

Square shoulder milling cutter

DOFTRI

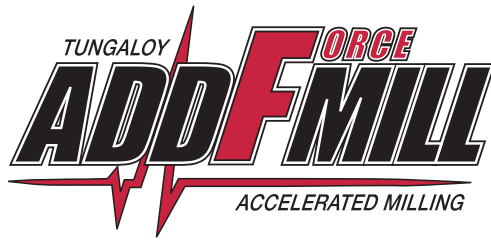
Tungaloy Report No. 501-G

High productive and cost-effective
shoulder milling cutter - **Now available
with new AH3225 grade**





INDUSTRY 4.0
FEED the SPEED!



DO F TRI



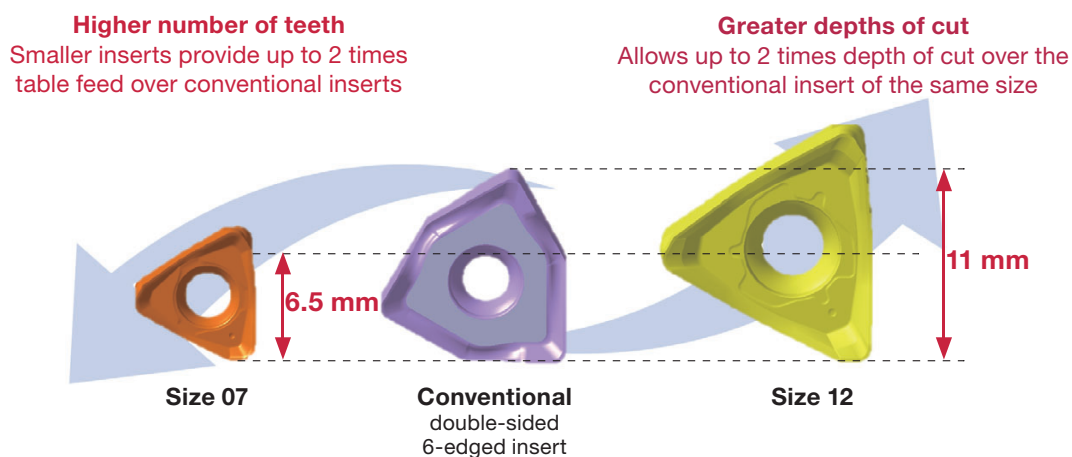
New AH3225 grade offers extended tool life for
maximum economical benefits

Economical shoulder mill with an innovative 6-edged geometry offers **maximum performance** in various applications

■ Innovative insert design for improved productivity

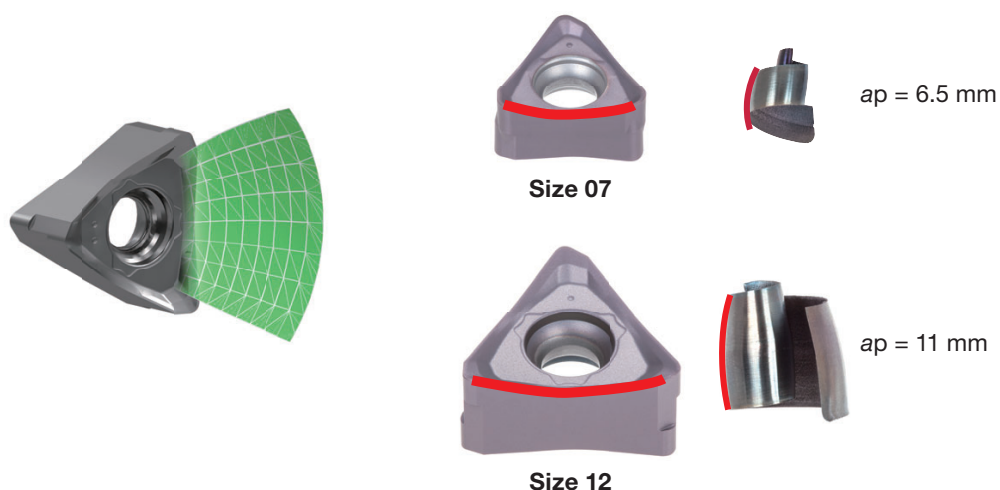
● High efficiency

Inserts are available in 2 sizes for high cutter density and cutting depths over conventional double-sided 6-edged inserts.



● High machining flexibility

The cutting edge is configured with a large curve with an optimal inclination, providing not only effective chip evacuation during heavy stock removal but also low cutting force in light depth of cut.



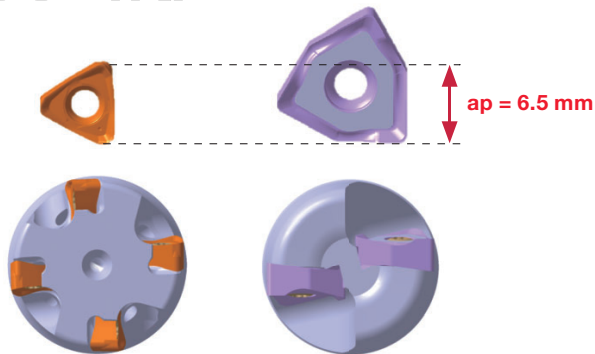
Size 07

● High insert density for efficiency

DoForce-Tri offers insert density of up to 2 times as high as competitors' shoulder cutters of the same depth of cut, ensuring maximum efficiency thanks to its curved cutting edge with optimal inclination.

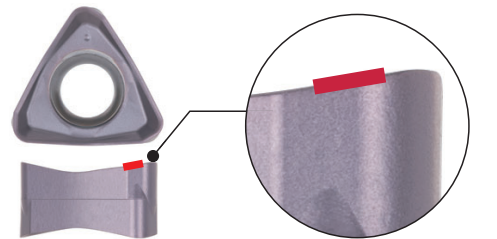
DOF^{ORCE}TRI

Conventional



● Superior surface finishing

Every cutting edge is built with a wiper, thanks to the innovative flank design.



Optimized cutting edge ensures smooth entry and good surface finish

Size 12

● Insert lineup for various applications



TNMU-MJ

with built-in wipers

1st choice

Versatile geometry with good surface finish



TNGU-MJ

with built-in wipers

For close tolerance



TNMU-R-MJ

Radius insert

Strong cutting edge design with large corner radius



TNMU-NMJ

Serrated insert*

Ensures free cutting and good chip control during heavy milling

*Please see page 10 for instruction for use

● Lineup of each insert size

Size	Max. depth of cut (mm)	Corner radius (mm)	Workpiece material	Tool diameter (mm) Number of inserts							
07	6.5	0.4 / 0.8	P M K S	2	2, 3	3, 4	4, 5	6	8		
12	11	0.8 / 1.6 / 2	P M K S			2, 3	3, 4	4, 5	5, 6	6, 8	7, 10
									8, 12	10	

GRADES

Enriched grade lineup covers various materials and machining applications

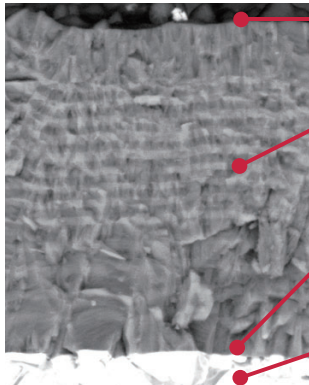
Offers three PVD and two CVD grades

New

AH3225

P M

- Nano multi-layer coating technology with three major properties for optimal cutting edge integrity
- Increased resistance to wear, fracture, oxidation, built-up edge, and delamination



Resistance to built-up edge

The coating surface prevents built-up edge

Resistance to wear, oxidation, and fracture

Multi-layered coating is designed to resist wear and oxidation, while preventing micro-cracks from propagating in the coating layer for improved resistance to edge chipping

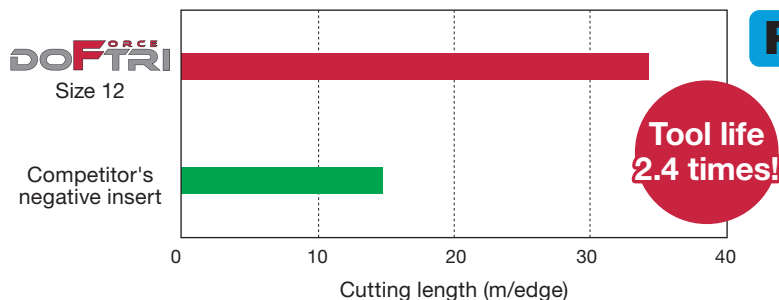
Strong coating / substrate adhesion

Coating is optimized for strong adhesion property with substrate to maintain strong cutting edge integrity

Carbide substrate

High resistance to fracture

Long tool life



P

Cutter : TPTN12M050B22.0R05
($\phi 50$ mm, $z = 5$)
Insert : TNMU120708PER-MJ AH3225
Workpiece material : S55C / C55
Cutting speed : $V_c = 200$ 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 : Dry
Machine : Vertical M/C, BT40

PREMIUMTEC

AH3135 **P M**

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

AH120 **P K**

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

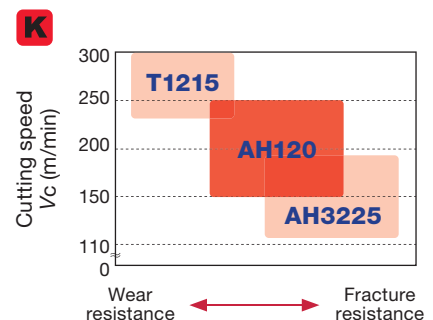
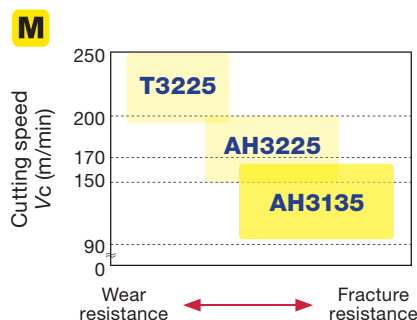
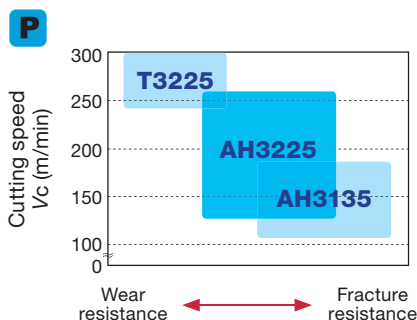
T1215 **K**

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

T3225 **P M**

- CVD grade with high chipping and fracture resistance

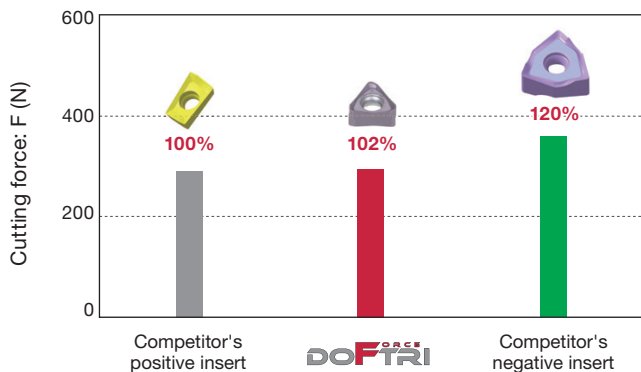
APPLICATION AREAS



CUTTING PERFORMANCE

Low cutting forces

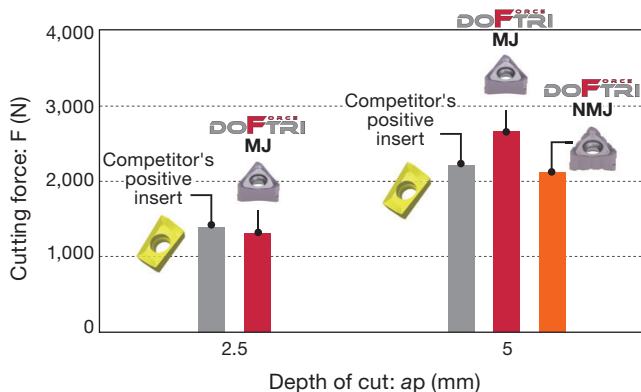
Size 07



Cutter : EPTN07M025C25.0R04 ($\phi 25$ mm, $z = 4$)
 Insert : TNMU070308PER-MJ AH3135
 Workpiece material : S55C / C55 (180 HB)
 Cutting speed : $V_c = 200$ m/min
 Feed per tooth : $f_z = 0.1$ mm/t
 Depth of cut : $a_p = 1.5$ mm
 Width of cut : $a_e = 15$ mm
 Number of insert : 1
 Coolant : Dry
 Machine : Vertical M/C, BT50

Unique cutting edge configuration can reduce cutting force to the same level produced by positive insert when $a_p \leq 1.5$ mm.

Size 12

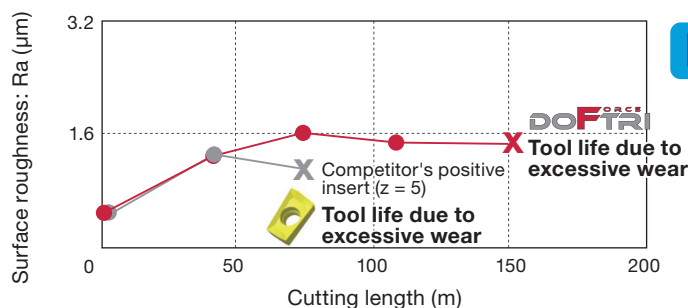


Cutter : TPTN12M050B22.0R04 ($\phi 50$ mm, $z = 4$)
 Insert : TNMU120708PER-MJ AH3135
 Workpiece material : S55C / C55 (180 HB)
 Cutting speed : $V_c = 150$ m/min
 Feed per tooth : $f_z = 0.15$ mm/t
 Depth of cut : $a_p = 2.5, 5$ mm
 Width of cut : $a_e = 30$ mm
 Number of inserts : 2
 Coolant : Dry
 Machine : Vertical M/C, BT50

The MJ style insert ensures freer cutting than positive insert at light depths of cut. While the NMJ insert provides lower cutting force at greater depths of cut.

High surface quality

Size 07



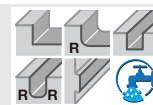
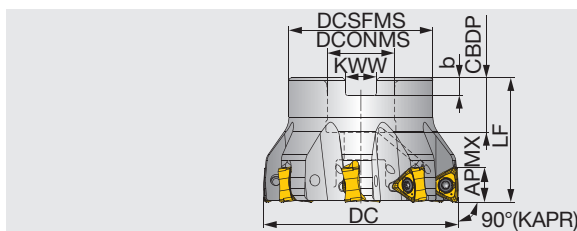
Cutter : EPTN07M025C25.0R04 ($\phi 25$ mm, $z = 4$, Competitor: $z = 5$)
 Insert : TNMU070308PER-MJ AH3135
 Workpiece material : S55C / C55 (180 HB)
 Cutting speed : $V_c = 200$ m/min
 Feed per tooth : $f_z = 0.1$ mm/t
 Depth of cut : $a_p = 3$ mm
 Width of cut : $a_e = 15$ mm
 Coolant : Dry
 Machine : Horizontal M/C, BT40

Built-in wiper provides quality surface finishing, while also prolonging insert life.

TPTN07

Square shoulder mill, with screw clamp system, for double sided triangular inserts

GAMP = +4.2°~ +4.7°, GAMF = -15.4°~ -11.2°



Designation	APMX	DC	CICT	DCSFMS	LF ⁽¹⁾	DCONMS	CBDP	KWW	b	WT(kg)	Air hole	Shell locking bolt	Insert
TPTN07M040B16.0R06	6.5	40	6	35	40	16	18	8.4	5.6	0.24	With	CM8X30H	TN MU07...
TPTN07M050B22.0R08	6.5	50	8	47	40	22	20	10.4	6.3	0.41	With	CM10X30H	TN MU07...

(1) The value is true with R0.8 insert. For R0.4, please refer to page 10

SPARE PARTS

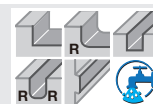
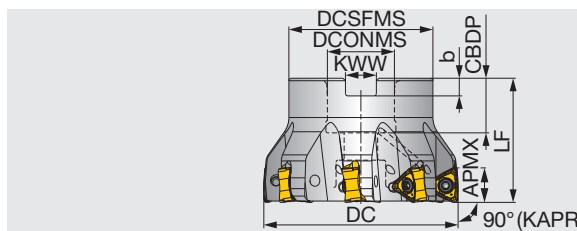
Designation	Clamping screw	Wrench
TPTN07...	CSPB-2.5SH	IP-7D

*Recommended clamping torque (N·m): CSPB-2.5SH = 1.1

TPTN12

Square shoulder mill, with screw clamp system, for double sided triangular inserts

GAMP = +4.2°~ +4.7°, GAMF = -15.4°~ -11.2°



Designation	APMX	DC	CICT	DCSFMS	LF	DCONMS	CBDP	KWW	b	WT(kg)	Air hole	Shell locking bolt	Insert
TPTN12M050B22.0R04	11	50	4	47	40	22	20	10.4	6.3	0.4	With	CM10X30H	TN*U12...
TPTN12M050B22.0R05	11	50	5	47	40	22	20	10.4	6.3	0.4	With	CM10X30H	TN*U12...
TPTN12M063B22.0R05	11	63	5	47	40	22	20	10.4	6.3	0.6	With	CM10X30H	TN*U12...
TPTN12M063B22.0R06	11	63	6	47	40	22	20	10.4	6.3	0.6	With	CM10X30H	TN*U12...
TPTN12J080B25.4R06	11	80	6	58	50	25.4	26	9.5	6	1.1	With	CM12X30H	TN*U12...
TPTN12J080B25.4R08	11	80	8	58	50	25.4	26	9.5	6	1.1	With	CM12X30H	TN*U12...
TPTN12M080B27.0R06	11	80	6	58	50	27	22	12.4	7	1.1	With	CM12X30H	TN*U12...
TPTN12M080B27.0R08	11	80	8	58	50	27	22	12.4	7	1.1	With	CM12X30H	TN*U12...
TPTN12J100B31.7R07	11	100	7	67	50	31.75	32	12.7	8	1.4	With	TMBA-M16H	TN*U12...
TPTN12J100B31.7R10	11	100	10	67	50	31.75	32	12.7	8	1.4	With	TMBA-M16H	TN*U12...
TPTN12M100B32.0R07	11	100	7	67	50	32	28.5	14.4	8	1.4	With	TMBA-M16H	TN*U12...
TPTN12M100B32.0R10	11	100	10	67	50	32	28.5	14.4	8	1.4	With	TMBA-M16H	TN*U12...
TPTN12J125B38.1R08	11	125	8	71	63	38.1	38	15.9	10	2.4	With	TMBA-M20H	TN*U12...
TPTN12J125B38.1R12	11	125	12	71	63	38.1	38	15.9	10	2.5	With	TMBA-M20H	TN*U12...
TPTN12M125B40.0R08	11	125	8	71	63	40	32	16.4	9	2.3	With	TMBA-M20H	TN*U12...
TPTN12M125B40.0R12	11	125	12	71	63	40	32	16.4	9	2.4	With	TMBA-M20H	TN*U12...
TPTN12M160B40.0R10N	11	160	10	100	63	40	29	16.4	9	4.5	Without	-	TN*U12...
TPTN12J160B50.8R10N	11	160	10	100	63	50.8	41	19	11	4.5	Without	-	TN*U12...

SPARE PARTS

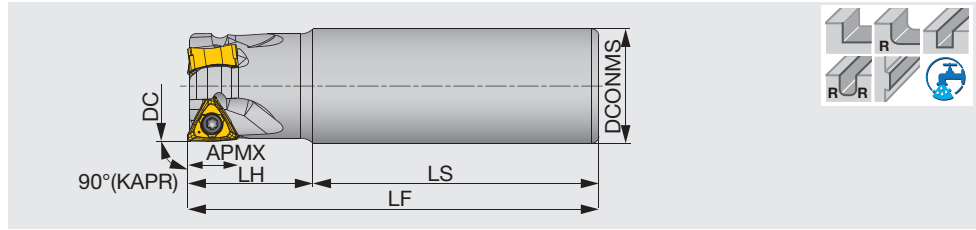
Designation	Clamping screw	Grip	Torx bit	Lubricant	Shell locking bolt 1	Shell locking bolt 2
TPTN12M050, 063B...	CSPB-3.5	H-TB2W	BLDIP15/S7	M-1000	-	CM10X30H
TPTN12*080B...	CSPB-3.5	H-TB2W	BLDIP15/S7	M-1000	-	CM12X30H
TPTN12*100B...	CSPB-3.5	H-TB2W	BLDIP15/S7	M-1000	TMBA-M16H	-
TPTN12*125B...	CSPB-3.5	H-TB2W	BLDIP15/S7	M-1000	TMBA-M20H	-
TPTN12*160B...	CSPB-3.5	H-TB2W	BLDIP15/S7	M-1000	-	-

*Recommended clamping torque (N·m): CSPB-3.5 = 3.5

EPTN07

Square shoulder endmill, with screw clamp system, for double sided triangular inserts

GAMP = +4.2° ~ +4.7°, GAMF = -15.4° ~ -11.2°



Designation	APMX	DC	CICT	DCONMS	LS	LH ⁽¹⁾	LF ⁽¹⁾	WT(kg)	Air hole	Insert
EPTN07M018C16.0R02	6.5	18	2	16	60	25	85	0.13	With	TN MU07...
EPTN07M020C20.0R02	6.5	20	2	20	70	30	100	0.22	With	TN MU07...
EPTN07M020C20.0R02L	6.5	20	2	20	135	50	185	0.41	With	TN MU07...
EPTN07M020C20.0R03	6.5	20	3	20	70	30	100	0.215	With	TN MU07...
EPTN07M025C25.0R03	6.5	25	3	25	80	35	115	0.41	With	TN MU07...
EPTN07M025C25.0R03L	6.5	25	3	25	150	70	220	0.78	With	TN MU07...
EPTN07M025C25.0R04	6.5	25	4	25	80	35	115	0.41	With	TN MU07...
EPTN07M032C32.0R04	6.5	32	4	32	80	35	115	0.66	With	TN MU07...
EPTN07M032C32.0R05	6.5	32	5	32	80	35	115	0.67	With	TN MU07...

(1) The value is true with R0.8 insert. For R0.4, please refer to page 10

SPARE PARTS



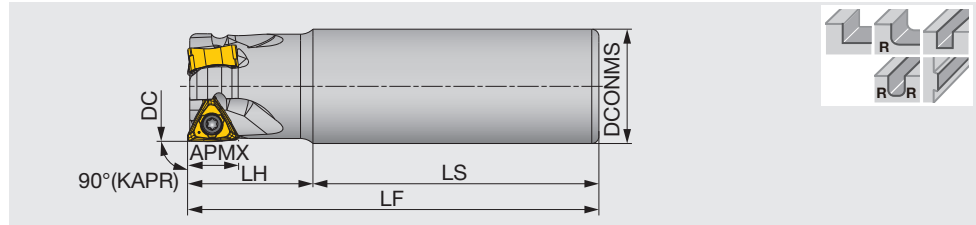
Designation	Clamping screw	Wrench
EPTN07...	CSPB-2.5SH	IP-7D

*Recommended clamping torque (N·m): CSPB-2.5SH = 1.1

EPTN12

Square shoulder endmill, with screw clamp system, for double sided triangular inserts

GAMP = +4.2° ~ +4.7°, GAMF = -15.4° ~ -11.2°



Designation	APMX	DC	CICT	DCONMS	LS	LH	LF	WT(kg)	Air hole	Insert
EPTN12M032C32.0R02N	11	32	2	32	80	35	115	0.7	Without	TN*U12...
EPTN12M032C32.0R03N	11	32	3	32	80	35	115	0.7	Without	TN*U12...
EPTN12M040C32.0R03N	11	40	3	32	80	35	115	0.8	Without	TN*U12...
EPTN12M040C32.0R04N	11	40	4	32	80	35	115	0.8	Without	TN*U12...

SPARE PARTS

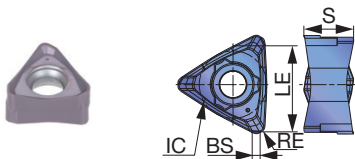


Designation	Clamping screw	Grip	Torx bit	Lubricant
EPTN12...	CSPB-3.5	H-TB2W	BLDIP15/S7	M-1000

*Recommended clamping torque (N·m): CSPB-3.5 = 3.5

INSERT

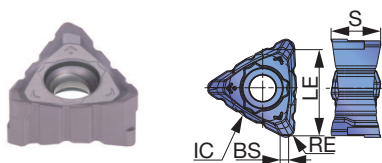
TNMU07-MJ



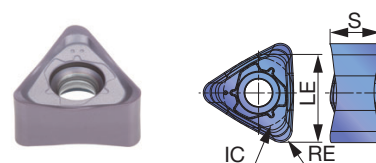
TNGU12-MJ/TNMU12-MJ



TNMU12-NMJ



TNMU12-R-MJ



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

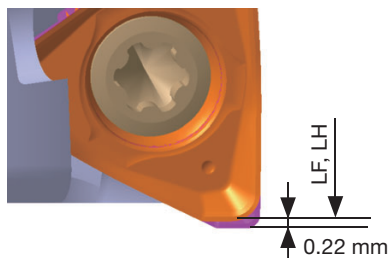
★ : First choice
☆ : Second choice

Designation	RE	APMX	Coated					LE	IC	S	BS
			AH120	AH3225	AH3135	T1215	T3225				
TNMU070304PER-MJ	0.4	6.5	●	●	●			6.5	5.7	4.1	0.6
TNMU070308PER-MJ	0.8	6.5	●	●	●			6.5	5.7	4.1	0.6
TNGU120708PER-MJ	0.8	11	●	●	●	●		12	9.525	7.04	1.16
TNMU120708PER-MJ	0.8	11	●	●	●	●		12	9.525	7.1	1.16
TNMU120708PER-NMJ	0.8	11	●	●	●			12	9.525	7.1	1.16
TNMU1207R16PER-MJ	1.6	11	●	●	●			12	9.525	6.88	-
TNMU1207R20PER-MJ	2	11	●	●	●			12	9.525	6.72	-

● : New product
● : Line up

Notes

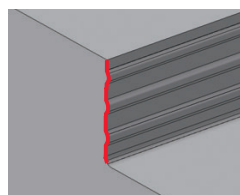
■ LF and LH dimensions for R0.4, size 07 insert



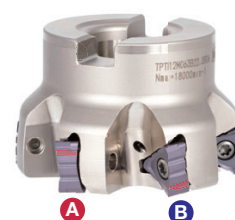
Add 0.22 mm to LH and LF measurements when R0.4 insert is used.

■ Serrated size 12 insert (NMJ)

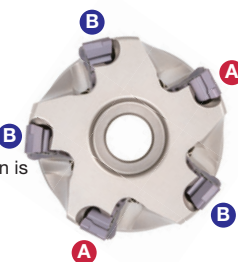
To obtain good wall accuracy, the serrated inserts must be arranged in alternative orders on the cutter so that the same serrated edge will not cut the same surface twice, generating steps on the wall. One of the serration grooves (marked in red) on the cutting edge has an irregular shape, and this must be placed alternatively as shown below by A and B.



Check the insert orientations if steps are produced on the wall surface.



The groove in red is asymmetric for easy identification



Insert orientation for odd number of teeth

STANDARD CUTTING CONDITIONS

Size 07 inserts

ISO	Workpiece material	Hardness	Priority	Grade	Cutting speed V _c (m/min)	Feed per tooth f _z (mm/t)
P	Carbon steel SS400, S15C, etc. E275A, C15E4, etc.	- 200 HB	First choice	AH3225	100 - 250	0.07 - 0.2
		- 200 HB	For fracture resistance	AH3135	100 - 250	0.07 - 0.2
	High Carbon steel, Alloy steel S45C, SCM440, etc. C45, 42CrMo4, etc.	- 300 HB	First choice	AH3225	100 - 230	0.07 - 0.15
		- 300 HB	For fracture resistance	AH3135	100 - 230	0.07 - 0.15
	Prehardened steel NAK80, PX5, etc.	30 - 40 HRC	First choice	AH3225	100 - 180	0.07 - 0.15
		30 - 40 HRC	For fracture resistance	AH3135	100 - 180	0.07 - 0.15
M	Stainless steel SUS304, etc. X5CrNi18-9, etc.	-	First choice	AH3135	90 - 200	0.07 - 0.15
		-	For wear resistance	AH3225	90 - 200	0.07 - 0.15
K	Grey cast iron FC250, etc. GG25, etc., 250, etc.	150 - 250 HB	First choice	AH120	140 - 250	0.07 - 0.2
		150 - 250 HB	For fracture resistance	AH3225	140 - 250	0.07 - 0.2
	Ductile cast iron FCD450, etc. GGG45, etc., 450-10S, etc.	150 - 250 HB	First choice	AH120	110 - 200	0.07 - 0.15
		150 - 250 HB	For fracture resistance	AH3225	110 - 200	0.07 - 0.15
S	Titanium alloys Ti-6Al-4V, etc.	-	First choice	AH3135	20 - 60	0.07 - 0.15
	Heat-resistant alloys Inconel 718, etc.	-	First choice	AH120	20 - 40	0.07 - 0.1

STANDARD CUTTING CONDITIONS

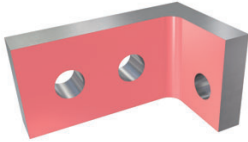
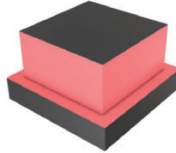
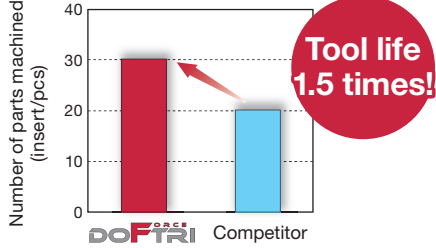
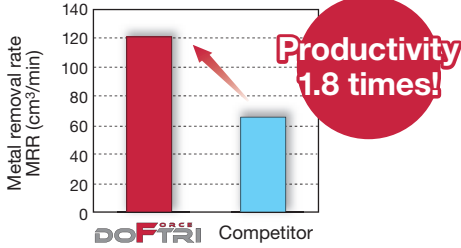
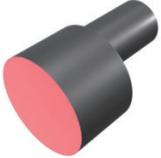
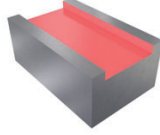
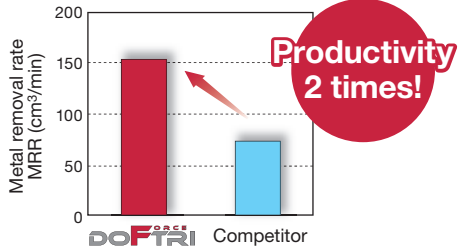
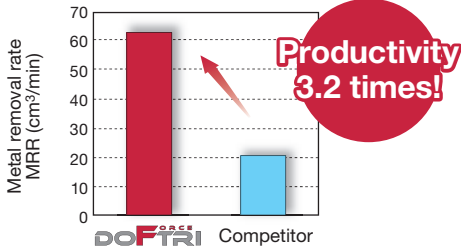
Size 12 inserts

ISO	Workpiece material	Hardness	Priority	Grade	Chipbreaker	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
P	Carbon steel SS400, S15C, etc. E275A, C15E4, etc.	- 200 HB	First choice	AH3225	MJ	100 - 250	0.08 - 0.3
		- 200 HB	For fracture resistance	AH3135	MJ	100 - 250	0.08 - 0.3
		- 200 HB	For wear resistance	T3225	MJ	100 - 300	0.08 - 0.3
		- 200 HB	Low cutting force	AH3225	NMJ	100 - 250	0.08 - 0.14
	High Carbon steel, Alloy steel S45C, SCM440, etc. C45, 42CrMo4, etc.	- 300 HB	First choice	AH3225	MJ	100 - 230	0.08 - 0.3
		- 300 HB	For fracture resistance	AH3135	MJ	100 - 230	0.08 - 0.3
		- 300 HB	For wear resistance	T3225	MJ	100 - 280	0.08 - 0.3
		- 300 HB	Low cutting force	AH3225	NMJ	100 - 230	0.08 - 0.14
	Prehardened steel NAK80, PX5, etc.	30 - 40 HRC	First choice	AH3225	MJ	100 - 180	0.08 - 0.25
		30 - 40 HRC	For fracture resistance	AH3135	MJ	100 - 180	0.08 - 0.25
		30 - 40 HRC	For wear resistance	T3225	MJ	100 - 200	0.08 - 0.25
		30 - 40 HRC	Low cutting force	AH3225	NMJ	100 - 180	0.08 - 0.14
M	Stainless steel SUS304, etc. X5CrNi18-9, etc.	-	First choice	AH3135	MJ	90 - 200	0.08 - 0.25
		-	For wear resistance	T3225	MJ	90 - 250	0.08 - 0.25
		-	Low cutting force	AH3135	NMJ	90 - 200	0.08 - 0.14
K	Grey cast iron FC250, etc. GG25, etc., 250, etc.	150 - 250 HB	First choice	AH120	MJ	140 - 250	0.08 - 0.3
		150 - 250 HB	For fracture resistance	AH3225	MJ	140 - 250	0.08 - 0.3
		150 - 250 HB	For wear resistance	T1215	MJ	140 - 300	0.08 - 0.3
		150 - 250 HB	Low cutting force	AH120	NMJ	140 - 250	0.08 - 0.14
	Ductile cast iron FCD450, etc. GGG45, etc., 450-10S, etc.	150 - 250 HB	First choice	AH120	MJ	110 - 200	0.08 - 0.25
		150 - 250 HB	For fracture resistance	AH3225	MJ	110 - 200	0.08 - 0.25
		150 - 250 HB	For wear resistance	T1215	MJ	110 - 250	0.08 - 0.25
		150 - 250 HB	Low cutting force	AH120	NMJ	110 - 200	0.08 - 0.14
S	Titanium alloys Ti-6Al-4V, etc.	-	First choice	AH3135	MJ	20 - 60	0.08 - 0.2
		-	Low cutting force	AH3135	NMJ	20 - 60	0.08 - 0.14
	Heat-resistant alloys Inconel 718, etc.	-	First choice	AH120	MJ	20 - 40	0.07 - 0.18
		-	Low cutting force	AH120	NMJ	20 - 40	0.07 - 0.14

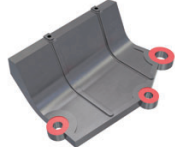
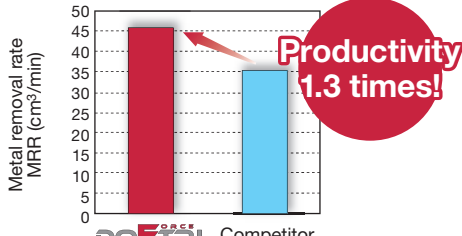
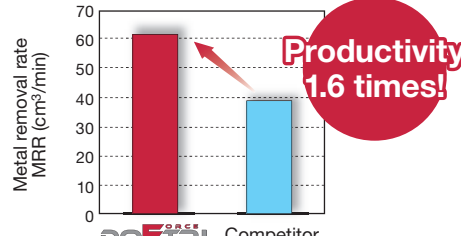
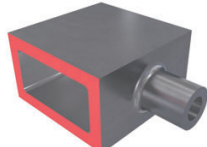
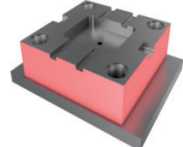
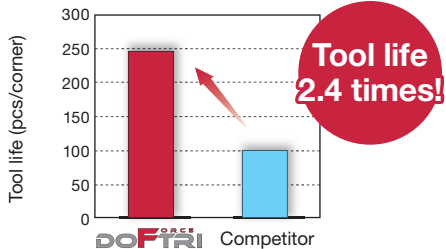
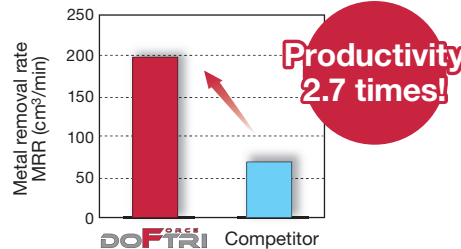
Note: For NMJ chipbreaker, use a feed rate that satisfies the following theoretical chip thickness:

Designation	Chip thickness (mm)
TNMMU120708PER-NMJ	< 0.2

PRACTICAL EXAMPLES

Workpiece type		Bracket	Machine part
Cutter		TPTN12M050B22.0R05 (ø50 mm, z = 5)	EPTN12M040C32.0R04N (ø40 mm, z = 4)
Insert		TNMU120708PER-MJ	TNMU120708PER-NMJ
Grade		AH3225	AH3135
Workpiece material		SS400 / E275A	S45C / C45
		 P	 P
Cutting conditions	Cutting speed : Vc (m/min)	140	251
	Feed per tooth: fz (mm/t)	0.12	0.14
	Feed speed : Vf (mm/min)	535	1119
	Depth of cut : ap (mm)	1.5	4
	Width of cut : ae (mm)	36	27
	Machining	Shoulder milling	Shoulder milling
	Coolant	Wet	None
Machine		Vertical M/C, BT40	Horizontal M/C, BT40
Results		 Tool life 1.5 times! The combination of special insert geometry and grade for inserts in DoForce-Tri series helps extend tool life compared to the competitor.	 Productivity 1.8 times! DoForce-Tri's NMJ chipbreaker with serrations reduced cutting force eliminating chatter. MRR has been improved to double the depth of cut with long and stable tool life.
		Number of parts machined (insert/pcs) DOFTRI Competitor	Metal removal rate MRR (cm³/min) DOFTRI Competitor
Workpiece type		Crankshaft	Machine part
Cutter		TPTN12M160B40.0R10N (ø160 mm, z = 10)	EPTN07M025C25.0R04 (ø25 mm, z = 4)
Insert		TNMU120708PER-MJ	TNMU070308PER-MJ
Grade		AH3135	AH3135
Workpiece material		S55C / C55	SUS304 / X5CrNi18-9
		 P	 M
Cutting conditions	Cutting speed : Vc (m/min)	135	196
	Feed per tooth: fz (mm/t)	0.157	0.13
	Feed speed : Vf (mm/min)	420	1298
	Depth of cut : ap (mm)	3	2
	Width of cut : ae (mm)	125	25
	Machining	Shoulder milling	Slotting
	Coolant	Air blast	Air blast
Machine		Horizontal boring M/C, BT50	Horizontal M/C, BT40
Results		 Productivity 2 times! The competitor's shoulder mill chattered at high cutting parameters. DoForce-Tri's helical cutting edges produced stable machining at 1.7 times number of teeth and 1.2 times depth of cut.	 Productivity 3.2 times! MRR has been improved by 3.2 times over the competitor's positive inserts thanks to higher number of teeth on the cutter increasing feed per tooth. No sacrifice for surface quality.
		Metal removal rate MRR (cm³/min) DOFTRI Competitor	Metal removal rate MRR (cm³/min) DOFTRI Competitor

PRACTICAL EXAMPLES

Workpiece type		Bearing housing	Bracket
Cutter		EPTN07M032C32.0R05 (ø32 mm, z = 5)	EPTN07M025C25.0R04 (ø25 mm, z = 4)
Insert		TNMU070308PER-MJ	TNMU070308PER-MJ
Grade		AH3135	AH120
Workpiece material		FC250 / GG25 / 250	FCD400
		 K	 K
Cutting conditions	Cutting speed : Vc (m/min)	320	180
	Feed per tooth: fz (mm/t)	0.06	0.08
	Feed speed : Vf (mm/min)	960	690
	Depth of cut : ap (mm)	2	4
	Width of cut : ae (mm)	24	22
	Machining	Grooving	Face milling
	Coolant	Air blast	Air blast
	Machine	Horizontal M/C, BT40	Vertical M/C, BT40
Results		 Productivity 1.3 times! MRR has been improved by 1.3 times over the competitor's positive inserts thanks to higher number of teeth and increased feed per tooth.	 Productivity 1.6 times! Inserts' free cutting action eliminated chatter despite higher number of cutting edges, improving MRR by 1.6 times.
Workpiece type		Carrier	Mold base
Cutter		TPTN12R063M22.0E06 (ø63 mm, z = 6)	TPTN12J080B25.4R06 (ø80 mm, z = 6)
Insert		TNGU120708PER-MJ	TNMU120708PER-MJ
Grade		AH120	AH120
Workpiece material		Pearlitic cast iron (250 HB)	FCD600 / GGG60 / 600-3
		 K	 K
Cutting conditions	Cutting speed : Vc (m/min)	150	200
	Feed per tooth: fz (mm/t)	0.2	0.2
	Feed speed : Vf (mm/min)	950	965
	Depth of cut : ap (mm)	6	5
	Width of cut : ae (mm)	20	40
	Machining	Face milling	Shoulder milling
	Coolant	Wet	Wet
	Machine	Horizontal M/C, BT50	Horizontal M/C, BT50
Results		 Tool life 2.4 times! The combination of special insert geometry and grade for inserts in DoForce-Tri series helps extend tool life compared to the competitor.	 Productivity 2.7 times! The competitor's shoulder mill chattered at high cutting parameters. DoForce-Tri's helical cutting edges produced high wall accuracy at double cutting speed and 1.7 times greater depth of cut.

FIXED TORQUE WRENCH

Achieves high cutting edge precision thanks to uniform clamping force

Easy setting

Handle

Multi-component handle optimally designed for the hand enables ideal power transmission.



Mechanism

Driver clicks to alert the operator when the preset torque is attained. IDs printed on the handle end allow easy identification of the driver specs. Driver has unlimited loosening torque. Driver mechanism is industrial-lubricant-resistant.

High repeatability & robustness

Robustness / Fitting

Wiha ChromTop® finish on tip for a perfect fit every time. Durability thanks to high quality chrome-vanadium-molybdenum steel, through hardened, chrome-plated.

Versatility

Extra slim blade geometry is particularly suitable for applications with confined narrow access.



Handle

Ex) **TW - D - 0.6NM**

1 Torque Wrench 2 Driver type 3 Torque



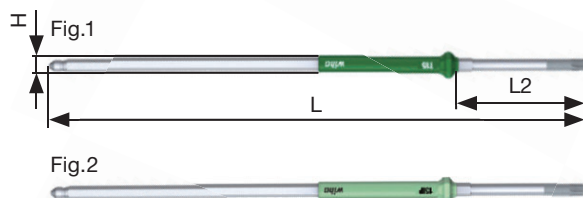
Designation	Stock	Torque (N-m)	Accuracy (%)	øD	L
TW-D-0.6NM	●	0.6	10	34	130
TW-D-0.9NM	●	0.9	10	34	130
TW-D-1.1NM	●	1.1	10	34	130
TW-D-1.4NM	●	1.4	10	34	130
TW-D-2.5NM	●	2.5	10	34	130
TW-D-3.0NM	●	3.0	10	34	130
TW-D-3.5NM	●	3.5	10	34	130

1 piece per package

Blade

Ex) **TW - B - T6**

1 Torque Wrench 2 Blade 3 TORX geom.



Designation	Stock	TORX geom.	H	L	L2	Fig.
TW-B-T6	●	T6	4	175	42	1
TW-B-T7	●	T7	4	175	42	1
TW-B-T8	●	T8	4	175	42	1
TW-B-T9	●	T9	4	175	42	1
TW-B-T10	●	T10	4	175	42	1
TW-B-T15	●	T15	4	175	42	1
TW-B-6IP	●	6IP	4	175	42	2
TW-B-7IP	●	7IP	4	175	42	2
TW-B-8IP	●	8IP	4	175	42	2
TW-B-10IP	●	10IP	4	175	42	2
TW-B-15IP	●	15IP	4	175	42	2

1 piece per package

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