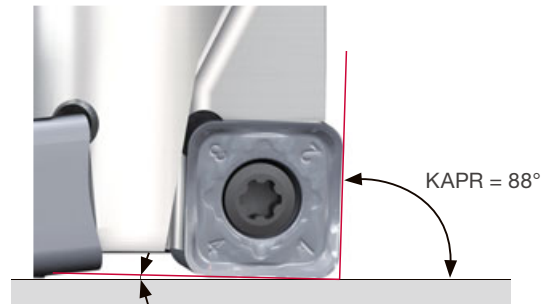


P Steel	Cutter	: THSN12M050B22.0R05 ($\phi = 50$ mm, $z = 5$)
	Insert	: SNMU120608HNEN-MM AH3135
	Workpiece material	: SCM440 (270HB)
	Cutting speed	: $V_c = 200$ m/min
	Feed per tooth	: $f_z = 0.15$ mm/t
	Depth of cut	: $a_p = 0.5$ mm
	Width of cut	: $a_e = 30$ mm
	Coolant	: Wet

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.

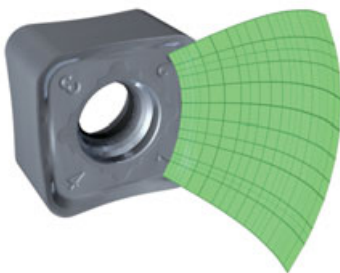
➔ Ideal for milling workpieces with thin wall/base or when the fixture is weak



P Cutter : THSN12M050B22.0R05
 Steel Insert : SNMU120608HNEN-MM AH3135
 Workpiece material : S55C (200HB)
 Cutting speed : $V_c = 150$ m/min
 Feed per tooth : $f_z = 0.15$ mm/t
 Depth of cut : $a_p = 3$ mm
 Width of cut : $a_e = 30$ 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.



Chip formation (slotting)



P Cutter : THSN12M050B22.0R05
 Steel Insert : SNMU120620EN-MM AH3135
 Workpiece material : SCM440 (270HB)
 Cutting speed : $V_c = 200$ m/min
 Feed per tooth : $f_z = 0.2$ mm/t
 Depth of cut : $a_p = 9$ mm
 Width of cut : $a_e = 50$ mm
 Coolant : Dry

■ Reinforced insert with resistance to fracture



Comparison of insert toughness

	Feed: f_z (mm/tooth)		
	0.1	0.2	0.3
DOQ MILL	OK	OK	OK
Competitor	OK	OK	Fractured

P Cutter : THSN12M050B22.0R05
 Steel Insert : SNMU120620EN-MM AH3135
 Workpiece material : SCM440 (270HB)
 Cutting speed : $V_c = 200$ m/min
 Feed per tooth : $f_z = 0.1 - 0.3$ mm/t
 Depth of cut : $a_p = 5$ mm
 Width of cut : $a_e = 30$ mm
 Coolant : Dry

Insert grades selection for various materials

- A total of four grades, including two CVD grades

AH3135



Steel Stainless

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

AH120



Steel Cast iron

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

T1215



Cast iron

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

T3225



Steel Stainless

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

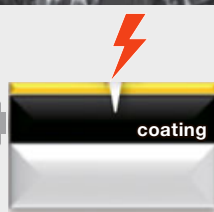
Special Surface Technology

PREMIUMTEC

TUNGALOY

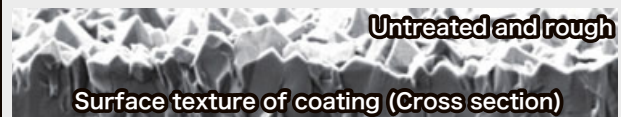


Indentation test on coating

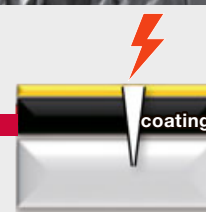
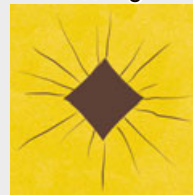


PremiumTec controls tensile residual stress and improves crack resistance.

Conventional item

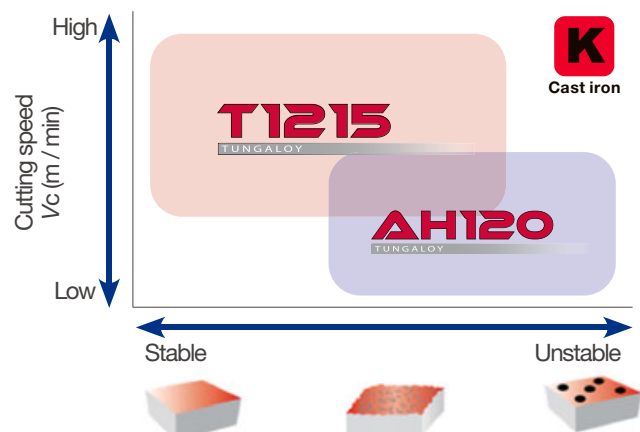
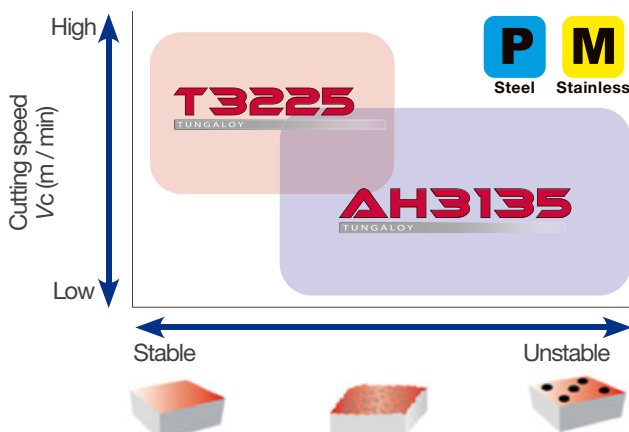


Indentation test on coating



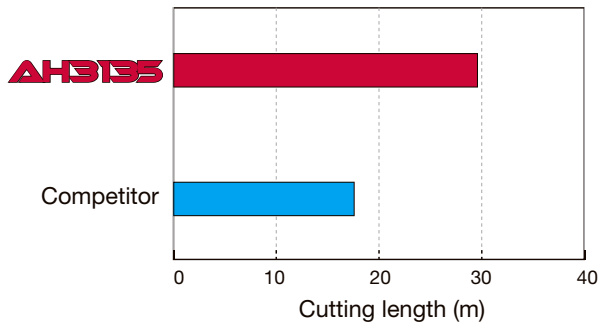
CVD coat by nature has high tensile residual stress allowing crack propagation easily.

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



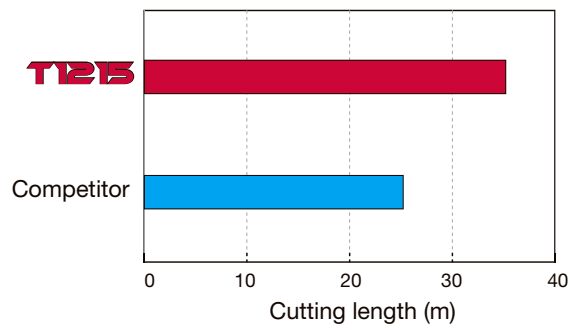
Tool life

- Tool life comparison in machining carbon steel



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

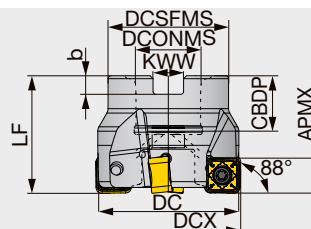


Cutter : THSN12M050B22.0R05
 ($\phi = 50$ mm, $z = 5$)
 Insert : SNMU120620EN-MM T1215
 Workpiece material: FCD600 (160HB)
 Cutting speed : $V_c = 350$ m/min
 Feed per tooth : $f_z = 0.12$ mm/t
 Depth of cut : $a_p = 3$ mm
 Width of cut : $a_e = 30$ mm
 Coolant : Dry

THSN12

88° face mills with double sided square inserts

GAMP = +3°, GAMF = -11°



Designation	APMX	DC	DCX	CICT	DCSFMS	Lf	DCONMS	CDBP	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...

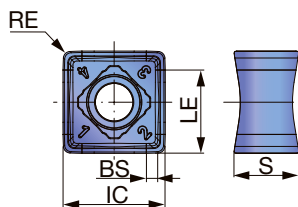
SPARE PARTS



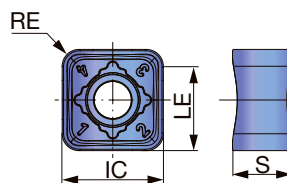
Designation	Clamping screw	Torx bit	Grip	Center bolt
THSN12M050...	CSPB-4	BLDIP15/S7	H-TB2W	CM10x30H
THSN12M063...	CSPB-4	BLDIP15/S7	H-TB2W	CM10x30H
THSN12J080...	CSPB-4	BLDIP15/S7	H-TB2W	CM12X30H
THSN12M080...	CSPB-4	BLDIP15/S7	H-TB2W	CM12X30H
THSN12J100...	CSPB-4	BLDIP15/S7	H-TB2W	TMBA-M16H
THSN12M100...	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 January 2019

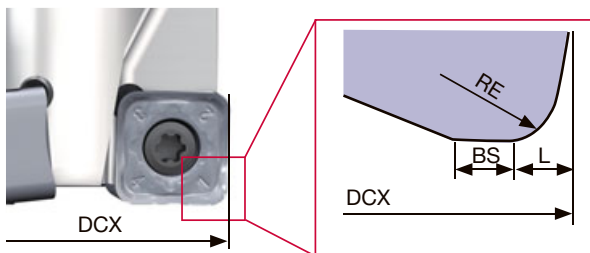
●: Line up

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	MM	100 - 250	0.06 - 0.3
		- 200 HB	Priority on wear resistance	T3225	MM	200 - 350	0.06 - 0.25
	High carbon steels, alloyed steels (S55C / C55, SCM440 / 42CrMo4, etc.)	- 300 HB	First choice	AH3135	MM	100 - 250	0.06 - 0.3
		- 300 HB	Priority on wear resistance	T3225	MM	180 - 300	0.06 - 0.25
	Prehardened steel (NAK80, PX5, etc.)	30 - 40 HRC	First choice	AH3135	MM	100 - 200	0.06 - 0.25
		30 - 40 HRC	Priority on wear resistance	T3225	MM	150 - 250	0.06 - 0.2
M	Austenitic stainless steel (SUS304 / X5CrNi18-9, SUS316 / X5CrNiMo17-12-3, etc.)	- 200 HB	First choice	AH3135	MM	100 - 200	0.06 - 0.25
		- 200 HB	Priority on wear resistance	T3225	MM	100 - 250	0.06 - 0.2
	Stainless cast steel (SCH20XNb / 1.4849, etc.)	-	First choice	T3225	MM	60 - 120	0.06 - 0.2
		-	Priority on fracture resistance	AH3135	MM	60 - 120	0.06 - 0.2
K	Grey cast iron (FC250 / 250 / GG25, etc.)	150 - 250 HB	First choice	T1215	MM	100 - 350	0.06 - 0.3
		150 - 250 HB	Priority on fracture resistance	AH120	MM	100 - 250	0.06 - 0.3
	Ductile cast iron (FCD600 / 600-3 / GGG60, etc.)	150 - 250 HB	First choice	T1215	MM	100 - 350	0.06 - 0.25
		150 - 250 HB	Priority on fracture resistance	AH120	MM	80 - 200	0.06 - 0.3
S	Titanium alloy (Ti-6Al-4V, etc.)	- 40 HRC	First choice	AH3135	MM	30 - 60	0.06 - 0.2
	Heat resistant alloy (Inconel718, etc.)	- 40 HRC	First choice	AH120	MM	10 - 40	0.04 - 0.16
H	Hardened steel (SKD61 / X40CrMoV5-1, etc.)	40 - 50 HRC	First choice	AH3135	MM	80 - 130	0.04 - 0.16
	Hardened steel (SKD11 / X153CrMoV12, etc.)	50 - 60 HRC	First choice	AH120	MM	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.

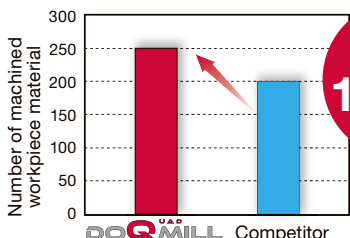
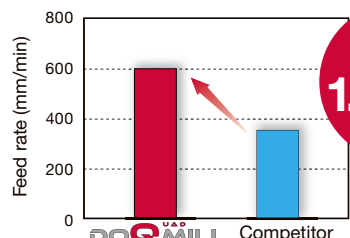
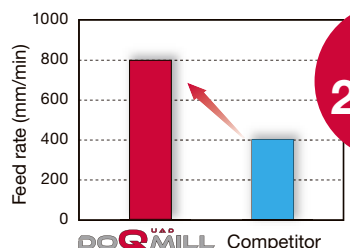
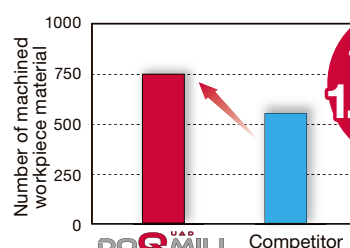


Designation	RE	BS	L
SNMU120608HNEN-MM	0.8	1.4	1.3
SNMU120612EN-MM	1.2	-	1.7
SNMU120620EN-MM	2	-	2.5

The following table shows the amount overcut (t) when the cutter is used 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	AH3135
Workpiece material		FCD450	Alloy steel (35HRC)
		 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		 Despite poor workpiece rigidity, DoQuad-Mill provided low cutting load and tool life predictability.	 Robust DoQuad-Mill improved machining efficiency over the competitor's shoulder milling cutter.
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	AH3135
Workpiece material		Alloy steel	Forged steel (28HRC)
		 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		 Conventional shoulder mill could not improve feed due to insert fracture. DoQuad-Mill doubled feed thanks to its high cutting edge integrity.	 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.

Tungaloy Corporation (Head office)

11-1 Yoshima-Kogyodanchi
Iwaki-city, Fukushima 970-1144 Japan
Phone: +81-246-36-8501
Fax: +81-246-36-8542
www.tungaloy.co.jp

Tungaloy-NTK America Inc.

3726 N Ventura Drive
Arlington Heights, IL 60004, U.S.A.
Phone: +1-888-554-8394
Fax: +1-888-554-8392
www.tungaloy.com/us

Tungaloy Canada

432 Elgin St. Unit 3
Brantford, Ontario N3S 7P7, Canada
Phone: +1-519-758-5779
Fax: +1-519-758-5791
www.tungaloy.com/ca

Tungaloy-NTK De Mexico S.A.

C. Los Arellano 113,
Parque Industrial Siglo XXI
Aguascalientes, AGS, Mexico 20290
Phone: +52-449-929-5410
Fax: +52-449-929-5411
www.tungaloy.com/mx

Tungaloy-NTK do Brasil Ltda.

Avd. Independência N4158 Residencial Flora
13280-000 Vinhedo, São Paulo, Brasil
Phone: +55-19-38262757
Fax: +55-19-38262757
www.tungaloy.com/br

Tungaloy-NTK Germany GmbH.

Katzbergstr. 3a
D-40764 Langenfeld, Germany
Phone: +49-2173-90420-0
Fax: +49-2173-90420-19
www.tungaloy.com/de

Tungaloy France s.a.s

Les Fjords
19 avenue de Norvège
91140 Villebon Sur Yvette, France
Phone: +33-1-6486-4300
Fax: +33-1-6907-7817
www.tungaloy.com/fr

Tungaloy Italia S.r.l.

Viale Sarca 336/Edificio 13
20126 Milano, Italy
Phone: +39-02-252012-1
Fax: +39-02-252012-65
www.tungaloy.com/it

Tungaloy Czech s.r.o.

Turanka 1583/115g,
627 00 Brno, Czech Republic
Phone: +420-532 123 391
www.tungaloy.com/cz

Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7
Pol. Ind. Bufalvent
ES-08243 Manresa (BCN), Spain
Phone: +34 93 113 1360
www.tungaloy.com/es

Tungaloy Scandinavia AB

Bultgatan 38
442 40 Kungälv, Sweden
Phone: +46-462119200
Fax: +46-462119207
www.tungaloy.com/se

Tungaloy Rus, LLC

Andropova avenue, h.18/7,
11 floor, office 3, 115432,
Moscow, Russia
Phone: +7-499-683-01-80
Fax: +7-499-683-01-81
www.tungaloy.com/ru

Tungaloy Polska Sp. z o.o.

Ul. Irysowa 1, 55-040 Bielany
Wrocławskie, Poland
Phone: +48 607 907 237
www.tungaloy.com/pl

Tungaloy-NTK UK Ltd.

Suite 3, Pioneer House, Mill Street,
Cannock, WS11 0EF, UK
Phone: +44 121 4000 231
Fax: +44 121 270 9694
www.tungaloy.com/uk

Tungaloy Hungary Kft

Erzsébet királyné útja 125
H-1142 Budapest, Hungary
Phone: +36 1 781-6846
Fax: +36 1 781-6866
www.tungaloy.com/hu

Tungaloy Turkey

Serifali Mah.bayraktar Bulvari Kule Sk. No:26
34775 Umraniye / Istanbul / Turkey
Phone: +90 216 540 04 67
Fax: +90 216 540 04 87
www.tungaloy.com/tr

Tungaloy Benelux b.v.

Tjalk 70
NL-2411 NZ Bodegraven, Netherlands
Phone: +31 172 630 420
Fax: +31 172 630 429
www.tungaloy.com/nl

Tungaloy Croatia

Ulica bana Josipa Jelačića 87,
10430, Samobor, Croatia
Phone: +385 1 3326 604
Fax: +385 1 3327 683
www.tungaloy.com/hr

Tungaloy Cutting Tool (Shanghai) Co. Ltd.

Rm No 401 No.88 Zhabei
Jiangchang No.3 Rd
Shanghai 200436, China
Phone: +86-21-3632-1880
Fax: +86-21-3621-1918
www.tungaloy.com/cn

Tungaloy Cutting Tools Taiwan Co. Ltd.

9F, No.293, Zhongyang Rd,
Xinzhuan Dist, New Taipei City,
24251 Taiwan
Phone: +886-2-8521-9986
Fax: +886-2-8521-8935
www.tungaloy.com/tw

Tungaloy-NTK Cutting Tool (Thailand) Co.,Ltd.

Interlink tower 4th Fl.
1858/5-7 Bangna-Trad Road
km.5 Bangna, Bangna, Bangkok 10260
Thailand
Phone: +66-2-751-5711
Fax: +66-2-751-5715
www.tungaloy.com/th

Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #08-09 Oxley BizHub 2
Singapore 408734
Phone: +65-6391-1833
Fax: +65-6299-4557
www.tungaloy.com/sing

Tungaloy-NTK Vietnam LLC

3rd Floor, Licogi 13 Tower, 164 Khuat Duy
Tien, Nhan Chinh, Thanh Xuan District,
Hanoi, Vietnam
Phone: +84 24 63282086
www.tungaloy.com/vn

Tungaloy India Pvt. Ltd.

One International Center,
Unit # 902-A, 9th Floor,
Tower 1, Senapati Bapat Marg,
Elphinstone Road (West),
Mumbai 400013, India
Phone: +91-22-6124-8803
Fax: +91-22-6124-8899
www.tungaloy.com/in

Tungaloy Korea Co., Ltd

#1312, Byucksan Digital Valley 5-cha
Beotkkot-ro 244, Geumcheon-gu
153-788 Seoul, Korea
Phone: +82-2-2621-6161
Fax: +82-2-6393-8952
www.tungaloy.com/kr

Tungaloy Malaysia Sdn Bhd

50 K-2, Kelana Mall, Jalan SS6/14
Kelana Jaya, 47301
Petaling Jaya, Selangor Darul Ehsan
Malaysia
Phone: +603-7805-3222
Fax: +603-7804-8563
www.tungaloy.com/my

Tungaloy Australia Pty Ltd

Unit 68 1470 Ferntree Gully Road
Knoxfield 3180 Victoria, Australia
Phone: +61-3-9755-8147
Fax: +61-3-9755-6070
www.tungaloy.com/au

PT. Tungaloy Indonesia

Ruko Blok AA.10 No3&5, Grand Wisata,
Lembangjaya, Tambun Selatan, Bekasi,
17510 Indonesia
Phone: +62-21-8261-5808
Fax: +62-21-8261-5809
www.tungaloy.com/id



tungaloy.com

follow us at:

facebook.com/tungaloyjapan

twitter.com/tungaloyjapan

www.youtube.com/tungaloycorporation

Distributed by:



Tungaloy APP & SNS

FIND US ON THE CLOUD!
machiningcloud.com



AS9100 Certified
78006
2015.11.04
ISO 14001 Certified
EC97J1123
1997.11.26