

MillLine

**DOFEED**

[www.tungaloy.com](http://www.tungaloy.com)

Tungaloy Report No. 403-G

DOFEED

Innovative high-feed cutters offer  
**incredible productivity!**



Member IMC Group  
**Tungaloy**



ACCELERATED MACHINING





High-feed cutters reduce machining time for a wide range of applications.

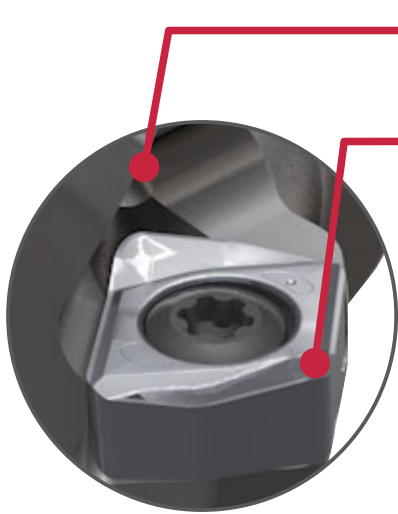


# Innovative high-feed cutters!

DoFeed offers outstanding productivity with close-pitch cutters and special insert geometry that reduces cutting force. The rich lineup of items meets a wide variety of application needs.

## Outstanding productivity

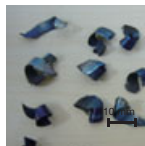
### Excellent chip evacuation prevents chip packing



- Air hole removes all chips away from the insert and cutter body.
- Large inclination forms ideal chips and controls the direction chips flow.



**DOFEED**  
**Good**  
Curl consistently at ideal length



**Competitor**  
**Poor**  
Crushed or unstable

Cutter : TXN06R050M22.0E05  
 Insert : LNMU06X5ZER-MJ  
 Grade : AH725  
 Workpiece material : Carbon steels (S55C / C55)  
 Cutting speed :  $V_c = 180$  m/min  
 Feed per tooth :  $f_z = 1.8$  mm/t  
 Depth of cut :  $a_p = 1.0$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT50

### Close pitch cutters for high productivity!

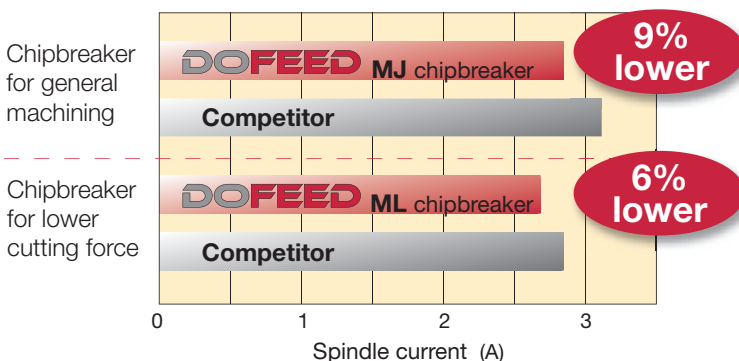
Tool dia. øDc (mm)	No. of inserts (z)		Competitor	Productivity improvement compared to competitor
	DOFEED Coarse pitch	DOFEED Close pitch		
ø20	3	4	3	1.3 times
ø25	4	5	4	1.3 times
ø50	4	5	4	1.3 times
ø63	4	6	4	1.5 times

Coarse-pitch cutters minimize vibration for tools on low-powered machines.

· ø20 and ø25 are based on EXN03 and HXN03 type  
 · ø50 and ø63 are based on TXN06 type

### Reduced chatter due to double-sided insert with low cutting forces

#### ■ Comparison of spindle load

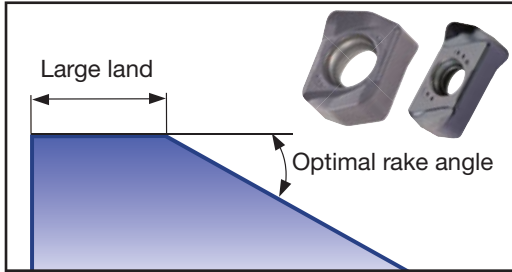


Cutter : EXN03R025M25.0-05 (ø25, z = 5)  
 Insert : LNMU0303ZER-MJ / ML  
 Grade : AH725  
 Workpiece material : Carbon steels (S55C / C55)  
 Cutting speed :  $V_c = 250$  (m/min)  
 Feed per tooth :  $f_z = 0.5$  mm/t (1 insert)  
 Depth of cut :  $a_p = 0.5$  mm  
 Width of cut :  $a_e = 25$  mm (Slot milling)  
 Coolant : Dry  
 Machine : Vertical M/C, BT40

## Extensive application coverage with a large variety of items

### Three chipbreakers for all machining needs

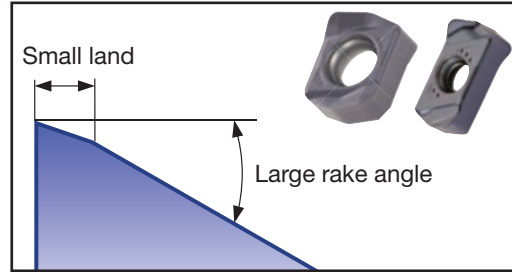
#### MJ General machining



**P K H**  
Steel Cast iron Hard Materials

- 4 cutting edges
- Excellent combination of sharpness and strength
- Ideal for machining steel, cast iron, and hardened steel

#### ML Low cutting force



**M S**  
Stainless Superalloys

- 4 cutting edges
- Exceptional sharpness
- Suitable for cutting stainless steel, titanium alloys, and other exotic materials
- Reduces chattering when cutting with low rigid set-ups

#### W Wiper insert



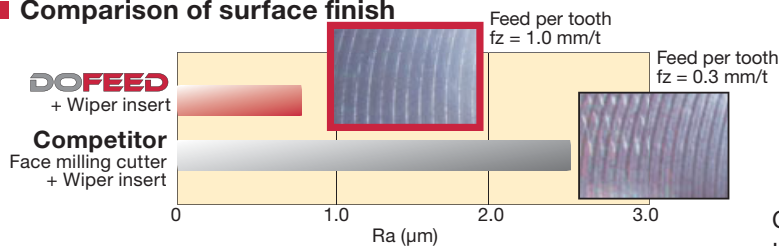
**P M K S H**  
Steel Stainless Cast Superalloys Hard iron Materials

- 2 cutting edges
- Excellent surface finish while maintaining high productivity

### Cutting performance of wiper insert

#### Excellent surface finish!

##### Comparison of surface finish

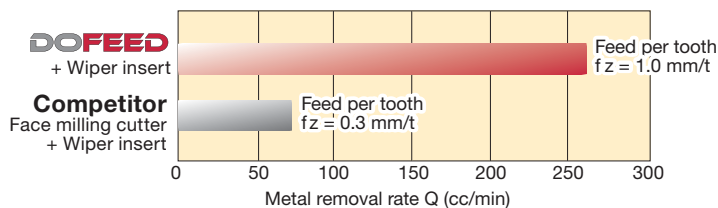


Wiper insert  
LNGU06X5ZER-W

Cutter : TXN06R080M31.7-05  
 Insert : LNMU06X5ZER-ML x 3  
 : LNGU06X5ZER-W x 2  
 Grade : AH725  
 Workpiece material : S55C  
 Cutting speed :  $V_c = 150$  m/min  
 Depth of cut :  $a_p = 1.5$  mm  
 Width of cut :  $a_e = 60$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT50

#### Tripled metal removal rate!

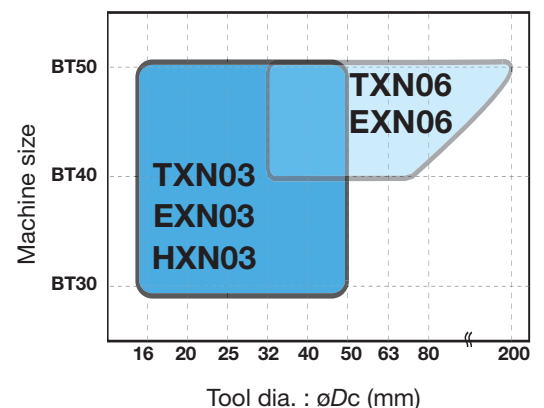
##### Comparison of metal removal rate



### Rich lineup of cutter bodies from $\phi 16$ to $\phi 200$ mm

Insert	Bore type	Shank type	Modular type
LNMU03 Max. $a_p = 1.0$ mm	TXN03 ( $\phi D_c = 40 - 50$ mm)	EXN03 ( $\phi D_c = 16 - 35$ mm)	HXN03 ( $\phi D_c = 16 - 32$ mm)
LN*U06 Max. $a_p = 1.5$ mm	TXN06 ( $\phi D_c = 50 - 200$ mm)	EXN06 ( $\phi D_c = 32 - 40$ mm)	

#### Applicable area



## Grades with long tool life for a wide range of materials

### Special Surface Technology

#### AH725



- Superior resistance to wear and fracture in cast iron milling

#### AH130



- High chipping resistance
- Ideal for titanium alloy machining

#### AH120



- High wear resistance
- Exceptionally wear resistant in cast iron machining

#### AH3035



- Wear and fracture resistant
- Most suitable for steel and stainless steel machining

**New**

#### AH8015



- High wear and chipping resistance and minimized build-up edge due to nano multi-layered AlTiN coating with high Al content
- Most suitable for hard materials of HRC45 and higher and Inconel

### Special Surface Technology

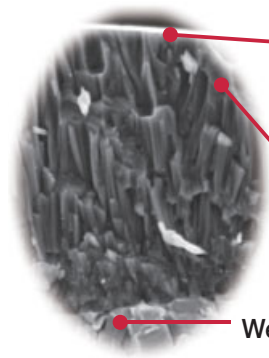
## PREMIUMTEC

TUNGALOY

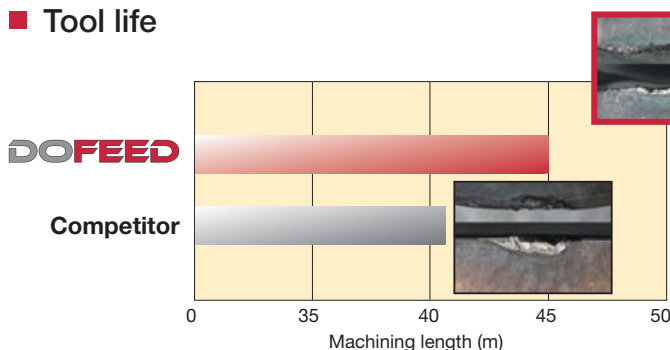
Smooth insert surface prevents chip adhesion!

Extremely hard layer of nano multi-layered AlTiN coating with high Al content

Wear resistant substrate



### ■ Tool life



Cutter : EXN03R020M20.0-04  
 Insert : EXN03R020M20.0-04  
 Grade : AH8015  
 Workpiece material : SKD61 (50HRC)  
 Cutting speed :  $V_c = 150$  m/min  
 Feed per tooth :  $f_z = 0.5$  mm/t  
 Depth of cut :  $a_p = 0.5$  mm  
 Width of cut :  $a_e = 10$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT40

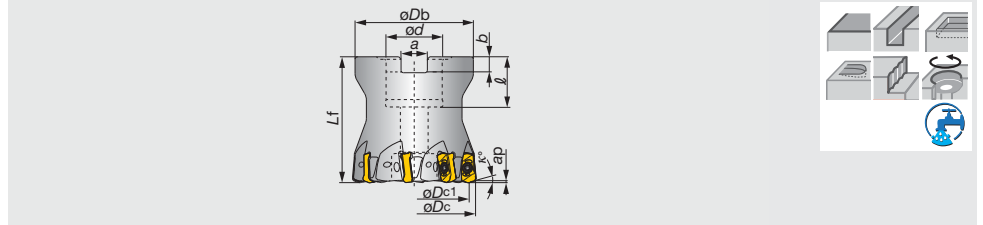
### Specification of AH8015

Application	Grade	Substrate			Coating layer		Features
	Application code	Relative density	Hardness (HRA)	T.R.S. (GPa)	Main Composition	Thickness ( $\mu$ m)	
	<b>AH8015</b>	15.0	92.0	3.0	Flash-Coating (Ti, Al)N, base	3.5	Superior wear resistance and eliminates build up edge
	<b>H10-H20</b>						

## TXN03

Super high feed milling cutters with double sided inserts with 4 edges

A.R. = +6°, R.R. = +12° ~ 13°



Designation	Max. ap	$\phi D_c$	z	$\phi D_{c1}$	$\phi D_b$	$\phi d$	$\ell$	$L_f$	b	a	°κ	Kg	Air hole	Insert
TXN03R040M16.0E05	1	40	5	33.6	35	16	18	40	5.6	8.4	17	0.2	with	LNMU03...
TXN03R040M16.0E06	1	40	6	33.6	35	16	18	40	5.6	8.4	17	0.2	with	LNMU03...
TXN03R050M22.0E05	1	50	5	43.6	47	22	20	50	6.3	10.4	17	0.5	with	LNMU03...
TXN03R050M22.0E08	1	50	8	43.6	47	22	20	50	6.3	10.4	17	0.5	with	LNMU03...
TXN03R050M22.2-08	1	50	8	43.6	47	22.225	20	50	5	8	17	0.5	with	LNMU03...

### SPARE PARTS



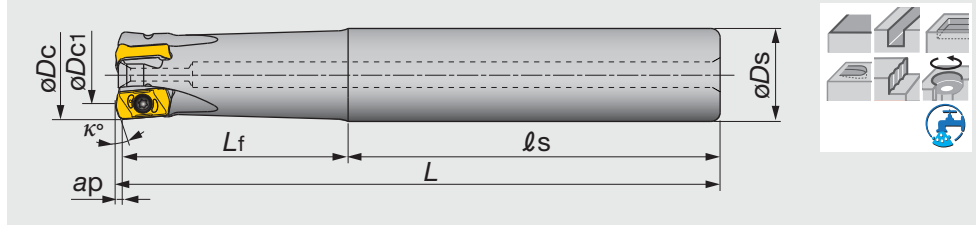
Designation	Clamping screw	Lubricant	Shell locking bolt	Wrench
TXN03R04...	CSPB-2.5	M-1000	CM8X30H	IP-8D
TXN03R05...	CSPB-2.5	M-1000	CM10X30H	IP-8D



## EXN03

Super high feed milling endmills with double sided inserts with 4 edges

A.R. = +6°, R.R. = +5° ~ +11°



Designation	Max. ap	$\phi D_c$	z	$\phi D_{c1}$	$\phi D_s$	L	$L_f$	$L_s$	$\kappa^\circ$	Kg	Air hole	Insert
EXN03R016M16.0-02	1	16	2	9.6	16	100	30	70	15	0.2	with	LNMU03...
EXN03R016M16.0-02L	1	16	2	9.6	16	150	50	100	15	0.2	with	LNMU03...
EXN03R018M16.0-02	1	18	2	11.5	16	100	30	70	17	0.2	with	LNMU03...
EXN03R018M16.0-02L	1	18	2	11.5	16	150	25	125	17	0.2	with	LNMU03...
EXN03R020M20.0-03	1	20	3	13.5	20	130	50	80	17	0.3	with	LNMU03...
EXN03R020M20.0-03L	1	20	3	13.5	20	160	80	80	17	0.3	with	LNMU03...
EXN03R020M20.0-04	1	20	4	13.5	20	130	50	80	17	0.3	with	LNMU03...
EXN03R022M20.0-03	1	22	3	15.5	20	130	50	80	17	0.3	with	LNMU03...
EXN03R022M20.0-03L	1	22	3	15.5	20	160	30	130	17	0.4	with	LNMU03...
EXN03R022M20.0-04	1	22	4	15.5	20	130	50	80	17	0.3	with	LNMU03...
EXN03R025M25.0-04	1	25	4	18.5	25	140	60	80	17	0.5	with	LNMU03...
EXN03R025M25.0-04L	1	25	4	18.5	25	180	100	80	17	0.6	with	LNMU03...
EXN03R025M25.0-05	1	25	5	18.5	25	140	60	80	17	0.5	with	LNMU03...
EXN03R028M25.0-04	1	28	4	21.5	25	140	60	80	17	0.5	with	LNMU03...
EXN03R028M25.0-04L	1	28	4	21.5	25	180	35	145	17	0.7	with	LNMU03...
EXN03R028M25.0-05	1	28	5	21.5	25	140	60	80	17	0.5	with	LNMU03...
EXN03R030M32.0-04	1	30	4	23.5	32	150	70	80	17	0.8	with	LNMU03...
EXN03R030M32.0-04L	1	30	4	23.5	32	200	120	80	17	0.9	with	LNMU03...
EXN03R030M32.0-05	1	30	5	23.5	32	150	70	80	17	0.8	with	LNMU03...
EXN03R032M32.0-05	1	32	5	25.5	32	150	70	80	17	0.8	with	LNMU03...
EXN03R032M32.0-05L	1	32	5	25.5	32	200	120	80	17	1.1	with	LNMU03...
EXN03R032M32.0-06	1	32	6	25.5	32	150	70	80	17	0.9	with	LNMU03...
EXN03R035M32.0-05	1	35	5	28.5	32	150	35	115	17	0.9	with	LNMU03...
EXN03R035M32.0-05L	1	35	5	28.5	32	200	35	165	17	1.2	with	LNMU03...
EXN03R035M32.0-06	1	35	6	28.5	32	150	35	115	17	0.9	with	LNMU03...

### SPARE PARTS



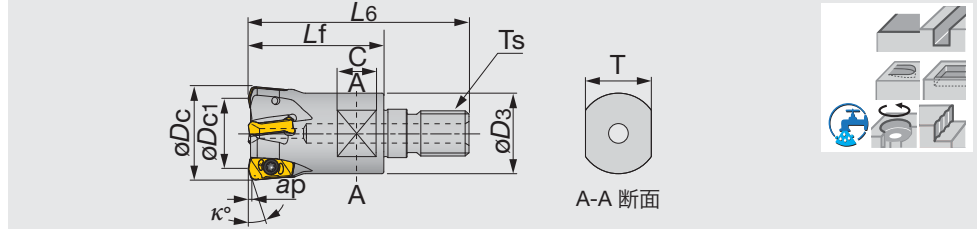
Designation	Clamping screw	Lubricant	Wrench
EXN03...	CSPB-2.5	M-1000	IP-8D



## HXN03-M

Super high feed milling endmills (Dofeed) with TungFlex

A.R. = +6°, R.R. = +5° ~ +11°



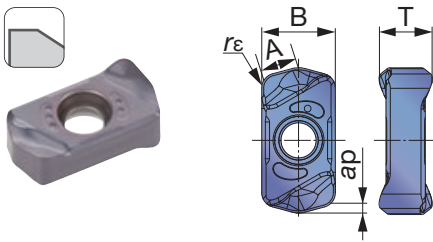
Designation	Max. ap	øDc	z	øDc1	L6	Lf	C	T	øD3	°κ	Ts	Kg	Air hole	Insert
HXN03R016MM08-02	1	16	2	9.6	42	25	8	10	12.8	15	M8	0.03	with	LNMU03...
HXN03R018MM08-02	1	18	2	11.5	42	25	8	10	14.5	17	M8	0.04	with	LNMU03...
HXN03R020MM10-03	1	20	3	13.5	49	30	10	15	17.8	17	M10	0.06	with	LNMU03...
HXN03R020MM10-04	1	20	4	13.5	49	30	10	15	17.8	17	M10	0.06	with	LNMU03...
HXN03R022MM10-03	1	22	3	15.5	49	30	10	15	17.8	17	M10	0.06	with	LNMU03...
HXN03R022MM10-04	1	22	4	15.5	49	30	10	15	17.8	17	M10	0.07	with	LNMU03...
HXN03R025MM12-04	1	25	4	18.5	57	35	10	17	20.8	17	M12	0.1	with	LNMU03...
HXN03R025MM12-05	1	25	5	18.5	57	35	10	17	20.8	17	M12	0.11	with	LNMU03...
HXN03R028MM12-04	1	28	4	21.5	57	35	10	17	23	17	M12	0.12	with	LNMU03...
HXN03R028MM12-05	1	28	5	21.5	57	35	10	17	23	17	M12	0.12	with	LNMU03...
HXN03R030MM16-04	1	30	4	23.5	63	40	12	22	28.8	17	M16	0.19	with	LNMU03...
HXN03R030MM16-05	1	30	5	23.5	63	40	12	22	28.8	17	M16	0.2	with	LNMU03...
HXN03R032MM16-05	1	32	5	25.5	63	40	12	22	28.8	17	M16	0.2	with	LNMU03...
HXN03R032MM16-06	1	32	6	25.5	63	40	12	22	28.8	17	M16	0.21	with	LNMU03...

### SPARE PARTS

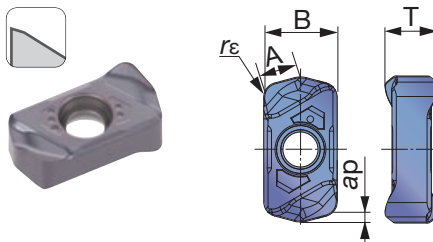
Designation	Clamping screw	Lubricant	Wrench
HXN03...	CSPB-2.5	M-1000	IP-8D

## INSERT

### LNMU03-MJ(for general purpose)



### LNMU03-ML(for low cutting force)



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

★ : First choice  
☆ : Second choice

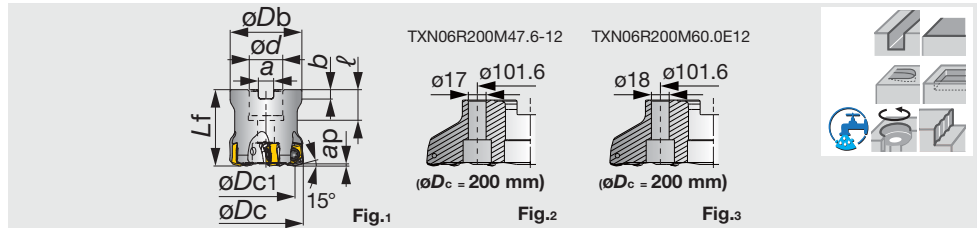
Designation	rε	Max. ap	Coated				A	B	T
			AH130	AH725	AH3035	AH8015			
LNMU0303ZER-MJ	1.2	1	●	●	●	●	3.2	6	4.3
LNMU0303ZER-ML	1.2	1	●	●	●	●	3.2	6	4.3

● : Line up

## TXN06

Super high feed milling cutters with double sided inserts with 4 edges

A.R.=+10°,R.R.=+2°~+6°



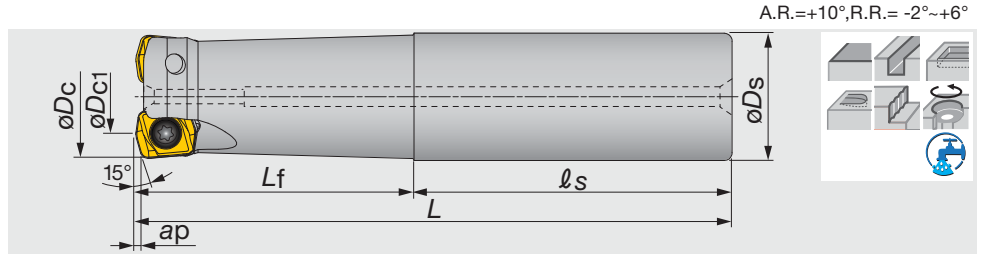
Designation	Max. ap	$\phi D_c$	z	$\phi D_{c1}$	$\phi D_b$	$L_f$	$\phi d$	$\ell$	a	b	Kg	Air hole	Insert	.Fig
TXN06R050M22.0E04	1.5	50	4	37.6	47	50	22	20	10.4	6.3	0.4	with	LN*U06...	1
TXN06R050M22.0E05	1.5	50	5	37.6	47	50	22	20	10.4	6.3	0.4	with	LN*U06...	1
TXN06R050M22.2-04	1.5	50	4	37.6	47	50	22.225	20	8	5	0.4	with	LN*U06...	1
TXN06R050M22.2-05	1.5	50	5	37.6	47	50	22.225	20	8	5	0.4	with	LN*U06...	1
TXN06R052M22.0E04	1.5	52	4	39.6	49	50	22	20	10.4	6.3	0.5	with	LN*U06...	1
TXN06R052M22.0E05	1.5	52	5	39.6	49	50	22	20	10.4	6.3	0.5	with	LN*U06...	1
TXN06R063M22.0E04	1.5	63	4	50.6	59	50	22	20	10.4	6.3	0.8	with	LN*U06...	1
TXN06R063M22.0E06	1.5	63	6	50.6	59	50	22	20	10.4	6.3	0.8	with	LN*U06...	1
TXN06R063M22.2-04	1.5	63	4	50.6	59	50	22.225	20	8	5	0.8	with	LN*U06...	1
TXN06R063M22.2-06	1.5	63	6	50.6	59	50	22.225	20	8	5	0.8	with	LN*U06...	1
TXN06R066M27.0E04	1.5	66	4	53.6	63	50	27	22	12.4	7	0.8	with	LN*U06...	1
TXN06R066M27.0E06	1.5	66	6	53.6	63	50	27	22	12.4	7	0.8	with	LN*U06...	1
TXN06R080M27.0E05	1.5	80	5	67.6	76	63	27	22	12.4	7	1.6	with	LN*U06...	1
TXN06R080M27.0E08	1.5	80	8	67.6	76	63	27	22	12.4	7	1.6	with	LN*U06...	1
TXN06R080M31.7-05	1.5	80	5	67.6	76	63	31.75	32	12.7	8	1.6	with	LN*U06...	1
TXN06R080M31.7-08	1.5	80	8	67.6	76	63	31.75	32	12.7	8	1.6	with	LN*U06...	1
TXN06R100M31.7-06	1.5	100	6	87.6	96	63	31.75	32	12.7	8	2.2	with	LN*U06...	1
TXN06R100M32.0E06	1.5	100	6	87.6	96	63	32	25	14.4	8	2.2	with	LN*U06...	1
TXN06R125M38.1-08	1.5	125	8	112.6	100	63	38.1	43	15.9	10	3	with	LN*U06...	1
TXN06R125M40.0E08	1.5	125	8	112.6	100	63	40	37	16.4	9	3	with	LN*U06...	1
TXN06R160M40.0E10	1.5	160	10	147.6	100	63	40	37	16.4	9	5	with	LN*U06...	1
TXN06R160M50.8-10	1.5	160	10	147.6	100	63	50.8	46	19	11	4.6	with	LN*U06...	1
TXN06R200M47.6-12	1.5	200	12	187.6	130	63	47.625	38	25.4	14	7.7	without	LN*U06...	2
TXN06R200M60.0E12	1.5	200	12	187.6	130	63	60	38	25.7	14	7.2	without	LN*U06...	3

### SPARE PARTS

Designation	Clamping screw	Grip	Lubricant	Shell locking bolt	Shell locking bolt 1	Torx bit
TXN06R050M22.0...	CSPB-5	H-TB2W	M-1000	-	FSHM10-40H	BLDIP20/S7
TXN06R050M22.2-04	CSPB-5	H-TB2W	M-1000	-	CM10-30H	BLDIP20/S7
TXN06R050M22.2-05, TXN06R052M22.0...	CSPB-5	H-TB2W	M-1000	-	FSHM10-40H	BLDIP20/S7
TXN06R063M...	CSPB-5	H-TB2W	M-1000	-	CM10X30H	BLDIP20/S7
TXN06R066,080M27.0...	CSPB-5	H-TB2W	M-1000	-	CM12X30H	BLDIP20/S7
TXN06R080,100M31.7...	CSPB-5	H-TB2W	M-1000	-	CM16X40H	BLDIP20/S7
TXN06R125M...	CSPB-5	H-TB2W	M-1000	TMBA-M20H	-	BLDIP20/S7
TXN06R160M40.0...	CSPB-5	H-TB2W	M-1000	TMBA-M20H	-	BLDIP20/M7
TXN06R160M50.8...	CSPB-5	H-TB2W	M-1000	TMBA-M24H	-	BLDIP20/M7
TXN06R200M...	CSPB-5	H-TB2W	M-1000	-	-	BLDIP20/M7

## EXN06

Super high feed milling endmills with double sided inserts with 4 edges



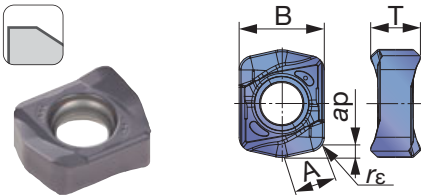
Designation	Max. $ap$	$\phi D_c$	$z$	$\phi D_{c1}$	$\phi D_s$	$L$	$L_f$	$l_s$	Kg	Air hole	Insert
EXN06R032M32.0-02	1.5	32	2	19.7	32	150	70	80	0.8	with	LN*U06...
EXN06R032M32.0-02L	1.5	32	2	19.7	32	200	120	80	1.1	with	LN*U06...
EXN06R035M32.0-02	1.5	35	2	22.7	32	150	45	105	0.9	with	LN*U06...
EXN06R035M32.0-02L	1.5	35	2	22.7	32	200	45	155	1.2	with	LN*U06...
EXN06R040M32.0-03	1.5	40	3	27.7	32	150	45	105	0.9	with	LN*U06...
EXN06R040M32.0-03L	1.5	40	3	27.7	32	220	45	175	1.3	with	LN*U06...

### SPARE PARTS

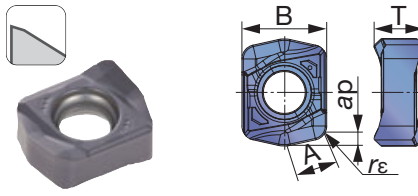
Designation	Clamping screw	Lubricant	Wrench
EXN06	CSPB-5	M-1000	IP-20D

## INSERT

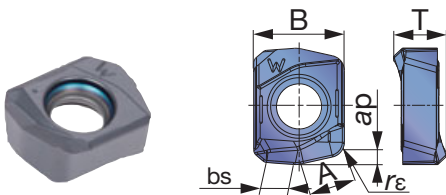
### LNMU06-MJ



### LNMU06-ML



### LNGU06-W (2 cutting edges)



<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	$r_\epsilon$	Max. $ap$	Coated					A	B	T	bs
			AH120	AH130	AH725	AH3035	AH8015				
LNMU06X5ZER-MJ	2	1.5	●	●	●	●	●	6	12	7	-
LNMU06X5ZER-ML	2	1.5	●	●	●	●	●	6	12	7	-
LNGU06X5ZER-W	2	1.5			●			6	12	7	3.6

● : Line up

## Standard cutting conditions TXN03 / EXN03 / HXN03 type

ISO	Workpiece material	Hardness	Priority	Grade	Chip-breaker	Cutting speed Vc (m/min)	Feed per tooth: fz (mm/t)			ø16, z = 2		ø18, z = 2		ø20		
							Tool dia.: øDc (mm)			n	Vf	n	Vf	n	Vf	
							ø16 - ø22	ø25 - ø50	Plunging						z = 3	z = 4
P	Carbon steels (C45, C55 etc.)	~ 300HB	First choice	AH3035	MJ	100 - 300	0.5 - 1.2	0.5 - 1.5	0.1	3,980	6,370	3,540	5,660	3,180	7,630	10,180
		~ 300HB	for wear resistance	AH8015	MJ	100 - 300	0.5 - 1.2	0.5 - 1.5	0.1	3,980	6,370	3,540	5,660	3,180	7,630	10,180
	Alloy steels (42CrMo4, 17Cr3 etc.)	~ 300HB	First choice	AH3035	MJ	100 - 300	0.5 - 1.2	0.5 - 1.5	0.1	3,980	6,370	3,540	5,660	3,180	7,630	10,180
		~ 300HB	for wear resistance	AH8015	MJ	100 - 300	0.5 - 1.2	0.5 - 1.5	0.1	3,980	6,370	3,540	5,660	3,180	7,630	10,180
	Prehardened steels (NAK80, PX5 etc.)	30 ~ 40HRC	First choice	AH3035	ML	100 - 200	0.5 - 1.0	0.5 - 1.0	0.1	2,980	4,170	2,650	3,710	2,390	5,020	6,690
		30 ~ 40HRC	for impact resistance	AH3035	MJ	100 - 200	0.5 - 1.2	0.5 - 1.5	0.1	2,980	4,770	2,650	4,240	2,390	5,740	7,650
30 ~ 40HRC		for wear resistance	AH8015	ML	100 - 200	0.5 - 1.0	0.5 - 1.0	0.1	2,980	4,170	2,650	3,710	2,390	5,020	6,690	
M	Stainless steels (X5CrNi18-10, X5CrNiMo17-12-2 etc.)	~ 200HB	First choice	AH3035	ML	100 - 150	0.3 - 0.7	0.3 - 0.7	0.08	2,390	1,910	2,120	1,700	1,910	2,290	3,060
		~ 200HB	for impact resistance	AH3035	MJ	100 - 150	0.3 - 0.8	0.3 - 0.8	0.08	2,390	2,390	2,120	2,120	1,910	2,870	3,820
K	Gray cast irons (GG25, GG30 etc.)	150 ~ 250HB	First choice	AH725	MJ	100 - 300	0.5 - 1.2	0.5 - 1.5	0.1	3,980	6,370	3,540	5,660	3,180	7,630	10,180
		150 ~ 250HB	for wear resistance	AH8015	MJ	100 - 300	0.5 - 0.7	0.5 - 1.0	0.1	3,980	4,780	3,540	4,250	3,180	5,720	7,630
	Ductile cast irons (GGG40 etc.)	150 ~ 250HB	First choice	AH725	MJ	80 - 200	0.5 - 1.2	0.5 - 1.5	0.1	2,980	4,770	2,650	4,240	2,390	5,740	7,650
		150 ~ 250HB	for wear resistance	AH8015	MJ	80 - 200	0.5 - 1.2	0.5 - 1.5	0.1	2,980	3,580	2,650	3,180	2,390	4,300	5,740
S	Titanium alloy (Ti-6Al-4V etc.)	~ 40HRC	First choice	AH130	ML	30 - 60	0.3 - 0.7	0.3 - 0.7	0.08	800	640	710	570	640	770	1,020
		~ 40HRC	for impact resistance	AH130	MJ	30 - 60	0.3 - 0.7	0.3 - 0.7	0.08	800	640	710	570	640	770	1,020
	Heat-resistance alloy (Inconel, Hasteroxy etc.)	~ 40HRC	First choice	AH725	ML	20 - 50	0.1 - 0.3	0.1 - 0.3	0.05	600	240	530	210	480	290	380
		~ 40HRC	for wear resistance	AH8015	ML	20 - 50	0.1 - 0.3	0.1 - 0.3	0.05	600	240	530	210	480	290	380
H	Hot mold steel (X40CrMoV5-1 etc.)	40 ~ 50HRC	First choice	AH8015	MJ	80 - 150	0.1 - 0.2	0.1 - 0.5	0.05	1,990	1,190	1,770	1,060	1,970	1,770	2,360
		50 ~ 60HRC	for impact resistance	AH3035	MJ	80 - 150	0.03 - 0.05	0.1 - 0.3	0.05	1,990	800	1,770	710	1,970	1,180	1,580
	Cold mold steel (X153CrMoV12 etc.)	50 ~ 60HRC	First choice	AH8015	MJ	50 - 70	0.1 - 0.2	0.05 - 0.2	0.03	1,190	290	1,060	250	950	340	450
		50 ~ 60HRC	for impact resistance	AH725	MJ	50 - 70	0.03 - 0.05	0.03 - 0.07	0.03	1,190	100	1,060	80	950	110	150

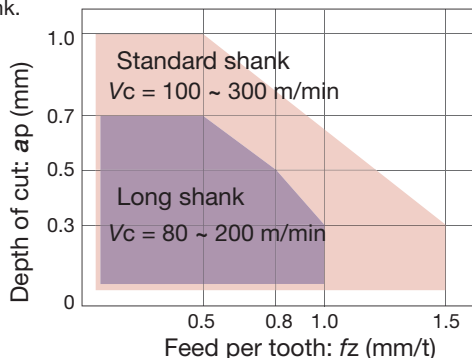
· When chips stay in the cutting zone during slotting or pocketing, use air blast to remove chips from the work area.

· Tool overhang length must be as short as possible to avoid chatter. When the tool overhang length is long, decrease the number of revolutions and feed.

### Cautionary points in use

#### ■ The use of a standard or long shank

When using a long shank, please lower the cutting conditions (Vc, fz, ap) to 70% of the maximum conditions for the standard shank.

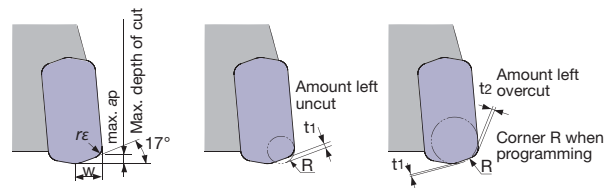


Tool dia.: øDc = ø16 ~ 35 mm  
Workpiece: S55C / C55 (200HB)

**L/D ratio of overhang**  
Standard shank: L/D ≤ 3  
Long shank: L/D = 4

#### ■ Tool geometry on programming

When programming for CAM, the tool should be considered as a radius cutter. Usually, the corner radius should be set as R = 1.5 mm. If a larger radius is used, overcutting will occur. The following table shows the amount left uncut (t1) and overcut (t2).



Max. depth of cut max ap (mm)	Corner radius Rε (mm)	W (mm)	Corner R when programming	Amount left uncut t1 (mm)	Amount left overcut t2 (mm)
1.0	1.2	3.0	1.0	0.6	-
1.0	1.2	3.0	1.5	0.5	-
1.0	1.2	3.0	2.0	0.25	0.08
1.0	1.2	3.0	2.5	0.14	0.26

Each value in table is calculated theoretically at the maximum condition.

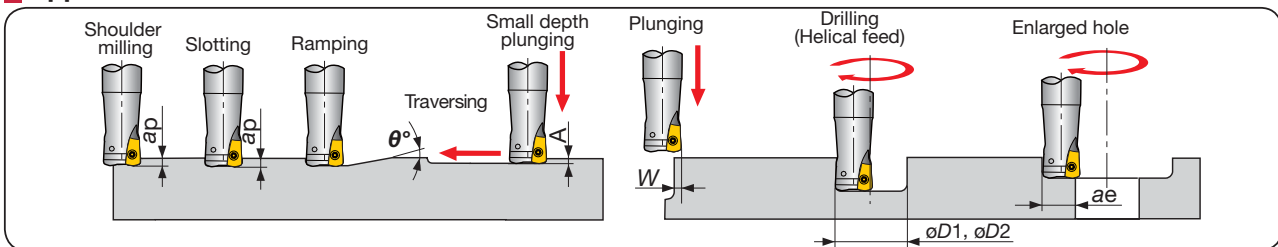
Tool dia.:  $\phi D_c$  (mm), Number of revolutions:  $n$  (min<sup>-1</sup>), Feed speed:  $V_f$  (mm/min), Max. depth of cut:  $ap = 1.0$  mm

$\phi 22$		$\phi 25$			$\phi 28$			$\phi 30$			$\phi 32$			$\phi 35$			$\phi 40$			$\phi 50$			
$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$		
$z=3$	$z=4$	$z=4$	$z=5$	$z=4$	$z=5$	$z=4$	$z=5$	$z=4$	$z=5$	$z=5$	$z=6$	$z=5$	$z=6$	$z=5$	$z=6$	$z=5$	$z=6$	$z=5$	$z=6$	$z=5$	$z=8$		
2,890	6,940	9,250	2,550	8,160	10,180	2,270	7,280	9,100	2,120	8,480	10,600	1,990	9,950	11,940	1,820	9,100	10,920	1,590	7,950	9,540	1,270	6,350	10,160
Vc = 200 m/min, fz = 1 mm/t																							
2,890	6,940	9,250	2,550	8,160	10,180	2,270	7,280	9,100	2,120	8,480	10,600	1,990	9,950	11,940	1,820	9,100	10,920	1,590	7,950	9,540	1,270	6,350	10,160
Vc = 200 m/min, fz = 1 mm/t																							
2,890	6,940	9,250	2,550	8,160	10,180	2,270	7,280	9,100	2,120	8,480	10,600	1,990	9,950	11,940	1,820	9,100	10,920	1,590	7,950	9,540	1,270	6,350	10,160
Vc = 200 m/min, fz = 1 mm/t																							
2,890	6,940	9,250	2,550	8,160	10,180	2,270	7,280	9,100	2,120	8,480	10,600	1,990	9,950	11,940	1,820	9,100	10,920	1,590	7,950	9,540	1,270	6,350	10,160
Vc = 200 m/min, fz = 1 mm/t																							
2,170	4,560	6,080	1,910	5,350	6,690	1,710	4,790	5,990	1,590	4,450	5,570	1,490	5,220	6,260	1,360	4,760	5,710	1,190	4,170	5,000	950	3,330	5,320
Vc = 150 m/min, fz = 0.7 mm/t																							
2,170	5,210	6,940	1,910	7,640	9,550	1,710	6,840	8,550	1,590	6,360	7,950	1,490	7,450	8,940	1,360	6,800	8,160	1,190	5,950	7,140	950	4,750	7,600
Vc = 150 m/min, fz = 1 mm/t																							
2,170	4,560	6,080	1,910	5,350	6,690	1,710	4,790	5,990	1,590	4,450	5,570	1,490	5,220	6,260	1,360	4,760	5,710	1,190	4,170	5,000	950	3,330	5,320
Vc = 150 m/min, fz = 0.7 mm/t																							
1,740	2,090	2,780	1,530	2,450	3,060	1,360	2,180	2,730	1,270	2,540	3,180	1,190	2,980	3,570	1,090	2,730	3,270	950	2,380	2,850	760	1,900	3,040
Vc = 120 m/min, fz = 0.5 mm/t																							
1,740	2,610	3,480	1,530	3,060	3,820	1,360	2,730	3,410	1,270	3,050	3,810	1,190	3,570	4,280	1,090	3,270	3,920	950	2,850	3,420	760	2,280	3,650
Vc = 120 m/min, fz = 0.6 mm/t																							
2,890	6,940	9,250	2,550	8,160	10,180	2,270	7,280	9,100	2,120	8,480	10,600	1,990	9,950	11,940	1,820	9,100	10,920	1,590	7,950	9,540	1,270	6,350	10,160
Vc = 200 m/min, fz = 1 mm/t																							
2,890	5,200	6,940	2,550	6,110	7,640	2,270	5,460	6,820	2,120	6,780	8,480	1,990	7,960	9,550	1,820	7,280	8,740	1,590	6,360	7,630	1,270	5,080	8,130
Vc = 150 m/min, fz = 0.8 mm/t																							
2,170	5,210	6,940	1,910	6,110	7,640	1,710	5,460	6,820	1,590	6,360	7,950	1,490	7,450	8,940	1,360	6,800	8,160	1,190	5,950	7,140	950	4,750	5,700
Vc = 150 m/min, fz = 1 mm/t																							
2,170	3,910	5,210	1,910	6,110	7,640	1,710	5,460	6,820	1,590	6,360	7,950	1,490	7,450	8,940	1,360	6,800	8,160	1,190	5,950	7,140	950	4,750	5,700
Vc = 150 m/min, fz = 1 mm/t																							
580	700	930	510	820	1,020	450	730	910	420	840	1,050	400	1,000	1,200	360	900	1,080	320	800	960	250	630	1,000
Vc = 40 m/min, fz = 0.5 mm/t																							
580	700	930	510	820	1,020	450	730	910	420	840	1,050	400	1,000	1,200	360	900	1,080	320	800	960	250	630	1,000
Vc = 40 m/min, fz = 0.5 mm/t																							
430	260	340	380	230	290	340	200	260	320	260	320	300	300	360	270	270	320	240	240	290	190	190	300
Vc = 30 m/min, fz = 0.2 mm/t																							
430	260	340	380	230	290	340	200	260	320	260	320	300	300	360	270	270	320	240	240	290	190	190	300
Vc = 30 m/min, fz = 0.2 mm/t																							
2,160	1,940	2,590	1,270	1,520	1,900	1,140	1,370	1,710	1,060	1,270	1,590	990	1,490	1,780	910	1,370	1,640	800	1,200	1,440	640	960	1,540
Vc = 100 m/min, fz = 0.3 mm/t																							
2,160	1,300	1,730	1,270	1,020	1,270	1,140	910	1,140	1,060	850	1,060	990	990	1,190	910	910	1,090	800	800	960	640	640	1,020
Vc = 100 m/min, fz = 0.2 mm/t																							
870	310	420	760	300	380	680	270	340	640	260	320	600	300	360	550	230	340	480	240	280	380	200	300
Vc = 60 m/min, fz = 0.1 mm/t																							
870	100	140	760	120	150	680	110	140	640	100	130	600	120	140	550	110	130	480	100	120	380	80	120
Vc = 60 m/min, fz = 0.04 mm/t																							

The above table shows the conditions for standard shank type cutters. When using long shank type cutters, the number of teeth may be different. In this case, the cutting conditions should be changed by referring to: "The usage of standard and long shanks" shown in previous page.

Cutting conditions are generally limited by the rigidity and power of the machine and the rigidity of the workpiece. When setting the conditions, start from half of the values of the standard cutting conditions and then increase the value gradually while making sure the machine is running normally.

## Applications



Cat. No.	Tool dia. $\phi D_c$	Max. depth of cut	Max. ramping angle	Max. plunging depth	Max. cutting width in plunging	Min. machinable hole dia.	Max. machinable hole dia.	Max. cutting width in enlarged hole
		Max ap	$\theta^\circ$	A	W	$\phi D1$	$\phi D2$	ae
E/HXN03R016M...	$\phi 16$	1	2.1	0.3	3.5	22	30	12.5
E/HXN03R018M...	$\phi 18$	1	1.7	0.3	3.5	26	34	14.5
E/HXN03R020M...	$\phi 20$	1	1.4	0.3	3.5	30	38	16.5
E/HXN03R022M...	$\phi 22$	1	1.2	0.3	3.5	34	42	18.5
E/HXN03R025M...	$\phi 25$	1	1.0	0.3	3.5	40	48	21.5
E/HXN03R028M...	$\phi 28$	1	0.8	0.3	3.5	46	54	24.5
E/HXN03R030M...	$\phi 30$	1	0.7	0.3	3.5	50	58	26.5
E/HXN03R032M...	$\phi 32$	1	0.7	0.3	3.5	54	62	28.5
EXN03R035M...	$\phi 35$	1	0.6	0.3	3.5	60	68	31.5
TXN03R040M...	$\phi 40$	1	0.5	0.3	3.5	70	78	36.5
TXN03R050M...	$\phi 50$	1	0.4	0.3	3.5	90	98	46.5

For  $\phi D_c$  above  $\phi 33$  mm, slot milling, ramping or contouring is not recommended as chips may be re-cut



## Standard cutting conditions TXN06 / EXN06 type

ISO	Work material	Hardness	Priority	Grades	Chip-breaker	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)		Tool dia: $\phi D_c$ (mm)					
							$\phi 32 \sim \phi 200$	Feed when plunging fz (mm/t)	$\phi 32, z = 2$		$\phi 35, z = 2$		$\phi 40, z = 3$	
									n	Vf	n	Vf	n	Vf
P	Carbon steels (C45, C55 etc.)	~ 300HB	First choice for wear resistance	AH3035	MJ	100 - 300	0.5 - 1.5	0.15	1,990	3,980	1,820	3,640	1,590	4,770
				AH8015	MJ				1,990	3,980	1,820	3,640	1,590	4,770
	Alloy steels (42CrMo4, 17Cr3 etc.)	~ 300HB	First choice for wear resistance	AH3035	MJ	100 - 300	0.5 - 1.5	0.15	1,990	3,980	1,820	3,640	1,590	4,770
				AH8015	MJ				1,990	3,980	1,820	3,640	1,590	4,770
				AH8015	ML				1,490	2,380	1,360	2,180	1,190	2,860
Prehardened steels (NAK80, PX5 etc.)	30 ~ 40HRC	for impact resistance	AH3035	MJ	100 - 200	0.5 - 1.5	0.15	1,490	2,980	1,360	2,720	1,190	3,570	
			AH3035	MJ				1,490	2,980	1,360	2,720	1,190	3,570	
			AH8015	ML				1,490	2,380	1,360	2,180	1,190	2,860	
M	Stainless steels (X5CrNi18-10, X5CrNiMo17-12-2 etc.)	~ 200HB	First choice for impact resistance	AH3035	ML	100 - 150	0.3 - 0.7	0.1	1,190	1,190	1,090	1,090	950	1,430
				AH3035	MJ				1,190	1,430	1,090	1,310	950	1,710
K	Gray cast irons (GG25, GG30 etc.)	150 ~ 250HB	First choice for wear resistance	AH120	MJ	100 - 300	0.5 - 1.5	0.15	1,990	3,980	1,820	3,640	1,590	4,770
				AH8015	MJ				1,990	3,980	1,820	3,640	1,590	4,770
	Ductile cast irons (GGG40 etc.)	150 ~ 250HB	First choice for wear resistance	AH120	MJ	80 - 200	0.5 - 1.5	0.15	1,490	2,980	1,360	2,720	1,190	3,570
				AH8015	MJ				1,490	2,980	1,360	2,720	1,190	3,570
S	Titanium alloy (Ti-6Al-4V etc.)	~ 40HRC	First choice for impact resistance	AH130	ML	30 - 60	0.3 - 0.7	0.08	400	400	360	360	320	480
				AH130	MJ				400	400	360	360	320	480
H	Heat-resistance alloy (Inconel, Hasteroxy etc.)	~ 40HRC	First choice for wear resistance	AH725	ML	20 - 50	0.1 - 0.3	0.05	300	120	270	110	240	140
				AH8015	ML				300	120	270	110	240	140
H	Hot mold steel (X40CrMoV5-1 etc.)	40 ~ 50HRC	First choice for impact resistance	AH8015	MJ	80 - 150	0.1 - 0.5	0.05	1,190	710	1,090	650	950	850
				AH3035	MJ				1,190	470	1,090	430	950	560
	Cold mold steel (X153CrMoV12 etc.)	50 ~ 60HRC	First choice for impact resistance	AH8015	MJ	50 - 70	0.05 - 0.2	0.03	600	120	550	110	480	140
				AH725	MJ				600	60	550	55	480	70

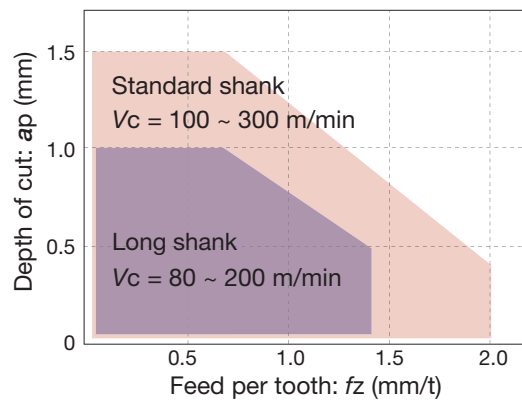
The above table shows the conditions for standard shank type cutters. When using long shank type cutters, the number of teeth may be different. In this case, the cutting conditions should be changed by referring to: "The usage of standard and long shanks" shown in previous page.

Cutting conditions are generally limited by the rigidity and power of the machine and the rigidity of the workpiece. When setting the conditions, start from half of the values of the standard cutting conditions and then increase the value gradually while making sure the machine is running normally.

### Cautionary points in use

#### The use of a standard or long shank

When using a long shank, please lower the cutting conditions (Vc, fz, ap) to 70% of the maximum conditions for the standard shank.

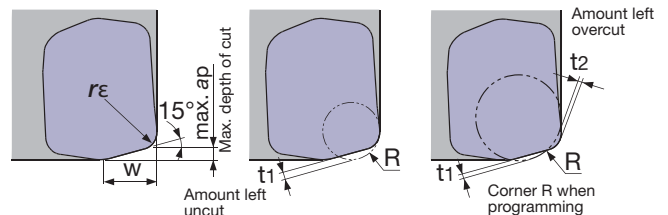


Tool dia.:  $\phi D_c = \phi 32 \sim 40$  mm  
Workpiece: S55C / C55 (200HB)

**L/D ratio of overhang**  
Standard shank: L/D  $\leq$  3  
Long shank: L/D = 4

#### Tool geometry on programming

When programming for CAM, the tool should be considered as a radius cutter. Usually, the corner radius should be set as R = 3.0 mm. If a larger radius is used, overcutting will occur. The following table shows the amount left uncut (t1) and overcut (t2).



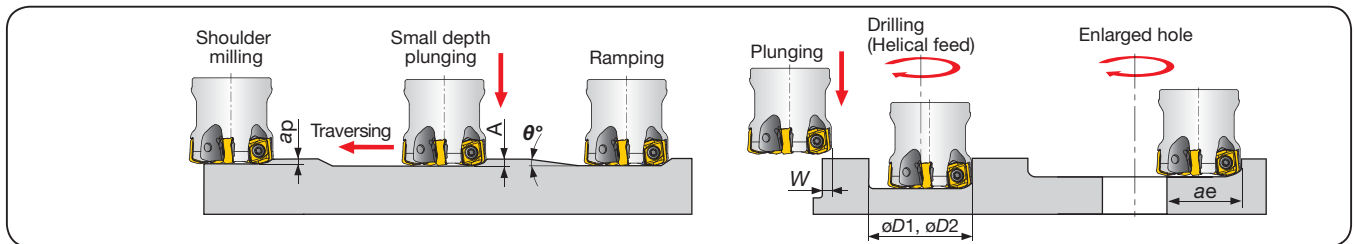
Max. depth of cut max ap (mm)	Corner radius $r_E$	W (mm)	Corner R when programming	Amount left uncut $t^1$ (mm)	Amount left overcut $t^2$ (mm)
1.5	2.0	6.0	2.0	1.0	-
			3.0	0.77	-
			4.0	0.54	0.26

Each value in table is calculated theoretically at the maximum condition.

Tool dia:  $\phi D_c$  (mm), Number of revolution:  $n$  (min<sup>-1</sup>), Feed speed:  $V_f$  (mm/min), Max. depth of cut:  $a_p = 1.5$  mm, Number of teeth:  $z$

$\phi 50$		$\phi 63$		$\phi 80$		$\phi 100, z = 6$		$\phi 125, z = 8$		$\phi 160, z = 10$		$\phi 200, z = 12$	
$n$	$V_f$ $z = 4$ $z = 5$	$n$	$V_f$ $z = 4$ $z = 6$	$n$	$V_f$ $z = 5$ $z = 8$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$
1,270	5,080   6,350	1,010	4,040   6,060	800	4,000   6,400	640	3,820	510	4,080	400	3,980	320	3,820
Vc = 200 m/min, fz = 1 mm/t													
1,270	5,080   6,350	1,010	4,040   6,060	800	4,000   6,400	640	3,820	510	4,080	400	3,980	320	3,820
Vc = 200 m/min, fz = 1 mm/t													
950	3,040   3,800	760	2,430   3,650	600	2,400   3,840	480	2,290	380	2,450	300	2,390	240	2,290
Vc = 150 m/min, fz = 0.8 mm/t													
950	3,800   4,750	760	3,040   4,560	600	3,000   4,800	480	2,880	380	3,040	300	3,000	240	2,880
Vc = 150 m/min, fz = 1.0 mm/t													
950	3,040   3,800	760	2,430   3,650	600	2,400   3,840	480	2,290	380	2,450	300	2,390	240	2,290
Vc = 150 m/min, fz = 0.8 mm/t													
760	1,520   1,900	610	1,220   1,830	480	1,200   1,920	380	1,150	310	1,220	240	1,190	190	1,150
Vc = 120 m/min, fz = 0.5 mm/t													
760	1,820   2,280	610	1,470   2,200	480	1,440   2,300	380	1,380	310	1,470	240	1,430	190	1,380
Vc = 120 m/min, fz = 0.6 mm/t													
1,270	5,080   6,350	1,010	4,040   6,060	800	4,000   6,400	640	3,820	510	4,080	400	3,980	320	3,820
Vc = 200 m/min, fz = 1 mm/t													
1,270	5,080   6,350	1,010	4,040   6,060	800	4,000   6,400	640	3,820	510	4,080	400	3,980	320	3,820
Vc = 200 m/min, fz = 1 mm/t													
950	3,800   4,750	760	3,040   4,560	600	3,000   4,800	480	2,870	380	3,060	300	2,990	240	2,870
Vc = 150 m/min, fz = 1 mm/t													
950	3,800   4,750	760	3,040   4,560	600	3,000   4,800	480	2,870	380	3,060	300	2,990	240	2,870
Vc = 150 m/min, fz = 1 mm/t													
250	500   630	200	400   600	160	400   640	130	380	100	410	80	400	60	380
Vc = 40 m/min, fz = 0.5 mm/t													
190	150   190	150	120   180	120	120   190	100	120	80	120	60	120	50	120
Vc = 30 m/min, fz = 0.2 mm/t													
760	910   1,140	610	730   1,100	480	720   1,150	380	680	310	740	240	720	190	680
Vc = 120 m/min, fz = 0.3 mm/t													
760	600   760	610	490   730	480	480   760	380	450	310	490	240	480	190	450
Vc = 120 m/min, fz = 0.2 mm/t													
380	150   190	300	120   180	240	120   190	190	110	150	120	120	120	100	120
Vc = 60 m/min, fz = 0.1 mm/t													
380	75   95	300	60   90	240	60   95	190	55	150	60	120	60	100	60
Vc = 60 m/min, fz = 0.05 mm/t													

## Applications

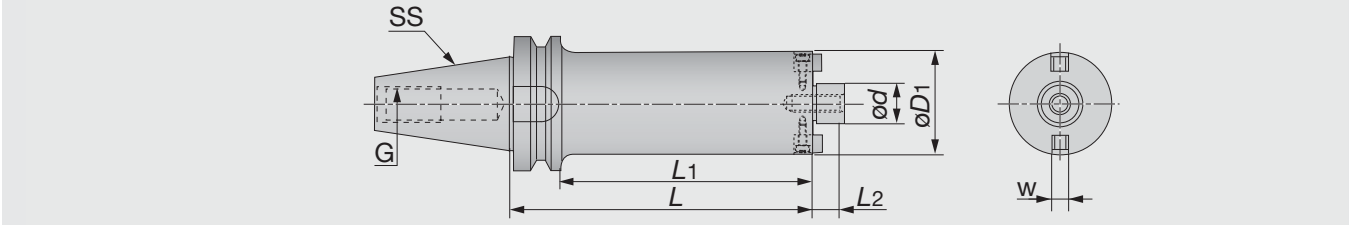


Designation	Tool dia. $\phi D_c$	Max. depth of cut Max. $a_p$	Max. ramping angle $\theta^\circ$	Max. plunging depth A	Max. cutting width in plunging W	Min. machinable hole dia. $\phi D1$	Max. machinable hole dia. $\phi D2$	Max. cutting width in enlarged hole ae
EXN06R032M...	$\phi 32$	1.5	2	0.5	6	47	59	25
EXN06R035M...	$\phi 35$	1.5	1.7	0.5	6	53	65	28
EXN06R040M...	$\phi 40$	1.5	1.3	0.5	6	63	75	33
TXN06R050M...	$\phi 50$	1.5	0.9	0.5	6	83	95	43
TXN06R052M...	$\phi 52$	1.5	0.8	0.5	6	87	99	45
TXN06R063M...	$\phi 63$	1.5	0.6	0.5	6	109	121	56
TXN06R066M...	$\phi 66$	1.5	0.5	0.5	6	115	127	59
TXN06R080M...	$\phi 80$	1.5	0.5	0.5	6	143	155	73
TXN06R100M...	$\phi 100$	1.5	0.34	0.5	6	183	195	93
TXN06R125M...	$\phi 120$	1.5	0.26	0.5	6	233	245	118
TXN06R160M...	$\phi 160$	1.5	0.2	0.5	6	303	315	153
TXN06R200M...	$\phi 200$	1.5	0.15	0.5	6	383	395	193

For  $\phi D_c$  above 100 mm, slot milling, ramping or contouring is not recommended as chips may be re-cut.

## BT50-FM (Shell mill holder for long overhang)

Face mill holder with BT shank

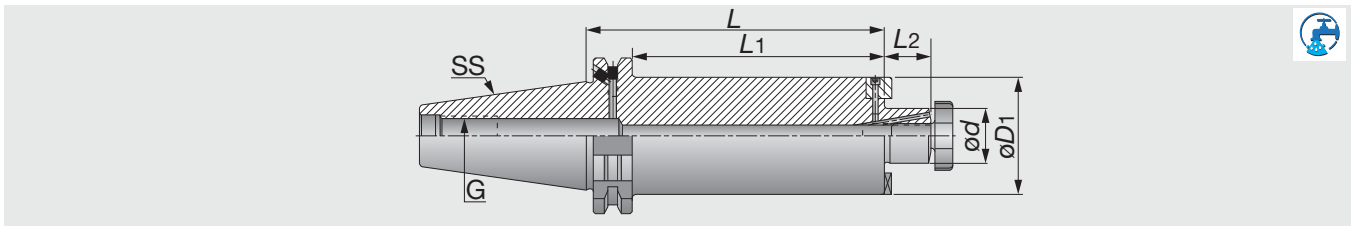


Designation	SS	ød	øD1	L2	L	L1	G	W	Kg
BT50-FMC22-138-47	50	22	47	18	138	100	M24	10	5.2
BT50-FMC22-188-47	50	22	47	18	188	150	M24	10	5.9
BT50-FMC22-243-47	50	22	47	18	243	205	M24	10	6.5
BT50-FMC22-293-47	50	22	47	18	293	255	M24	10	7.2
BT50-FMC22-178-59	50	22	59	18	178	140	M24	10	6.8
BT50-FMC22-238-59	50	22	59	18	238	200	M24	10	8
BT50-FMC22-308-59	50	22	59	18	308	270	M24	10	9.5
BT50-FMC22-373-59	50	22	59	18	373	335	M24	10	10.9
BT50-FMA31.75-215-76	50	31.75	76	30	215	177	M24	12.7	10
BT50-FMA31.75-295-76	50	31.75	76	30	295	257	M24	12.7	12.9
BT50-FMA31.75-375-76	50	31.75	76	30	375	337	M24	12.7	15.8
BT50-FMA31.75-275-96	50	31.75	96	30	275	237	M24	12.7	16.8
BT50-FMA31.75-375-96	50	31.75	96	30	375	337	M24	12.7	23

(Option:Wrench for lock screw)

## DIN69871-SEM (Shell mill holder with extra long)

Extra long type shell mill holder with coolant hole with DIN69871 shank



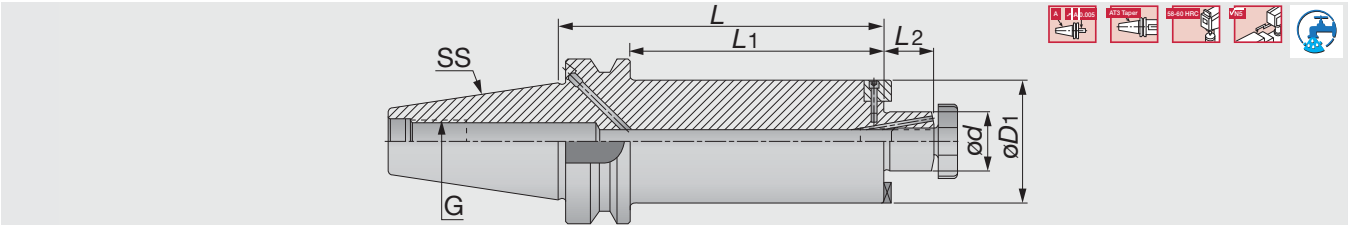
Designation	SS	ød	L2	øD1	L	L1	G
DIN6987150SEM22X48X200C	50	22	19	48	200	181	M24
DIN6987150SEM22X61X300C	50	22	19	61	300	281	M24
DIN6987150SEM27X61X300C	50	27	21	61	300	281	M24

- Applicable for 10 MPa pressure coolant
- If the "B type" option is required, the plug screw must be removed from the flange cooling hole. (use a 2 mm hex key.)

(Option:Wrench for lock screw)

## BT-SEM-C (Shell mill holder)

Shell mill holder with coolant hole with BT shank (Extra long type)

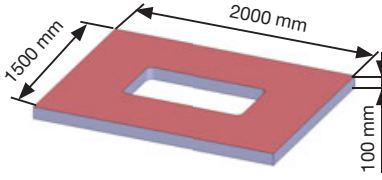
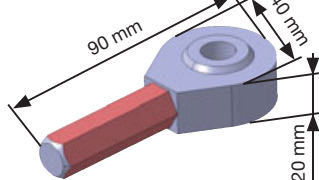
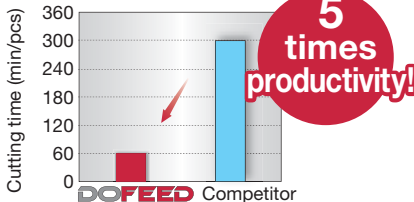
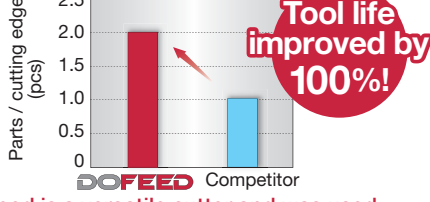
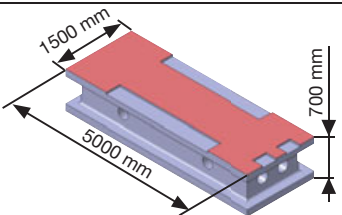
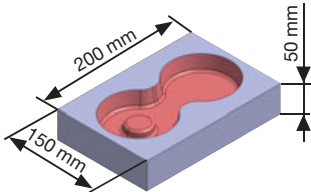
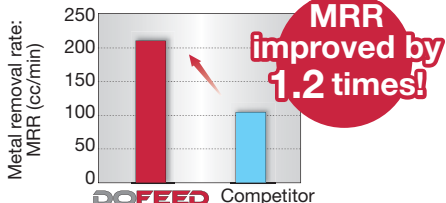
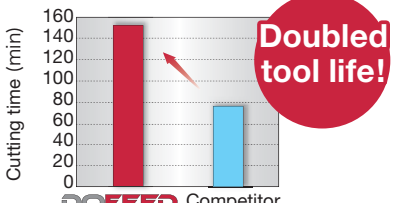


Designation	SS	ød	øD1	L	L1	L2	G
BT50SEM22X48X220C	50	22	48	220	182	19	M24
BT50SEM22X61X320C	50	22	61	320	282	19	M24
BT50SEM27X61X320C	50	27	61	320	282	21	M24

- Applicable for 10 MPa pressure coolant (Option: Wrench for lock screw)
- If the "B type" option is required, the plug screw must be removed from the flange cooling hole (use a 2 mm hex key).



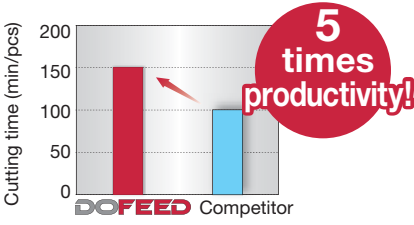
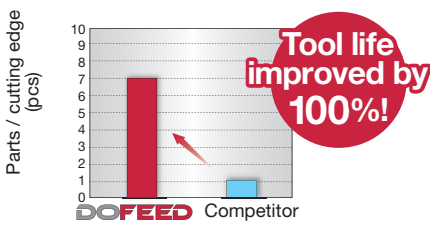
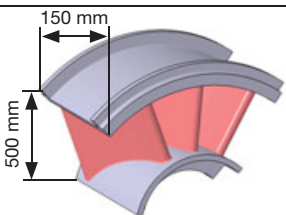
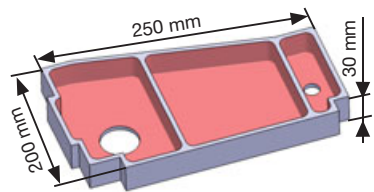
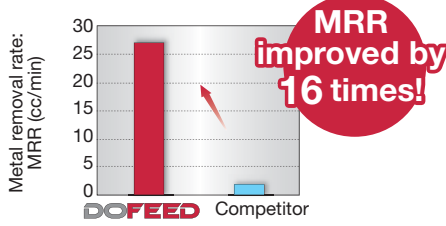
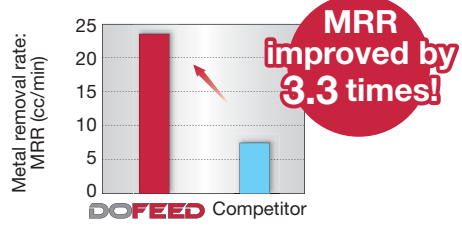
## TEST REPORTS

Workpiece type		Die & Mould / Back block	Machine parts
Cutter		TXN06R063M22.2-06 (ø63, z = 6)	EXN03R025M25.0-05 (ø25, z = 5)
Insert		LNMU06X5ZER-MJ	LNMU0303ZER-MJ
Grade		AH3035	AH725
Workpiece material		Prehardened steel HPM7 (HRC30)	Prehardened steel (40HRC)
Cutting conditions	Cutting speed: $V_c$ (m/min)	115	100
	Feed per tooth: $f_z$ (mm/t)	0.7	0.8
	Depth of cut: $ap$ (mm)	1.1	0.5
	Width of cut: $ae$ (mm)	42	18
	Process	Contour milling	Pocket milling
	Coolant	Air blow	Dry (air)
Machine		Vertical M/C, BT50	Vertical M/C, BT40
Results		<p><b>1.5 times tool life!</b></p> <p>AH3035 grade showed better chipping resistance than competitor improving tool life by 50%.</p>	<p><b>Machining time improved by 240%!</b></p> <p>VBmax = 0.304 mm Actual machining time: 69 min</p> <p>VBmax = 0.309 mm Actual machining time: 29 min</p>

Workpiece type		Machine frame	Automotive / Rod end
Cutter		TXN06R080M31.7-08 (ø80, z = 8)	EXN03R032M32.0-06 (ø32, z = 6)
Insert		LNMU06X5ZER-ML x 7 / LNU06X5ZER-W x 1	LNMU0303ZER-ML
Grade		AH130 / AH725	AH130
Workpiece material		SUS304 / X5CrNi18-9	SUS630 / X5CrNiCuNb16-4
			
Cutting conditions	Cutting speed: <b>Vc</b> (m/min)	100	70
	Feed per tooth: <b>fz</b> (mm/t)	0.4	0.15
	Feed speed: <b>Vf</b> (mm/min)	1273	-
	Depth of cut: <b>ap</b> (mm)	0.5	1
	Width of cut: <b>ae</b> (mm)	60	40
	Process	Face milling	Face milling
	Coolant	Wet	Internal supply
Machine	Vertical M/C, BT50	Turning center / 7.5 kW	
Results	 <p><b>5 times productivity!</b></p> <p>Competitor's tool took 300 minutes for roughing and finishing. DoFeed with wiper insert reduces time for finishing and improves total productivity by 5 times that of the competitor.</p>		 <p><b>Tool life improved by 100%!</b></p> <p>DoFeed is a versatile cutter and was used against a shoulder milling cutter, achieving double tool life.</p>
Workpiece type		Large machine parts	Die & mould
Cutter		TXN06R200M47.6-12 (ø200, z = 12)	HXN03R020MM10-04 (ø20, z = 4)
Insert		LNMU06X5ZER-MJ	LNMU0303ZER-MJ
Grade		AH120	AH725
Workpiece material		FCD600 / 600-3	FCD600 / 600-3
			
Cutting conditions	Cutting speed: <b>Vc</b> (m/min)	150	190
	Feed per tooth: <b>fz</b> (mm/t)	1.0	0.4
	Depth of cut: <b>ap</b> (mm)	0.5	0.3
	Width of cut: <b>ae</b> (mm)	150	9
	Process	Face milling	Pocket milling
	Coolant	Dry	Dry (air)
	Machine	Horizontal M/C, BT50	Vertical M/C, BT40
Results	 <p><b>MRR improved by 1.2 times!</b></p> <p>DoFeed, with high density insert, can effectively increase productivity. Lower cutting forces reduce chattering, achieving 1.5 times tool life.</p>		 <p><b>Doubled tool life!</b></p> <p>Due to the lower cutting forces, DoFeed can increase the productivity 4 times higher. AH725 grade can effectively reduce sudden fracture, achieving double tool life.</p>



# ACCELERATED MACHINING

Workpiece type		Die	Machine part
Cutter		TXN03R050M22.0E08	EXN03R035M32.0-06
Insert		LNMU0303ZER-MJ	LNMU0303ZER-MJ
Grade		AH8015	AH8015
Workpiece material		H13(HRC50)	42CrMo4(44HRC)
		 <b>H</b>	 <b>H</b>
Cutting conditions	Cutting speed: $V_c$ (m/min)	73	170
	Feed per tooth: $f_z$ (mm/t)	0.9	0.8
	Depth of cut: $a_p$ (mm)	0.5	0.92
	Width of cut: $a_e$ (mm)	40	0.92
	Process	Face milling	Pocketing
	Coolant	Internal	Air blast
	Machine	Horizontal M/C	Vertical M/C
Results		 <b>5 times productivity!</b>	 <b>Tool life improved by 100%!</b>
Workpiece type		Turbine blade	Aerospace component
Cutter		EXN03R030M32.0-05 ( $\phi 30, z = 5$ )	EXN03R025M25.0-05 ( $\phi 25, z = 5$ )
Insert		LNMU0303ZER-ML	LNMU0303ZER-ML
Grade		AH725	AH725
Workpiece material		Heat resistant cast steel	Ti-6Al-4V (36HRC)
		 <b>S</b>	 <b>S</b>
Cutting conditions	Cutting speed: $V_c$ (m/min)	70	50
	Feed per tooth: $f_z$ (mm/t)	0.5	0.7
	Depth of cut: $a_p$ (mm)	0.5	0.5
	Width of cut: $a_e$ (mm)	30	25
	Process	Shoulder milling	Pocket milling
	Coolant	Wet	Wet
	Machine	Vertical M/C, BT50	Vertical M/C, BT40
Results		 <b>MRR improved by 16 times!</b> <b>Tripled cutting speed and super high feed milling offer 16 times higher productivity.</b>	 <b>MRR improved by 3.3 times!</b> <b>7.3 times higher feed machining that drastically improves productivity.</b>

## 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

36-D Harkovsky Lane  
308009 Belgorod, Russia  
Phone: +7 4722 24 00 07  
Fax: +7 4722 24 00 08  
www.tungaloy.co.jp/ru

## Tungaloy East LLC

Stachek str., h.4, office 2, Ekaterinburg,  
620017, Russia  
Phone: +7-343-389-13-22  
Fax: +7-343-278-94-35  
www.tungaloy.co.jp/rue

## 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.com.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



www.tungaloy.com

follow us at:

facebook.com/tungaloyjapan

twitter.com/tungaloyjapan

To see this product in action visit:

# Tung-TV

www.youtube.com/tungaloycorporation

Distributed by:



DOWNLOAD  
Dr. Carbide App



Available on the  
App Store



GET IT ON  
Google play



AS9100 Certified  
78006  
2015.11.04  
ISO14001 Certified  
EC97J1123  
1997.11.26

Produced from Recycled paper

Jun. 2017 (TJ)