

# HGOF4-TH

## Corner Radius End Mills for High Hardness Materials



### FEATURES

Low-resistance flute shape enables high-efficiency roughing of high-hardness materials

Four flute design is ideal for high feed rates and low depths of cut

Strong back taper suppresses chatter

New Advanced TH (ATH) Coating provides long tool life in both wet and dry machining

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## INTRODUCTION

The HGOF4-TH Corner Radius End Mills utilize a low-resistance flute shape to enable high-efficiency roughing of high-hardness materials. The strong back taper suppresses chatter, and the four flute design is optimized for low depth of cut, high feed rate machining.

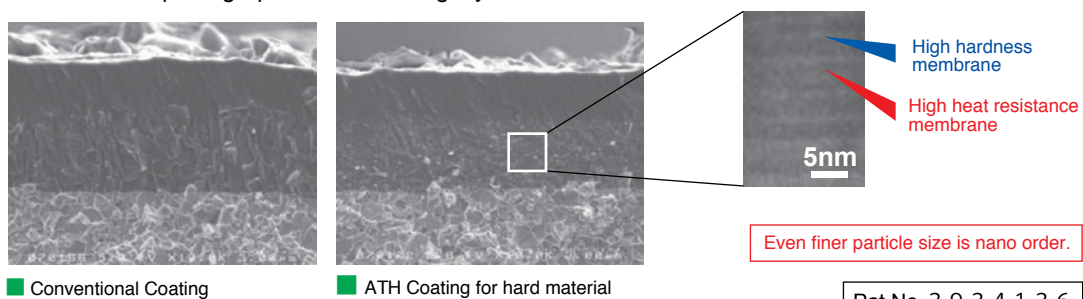
The Advanced TH (ATH) coating on the HGOF4-TH End Mills features a hardness of 3800HV, and an oxidation temperature of 1200°C. This coating exhibits amazing performance in ultra-high-efficiency machining, and provides long tool life in both wet and dry applications.

## FEATURES

### 1. New PVD Coating Technology

**Advanced TH (ATH) Coating:** With a hardness of 3800Hv and oxidation temperature of 1200°, our new ATH Coating enables longer life and higher efficiency when cutting high-hardness materials (55HRC or higher). Compared with our previous generation coating, double the tool life and more than double the machining efficiency can be achieved. The ATH Coating is ideal for both dry cutting and wet cutting in a variety of materials including cold-worked die steel, HSS, tool steel, composite materials, carbide alloys and more.

Cross-section photograph of ATH coating layer structure

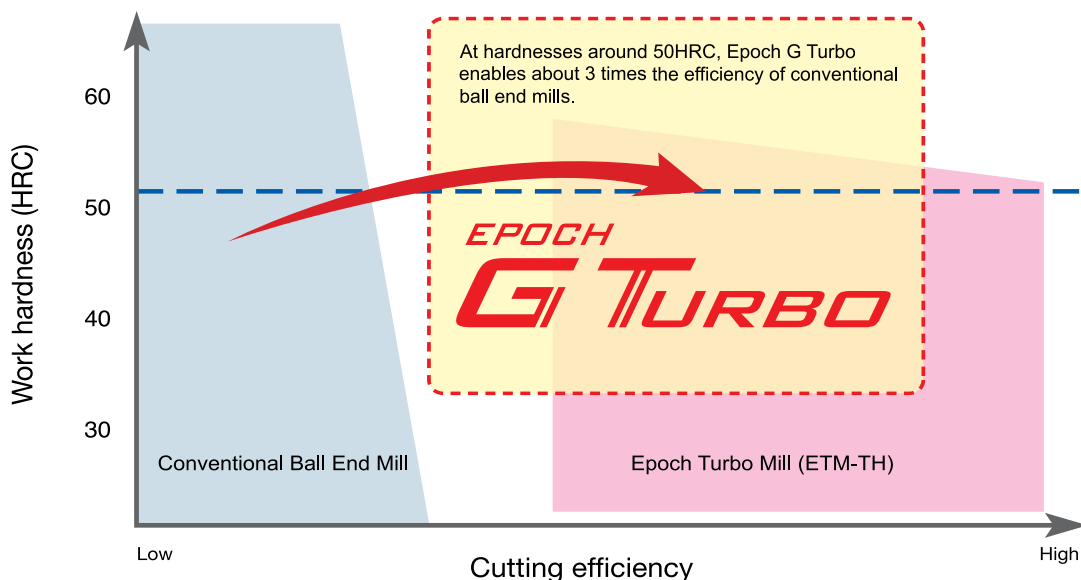


■ Conventional Coating

■ ATH Coating for hard material

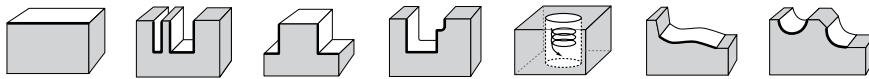
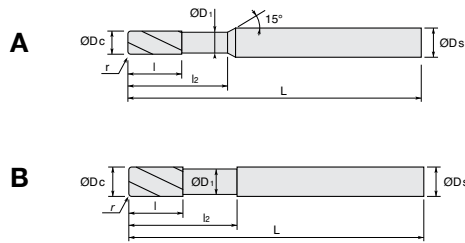
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### 2. Designed for high-efficiency machining of hard materials



Positioning that covers the roughing of high-hardness materials with conventional tools.

# HGOF4-TH



Helix Angle	15°	φDc	0/-0.03
φDs	h5	CR	±0.01

## Size (mm)

Part No.	Stock	D <sub>c</sub>	r	l	l <sub>2</sub>	D <sub>1</sub>	L	D <sub>s</sub>	Flutes	Type
HGOF4020-05-TH	●	2	0.5	1.0	6	1.9	60	6	4	A
HGOF4030-08-TH	●	3	0.8	1.5	9	2.9	60	6	4	A
HGOF4040-10-TH	●	4	1.0	2.0	12	3.8	60	6	4	A
HGOF4050-12-TH	●	5	1.2	2.5	15	4.7	60	6	4	A
HGOF4060-15-TH	●	6	1.5	3.0	18	5.7	60	6	4	B
HGOF4080-20-TH	●	8	2.0	4.0	24	7.6	75	8	4	B
HGOF4100-20-TH	●	10	2.0	5.0	30	9.5	80	10	4	B
HGOF4120-20-TH	●	12	2.0	6.0	36	11.5	100	12	4	B

# HGOF4-TH

## HGOF4-TH Cutting Conditions (Metric)



Work Material	Cutting Range	Cutting Conditions	Mill Dia. × Corner radius (mm)							
			Ø2×r0.5	Ø3×r0.8	Ø4×r1	Ø5×r1.2	Ø6×r1.5	Ø8×r2	Ø10×r2	Ø12×r2
Cast iron, Carbon steels, Alloy steels (150-250HB)	General	N (RPM)	12,000	8,000	6,000	4,800	4,000	3,000	2,400	2,000
		Vf (mm/min)	5,380	6,050	6,380	6,380	6,720	6,720	6,720	6,380
		ap (mm)	0.12	0.19	0.24	0.29	0.36	0.48	0.48	0.48
		ae (mm)	0.5	0.7	1.0	1.3	1.5	2.0	3.0	4.0
	High Speed	N (RPM)	27,000	18,000	13,500	10,800	9,000	6,800	5,400	4,500
		Vf (mm/min)	12,100	13,610	14,360	14,360	15,120	15,230	15,120	14,360
		ap (mm)	0.05	0.08	0.10	0.12	0.15	0.20	0.20	0.20
		ae (mm)	1.0	1.4	2.0	2.5	3.0	4.0	5.0	6.0
Tool Steels (25-35HRC)	General	N (RPM)	11,000	7,400	5,600	4,500	3,700	2,800	2,200	1,900
		Vf (mm/min)	4,510	5,110	5,450	5,470	5,680	5,730	5,630	5,540
		ap (mm)	0.12	0.19	0.24	0.29	0.36	0.48	0.48	0.48
		ae (mm)	0.5	0.7	1.0	1.3	1.5	2.0	3.0	4.0
	High Speed	N (RPM)	27,100	18,000	13,500	10,800	9,000	6,800	5,400	4,500
		Vf (mm/min)	11,100	12,440	13,130	13,130	13,820	13,930	13,820	13,130
		ap (mm)	0.05	0.08	0.10	0.12	0.15	0.20	0.20	0.20
		ae (mm)	1.0	1.4	2.0	2.5	3.0	4.0	5.0	6.0
Pre-hardened steels (35-45HRC)	General	N (RPM)	10,000	6,900	5,200	4,100	3,400	2,600	2,100	1,700
		Vf (mm/min)	3,200	3,730	3,950	3,900	4,080	4,160	4,200	3,880
		ap (mm)	0.12	0.19	0.24	0.29	0.36	0.48	0.48	0.48
		ae (mm)	0.5	0.7	1.0	1.3	1.5	2.0	3.0	4.0
	High Speed	N (RPM)	25,500	17,000	12,700	10,200	8,500	6,400	5,100	4,200
		Vf (mm/min)	8,160	9,180	9,650	9,690	10,200	10,240	10,200	9,580
		ap (mm)	0.05	0.08	0.10	0.12	0.15	0.20	0.20	0.20
		ae (mm)	1.0	1.4	2.0	2.5	3.0	4.0	5.0	6.0
Hardened Steels (45-55HRC)	General	N (RPM)	8,000	5,300	4,000	3,200	2,700	2,000	1,600	1,300
		Vf (mm/min)	2,560	2,860	3,040	3,040	3,240	3,200	3,200	2,960
		ap (mm)	0.08	0.13	0.17	0.20	0.25	0.34	0.34	0.34
		ae (mm)	0.5	0.7	1.0	1.3	1.5	2.0	3.0	4.0
	High Speed	N (RPM)	22,300	14,900	11,100	8,900	7,400	5,600	4,500	3,700
		Vf (mm/min)	7,140	8,050	8,440	8,460	8,880	8,960	9,000	8,440
		ap (mm)	0.04	0.06	0.08	0.10	0.12	0.16	0.16	0.16
		ae (mm)	1.0	1.4	2.0	2.5	3.0	4.0	5.0	6.0
Hardened Steels (55-60HRC)	General	N (RPM)	8,000	5,300	4,000	3,200	2,700	2,000	1,600	1,300
		Vf (mm/min)	1,275	1,425	1,525	1,525	1,625	1,600	1,600	1,488
		ap (mm)	0.06	0.10	0.12	0.14	0.18	0.24	0.24	0.24
		ae (mm)	0.5	0.7	1.0	1.3	1.5	2.0	3.0	4.0
	High Speed	N (RPM)	14,300	9,500	7,200	5,700	4,800	3,600	2,900	2,400
		Vf (mm/min)	1,830	2,050	2,190	2,170	2,300	2,300	2,320	2,190
		ap (mm)	0.03	0.05	0.06	0.07	0.09	0.12	0.12	0.12
		ae (mm)	1.0	1.4	2.0	2.5	3.0	4.0	5.0	6.0