

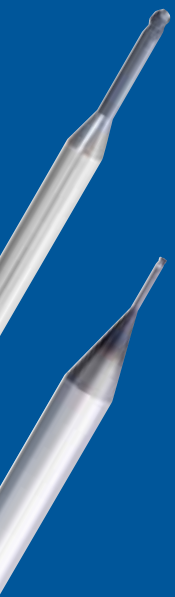


Long-neck & Ball nose end mills

PHX-LN-DBT PHX-LN-CRE



PHX End Mill Series



PHX-LN-DBT **NEW SIZES**

3-flute long neck ball nose end mill - Applicable to rough milling and rib milling PAGE 3

PHX-LN-CRE

4-flute long neck small ball nose end mill - Provides excellent surface finish under high feed rate condition PAGE 8



Key features PHX-LN-DBT



Time required for roughing can be greatly reduced with the PHX long neck ball nose end mill!

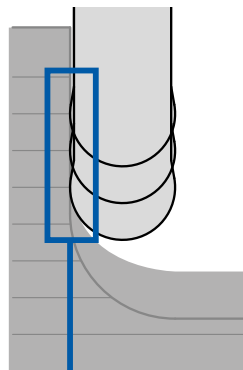
1 Short length of cut

Highly rigid 0.75D short length of cut geometry enables low resistance vertical wall milling.

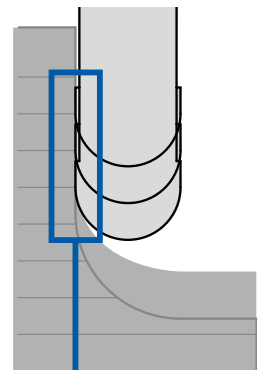


2 Improved accuracy in vertical wall milling

Without back taper, the PHX-LN-DBT's peripheral cutting edge is able to achieve flat milling to improve accuracy.



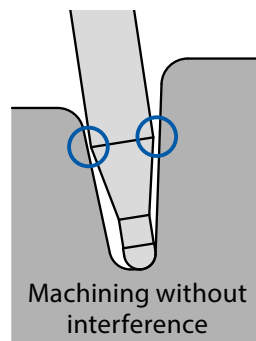
Peripheral cutting edge with back taper



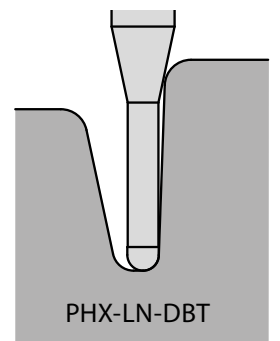
Peripheral cutting edge without back taper

3 Slim neck shape

Performs particularly well in five-axis milling with neck length limitation.

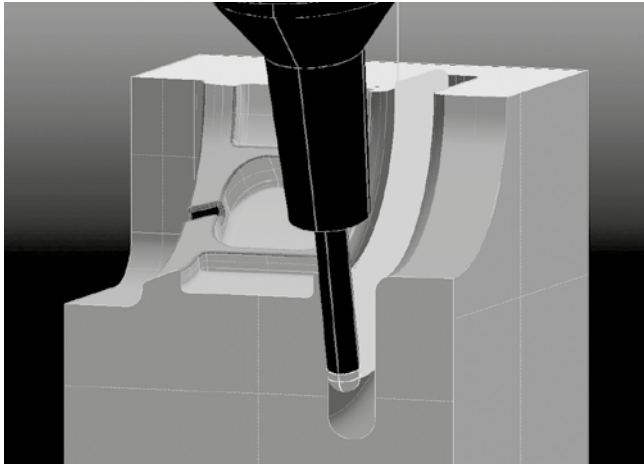
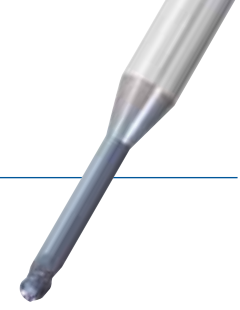


Machining without interference



PHX-LN-DBT

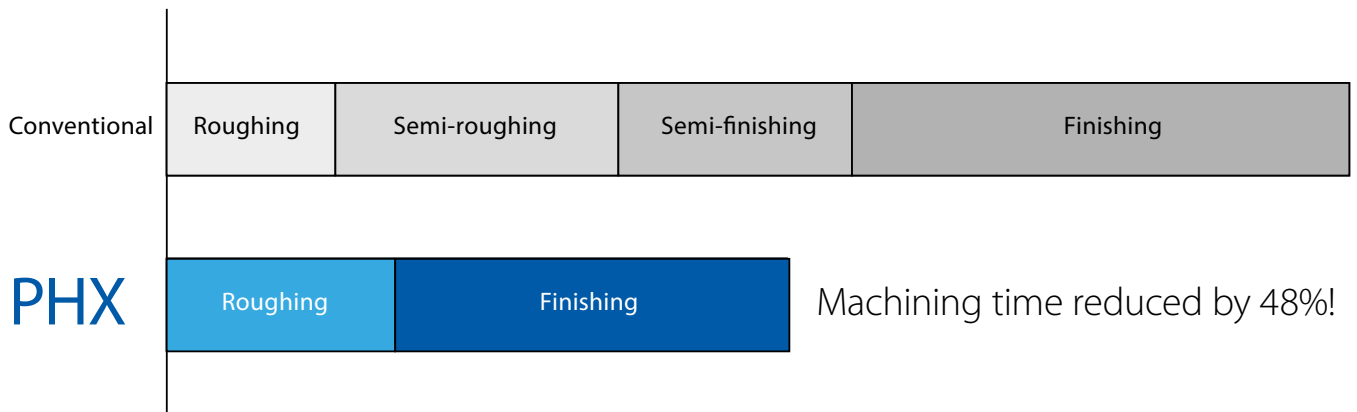
Example in five-axis machining



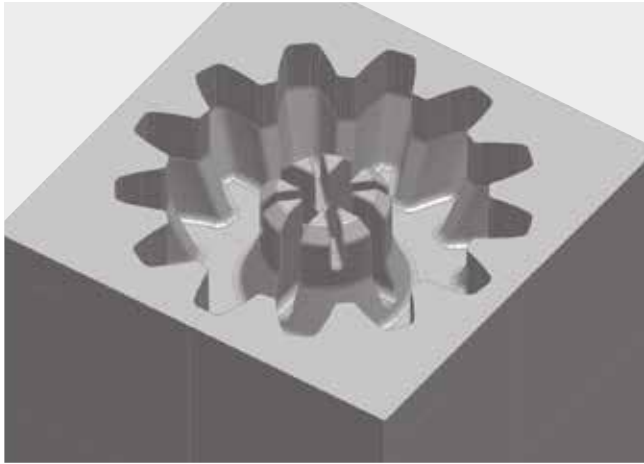
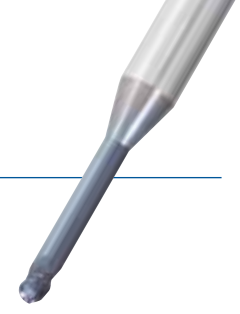
Work size	50×50×50mm
Work Material	NAK80 40HRC
Machine	Five-axis Machining Center
Main Spindle	HSK A63
Coolant	Air Blow
Maximum RPM	18,000 min ⁻¹
Holder	Shrink Fit

Process	Milling Process	Tool	Length	(min ⁻¹) Speed	(mm/min) Feed	(mm) ap	(mm) pf	(mm) Remnants	(m) Milling Length	Milling Time
1	Contour roughing	PHX-DFR 10×R2	25.0	3,800	2,100	0.50	2.50	0.1	15.4	0:07:16
2	Side finish milling	↓	25.0	3,800	600	-	2.40	0	376.0	0:00:50
3	Contour roughing	↓	25.0	2,400	2,100	0.50	2.50	0.05	20.1	0:08:37
4	Fixed inclined-axis surface milling	↓	25.0	3,800	1,000	-	0.20	0	8.9	0:10:42
5	Contour surface roughing	PHX-LN-DBT R2×20	23.0	7,600	1,550	0.25	1.00	0.01	17.5	0:13:46
6	Contour surface finish milling	↓	23.0	5,500	1,350	0.12	0.10	0	16.2	0:10:40
7	Contour surface roughing	PHX-LN-DBT R1.5×12	14.0	12,000	1,700	0.30	0.70	0.05	14.0	0:09:26
8	Contour surface finish milling	↓	14.0	11,000	2,050	0.09	0.10	0	9.5	0:04:31
9	Circumferential surface finish milling	↓	14.0	11,000	2,050	-	0.08	0	5.4	0:02:49
10	Surface milling (rounded corners)	↓	14.0	11,000	2,050	-	0.08	0	5.4	0:03:12
11	Milling of remaining areas	PHX-LN-DBT R0.75×6	13.0	16,000	960	0.04	0.04	0	18.4	0:24:54
12	Contour surface roughing	PHX-LN-DBT R0.5×4	12.0	18,000	1,000	0.05	0.16	0	9.0	0:09:45
13	Contour surface finish milling	↓	12.0	18,000	900	-	0.03	0	339.0	0:00:29

Tool operation time 1:46:57



Machining data

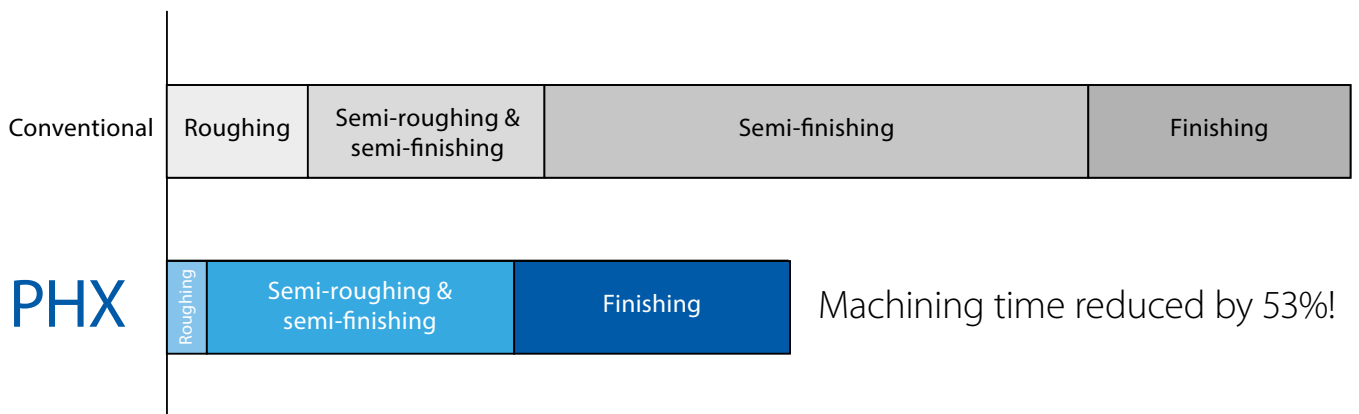


Work size	50×50×50mm
Work Material	NAK80 40HRC
Machine	Five-axis Machining Center
Main Spindle	HSK A63
Coolant	Air Blow
Maximum RPM	18,000 min ⁻¹
Holder	Shrink Fit

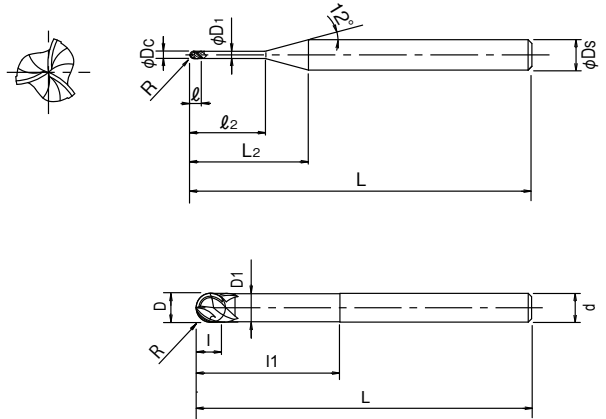
Process	Milling Process	Tool	Length	(min ⁻¹) Speed	(mm/min) Feed	(mm) ap	(mm) pf	(mm) Remnants	(m) Milling Length	Milling Time
1	3D Arbitrary Stock Roughing	PHX-LN-DBT R3×20	22	8,000	4,500	0.50	1.5	0.1	10.1	0:06:27
2	Arbitrary Stock Roughing	PHX-LN-DBT R1×12	20	12,000	1,200	0.15	0.8	0.05	28.3	0:43:19
3 ¹	3D Complete Machining	↓	20	12,000	1,200	-	0.4	0.05	782.0	
4	3D Z-Level Finishing	↓	20	12,000	2,000	0.12	-	0	33.4	0:31:31
5	3D Plofile Finishing	↓	20	12,000	2,000	-	0.12	0	4.4	
6	3D Rest Machining	↓	20	12,000	2,000	0.12	0.12	0	2.5	
7	3D Z-Level Finishing	PHX-LN-DBT R0.5×6	15	12,000	600	0.06	-	0	8.3	0:36:58
8	3D Z-Level Finishing	↓	15	12,000	800	0.06	-	0	6.7	
9	3D Plofile Finishing	↓	15	12,000	800	-	0.06	0	433.0	

¹ For flat surface milling

Tool operation time 1:58:15



Machining time reduced by 53%!



Phoenix Long Neck Ball Nose End Mill

- Tool Material: Micro Grain Carbide
- Surface Treatment: WX Super Coating
- Helix Angle: 45°
- Tolerance of Ball Nose Radius: ± 0.007mm
- Tolerance for Outer Diameter: ± 0.007mm

Unit: mm

NEW SIZES
NEW SIZES
NEW SIZES
NEW SIZES
NEW SIZES

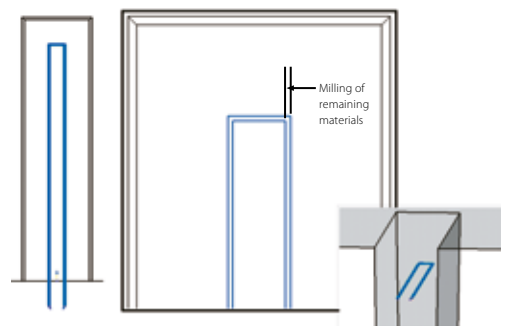
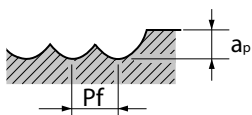
EDP No.	Z	R×ℓ ₂	L ₂	L	ℓ	D _s	D ₁	θk	*1		Type
									0,5°	1°	
3194901	3	R 0,3 × 1	9,1	50	0,45	4	0,55	11,02	1,03	1,06	1
3194902		R 0,3 × 2	10,1					9,92	2,07	2,15	
3194903		R 0,3 × 3	11,1					9,01	3,12	3,24	
3194904		R 0,3 × 4	12,1					8,25	4,16	4,33	
3194906		R 0,3 × 6	14,1					7,07	6,24	6,51	
W1504436	3	R 0,4 × 1	8,8	50	0,6	4	0,75	11,09	1,03	1,06	1
W1504437		R 0,4 × 2	9,8					9,91	2,07	2,15	
W1504438		R 0,4 × 3	10,8					8,95	3,11	3,24	
W1504439		R 0,4 × 4	11,8					8,16	4,15	4,32	
W1504440		R 0,4 × 6	13,8					6,94	6,24	6,51	
3195004	3	R 0,5 × 4	11,2	50	0,75	4	0,95	8,06	4,15	4,31	1
3195006		R 0,5 × 6	13,2					6,8	6,24	6,49	
3195008		R 0,5 × 8	15,2					5,87	8,32	8,67	
3195010		R 0,5 × 10	17,2					5,17	10,41	10,85	
3195012		R 0,5 × 12	19,2					4,62	12,49	13,03	
3195014		R 0,5 × 14	21,2					4,17	14,58	15,21	
3195016		R 0,5 × 16	23,2					3,8	16,66	17,39	
3195106	3	R 0,75 × 6	12	50	1,13	4	1,45	6,38	6,22	6,47	1
3195108		R 0,75 × 8	14					5,42	8,31	8,65	
3195110		R 0,75 × 10	16					4,71	10,4	10,83	
3195112		R 0,75 × 12	18					4,17	12,48	13,01	
3195116		R 0,75 × 16	22					3,38	16,65	17,36	
3195206	3	R 1 × 6	11	50	1,5	4	1,95	5,85	6,21	6,45	1
3195208		R 1 × 8	13					4,87	8,3	8,63	
3195210		R 1 × 10	15					4,16	10,39	10,81	
3195212		R 1 × 12	17					3,64	12,47	12,98	
3195214		R 1 × 14	19	3,23				14,56	15,16		
3195216		R 1 × 16	21	2,9				16,64	17,34		
3195218		R 1 × 18	23	2,64				18,73	19,52		
3195220		R 1 × 20	25	2,41				20,81	21,7		
3195222	R 1 × 22	27	2,23	22,9	23,88						
3195312	3	R 1,5 × 12	14,5	60	2,25	4	2,85	2,22	12,45	12,94	1
3195316		R 1,5 × 16	18,5					1,7	16,62	17,3	
3195320		R 1,5 × 20	22,5					1,37	20,79	21,66	
3195325		R 1,5 × 25	27,5					1,11	26,01	27,1	
3195416	3	R 2 × 16	-	60	3	4	3,85	-	-	-	2
3195420		R 2 × 20	-					-	-	-	
3195425		R 2 × 25	-					-	-	-	
3195520	3	R 3 × 20	-	70	4,5	6	5,85	-	-	-	2
3195530		R 3 × 30	-					-	-	-	

*1: Please see p. 9 for effective neck length (Le) based on the inclination angle (α) of workpiece.

Recommended Milling Conditions

Work Material			Vibration control condition																			
			~40HRC High feed roughing of free-cutting materials					40~60HRC Semi-roughing in high toughness mold materials					~60HRC Machining conditions for slotting					~60HRC Machining conditions for finishing				
			Hardened Steel • Prehardened Steel																			
			SKT4 • SKD61 • NAK80 • HPM1 • DH** SCM • S40C~S60C • CoCrMo					DH** • DAC** • ZHD** • SKD61 • SKD11 • Ti-6Al-4V(H) • CoCr • SKT4 • NAK80 • HPM** • SCM**														
R	ℓ2	Recommended Cutting Angle	Speed (min ⁻¹)	Feed (mm/min)	Depth of Cut (mm)		Speed (min ⁻¹)	Feed (mm/min)	Depth of Cut (mm)		Speed (min ⁻¹)	Feed (mm/min)	Depth of Cut (mm)		Speed (min ⁻¹)	Feed (mm/min)	Depth of Cut (mm)		Clearance (mm)			
			a _p	P _f			a _p	P _f			Last Pitch *1			a _p	P _f							
R0.3	1	0.3°	18,000	1,200	0.06	0.14	18,000	1,000	0.05	0.1	18,000	300	0.05	0.05	18,000	700	0.018	0.018	0.03			
	2		18,000	1,000	0.05	0.12	18,000	850	0.04	0.1	18,000	255	0.04	0.05	18,000	700	0.018	0.018	0.03			
	3		18,000	850	0.04	0.12	18,000	700	0.03	0.08	18,000	210	0.03	0.04	18,000	700	0.018	0.018	0.025			
	4		18,000	700	0.03	0.1	18,000	600	0.025	0.08	18,000	180	0.025	0.04	18,000	700	0.018	0.018	0.02			
	6		18,000	500	0.02	0.09	16,000	400	0.02	0.06	16,000	120	0.02	0.03	16,000	620	0.018	0.018	0.01			
R0.4	1	0.3°	18,000	1,050	0.05	0.16	18,000	850	0.05	0.15	18,000	250	0.05	0.05	18,000	700	0.024	0.024	0.03			
	2		18,000	1,050	0.05	0.16	18,000	850	0.05	0.15	18,000	250	0.05	0.05	18,000	700	0.024	0.024	0.03			
	3		18,000	900	0.04	0.16	18,000	700	0.04	0.15	18,000	200	0.04	0.05	18,000	700	0.024	0.024	0.03			
	4		18,000	750	0.03	0.14	18,000	600	0.03	0.14	18,000	180	0.03	0.04	18,000	700	0.024	0.024	0.02			
	6		18,000	700	0.02	0.14	18,000	400	0.02	0.14	18,000	120	0.02	0.04	18,000	700	0.024	0.024	0.02			
R0.5	4	0.3°	18,000	1,200	0.08	0.2	18,000	1,100	0.07	0.16	18,000	330	0.07	0.07	18,000	900	0.03	0.03	0.05			
	6		18,000	1,000	0.05	0.16	18,000	900	0.05	0.16	18,000	270	0.05	0.07	18,000	900	0.03	0.03	0.05			
	8		16,000	800	0.04	0.16	16,000	700	0.04	0.16	16,000	210	0.04	0.05	16,000	720	0.03	0.03	0.03			
	10		12,000	650	0.04	0.16	10,000	550	0.03	0.15	10,000	160	0.03	0.05	12,000	540	0.03	0.03	0.03			
	12		8,000	420	0.03	0.15	8,000	420	0.03	0.15	-	-	-	-	8,000	360	0.03	0.03	0.02			
	14		7,000	350	0.02	0.13	7,000	350	0.02	0.13	-	-	-	-	7,000	320	0.03	0.03	0.02			
R0.75	6	0.3°	18,000	1,500	0.1	0.3	16,000	1,300	0.1	0.23	16,000	390	0.1	0.1	18,000	1,100	0.04	0.04	0.05			
	8		16,000	1,300	0.08	0.3	16,000	1,150	0.08	0.23	16,000	340	0.08	0.1	16,000	960	0.04	0.04	0.05			
	10		15,000	1,100	0.06	0.25	15,000	950	0.06	0.23	15,000	280	0.06	0.1	15,000	900	0.04	0.04	0.03			
	12		10,000	700	0.04	0.2	10,000	600	0.03	0.2	10,000	180	0.03	0.1	10,000	600	0.04	0.04	0.02			
	16		7,500	400	0.025	0.15	7,500	400	0.02	0.15	7,500	120	0.02	0.07	10,000	600	0.04	0.04	0.01			
R1	6	0.3°	18,000	1,600	0.2	0.6	15,000	1,400	0.2	0.3	15,000	420	0.2	0.1	15,000	1,800	0.06	0.05	0.1			
	8		14,000	1,400	0.18	0.5	14,000	1,200	0.15	0.3	14,000	360	0.15	0.1	12,000	1,500	0.06	0.05	0.07			
	10		12,000	1,250	0.16	0.4	12,000	1,100	0.12	0.3	12,000	330	0.12	0.1	12,000	1,500	0.06	0.05	0.07			
	12		10,000	1,050	0.14	0.4	10,000	900	0.1	0.3	10,000	300	0.1	0.1	10,000	1,200	0.06	0.05	0.07			
	14		8,000	850	0.12	0.35	8,000	700	0.08	0.3	8,000	240	0.08	0.1	8,000	1,000	0.06	0.05	0.05			
	16		7,500	780	0.12	0.4	7,500	650	0.07	0.25	7,500	260	0.07	0.07	7,500	950	0.06	0.05	0.03			
	18		6,800	700	0.1	0.4	6,800	630	0.06	0.2	6,800	250	0.06	0.07	6,800	700	0.06	0.05	0.03			
	20		6,200	650	0.1	0.4	6,200	600	0.05	0.2	6,200	240	0.05	0.05	6,200	600	0.06	0.05	0.02			
R1.5	12	0.3°	12,000	1,700	0.3	0.7	8,000	1,200	0.25	0.5	8,000	480	0.25	0.15	11,000	2,050	0.09	0.08	0.1			
	16		10,000	1,550	0.25	0.7	8,000	1,200	0.2	0.5	8,000	480	0.2	0.15	10,000	1,900	0.09	0.08	0.07			
	20		7,500	1,150	0.2	0.6	7,200	1,100	0.2	0.5	7,200	440	0.2	0.15	7,500	1,400	0.09	0.08	0.07			
	25		4,800	750	0.18	0.6	4,600	700	0.18	0.5	4,600	280	0.18	0.15	4,800	900	0.09	0.08	0.05			
R2	16	0.5°	9,300	1,900	0.27	1	6,000	1,200	0.27	0.8	6,000	480	0.27	0.2	9,000	2,250	0.12	0.1	0.1			
	20		7,600	1,550	0.25	1	6,000	1,150	0.25	0.8	6,000	450	0.25	0.2	8,200	2,050	0.12	0.1	0.1			
	25		6,100	1,250	0.23	0.8	5,500	1,100	0.23	0.6	5,500	420	0.23	0.2	5,500	1,350	0.12	0.1	0.07			
R3	20	0.5°	8,000	3,000	0.43	1.5	4,000	1,200	0.3	1	4,000	480	0.3	0.2	8,000	1,800	0.18	0.16	0.1			
	30		5,100	1,500	0.34	1.2	4,000	1,150	0.3	1	4,000	480	0.3	0.2	5,100	1,150	0.18	0.16	0.07			

- *1. The "Last Pitch" is the standard final contour pitch value calculated based on slotting and pocket milling paths including runout and overcut caused by lateral cutting forces.
- The above cutting conditions based on overhang length are to be used as general guideline. Adjustments may be necessary depending on actual milling condition.
 - Overhang cutting conditions based on the effective length of the tool attached to the holder.
 - Highly rigid machines and tool holders should be used.
 - Tool vibrations should be kept at a minimum level for maximum accuracy.
 - In the case of linear machining, do not use the P_f value, instead refer to the a_p value.
 - More stable high-feed machining in the corners can be attained by setting an R insertion or deceleration on the CAM or machine side.
 - When cutting load fluctuates (in the corners, etc.) or when high precision is required, be sure to control the rotational speed.
 - When cutting at greater than the recommended cutting angle, reduce the feed.
 - When the depth of cut is less than the specified amount as listed above, the feed rate can be increased up to 150%.
 - When the depth of cut is greater than the specified amount as listed above, the feed rate can be reduced by no more than 60% to ensure stable milling.



In comparison to radius end mills, ball end mills machine less materials per pass. In order to improve the precision of the ribs, please separate the roughing and finishing procedures.

Key features PHX-LN-CRE

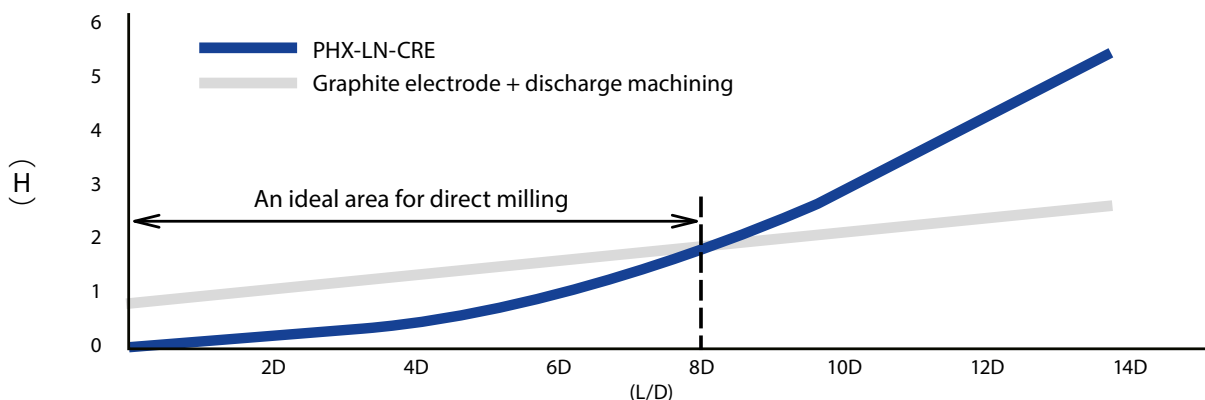


4-flute Long Neck Small Bull Nose End Mill

- 1** The corner radius shape provides both cutting force and cutting edge rigidity.
- 2** Radial and end edge configurations suppress the generation of chattering vibration.
- 3** Special edge lines prevent biting.
- 4** An ideal chip pocket for superior chip evacuation.

<p>1. Length of cut</p> <p>2. Short flute length</p> <p>3. Unequal spacing</p>	<p>PHX-LN-CRE</p>	<p>conventional</p>	<p>photo of end edge</p>
--	-------------------	---------------------	--------------------------

A map for effective machining



This graph is the image graph of 1.5mm wide 40mm long flute dimension.

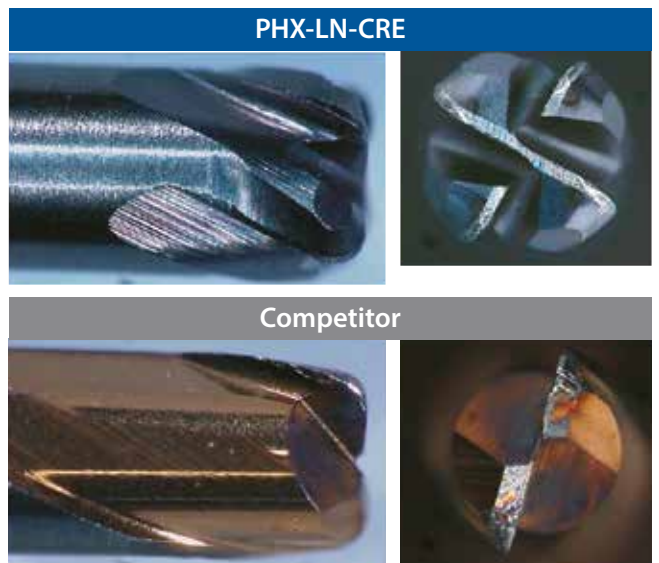
Machining data

Lib operation on plastic mold.

A special designed tool for slot milling on high hardness steel as STAVAX(52HRC)

- A special tool for easy direct milling operations
- A special cutting edge design enabled a stable operation
- Capable even on shallow flute milling with ultra high speed

Tool	PHX-LN-CRE $\phi 1 \times R0.2 \times 6$
Work Material	STAVAX (52HRC)
Milling Method	Lib Groove Operation
Cutting Speed	63m/min (20,000min ⁻¹)
Feed	840mm/min (0.0105mm/t)
Depth of Cut	ap=0.02mm
Coolant	Air Blow
Machine	Vertical Machining Center
Milling Length	120m



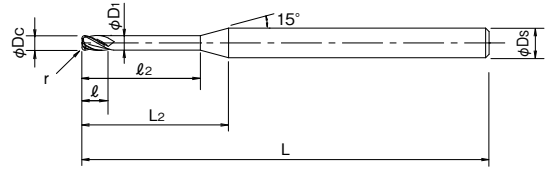
High precision machining on HPM38 (53HRC) with gear shape

- From semi-finish to finishing operation
- Capable with high feed rate even at narrow area

Tool	PHX-LN-CRE $\phi 2 \times R0.5 \times 10$
Work Material	HPM38 (53HRC)
Milling Method	Countour Line Operation
Cutting Speed	113m/min (18,000min ⁻¹)
Feed	2,500mm/min (0.035mm/t)
Depth of Cut	ap=0.1mm ae=0.8mm
Coolant	Air Blow
Machine	Vertical Machining Center
Milling Length	80m



PHX-LN-CRE



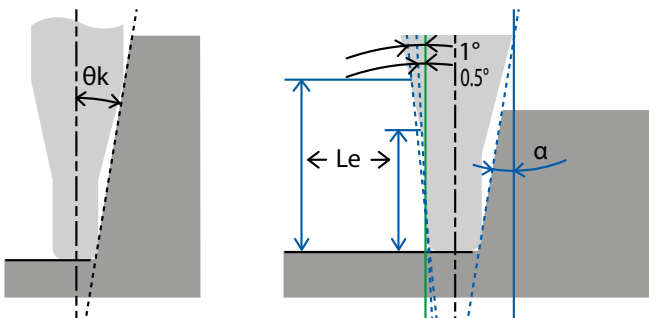
4-flute Long Neck Small Bull Nose End Mill

- Tool Material: Micro Grain Carbide
- Surface Treatment: WX Super Coating
- Helix Angle: $D_c = 0.8 \ 54^\circ$, $D_c \geq 1 \ 30^\circ$
- Tolerance of Radius: $\pm 0.007\text{mm}$
- Tolerance for Outer Diameter: $0 \sim 0.0015\text{mm}$
- Neck Length Tolerance: $0 \sim 0.1\text{mm}$

Unit: mm

EDP No.	Z	Dc x r x ℓ2	L2	L	ℓ	Ds	D1	θk	(Le) ^{*1}						
									0.5°	1°					
3190800	4	0.8 × R0.1 × 2	8.1	50	0.32	4	0.72	11.48	2.06	2.13					
3190801		0.8 × R0.1 × 4	10.1					9.2	4.13	4.27					
3190802		0.8 × R0.1 × 6	12.1					7.67	6.2	6.41					
3190803		0.8 × R0.1 × 8	14.1					6.58	8.27	8.55					
3191006	4	1 × R0.1 × 4	9.7	50	0.4	4	0.93	8.97	4.13	4.27					
3191007		1 × R0.1 × 6	11.7					7.43	6.2	6.41					
3191008		1 × R0.1 × 8	13.7					6.34	8.27	8.55					
3191009		1 × R0.1 × 10	15.7					5.53	10.33	10.69					
3191010		1 × R0.1 × 12	17.7					4.9	12.4	12.83					
3191011		1 × R0.2 × 4	9.7					9.05	4.13	4.26					
3191012		1 × R0.2 × 6	11.7					7.49	6.2	6.4					
3191013		1 × R0.2 × 8	13.7					6.38	8.26	8.54					
3191014		1 × R0.2 × 10	15.7					5.56	10.33	10.68					
3191015		1 × R0.2 × 12	17.7					4.93	12.4	12.82					
3191018		1 × R0.3 × 4	9.7					9.14	4.12	4.26					
3191019		1 × R0.3 × 6	11.7					7.55	6.19	6.4					
3191501		4	1.5 × R0.1 × 4					8.8	50	0.6	4	1.41	8.3	4.13	4.27
3191503			1.5 × R0.1 × 8					12.8					5.68	8.27	8.55
3191505	1.5 × R0.1 × 12		16.8	4.31	12.4	12.83									
3191506	1.5 × R0.2 × 4		8.8	8.39	4.13	4.26									
3191507	1.5 × R0.2 × 6		10.8	6.8	6.2	6.4									
3191508	1.5 × R0.2 × 8		12.8	5.72	8.26	8.54									
3192001	4	2 × R0.1 × 8	12.1	50	0.8	4	1.89	4.91	8.27	8.55					
3192002		2 × R0.1 × 10	14.1					4.19	10.33	10.69					
3192003		2 × R0.1 × 12	16.1					3.66	12.4	12.83					
3192004		2 × R0.1 × 16	20.1					2.92	16.54	17.11					
3192013		2 × R0.3 × 8	12.1					4.99	8.26	8.54					
3192015		2 × R0.3 × 12	16.1					3.71	12.39	12.82					
3192019		2 × R0.5 × 6	10.1					6.16	6.19	6.38					
3192020		2 × R0.5 × 8	12.1					5.08	8.25	8.52					
3192021		2 × R0.5 × 10	14.1					4.32	10.32	10.66					
3192022		2 × R0.5 × 12	16.1					3.75	12.39	12.8					
3193008		4	3 × R0.3 × 12					14.2	50	1.2	4	2.85	2.11	12.39	12.82

*1: Please see p. 9 for effective neck length (Le) based on the inclination angle (α) of workpiece.



No numerical value means no interference with the workpiece.

Recommended Milling Conditions

Work Material			Lib Groove Milling								Contour Line Finish Milling		
			Slotting				Contour Offset						
			CENA1 STAVAX HPM38 SKD61 42~55HRC										
Dc	r	ℓ	Speed (min ⁻¹)	Feed (mm/min)	Depth of Cut		Speed (min ⁻¹)	Feed (mm/min)	Depth of Cut		Speed (min ⁻¹)	Feed (mm/min)	Depth of Cut ae
					ap	ae			ap	ae			
0.8	0.1	2	18,000	720	0.02	0.2	18,000	930	0.02	0.2	18,000	1,150	0.015
		4	18,000	720	0.02	0.2	18,000	930	0.02	0.2	18,000	1,150	0.015
		6	18,000	720	0.02	0.2	18,000	930	0.02	0.2	18,000	1,150	0.015
		8	15,000	540	0.013	0.2	15,000	630	0.013	0.2	16,000	700	0.013
1	0.1	4	18,000	830	0.03	0.23	18,000	880	0.03	0.23	18,000	1,440	0.015
		6	18,000	830	0.024	0.23	18,000	880	0.024	0.23	18,000	1,440	0.015
		8	15,000	750	0.013	0.23	15,000	800	0.013	0.23	15,000	1,200	0.015
		10	12,000	300	0.007	0.2	12,000	400	0.007	0.2	12,000	960	0.015
		12	10,500	220	0.006	0.18	10,500	288	0.006	0.18	10,500	840	0.015
1	0.2	4	18,000	830	0.03	0.23	18,000	880	0.03	0.23	18,000	1,440	0.018
		6	18,000	830	0.024	0.23	18,000	880	0.024	0.23	18,000	1,440	0.018
		8	15,000	750	0.013	0.23	15,000	800	0.013	0.23	15,000	1,200	0.018
		10	12,000	300	0.007	0.2	12,000	400	0.007	0.2	12,000	960	0.018
		12	10,500	220	0.006	0.18	10,500	290	0.006	0.18	10,500	840	0.018
1	0.3	4	18,000	830	0.03	0.23	18,000	1,000	0.03	0.23	18,000	1,440	0.022
		6	18,000	830	0.024	0.23	18,000	890	0.024	0.23	18,000	1,440	0.022
1.5	0.1	4	16,000	1,230	0.03	0.34	16,000	1,300	0.03	0.34	18,000	1,620	0.015
		8	16,000	1,230	0.026	0.34	16,000	1,300	0.026	0.34	18,000	1,620	0.015
		12	10,000	480	0.013	0.3	10,000	750	0.013	0.3	10,000	900	0.015
1.5	0.2	4	16,000	1,230	0.03	0.34	16,000	1,300	0.03	0.34	18,000	1,620	0.018
		6	16,000	1,230	0.029	0.34	16,000	1,300	0.029	0.34	18,000	1,620	0.018
		8	16,000	1,230	0.026	0.34	16,000	1,300	0.026	0.34	18,000	1,620	0.018
2	0.1	8	12,000	1,300	0.03	0.46	12,000	1,760	0.03	0.46	18,000	1,620	0.015
		10	12,000	1,200	0.03	0.46	12,000	1,620	0.03	0.46	15,000	1,350	0.015
		12	12,000	1,150	0.024	0.46	12,000	1,320	0.024	0.46	13,000	1,170	0.015
		16	7,600	780	0.012	0.46	7,600	750	0.012	0.46	7,000	630	0.015
2	0.3	8	12,000	1,300	0.05	0.46	12,000	1,620	0.05	0.46	18,000	1,620	0.022
		12	12,000	1,150	0.04	0.46	12,000	1,320	0.04	0.46	13,000	1,170	0.022
2	0.5	6	12,000	1,300	0.08	0.45	12,000	1,760	0.08	0.45	18,000	1,620	0.025
		8	12,000	1,300	0.075	0.45	12,000	1,760	0.075	0.45	18,000	1,620	0.025
		10	12,000	1,200	0.07	0.45	12,000	1,620	0.07	0.45	15,000	1,350	0.025
		12	12,000	1,150	0.06	0.45	12,000	1,320	0.06	0.45	13,000	1,170	0.025
3	0.3	12	8,000	1,200	0.046	0.7	8,000	1,400	0.046	0.7	13,000	1,170	0.022

- Adjust the speed, feed, and depth of cut in according to the operating conditions, including the machining shape, machine and, holder rigidity, and workholding force.
- If the speed and feed rates cannot be increased due to equipment capability, operate by reducing the speed and feed rates at the same ratio.
- High cutting speeds and feed rates can cause wear and/or reduce machining precision. Therefore, please reduce the feed as needed.
- Chattering may occur depending on the shape of the part, which can damages. Reduce the speed and feed rate at the same ratio to avoid chattering.
- For precise, detailed machining, use a dedicated machine that operates less chattering.
- Keep the runout at the tip of the end mill below 0.005mm.
- To perform finish machining with a high level of efficiency, keep the speed and feed rates below 2 times.
- To finish a flat surface, remain speed range in a minimal amount of equipment vibration and feed rate not causing the equipment to wobble.
- To finish machining a curved surface using the corner radius of the tool, operate by changing the machining pitch.
- Set the inclined cut angle between approximately 0.3° to 0.5°.
- When the depth of cut is less than the specified amount as listed above, the feed rate can be increased up to 150%.
- When the depth of cut is greater than the specified amount as listed above, the feed rate can be reduced by no more than 60% to ensure stable milling.



shaping your dreams

OSG EUROPE LOGISTICS

Avenue Lavoisier 1
B-1300 Z.I. Wavre - Nord - Belgium
Tel: +32 10 23 05 07
Fax: +32 10 23 05 51
info@osgeurope.com

OSG BELUX

Avenue Lavoisier 1
B-1300 Z.I. Wavre - Nord - Belgium
Tel: +32 10 23 05 11
Fax: +32 10 23 05 31
info@osg-belgium.com

OSG FRANCE

Parc Icade, Paris Nord 2
Immeuble "Le Rimbaud"
22 Avenue des Nations
CS66191 - 93420 Villepinte - France
Tel: +33 1 49 90 10 10
Fax: +33 1 49 90 10 15
sales@osg-france.com

OSG NETHERLANDS

Bedrijfsweg 5 - 3481 MG Harmelen
Tel: +31 348 44 2764
Fax: +31 348 44 2144
info@osg-nl.com

OSG UK

Kelsey Close, Attleborough Fields Ind Est,
CV11 6RS, Nuneaton, United Kingdom.
Tel: +44 1827 720 013
uk_sales@osg-uk.com

CZECH, SLOVAKIA, HUNGARY

OSG Europe Logistics S.A.
Slovakia organizacna zlozka
Racianská 22/A, SK-83102 Bratislava
Slovakia
Tel. +421 24 32 91 295
Orders-osgsvk@osgeurope.com

OSG POLAND Sp. z.o.o.

Spółdzielcza 57
05-074 Halinów - Poland
Tel: +22 760 82 71
Fax: +22 760 82 71
osg@osg-poland.com

OSG GERMANY

Karl-Ehmann-Str. 25
D - 73037 Göppingen - Germany
Tel: +49 7161 6064 - 0
Fax: +49 7161 6064 - 444
info@osg-germany.de

OSG SCANDINAVIA

(For Scandinavian countries)
Langebjergvaenget 16
4000 Roskilde - Denmark
Tel: +45 46 75 65 55
Fax: +45 46 75 67 00
osg@osg-scandinavia.com

SWEDEN

Branch office of OSG SCANDINAVIA
Singelgatan 7
212 28 Malmö - Sweden
Tel: +46 40 41 22 55
osg@osg-scandinavia.com

OSG IBERICA

Bekolarra 4
E - 01010 Vitoria-Gasteiz - Spain
Tel: +34 945 242 400
Fax: +34 945 228 883
osg.iberica@osg-ib.com

RUSSIA

Butlerova street, 17B, office 5069
117342 Moscow - Russia
Tel: +7 (495) 150 41 54
info@osg-russia.com

OSG TURKEY

Rami Kişla Cad.No:56 Eyüp
Istanbul 34056 - Turkey
Tel:+90 212 565 24 00
Fax: +90 212 565 44 00
info@osg-turkey.com

ROMSAN INTERNATIONAL CO. SRL

Reprezentant Exclusiv OSG
25C, Bucuresti-Magurele Street
051431 Bucuresti - România
Tel: +40 21 322 07 47
Fax: +40 21 321 56 00
romsan.int@romsan.ro

AUSTRIA

Branch office of OSG GERMANY
Messestraße 11
A-6850 Dornbirn
Tel: +49 7161 6064-0
Fax: +49 7161 6064-444
info@osg-germany.de

OSG ITALIA

Via Ferrero, 65 A/B3
I - 10098 Rivoli - Italy
Tel: +39 0117705211
Fax: +39 0117705215
info@osg-italia.it

Vischer & Bolli AG

Machining and Workholding
Im Schossacher 17
CH-8600 Dübendorf
T +41 44 802 15 15
F +41 44 802 15 95
info@vb-tools.com

OSG EUROPE LOGISTICS S.A.

09/2020 - All rights reserved. © OSG Europe 2020.

The contents of this catalogue are provided to you for viewing only. They are not intended for reproduction either in part or in whole in this or other medium. They cannot be copied, used to create derivation work or used for any reason, by means without the express, written permission of the copyright owner. If prices are stated, they are netto unit-prices and any eventual tax(es) have to be added. The company is not responsible for any printing error in technical, price and/or any other data.

Tool specifications subject to change without notice.

www.osgeurope.com