KORLOY
TECH-NEWS

Tangen-Pro

TP2P

Tangential Shoulder Milling Tool

This milling tool series with its tangential clamping system increases stable machining and productivity, while improving perpendicularity

Superior Clamping Stability

The tangential clamping system enables high speed and high feed machining with its wedge-shaped inserts

Improved Perpendicularity

A high quality milling tool and optimized blade design improves surface finish and perpendicularity

Higher Productivity

High speed and high feed machining result in an exceptional chip removal rate per minute

KORLOY

Insert

Shank

Cutter

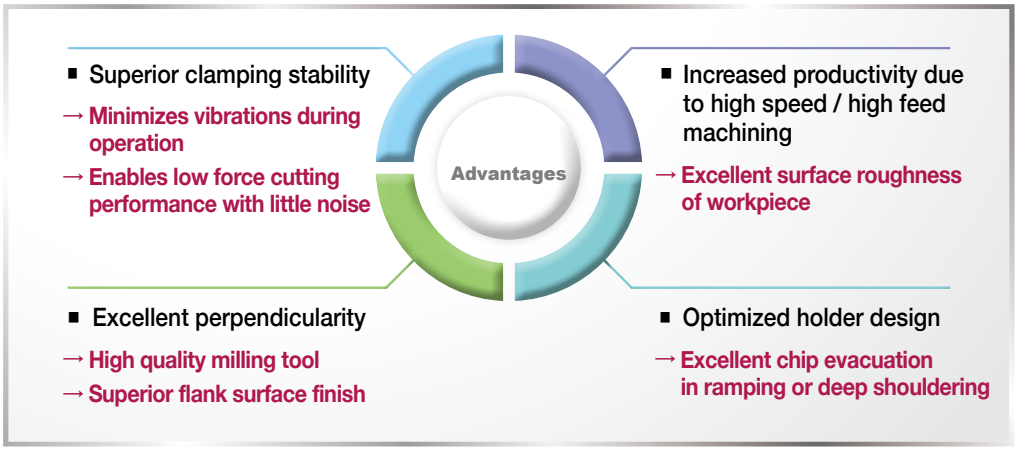
Tangential Shoulder Milling Tool

Tangen-Pro TP2P

The accelerated development of industrial structures has complicated the forming of the workpiece shapes more than ever before. The clamping area for a jig or a vise becomes narrow and leads to tool vibration and imperfect machining conditions. Workpiece materials are also evolving to hard-to-cut materials and high hardness in order to achieve higher durability for industrial components. This is often said to be the major cause of shortened tool life and unexpected tool breakage in many modern metal cutting applications. So companies dealing with unstable workpiece clamping and hard-to-cut materials has a growing demand for cutting tools that are able to solve these problems.

TP2P responds to these demands by using the tangential clamping system and wedge-shaped inserts to improve the clamping stability of the tool itself. Therefore unstable clamping of the workpiece can be off-set by a strong clamping force of the tool. In addition, a sharp chip breaker and high helix angle were applied to the insert design for stable cutting performance in hard-to-cut materials and high hardened workpieces. These design details lead to exceptional increases in tool life.

Additionally, the tangential-type clamping system facilitates securing chip pockets and enables multiple-corner use to boost productivity. TP2P features low force cutting performance even at high speeds and high feeds thanks to its optimized blade design that effectively reduces vibration and cutting resistance during operations. Now productivity can be improved over non-tangential designs by more than 30% due to increases in table feeds, stable clamping, and high speed/high feed rates. The Tangen-Pro TP2P shows excellent performance in P, M, K type materials with its specialized design and grades developed specifically for the most challenging metal cutting applications.
KORLOY's Tangen-Pro TP2P is one of the most advanced tangential type milling tools available to meet the demand of the industrial market today.



Code System

[Insert]

L N K T 17 07 - 08 P N R - MM

- **Insert shape**: L : L type
- **Relief angle of major cutting edge**: N:0°
- **Tolerance**: K : K Class
- **Shape of cross section**: T:T type
- **Cutting edge length**: 17:17mm
- **Height of cutting edge**: 07:7mm
- **Nose R**: 08:R0.8
- **A.A**: P:90°
- **Relief angle of minor cutting edge**: N:0°
- **Hand**: R:Right-handed
- **Chip breaker**: MM: General cutting; ML: Light cutting

[Shank type]

TP 2 P S 050 R - 2 W 32 - 130 - LN17

- **Tangen-Pro**
- **No. of corner**: 2:2corner
- **Approach angle**: P:90°
- **Type**: S:Shank
- **Machining diameter**: 050:Ø50
- **Oil hole & Hand**: R: With oil hole, Right-handed; NR: Without oil hole, Right-handed
- **No. of tooth**: 2: 2 teeth
- **Shank type**: W:Weldon; C:Cylinder
- **Shank diameter**: 032:Ø32
- **Overall length**: 130:130mm
- **Applicable insert**: LN17:LNKT17

[Cutter type]

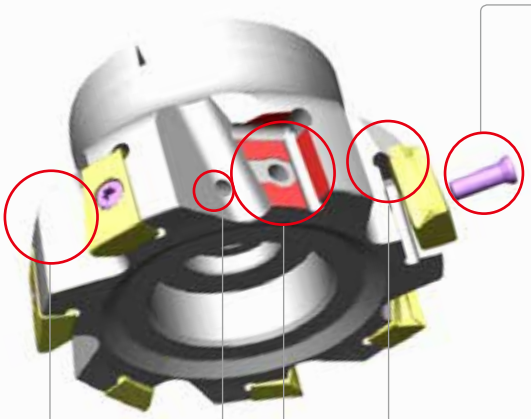
TP 2 P C M 080 R - 22 - 7 - LN17

- **Tangen-Pro**
- **No. of corner**: 2:2corner
- **Approach angle**: P:90°
- **Type**: C:Cutter
- **Arbor type**: M:Metric; A:Inch; None : Asia
- **Machining diameter**: 080:Ø80
- **Oil hole & Hand**: R: With oil hole, Right-handed; NR: Without oil hole, Right-handed
- **Internal diameter**: 22:22mm
- **No. of tooth**: 7: 7 teeth
- **Applicable insert**: LN17:LNKT17

Cutter Features

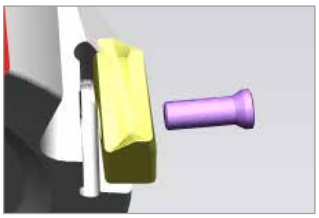
•Tangential clamping system, wedge-shaped inserts and wide seat area
→ **Higher clamping stability**
→ **Lower vibrations and cutting resistance during machining**

•Optimized H/D design with curved surface for smooth chip flow
→ **Excellent chip evacuation in ramping or deep shouldering**



Tangential clamping

• Multi-corner use
→ High feed machining availability

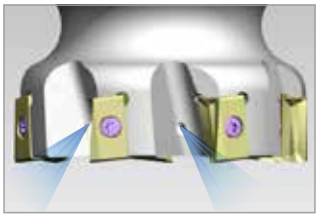


Efficient holder design

• Smoother chip evacuation in slotting or deep shouldering

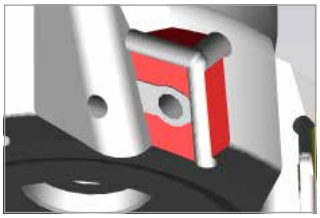
Through coolant system

• Improved chip evacuation
• Longer tool life due to insert cooling



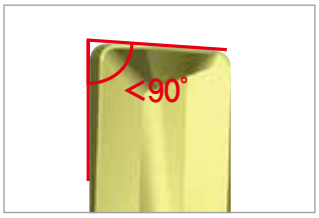
Wide seat area

• Strong clamping force



Wedge type clamping

• Stable insert life



Tangen-Pro TP2P

Features

- **Clamping stability** gained through tangential clamping system and wedge-shaped inserts
- **Excellent surface finish** nearly perfect perpendicularity, and highly even flank surface compared to competitors designs
- **Improved productivity** due to high rake angles and sharp cutting edges which lead to lower cutting resistance → Ideally suited for high speed and high feed machining

Insert Features

Wedge type clamping area

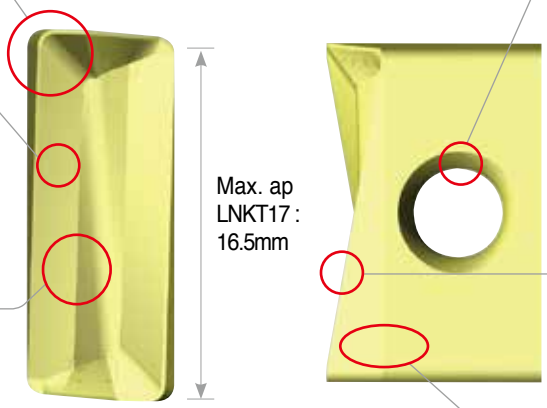
- Clamping in wedge form on seats
  → Creates strong clamping force

High rake angle chip breaker

- High rake angle applied
- Produces smooth chip flow
  → Extended insert life

Convex projection

- Improved chip evacuation
- Enhances rigidity



Side hole (tangential type)

- Higher clamping stability

High rake angle cutting edges

- Improves cutting performance while reducing cutting load

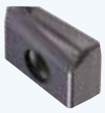
2-level flank relief surface

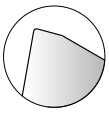
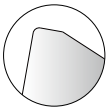
- 1st reverse positive relief surface enhances rigidity
- 2nd negative relief surface enables stable clamping
  → Improved chipping resistance and surface finish

Chip Breaker Features

- Chip breaker **ML**

- Chip breaker **MM**



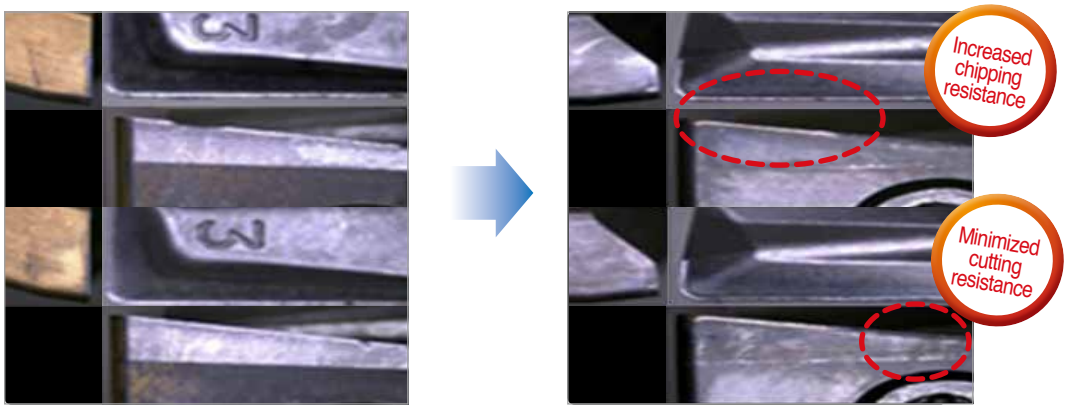
Chip breaker	Cutting edge shape	Application	Features
ML		for Light cutting	■ Chip breaker design for low cutting resistance that provides excellent tool life and quality surface finishes in light cutting and hard-to-cut materials
MM		for General cutting	■ Universal design for general shoulder milling operations, highly suitable in most applications

Performance Evaluation

- **Workpiece** 42CrMo4(DIN), SCM440(KS), 4140(AISI), 300(L)x200(W)x100(h), Steel rectangular tube
- **Cutting conditions** vc(m/min) = 250, fz(mm/t) = 0.2, ap(mm) = 14, ae(mm) = 10, Dry
- **Machining method** Facing
- **Tools** **Insert** LNKT170708PNR-MM(PC5300) **Holder** TP2PCM080R-27-7-LN17

- Stable clamping improves chipping resistance under high speed cutting conditions over vc(m/min) = 250
  → Minimized unexpected tool breakage
- Optimized cutting edge design
  → Minimized cutting resistance

Wear resistance evaluation

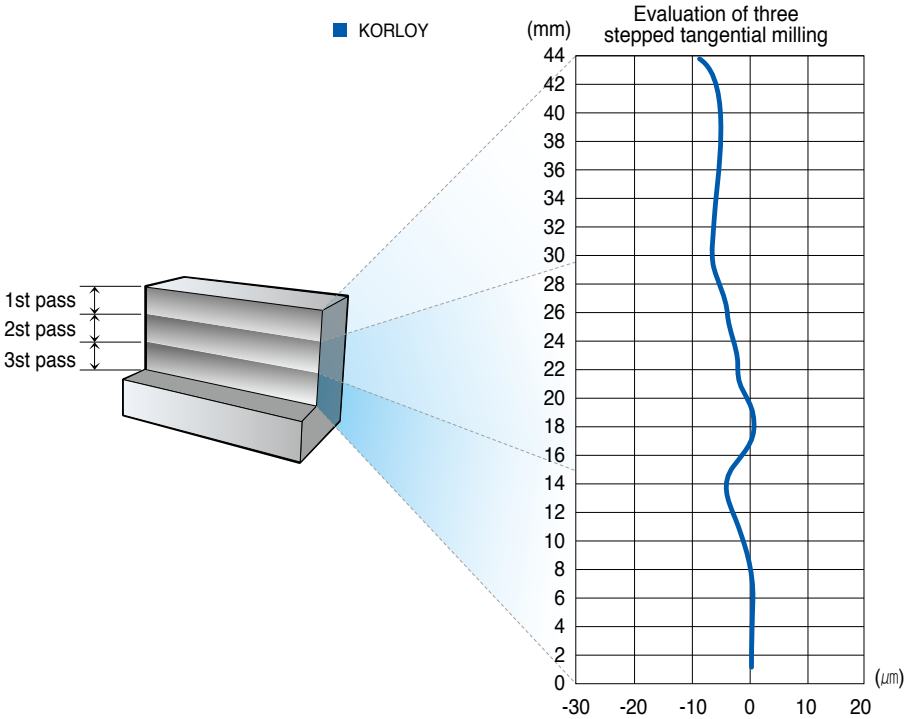


[Competitor] [TP2P]

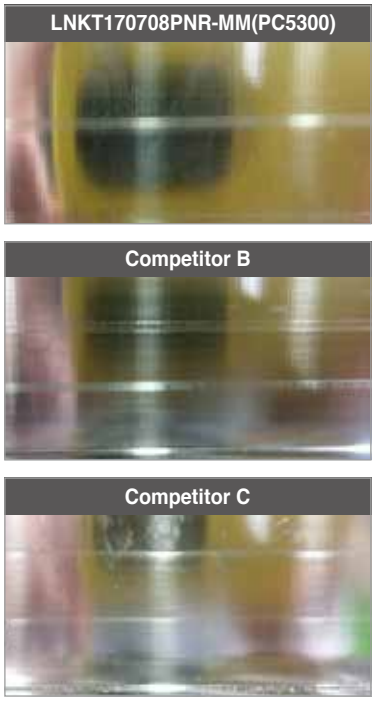
Perpendicularity Evaluation

- **Workpiece** C45(ISO), SM45C(KS), 1045(AISI), 300(L)x200(W)x100(h), Steel rectangular tube
- **Cutting conditions** vc(m/min) = 150, fz(mm/tooth) = 0.15, ap(mm) = 15, ae(mm) = 5, Dry
- **Machining method** Multiple passes in depth, measured after three passes of 15mm each, in total 45mm (measurement of perpendicularity and flank surface roughness)
- **Tools** **Insert** LNKT170708PNR-MM(PC5300) **Holder** TP2PCM080R-27-7-LN17

Perpendicularity Evaluation



[Comparison graph of measured perpendicularities]



[Comparison pictures of flank surface finish]

Tangen-Pro TP2P

Grade Guideline by Workpiece Type

Cutting conditions		P		K
		Carbon steel	Alloy steel	Cast iron
Grade	High speed cutting	PC5300	PC5300	PC6510
	General cutting	PC5400	PC5300	PC6510
	Interrupted cutting	PC5400	PC5400	PC5300

Recommended Cutting Conditions

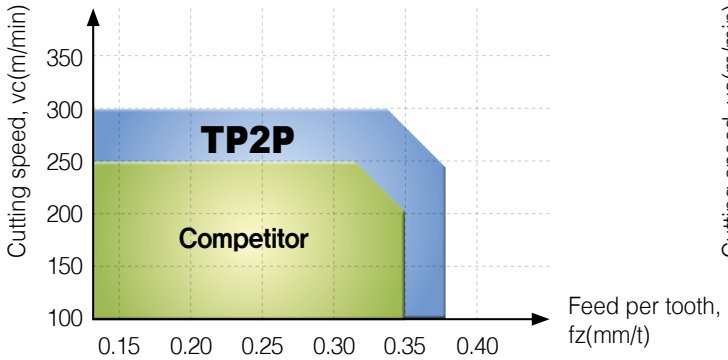
Workpiece		Grade	vc (m/min)	fz (mm/t)	Max. ap (mm)	Applicable insert
P	Steel	PC5300	150~240	0.25~0.05	16.5	LNKT170708PNR-MM
		PC5400	130~210	0.25~0.05	16.5	
K	Cast iron	PC6510	100~250	0.25~0.05	16.5	LNKT170708PNR-ML

※ The above data refer to general cutting conditions and can be adjustable to the speed of 300m/min and the feed per tooth of 0.5mm/t depending on user environment.

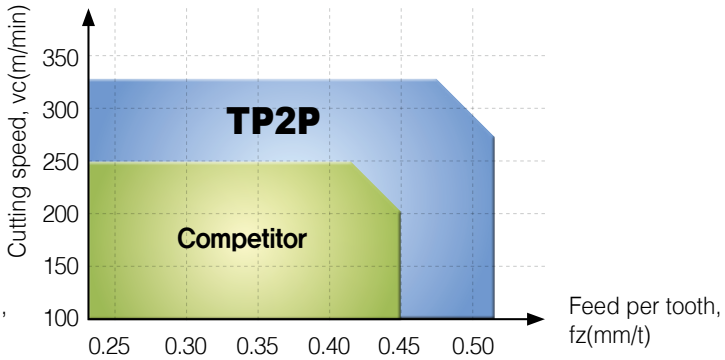
Application Range

■ High speed / high feed capability improves productivity compared to competitors

• ap(mm) = 14, ae(mm) = 10

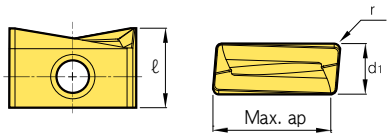


• ap(mm) = 8, ae(mm) = 10

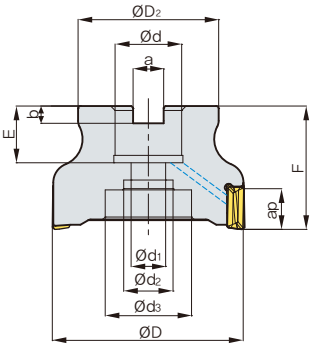


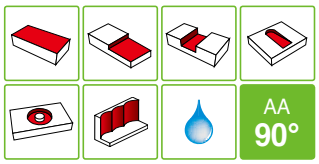
Applicable Insert

(mm)

Shape	Designation		Dimensions (mm)				Coated			Figure
			d_1	ℓ	r	Max. ap	PC5300	PC5400	PC6510	
	LNKT	170708PNR-MM	7.0	11.0	0.8	16.5	●	●		
		170708PNR-ML	7.0	11.0	0.8	16.5	●		●	

Cutter





(mm)

Designation			ØD	ØD2	Ød	Ød1	Ød2	Ød3	a	b	E	F	ap	kg
TP2PCM	040R-16-3-LN17	3	40	35	16	9	14	-	8.4	5.6	16	40	16.5	0.17
	040R-16-4-LN17	4	40	35	16	9	14	-	8.4	5.6	16	40	16.5	0.17
	050R-22-4-LN17	4	50	41	22	11	18	-	10.4	6.3	20	40	16.5	0.27
	050R-22-5-LN17	5	50	41	22	11	18	-	10.4	6.3	20	40	16.5	0.26
	063R-22-6-LM17	6	63	49	22	11	18	-	10.4	6.3	20	40	16.5	0.46
	063R-22-7-LM17	7	63	49	22	11	18	-	10.4	6.3	20	40	16.5	0.47
	080R-27-7-LN17	7	80	57	27	14	20	35	12.4	7.0	23	50	16.5	0.89
	080R-27-8-LN17	8	80	57	27	14	20	35	12.4	7.0	23	50	16.5	0.91
	100R-32-8-LN17	8	100	67	32	18	28	45	14.4	8.0	25	63	16.5	1.68
	100R-32-9-LN17	9	100	67	32	18	28	45	14.4	8.0	25	63	16.5	1.75
	125R-40-10-LN17	10	125	90	40	22	32	52	16.4	10.0	30	63	16.5	2.88
	125R-40-11-LN17	11	125	90	40	22	32	52	16.4	10.0	30	63	16.5	2.88
TP2PC	080R-25.4-7-LN17	7	80	57	25.4	14	20	35	9.5	6.0	25	50	16.5	0.92
	080R-25.4-8-LN17	8	80	57	25.4	14	20	35	9.5	6.0	25	50	16.5	0.93
	100R-31.75-8-LN17	8	100	67	31.75	18	28	45	12.7	8.0	32	63	16.5	1.73
	100R-31.75-9-LN17	9	100	67	31.75	18	28	45	12.7	8.0	32	63	16.5	1.73
	125R-38.1-10-LN17	10	125	90	38.1	22	32	52	15.9	9.0	35	63	16.5	3.06
	125R-38.1-11-LN17	11	125	90	38.1	22	32	52	15.9	9.0	35	63	16.5	2.91

Applicable Insert

LNKT-MM

LNKT-ML

Designation		Coated		
		PC5300	PC5400	PC6510
LNKT	170708PNR-MM	●	●	
	170708PNR-ML	●		●

Applicable Arbor

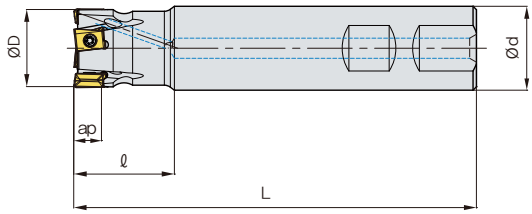
Designation		Applicable arbor
TP2PCM	040R-16-3-LN17	BT□□-FMC16-□□
	040R-16-4-LN17	
	050R-22-4-LN17	BT□□-FMC22-□□
	050R-22-5-LN17	
	063R-22-6-LN17	
	063R-22-7-LN17	
	080R-27-7-LN17	BT□□-FMC27-□□
	080R-27-8-LN17	
	100R-32-8-LN17	BT□□-FMC32-□□
	100R-32-9-LN17	
	125R-40-10-LN17	BT□□-FMC40-□□
	125R-40-11-LN17	
TP2PC	080R-25.4-7-LN17	BT□□-FMA25.4-□□
	080R-25.4-8-LN17	
	100R-31.75-8-LN17	BT□□-FMA31.75-□□
	100R-31.75-9-LN17	
	125R-38.1-10-LN17	BT□□-FMA38.1-□□
	125R-38.1-11-LN17	

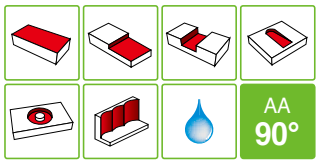
Parts

Specification	Screw	Wrench
Ø40 ~ Ø125	FTKA0412B	TW15S

Tangen-Pro TP2P

Shank





(mm)

Designation			ØD	Ød	ℓ	L	ap	kg
TP2PS	032R-2W32-130-LN17	2	32	32	40	130	16.5	0.68
	032R-3W32-130-LN17	3	32	32	40	130	16.5	0.67
	040R-3W32-130-LN17	3	40	32	40	130	16.5	0.73
	040R-4W32-130-LN17	4	40	32	40	130	16.5	0.73
	050R-4W32-130-LN17	4	50	32	40	130	16.5	0.83
	050R-5W32-130-LN17	5	50	32	40	130	16.5	0.83

Applicable Insert

LNKT-MM

LNKT-ML

Designation		Coated		
		PC5300	PC5400	PC6510
LNKT	170708PNR-MM	●	●	
	170708PNR-ML	●		●

Coating

Specification	Screw	Wrench
Ø32 ~ Ø50	FTKA0412B	TW15S

KORLOY

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