

# T Endmill



## Endmill for Machining Dental Prostheses

Endmills for machining dental prostheses made of zirconia, titanium, Co-Cr, wax, PMMA, etc.

### ▣ PC2510/ND3000

Improved tool performance thanks to the optimized grade for each material (• PC2510: Titanium, Co-Cr • ND3000: Zirconia)

### ▣ Custom-Made Tools for Each Equipment type

Differentiated tools specialized for each type of home and foreign CNC machines for dental purpose



# Endmill for Machining Dental Prostheses

made of zirconia, titanium, Co-Cr, wax, PMMA, etc.



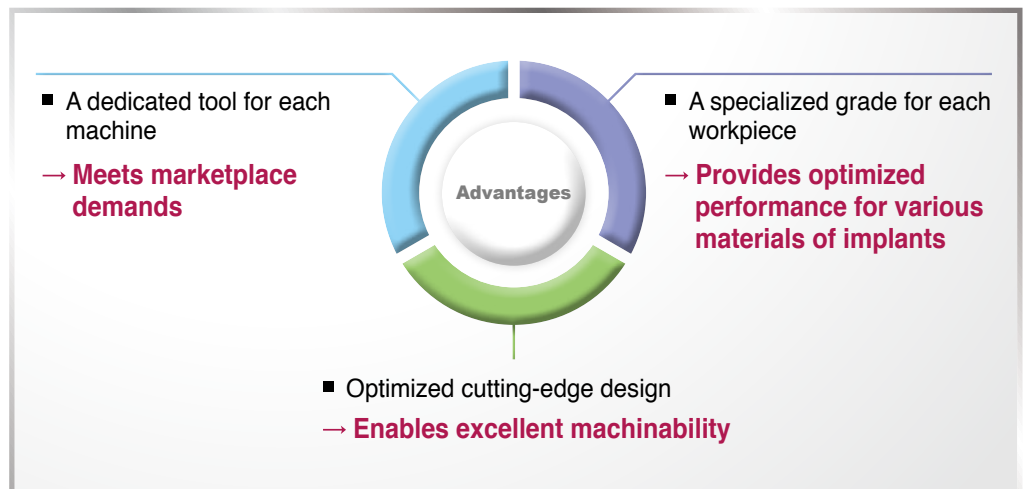
The need for dental implants has grown steadily in step with the increase in the aging global population. Accordingly, many companies are now actively developing dental CAD/CAM machines, and they compete by developing their own proprietary tool shapes. To meet the demand, KORLOY has released the **T Endmill** that helps customers stay ahead of the competition with a customized tool for each machine.



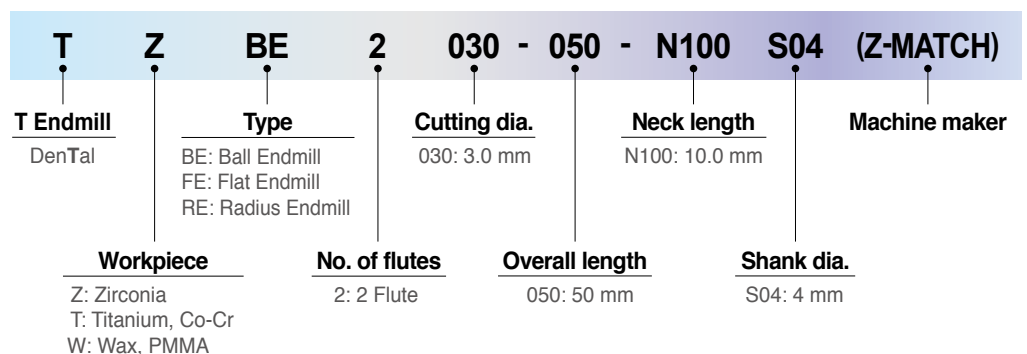
Dental CAD/CAM technology is continuously developing by taking advantage of X-ray and oral scanners, and many manufacturers have commercialized CNC machines to automate the previous manual process of manufacturing implants. As a result, machining time is significantly reduced, resulting in improved productivity and demands for tools with longer life.

The typical materials of dental prostheses, such as zirconia, titanium, Co-Cr, wax, and PMMA, have different physical and mechanical properties, and each requires an optimized tool solution.

**T Endmill** uses a specialized grade for each workpiece: ND3000 for zirconia, and PC2510 for titanium and Co-Cr, and guarantees excellent machinability thanks to its optimized blade design.



## Code System

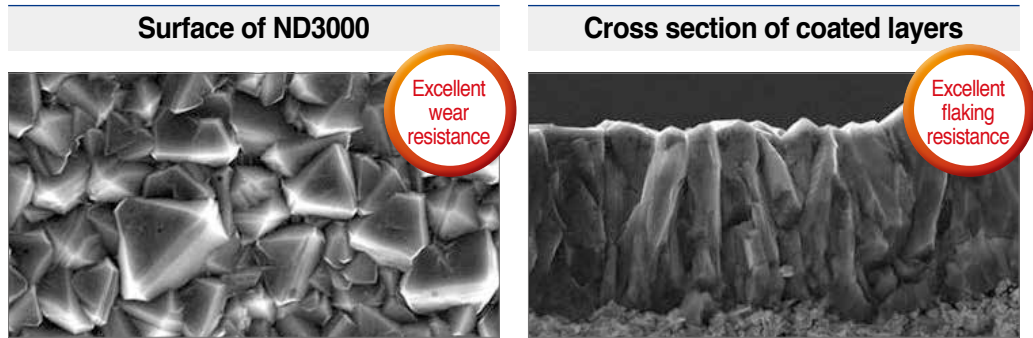


## Grade for Zirconia

### Development of ND3000 (Diamond-coated grade)

- High hardness diamond coating that is excellent in machining graphite and ceramic
- Optimized for high speed and medium duty cutting thanks to its excellent grip to coated layers

• Inhibiting excessive flank wear caused by friction between ceramic particles and clearance surface of the tool



→ High hardness diamond coating (Hv 10,000) provides **excellent wear resistance**

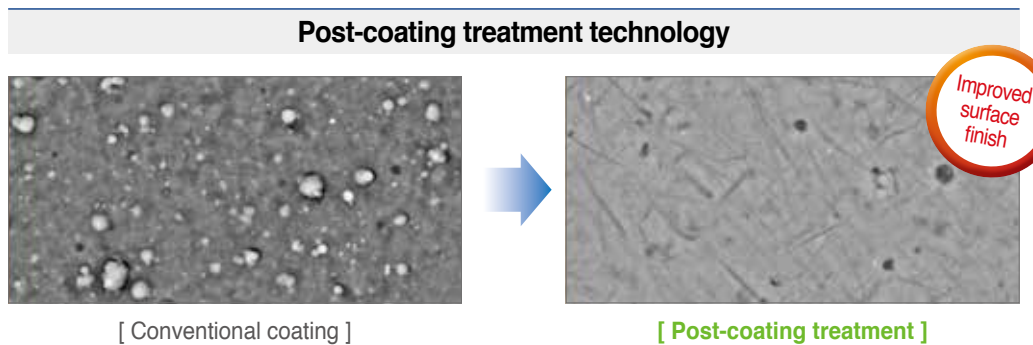
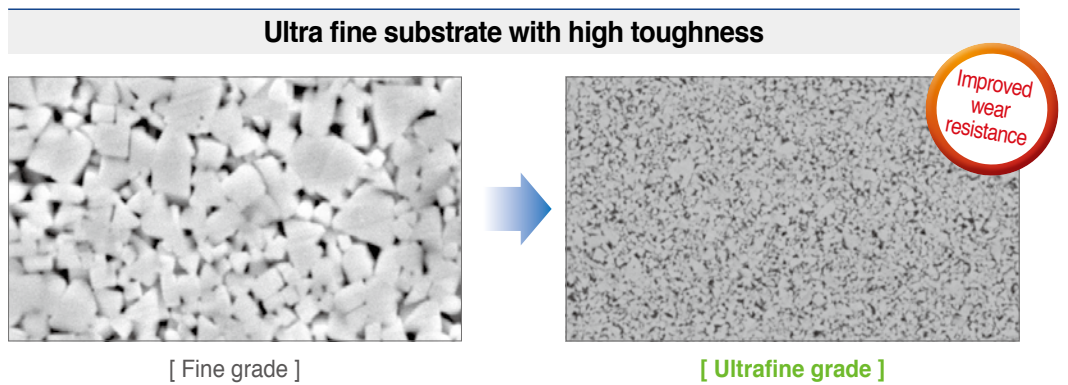
→ Specialized grade for zirconia provides **excellent adhesion**

## Grade for Titanium, Co-Cr

### Development of PC2510 (Coated grade for high hardened steel)

- Post-coating treatment has been applied to improve surface finish.
- A grade optimized for interrupted machining of high hardness steels and wet treatment accompanying high thermal shock. Its ultrafine substrate features high toughness which allows stable performance.

• Its tough and wear-resistant substrate is optimized for absorbing thermal shock which is concentrated on cutting edges when machining Titanium.



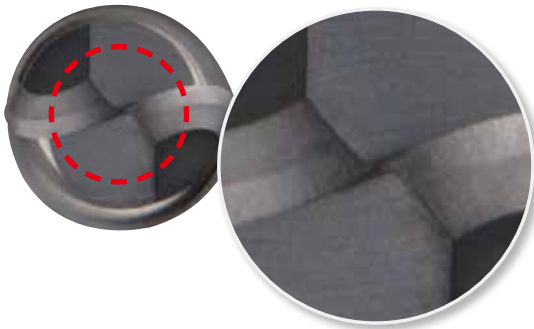
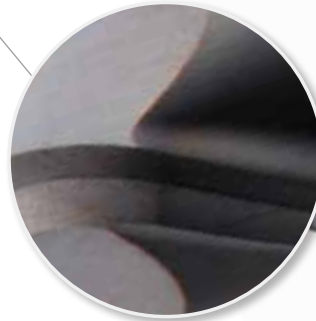
## Endmill Series for Machining Dental Prostheses

- For machining dental prostheses made of zirconia, titanium, Co-Cr, wax, PMMA, etc.
- Optimized cutting performance by matching a proper grade with each type of material
- Inhibited unevenness and excellent finish in machined surfaces due to the optimized cutting-edge design
- Specialized tool shape for each machine type

### Features

#### Tangential cutting-edge shape

- One-Pass Grinding applied
- Inhibited unevenness and excellent finish in machined surfaces

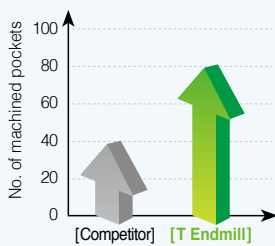


#### Center-Matched ball shape

- Optimized center shape ensures relief angle at the ball point.
- Cutting edges of the ball point shape provide excellent wear resistance and cutting performance.

### Performance Evaluation

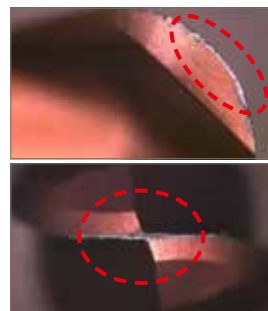
#### [ Cutting Performance ]



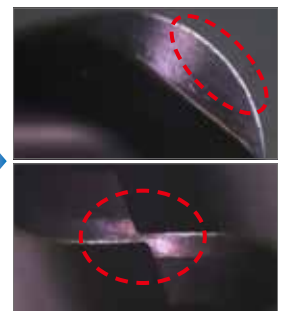
Excellent resistance to toughness and wear thanks to the new grade PC2510

#### Picture comparison of wear

- Workpiece Co-Cr
- Cutting conditions
  - vc (m/min) = 150
  - fz (mm/t) = 0.08
  - ap (mm) = 0.13
  - ae (mm) = 0.7
  - wet
- Tool TTBE2030-050



[ Competitor ]



[ T Endmill ]

## ⇒ Application Examples



### Zirconia crowns

- Workpiece Zirconia
- Cutting conditions  $v_c$  (m/min) = 140,  $f_z$  (mm/t) = 0.05,  $a_p$  (mm) = 0.1,  $a_e$  (mm) = 0.6, dry
- Tool TZBE2020-044-N200S03 (DOF)

#### T Endmill

Machined over 200 pieces of crowns

#### Competitor

Machined about 200 pieces of crowns



➔ 10% more crowns than the competitor

## ⇒ Recommended Cutting Conditions (for Titanium and Co-Cr)

Cutting diameter (Ø)	Application	$a_p$ (mm)	$a_e$ (mm)	$n$ (min <sup>-1</sup> )	$vf$ (mm/min)
3.0	Roughing	0.12	0.7	10,500	1,150
2.5	Medium cutting	0.08	0.53	11,500	850
2.0	Medium cutting	0.08	0.42	14,500	850
1.5	Finishing	0.04	0.32	19,000	850
1.0	Finishing	0.02	0.07	28,500	850
0.6	Finishing	0.02	0.07	28,500	850

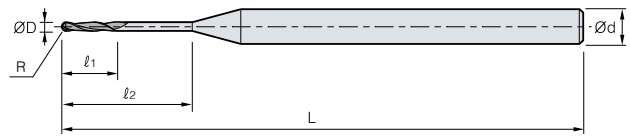
## ⇒ Recommended Cutting Conditions (for Zirconia)

Cutting diameter (Ø)	Application	$a_p$ (mm)	$a_e$ (mm)	$n$ (min <sup>-1</sup> )	$vf$ (mm/min)
3.0	Roughing	0.5	1.5	23,500	1,600
2.5	Medium cutting	0.3	1.25	28,000	1,200
2.0	Finishing	0.3	1.0	35,000	1,200
1.0	Finishing	0.1	0.2	38,500	1,050
0.6	Finishing	0.1	0.2	63,500	630

### ※ Caution

- Please adjust the above cutting conditions according to the state of your machine, the target shape and your purpose.
- Workpieces should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio.

## ➔ TZBE2000 (Ball Endmill for Machining Zirconia)

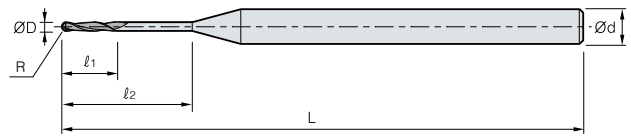


ØD	Tolerance
~ Ø1.0	0.00~ -0.015
Ø1.0~Ø3.0	0.00~ -0.02

(mm)

Shape	Machine type	Designation	ØD	ℓ <sub>1</sub>	ℓ <sub>2</sub>	L	Ød	R
	MANIX	TZBE2006-045-N070S04 (MANIX)	0.6	2	7	45	4	0.3
		TZBE2010-050-N160S04 (MANIX)	1	3	16	50	4	0.5
		TZBE2020-050-N200S04 (MANIX)	2	8	20	50	4	1.0
	VHF K3, K4	TZBE2006-035-N070S03 (VHF)	0.6	2	7	35	3	0.3
		TZBE2010-035-N160S03 (VHF)	1	2	16	35	3	0.5
		TZBE2020-035-N160S03 (VHF)	2	4	16	35	3	1.0
	VHF S1, S2, S3	TZBE2006-040-N070S03 (VHF)	0.6	2	7	40	3	0.3
		TZBE2010-040-N160S03 (VHF)	1	2	16	40	3	0.5
		TZBE2020-040-N200S03 (VHF)	2	4	20	40	3	1.0
	IMES-ICORE	TZBE2006-048-N100S03 (IMESICORE)	0.6	1.5	10	48	3	0.3
		TZBE2006-050-N020S06 (IMESICORE)	0.6	2	-	50	6	0.3
		TZBE2010-048-N140S03 (IMESICORE)	1	4	14	48	3	0.5
		TZBE2010-050-N150S06 (IMESICORE)	1	4	15	50	6	0.5
		TZBE2025-048-N200S03 (IMESICORE)	2.5	4.5	20	48	3	1.25
		TZBE2025-050-N200S06 (IMESICORE)	2.5	10	20	50	6	1.25
	DOF	TZBE2010-044-N190S03 (DOF)	1	6	19	44	3	0.5
		TZBE2020-044-N200S03 (DOF)	2	8	20	44	3	1.0
	WIELAND MINI	TZBE2003-035-N003S03 (WIELAND)	0.3	0.3	-	35	3	0.15
		TZBE2007-035-N070S03 (WIELAND)	0.7	2	7	35	3	0.35
		TZBE2010-035-N140S03 (WIELAND)	1	4	14	35	3	0.5
		TZBE2025-035-N200S03 (WIELAND)	2.5	6	20	35	3	1.25
	WIELAND SELECT	TZBE2003-040-N015S03 (WIELAND)	0.3	1.5	-	40	3	0.15
		TZBE2007-040-N070S03 (WIELAND)	0.7	2	7	40	3	0.35
		TZBE2010-040-N140S03 (WIELAND)	1	4	14	40	3	0.5
		TZBE2025-040-N200S03 (WIELAND)	2.5	6	20	40	3	1.25
	ARUM	TZBE2006-050-N080S06 (ARUM)	0.6	1.5	8	50	6	0.3
		TZBE2010-045-N160S04 (ARUM)	1	2	14	53	6	0.5
		TZBE2020-045-N160S04 (ARUM)	2	6	20	53	6	1.0

## ➔ TZBE2000 (Ball Endmill for Machining Zirconia)

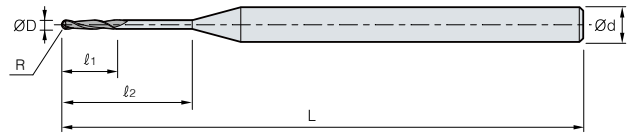


ØD	Tolerance
~Ø1.0	0.00~ -0.015
Ø1.0~Ø3.0	0.00~ -0.02

(mm)

Shape	Machine type	Designation	ØD	ℓ <sub>1</sub>	ℓ <sub>2</sub>	L	Ød	R
	ZIRKONZAHN	TZBE2005-050-N095S06 (ZIRKONZAHN)	0.5	3	9.5	50	6	0.25
		TZBE2005-057-N095S03 (ZIRKONZAHN)	0.5	3	9.5	57	3	0.25
		TZBE2010-050-N120S06 (ZIRKONZAHN)	1	6	12	50	6	0.5
		TZBE2010-057-N120S03 (ZIRKONZAHN)	1	6	12	57	3	0.5
		TZBE2020-050-N180S06 (ZIRKONZAHN)	2	10	18	50	6	1.0
		TZBE2020-057-N180S03 (ZIRKONZAHN)	2	10	18	57	3	1.0
	SIRONA	TZBE2005-042-N090S03 (SIRONA)	0.5	1.5	9	42	3	0.25
		TZBE2010-043-N170S03 (SIRONA)	1	3.5	17	43	3	0.5
		TZBE2025-044-N240S03 (SIRONA)	2.5	4	24	44	3	1.25
	ROLAND	TZBE2006-050-N120S04 (ROLAND)	0.6	1.5	12	50	4	0.3
		TZBE2010-050-N160S04 (ROLAND)	1	2	16	50	4	0.5
		TZBE2020-050-N200S04 (ROLAND)	2	3	20	50	4	1.0
		TZBE2030-050-N200S04 (ROLAND)	3	6	20	50	4	1.5
	Z-MATCH	TZBE2005-055-N080S06 (Z-MATCH)	0.5	1.5	8	55	6	0.25
		TZBE2010-055-N160S06 (Z-MATCH)	1	3	16	55	6	0.5
		TZBE2020-055-N200S06 (Z-MATCH)	2	6	20	55	6	1.0
	CERACUBE TRION-Z	TZBE2005-050-N030S04 (TRION-Z)	0.5	2	23	50	4	0.25
		TZBE2010-050-N180S04 (TRION-Z)	1	3	18	50	4	0.5
		TZBE2020-050-N200S04 (TRION-Z)	2	7	20	50	4	1.0
	DATRON	TZBE2006-050-N100S06 (DATRON)	0.6	2.5	10	50	6	0.3
		TZBE2010-050-N160S06 (DATRON)	1	4	16	50	6	0.5
		TZBE2020-050-N200S06 (DATRON)	2	4.5	20	50	6	1.0
	CHARLY	TZBE2005-0385-N090S03 (CHARLY)	0.5	1.5	9	38.5	3	0.25
		TZBE2010-0385-N110S03 (CHARLY)	1	2	11	38.5	3	0.5
		TZBE2015-0385-N110S03 (CHARLY)	1.5	3	11	38.5	3	0.75
	CHARLY	TZFE2030-0385-N060S03 (CHARLY)	3	6	-	38.5	3	-
	YENA	TZBE2006-045-N070S04 (YENA)	0.6	2	7	45	4	0.3
		TZBE2010-045-N160S04 (YENA)	1	3	16	45	4	0.5
		TZBE2020-045-N160S04 (YENA)	2	10	16	45	4	1.0

## TTBE2000 (Ball Endmill for Machining Titanium and Co-Cr)



ØD	Tolerance
~Ø3.0	0.00~ -0.015

(mm)

Shape	Machine type	Designation	ØD	l <sub>1</sub>	l <sub>2</sub>	L	Ød	R
	ARUM	TTBE2006-050-N030S06 (ARUM)	0.6	1.5	3	50	6	0.3
		TTBE2010-050-N100S06 (ARUM)	1	2	10	50	6	0.5
		TTBE2015-050-N100S06 (ARUM)	1.5	3	10	50	6	0.75
		TTBE2020-050-N120S06 (ARUM)	2	6	12	50	6	1.0
		TTBE2030-050-N120S06 (ARUM)	3	8	12	50	6	1.5
	ZIRKONZAHN	TTBE2020-050-N120S06 (ZIRKONZAHN)	2	3	12	50	6	1.0
		TTBE2030-050-N180S06 (ZIRKONZAHN)	3	4.5	18	50	6	1.5
	RND	TTBE2010-050-N100S06 (RND)	1	1.5	10	50	6	0.5
		TTBE2015-050-N100S06 (RND)	1.5	2	10	50	6	0.75
		TTBE2020-050-N120S06 (RND)	2	3	12	50	6	1.0
		TTBE2030-050-N120S06 (RND)	3	4.5	12	50	6	1.5
	Z-MATCH	TTBE2015-045-N070S06 (Z-MATCH)	1.5	3	7	45	6	0.75
		TTBE2020-045-N070S06 (Z-MATCH)	2	3	7	45	6	1.0
		TTBE2030-045-N100S06 (Z-MATCH)	3	4	10	45	6	1.5
	ELBEN	TTBE2010-045-N100S06 (ELBEN)	1	2	10	45	6	0.5
		TTBE2020-045-N120S06 (ELBEN)	2	4	12	45	6	1.0
		TTBE2030-045-N150S06 (ELBEN)	3	6	15	45	6	1.5
	IMES-CORE	TTBE2030-0385-N120S03 (IMESICORE)	3	4	12	38.5	3	1.5
	MANIX	TTBE2030-045-N130S06 (MANIX)	3	4	13	45	6	1.5



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