

**Tungaloy**

Member IMC Group

Keeping the Customer First

Tungaloy Report No. 408-G

**MILLLINE** Slot milling cutter

**TECSLOT**



TSN / ASN type

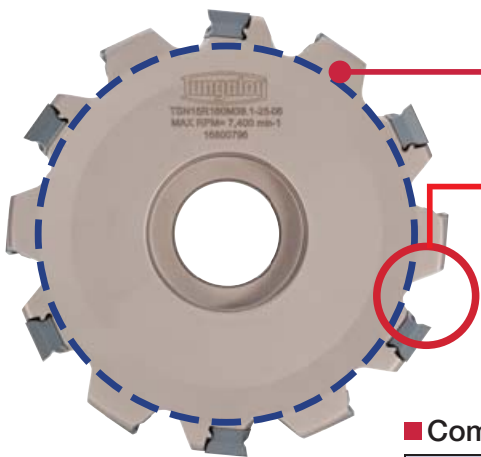
**Incredibly secure system for slot milling!**



# Strong body and tangential insert provide stable slot milling

## Features

● High productivity credit to a large number of edge lines



Highly rigid cutter body with tangential insert

Excellent chip evacuation with an optimized chip gullet

■ Comparison of no. of edge lines (Edge width:  $W = 16$  mm)

Tool dia. $\phi D_c$ (mm)	<b>TECSLOT</b>	Competitor A	Competitor B
$\phi 100$	<b>5</b>	-	3
$\phi 125$	<b>6</b>	5	4
$\phi 160$	<b>7</b>	6	5
$\phi 200$	<b>8</b>	7	6

## ● TecSlot Components

### Cutter

Two types of cutter mounting



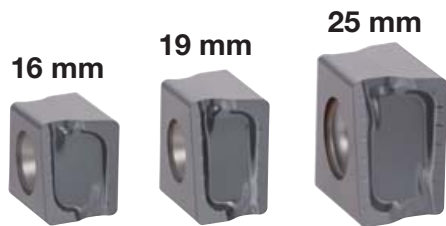
Axial drive



Radial drive

### Insert

Three edge width dimensions



16 mm  
LMEU1008\*\*  
ZNEN-MJ

19 mm  
LMEU1208\*\*  
ZNEN-MJ

25 mm  
LMEU1509\*\*  
ZNEN-MJ

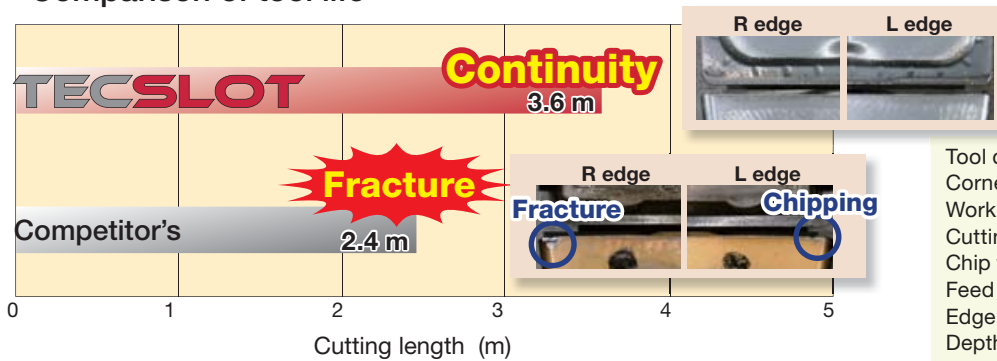
# ial inserts



## Tough cutting edge with the thick insert



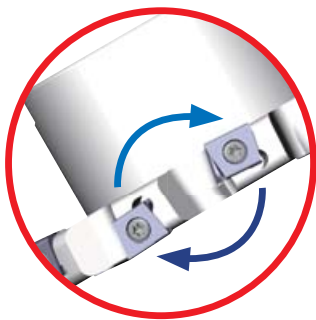
### Comparison of tool life



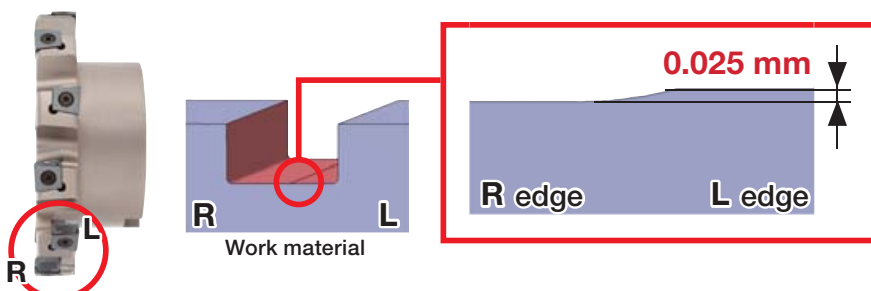
Tool diameter	: $\phi D_c = \phi 125$ mm
Corner radius	: $r_\epsilon = 0.8$ mm
Work material	: S55C / C55 (200HB)
Cutting speed	: $V_c = 150$ m/min
Chip thickness	: $t = 0.2$ mm
Feed per edge line	: $f_z = 0.3$ mm/t
Edge width	: $W = 16$ mm
Depth of slot	: $a_e = 16$ mm
Coolant	: Dry
No. of edge lines	: 1 edge line
Machine	: Vertical M/C, BT50

## High accuracy insert

Right and Left hand edges in ONE insert



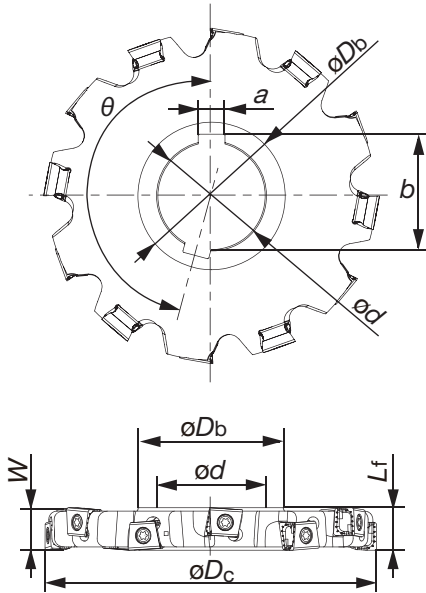
### Gap between R edge and L edge



Tool diameter	: $\phi D_c = \phi 125$ mm
Work material	: S55C / C55 (200HB)
Cutting speed	: $V_c = 150$ m/min
Chip thickness	: $t = 0.13$ mm
Edge width	: $W = 16$ mm
Depth of slot	: $a_e = 6$ mm
Machine	: Vertical M/C, BT50

# Cutter

Axial drive



### Replacement parts

Descriptions		Parts Cat. No.	
Applicable cutter		ASN10R... ASN12R...	ASN15R...
Clamping screw		SM40-143-H0	CSTB-5L159
Wrench	Bit	BT15S	BT20S
	Grip	H-TB	H-TB

### JIS

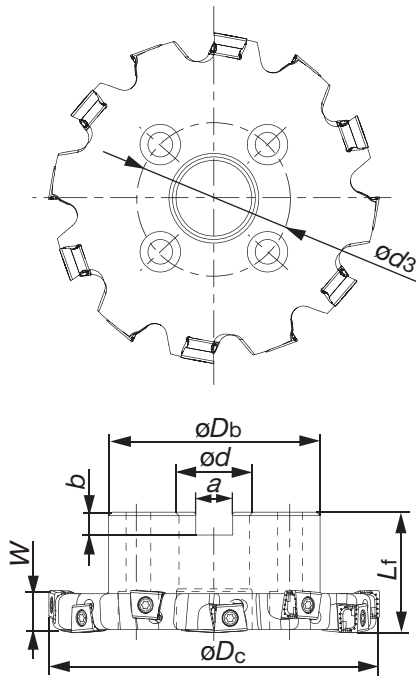
Edge width $W$ (mm)	Cat. No.	Stock	No. of edge lines / No. of inserts	Dimensions (mm)							Insert
				$\phi D_c$	$\phi D_b$	$\phi d$	$L_f$	$b$	$a$	$\theta$	
16	ASN10R100M31.7-16-05	●	5/10	100	48	31.75	16	35.2	7.92	162°	LMEU1008** ZNEN-MJ
	ASN10R125M38.1-16-06	●	6/12	125	58	38.1	16	42.3	9.52	165°	
	ASN10R160M38.1-16-07	●	7/14	160	58	38.1	16	42.3	9.52	167.14°	
19	ASN12R100M31.7-19-05	●	5/10	100	48	31.75	19	35.2	7.92	162°	LMEU1208** ZNEN-MJ
	ASN12R125M38.1-19-06	●	6/12	125	58	38.1	19	42.3	9.52	165°	
	ASN12R160M38.1-19-07	●	7/14	160	58	38.1	19	42.3	9.52	167.14°	
25	ASN15R125M38.1-25-05	●	5/10	125	58	38.1	25	42.3	9.52	162°	LMEU1509** ZNEN-MJ
	ASN15R160M38.1-25-06	●	6/12	160	58	38.1	25	42.3	9.52	165°	

### ISO

Edge width $W$ (mm)	Cat. No.	Stock	No. of edge lines / No. of inserts	Dimensions (mm)							Insert
				$\phi D_c$	$\phi D_b$	$\phi d$	$L_f$	$b$	$a$	$\theta$	
16	ASN10R100M32.0E16-05	●	5/10	100	47	32	16	34.8	8	162°	LMEU1008** ZNEN-MJ
	ASN10R125M40.0E16-06	●	6/12	125	55	40	16	43.5	10	165°	
	ASN10R160M40.0E16-07	●	7/14	160	55	40	16	43.5	10	167.14°	
	ASN10R200M50.0E16-08	●	8/16	200	69	50	16	53.6	12	168.75°	
19	ASN12R100M32.0E19-05	●	5/10	100	47	32	19	34.8	8	162°	LMEU1208** ZNEN-MJ
	ASN12R125M40.0E19-06	●	6/12	125	55	40	19	43.5	10	165°	
	ASN12R160M40.0E19-07	●	7/14	160	55	40	19	43.5	10	167.14°	
	ASN12R200M50.0E19-08	●	8/16	200	69	50	19	53.6	12	168.75°	
	ASN12R250M50.0E19-09	●	9/18	250	84	50	19	53.6	12	170°	
25	ASN15R125M40.0E25-05	●	5/10	125	55	40	25	43.5	10	165°	LMEU1509** ZNEN-MJ
	ASN15R160M40.0E25-06	●	6/12	160	55	40	25	43.5	10	167.14°	
	ASN15R200M50.0E25-07	●	7/14	200	69	50	25	53.6	12	168.75°	
	ASN15R250M50.0E25-08	●	8/16	250	84	50	25	53.6	12	170°	

● : Stocked items

## Radial drive



### Replacement parts

Descriptions		Parts Cat. No.	
Applicable cutter		TSN10R... TSN12R...	TSN15R...
Clamping screw		SM40-143-H0	CSTB-5L159
Wrench	Bit	BT15S	BT20S
	Grip	H-TB	H-TB

### JIS

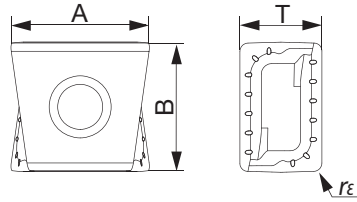
Edge width $W$ (mm)	Cat. No.	Stock	No. of edge lines / No. of inserts	Dimensions (mm)							Insert
				$\phi D_c$	$\phi D_b$	$\phi d$	$L_f$	$b$	$a$	P.C.D. $\phi d_3$	
16	TSN10R100M25.4-16-05	●	5/10	100	50	25.4	50	6	9.5	-	LMEU1008** ZNEN-MJ
	TSN10R125M31.7-16-06	●	6/12	125	70	31.75	50	8	12.7	-	
	TSN10R160M38.1-16-07	●	7/14	160	100	38.1	63	10	15.9	-	
	TSN10R200M47.6-16-08	●	8/16	200	135	47.625	63	14	25.4	101.6	
19	TSN12R100M25.4-19-05	●	5/10	100	50	25.4	50	6	9.5	-	LMEU1208** ZNEN-MJ
	TSN12R125M31.7-19-06	●	6/12	125	70	31.75	50	8	12.7	-	
	TSN12R160M38.1-19-07	●	7/14	160	100	38.1	63	10	15.9	-	
	TSN12R200M47.6-19-08	●	8/16	200	135	47.625	63	14	25.4	101.6	
	TSN12R250M47.6-19-09	●	9/18	250	140	47.625	63	14	25.4	101.6	
25	TSN15R125M31.7-25-05	●	5/10	125	70	31.75	50	8	12.7	-	LMEU1509** ZNEN-MJ
	TSN15R160M38.1-25-06	●	6/12	160	100	38.1	63	10	15.9	-	
	TSN15R200M47.6-25-07	●	7/14	200	135	47.625	63	14	25.4	101.6	
	TSN15R250M47.6-25-08	●	8/16	250	140	47.625	63	14	25.4	101.6	

### ISO

Edge width $W$ (mm)	Cat. No.	Stock	No. of edge lines / No. of inserts	Dimensions (mm)							Insert
				$\phi D_c$	$\phi D_b$	$\phi d$	$L_f$	$b$	$a$	P.C.D. $\phi d_3$	
16	TSN10R100M27.0E16-05	●	5/10	100	58	27	50	7	12.4	-	LMEU1008** ZNEN-MJ
	TSN10R125M32.0E16-06	●	6/12	125	66	32	50	8	14.4	-	
	TSN10R160M40.0E16-07	●	7/14	160	82	40	63	9	16.4	-	
	TSN10R200M40.0E16-08	●	8/16	200	88	40	63	9	16.4	66.7	
19	TSN12R100M27.0E19-05	●	5/10	100	58	27	50	7	12.4	-	LMEU1208** ZNEN-MJ
	TSN12R125M32.0E19-06	●	6/12	125	66	32	50	8	14.4	-	
	TSN12R160M40.0E19-07	●	7/14	160	82	40	63	9	16.4	-	
	TSN12R200M40.0E19-08	●	8/16	200	88	40	63	9	16.4	66.7	
	TSN12R250M60.0E19-09	●	9/18	250	128	60	63	14	25.7	101.6	
25	TSN15R125M32.0E25-05	●	5/10	125	66	32	50	8	14.4	-	LMEU1509** ZNEN-MJ
	TSN15R160M40.0E25-06	●	6/12	160	82	40	63	9	16.4	-	
	TSN15R200M40.0E25-07	●	7/14	200	88	40	63	9	16.4	66.7	
	TSN15R250M60.0E25-08	●	8/16	250	128	60	63	14	25.7	101.6	

● : Stocked items

## Insert



Cat. No.	Accuracy	Honing	Grades			Dimensions (mm)			
			AH725	AH140	AH120	A	B	T	r <sub>ε</sub>
LMEU100808ZNEN-MJ	E	with	●	●	●	12.7	10.5	8	0.8
LMEU100816ZNEN-MJ			●	●	●	12.5			1.6
LMEU100824ZNEN-MJ			●	●	●	12.4			2.4
LMEU100832ZNEN-MJ			●	●	●	12.2			3.2
LMEU120808ZNEN-MJ	E	with	●	●	●	13.6	12.7	8	0.8
LMEU120816ZNEN-MJ			●	●	●	13.4			1.6
LMEU120824ZNEN-MJ			●	●	●	13.2			2.4
LMEU120832ZNEN-MJ			●	●	●	13.1			3.2
LMEU150908ZNEN-MJ	E	with	●	●	●	15.6	15	9.5	0.8
LMEU150916ZNEN-MJ			●	●	●	15.4			1.6
LMEU150924ZNEN-MJ			●	●	●	15.3			2.4
LMEU150932ZNEN-MJ			●	●	●	15.1			3.2

## Standard cutting conditions

Work materials	Hardness (HB)	Priority	Grades	Cuttings peed V <sub>c</sub> (m/min)	Chip thickness t (mm)
Low carbon steels S10C / C10E / C10 etc.	~ 200	First choice	AH725	90 ~ 180	0.13 ~ 0.25
		Priority for impact resistance	AH140		
High carbon steels S45C / C45 etc.	200 ~ 300	First choice	AH725	90 ~ 180	0.13 ~ 0.25
		Priority for impact resistance	AH140		
Alloy steels SCM440 / 42CrMo4 etc.	150 ~ 300	First choice	AH725	90 ~ 180	0.13 ~ 0.25
		Priority for impact resistance	AH140		
Tool steels SKD61 / X40CrMoV5-1 etc.	~ 300	First choice	AH725	90 ~ 180	0.13 ~ 0.25
		Priority for impact resistance	AH140		
Stainless steel SUS304 / X5CrNi-18-9 etc.	-	-	AH140	90 ~ 200	0.13 ~ 0.25
Grey cast irons FC250 / GG25 / 250 etc.	150 ~ 250	-	AH120	120 ~ 230	0.13 ~ 0.3
Ductile cast irons FCD450 / GGG45 / 450-10S etc.		-	AH120	90 ~ 150	0.13 ~ 0.2
Titanium alloys Ti-6Al-4V etc.	-	-	AH725	30 ~ 40	0.07 ~ 0.13
Nickel-based alloys Inconel718 etc.	-	-	AH725	20 ~ 35	0.07 ~ 0.13

## ■ Chip thickness “t”

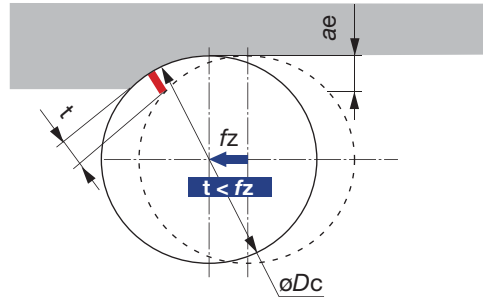
- Chip thickness “t” is one of the most important factors for chip evacuation in slot milling.
- Hence, setup feed per edge line (fz) should be calculated according to chip thickness (t).

## Slotting with a slot milling cutter

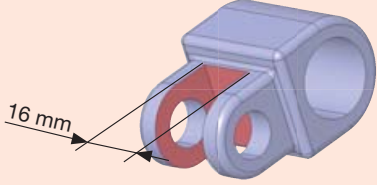
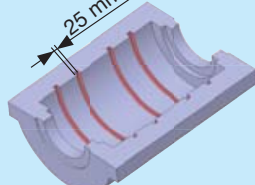
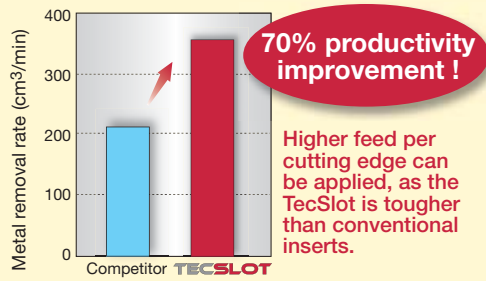
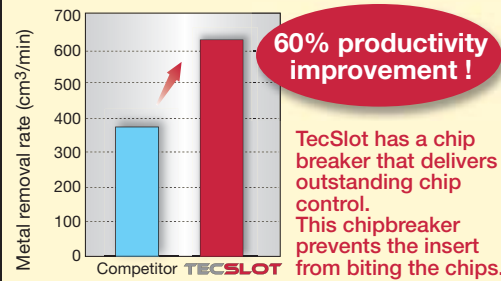
$$t \cong 2 \times fz \times \sqrt{(ae / \phi Dc) \times (1 - (ae / \phi Dc))}$$

$$fz \cong t / 2 / \sqrt{(ae / \phi Dc) \times (1 - (ae / \phi Dc))}$$

$\phi Dc$  : Tool diameter (mm)  
 $fz$  : Feed per edge line (mm/t)  
 $ae$  : Depth of slot (mm)



## Practical examples

Workpiece type		Machine parts	Power generation
Cutter		TSN10R125M31.7-16-06 ( $\phi 125$ , 6 edge lines)	TSN15R250M47.6-25-08 ( $\phi 250$ , 8 edge lines)
Insert		LMEU100808ZNEN-MJ	LMEU100808ZNEN-MJ
Grade		AH120	AH725
Work material		FCD450 / GGG45 / 450-10S	SS400 / E275A
			
Cutting conditions	Cutting speed $Vc$ (m/min)	150	150
	Chip thickness $t$ (mm)	0.15	0.18
	Feed per edge line $fz$ (mm/t)	0.2	0.3
	Feed speed $Vf$ (mm/min)	358	627
	Edge width $W$ (mm)	16	25
	Depth of slot $ae$ (mm)	22	25
	Coolant	Dry	Dry
Machine		Vertical M/C, BT50	Vertical M/C, BT50
Results		 <p>Higher feed per cutting edge can be applied, as the TecSlot is tougher than conventional inserts.</p>	 <p>TecSlot has a chip breaker that delivers outstanding chip control. This chipbreaker prevents the insert from biting the chips.</p>



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