

NEW



高硬度鋼加工用ボールエンドミル

Ball End Mill for Hardened Steel

IXエポックディープボール-TH3

IX Epoch Deep Ball-TH3

IX-EPDB-TH3



株式会社 MOLDINO
MOLDINO Tool Engineering, Ltd.

New Product News | No.2503 | 2025-2

“IX”が超硬の概念を変える!

“IX” changes the concept of carbide!

IX
Innovation X

IX-EPDB-TH3の特長

Features of IX-EPDB-TH3

01

新開発の超々微粒超硬合金の採用により
耐摩耗性と耐欠損性を高次元で両立

Uses a newly-developed ultra-fine-grain carbide alloy to combine high wear resistance and chipping resistance.

02

優れた耐摩耗性と耐熱性を有する高硬度鋼
加工用 TH3コーティングを採用

Uses a TH3 coating designed for machining hardened steel, offering outstanding wear resistance and heat resistance.

03

特に60HRCクラスの高硬度鋼加工で寿
命が飛躍的に向上

Greatly improves tool life, especially when machining 60HRC class hardened steel.



TH3コーティング TH3 Coating					
炭素鋼 合金鋼 Carbon steel Alloy steel	ステンレス鋼 工具鋼 Stainless steel Tool steel	プリハードン鋼 Pre-hardened steel	焼入れ鋼 45~55HRC Hardened steel 45-55HRC	焼入れ鋼 55~65HRC Hardened steel 55-65HRC	焼入れ鋼 65~72HRC Hardened steel 65-72HRC

加工
用途
Applications



金型製作
Mold making

部品加工
Parts processing

IX-EPDB-TH3

RE0.05~RE1.25 [106アイテム]
Items

特長
Features

01

高硬度鋼加工用 次世代超硬合金

Next-generation carbide alloy for machining hardened steel

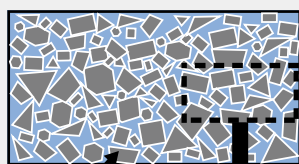
●組織の微細化により従来比約10%の高硬度化を実現

●次世代添加元素の採用により耐摩耗性(硬さ)と耐欠損性(靱性)を高次元で両立

●Features refined material structure with approximately 10% greater hardness than conventional materials.

●Incorporates next-generation additive elements to combine high wear resistance (hardness) and chipping resistance (toughness).

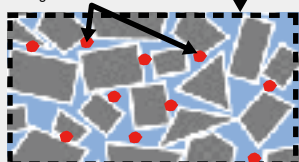
次世代超硬合金 Next-generation carbide alloy



炭化タングステン(WC)
Tungsten carbide (WC)

拡大
Enlarged view

次世代添加元素
Next-generation additive elements

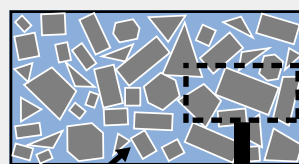


チッピングを
大幅に抑制
Dramatically
reduces chipping.

次世代添加元素はWC粒子の周囲に偏析しにくい
→ 超硬合金の靱性が向上

Next-generation additive elements resist segregating around WC particles.
→ Increases carbide toughness.

従来超硬合金 Conventional carbide alloy



コバルト
Cobalt

拡大
Enlarged view

従来添加元素
Conventional additive elements



チッピングが
著しく進行
Notable chipping

従来添加元素はWC粒子の周囲に偏析する
→ 超硬合金の靱性が低下

Conventional additive elements segregate around WC particles.
→ Reduces carbide toughness.

使用工具 Tool : $\phi 2 \times$ 首下長 Under neck length 4mm 機械 Machine : 立型MC(HSK-E32) Vertical MC

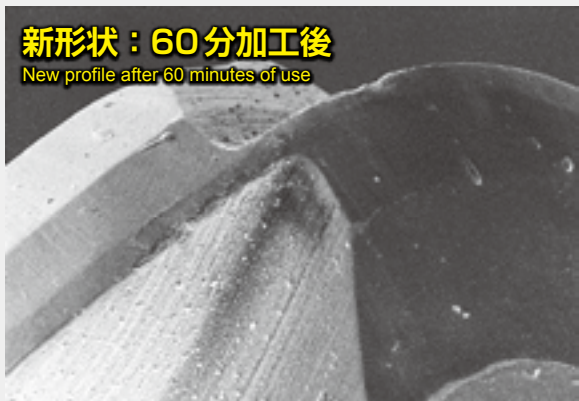
被削材 Work material : SLD(60HRC) クーラント Coolant : ミストブロー Mist blow 加工時間 Cutting time : 320分 320 min.

切削条件 Cutting conditions : $n=30,000\text{min}^{-1}$ ($v_c=188\text{m/min}$) $v_r=3,000\text{mm/min}$ ($f_z=0.05\text{mm/t}$) $a_p \times a_e=0.03\text{mm} \times 0.05\text{mm}$

IX-EPDB-TH3



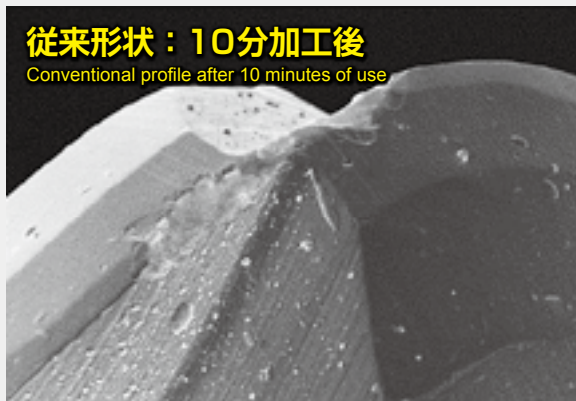
新形状：60分加工後
New profile after 60 minutes of use



従来品 Conventional



従来形状：10分加工後
Conventional profile after 10 minutes of use



0.05mm

使用工具 Tool : $\phi 0.6 \times$ 首下長 Under neck length 1.5mm 機械 Machine : 立型MC(HSK-E32) Vertical MC

被削材 Work material : SLD(60HRC) クーラント Coolant : ミストブロー Mist blow

切削条件 Cutting conditions : $n=40,000\text{min}^{-1}$ ($v_c=75\text{m/min}$) $v_f=800\text{mm/min}$ ($f_z=0.01\text{mm/t}$) $a_p \times a_e=0.005\text{mm} \times 0.01\text{mm}$

高硬度鋼の加工で発生しやすいチッピングを効果的に抑制します

Effectively reduces chipping common when machining hardened steel.

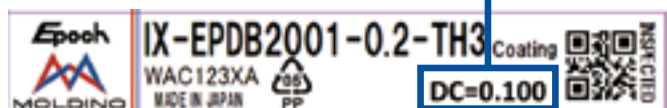
測定の手間なく

実測値をCAMに反映し
加工精度の向上に貢献 !!

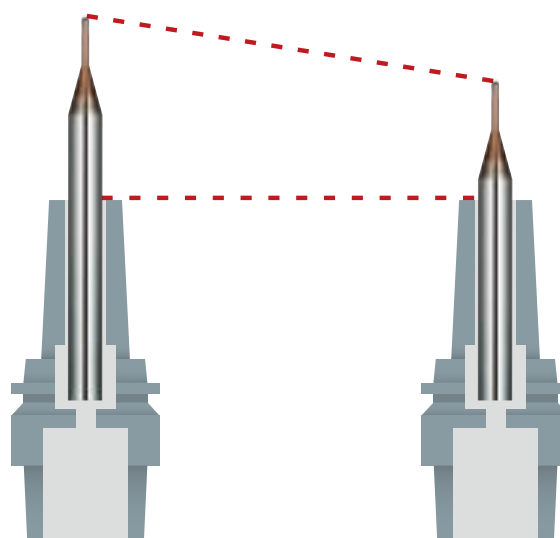
Allows use of actual size in CAM
without the need for measurement,
for improved machining accuracy!

Actual size indicated here.

ここに実測値 が表記されます。



※商品ラベルイメージ
Example product label



Regular
レギュラーシャンク

Short
ショートシャンク

焼きばめホルダにFitする全長設計

Full-length design that fits shrink-fit holders

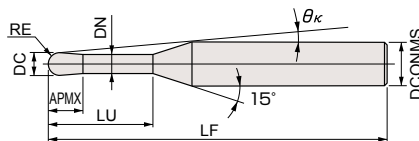
ラインナップ

Line Up

2枚刃
2 Flutes



外径実測値付き Indicates actual measured mill diameter value.



ボール半径RE Ball radius	RE公差 Tolerance on RE
RE ≤ 0.075	±0.002
0.075 < RE ≤ 0.45	±0.003
0.45 < RE	±0.005

IX-EPDB2000-000-TH3



商品コード Item code	在庫 Stock	寸法 Size(mm)							干渉角度 Interference angle (°)	勾配角に対する実有効首下長 Effective under neck length with respect to draft angle					希望小売 価格 (円) Suggested retail price (¥)
		ボール半径 Ball radius RE	外径 Tool dia. DC	首下長 Under neck length LU	刃長 Flute length APMX	首径 Neck dia. DN	全長 Overall length LF	シャンク径 Shank dia. DCONMS		0.5°	1°	1.5°	2°	3°	
IX-EPDB2001-0.2-TH3	●	0.05	0.1	0.2	0.08	0.09	35	4	14.66	0.22	0.23	0.23	0.24	0.25	9,140
IX-EPDB2001-0.3-TH3	●			0.3					14.47	0.32	0.33	0.34	0.35	0.38	9,200
IX-EPDB2001-0.4-TH3	●			0.4					14.29	0.43	0.44	0.45	0.47	0.50	9,220
IX-EPDB2001-0.5-TH3	●			0.5					14.11	0.53	0.55	0.56	0.58	0.63	9,240
IX-EPDB20015-0.3-TH3	●	0.075	0.15	0.3	0.12	0.14	35	4	14.51	0.32	0.33	0.34	0.35	0.37	9,050
IX-EPDB20015-0.4-TH3	●			0.4					14.32	0.43	0.44	0.45	0.47	0.50	9,050
IX-EPDB20015-0.5-TH3	●			0.5					14.14	0.53	0.54	0.56	0.58	0.62	9,060
IX-EPDB20015-0.6-TH3	●			0.6					13.97	0.63	0.65	0.67	0.70	0.75	9,400
IX-EPDB20015-0.75-TH3	●			0.75					13.71	0.79	0.81	0.84	0.87	0.93	9,870
IX-EPDB2002-0.3-TH3	●	0.1	0.2	0.3	0.15	0.19	35	4	14.54	0.32	0.33	0.34	0.35	0.37	8,720
IX-EPDB2002-0.4-TH3	●			0.4					14.35	0.42	0.44	0.45	0.46	0.49	8,730
IX-EPDB2002-0.5-TH3	●			0.5					14.17	0.53	0.54	0.56	0.58	0.62	8,740
IX-EPDB2002-0.6-TH3	●			0.6					13.99	0.63	0.65	0.67	0.69	0.74	8,750
IX-EPDB2002-0.75-TH3	●			0.75					13.73	0.79	0.81	0.84	0.86	0.93	8,760
IX-EPDB2002-0.85-TH3	●			0.85					13.57	0.89	0.92	0.95	0.98	1.05	9,100
IX-EPDB2002-1-TH3	●			1			38		13.32	1.04	1.08	1.11	1.15	1.24	9,510
IX-EPDB2003-0.5-TH3	●	0.15	0.3	0.5	0.2	0.29	35	4	14.23	0.53	0.54	0.55	0.57	0.60	7,890
IX-EPDB2003-0.6-TH3	●			0.6					14.05	0.63	0.65	0.66	0.68	0.73	7,900
IX-EPDB2003-0.75-TH3	●			0.75					13.78	0.78	0.81	0.83	0.86	0.92	7,900
IX-EPDB2003-1-TH3	●			1					13.35	1.04	1.07	1.11	1.14	1.23	8,550
IX-EPDB2003-1.25-TH3	●			1.25			38		12.95	1.30	1.34	1.39	1.43	1.54	8,600
IX-EPDB2003-1.5-TH3	●			1.5					12.58	1.56	1.61	1.66	1.72	1.85	8,690
IX-EPDB2004-0.5-TH3	●	0.2	0.4	0.5	0.25	0.39	35	4	14.30	0.52	0.54	0.55	0.56	0.59	7,680
IX-EPDB2004-0.75-TH3	●			0.75					13.83	0.78	0.80	0.83	0.85	0.90	7,740
IX-EPDB2004-1-TH3	●			1					13.39	1.04	1.07	1.10	1.14	1.21	7,800
IX-EPDB2004-1.2-TH3	●			1.2					13.06	1.25	1.28	1.32	1.37	1.46	8,200
IX-EPDB2004-1.5-TH3	●			1.5			38		12.59	1.56	1.61	1.66	1.71	1.84	8,640
IX-EPDB2004-1.8-TH3	●			1.8					12.15	1.87	1.93	1.99	2.06	2.21	8,660
IX-EPDB2004-2-TH3	●			2					11.87	2.07	2.14	2.21	2.29	2.46	8,680
IX-EPDB2004-2.5-TH3	●			2.5					11.24	2.59	2.68	2.77	2.86	3.08	8,680
IX-EPDB2004-3-TH3	●			3					10.66	3.11	3.21	3.32	3.44	3.70	8,710
IX-EPDB2004-3.5-TH3	●			3.5					10.15	3.63	3.75	3.87	4.01	4.32	8,730
IX-EPDB2004-4-TH3	●			4					9.67	4.14	4.28	4.43	4.59	4.94	8,760
IX-EPDB2005-0.75-TH3	●	0.25	0.5	0.75	0.3	0.49	35	4	13.88	0.78	0.80	0.82	0.84	0.89	7,480
IX-EPDB2005-1-TH3	●			1					13.42	1.04	1.07	1.10	1.13	1.20	7,550
IX-EPDB2005-1.5-TH3	●			1.5					12.60	1.56	1.60	1.65	1.70	1.82	7,770
IX-EPDB2005-2-TH3	●			2					11.87	2.07	2.14	2.21	2.28	2.45	7,890
IX-EPDB2005-2.5-TH3	●			2.5			38		11.21	2.59	2.67	2.76	2.85	3.07	8,590
IX-EPDB2005-3-TH3	●			3					10.63	3.11	3.21	3.31	3.43	3.69	8,640
IX-EPDB2005-3.5-TH3	●			3.5					10.10	3.62	3.74	3.87	4.00	4.31	8,700
IX-EPDB2005-4-TH3	●			4					9.62	4.14	4.28	4.42	4.58	4.93	8,780
IX-EPDB2005-5-TH3	●			5			42		8.78	5.17	5.35	5.53	5.73	6.17	9,030
IX-EPDB2006-0.75-TH3	●	0.3	0.6	0.75	0.35	0.58	35	4	13.90	0.80	0.82	0.84	0.86	0.90	7,290
IX-EPDB2006-1-TH3	●			1					13.43	1.06	1.08	1.11	1.14	1.21	7,320
IX-EPDB2006-1.5-TH3	●			1.5					12.58	1.57	1.62	1.67	1.72	1.84	7,410
IX-EPDB2006-2-TH3	●			2			38		11.83	2.09	2.15	2.22	2.29	2.46	7,550
IX-EPDB2006-2.5-TH3	●			2.5					11.16	2.61	2.69	2.78	2.87	3.08	7,610
IX-EPDB2006-3-TH3	●			3					10.57	3.12	3.22	3.33	3.44	3.70	8,390
IX-EPDB2006-3.5-TH3	●			3.5					10.03	3.64	3.76	3.88	4.02	4.32	8,440
IX-EPDB2006-4-TH3	●			4					9.54	4.16	4.29	4.44	4.59	4.94	8,500

●：標準在庫品です。●：Stocked items. 干渉なし：No interference.

IX-EPDB2○○○-○○-TH3

商品コード Item code	在庫 Stock	寸 法 Size(mm)							干渉角度 Interference angle (°)	勾配角に対する実有効首下長 Effective under neck length with respect to draft angle					希望小売 価格(円) Suggested retail price (¥)
		ボール半径 Ball radius	外径 Tool dia.	首下長 Under neck length	刃長 Flute length	首径 Neck dia.	全長 Overall length	シャンク径 Shank dia.		0.5°	1°	1.5°	2°	3°	
		RE	DC	LU	APMX	DN	LF	DCONMS		θκ					
IX-EPDB2006-4.5-TH3	●	0.3	0.6	4.5	0.35	0.58	38	4	9.10	4.68	4.83	4.99	5.17	5.56	8,600
IX-EPDB2006-5-TH3	●			5			8.70		5.19	5.36	5.55	5.74	6.19	8,670	
IX-EPDB2006-5.5-TH3	●			5.5			8.33		5.71	5.90	6.10	6.32	6.81	8,700	
IX-EPDB2006-6-TH3	●			6			7.99		6.23	6.43	6.65	6.89	7.43	8,750	
IX-EPDB2007-2-TH3	●	0.35	0.7	2	0.4	0.68	38	4	11.82	2.09	2.15	2.22	2.29	2.44	7,670
IX-EPDB2007-4-TH3	●			4			9.48		4.16	4.29	4.43	4.59	4.93	8,670	
IX-EPDB2008-1-TH3	●	0.4	0.8	1	0.45	0.78	35	4	13.51	1.05	1.08	1.10	1.13	1.19	7,400
IX-EPDB2008-1.5-TH3	●			1.5			12.60		1.57	1.61	1.66	1.70	1.81	7,440	
IX-EPDB2008-2-TH3	●			2			11.81		2.09	2.15	2.21	2.28	2.43	7,580	
IX-EPDB2008-2.5-TH3	●			2.5			11.11		2.60	2.68	2.76	2.85	3.05	7,610	
IX-EPDB2008-3-TH3	●			3			10.48		3.12	3.22	3.32	3.43	3.68	8,350	
IX-EPDB2008-4-TH3	●			4			9.42		4.15	4.29	4.43	4.58	4.92	8,450	
IX-EPDB2008-5-TH3	●			5			8.55		5.19	5.36	5.54	5.73	6.16	8,680	
IX-EPDB2008-6-TH3	●			6			7.82		6.22	6.43	6.64	6.88	7.41	8,820	
IX-EPDB2008-8-TH3	●			8			6.69	8.29	8.56	8.86	9.18	9.89	9,040		
IX-EPDB2009-2-TH3	●	0.45	0.9	2	0.5	0.88	35	4	11.80	2.09	2.14	2.20	2.27	2.42	7,160
IX-EPDB2009-4-TH3	●			4			9.35		4.15	4.28	4.42	4.57	4.91	8,250	
IX-EPDB2009-6-TH3	●			6			7.74		6.22	6.42	6.64	6.87	7.39	8,480	
IX-EPDB2010-1.5-TH3	●	0.5	1	1.5	0.7	0.97	35	4	12.60	1.59	1.62	1.67	1.71	1.81	6,950
IX-EPDB2010-2-TH3	●			2			11.75		2.10	2.16	2.22	2.29	2.43	7,000	
IX-EPDB2010-2.5-TH3	●			2.5			11.02		2.62	2.69	2.77	2.86	3.05	7,140	
IX-EPDB2010-3-TH3	●			3			10.36		3.14	3.23	3.33	3.44	3.68	7,890	
IX-EPDB2010-4-TH3	●			4			9.26		4.17	4.30	4.44	4.59	4.92	8,000	
IX-EPDB2010-5-TH3	●			5			8.37		5.20	5.37	5.55	5.74	6.16	8,060	
IX-EPDB2010-6-TH3	●			6			7.63		6.24	6.44	6.65	6.88	7.41	8,240	
IX-EPDB2010-7-TH3	●			7			7.01		7.27	7.51	7.76	8.03	8.65	8,310	
IX-EPDB2010-8-TH3	●			8			6.49		8.31	8.58	8.87	9.18	9.89	8,370	
IX-EPDB2010-9-TH3	●			9			6.03		9.34	9.65	9.98	10.33	11.13	8,500	
IX-EPDB2010-10-TH3	●			10			5.64		10.37	10.72	11.09	11.48	12.38	8,610	
IX-EPDB2010-12-TH3	●			12			4.99		12.44	12.86	13.30	13.78	14.86	8,740	
IX-EPDB2015-2-TH3	●	0.75	1.5	2	1.25	1.46	35	4	11.64	2.11	2.16	2.21	2.27	2.40	7,020
IX-EPDB2015-2.5-TH3	●			2.5			10.78		2.63	2.70	2.77	2.85	3.02	7,060	
IX-EPDB2015-3-TH3	●			3			10.04		3.15	3.23	3.32	3.42	3.64	7,090	
IX-EPDB2015-4-TH3	●			4			8.82		4.18	4.30	4.43	4.57	4.88	7,250	
IX-EPDB2015-5-TH3	●			5			7.87		5.22	5.37	5.54	5.72	6.13	7,300	
IX-EPDB2015-6-TH3	●			6			7.10		6.25	6.44	6.65	6.87	7.37	8,130	
IX-EPDB2015-8-TH3	●			8			5.93		8.32	8.58	8.86	9.17	9.86	8,330	
IX-EPDB2015-10-TH3	●			10			5.09		10.38	10.72	11.08	11.47	12.34	8,430	
IX-EPDB2015-12-TH3	●			12			4.46	12.45	12.86	13.30	13.77	14.83	8,630		
IX-EPDB2020-2.5-TH3	●	1	2	2.5	1.6	1.95	35	4	10.46	2.64	2.70	2.76	2.83	2.98	7,350
IX-EPDB2020-3-TH3	●			3			9.60		3.16	3.23	3.32	3.40	3.60	7,390	
IX-EPDB2020-4-TH3	●			4			8.24		4.19	4.30	4.42	4.55	4.85	7,440	
IX-EPDB2020-5-TH3	●			5			7.22		5.23	5.37	5.53	5.70	6.09	7,610	
IX-EPDB2020-6-TH3	●			6			6.42		6.26	6.44	6.64	6.85	7.33	8,320	
IX-EPDB2020-8-TH3	●			8			5.25		8.33	8.58	8.86	9.15	9.82	8,520	
IX-EPDB2020-10-TH3	●			10			4.44		10.39	10.72	11.07	11.45	12.31	8,630	
IX-EPDB2020-12-TH3	●			12			3.85		12.46	12.86	13.29	13.75	14.79	8,820	
IX-EPDB2020-13-TH3	●			13			3.60		13.50	13.93	14.40	14.90	16.04	8,870	
IX-EPDB2020-14-TH3	●			14			3.39		14.53	15.00	15.51	16.05	17.28	8,920	
IX-EPDB2020-16-TH3	●			16			3.03		16.60	17.14	17.72	18.35	19.76	9,170	
IX-EPDB2020-18-TH3	●			18			2.74		18.66	19.28	19.94	20.65	干渉なし	9,300	
IX-EPDB2020-20-TH3	●			20			2.50	20.73	21.42	22.16	22.95	干渉なし	9,520		
IX-EPDB2025-6-TH3	●	1.25	2.5	6	1.9	2.44	38	4	5.54	6.27	6.45	6.64	6.84	7.30	7,330
IX-EPDB2025-8-TH3	●			8			4.41		8.34	8.59	8.85	9.14	9.78	7,800	
IX-EPDB2025-10-TH3	●			10			3.66		10.41	10.73	11.07	11.44	12.27	8,450	
IX-EPDB2025-15-TH3	●			15			2.57		15.57	16.07	16.61	17.19	干渉なし	8,790	

標準切削条件表

Recommended Cutting Conditions

高能率切削条件

High efficiency cutting condition

高精度切削条件

High accuracy cutting condition

高精度切削条件は8ページを参照してください。Please refer to P.8 about high accuracy cutting conditions

被削材 Work material				1		2		3		4		5	
				プリハードン鋼 Pre-hardened steels (35~45HRC)		焼入れ鋼 Hardened steels (45~55HRC)		焼入れ鋼 Hardened steels (55~60HRC)		焼入れ鋼 Hardened steels (60~65HRC)		焼入れ鋼 Hardened steels (65~72HRC)	
切込み比率 Ratio to standard depth of cut				100%		85%		80%		65%		55%	
ボール半径RE Ball radius (mm)	外径DC Tool dia. (mm)	首下長LU Under neck length (mm)	ap (mm)	回転数 n min ⁻¹	送り速度 V_f mm/min	回転数 n min ⁻¹	送り速度 V_f mm/min	回転数 n min ⁻¹	送り速度 V_f mm/min	回転数 n min ⁻¹	送り速度 V_f mm/min	回転数 n min ⁻¹	送り速度 V_f mm/min
0.05	0.1	0.2	0.006	50,000	230	50,000	200	50,000	190	45,000	170	42,500	130
		0.3	0.005	50,000	230	50,000	200	50,000	190	45,000	170	42,500	130
		0.4	0.004	50,000	230	50,000	200	50,000	190	45,000	170	42,500	130
		0.5	0.003	50,000	230	50,000	200	50,000	190	45,000	170	42,500	130
0.075	0.15	0.3	0.009	50,000	280	46,000	230	42,000	180	37,500	160	35,500	120
		0.4	0.008	50,000	280	46,000	230	42,000	180	37,500	160	35,500	120
		0.5	0.008	50,000	280	46,000	230	42,000	180	37,500	160	35,500	120
		0.6	0.007	50,000	280	46,000	230	42,000	180	37,500	160	35,500	120
0.1	0.2	0.75	0.007	50,000	280	46,000	230	42,000	180	37,500	160	35,500	120
		0.3	0.016	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
		0.4	0.016	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
		0.5	0.016	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
0.15	0.3	0.6	0.014	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
		0.75	0.014	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
		0.85	0.011	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
		1	0.011	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
0.2	0.4	0.5	0.022	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
		0.6	0.02	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
		0.75	0.019	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
		1	0.017	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
0.25	0.5	1.25	0.015	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
		1.5	0.013	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
0.3	0.6	0.5	0.034	50,000	770	46,800	660	43,680	610	39,310	550	37,130	430
		0.75	0.034	50,000	770	46,800	660	43,680	610	39,310	550	37,130	430
		1	0.032	50,000	770	46,800	660	43,680	610	39,310	550	37,130	430
		1.2	0.027	50,000	660	46,800	470	43,680	440	39,310	390	37,130	310
0.35	0.7	1.5	0.027	50,000	660	46,800	470	43,680	440	39,310	390	37,130	310
		1.8	0.022	50,000	550	46,800	470	43,680	440	39,310	390	37,130	310
		2	0.022	50,000	550	46,800	470	43,680	440	39,310	390	37,130	310
		2.5	0.018	36,720	360	35,020	290	33,820	270	32,660	250	30,850	190
0.4	0.8	3	0.013	36,720	360	35,020	290	33,820	270	32,660	250	30,850	190
		3.5	0.01	36,720	360	35,020	290	33,820	270	32,660	250	30,850	190
		4	0.008	36,720	360	35,020	290	33,820	270	32,660	250	30,850	190
		0.75	0.036	50,000	1,190	47,130	1,050	43,930	740	39,820	670	37,560	520
0.45	0.9	1	0.036	50,000	1,190	47,130	1,050	43,930	740	39,820	670	37,560	520
		1.5	0.032	50,000	1,190	47,130	1,050	43,930	680	39,820	610	37,560	480
		2	0.028	50,000	960	47,130	840	43,930	680	39,820	610	37,560	480
		2.5	0.026	45,450	650	42,840	570	39,940	500	36,220	450	34,180	350
0.5	1.0	3	0.024	45,450	650	42,840	570	39,940	500	36,220	450	34,180	350
		3.5	0.02	34,970	500	32,950	440	30,730	390	28,540	350	26,290	270
		4	0.016	34,970	500	32,950	440	30,730	390	28,540	350	26,290	270
		5	0.014	34,970	500	32,950	440	30,730	390	28,540	350	26,290	270
0.55	1.1	0.75	0.06	50,000	1,950	48,000	1,730	44,800	1,340	40,320	1,210	38,080	940
		1	0.06	50,000	1,950	48,000	1,730	44,800	1,340	40,320	1,210	38,080	940
		1.5	0.055	50,000	1,950	48,000	1,730	44,800	1,340	40,320	1,210	38,080	940
		2	0.05	50,000	1,950	48,000	1,730	44,800	1,340	40,320	1,210	38,080	940
0.6	1.2	2.5	0.036	50,000	1,560	48,000	1,380	44,800	990	40,320	890	38,080	690
		3	0.033	50,000	1,560	48,000	1,380	44,800	990	40,320	890	38,080	690
		3.5	0.028	48,960	1,450	43,200	1,180	40,320	840	36,290	760	34,270	590
		4	0.021	48,960	1,450	43,200	1,180	40,320	770	36,290	690	34,270	540
0.65	1.3	4.5	0.018	45,900	1,070	40,500	880	37,800	680	34,020	610	32,130	480
		5	0.016	39,780	930	35,100	760	32,760	590	29,480	530	27,850	410
		5.5	0.014	39,780	930	35,100	760	32,760	590	29,480	530	27,850	410
		6	0.012	39,780	930	35,100	760	32,760	590	29,480	530	27,850	410
0.7	1.4	2	0.073	50,000	2,160	48,000	1,930	44,800	1,190	40,320	1,070	38,080	830
		4	0.033	48,960	1,600	47,000	1,320	43,870	850	39,480	760	37,370	590
0.75	1.5	1	0.12	50,000	2,400	48,000	2,210	44,800	1,880	40,320	1,690	38,080	1,320
		1.5	0.12	50,000	2,400	48,000	2,210	44,800	1,880	40,320	1,690	38,080	1,320
		2	0.096	50,000	2,400	48,000	2,210	44,800	1,880	40,320	1,690	38,080	1,320
		2.5	0.088	50,000	2,400	48,000	2,210	44,800	1,880	40,320	1,690	38,080	1,320
0.8	1.6	3	0.08	50,000	2,400	48,000	2,210	44,800	1,880	40,320	1,690	38,080	1,320

被削材 Work material				1		2		3		4		5	
				プリハードン鋼 Pre-hardened steels (35~45HRC)		焼入れ鋼 Hardened steels (45~55HRC)		焼入れ鋼 Hardened steels (55~60HRC)		焼入れ鋼 Hardened steels (60~65HRC)		焼入れ鋼 Hardened steels (65~72HRC)	
切込み比率 Ratio to standard depth of cut				100%		85%		80%		65%		55%	
ボール半径RE Ball radius (mm)	外径DC Tool dia. (mm)	首下長LU Under neck length (mm)	ap (mm)	回転数 n min ⁻¹	送り速度 Vf mm/min	回転数 n min ⁻¹	送り速度 Vf mm/min	回転数 n min ⁻¹	送り速度 Vf mm/min	回転数 n min ⁻¹	送り速度 Vf mm/min	回転数 n min ⁻¹	送り速度 Vf mm/min
0.4	0.8	4	0.063	50,000	2,400	48,000	2,210	44,800	1,880	40,320	1,690	38,080	1,320
		5	0.047	48,960	2,110	43,200	1,770	40,320	1,520	36,290	1,370	34,270	1,070
		6	0.033	42,840	1,730	37,800	1,430	35,280	1,250	31,750	1,120	29,990	870
		8	0.016	35,360	1,020	31,200	840	29,120	730	26,210	660	24,750	510
0.45	0.9	2	0.108	50,000	2,820	45,600	2,410	42,560	2,140	38,300	1,930	36,180	1,500
		4	0.065	48,450	2,370	42,750	1,960	39,900	1,740	35,910	1,560	33,920	1,220
		6	0.044	40,700	1,520	35,910	1,250	33,520	1,110	30,160	1,000	28,490	780
0.5	1	1.5	0.18	45,900	3,100	43,200	2,720	37,800	2,270	34,020	2,040	32,130	1,590
		2	0.16	45,900	3,100	43,200	2,720	37,800	2,270	34,020	2,040	32,130	1,590
		2.5	0.16	45,900	3,100	43,200	2,720	37,800	2,270	34,020	2,040	32,130	1,590
		3	0.16	45,900	3,100	43,200	2,720	37,800	2,270	34,020	2,040	32,130	1,590
		4	0.112	45,900	3,100	43,200	2,720	37,800	2,270	34,020	2,040	32,130	1,590
		5	0.072	39,780	2,600	37,440	2,250	32,760	1,840	29,480	1,650	27,850	1,280
		6	0.048	38,560	2,320	33,690	1,860	29,480	1,380	26,540	1,240	25,060	970
		7	0.048	33,050	1,340	31,590	1,250	27,220	1,060	24,490	960	23,130	740
		8	0.048	33,050	1,340	31,590	1,250	27,220	980	24,490	880	23,130	690
		9	0.036	33,050	1,340	31,590	1,250	27,220	980	24,490	880	23,130	690
		10	0.03	33,050	1,340	31,590	1,250	27,220	980	24,490	880	23,130	690
		12	0.02	24,480	940	21,600	770	20,160	690	18,140	620	17,140	480
0.75	1.5	2	0.192	35,700	3,210	31,500	2,550	29,400	2,210	26,460	1,990	24,990	1,540
		2.5	0.192	35,700	3,210	31,500	2,550	29,400	2,210	26,460	1,990	24,990	1,540
		3	0.192	35,700	3,210	31,500	2,550	29,400	2,210	26,460	1,990	24,990	1,540
		4	0.16	35,700	3,210	31,500	2,550	29,400	2,210	26,460	1,990	24,990	1,540
		5	0.16	35,700	3,210	31,500	2,550	29,400	2,210	26,460	1,990	24,990	1,540
		6	0.16	35,700	3,210	31,500	2,550	29,400	2,210	26,460	1,990	24,990	1,540
		8	0.072	27,850	1,810	24,570	1,430	22,930	1,240	20,640	1,120	19,490	870
		10	0.072	25,700	1,670	22,680	1,320	21,170	1,140	19,050	1,030	17,990	800
1	2	12	0.072	25,700	1,390	22,680	1,100	21,170	950	19,050	860	17,990	670
		2.5	0.32	26,780	3,620	23,630	3,050	22,050	2,650	19,850	2,380	18,740	1,850
		3	0.32	26,780	3,620	23,630	3,050	22,050	2,650	19,850	2,380	18,740	1,850
		4	0.32	26,780	3,620	23,630	3,050	22,050	2,650	19,850	2,380	18,740	1,850
		5	0.32	26,780	3,620	23,630	3,050	22,050	2,650	19,850	2,380	18,740	1,850
		6	0.32	26,780	3,210	23,630	2,690	22,050	2,380	19,850	2,140	18,740	1,670
		8	0.224	26,780	3,210	23,630	2,690	22,050	2,380	19,850	2,140	18,740	1,670
		10	0.168	24,990	2,700	22,050	2,250	19,110	1,470	17,200	1,320	16,240	1,030
		12	0.096	22,490	2,430	19,850	2,020	17,200	1,320	15,480	1,190	14,620	930
		13	0.096	22,490	2,430	19,850	2,020	15,880	1,020	14,290	920	13,500	710
		14	0.096	22,490	2,430	19,850	2,020	15,880	1,020	14,290	920	13,500	710
		16	0.096	20,890	1,350	18,430	1,110	15,880	910	14,290	820	13,500	640
1.25	2.5	18	0.072	20,890	1,350	18,430	1,110	15,880	910	14,290	820	13,500	640
		20	0.06	20,890	1,350	18,430	1,110	15,880	910	14,290	820	13,500	640
		6	0.4	23,590	3,800	20,810	3,090	19,430	2,530	17,480	2,280	16,610	1,820
		8	0.272	23,590	3,800	20,810	3,090	19,430	2,530	17,480	2,280	16,610	1,820
		10	0.272	23,590	3,800	20,810	3,090	19,430	2,530	17,480	2,280	16,610	1,820
		15	0.12	18,400	2,480	16,230	2,020	15,150	1,420	13,640	1,280	12,950	1,020

※(1) apはプリハードン鋼での目安を示しています。プリハードン鋼以外の場合は、上表の切込み比率を目安に調整してください。

※(2) リブ加工や止まり溝など、切りくすがつまりやすい切削の場合、切込み設定は上表のapに切込み比率をかけて算出し、

さらにその80%まで小さくして使用してください。

※(3) aeの設定はap×切込み比率×3~5倍を目安に調整してください。仕上げ加工を行う場合、理論カスプハイトを計算し設定してください。

※(1) ap is shown as the criteria for pre-hardened steel. For other materials, adjust the cutting depth according to the cutting depth factors in the above table.

※(2) When performing cutting where cutting chips may cause clogging, such as for rib cutting, blind grooves, etc., the cutting depth setting should be set by multiplying ap by a cutting depth factor to calculate the cutting depth amount, and this amount should then be reduced to 80% of the calculated value.

※(3) Adjust by setting ae to (3 to 5)×(ap)×(cutting depth ratio). When performing finishing processing, calculate the theoretical cusp height and set accordingly.

【切込み設定例】 IX-EPDB2020-10-TH3の工具で焼入れ鋼(50HRC)をリブ溝等高線切削する場合、
切込み=0.168(ap)×0.85(焼入れ鋼(45~55HRC)の切込み比率)×0.8(閉鎖域の切削)=0.11mm

Cutting depth setting example: When cutting rib groove contours in hardened steel (50HRC) using an IX-EPDB2020-10-TH3 tool:

Cutting depth = 0.168 (ap) × 0.85 (cutting depth factor for hardened steel [45~55HRC]) × 0.8 (for closed-area cutting) = 0.011 mm

【注意】 ①基本的にはDry(エアブロー)切削を推奨しますが、被削材、加工形状に合わせて、適切なクーラントを使用してください。
②この標準切削条件表は切削条件の目安を示すものです。実際の加工では加工形状、目的、使用機械等により条件を調整してください。
③機械の回転数が足りない場合は、回転数と送り速度を同じ比率で下げてください。

【Note】 ① Although basically dry (air blow) cutting is recommended, please use appropriate coolant according to the work material and machining shape.
② These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
③ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.

標準切削条件表

Recommended Cutting Conditions

高能率切削条件

High efficiency cutting condition

高精度切削条件

High accuracy cutting condition

高能率切削条件は6ページを参照してください。Please refer to P.6 about high efficiency cutting conditions

被削材 Work material				1		2		3		4		5	
				プリハードン鋼 Pre-hardened steels (35~45HRC)		焼入れ鋼 Hardened steels (45~55HRC)		焼入れ鋼 Hardened steels (55~60HRC)		焼入れ鋼 Hardened steels (60~65HRC)		焼入れ鋼 Hardened steels (65~72HRC)	
切込み比率 Ratio to standard depth of cut				100%		85%		80%		65%		55%	
ボール半径RE Ball radius (mm)	外径DC Tool dia. (mm)	首下長LU Under neck length (mm)	ap (mm)	回転数 n min^{-1}	送り速度 V_f mm/min	回転数 n min^{-1}	送り速度 V_f mm/min	回転数 n min^{-1}	送り速度 V_f mm/min	回転数 n min^{-1}	送り速度 V_f mm/min	回転数 n min^{-1}	送り速度 V_f mm/min
0.05	0.1	0.2	0.003	50,000	230	50,000	200	50,000	190	45,000	170	42,500	130
		0.3	0.002	50,000	230	50,000	200	50,000	190	45,000	170	42,500	130
		0.4	0.002	50,000	230	50,000	200	50,000	190	45,000	170	42,500	130
		0.5	0.002	50,000	230	50,000	200	50,000	190	45,000	170	42,500	130
0.075	0.15	0.3	0.007	50,000	280	46,000	230	42,000	180	37,500	160	35,500	120
		0.4	0.006	50,000	280	46,000	230	42,000	180	37,500	160	35,500	120
		0.5	0.006	50,000	280	46,000	230	42,000	180	37,500	160	35,500	120
		0.6	0.005	50,000	280	46,000	230	42,000	180	37,500	160	35,500	120
0.1	0.2	0.75	0.005	50,000	280	46,000	230	42,000	180	37,500	160	35,500	120
		0.3	0.012	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
		0.4	0.012	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
		0.5	0.012	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
0.15	0.3	0.6	0.01	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
		0.75	0.01	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
		0.85	0.008	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
		1	0.008	50,000	330	45,500	270	42,000	210	37,800	190	35,700	150
0.2	0.4	0.5	0.016	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
		0.6	0.015	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
		0.75	0.014	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
		1	0.013	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
0.25	0.5	1.25	0.011	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
		1.5	0.01	50,000	450	45,000	380	42,000	340	37,800	300	35,700	240
0.3	0.6	0.5	0.024	40,800	450	36,000	360	33,600	340	30,240	300	28,560	240
		0.75	0.024	40,800	450	36,000	360	33,600	340	30,240	300	28,560	240
		1	0.022	40,800	450	36,000	360	33,600	340	30,240	300	28,560	240
		1.2	0.02	40,800	450	36,000	360	33,600	340	30,240	300	28,560	240
0.35	0.7	1.5	0.02	40,800	450	36,000	360	33,600	340	30,240	300	28,560	240
		1.8	0.015	40,800	450	36,000	360	33,600	340	30,240	300	28,560	240
		2	0.015	40,800	450	36,000	360	33,600	340	30,240	300	28,560	240
		2.5	0.013	36,720	360	32,400	290	30,240	270	27,220	250	25,700	190
0.4	0.8	3	0.009	36,720	360	32,400	290	30,240	270	27,220	250	25,700	190
		3.5	0.006	36,720	360	32,400	290	30,240	270	27,220	250	25,700	190
		4	0.004	36,720	360	32,400	290	30,240	270	27,220	250	25,700	190
		0.75	0.025	34,000	610	30,000	540	28,000	480	25,200	430	23,800	330
0.45	0.9	1	0.025	34,000	610	30,000	540	28,000	480	25,200	430	23,800	330
		1.5	0.022	34,000	610	30,000	540	28,000	480	25,200	430	23,800	330
		2	0.02	34,000	610	30,000	540	28,000	480	25,200	430	23,800	330
		2.5	0.018	30,600	500	27,000	440	25,200	390	22,680	350	21,420	270
0.5	1.0	3	0.016	30,600	500	27,000	440	25,200	390	22,680	350	21,420	270
		3.5	0.014	30,600	500	27,000	440	25,200	390	22,680	350	21,420	270
		4	0.011	30,600	500	27,000	440	25,200	390	22,680	350	21,420	270
		5	0.01	30,600	500	27,000	440	25,200	390	22,680	350	21,420	270
0.55	1.1	0.75	0.04	34,000	880	30,000	720	28,000	560	25,200	500	23,800	390
		1	0.04	34,000	880	30,000	720	28,000	560	25,200	500	23,800	390
		1.5	0.038	34,000	880	30,000	720	28,000	560	25,200	500	23,800	390
		2	0.034	34,000	880	30,000	720	28,000	560	25,200	500	23,800	390
0.6	1.2	2.5	0.026	34,000	880	30,000	720	28,000	560	25,200	500	23,800	390
		3	0.024	34,000	880	30,000	720	28,000	560	25,200	500	23,800	390
		3.5	0.02	30,600	760	27,000	620	25,200	480	22,680	430	21,420	340
		4	0.015	30,600	760	27,000	620	25,200	480	22,680	430	21,420	340
0.65	1.3	4.5	0.013	30,600	720	27,000	580	25,200	450	22,680	410	21,420	320
		5	0.011	30,600	720	27,000	580	25,200	450	22,680	410	21,420	320
		5.5	0.01	30,600	720	27,000	580	25,200	450	22,680	410	21,420	320
		6	0.008	30,600	720	27,000	580	25,200	450	22,680	410	21,420	320
0.7	1.4	2	0.049	34,000	980	30,000	810	28,000	660	25,200	590	23,800	460
		4	0.027	30,600	840	27,000	690	25,200	560	22,680	510	21,420	400
0.8	1.5	1	0.08	34,000	1,090	30,000	900	28,000	780	25,200	710	23,800	550
		1.5	0.08	34,000	1,090	30,000	900	28,000	780	25,200	710	23,800	550
		2	0.064	34,000	1,090	30,000	900	28,000	780	25,200	710	23,800	550
		2.5	0.06	34,000	1,090	30,000	900	28,000	780	25,200	710	23,800	550
0.9	1.6	3	0.055	34,000	1,090	30,000	900	28,000	780	25,200	710	23,800	550
		3.5	0.055	34,000	1,090	30,000	900	28,000	780	25,200	710	23,800	550
		4	0.055	34,000	1,090	30,000	900	28,000	780	25,200	710	23,800	550
		4.5	0.055	34,000	1,090	30,000	900	28,000	780	25,200	710	23,800	550

被削材 Work material				1		2		3		4		5	
				プリハードン鋼 Pre-hardened steels (35~45HRC)		焼入れ鋼 Hardened steels (45~55HRC)		焼入れ鋼 Hardened steels (55~60HRC)		焼入れ鋼 Hardened steels (60~65HRC)		焼入れ鋼 Hardened steels (65~72HRC)	
切込み比率 Ratio to standard depth of cut				100%		85%		80%		65%		55%	
ボール半径RE Ball radius (mm)	外径DC Tool dia. (mm)	首下長LU Under neck length (mm)	ap (mm)	回転数 n min ⁻¹	送り速度 Vf mm/min	回転数 n min ⁻¹	送り速度 Vf mm/min	回転数 n min ⁻¹	送り速度 Vf mm/min	回転数 n min ⁻¹	送り速度 Vf mm/min	回転数 n min ⁻¹	送り速度 Vf mm/min
0.4	0.8	4	0.042	34,000	1,090	30,000	900	28,000	780	25,200	710	23,800	550
		5	0.032	30,600	880	27,000	730	25,200	640	22,680	570	21,420	450
		6	0.022	30,600	880	27,000	730	25,200	640	22,680	570	21,420	450
		8	0.011	27,200	780	24,000	650	22,400	560	20,160	510	19,040	400
0.45	0.9	2	0.072	32,300	1,220	28,500	1,000	26,600	890	23,940	800	22,610	620
		4	0.046	32,300	1,220	28,500	1,000	26,600	890	23,940	800	22,610	620
		6	0.034	29,070	980	25,650	810	23,940	720	21,550	650	20,350	510
0.5	1	1.5	0.09	30,600	1,380	27,000	1,130	25,200	1,010	22,680	910	21,420	710
		2	0.08	30,600	1,380	27,000	1,130	25,200	1,010	22,680	910	21,420	710
		2.5	0.08	30,600	1,380	27,000	1,130	25,200	1,010	22,680	910	21,420	710
		3	0.08	30,600	1,380	27,000	1,130	25,200	1,010	22,680	910	21,420	710
		4	0.056	30,600	1,380	27,000	1,130	25,200	1,010	22,680	910	21,420	710
		5	0.048	30,600	1,380	27,000	1,130	25,200	1,010	22,680	910	21,420	710
		6	0.032	27,540	1,120	24,300	920	22,680	820	20,410	730	19,280	570
		7	0.032	27,540	1,120	24,300	920	22,680	820	20,410	730	19,280	570
		8	0.032	27,540	1,120	24,300	920	22,680	820	20,410	730	19,280	570
		9	0.024	27,540	1,120	24,300	920	22,680	820	20,410	730	19,280	570
		10	0.02	27,540	1,120	24,300	920	22,680	820	20,410	730	19,280	570
		12	0.01	24,480	940	21,600	770	20,160	690	18,140	620	17,140	480
0.75	1.5	2	0.096	23,800	1,430	21,000	1,130	19,600	980	17,640	880	16,660	690
		2.5	0.096	23,800	1,430	21,000	1,130	19,600	980	17,640	880	16,660	690
		3	0.096	23,800	1,430	21,000	1,130	19,600	980	17,640	880	16,660	690
		4	0.08	23,800	1,430	21,000	1,130	19,600	980	17,640	880	16,660	690
		5	0.08	23,800	1,430	21,000	1,130	19,600	980	17,640	880	16,660	690
		6	0.08	23,800	1,430	21,000	1,130	19,600	980	17,640	880	16,660	690
		8	0.048	21,420	1,160	18,900	920	17,640	790	15,880	720	14,990	560
		10	0.048	21,420	1,160	18,900	920	17,640	790	15,880	720	14,990	560
1	2	12	0.048	21,420	1,160	18,900	920	17,640	790	15,880	720	14,990	560
		2.5	0.16	17,850	1,610	15,750	1,360	14,700	1,180	13,230	1,060	12,500	820
		3	0.16	17,850	1,610	15,750	1,360	14,700	1,180	13,230	1,060	12,500	820
		4	0.16	17,850	1,610	15,750	1,360	14,700	1,180	13,230	1,060	12,500	820
		5	0.16	17,850	1,610	15,750	1,360	14,700	1,180	13,230	1,060	12,500	820
		6	0.16	17,850	1,430	15,750	1,200	14,700	1,060	13,230	950	12,500	740
		8	0.112	17,850	1,430	15,750	1,200	14,700	1,060	13,230	950	12,500	740
		10	0.112	17,850	1,290	15,750	1,070	14,700	940	13,230	850	12,500	660
		12	0.064	16,070	1,160	14,180	960	13,230	850	11,910	760	11,250	590
		13	0.064	16,070	1,160	14,180	960	13,230	850	11,910	760	11,250	590
		14	0.064	16,070	1,160	14,180	960	13,230	850	11,910	760	11,250	590
		16	0.064	16,070	1,040	14,180	870	13,230	760	11,910	690	11,250	530
1.25	2.5	18	0.048	16,070	1,040	14,180	870	13,230	760	11,910	690	11,250	530
		20	0.04	16,070	1,040	14,180	870	13,230	760	11,910	690	11,250	530
		6	0.2	15,730	1,690	13,880	1,370	12,950	1,130	11,660	1,010	11,070	810
		8	0.136	15,730	1,690	13,880	1,370	12,950	1,130	11,660	1,010	11,070	810
		10	0.136	15,730	1,690	13,880	1,370	12,950	1,130	11,660	1,010	11,070	810
		15	0.08	14,150	1,370	12,490	1,110	11,660	910	10,490	820	9,970	660

※(1) apはプリハードン鋼での目安を示しています。プリハードン鋼以外の場合は、上表の切込み比率を目安に調整してください。

※(2) リブ加工や止まり溝など、切りくすがつまりやすい切削の場合、切込み設定は上表のapに切込み比率をかけて算出し、

さらにその80%まで小さくして使用してください。

※(3) aeの設定はap×切込み比率×3~5倍を目安に調整してください。仕上げ加工を行う場合、理論カスプハイトを計算し設定してください。

※(1) ap is shown as the criteria for pre-hardened steel. For other materials, adjust the cutting depth according to the cutting depth factors in the above table.

※(2) When performing cutting where cutting chips may cause clogging, such as for rib cutting, blind grooves, etc., the cutting depth setting should be set by multiplying ap by a cutting depth factor to calculate the cutting depth amount, and this amount should then be reduced to 80% of the calculated value.

※(3) Adjust by setting ae to (3 to 5)×(ap)×(cutting depth ratio). When performing finishing processing, calculate the theoretical cusp height and set accordingly.

【切込み設定例】 IX-EPDB2020-10-TH3の工具で焼入れ鋼(50HRC)をリブ溝等高線切削する場合、
切込み=0.112(ap)×0.85(焼入れ鋼(45~55HRC)の切込み比率)×0.8(閉鎖域の切削)=0.076mm

Cutting depth setting example: When cutting rib groove contours in hardened steel (50HRC) using an IX-EPDB2020-10-TH3 tool:
Cutting depth = 0.112 (ap) × 0.85 (cutting depth factor for hardened steel [45~55HRC]) × 0.8 (for closed-area cutting) = 0.076 mm

【注意】 ①基本的にはDry(エアブロー)切削を推奨しますが、被削材、加工形状に合わせて、適切なクーラントを使用してください。
②この標準切削条件表は切削条件の目安を示すものです。実際の加工では加工形状、目的、使用機械等により条件を調整してください。
③機械の回転数が足りない場合は、回転数と送り速度を同じ比率で下げてください。

【Note】 ① Although basically dry (air blow) cutting is recommended, please use appropriate coolant according to the work material and machining shape.
② These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
③ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.



従来超硬工具との比較事例

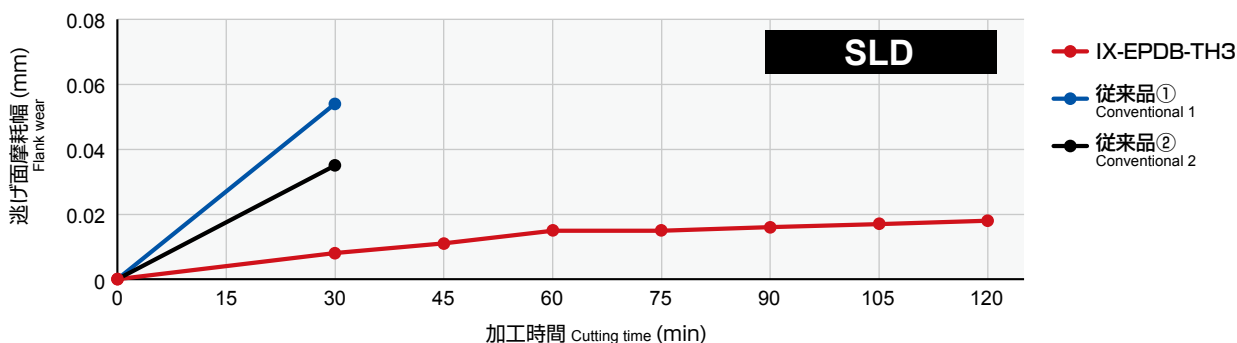
Comparison to conventional carbide tools

工具 Tool : IX-EPDB2003-0.5-TH3 (φ0.3 首下長 Under neck length 0.5mm) 機械 Machine : 立型MC(HSK-E25) Vertical MC

被削材 Work material : SLD(60HRC) VANADIS23(64HRC)

切削条件 Cutting conditions : $n=40,000\text{min}^{-1}$ ($v_c=38\text{m/min}$) $v_f=320\text{mm/min}$ ($f_z=0.004\text{mm/t}$)

$a_p \times a_e = 0.01\text{mm} \times 0.01\text{mm}$ クーラント Coolant : ミストブロー Mist blow

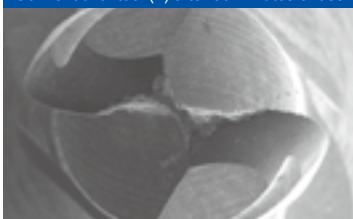


IX-EPDB-TH3 120分加工後
IX-EPDB-TH3 after 120 minutes of use



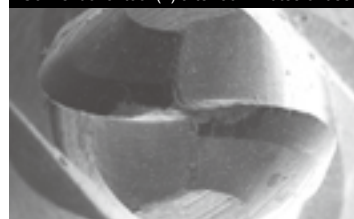
正常摩耗により継続使用可能
Normal wear allowing continued use

従来品① 30分加工後
Conventional tool (1) after 30 minutes of use

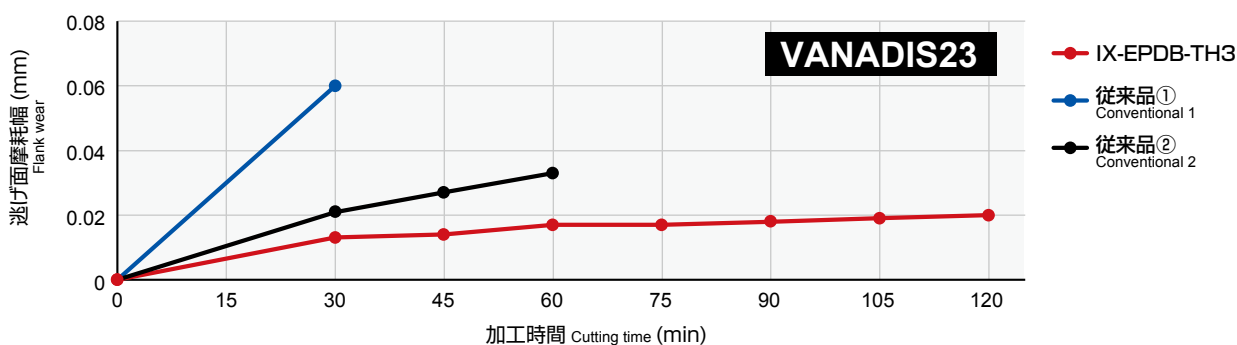


摩耗大+チッピング
Excessive wear + chipping

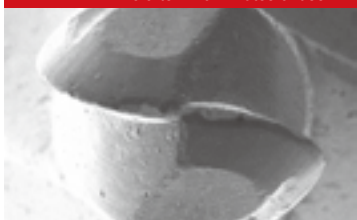
従来品② 30分加工後
Conventional tool (2) after 30 minutes of use



摩耗大+チッピング
Excessive wear + chipping

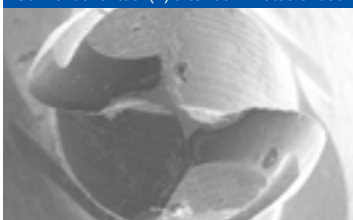


IX-EPDB-TH3 120分加工後
IX-EPDB-TH3 after 120 minutes of use



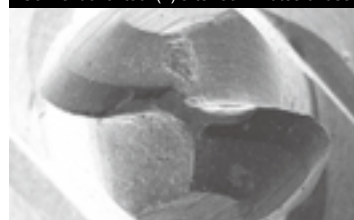
正常摩耗により継続使用可能
Normal wear allowing continued use

従来品① 30分加工後
Conventional tool (1) after 30 minutes of use



摩耗大+チッピング
Excessive wear + chipping

従来品② 30分加工後
Conventional tool (2) after 30 minutes of use



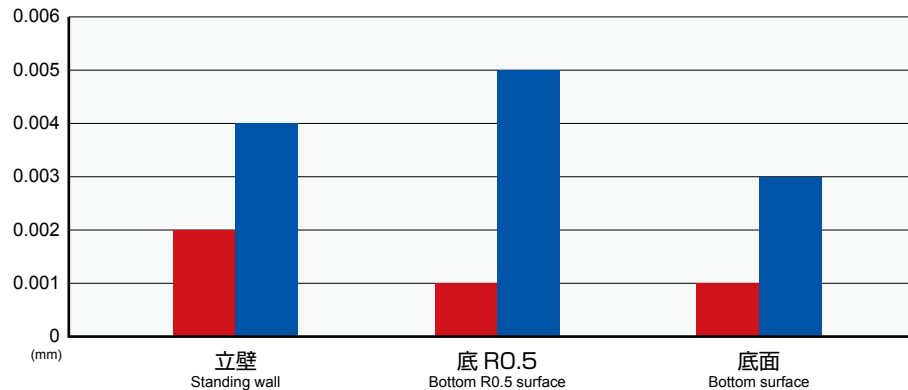
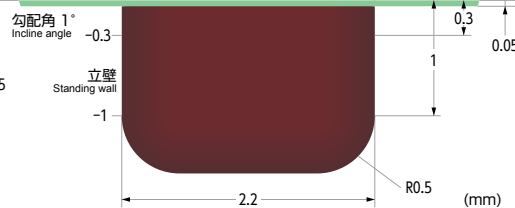
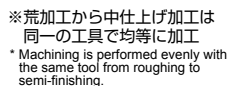
摩耗大+チッピング
Excessive wear + chipping

**耐摩耗性と耐欠損性を高次元で両立した IX-EPDB-TH3 は
高硬度鋼の加工における工具寿命が飛躍的に向上します**

IX-EPDB-TH3 combines high wear resistance and chipping resistance
to greatly improve tool life when machining hardened steel.

Comparison to cBN tools

※それぞれの工具で2溝を仕上げ加工 * Finish machining two grooves using each tool.



IX-EPDB-TH3 produces an even, glossy machined surface with fewer cutter marks and remains. Replacing cBN tools can significantly reduce tool costs.



図、表等のデータは試験結果の一例であり、保証値ではありません。
「MOLDINO」は株式会社MOLDINOの登録商標です。
IXシリーズの超硬素材は日本特殊合金株式会社の技術を基に開発した製品です。

The diagrams and table data are examples of test results, and are not guaranteed values.
“MOLDINO” is a registered trademark of MOLDINO Tool Engineering, Ltd.
Carbide material of the IX series is a product developed based on the technology of NIPPON TOKUSHU GOUKIN CO., LTD.

安全上のご注意 Attentions on Safety

1. 取扱上のご注意

- (1) 工具をケース(梱包)から取り出す際は、工具の飛び出し、落下にご注意ください。特に工具刃部との接触には十分ご注意ください。
- (2) 鋭利な切れ刃を有する工具を取扱う際は、切れ刃を素手で直接触れないように注意してください。

2. 取付け時のご注意

- (1) ご使用前に、工具の傷・割れ等の外観確認を行っていただき、コレットチャック等への取付けは確実に行ってください。
- (2) ご使用中に、異常な振動等が発生した場合は、直ちに機械を停止させて、その振動の原因を取り除いてください。

3. 使用上のご注意

- (1) 切削工具あるいは被削材の寸法・回転の方向は、あらかじめ確認しておいてください。
- (2) 標準切削条件表の数値は、新しい作業の立上げの目安としてご利用ください。切込みが大きい場合、使用機械の剛性が小さい場合あるいは被加工物の性状に応じて切削条件を適正に調整してご使用ください。
- (3) 切削工具材料は硬質の材料です。ご使用中に破損して飛散する場合があります。また、切りくずが飛散することがあります。これらの飛散物等は作業者を切傷させ、火傷あるいは目に入って負傷させる恐れがありますので、工具をご使用中はその周囲に安全カバーを取付け、保護メガネ等の保護具を着用して安全な環境下での作業をお願いいたします。
- (4) 切削中に発生する火花や、破損による発熱や、切りくずによる引火・火災の危険があります。引火や爆発の危険のあるところでは使用しないでください。不水溶性切削液をご使用される場合は防火対策を必ず行なってください。
- (5) 工具を本来の目的以外にはご使用にならないでください。

4. 再研削時のご注意

- (1) 再研削時期が不適当であると工具が破損する恐れがあります。適正な工具と交換するか、再研削を行ってください。
- (2) 工具を再研削しますと粉塵が発生します。再研削時にはその周囲に安全カバーを取付け、保護メガネ等の保護具を着用してください。
- (3) 本製品には特定化学物質に指定されたコバルト及びその無機化合物が含まれています。再研削等の加工を加える場合は特定化学物質障害予防規則(特化則)に従った取扱いをしてください。

5. 工具に関して、安全上の問題点・不明の点・その他相談がありましたら [フリーダイヤル技術相談](#)へご相談ください。

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 the local laws and regulations regarding prevention of hazards due to specified chemical substances.

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