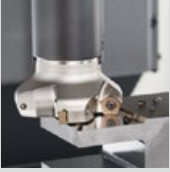


# CONTENTS

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## General product information

[View](#)

## Added products



### AH3225, AH8015, NS740, DC = 200, 250, 315

New grades and cutters for improved productivity machining large components of various materials

[View](#)



MillLine

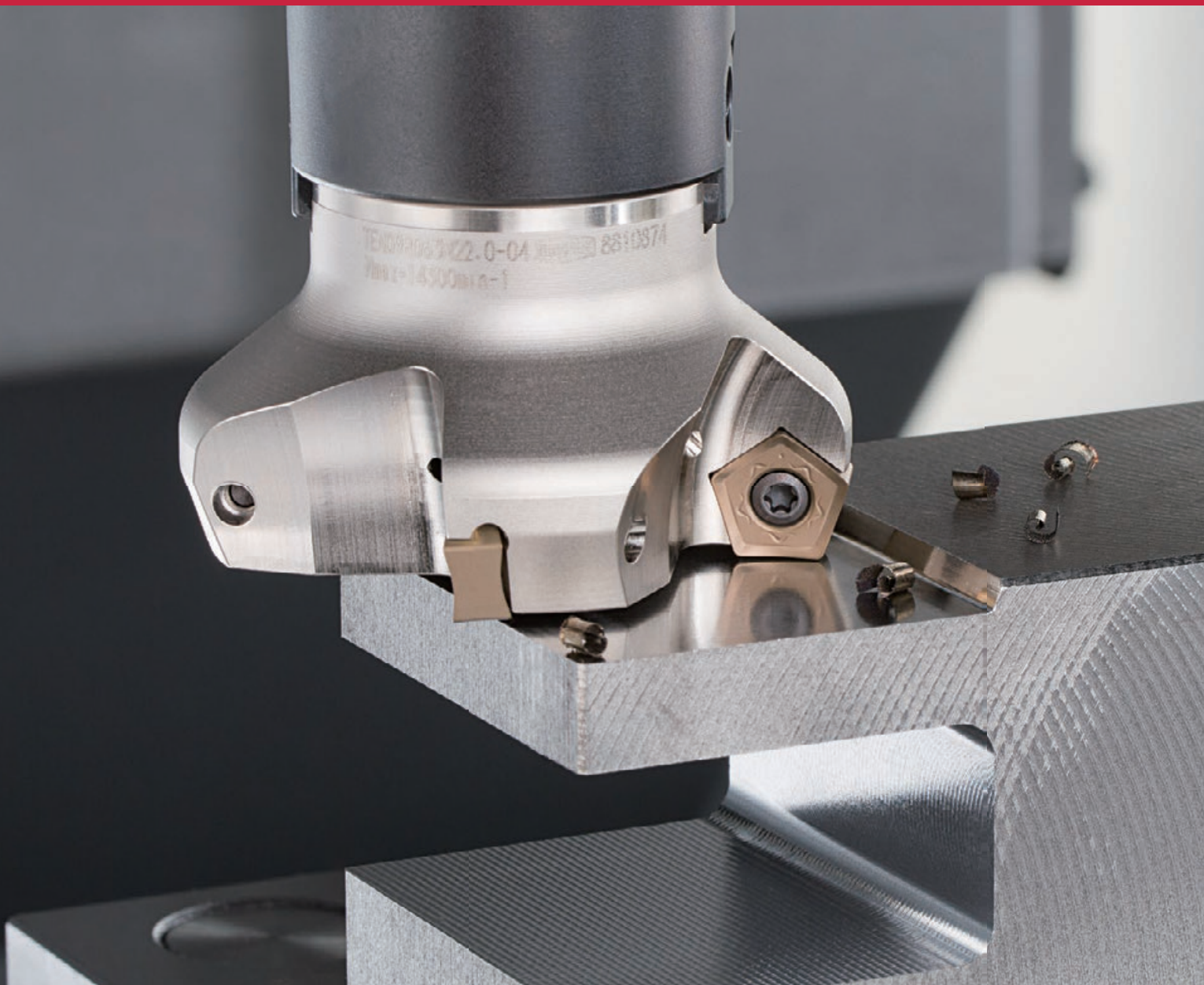


**DOPENT**

www.tungaloy.com

Tungaloy Report No. 372-G

High-speed face milling with superior surface finish - now available in **new CVD grades**



**INDUSTRY 4.0**  
*FEED the SPEED!*

BIG-PLUS SPINDLE SYSTEM

NO. BEEU1857 A

Tungaloy

ACCELERATED MACHINING



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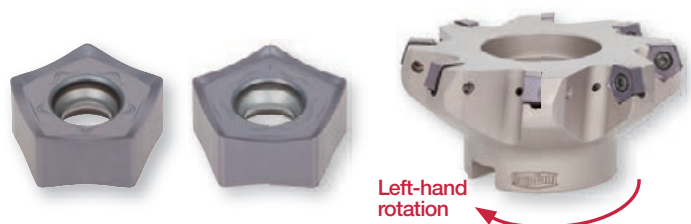
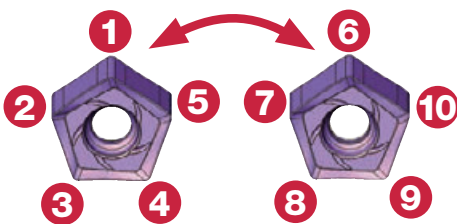
Face milling cutter with low cutting force and low cost per edge

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## Economical face milling cutter with high productivity for all materials!!

### Economical pentagonal insert

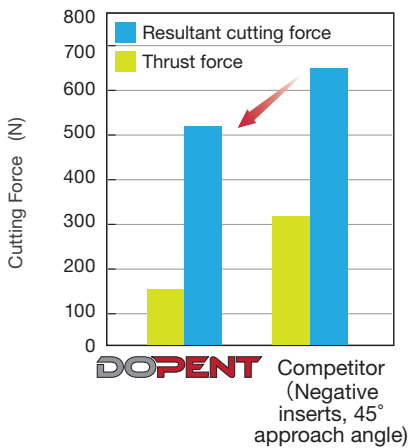
Double-sided insert with 10 cutting edges



The neutral inserts are mountable on the left-hand cutter.

### Low cutting force

Free cutting geometry thanks to its 70° approach angle and large rake angle



**P**

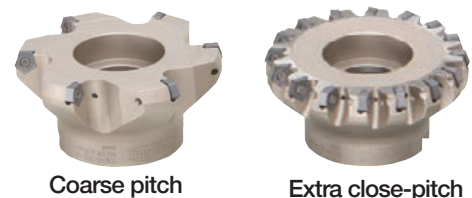
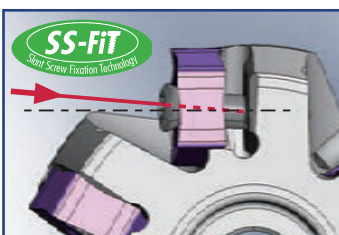
Cutter : TEN09R100M31.7-05( $\phi D_c = 100$  mm,  $z = 1$ )  
 Insert : PNMU0905GNEN-MJ / AH3135  
 Workpiece : S55C / C55, 200HB  
 Cutting speed :  $V_c = 200$  m/min  
 Feed per tooth :  $f_z = 0.2$  mm/t  
 Depth of cut :  $a_p = 2$  mm  
 Width of cut :  $a_e = 60$  mm  
 Coolant : Dry

**Resultant cutting force: down by 30%; Thrust force: down by 50%**

**Perfect for thin-structured, low rigidity workpieces**

### For higher machining efficiency, use the close-pitched cutter.

SS-FIT structure provides exceptional rigidity even with extra close-pitch cutters.



■ Large number of inserts on a cutter

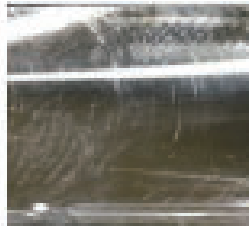
Dimensions $\phi D_c$ (mm)	No. of inserts			
	Close pitch		Extra close-pitch	
	DO PENT	Competitor	DO PENT	Competitor
63	6	5	8	7
80	7	6	10	9
100	8	7	12	11
125	10	9	16	13
160	12	11	20	15

## Superior surface finish quality

Improved surface finish quality thanks to the excellent chip control ability



**DOPENT**



Competitor  
(Negative inserts,  
65° approach angle)

**M**

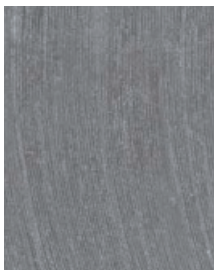
Cutter : TEN09R063M22.0-06 ( $\phi D_c = 63, z = 6$ )  
 Insert : PNCU0905GNEN-MJ / AH3135  
 Workpiece : SUS304 / X5CrNi18-9, 175HB  
 Cutting speed :  $V_c = 200$  m/min  
 Feed per tooth :  $f_z = 0.2$  mm/t  
 Depth of cut :  $a_p = 0.5$  mm  
 Width of cut :  $a_e = 51$  mm  
 Coolant : Dry

## Improved surface finish by cermet grade

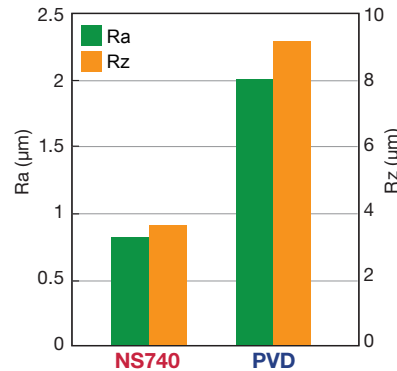
**NS740** performs well in finishing application due to strong welding resistance.



**NS740**



**PVD**



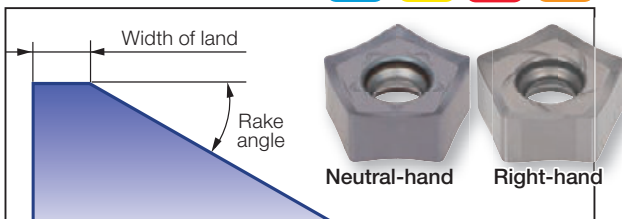
**P**

Cutter : TEN09R100M31.7-05 ( $z = 1$ )  
 Insert : PNCU0905GNER-MJ  
 Workpiece : SS400 / E275A (126HB)  
 Cutting speed :  $V_c = 250$  m/min  
 Feed per tooth :  $f_z = 0.15$  mm/t  
 Depth of cut :  $a_p = 0.3$  mm  
 Width of cut :  $a_e = 75$  mm  
 Coolant : Dry

## Wide line-up of inserts for various machining

**MJ** General purpose

**P M K S**

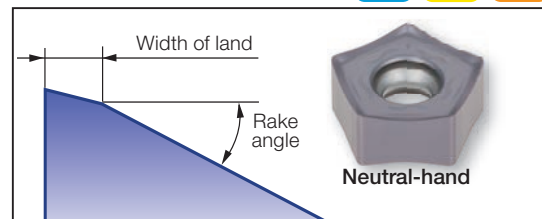


10 cutting edges

Excellent balance between sharpness and toughness of cutting edges

**ML** Light cutting geometry

**P M S**

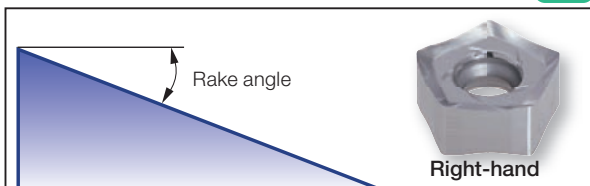


10 cutting edges

Sharp cutting edge for stainless machining

**AJ** For non-ferrous machining

**N**



10 cutting edges

Strong welding resistance due to large rake angle and lapped rake face

**W** With wipers

**P M K S**



2 cutting edges

Provides good surface finish due to wide wiper edge

## Rich grade lineup for every kind of material

### 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

### AH725



- Good balance between wear and chipping resistance
- Suitable for machining steel and superalloys

### T1215



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

### New T3225

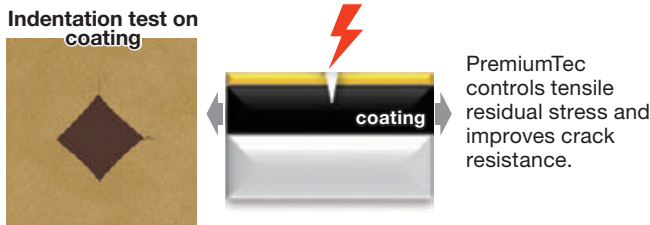
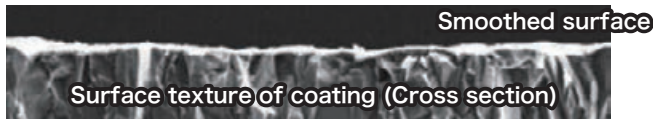


- CVD grade with excellent chipping and fracture resistance
- Most suited for steel and stainless steel at high-speed machining

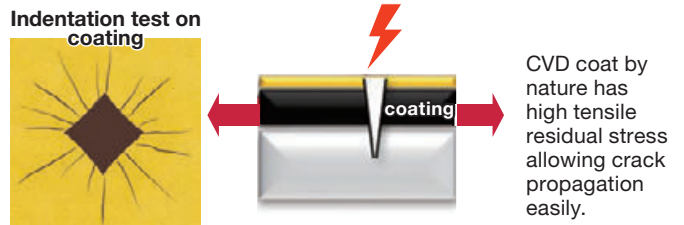
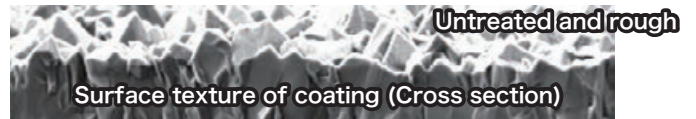
### Special Surface Technology

## PREMIUMTEC

TUNGALOY

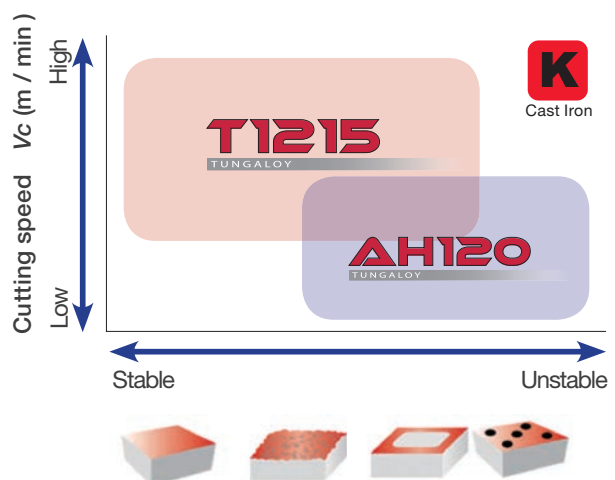
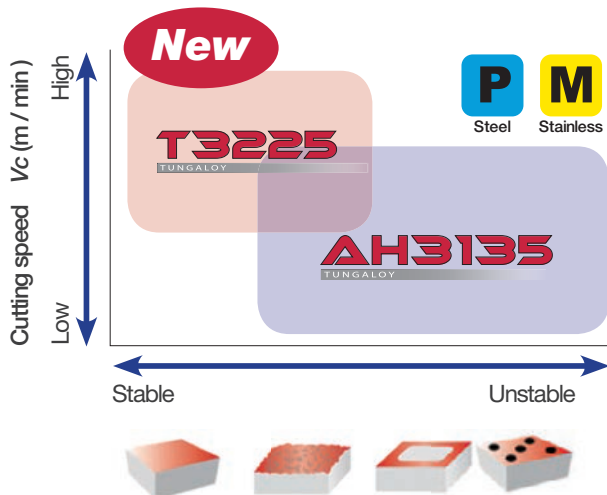


### Conventional item



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

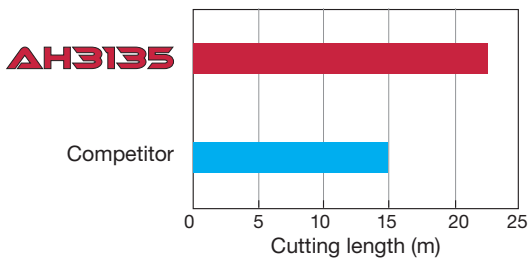
## Application area





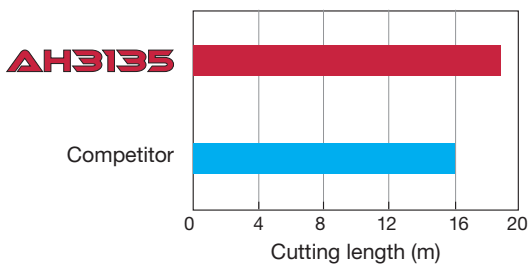
## Stable tool life

- Tool life comparison in machining steel (DC = 100 mm)



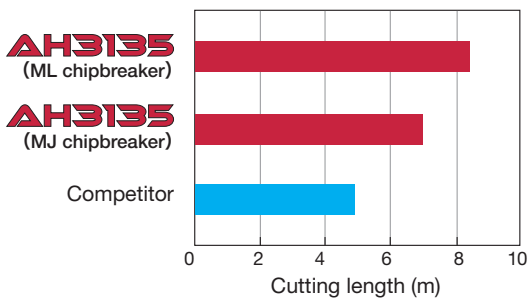
Cutter : TEN09R100M31.7-05 (ø100 mm, z = 1)  
 Insert : PNMU0905GNEN-MJ / AH3135  
 Workpiece : S55C / C55 (200HB)  
 Cutting speed :  $V_c = 200$  m/min  
 Feed per tooth :  $f_z = 0.3$  mm/t  
 Depth of cut :  $a_p = 2$  mm  
 Width of cut :  $a_e = 70$  mm  
 Coolant : Dry

- Tool life comparison in machining steel (DC = 63 mm)



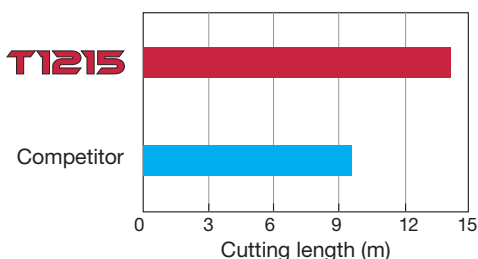
Cutter : TEN09R063M22.0-06 (ø63 mm, z = 1)  
 Insert : PNCU0905GNEN-MJ / AH3135  
 Workpiece : S55C / C55 (210HB)  
 Cutting speed :  $V_c = 200$  m/min  
 Feed per tooth :  $f_z = 0.3$  mm/t  
 Depth of cut :  $a_p = 2$  mm  
 Width of cut :  $a_e = 50$  mm  
 Coolant : Dry

- Tool life comparison in machining stainless (DC = 63 mm)



Cutter : TEN09R063M22.0-06 (ø63 mm, z = 1)  
 Insert : PNCU0905GNEN-MJ / AH3135  
 Workpiece : PNCU0905GNEN-ML / AH3135  
 Workpiece : SUS304 / X5CrNi18-9 (175HB)  
 Cutting speed :  $V_c = 150$  m/min  
 Feed per tooth :  $f_z = 0.2$  mm/t  
 Depth of cut :  $a_p = 2$  mm  
 Width of cut :  $a_e = 50$  mm  
 Coolant : Dry

- Tool life comparison in machining cast iron (DC = 63 mm)



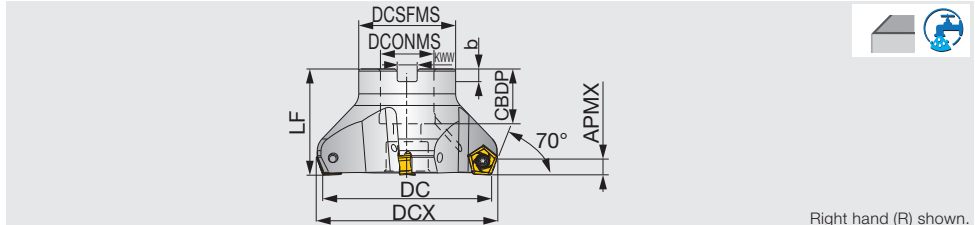
Cutter : TEN09R063M22.0-06 (ø63 mm, z = 1)  
 Insert : PNCU0905GNEN-MJ / T1215  
 Workpiece : FCD600 / 600-3 (160HB)  
 Cutting speed :  $V_c = 250$  m/min  
 Feed per tooth :  $f_z = 0.3$  mm/t  
 Depth of cut :  $a_p = 3$  mm  
 Width of cut :  $a_e = 50$  mm  
 Coolant : Dry

70° face mills with double sided pentagonal inserts.

## CUTTER - BORE TYPE

TEN09R/L

A.R.=-6°,R.R.=-10°~-2°



Right hand (R) shown.

Designation	APMX	DC	CICT	DCX	DCSFMS	LF	DCONMS	CBDF	KWW	b	WT(kg)	Air hole	Insert
TEN09R050M22.0-03	6.4	50	3	56	41	40	22	20	10	6	0.3	with	PN*U0905...
TEN09R050M22.0-04	6.4	50	4	56	41	40	22	20	10	6	0.3	with	PN*U0905...
TEN09R050M22.0-06	6.4	50	6	56	41	40	22	20	10	6	0.3	with	PN*U0905...
TEN09R050M22.0E04	6.4	50	4	56	41	40	22	20	10.4	6.3	0.3	with	PN*U0905...
TEN09R050M22.0E06	6.4	50	6	56	41	40	22	20	10.4	6.3	0.3	with	PN*U0905...
TEN09R063M22.0-04	6.4	63	4	69	41	40	22	20	10	6	0.5	with	PN*U0905...
TEN09R063M22.0-06	6.4	63	6	69	41	40	22	20	10	6	0.5	with	PN*U0905...
TEN09R063M22.0-08	6.4	63	8	69	41	40	22	20	10	6	0.5	with	PN*U0905...
TEN09R063M22.0E06	6.4	63	6	69	41	40	22	20	10.4	6.3	0.5	with	PN*U0905...
TEN09R063M22.0E08	6.4	63	8	69	41	40	22	20	10.4	6.3	0.5	with	PN*U0905...
TEN09R080M25.4-04	6.4	80	4	86	46	50	25.4	26	9.5	6	0.9	with	PN*U0905...
TEN09R080M25.4-07	6.4	80	7	86	46	50	25.4	26	9.5	6	0.9	with	PN*U0905...
TEN09R080M25.4-10	6.4	80	10	86	46	50	25.4	26	9.5	6	0.9	with	PN*U0905...
TEN09R100M31.7-05	6.4	100	5	106	60	50	31.75	32	12.7	8	1.3	with	PN*U0905...
TEN09R/L100M31.7-08*	6.4	100	8	106	60	50	31.75	32	12.7	8	1.3	with	PN*U0905...
TEN09R100M31.7-12	6.4	100	12	106	60	50	31.75	32	12.7	8	1.4	with	PN*U0905...
TEN09R125M38.1-06	6.4	125	6	131	80	63	38.1	38	15.9	10	2.6	with	PN*U0905...
TEN09R/L125M38.1-10*	6.4	125	10	131	80	63	38.1	38	15.9	10	2.7	with	PN*U0905...
TEN09R125M38.1-16	6.4	125	16	131	80	63	38.1	43	15.9	10	2.9	with	PN*U0905...
TEN09R160M50.8-07	6.4	160	7	166	100	63	50.8	46	19	11	4.4	without	PN*U0905...
TEN09R/L160M50.8-12*	6.4	160	12	166	100	63	50.8	46	19	11	4.6	without	PN*U0905...
TEN09R160M50.8-20	6.4	160	20	166	100	63	50.8	46	19	11	4.9	without	PN*U0905...

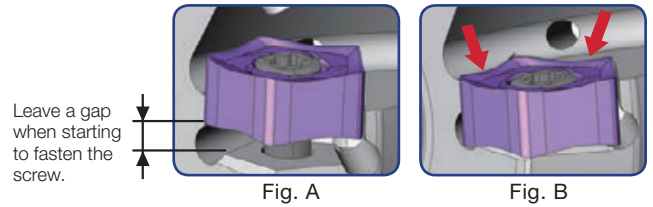
\* For TEN09L (left-hand cutter), use the neutral-hand inserts.

### SPARE PARTS

Designation	Clamping screw	Grip	Lubricant	Shell locking bolt	Shell locking bolt 1	Torx bit
TEN09R050 - 063...	CSTR-4L100	H-TBS	M-1000	-	CM10X30H	BT15S
TEN09R080...	CSTR-4L100	H-TBS	M-1000	-	CM12X30H	BT15S
TEN09R/L100...	CSTR-4L100	H-TBS	M-1000	TMBA-M16H	-	BT15S
TEN09R125...06	CSTR-4L100	H-TBS	M-1000	TMBA-M20H	-	BT15M
TEN09R/L125M...10	CSTR-4L100	H-TBS	M-1000	TMBA-M20H	-	BT15M
TEN09R125M...16	CSTR-4L100	H-TBS	M-1000	TMBA-M20H	-	BT15S
TEN09R160M...07	CSTR-4L100	H-TBS	M-1000	-	-	BT15M
TEN09R160M...12	CSTR-4L100	H-TBS	M-1000	-	-	BT15M
TEN09R160M...20	CSTR-4L100	H-TBS	M-1000	-	-	BT15S

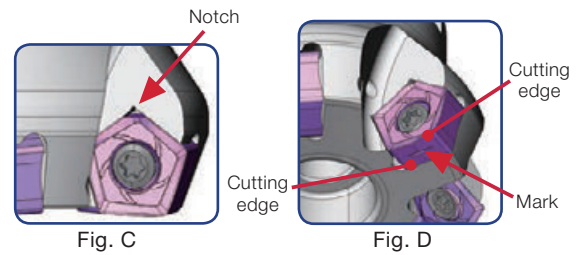
## Installation of inserts on an extra close-pitch cutter

- On an extra close-pitch cutter, the screw hole of an insert pocket is placed at an angle.
- Leave a gap between the insert and pocket when starting to fasten the screw on the cutter body as shown in Fig. A.
- After fastening the screw, please ensure that there is no gap between the cutter body and insert. (Fig. B)



## Notes for using wiper inserts

- When fine surface finish is required, wiper insert PNCU0905GNER-W is recommended.
- Attach the insert with its notch on the top, as shown in Fig. C.
- Also, make sure that the mark of the insert is located at the bottom of the cutter body, as shown in Fig. D.
- The wiper insert has two corners available (Fig. D). Do not use the other corners as the cutter body may be broken.

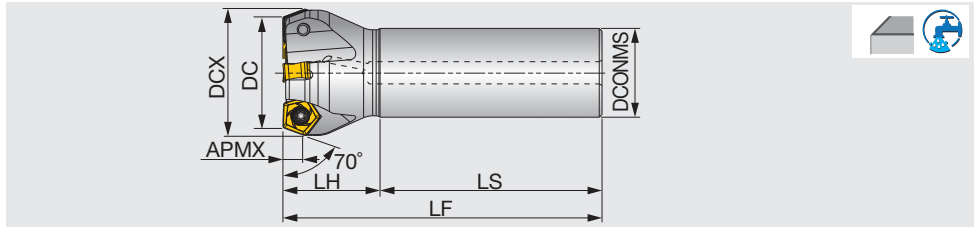


70° endmills with double sided pentagonal inserts.

## CUTTER - SHANK TYPE

EEN09

A.R.=-6°,R.R.=-2°~10°

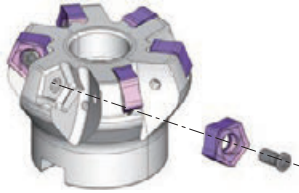


Designation	APMX	DC	CICT	DCX	DCONMS	LS	LH	LF	WT(kg)	Air hole	Insert
EEN09R032M32.0-03	6.4	32	3	38	32	80	35	115	0.7	with	PN*U0905...
EEN09R040M32.0-04	6.4	40	4	46	32	80	35	115	0.7	with	PN*U0905...
EEN09R050M32.0-04	6.4	50	4	56	32	80	40	120	0.9	with	PN*U0905...
EEN09R063M32.0-06	6.4	63	6	69	32	80	40	120	1	with	PN*U0905...
EEN09R080M32.0-07	6.4	80	7	86	32	80	40	120	1.3	with	PN*U0905...

### SPARE PARTS

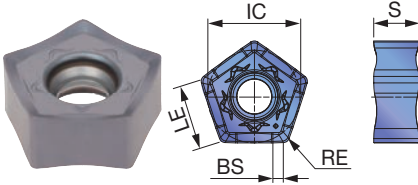


Designation	Clamping screw	Lubricant	Wrench
EEN09	CSTR-4L100	M-1000	T-15D

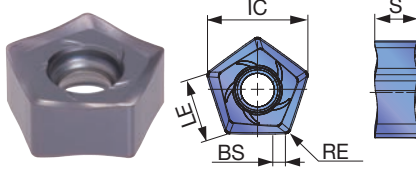


## INSERTS

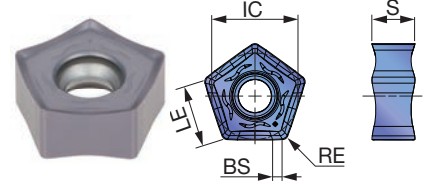
PN\*U0905GNEN-MJ (Neutral-hand)



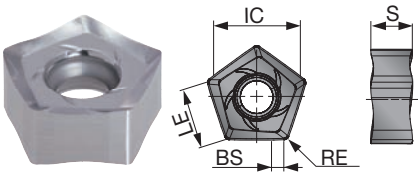
PNCU0905GNER-MJ (Right-hand)



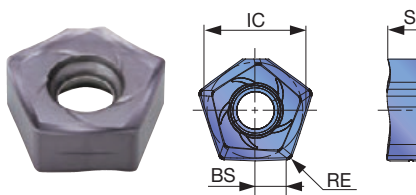
PNCU0905-ML (Neutral-hand)



PNCU0905-AJ (Right-hand)



PNCU0905-W (Right-hand)



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

★ : First choice  
☆ : Second choice

Designation	RE	APMX	Coated							Cermet	Un-coated	LE	S	IC	BS			
			AH120	AH140	AH725	AH3135	T1115	T1215	T3130							T3225	NS740	TH10
PNMU0905GNEN-MJ	0.8	6.4	●												8.9	6	12.2	1.4
PNCU0905GNEN-MJ	0.8	6.4	●												8.9	6	12.2	1.4
PNCU0905GNER-MJ	0.8	6.4	●	●	●		●		●						8.9	5.93	12.2	1.4
PNCU0905GNEN-ML	0.8	6.4				●									8.9	5.96	12.2	1.4
PNCU0905GNFR-AJ	0.8	6.4									●				8.9	6.25	12.2	1.4
PNCU0905GNER-W	0.8	2			●										-	5.93	12.2	3.8

● : New product  
● : Line up

## STANDARD CUTTING CONDITIONS




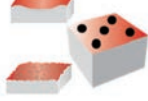
ISO	Workpiece materials	Hardness HB	Selection criteria	Recommended grade	Chip-breaker	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
<b>P</b>	Low carbon steels (S15C, etc.)	200 - 300 HB	First choice	AH3135	MJ	100 - 250	0.1 - 0.4
		200 - 300 HB	Low cutting force	AH3135	ML	100 - 250	0.1 - 0.3
		200 - 300 HB	Priority on wear resistance	T3225	MJ	200 - 350	0.1 - 0.3
		200 - 300 HB	Priority on surface quality	NS740	MJ	100 - 250	0.1 - 0.3
	High carbon steels, alloyed steels (S55C, SCM440, etc.)	150 - 300 HB	First choice	AH3135	MJ	100 - 250	0.1 - 0.35
		150 - 300 HB	Low cutting force	AH3135	ML	100 - 250	0.1 - 0.3
		150 - 300 HB	Priority on wear resistance	T3225	MJ	180 - 300	0.1 - 0.3
		150 - 300 HB	Priority on surface quality	NS740	MJ	100 - 250	0.1 - 0.3
	Prehardened steel (NAK80, PX5, etc.)	30 - 40 HRC	First choice	AH3135	MJ	100 - 200	0.1 - 0.3
		30 - 40 HRC	Low cutting force	AH3135	ML	100 - 200	0.1 - 0.25
30 - 40 HRC		Priority on wear resistance	T3225	MJ	150 - 250	0.1 - 0.25	
<b>M</b>	Stainless steel (SUS304 / X5CrNi18-9, etc.)	- 200 HB	First choice	AH3135	ML	100 - 200	0.1 - 0.3
		- 200 HB	Priority on fracture resistance	AH3135	MJ	100 - 200	0.1 - 0.35
		- 200 HB	Priority on wear resistance	T3225	MJ	100 - 250	0.1 - 0.3
<b>K</b>	Ductile cast iron (FCD400 / GGG40, etc.)	150 - 250 HB	First choice	T1215	MJ	100 - 300	0.1 - 0.35
		150 - 250 HB	Priority on fracture resistance	AH120	MJ	100 - 250	0.1 - 0.4
	Ductile cast iron (FCD400 / GGG40, etc.)	150 - 250 HB	First choice	T1215	MJ	100 - 300	0.1 - 0.35
		150 - 250 HB	Priority on fracture resistance	AH120	MJ	80 - 200	0.1 - 0.4
<b>N</b>	Aluminium alloys (Si < 13%)	-	First choice	TH10	AJ	500 - 1500	0.1 - 0.5
	Aluminium alloys (Si ≥ 13%)	-	First choice	TH10	AJ	150 - 500	0.1 - 0.5
<b>S</b>	Titanium alloys Ti-6Al-4V, etc.	- 40 HRC	First choice	AH3135	ML	30 - 60	0.1 - 0.3
		- 40 HRC	Priority on fracture resistance	AH3135	MJ	30 - 60	0.1 - 0.3
	Heat-resistance alloys Inconel 718, etc.	- 40 HRC	First choice	AH725	MJ	10 - 40	0.04 - 0.1

- Remove excessive chip with an air blast to prevent chip jamming.
- Use water-soluble coolant to avoid built-up edge in case extreme welding occurs on cutting edges. (ex. aluminium machining).
- For the operation with depth of cut which varies (ex. casting skin) and machining of workpiece materials with interrupted surface, the feed (fz) should be set to the lower recommended value shown in the above table.



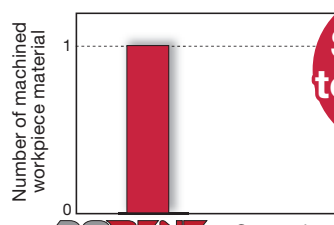
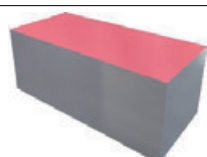

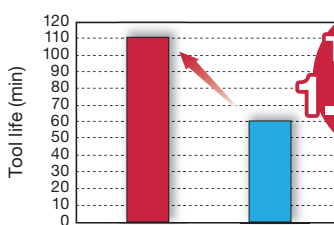
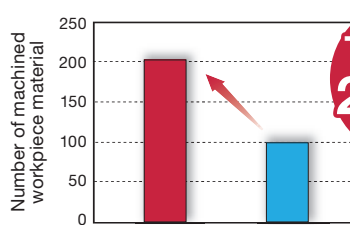
- Cutting conditions may be limited depending on machine power, workpiece rigidity, and spindle output. When the cutting width, depth or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.

## Selection guide for face milling cutters


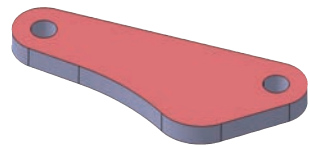
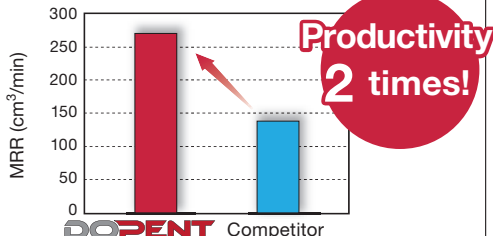
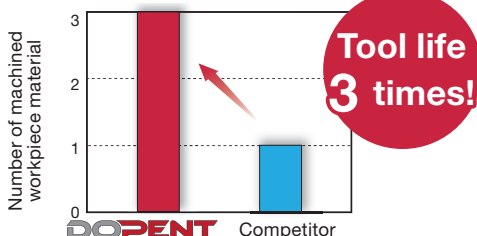
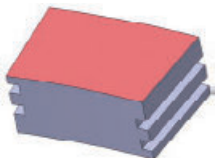

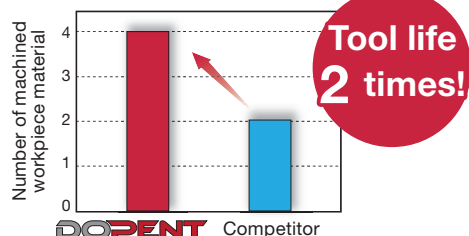
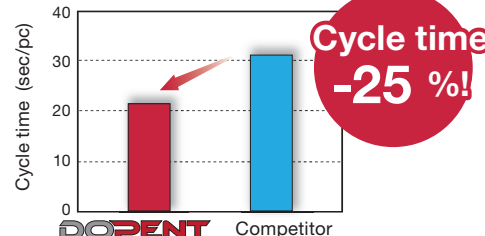
For workpiece configuration and spindle power

Spindle power			light interrupted cuts	Edging of thin sections	Thin plates / hollow structure	Heavy interrupted cuts / scale or unstable surface
BT40 (≥15kW)	BT50 (≥22kW)	BT50/ BT60 (≥30kW)				
<b>DOPENT</b>			◎	○	◎	○
←→			◎	◎	○	◎
<b>DO<sup>TRIPLE</sup>MILL</b>			◎	◎	○	◎
←→			◎	△	△	◎
<b>DOOCTO DOQUAD</b>			◎	△	△	◎
←→						

## PRACTICAL EXAMPLES

Workpiece type		Pump housing	Machine part
Cutter		TEN09R125M38.1-06 (ø125 mm, z = 6)	EEN09R050M32.0-04 (ø50 mm, z = 4)
Insert		PNCU0905GNEN-ML	PNMU0905GNEN-MJ
Grade		AH3135 SKD11	AH3135 SS400 / E275A
Workpiece material		 <b>P</b>	 <b>P</b>
Cutting conditions	Cutting speed: $V_c$ (m/min)	120	160
	Feed per tooth: $f_z$ (mm/t)	0.25	0.2
	Feed speed: $V_f$ (m/min)	458	815
	Depth of cut: $a_p$ (mm)	3	1
	Width of cut: $a_e$ (mm)	60	40
	Machining	Face milling	Face milling
	Coolant	Dry	Dry
Machine		Horizontal M/C	Vertical M/C
Results		 <p><b>Stable tool life!</b></p> <p>A weak workpiece fixture was causing a tool vibration. DoPent provided stable machining due to its light cutting design.</p>	<p>The competitor's tool was vibrating due to the thin workpiece. DoPent has successfully machined with no tool fractures.</p>
Workpiece type		Rolling die material	EGR valve
Cutter		TEN09R160M50.8-12 (ø160 mm, z = 12)	TEN09R125M38.1-06 (ø125 mm, z = 6)
Insert		PNMU0905GNEN-MJ	PNCU0905GNEN-MJ
Grade		T3225 <b>New</b> Tool steel	AH120 FC250 / 250
Workpiece material		 <b>P</b>	 <b>K</b>
Cutting conditions	Cutting speed: $V_c$ (m/min)	300	390
	Feed per tooth: $f_z$ (mm/t)	0.1	0.15
	Feed speed: $V_f$ (m/min)	716	900
	Depth of cut: $a_p$ (mm)	0.8	0.9
	Width of cut: $a_e$ (mm)	50	75
	Machining	Face milling	Face milling
	Coolant	Dry	External coolant
Machine		Horizontal M/C	Vertical M/C, 6kW
Results		 <p><b>Tool life 1.8 times!</b></p> <p>The new T3225 grade offered superior wear resistance and improved the tool life 1.8x over the competitor's.</p>	 <p><b>Tool life 2 times!</b></p> <p>DoPent has exhibited a smooth cutting action even on the low-power machine.</p>



Workpiece type		Steering knuckle	Airplane parts
Cutter		TEN09R050M22.0-06 (ø50 mm, z = 6)	TEN09R080M25.4-07 (ø80 mm, z = 7)
Insert		PNCU0905GNEN-MJ	PNCU0905GNEN-ML
Grade		AH120	AH3135
Workpiece material		Ductile cast iron  <b>K</b>	SUS630 / X5CrNiCuNb16-4  <b>M</b>
Cutting conditions	Cutting speed: $V_c$ (m/min)	350	85
	Feed per tooth: $f_z$ (mm/t)	0.17	0.11
	Feed speed: $V_f$ (m/min)	2270	260
	Depth of cut: $a_p$ (mm)	3	1.9
	Width of cut: $a_e$ (mm)	40	60
	Machining	Face milling	Face milling
	Coolant	Internal coolant	Dry
Machine		Horizontal M/C	Vertical M/C, BT50
Results		 <p>DoPent's low cutting force has allowed to double the feedrate over the competitor's.</p>	 <p>Too life is increased by 30% due to the combination of ML chipbreaker with sharp cutting edges and tough AH3135 grade.</p>
Workpiece type		Shroud	Motorcycle parts
Cutter		TEN09R063M22.0-06 (ø63 mm, z = 6)	TEN09R125M38.1-10 (ø125 mm, z = 10)
Insert		PNCU0905GNFR-MJ	PNCU0905GNFR-AJ
Grade		AH725 HR120	TH10 A7075S / AlZn5.5MgCu (200HB)
Workpiece material		 <b>S</b>	 <b>N</b>
Cutting conditions	Cutting speed: $V_c$ (m/min)	54	1000
	Feed per tooth: $f_z$ (mm/t)	0.03	Roughing: 0.3, Finishing: 0.1
	Feed speed: $V_f$ (m/min)	50	Roughing: 7640, Finishing: 2550
	Depth of cut: $a_p$ (mm)	2	Roughing: 2, Finishing: 0.5
	Width of cut: $a_e$ (mm)	50	20 - 80
	Machining	Face milling	Face milling
	Coolant	Internal coolant	Wet
Machine		Vertical M/C	Vertical M/C, BT40
Results		 <p>DoPent has doubled the tool life over the competitor thanks to its balanced sharp and tough cutting edges.</p>	 <p>Higher feed increases productivity in roughing by 190% and significantly reduces total cycle time.</p>

### 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 America, Inc.

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

### Tungaloy Canada

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

### Tungaloy 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.co.jp/mx

### Tungaloy do Brasil Ltda.

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

### Tungaloy Germany GmbH

An der Alten Ziegelei 1  
D-40789 Monheim, Germany  
Phone: +49-2173-90420-0  
Fax: +49-2173-90420-19  
www.tungaloy.de

### Tungaloy France S.A.S.

ZA Courtaboeuf - Le Rio  
1 rue de la Terre de feu  
F-91952 Courtaboeuf Cedex, France  
Phone: +33-1-6486-4300  
Fax: +33-1-6907-7817  
www.tungaloy.fr

### Tungaloy Italia S.r.l.

Via E. Andolfato 10  
I-20126 Milano, Italy  
Phone: +39-02-252012-1  
Fax: +39-02-252012-65  
www.tungaloy.it

### Tungaloy Czech s.r.o.

Turanka 115  
CZ-627 00 Brno, Czech Republic  
Phone: +420-532 123 391  
Fax: +420-532 123 392  
www.tungaloy.cz

### Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7  
Pol. Ind. Bufalvent  
ES-08243 Manresa (BCN), Spain  
Phone: +34 93 113 1360  
Fax: +34 93 876 2798  
www.tungaloy.es

### Tungaloy Scandinavia AB

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

### Tungaloy Rus, LLC

115432, Russian Federation, Moscow,  
Andropova avenue., h.18, bld.7, flt. 11,  
office 3.  
Phone: +7-499-683-01-80/81  
www.tungaloy.co.jp/ru

### Tungaloy East LLC

620075, Russian Federation, Sverdlovsk  
Region, Ekaterinburg, Mamina-Sibiryaka str.,  
bldg. 101, room 202  
Phone: +7-343-286-48-23/24  
Fax: +7-912-284-91-69  
www.tungaloy.co.jp/ru

### Tungaloy Polska Sp. z o.o.

ul. Genewska 24  
03-963 Warszawa, Poland  
Phone: +48-22-617-0890  
Fax: +48-22-617-0890  
www.tungaloy.co.jp/pl

### Tungaloy U.K. Ltd

The Technology Centre,  
Wolverhampton Science Park  
Glaisher Drive, Wolverhampton  
West Midlands WV10 9RU, UK  
Phone: +44 121 4000 231  
Fax: +44 121 270 9694  
www.tungaloy.co.jp/uk  
salesinfo@tungaloyuk.co.uk

### Tungaloy Hungary Kft

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

### Tungaloy Turkey

Dudullu, OSB 4. Cad No:4  
34776 Umraniye Istanbul, TURKEY  
Phone: +90 216 540 04 67  
Fax: +90 216 540 04 87  
www.tungaloy.com.tr  
info@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-benelux.com

### Tungaloy Croatia

Josipa Kozarca 4  
10432 Bregana, Croatia  
Phone: +385 1 3326 604  
Fax: +385 1 3327 683  
www.tungaloy.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.co.jp/tcts

### Tungaloy 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.co.th

### Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #06-11 Oxley BizHub 2  
Singapore 408734  
Phone: +65-6391-1833  
Fax: +65-6299-4557  
www.tungaloy.co.jp/tspl

### Tungaloy Vietnam

LE 04-38, Lexington Residence  
67 Mai Chi Tho, Dist. 2,  
Ho Chi Minh City, Vietnam  
Phone: +84-8-37406660  
Fax: +84-8-37406662  
www.tungaloy.co.jp/tspl

### Tungaloy India Pvt. Ltd.

Indiabulls Finance Centre,  
Unit # 902-A, 9th Floor,  
Tower 1, Senapati Bapat Marg,  
Elphinstone Road (West),  
Mumbai -400013, India  
Phone: +91-22-6124-8804  
Fax: +91-22-6124-8899  
www.tungaloy.co.jp/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.co.jp/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.co.jp/my

### Tungaloy Australia Pty Ltd

PO Box 2232, Rowville,  
Victoria 3178, Australia  
Phone: +61-3-9755-8147  
Fax: +61-3-9755-6070  
www.tungaloy.com.au

### PT. Tungaloy Indonesia

Kompleks Grand Wisata Block AA-10 No.3-5  
Cibitung  
Bekasi 17510, Indonesia  
Phone: +62-21-8261-5808  
Fax: +62-21-8261-5809  
www.tungaloy.co.jp/id



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MillLine



**DOPENT**

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Tungaloy Report No. 372S1-G

**New grades** and **cutters** for improved productivity machining large components of various materials

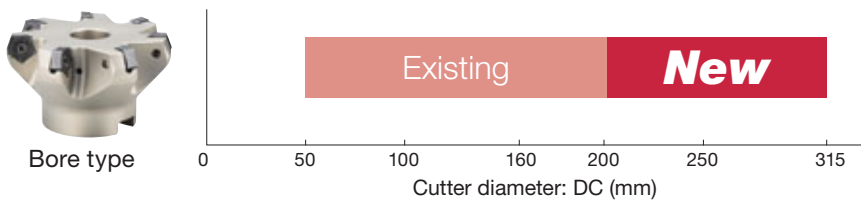


**INDUSTRY 4.0**  
*FEED the SPEED!*



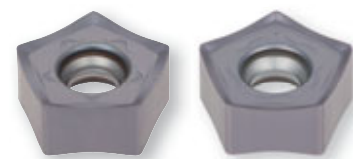
## Addition of cutters with large diameters improves machining efficiency of large components

DoPent's new cutters with 200, 250, and 315 mm diameters are also available in variable-pitch design for reduced chatter and vibration during machining.

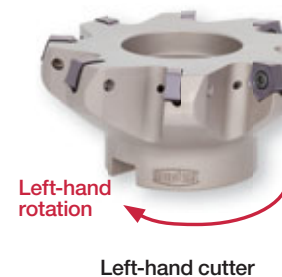


## A combination of new grades and neutral cutting edges boosts productivity in a wider application range

- For steel: **AH3225** PVD grade offers a good combination of wear and fracture resistance. **NS740** cermet grade is an excellent option for finishing steel.
- For hardened materials: **AH8015** PVD grade exhibits a good balance between wear and fracture resistance.



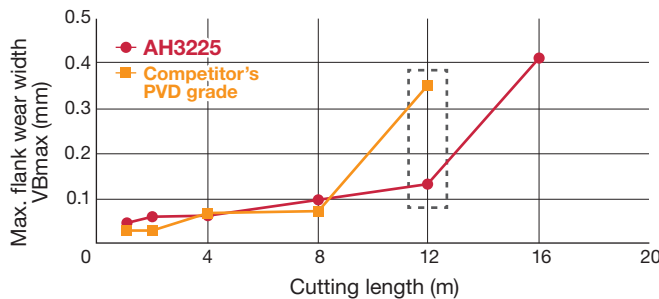
Since neutral inserts can be mounted on either the left- or right-hand cutter, DoPent is an ideal solution for duplex milling applications where the workpiece is machined with two spindles simultaneously.



## CUTTING PERFORMANCE

### AH3225 **P**

- Excellent resistance to wear, fracture, and oxidation
- First choice grade for steel machining with the latest nano-multilayer coating technology combined with a dedicated carbide substrate



Cutter : TEN09R063M22.0-04 (ø63 mm, z = 1)  
 Insert : PNMU0905GNEN-MJ AH3225  
 Workpiece material : S55C / C55 (200HB)  
 Cutting speed : Vc = 200 m/min  
 Feed per tooth : fz = 0.2 mm/t  
 Depth of cut : ap = 2 mm  
 Depth of width : ae = 50 mm  
 Coolant : Dry

After 12 m



Competitor's PVD grade

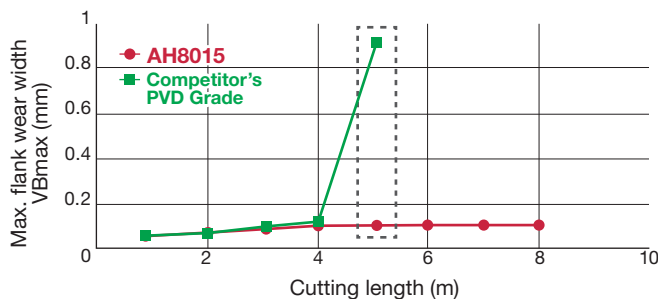


AH3225

Reduced crater wear

### AH8015 **H K**

- Extremely hard coating and carbide substrate
- First choice grade for hardened materials with superior resistance to wear, thermal shock, and welding



Cutter : TEN09R063M22.0-04 (ø63 mm, z = 1)  
 Insert : PNMU0905GNEN-MJ AH8015  
 Workpiece material : SKD61 / X40CrMoV5-1 (52HRC)  
 Cutting speed : Vc = 100 m/min  
 Feed per tooth : fz = 0.1 mm/t  
 Depth of cut : ap = 0.5 mm  
 Depth of width : ae = 30 mm  
 Coolant : Dry

After 5 m



Competitor's PVD grade



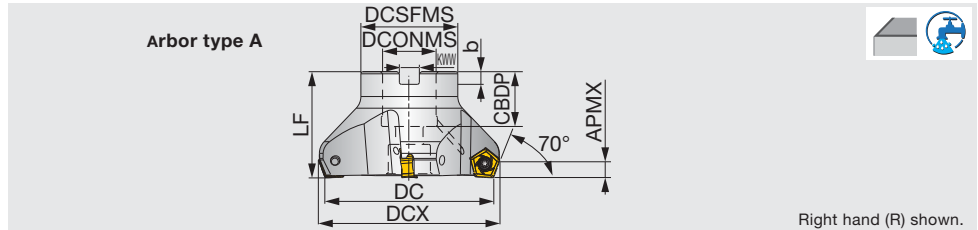
AH8015

... and still could have continued

## TEN09R/L

70° face mill, with screw clamp system, for double sided pentagonal inserts

GAMP=-6°, GAMF=-10°~-2°

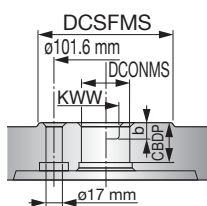


Designation	APMX	DC	CICT	DCX	DCSFMS	LF	DCONMS	CDBP	KWW	b	WT(kg)	Air hole	Insert	Arbor type
TEN09R050M22.0-03	6.4	50	3	56	41	40	22	20	10	6	0.3	With	PN*U0905...	A
TEN09R050M22.0-04	6.4	50	4	56	41	40	22	20	10	6	0.3	With	PN*U0905...	A
TEN09R050M22.0-06	6.4	50	6	56	41	40	22	20	10	6	0.3	With	PN*U0905...	A
TEN09R050M22.0E04	6.4	50	4	56	41	40	22	20	10.4	6.3	0.3	With	PN*U0905...	A
TEN09R050M22.0E06	6.4	50	6	56	41	40	22	20	10.4	6.3	0.3	With	PN*U0905...	A
TEN09R063M22.0-04	6.4	63	4	69	41	40	22	20	10	6	0.5	With	PN*U0905...	A
TEN09R063M22.0-06	6.4	63	6	69	41	40	22	20	10	6	0.5	With	PN*U0905...	A
TEN09R063M22.0-08	6.4	63	8	69	41	40	22	20	10	6	0.5	With	PN*U0905...	A
TEN09R063M22.0E06	6.4	63	6	69	41	40	22	20	10.4	6.3	0.5	With	PN*U0905...	A
TEN09R063M22.0E08	6.4	63	8	69	41	40	22	20	10.4	6.3	0.5	With	PN*U0905...	A
TEN09R080M25.4-04	6.4	80	4	86	46	50	25.4	26	9.5	6	0.9	With	PN*U0905...	A
TEN09R080M25.4-07	6.4	80	7	86	46	50	25.4	26	9.5	6	0.9	With	PN*U0905...	A
TEN09R080M25.4-10	6.4	80	10	86	46	50	25.4	26	9.5	6	0.9	With	PN*U0905...	A
TEN09R080M27.0E07	6.4	80	7	86	50	50	27	22	12.4	7	0.9	With	PN*U0905...	A
TEN09R080M27.0E10	6.4	80	10	86	50	50	27	22	12.4	7	1	With	PN*U0905...	A
TEN09R100M31.7-05	6.4	100	5	106	60	50	31.75	32	12.7	8	1.3	With	PN*U0905...	A
TEN09R/L100M31.7-08*	6.4	100	8	106	60	50	31.75	32	12.7	8	1.3	With	PN*U0905...	A
TEN09R100M31.7-12	6.4	100	12	106	60	50	31.75	32	12.7	8	1.4	With	PN*U0905...	A
TEN09R/L100M32.0E08*	6.4	100	8	106	60	50	32	28.5	14.4	8	1.3	With	PN*U0905...	A
TEN09R100M32.0E12	6.4	100	12	106	60	50	32	28.5	14.4	8	1.4	With	PN*U0905...	A
TEN09R125M38.1-06	6.4	125	6	131	80	63	38.1	38	15.9	10	2.6	With	PN*U0905...	A
TEN09R/L125M38.1-10*	6.4	125	10	131	80	63	38.1	38	15.9	10	2.7	With	PN*U0905...	A
TEN09R125M38.1-16	6.4	125	16	131	80	63	38.1	43	15.9	10	2.9	With	PN*U0905...	A
TEN09R/L125M40.0E10*	6.4	125	10	131	71	63	40	32	16.4	9	2.3	With	PN*U0905...	A
TEN09R125M40.0E16	6.4	125	16	131	71	63	40	32	16.4	9	2.5	With	PN*U0905...	A
TEN09R160M50.8-07	6.4	160	7	166	100	63	50.8	46	19	11	4.4	Without	PN*U0905...	A
TEN09R/L160M40.0E12*	6.4	160	12	166	100	63	40	29	16.4	9	4	Without	PN*U0905...	A
TEN09R160M40.0E20	6.4	160	20	166	100	63	40	29	16.4	9	4.3	Without	PN*U0905...	A
TEN09R/L160M50.8-12*	6.4	160	12	166	100	63	50.8	46	19	11	4.6	Without	PN*U0905...	A
TEN09R160M50.8-20	6.4	160	20	166	100	63	50.8	46	19	11	4.9	Without	PN*U0905...	A
<b>New</b> TEN09R200M47.6-10	6.4	200	10	206	130	63	47.625	38	25.4	14	6.5	Without	PN*U0905...	B
<b>New</b> TEN09R200M60.0E14	6.4	200	14	206	130	63	60	38	25.7	14	6.34	Without	PN*U0905...	B
<b>New</b> TEN09R250M47.6-12	6.4	250	12	256	130	63	47.625	38	25.4	14	12.94	Without	PN*U0905...	B
<b>New</b> TEN09R250M60.0E16	6.4	250	16	256	130	63	60	38	25.7	14	13.46	Without	PN*U0905...	B
<b>New</b> TEN09R315M47.6-14	6.4	315	14	321	220	63	47.625	38	25.4	14	17.9	Without	PN*U0905...	C

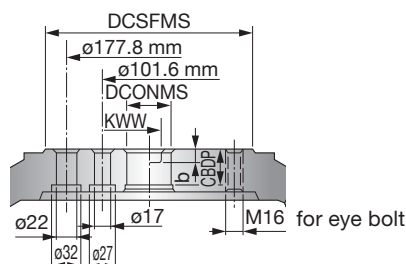
\*Please use neutral hand inserts for TEN09L (left hand cutter).

### Arbor type

Arbor type B



Arbor type C





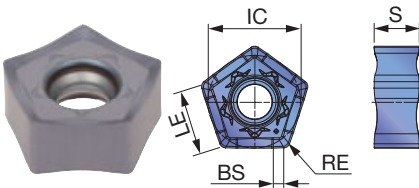
## SPARE PARTS

Designation	Clamping screw	Grip	Lubricant	Shell locking bolt 1	Shell locking bolt 2	Torx bit
TEN09R050 - 063...	CSTR-4L100	H-TBS	M-1000	-	CM10X30H	BT15S
TEN09R080...	CSTR-4L100	H-TBS	M-1000	-	CM12X30H	BT15S
TEN09R/L100...	CSTR-4L100	H-TBS	M-1000	TMBA-M16H	-	BT15S
TEN09R125...06	CSTR-4L100	H-TBS	M-1000	TMBA-M20H	-	BT15M
TEN09R/L125M...10	CSTR-4L100	H-TBS	M-1000	TMBA-M20H	-	BT15M
TEN09R125M...16	CSTR-4L100	H-TBS	M-1000	TMBA-M20H	-	BT15S
TEN09R160M...07	CSTR-4L100	H-TBS	M-1000	-	-	BT15M
TEN09R/L160M...12	CSTR-4L100	H-TBS	M-1000	-	-	BT15M
TEN09R160M...20	CSTR-4L100	H-TBS	M-1000	-	-	BT15S
TEN09R200M...	CSTR-4L100	H-TBS	M-1000	-	-	BT15M
TEN09R250M...	CSTR-4L100	H-TBS	M-1000	-	-	BT15M
TEN09R315M...	CSTR-4L100	H-TBS	M-1000	-	-	BT15L

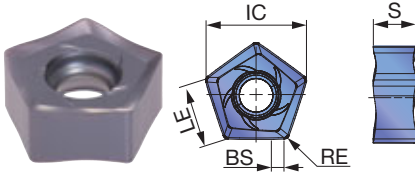
\*Recommended clamping torque (N·m): CSTR-4L100=3.5

## INSERTS

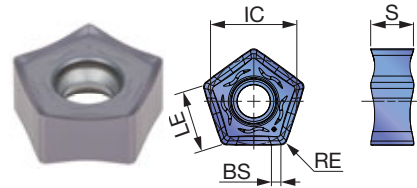
### PN\*U0905GNEN-MJ (Neutral)



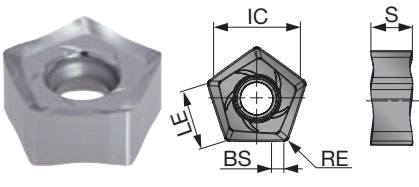
### PNCU0905GNER-MJ (Right hand)



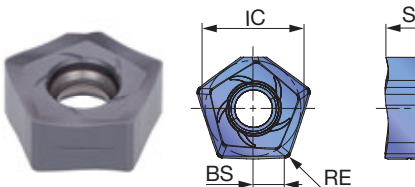
### PNCU0905-ML (Neutral)



### PNCU0905-AJ (Right hand)



### PNCU0905-W (Right hand)



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

★ : First choice  
☆ : Second choice

Designation	RE	APMX	Coated										Cermet	Uncoated	LE	S	IC	BS		
			AH3225	AH8015	AH3135	AH120	AH140	AH725	T1215	T1115	T3225	T3130							NS740	TH10
PNMU0905GNEN-MJ	0.8	6.4	●	●	●	●		●	●	●	●	●	●							
PNCU0905GNEN-MJ	0.8	6.4	●	●	●	●		●	●	●	●	●	●							
PNCU0905GNER-MJ	0.8	6.4				●	●	●		●	●	●	●							
PNCU0905GNEN-ML	0.8	6.4	●	●	●															
PNCU0905GNFR-AJ	0.8	6.4												●						
PNCU0905GNER-W	0.8	2						●												

● : New

## 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, etc. C15, etc.	200 - 300 HB	First choice	AH3225	MJ	100 - 250	0.1 - 0.4
		200 - 300 HB	Low cutting force	AH3225	ML	100 - 250	0.1 - 0.3
		200 - 300 HB	Wear resistance	T3225	MJ	200 - 350	0.1 - 0.3
		200 - 300 HB	Surface quality	NS740	MJ	100 - 250	0.1 - 0.3
	High carbon steels, alloyed steels S45C, SCM440, etc. C45, 42CrMo4, etc.	150 - 300 HB	First choice	AH3225	MJ	100 - 250	0.1 - 0.35
		150 - 300 HB	Low cutting force	AH3225	ML	100 - 250	0.1 - 0.3
		150 - 300 HB	Wear resistance	T3225	MJ	180 - 300	0.1 - 0.3
		150 - 300 HB	Surface quality	NS740	MJ	100 - 250	0.1 - 0.3
	Prehardened steels NAK80, PX5, etc.	30 - 40 HRC	First choice	AH3225	MJ	100 - 200	0.1 - 0.3
		30 - 40 HRC	Low cutting force	AH3225	ML	100 - 200	0.1 - 0.25
30 - 40 HRC		Wear resistance	T3225	MJ	150 - 250	0.1 - 0.25	
M	Stainless steels SUS304, etc. X5CrNi18-9, etc.	- 200 HB	First choice	AH3135	ML	100 - 200	0.1 - 0.3
		- 200 HB	Fracture resistance	AH3135	MJ	100 - 200	0.1 - 0.35
		- 200 HB	Wear resistance	T3225	MJ	100 - 250	0.1 - 0.3
K	Grey cast irons FCD400, etc. 250, etc.	150 - 250 HB	First choice	T1215	MJ	100 - 300	0.1 - 0.35
		150 - 250 HB	Fracture resistance	AH120	MJ	100 - 250	0.1 - 0.4
	Ductile cast irons FCD400, etc. 400-15S, etc.	150 - 250 HB	First choice	T1215	MJ	100 - 300	0.1 - 0.35
		150 - 250 HB	Fracture resistance	AH120	MJ	80 - 200	0.1 - 0.4
N	Aluminium alloys Si < 13%	-	First choice	TH10	AJ	500 - 1500	0.1 - 0.5
	Aluminium alloys Si ≥ 13%	-	First choice	TH10	AJ	150 - 500	0.1 - 0.5
S	Titanium alloys Ti-6Al-4V, etc.	- 40 HRC	First choice	AH3135	ML	30 - 60	0.1 - 0.3
		- 40 HRC	Fracture resistance	AH3135	MJ	30 - 60	0.1 - 0.3
	Heat-resistant alloys Inconel 718, etc.	- 40 HRC	First choice	AH725	MJ	10 - 40	0.04 - 0.1
H	Hardened materials SKD61, X40CrMoV5-1, etc.	- 45 HRC	First choice	AH8015	MJ	80 - 150	0.05 - 0.15
		- 45 HRC	Low cutting force	AH8015	ML	80 - 150	0.05 - 0.15

- Remove excessive chips with an air blast to prevent chip jamming.
- Use water-soluble coolant to avoid built-up edge in case extreme welding occurs on cutting edges. (ex. aluminium machining).
- For operations with a varied depth of cut (ex. casting skin) and machining of workpiece materials with interrupted surface, the feed (fz) should be set to the lower recommended value shown in the above table.

- Cutting conditions may be limited depending on machine power, workpiece rigidity, and spindle output. When the cutting width, depth or overhang length is large, set Vc and fz to the lower recommended values and check the machine power and vibration.



## 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 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 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 do Brasil Ltda.

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

## Tungaloy Germany GmbH

An der Alten Ziegelei 1  
D-40789 Monheim, Germany  
Phone: +49-2173-90420-0  
Fax: +49-2173-90420-19  
www.tungaloy.com/de

## Tungaloy France S.A.S.

ZA Courtaboeuf - Le Rio  
1 rue de la Terre de feu  
F-91952 Courtaboeuf Cedex, France  
Phone: +33-1-6486-4300  
Fax: +33-1-6907-7817  
www.tungaloy.com/fr

## Tungaloy Italia S.r.l.

Via E. Andolfato 10  
I-20126 Milano, Italy  
Phone: +39-02-252012-1  
Fax: +39-02-252012-65  
www.tungaloy.com/it

## Tungaloy Czech s.r.o.

Turanka 115  
CZ-627 00 Brno, Czech Republic  
Phone: +420-532 123 391  
Fax: +420-532 123 392  
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  
Fax: +34 93 876 2798  
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. Iryszowa 1, 55-040 Bielany  
Wroclawskie, Poland  
Phone: +48 607 907 237  
www.tungaloy.com/pl

## Tungaloy U.K. Ltd

Gallan Park, Watling Street,  
Cannock, WS110XG, 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,  
Xinzhuang Dist, New Taipei City,  
24251 Taiwan  
Phone: +886-2-8521-9986  
Fax: +886-2-8521-8935  
www.tungaloy.com/tw

## Tungaloy Cutting Tools (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, #06-11 Oxley BizHub 2  
Singapore 408734  
Phone: +65-6391-1833  
Fax: +65-6299-4557  
www.tungaloy.com/sg

## Tungaloy Vietnam

LE04.38, Lexington Residence  
67 Mai Chi Tho St., Dist. 2,  
Ho Chi Minh City, Vietnam  
Phone: +84-2837406660  
www.tungaloy.com/sg

## Tungaloy India Pvt. Ltd.

Indiabulls Finance Centre,  
Unit # 902-A, 9th Floor,  
Tower 1, Senapati Bapat Marg,  
Elphinstone Road (West),  
Mumbai-400013, India  
Phone: +91-22-6124-8804  
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

Kompleks Grand Wisata Block AA-10 No.3-5  
Cibitung  
Bekasi 17510, Indonesia  
Phone: +62-21-8261-5808  
Fax: +62-21-8261-5809  
www.tungaloy.com/id



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