Tungaloy
Member IMC Group

Tungaloy Report No. 390-G

MILLLINE Shoulder milling cutter

DOREC

New Version
Featuring new 18 mm size insert

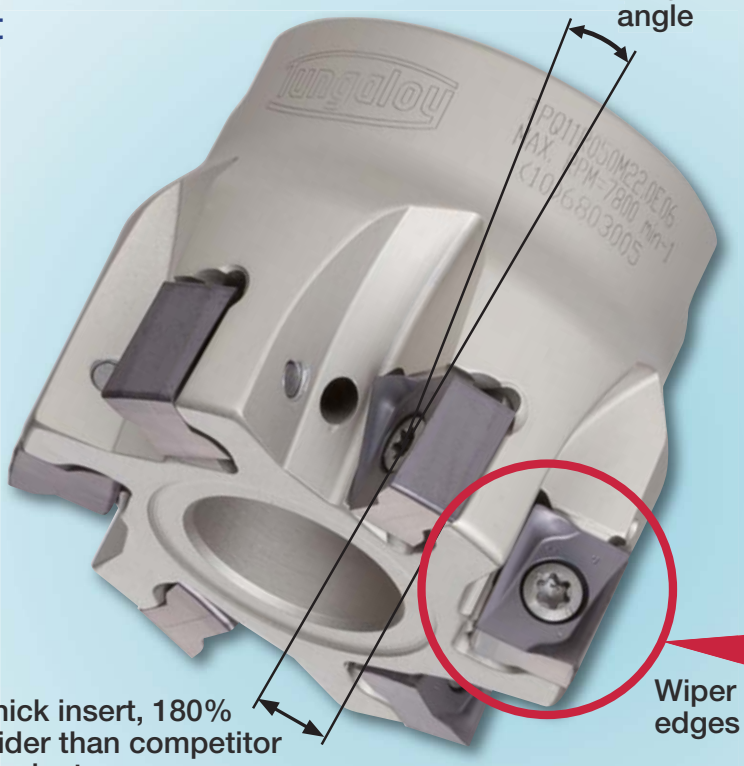
High performance economical double sided inserts with 4 cutting edges!

Economical insert with 4 edges to offer remarkable productivity levels!

High performance levels with a diverse range of applications

- Double sided square insert

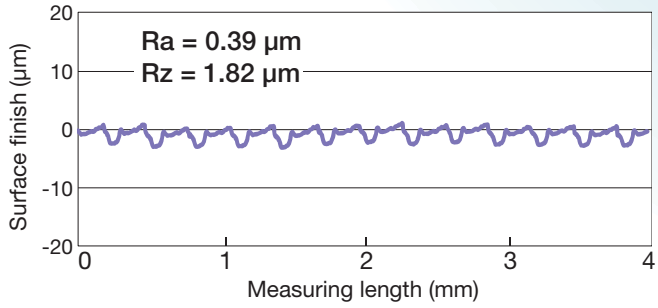
With 2 insert sizes, 3 grades and 4 corner radii options, DoRec suits most applications.



Low cutting force + Excellent surface finish

- Insert has high level of sharpness and incorporates effective wiper edges.

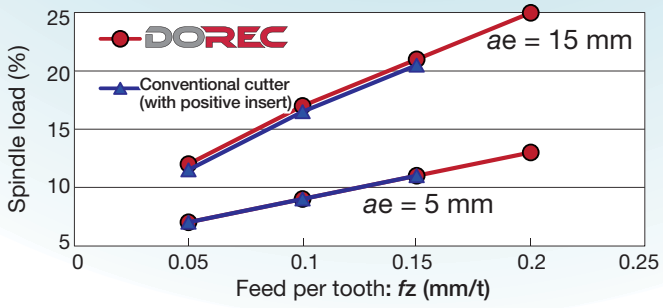
Surface finish



Cutter	: TPQ18R050M22.0E03 (øDc = 50, z = 3)	Cutting speed	: Vc = 150 m/min
		Feed per tooth	: fz = 0.1 mm/t
Insert	: LQMU1808008PNER-MJ	Depth of cut	: ap = 10 mm
Grade	: AH725	Width of cut	: ae = 50 mm
Work material	: S55C / C55 (200HB)	Coolant	: Wet
		Machine	: Vertical M/C, BT50

Exceptional surface finish with economical insert!

Comparison of spindle load

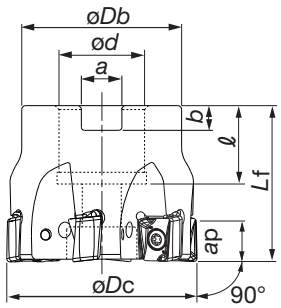


Cutter	: EPQ18R040M32.0W03 (øDc = 40, z = 3)	Cutting speed	: Vc = 150 m/min
		Depth of cut	: ap = 16 mm
Insert	: LQMU180808PNER-MJ	Coolant	: Wet
Work material	: S55C / C55 (200HB)	Machine	: Vertical M/C, BT50

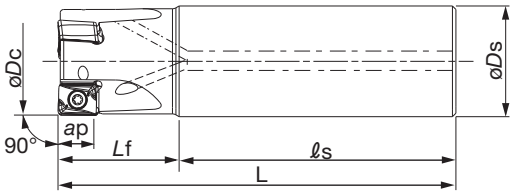
Similar load levels as a conventional tool!

Milling cutter

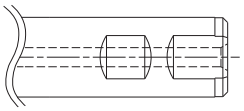
Bore type



Cylindrical



Weldon



Replacement parts

JIS / ISO

Description		Cat. No.	
Applicable cutter		T/EPQ11..	T/EPQ18
Clamping screw		CSTB-3.5L115	SR14-591
Wrench	Torx bit	BLDT10/S7	BT20M
	Grip	SW6-SD	H-TB
Mono block type substitution wrench		T-10D	T-20D

LQMU11 type: Max. *ap*: 9 mm
LQMU18 type: Max. *ap*: 16 mm

Bore type

JIS

Cat. No.	Stock	No. of Inserts	Dimensions (mm)							Weight (kg)	Air hole	Center bolt
			øDc	*øDb*	*ød*	*ℓ*	*Lf*	*b*	*a*			
TPQ11R040M16.0E04	●	4	40	35	16	20	40	5.6	8.4	0.2	with	CM8x30H
TPQ11R050M22.0E06	●	6	50	41	22	20	40	6.3	10.4	0.4	with	CM10x30H
TPQ11R063M22.0E07	●	7	63	47	22	20	40	6.3	10.4	0.6	with	CM10x30H
TPQ11R080M25.4-10	●	10	80	55	25.4	26	50	6	9.5	1.1	with	CM12x30H
TPQ11R100M31.7-12	●	12	100	67	31.75	32	50	8	12.7	1.6	with	TMBA-M16H
New TPQ18R050M22.0E03	●	3	50	47	22	20	40	6.3	10.4	0.4	with	CM10x30H
New TPQ18R063M25.4-04	●	4	63	55	25.4	26	50	6	9.5	0.7	with	CM12x30H
New TPQ18R080M25.4-05	●	5	80	55	25.4	26	50	6	9.5	0.9	with	CM12x30H
New TPQ18R100M31.7-06	●	6	100	70	31.75	32	50	8	12.7	1.4	with	TMBA-M16H
New TPQ18R125M38.1-08	●	8	125	80	38.1	38	63	10	15.9	2.9	with	TMBA-M20H
New TPQ18R160M50.8-09	●	9	160	100	50.8	38	63	11	19	4.1	Without	-

ISO

Cat. No.	Stock	No. of Inserts	Dimensions (mm)							Weight (kg)	Air hole	Centre bolt
			øDc	*øDb*	*ød*	*ℓ*	*Lf*	*b*	*a*			
TPQ11R040M16.0E05	●	5	40	35	16	20	40	5.6	8.4	0.2	with	CM8x30H
TPQ11R050M22.0E06	●	6	50	41	22	20	40	6.3	10.4	0.4	with	CM10x30H
TPQ11R063M22.0E07	●	7	63	47	22	20	40	6.3	10.4	0.5	with	CM10x30H
TPQ11R080M27.0E10	●	10	80	58	27	26	50	7	12.4	1.0	with	CM12x30H
TPQ11R100M32.0E12	●	12	100	66	32	32	50	8	14.4	1.6	with	TMBA-M16H
New TPQ18R050M22.0E03	●	3	50	47	22	20	40	6.3	10.4	0.4	with	CM10x30H
New TPQ18R063M27.0E04	●	4	63	58	27	26	50	7	12.4	0.5	with	CM10x30H
New TPQ18R080M27.0E05	●	5	80	58	27	26	50	7	12.4	0.9	with	CM12x30H
New TPQ18R100M32.0E06	●	6	100	66	32	32	50	8	14.4	1.4	with	TMBA-M16H
New TPQ18R125M40.0E08	●	8	125	82	40	38	63	9	16.4	2.9	with	TMBA-M20H
New TPQ18R160M40.0E09	●	9	160	100	40	38	63	9	16.4	4.1	Without	-

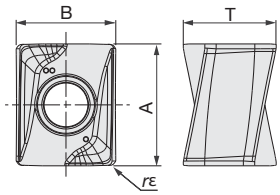
Shank type

JIS / ISO

Cat. No.	Stock	No. of Inserts	Dimensions (mm)					Weight (kg)	Air hole	Shank type
			øDc	*øDs*	*ℓ s*	*Lf*	*L*			
EPQ11R025M25.0-02	●	2	25	25	70	30	100	0.3	with	Cylindrical
EPQ11R032M32.0-03	●	3	32	32	80	35	115	0.7	with	
EPQ11R040M32.0-04	●	4	40	32	80	35	115	0.8	with	
EPQ11R050M32.0-05	●	5	50	32	80	40	120	0.9	with	
EPQ11R063M32.0-06	●	6	63	32	80	40	120	1.1	with	
EPQ11R080M32.0-07	●	7	80	32	80	40	120	1.4	with	
New EPQ18R040M32.0W03	●	3	40	32	75	35	110	0.7	with	Weldon
New EPQ18R050M32.0W04	●	4	50	32	75	40	115	0.9	with	

● : Stocked items

Inserts



Cat. No.	Accuracy	Honing	Grades Coated			Dimensions (mm)				Cutter
			AH725	AH120	AH140	A	B	T	r_ε	
LQMU110704PNER-MJ	M	with	●	●	●	11.0	9.0	8.3	0.4	EPQ11R TPQ11R
LQMU110708PNER-MJ	M	with	●	●	●	11.0	9.0	8.3	0.8	
LQMU110716PNER-MJ	M	with	●	●	●	11.0	9.0	8.3	1.6	
New LQMU180804PNER-MJ	M	with	●	●	●	17.5	11.5	10.9	0.4	TPQ18R EPQ18R
New LQMU180808PNER-MJ	M	with	●	●	●	17.5	11.5	10.9	0.8	
New LQMU180816PNER-MJ	M	with	●	●	●	17.5	11.5	10.9	1.6	
New LQMU180824PNER-MJ	M	with	●	●	●	17.5	11.5	10.9	2.4	

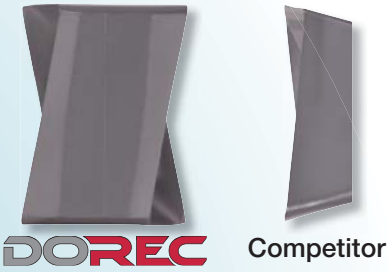
● : Stocked items

Standard cutting conditions

Workpiece materials	Hardness HB	Grades	Cutting speed *Vc* (m/min)	Feed per tooth *fz* (mm/t)
Low carbon steel (S15C / C15E etc.)	~ 200	AH725	100 - 250	0.10 - 0.25
High carbon steel (S45C / C45, S55C / C55 etc.)	200 ~ 300		100 - 230	0.10 - 0.20
Alloy steel (SCM440 / 42CrMo4 etc.)	150 ~ 300			
Tool steel (SKD11 / X153CrMoV12 etc.)	~ 300		100 - 180	
Stainless steel (SUS304 / X5CrNi18-9 etc.)	-	AH140	90 - 180	0.10 - 0.25
Grey cast iron (FC250 / GG25 / 250 etc.)	150 ~ 250	AH120	140 - 250	0.10 - 0.25
Ductile cast iron (FCD450 / GGG45 / 450-10S etc.)			110 - 200	0.10 - 0.25
Superalloys (Inconel 718, Ti-6Al-4V etc.)	-	AH725	20 - 50	0.08 - 0.20

· To remove excessive chip accumulation use an air blast.
· When cutting an interrupted surface or a casted skin, the feed per tooth (*fz*) should be reduced to the lower recommended value shown in the above table.
· Cutting conditions are limited by machine power, work piece 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.

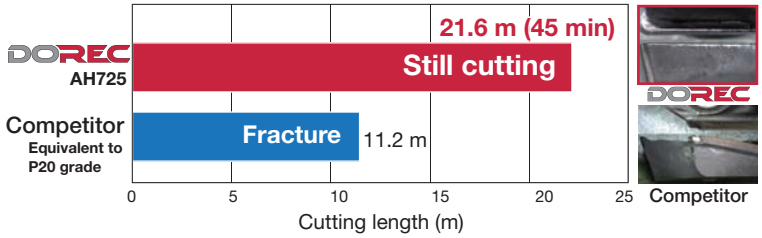
Extremely tough cutting edges lead to efficient machining.



Incredible productivity!

Insert thickness: 1.8 times wider than competitor! → **High fracture resistance**

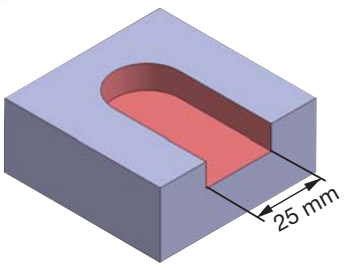
Comparison of fracture resistance



Tool diameter	: øDc = 25 mm	Depth of cut	: ap = 5.0 mm
Corner radius	: r_ε = 0.4	Width of cut	: ae = 12.5 mm
Work material	: S55C / C55 (200HB)	Coolant	: Dry
		No. of inserts	: Only used 1 insert
Cutting speed	: Vc = 150 m/min	Machine	: Vertical M/C, BT50
Feed per tooth	: fz = 0.25 mm/t		

High feed milling improves machining efficiency.

Comparison of metal removal rate

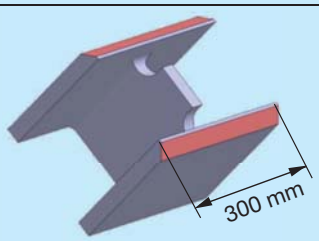
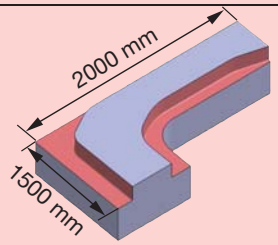
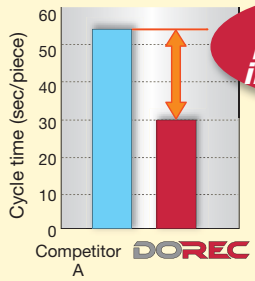
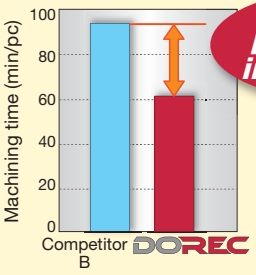


Application: Slot milling
Work material: S55C / C55 (200HB)
Machine: Vertical M/C, BT50

Cutting conditions	DOREC	Competitor
Cutter	**EPQ11R025M25.0-02** (øDc = 25 mm, z = 2)	øDc = 25 mm, z = 3
Insert	**LQMU110704PNER-MJ** AH725	Insert: Positive type with 2 corner P30 grade
Cutting speed: Vc (m/min)	200	150
Feed per tooth: fz (mm/t)	0.15	0.1
Depth of cut: ap (mm)	8	5
Metal removal rate: Q (cc/min)	**150**	70

210% MORE PRODUCTIVITY Milling Intelligently

Practical examples

Part of workpiece		Machine component	Press mold
Milling cutter		EPQ11R032M32.0-03 (ø32, z = 3)	TPQ18R080M25.4-05 (ø80, z = 5)
Insert		LQMU110708PNER-MJ	LQMU180816PNER-MJ
Grade		AH725	AH120
Workpiece material		SS400 / E275A (150HB)	FC250 / GG25 / 250 (180HB)
			
Cutting conditions	Cutting speed: *Vc* (m/min)	200	200
	Feed per tooth: *fz* (mm/t)	0.2	0.2
	Depth of cut: *ap* (mm)	8	12
	Width of cut: *ae* (mm)	4	20 - 60
	Method of machining	Side milling	Shoulder milling
	Coolant	Dry	Dry
	Machine	Vertical M/C, BT40	Vertical M/C, BT50
Results		 180% productivity improvement *Vf* = 671 ➡ 1194 mm/min High feed rate significantly reduces machining time. Stable tool life is provided with the reduction of sudden insert fracture.	 130% productivity improvement *Vf* = 480 ➡ 800 mm/min Due to the tough cutting edge, higher feed per tooth can be applied to reduce the machining time.

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