Advanced Engineering
Hitachi Tool

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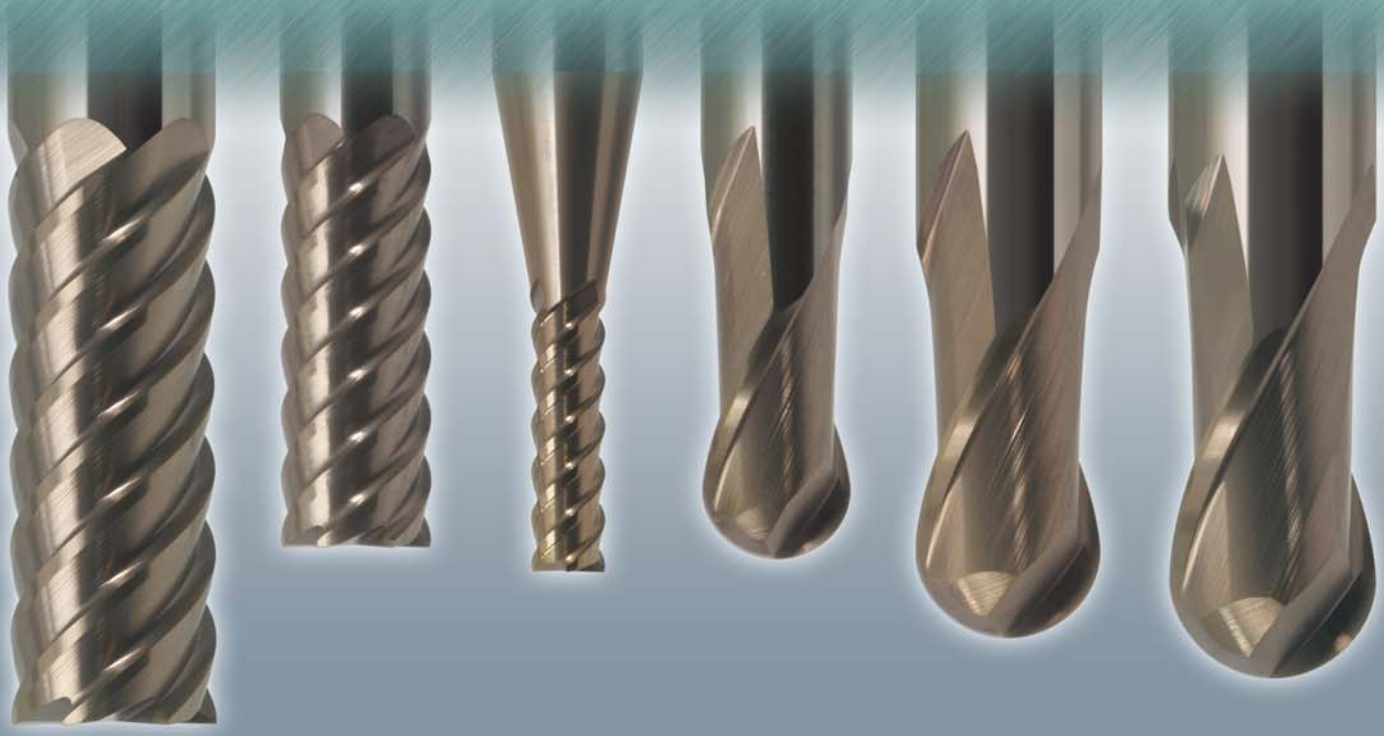
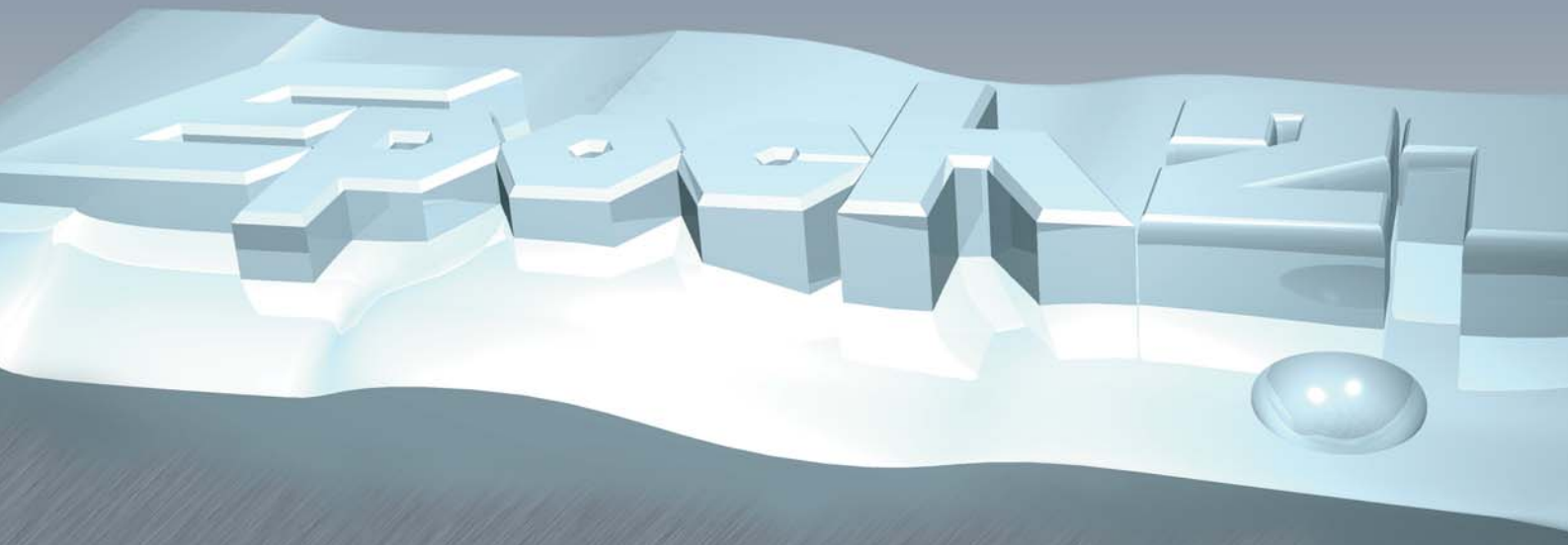
No. 408

NEW
Nano-PVD Coating
Epoch21 TH45+

EPHT Epoch Hard TH Coating
EPBT Epoch Ball TH Coating

High Speed Direct Milling of Hardened Steels





Hitachi Tool Engineering Europe GmbH
www.high-speed-cutting.com

Nano-PVD Technology

FEATURES

- New Nano-composite coating material achieves extraordinary heat resistance and hardness. This is attained due to the new composite layer, consisting of nano-crystal material (Oxidizing temperature: 1100°C, Layer hardness: HV 3600).
- Achieves extraordinary performance in high-speed cutting, and high efficient machining of hardened steel, machining efficiency is more than twice as effective as other manufacturers solid carbide end mills.
- Ensuring long life and reliability in hardened steel applications (45-60HRC) Material examples: 1.2080, 1.2344, and 1.2379, ASP Powder Steels, High Speed Steels and Stainless Steels
- The coating generates less heat during cutting; therefore it is well suited to dry machining conditions.

BESONDERHEITEN

- Die bemerkenswert hohe Hitzebeständigkeit und Härte des neuen Nano-Composite Beschichtungsmaterials (Oxidierungstemperatur: 1.100°C, Härte der Beschichtung: HV 3.600). Verantwortlich dafür ist eine neuartige Misch-Beschichtung, bestehend aus einem Nano-Kristall-Material
- Die außerordentlichen Zerpanungsleistungen in HSC-Bearbeitungen und die hohe Leistungsfähigkeit bei der Bearbeitung von gehärteten Stählen, ermöglichen eine Steigerung der Bearbeitungseffizienz um das 2-fache gegenüber Vollhartmetall-Werkzeugen anderer Hersteller (oder gegenüber herkömmlich beschichteten Vollhartmetall-Werkzeugen).
- Die garantiert hohen Standzeiten und Wiederhol-Genauigkeiten bei der Bearbeitung von gehärteten Stählen (HRC 45-60) wie: 1.2080, 1.2344 und 1.2379, ASP Pulverstähle, HSS-Stähle und rostfreie Stähle
- Die geringe Hitzeentwicklung während der Bearbeitung, prädestiniert diese Beschichtung für die Trocken-Bearbeitung.

PARTICOLARITÀ

- Il nuovo nano-rivestimento è straordinariamente resistente al calore e alla durezza grazie a strati composti costituiti da materiale micro-cristallizzato.
- La temperatura di ossidazione è circa 1100°C con una durezza dello strato di circa 3600 HV.
- Raggiunge alte prestazioni per la fresatura ad alta velocità e per l´efficiente lavorazione di acciai temprati. Il rendimento è più del doppio rispetto ad altri produttori di frese in metallo duro integrale.
- Garantisce una vita del tagliente e un´affidabilità straordinaria per applicazioni con materiali temprati (45-65 HRC).
- Esempi per materiali sono: 1.2080, 1.2344, 1.2379, Acciai HSS a polvere sinterizzato (ASP), Acciai Super Rapidi (HSS) e acciai inossidabili.
- Il rivestimento crea un calore minore durante il processo di taglio; come conseguenza la fresa lavora bene a secco.

VENTAJAS

- El nuevo Nano-Recubrimiento tiene una extraordinaria dureza y resistencia al calor. Esto se logra gracias a la nueva composición, formada por materiales nano-cristalinos (Temperatura de oxidación 1100°C, Dureza: 3600 HV)
- Especialmente eficaz mecanizando materiales templados en alta velocidad. En comparación con las fresas de otros fabricantes se logra duplicar su rendimiento y duración.
- Garantiza una gran duración y fiabilidad en aplicaciones en acero templado (45-60 HRC) como por ejemplo 1.2080, 1.2344, y 1.2379, ASP sinterizado, acero rápido (HSS) y acero inoxidable.
- El recubrimiento genera menos calor durante el mecanizado por lo que es ideal para el mecanizado en seco.

CARACTÉRISTIQUES

- Nouveau Revêtement NANO PVD Epoch Revêtement TH . Celle-ci est atteinte grâce à la nouvelle composition des couches, constituées d'une matière nano- cristallin (Température d'oxydation 1100°C, dureté de la couche HV 3600)
- Obtenir d'extraordinaires performances en UGV, et haut rendement d'usinage dans les aciers traités, l'efficacité d'usinage est plus de deux fois supérieure aux autres fabricants de fraises carbure .
- Assure une grande durée de vie et fiabilité dans les aciers traités (45-60HRC). Exemples de matière : 1.2080, 1.2344 et 1.2379, Acier fritté ASP, Acier Super Rapide et Acier Inoxydable
- Le revêtement génère moins de chaleur pendant la coupe, aussi est-il très recommandé d'usiner à sec

TH Coatings Hardness and Oxidization-Resistance compared to conventional coatings

Härte und Oxidations-Widerstandsfähigkeit der TH 45+ Beschichtung im Vergleich zu herkömmlichen Beschichtungen

Durezza e Resistenza di ossidazione del rivestimento TH a confronto con i rivestimenti convenzionali

Dureza y resistencia a la oxidación del recubrimiento TH comparada con los recubrimientos convencionales

La dureté et la résistance à l'oxydation du revêtement TH comparées aux revêtements conventionnels

FEATURES

Newly developed TH Coating has excellent oxidation-resistant properties, this achieves:

- High speed cutting of hard steels = High Efficiency
- Improvement in tool life = Lower tooling costs

The newly designed flute geometry increases rigidity, with the improved high radius accuracy producing higher tolerance, and smoother surface finish.

- Direct milling of hardened steel is now possible = Faster production times
- Highly accurate finish machining is achievable = Less Re-work and polishing

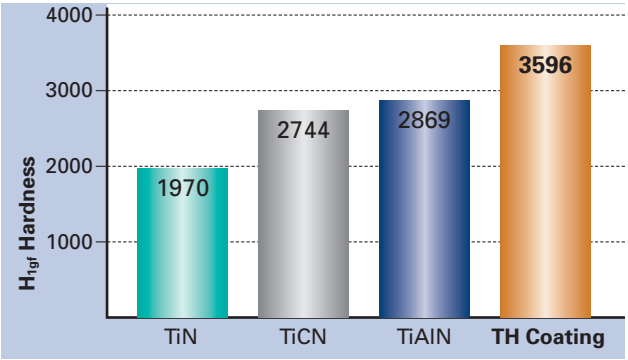
The tool exhibits its power to cut various materials, from pre-hardened steels (35 HRC) to high hardened steels (65 HRC).

The Epoch Hard is especially for high-speed cutting. This End Mill can achieve a lot higher tool life than conventional coated tools.

Direct milling of high-hardened die steel is easily accomplished.

Radius tolerance: +/- 0.005 mm (under Ø6), Highly accurate finish machining is possible.

Nano-PVD Technology



BESONDERHEITEN

Die exzellente Oxidations-Widerstandsfähigkeit der neu entwickelten TH 45+ Beschichtung ermöglicht

- HSC-Bearbeitungen in gehärteten Stählen = Hohe Effizienz
- Verbesserung der Werkzeugstandzeit = Niedrigere Werkzeugkosten

Die durch eine neu entwickelte Schneidengeometrie enorm gesteigerte Steifigkeit und eine erhöhte Radius-Genauigkeit ermöglichen

- Die direkte Bearbeitung von gehärteten Stählen = kürzere Produktionszeiten
- Hochgenaue Schlichtbearbeitungen = Weniger Nach- oder Polierarbeiten

Die Stärken dieses Werkzeugs liegen in der Fähigkeit, die unterschiedlichsten Werkstoffe zu zerspanen, ob vorgehärtete Stähle (HRC 35) oder Werkstoffe mit hohen Härten (HRC 65).

Der Epoch Hard ist speziell für die HSC-Bearbeitung entwickelt worden und erreicht wesentlich höhere Standzeiten als herkömmlich beschichtete Werkzeuge.

Die direkte Bearbeitung von hoch-gehärteten Stählen bereitet mit diesem neuen Werkzeug keinerlei Probleme mehr.

Die Radius-Toleranz von +/- 0,005 mm (unter Ø 6 mm), ermöglicht höchstgenaue Schlichtbearbeitungen.

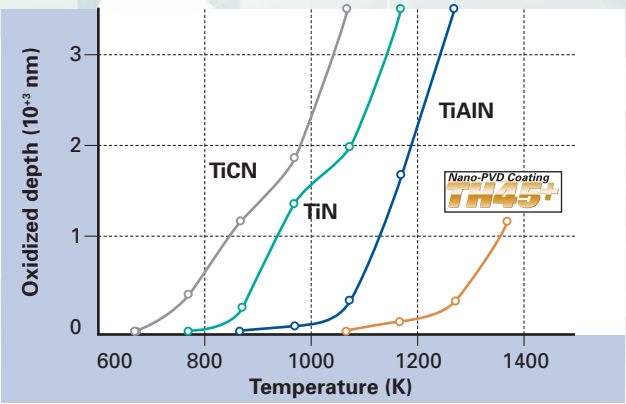
ASPETTI PARTICOLARI

L´ultimo sviluppo di rivestimenti "TH" ha eccellente proprietà di resistenza all´ossidazione e permette:

- Lavorazione ad alta velocità di materiali temprati = alta efficienza
- Grande allungamento di vita dell´utensile = Costi più bassi degli utensili

Il disegno di nuova concezione del corpo tagliente incrementa la rigidità che, unita all'estrema precisione della geometria raggio utensile, garantisce un alto livello di precisione e un grado di finitura superficiale eccezionale.

- La fresatura diretta dei materiali temprati è adesso possibile = tempi di esecuzione ridotti



- Alta precisione di finitura superficiale raggiungibile = tempi di ripresa e lucidatura sono percettibilmente ridotti.

L´utensile rende possibile la fresatura di materiali diversi, da bonificati (da 35 HRC in su) a acciai di alte durezze (fino 65 HRC).

L´Epoch Duro è stato fatto particolarmente per lavorazioni ad Alta Velocità.

Questa fresa garantisce una vita dell´utensile più elevata in confronto a frese con un rivestimento convenzionale.

La fresatura diretta dei materiali temprati è facilmente raggiunta.

Tolleranza del raggio: ± 0.005 mm (< Ø6) per richieste di finitura superficiale accurata.

VENTAJAS

El nuevo recubrimiento TH tiene una excelente resistencia a la oxidación que le permite:

- Mecanizar a alta velocidad materiales templados = Alta eficacia
- Mayor vida de herramienta = Menor coste

Una nueva geometría que aumenta la rigidez, y una mejorada precisión de radio, permiten mecanizar con tolerancias muy exigentes y obtener rugosidades superficiales óptimas

- El mecanizado directo de material templado = Menor tiempo de producción
- El mecanizado de alta precisión = Menos ajuste y pulido.

La herramienta demuestra su eficacia en diversos materiales, desde 35 HRC hasta 65 HRC.

La Epoch Hard esta especialmente diseñada para el mecanizado alta velocidad. La duración de esta herramienta es muy superior a la de fresas convencionales.

El mecanizado directo de aceros altamente templados es fácilmente realizable.

Tolerancia del radio: +/- 0.005 mm (hasta Ø6), Permite mecanizar con una altísima precisión.

DESCRIPTIONS

Le nouveau revêtement TH offre d'excellentes propriétés à la résistance à l'oxydation, ceci implique :

- Hautes vitesses de coupe des aciers traités = Grande efficacité
- Augmentation de la durée de vie = Baisse des coûts d'outillage

Le nouveau dessin de la géométrie de la dent augmente la rigidité, de plus l'amélioration de la tolérance du rayon produit une meilleure tolérance d'usinage et un meilleur état de surface .

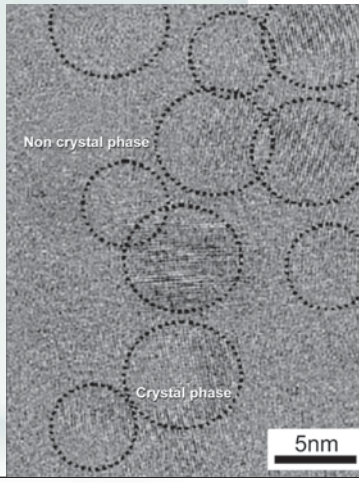
- Usinage direct dans les aciers traités est maintenant possible = Temps de production raccourcis
- Haute tolérance en usinage de finition = Moins d'opération de reprise

L'outil démontre son pouvoir de coupe dans différentes matières, des aciers prétraités (35HRC) aux aciers traités (65 HRC) .

L'"Epoch Hard" est recommandée pour l'UGV . Ces fraises obtiennent une plus grande durée de vie que les outils avec un revêtement standard .

L'usinage direct de matrice en aciers traités est facilement réalisable .

Tolérance du rayon: +/- 0.005mm (outil Ø6). Très haute tolérance en usinage de finition réalisable .



Chrystal Control in TH Coating

Cutting Performance

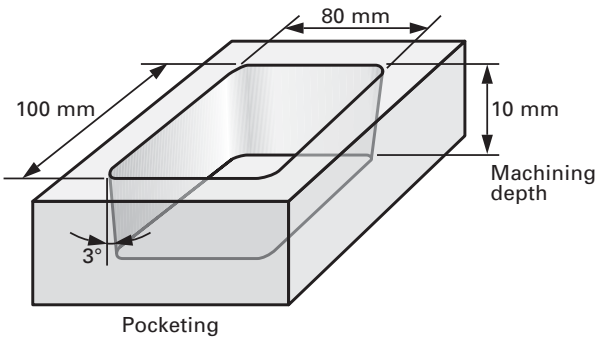
Direct Milling of Hardened Steel

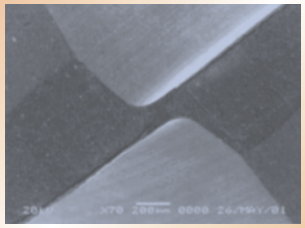
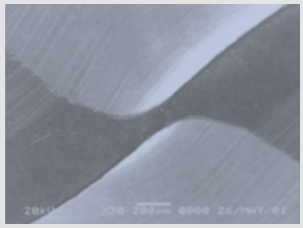
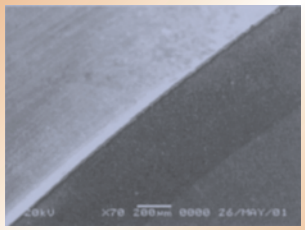
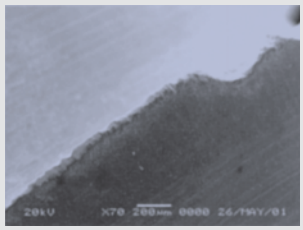
EPBT-2100

1.2344 (50HRC)
Pocketing

n = 5,700 min^{-1}
V_c = 180 m/min
V_f = 2,050 mm/min
f_z = 0.18 mm/tooth
a_p x a_e = 1 x 3 mm

Dry (Air Blow) M/C ISO 40
Milling time: 24 min



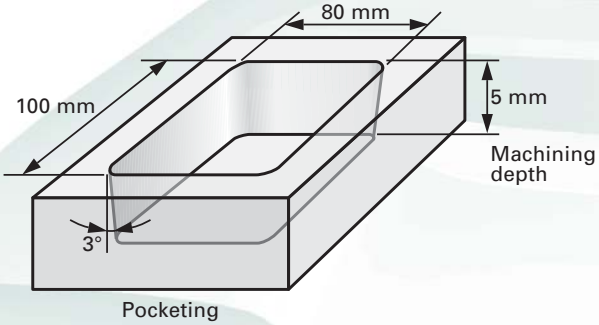
	Epoch TH Hard Ball	A: TiAlN Coating
Center area	 **0.028 mm** Flank wear	 **0.07 mm** Flank wear
Boundary area	 **0.028 mm** Flank wear	 **0.23 mm** Chipping

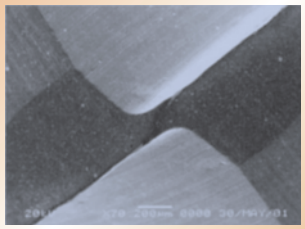
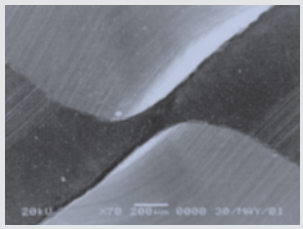
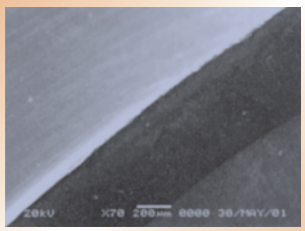
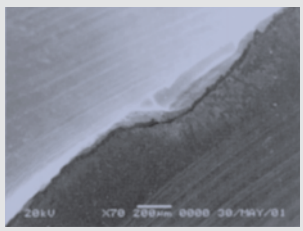
EPBT-2100

1.2379 (58HRC)
Pocketing

n = 4,500 min^{-1}
V_c = 140 m/min
V_f = 1,080 mm/min
f_z = 0.12 mm/tooth
a_p x a_e = 0.5 x 2 mm

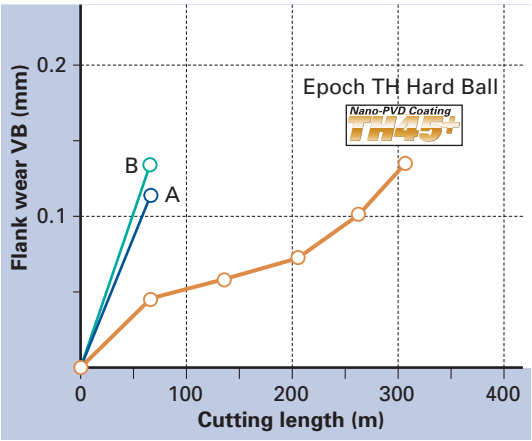
Dry (Air Blow) M/C ISO 40
Milling time: 33 min



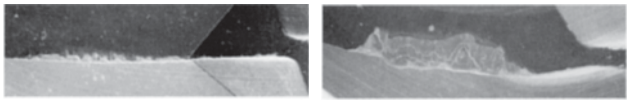
	Epoch TH Hard Ball	A: TiAlN Coating
Center area	 **0.02 mm** Flank wear	 **0.045 mm** Flank wear
Boundary area	 **0.037 mm** Flank wear	 **0.25 mm** Chipping

Cutting Performance

High Speed Finish Cutting of Hardened Die Steel (62HRC)



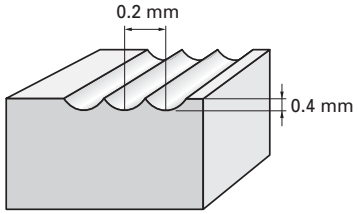
Epoch TH Hard Ball **A: TiAlN Coating**



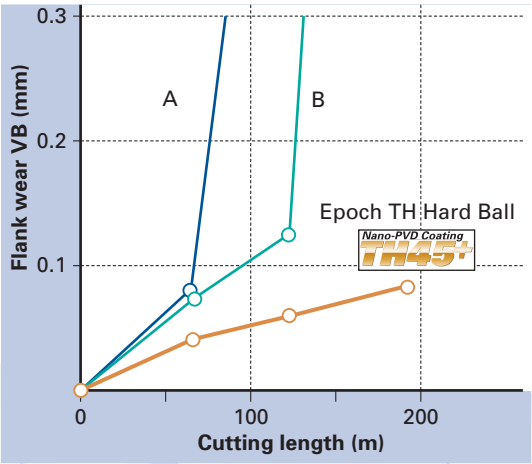
EPBT-2100

1.2379 (62HRC)

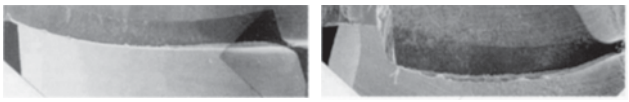
n = 8,000 min^{-1}
V_f = 1,600 mm/min
f_z = 0.1 mm/tooth
a_p x a_e = 0.4 x 0.2 mm
Straight down cut, air blow



High Speed Cutting of Hardened Die Steel (52HRC)



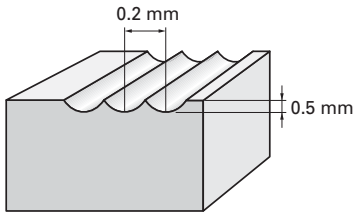
Epoch TH Hard Ball **A: TiAlN Coating**



EPBT-2100

1.2343 (52HRC)

n = 8,000 min^{-1}
V_f = 1,600 mm/min
f_z = 0.1 mm/tooth
a_p x a_e = 0.5 x 0.2 mm
Straight down cut, air blow



Field Data

HSC (High Speed Cutting)
3D / Semi-Finishing
EPBT-2100 (R5xØ10)

W = **1.2080 (60HRC)**
n = 4,700 min^{-1}
V_f = 1,200 mm/min
f_z = 0.13 mm/tooth
a_p x a_e = 0.3 x 0.5 mm
High Speed M/C, Oil mist

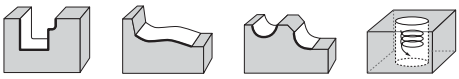
HPC (High Precision Cutting)
3D / Fine-Finishing
EPBT-2010 (R0.5xØ1)

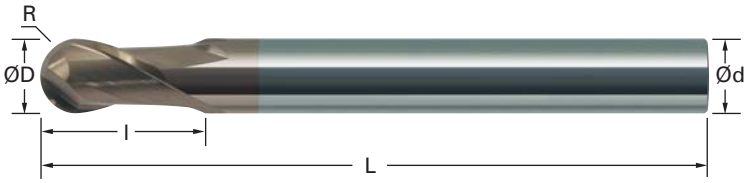
W = **1.2379 (58HRC)**
n = 13,000 min^{-1}
V_f = 400 mm/min
f_z = 0.015 mm/tooth
a_p x a_e = 0.01 x 0.03 mm
High Speed M/C, Oil mist

Nano-PVD Technology

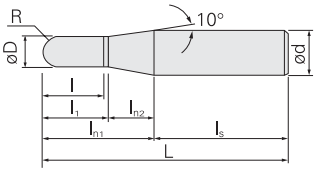
EPBT | Epoch Ball TH-Coating

V max	Roughing	Semi-Finishing	Finishing	HRC	No. of Teeth
High Speed	▽	▽▽	▽▽▽	70	2

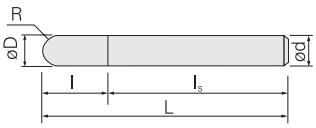




A



B



Carbide	TH45+	Rake Angle
Micro Grain	Nano-PVD Coating	Positive

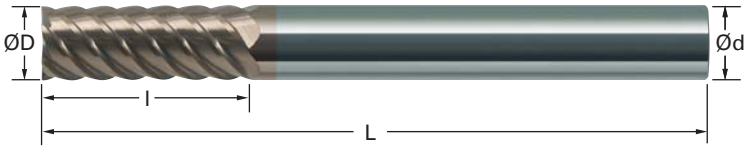
R	± 0.005
D	0/-0.01
d	h5

ID Code	Item No.	Stock	Z	R	ØD	l	dn	l_1	l_{n1}	l_{n2}	l_s	L	d	Type
EP 255	**EPBT-2010**	■	2	0.5	**1**	1.5		2.5	11	8.5		50	4	A
EP 256	**EPBT-2020**	■	2	1	**2**	3		4	15.3	11.3		50	6	A
EP 257	**EPBT-2030**	■	2	1.5	**3**	4.5		5.5	14	8.5		70	6	A
EP 258	**EPBT-2040**	■	2	2	**4**	6		7	12.7	5.7		70	6	A
EP 259	**EPBT-2050**	■	2	2.5	**5**	7.5		8.5	11.3	2.8		80	6	A
EP 260	**EPBT-2060**	■	2	3	**6**	9		–	–	–		90	6	B
EP 261	**EPBT-2080**	■	2	4	**8**	12		–	–	–		100	8	B
EP 262	**EPBT-2100**	■	2	5	**10**	15		–	–	–		100	10	B
EP 263	**EPBT-2120**	■	2	6	**12**	18		–	–	–		110	12	B

■ = Stock | Germany

EPHT | Epoch Hard TH-Coating

V max	Semi-Finishing	Finishing	HRC	No. of Teeth	No. of Teeth
High Speed	▽▽	▽▽▽	70	4	6



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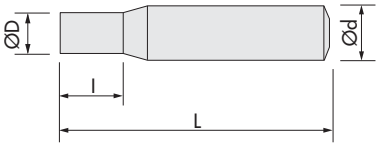
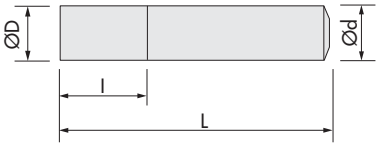
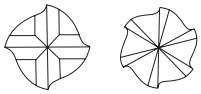


B



Carbide	TH45+	Rake Angle
Micro Grain	Nano-PVD Coating	Negative



~Ø3	-0.014/-0.028
Ø3~Ø6	-0.020/-0.038
Ø6~Ø20	-0.025/-0.047
d	h6

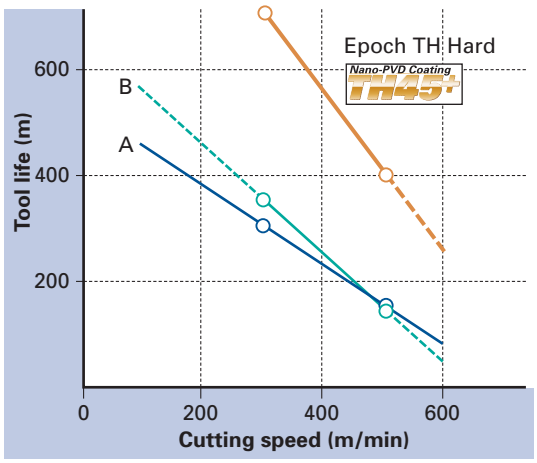
ID Code	Item No.	Stock	Z	R	ØD	l	dn	l_1	l_{n1}	l_{n2}	l_s	L	d	Type
EP 244	**EPHT-4010**	■	4		**1**	3.5						60	6	A
EP 264	**EPHT-4015**	■	4		**1.5**	5						60	6	A
EP 245	**EPHT-4020**	■	4		**2**	7						60	6	A
EP 265	**EPHT-4025**	■	4		**2.5**	8						60	6	A
EP 246	**EPHT-4030**	■	4		**3**	10						60	6	A
EP 247	**EPHT-4040**	■	4		**4**	12						60	6	A
EP 248	**EPHT-4050**	■	4		**5**	15						60	6	A
EP 249	**EPHT-6060**	■	6		**6**	15						60	6	B
EP 250	**EPHT-6080**	■	6		**8**	20						75	8	B
EP 251	**EPHT-6100**	■	6		**10**	25						80	10	B
EP 252	**EPHT-6120**	■	6		**12**	30						100	12	B
EP 253	**EPHT-6160**	■	6		**16**	40						110	16	B
EP 254	**EPHT-6200**	■	6		**20**	45						125	20	B

■ = Stock | Germany

Cutting Performance

High Speed Cutting of Hardened Die Steel (52HRC)

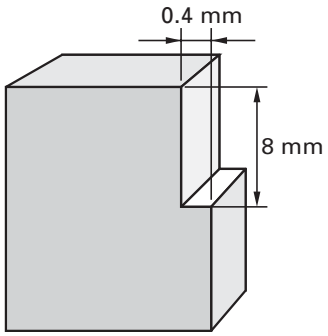
52HRC



EPHT-6080

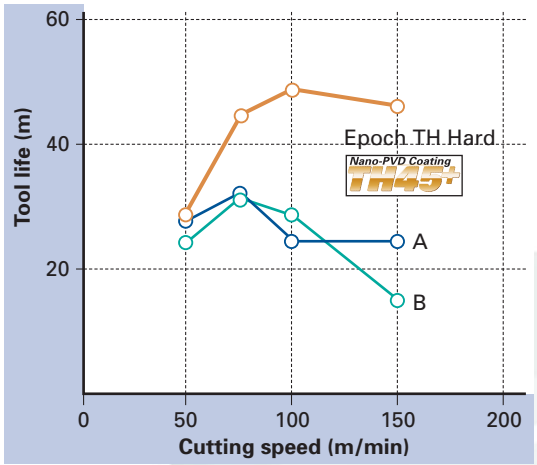
1.2344 (52HRC)

V_c = 300~500 m/min
f_z = 0.07 mm/tooth
a_p x a_e = 8 x 0.4 mm
Straight down cut, air blow



High Speed Cutting of Hardened Die Steel (60HRC)

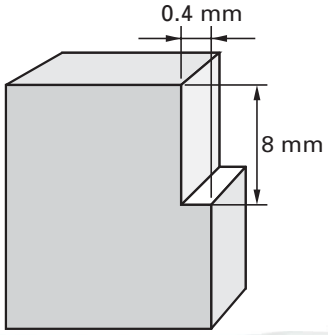
60HRC



EPHT-6080

1.2379 (62HRC)

V_c = 50~150 m/min
f_z = 0.05 mm/tooth
a_p x a_e = 8 x 0.4 mm
Straight down cut, air blow



Field Data

HSC (High Speed Cutting)
Side-Milling / Roughing

EPHT-6100 (Ø10)

W = 1.3343 (58HRC)
n = 6,400 min^{-1}
V_c = 201 m/min
V_f = 3,840 mm/min
f_z = 0.1 mm/tooth
a_p x a_e = 20 x 0.2 mm
M/C, ISO 40, Oil mist

HPC (High Precision Cutting)
Side-Milling / Finishing

EPHT-6100 (Ø10)

W = 1.3343 (58HRC)
n = 2,000 min^{-1}
V_c = 62.8 m/min
V_f = 150 mm/min
f_z = 0.0125 mm/tooth
a_p x a_e = 20 x 0.02 mm, Zero-cut
M/C, ISO 40, Oil mist

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