MOLDINO
The Edge To Innovation

4 flutes high efficiency ball end mill

EHHBE-TH3

Epoch High Hard Ball-TH3

Lineup expanded with under neck length 5DC type

MOLDINO Tool Engineering, Ltd.

New Product News | No.1901E-9 | 2026-2

Evolved by addopting a TH3 Coating on 4-flute ball end mill for high hardened steel processing.
On high-hardened steel processing, to achieve even longer tool life.

Features of EHHBE-TH3

01 Highly efficient cutting with 4 flutes

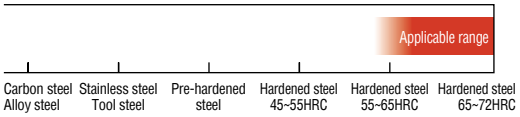
02 Special edge shape in tip area improves cutting performance.

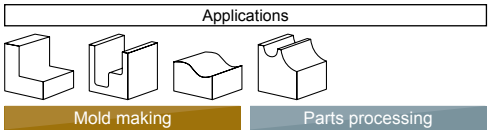
03 TH3 Coating provides long tool life even on hardened steels.

04 Variable Pitch geometry enables vibrations to be suppressed even for 4 flutes.

05 Wide chip pocket improves chip removal.

06 Available for adaptive milling.



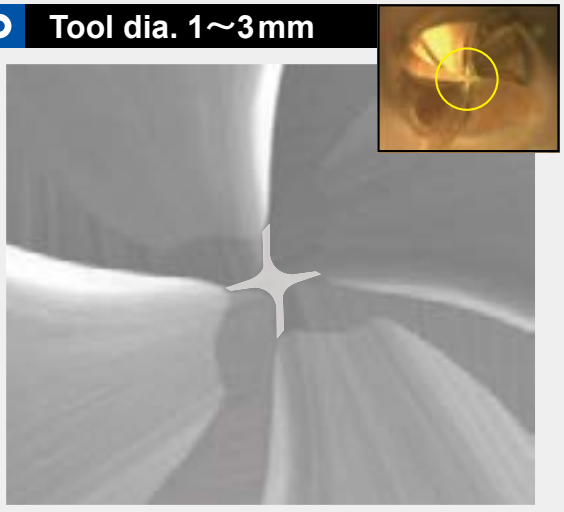


EHHBE-3DC-TH3:RE0.5～RE6
[17 Items]

EHHBE-5DC-TH3:RE0.5～RE6
[17 Items]

Features Special tip shape

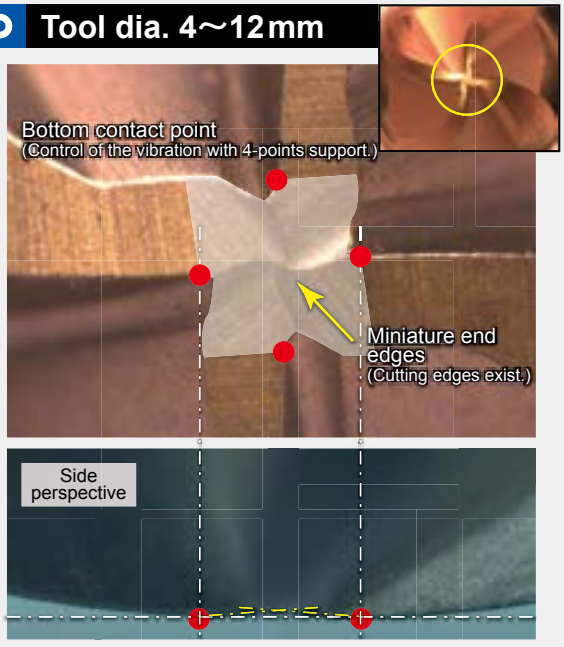
Tool dia. 1～3mm



<Features and effects>

By creating a special flank face with a tiny relief angle at the very tip section, R accuracy is improved even with 4 flutes.

Tool dia. 4～12mm

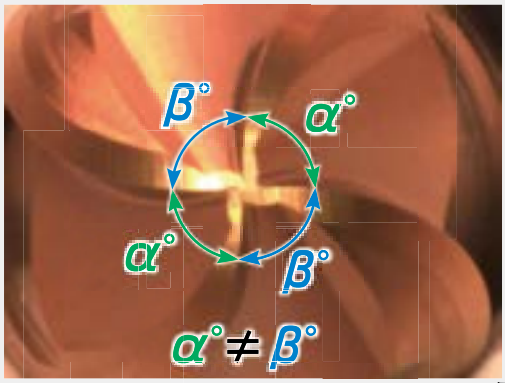


<Features and effects>

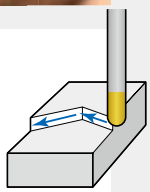
Features: Zero cutting point at the center is isolated from the cutting point.

Effects: Chipping due to jamming of cutting chips at center area is suppressed.

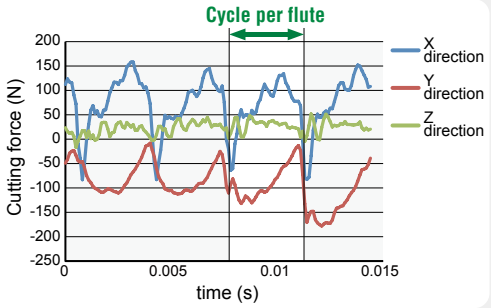
Features Suppressed vibration with Variable Pitch geometry



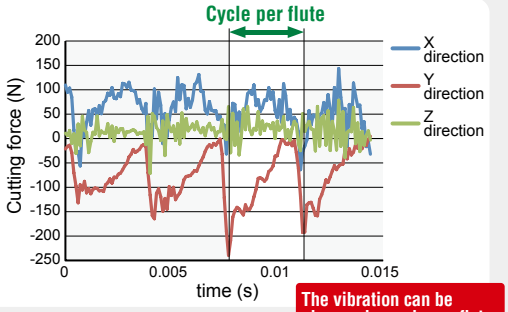
Work material：YXR3(58HRC)
Tool：φ8 (RE4) ×4 flutes
n=4,000min^{-1} (v_c=100m/min)
v_f=1,920mm/min (f_z=0.12mm/t)
a_p=0.3mm a_e=0.1mm
Dry Air-blow
Machine：HSK-A63 Over hang：32mm



EHHBE-TH3
4 flutes
Variable Pitch



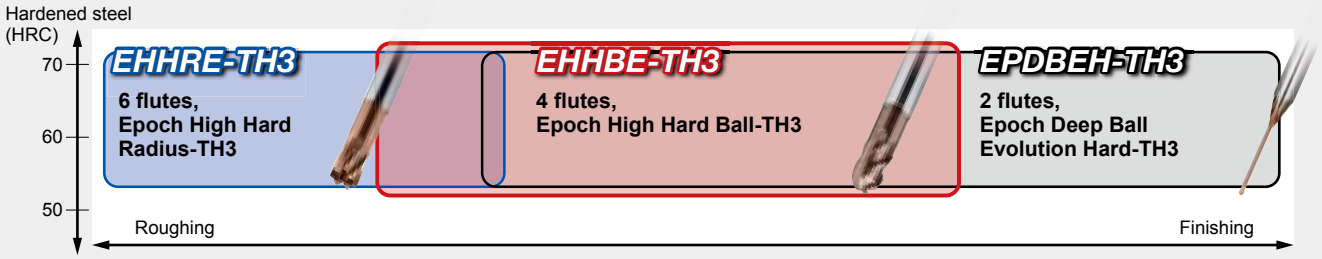
Conventional
4 flutes
Equal pitch



The vibration can be observed a cycle per flute.

Features Performance and positioning

EHHBE-TH3 exhibits the performance during roughing to semi-finishing of high hardened steel (55HRC～).



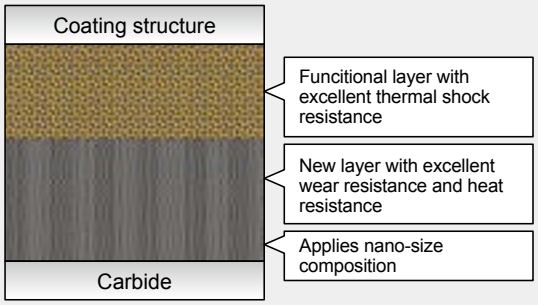
Features Newly developed coating "TH3" for hardened steel machining

Features and performance

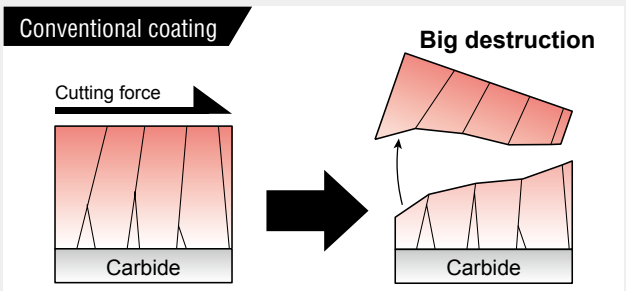
- High hardness coating with excellent wear resistance and heat resistance
- Has excellent thermal shock resistance enables to suppress sudden chipping
- Long tool life when cutting high-hardness materials (50HRC or higher) such as hardened steel

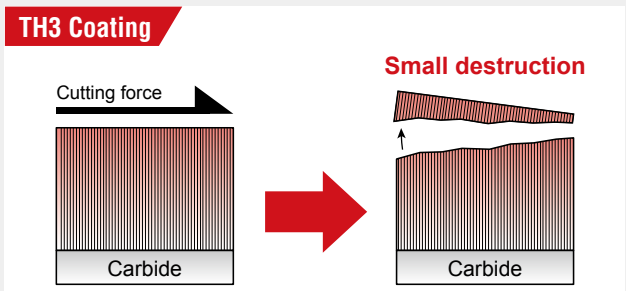
Target steel grade

- Hardened steel (especially 50HRC or higher), high-speed steel

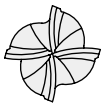


! Point TH3 Coating achieves to reduce destruction unit of layer by applying "nano-size composition".





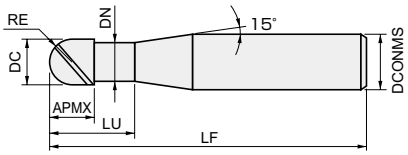
Line Up



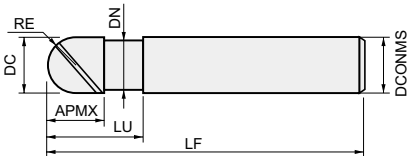
Under neck length 3DC type

Under neck length 5DC type

A type



B type



(mm)

Ball radius RE	Tolerance on RE	Tolerance on dia.
RE0.5~1.5	±0.005	0~−0.010
RE2~3	±0.007	0~−0.014
RE4~6	±0.010	0~−0.020

EHHBE4○○○(-○○.○)(-S○)-TH3

Carbide | TH3 | Helix angle 40° | Unequal Pitch | h5

Item code	Stock	Size (mm)							No. of flutes	Type
		Ball radius RE	Tool dia. DC	Flute length APMX	Under neck length LU	Neck dia. DN	Overall length LF	Shank dia. DCONMS		
EHHBE4010-S4-TH3	●	0.5	1	1.5	3	0.95	50	4	4	A
EHHBE4010-S6-TH3	●							6		
EHHBE4010-5-S4-TH3	●				5			4		
EHHBE4010-5-S6-TH3	●						55	6		
EHHBE4015-S4-TH3	●	0.75	1.5	2.5	4.5	1.43	50	4		
EHHBE4015-S6-TH3	●							6		
EHHBE4015-7.5-S4-TH3	●				7.5			4		
EHHBE4015-7.5-S6-TH3	●						55	6		
EHHBE4020-S4-TH3	●	1	2	3	6	1.9	50	4		
EHHBE4020-S6-TH3	●							6		
EHHBE4020-10-S4-TH3	●				10			4		
EHHBE4020-10-S6-TH3	●						55	6		
EHHBE4025-S4-TH3	●	1.25	2.5	4	7.5	2.38	50	4		
EHHBE4025-S6-TH3	●							6		
EHHBE4025-12.5-S4-TH3	●				12.5			4		
EHHBE4025-12.5-S6-TH3	●						60	6		
EHHBE4030-S4-TH3	●	1.5	3	4.5	9	2.9	70	4		
EHHBE4030-S6-TH3	●							6		
EHHBE4030-15-S4-TH3	●				15		60	4		
EHHBE4030-15-S6-TH3	●							6		
EHHBE4040-S4-TH3	●	2	4	6	12	3.9	70	4		B
EHHBE4040-S6-TH3	●							6		A
EHHBE4040-20-S4-TH3	●				20		60	4		B
EHHBE4040-20-S6-TH3	●							6		A
EHHBE4050-TH3	●	2.5	5	7.5	15	4.7	80	6		A
EHHBE4050-25-TH3	●				25		60			
EHHBE4060-TH3	●	3	6	9	18	5.7	90	6		B
EHHBE4060-30-TH3	●				30		70			
EHHBE4080-TH3	●	4	8	12	24	7.6	100	8		
EHHBE4080-40-TH3	●				40		80			
EHHBE4100-TH3	●	5	10	15	30	9.5	100	10		
EHHBE4100-50-TH3	●				50		90			
EHHBE4120-TH3	●	6	12	18	36	11.5	110	12		
EHHBE4120-60-TH3	●				60					

● : Stocked items.

Re-grinding compatibility range table

Item code	Product name	Tool dia. (mm)	Shape	Re-grinding compatibility range(mm)	
				Outer dia.	End
EHHBE-3DC-TH3	Epoch High Hard Ball-TH3 -Under neck length 3DC	1～12		4～12	4～12
EHHBE-5DC-TH3	Epoch High Hard Ball-TH3 -Under neck length 5DC	1～12		4～12	4～12

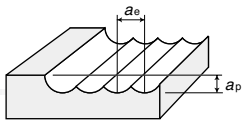
For regrinding of this tool, please ask our company. We will reproduce the special tip section shape.

Recommended Cutting Conditions

Recommended cutting condition for under neck length 3DC type

Roughing

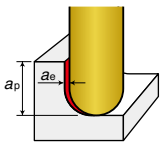
For work materials with hardnesses up to 55HRC, we recommend our company's 2-flute or 3-flute tool series.



Work material		Hardened steels (55～62HRC) SKD11, YXR3				Hardened steels (62～66HRC) HAP40, YXR7, SKH51				Hardened steels (66～72HRC) HAP72			
Ball radius RE (mm)	Tool dia. DC (mm)	Cutting speed v_c=110m/min				Cutting speed v_c=90m/min				Cutting speed v_c=70m/min			
		Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm
0.5	1	35,000	1,930	0.08	0.23	28,700	1,340	0.06	0.18	22,300	860	0.05	0.14
0.75	1.5	23,400	1,760	0.11	0.34	19,100	1,220	0.09	0.27	14,900	780	0.07	0.20
1	2	17,500	1,750	0.15	0.45	14,300	1,220	0.12	0.36	11,100	780	0.09	0.27
1.25	2.5	14,000	1,650	0.19	0.56	11,500	1,150	0.15	0.45	8,900	730	0.11	0.34
1.5	3	11,700	1,650	0.23	0.68	9,600	1,150	0.18	0.54	7,400	730	0.14	0.41
2	4	8,800	1,670	0.30	0.90	7,200	1,160	0.24	0.72	5,600	740	0.18	0.54
2.5	5	7,000	1,700	0.38	1.13	5,700	1,170	0.30	0.90	4,500	760	0.23	0.68
3	6	5,800	1,690	0.45	1.35	4,800	1,190	0.36	1.08	3,700	750	0.27	0.81
4	8	4,400	1,760	0.60	1.80	3,600	1,220	0.48	1.44	2,800	780	0.36	1.08
5	10	3,500	1,750	0.75	2.25	2,900	1,230	0.60	1.80	2,200	770	0.45	1.35
6	12	2,900	1,650	0.90	2.70	2,400	1,160	0.72	2.16	1,900	760	0.54	1.62

Side Cutting

For work materials with hardnesses up to 55HRC, we recommend our company's 2-flute or 3-flute tool series.



Work material		Hardened steels (55～62HRC) SKD11, YXR3				Hardened steels (62～66HRC) HAP40, YXR7, SKH51				Hardened steels (66～72HRC) HAP72			
Ball radius RE (mm)	Tool dia. DC (mm)	Cutting speed v_c=150m/min				Cutting speed v_c=125m/min				Cutting speed v_c=100m/min			
		Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm
0.5	1	47,800	2,630	1.00	0.02	39,800	1,750	1.00	0.02	31,800	1,050	1.00	0.01
0.75	1.5	31,800	2,390	1.50	0.03	26,500	1,590	1.50	0.02	21,200	950	1.50	0.02
1	2	23,900	2,390	2.00	0.04	19,900	1,590	2.00	0.03	15,900	950	2.00	0.02
1.25	2.5	19,100	2,240	2.50	0.05	15,900	1,490	2.50	0.04	12,700	900	2.50	0.03
1.5	3	15,900	2,240	3.00	0.06	13,300	1,500	3.00	0.05	10,600	900	3.00	0.03
2	4	11,900	2,260	4.00	0.08	10,000	1,520	4.00	0.06	8,000	910	4.00	0.04
2.5	5	9,600	2,330	5.00	0.10	8,000	1,550	5.00	0.08	6,400	930	5.00	0.05
3	6	8,000	2,330	6.00	0.12	6,600	1,540	6.00	0.09	5,300	930	6.00	0.06
4	8	6,000	2,400	8.00	0.16	5,000	1,600	8.00	0.12	4,000	960	8.00	0.08
5	10	4,800	2,400	10.00	0.20	4,000	1,600	10.00	0.15	3,200	960	10.00	0.10
6	12	4,000	2,280	12.00	0.24	3,300	1,500	12.00	0.18	2,700	920	12.00	0.12

	55～62HRC	62～66HRC	66～72HRC
Slant angle for helical boring	1°	0.5°	0.2°
Feed rate for helical boring	70% of side cutting conditions		

※Set the hole diameter for helical boring to between 1.6 and 2.0 times the tool diameter.

※Set the maximum depth for helical boring to the tool diameter or smaller (≤ 1DC).

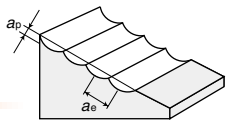
【Note】

① Use the appropriate coolant for the work material and machining shape.
② Use as highly rigid and accurate machine as possible.
③ These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
④ If the rpm available is lower than that recommended please reduce the feed rate to the same ratio.

Recommended Cutting Conditions, Field data

Recommended cutting condition for under neck length 3DC, 5DC type

Finishing



Work material		Tool steels (25～35HRC) HPM7, SCM440				Pre-hardened steels (35～45HRC) HPM-MAGIC, CENA1				Hardened steels (45～55HRC) SKD61, HPM38, DAC-MAGIC			
Ball radius RE (mm)	Tool dia. DC (mm)	Cutting speed v_c=280m/min				Cutting speed v_c=250m/min				Cutting speed v_c=210m/min			
		Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm
0.5	1	60,000	3,240	0.02～0.05	0.02	60,000	2,970	0.02～0.05	0.02	60,000	2,700	0.02～0.05	0.02
0.75	1.5	60,000	4,860	0.02～0.07	0.03	53,100	3,940	0.02～0.07	0.03	44,600	3,010	0.02～0.07	0.03
1	2	44,600	4,820	0.02～0.10	0.04	39,800	3,940	0.02～0.10	0.04	33,400	3,010	0.02～0.10	0.04
1.25	2.5	35,700	5,030	0.05～0.12	0.05	31,800	4,110	0.05～0.12	0.05	26,800	3,150	0.05～0.12	0.05
1.5	3	29,700	5,030	0.05～0.15	0.06	26,500	4,110	0.05～0.15	0.06	22,300	3,140	0.05～0.15	0.06
2	4	22,300	5,080	0.05～0.20	0.08	19,900	4,160	0.05～0.20	0.08	16,700	3,170	0.05～0.20	0.08
2.5	5	17,800	5,180	0.05～0.25	0.1	15,900	4,240	0.05～0.25	0.1	13,400	3,250	0.05～0.25	0.10
3	6	14,900	5,200	0.05～0.3	0.12	13,300	4,260	0.05～0.3	0.12	11,100	3,230	0.05～0.3	0.12
4	8	11,100	5,330	0.05～0.4	0.16	10,000	4,400	0.05～0.4	0.16	8,400	3,360	0.05～0.4	0.16
5	10	8,900	5,340	0.05～0.5	0.2	8,000	4,400	0.05～0.5	0.2	6,700	3,350	0.05～0.5	0.20
6	12	7,400	5,060	0.05～0.6	0.24	6,600	4,140	0.05～0.6	0.24	5,600	3,190	0.05～0.6	0.24

Work material		Hardened steels (55～62HRC) SKD11, YXR3				Hardened steels (62～66HRC) HAP40, YXR7, SKH51				Hardened steels (66～72HRC) HAP72			
Ball radius RE (mm)	Tool dia. DC (mm)	Cutting speed v_c=160m/min				Cutting speed v_c=140m/min				Cutting speed v_c=120m/min			
		Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm	Revolution n min^{-1}	Feed rate v_f mm/min	a_p mm	a_e mm
0.5	1	51,000	1,840	0.02～0.05	0.02	44,600	1,300	0.02～0.05	0.02	38,200	950	0.02～0.05	0.02
0.75	1.5	34,000	1,840	0.02～0.07	0.03	29,700	1,300	0.02～0.07	0.03	25,500	950	0.02～0.07	0.03
1	2	25,500	1,840	0.02～0.10	0.04	22,300	1,300	0.02～0.10	0.04	19,100	950	0.02～0.10	0.04
1.25	2.5	20,400	1,920	0.05～0.12	0.05	17,800	1,360	0.05～0.12	0.05	15,300	990	0.05～0.12	0.05
1.5	3	17,000	1,920	0.05～0.15	0.06	14,900	1,370	0.05～0.15	0.06	12,700	980	0.05～0.15	0.06
2	4	12,700	1,930	0.05～0.20	0.08	11,100	1,370	0.05～0.20	0.08	9,600	1,000	0.05～0.20	0.08
2.5	5	10,200	1,980	0.05～0.25	0.10	8,900	1,400	0.05～0.25	0.10	7,600	1,010	0.05～0.25	0.10
3	6	8,500	1,980	0.05～0.3	0.12	7,400	1,400	0.05～0.3	0.12	6,400	1,020	0.05～0.3	0.12
4	8	6,400	2,050	0.05～0.4	0.16	5,600	1,460	0.05～0.4	0.16	4,800	1,060	0.05～0.4	0.16
5	10	5,100	2,040	0.05～0.5	0.20	4,500	1,460	0.05～0.5	0.20	3,800	1,050	0.05～0.5	0.20
6	12	4,200	1,920	0.05～0.6	0.24	3,700	1,370	0.05～0.6	0.24	3,200	1,000	0.05～0.6	0.24

【Note】
① Use the appropriate coolant for the work material and machining shape.
② Use as highly rigid and accurate machine as possible.
③ These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
④ If the rpm available is lower than that recommended please reduce the feed rate to the same ratio.

Recommended cutting condition for under neck length 5DC type

Calculate by multiplying the standard cutting conditions for under neck length 3DC type by the correction value below.

Roughing

n (min^{-1})	v_f (mm/min)	a_p (mm)	a_e (mm)
70%	70%	50%	100%

【Example】 Work material: Hardened steel Tool: EHHBE4060-30-TH3
n=4,060min^{-1} v_f=1,180mm/min a_p=0.225mm a_e=1.35mm

Side cutting

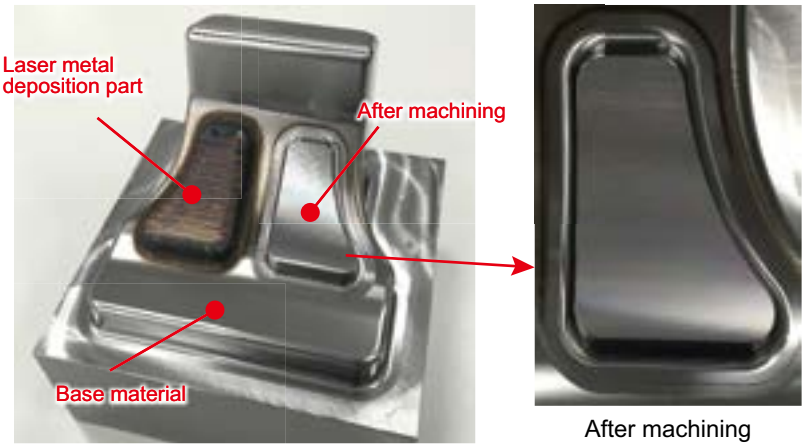
n (min^{-1})	v_f (mm/min)	a_p (mm)	a_e (mm)
70%	70%	100%	50%

【Example】 Work material: Hardened steel Tool: EHHBE4060-30-TH3
n=5,600min^{-1} v_f=1,630mm/min a_p=6mm a_e=0.06mm

Finishing

※For finishing, please use the same cutting conditions as the under neck length 3DC type.

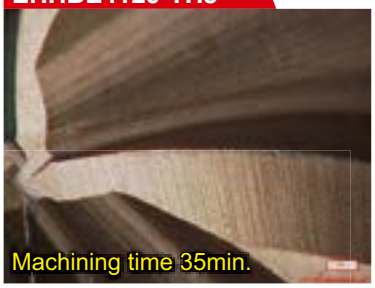
01 Cutting application for Laser metal deposition [SKD61Ⓗ 56HRC]



After machining

■ Condition for tool wear (after machining)

EHHBE4120-TH3



EHHBE4040-S4-TH3

Work size：150×150×150mm

Work material
Base material：SKD61 43HRC
Laser metal deposition part：SKD61 56HRC

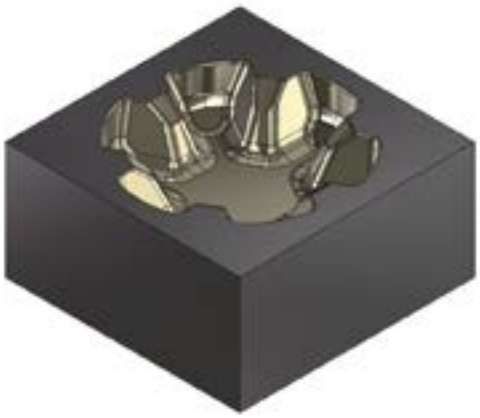
Microwear and possible to use continuously

Machine tool : Okuma Corporation MU-8000V LASER EX
CAM : C&G SYSTEMS INC. CAM-TOOL

Process		Tool	Tool dia. (mm)	Revolution n (min^{-1})	Cutting speed v_c (m/min)	Feed rate v_f (mm/min)	Feed per tooth f_z (mm/t)	a_p (mm)	a_e (mm)	Coolant
Laser metal deposition part	Rouging	EHHBE4120-TH3	12	2,400	90	1,160	0.12	0.5	0.7	Air
		EHHBE4040-S4-TH3	4	7,200	90	1,160	0.04	0.2	0.6	Air
	Finishing	EHHBE4120-TH3	12	3,700	139	1,370	0.09	–	0.2	Air
		EHHBE4040-S4-TH3	4	10,000	126	1,240	0.03	–	0.1	Air

02 Compare with contouring machining and adaptive milling.

■ Cutting application for cold forging die (Bevel Gear) [YXR3 60HRC]

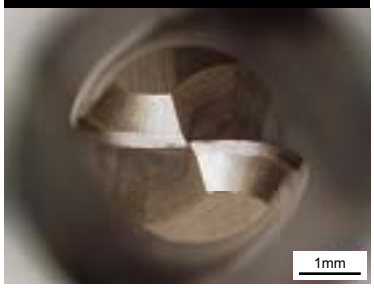


(φ25.6×Depth 6mm)

EHHBE4040-S4-TH3
(Adaptive milling)

Flank wear：0.015mm

Conventional 2 flutes ball end mill
(Contouring)



Flank wear：0.062mm

Adaptive milling with EHHBE-TH3 makes possible to high-efficiency and long tool life than conventional ball end mill (2 flutes).

Cutting conditions

Machine : Vertical MC(HSK-F63) Coolant : Air-blow

Cutting method	Tool	Revolution n (min^{-1})	Cutting speed v_c (m/min)	Feed rate v_f (mm/min)	Feed per tooth f_z (mm/t)	a_p (mm)	a_e (mm)	Max. chip removal volume (cm^3/min)	Actual cutting time
Contouring	Conventional 2 flutes Ball End Mill	14,000	176	750	0.027	0.2	0.6	0.09	28 min.
High efficiency side milling (Helical cutting ⇒ Trochoidal cutting)	EHHBE4040-S4-TH3	11,900	150	1,200	0.025	4	0.25 (Max.)	1.2	10 min.

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The Edge To Innovation

The diagrams and table data are examples of test results, and are not guaranteed values.

⚠ Attentions on Safety

1. Cautions regarding handling

(1) When removing the tool from its case (packaging), be careful that the tool does not pop out or is dropped. Be particularly careful regarding contact with the tool flutes.
(2) When handling tools with sharp cutting flutes, be careful not to touch the cutting flutes directly with your bare hands.

2. Cautions regarding mounting

(1) Before use, check the outside appearance of the tool for scratches, cracks, etc. and that it is firmly mounted in the collet chuck, etc.
(2) If abnormal chattering, etc. occurs during use, stop the machine immediately and remove the cause of the chattering.

3. Cautions during use

(1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
(2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
(3) Cutting tools are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be attached when work is performed and safety equipment such as safety goggles should be worn to create a safe environment for work.
(4) There is a risk of fire or inflammation due to sparks, heat due to breakage, and cutting chips. Do not use where there is a risk of fire or explosion. **Please caution of fire while using oil base coolant, fire prevention is necessary.**
(5) Do not use the tool for any purpose other than that for which it is intended.

4. Cautions regarding regrinding

(1) If regrinding is not performed at the proper time, there is a risk of the tool breaking. Replace the tool with one in good condition, or perform regrinding.
(2) Grinding dust will be created when regrinding a tool. When regrinding, be sure to attach a safety cover over the work area and wear safety clothes such as safety goggles, etc.
(3) This product contains the specified chemical substance cobalt and its inorganic compounds. When performing regrinding or similar processing, be sure to handle the processing in accordance with thelocal laws and regulations regarding prevention of hazards due to specified chemical substances.

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