Advanced Engineering

MMC Hitachi Tool

No. 414.2

microEndMill

Nano-PVD Coating TH45+

EPSB Epoch Super Hard Ball

For Hardened Steels 55 ~ 72 HRC

- **Sizes**
  - 11 Diameters 0.1–2mm
  - 2 Under-neck lengths
  - = 22 Items
- **Tolerance**
  - R -0.007/+0.003
  - Shank Diameter h4
- **Using Length**
  - Up to 3xD

MMC Hitachi Tool Engineering Europe GmbH

www.micro-mill.com

Ultra Micro Grain Carbide End Mill

EPOCH SUPER HARD BALL

Recently, harder and harder materials are being used in mold processing, making machining extremely difficult. In addition, tool durability against wear is very important for ultra-high-accuracy processing, and CBN tools, etc. have been gaining focus in addition to carbide tools. However, there are many problems such as chipping, so that currently stable processing cannot be performed.

The newly developed Epoch Super Hard Ball uses a new flute shape and new carbide material to push the limits of our original TH coating to provide wear durability approaching that of CBN tools.

FEATURES & APPLICATIONS

1. New flute shape provides a huge reduction in wear compared to conventional products.
2. Use of backdraft shape suppresses the vibrating chatter peculiar to small-diameter tools to enable stable processing.
3. Guaranteed ultra-high R accuracy and shank accuracy enable ultra-fine finishing.
4. Standard product R accuracy: -0.007mm<=R=>+0.003mm
5. Wear durability approaching that of CBN tools provides long tool life even when directly machining materials with hardnesses exceeding 60HRC.
6. Dimensional sizes of R0.05 to R1 make them ideal for machining of small parts.

EPOCH SUPER HARD BALL

In letzter Zeit kommen immer härtere Materialien im Werkzeug- und Formenbau zum Einsatz, welche die Bearbeitung immer schwieriger gestalten. Zusätzlich behindert der hohe Verschleiß der Werkzeuge die Herstellung von Formen mit höchstmöglichen Toleranzen. Daher wurden immer mehr CBN Werkzeuge für härtere Werkstoffe fokussiert. Diese konnten aufgrund von Ausbrüchen usw. oft nicht über eine längere Bearbeitungszeit prozesssicher eingesetzt werden.

Der neu entwickelte „EPOCH SUPER HARD BALL“ verringert nun die Lücke zwischen Vollhartmetall- und CBN Werkzeugen. Eine neue Schneidengeometrie, in Verbindung mit unserer bewährten TH45+ Beschichtung, und das optimale Feinstkorn-Vollhartmetallsubstrat bietet dem Anwender den Verschleißwiderstand ähnlich der CBN Werkzeuge an.

BESONDERHEITEN & BEARBEITUNGEN

1. Eine neue Schneidengeometrie reduziert den Verschleiß enorm gegenüber konventionellen Werkzeugen.
2. Der „Backdraft Effect“ minimiert Vibrationen und sorgt auch bei kleinsten Durchmessern für eine prozesssichere und stabile Bearbeitung.
3. Beste Toleranzen an Radien und Schaft ermöglichen genaueste Schlichtbearbeitungen.
4. Standardtoleranz am Radius: -0,007 mm bis +0,003 mm
5. Der hohe Verschleißwiderstand, ähnlich der von CBN Werkzeugen, ermöglicht eine lange Lebensdauer, selbst bei Materialien über 60HRC.
6. Abmessungen von R0,05 mm bis R1,0 mm machen ihn ideal für Bearbeitungen von sehr kleinen Werkstücken.

EPOCH SUPER HARD BALL

Attualmente vengono impiegati materiali sempre più duri per la costruzione degli stampi, ciò comporta un processo di fresatura estremamente difficile.

Inoltre, la resistenza contro l’usura dell’ utensile è molto importante per un processo di elevatissime precisioni.

Entrambe le richieste venivano soddisfatte dagli utensili CBN.

Tuttavia l’utilizzo di tali utensili non è in grado di risolvere molti problemi come per esempio la scheggiatura che attualmente non permette di stabilire un processo sicuro.

Per la nuova serie Epoch Super Hard Ball abbiamo sviluppato una innovativa geometria del tagliente con il nostro originale rivestimento TH. Questo ci permette di garantire una elevata vita del tagliente che si avvicina a quella del CBN.

CARATTERISTICHE E APPLICAZIONI

1. La nuova geometria del tagliente permette una enorme riduzione dell’usura rispetto agli utensili convenzionali.
2. L’ utilizzo dell’ effetto “BACKDRAFT” garantisce minori vibrazioni tra il tagliente e la parete durante lavorazioni sul fianco.
3. L’altissima precisione sia del raggio che del gambo garantisce lavorazioni di elevatissime qualità.
4. La tolleranza standard del raggio è del -0.007 mm <=R=> +0.003 mm.
5. La resistenza all’ usura (come CBN) garantisce una elevata vita del tagliente durante la fresatura diretta su materiali oltre i 60HRc.
6. La gamma dal R0.05 a R1 rendono questi utensili ideali per lavorazioni di piccole dimensioni.

EPOCH SUPER HARD BALL

En la actualidad, el uso de materiales cada vez más duros en la fabricación de moldes, hace que el mecanizado resulte cada vez más dificultoso. Asimismo, la resistencia de la herramienta al desgaste es un factor vital en el mecanizado de ultra-.precisión, y las herramientas de CBN y similares están ganado terreno a las de metal duro. Sin embargo, este tipo de herramientas conllevan problemas como la microrotura, y no permiten realizar procesos estables de mecanizado.

El desarrollo de la nueva EPOCH SUPER HARD BALL utiliza una nueva geometría de filo y una nueva composición de metal duro, que permiten obtener el máximo rendimiento de nuestro recubrimiento exclusivo TH, consiguiendo niveles de vida muy próximos a los de las herramientas de CBN.

CARACTERÍSTICAS Y APLICACIONES

1. La nueva geometría de los filos proporciona una notable reducción del desgaste en comparación con los productos convencionales.
2. La geometría “backdraft” elimina las vibraciones características de las fresas miniatura mejorando considerablemente la estabilidad del proceso de mecanizado.
3. La estrecha y garantizada tolerancia de radio y mango permiten unos acabados dimensionales y superficiales excelentes.
4. Tolerancia estándar del radio: -0.007mm<=R=>+0.003mm.
5. La resistencia al desgaste, cercana a la de las fresas CBN, permite realizar procesos largos de mecanizado directo en materiales que están por encima de los 60 HRC.
6. La gama, de R0.05 a R1, las hacen ideales para el mecanizado de pequeños componentes.

EPOCH SUPER HARD BALL

Depuis peu, dans l’usinage de moules et matrices, nous constatons une forte orientation vers l’utilisation de matériaux de plus en plus durs, rendant les phases d’usinage très difficiles. Dans de telles applications, la résistance à l’usure des outils devient un facteur essentiel afin de pouvoir garantir de hautes tolérances. C’est pourquoi, parallèlement aux outils en carbure, on constate une augmentation de l’utilisation d’outils de type CBN, etc… Cependant, les problèmes d’usure restent trop nombreux pour garantir la stabilité des processus d’usinage.

Lors du récent développement de notre Epoch Super Hard Ball, nous avons optés pour l’utilisation d’un nouveau substrat, ainsi que d’une nouvelle géométrie, afin de pouvoir encore repousser les limites de notre propre revêtement TH jusqu’à concurrencer la résistance à l’usure des outils CBN.

CARACTÉRISTIQUES & APPLICATIONS

1. Nouvelle géométrie apportant une énorme réduction des phénomènes d’usures en comparaison avec des outils conventionnels.
2. L’utilisation de notre géométrie « back-draft » supprime les vibrations dues à la flexion latérale propre aux outils de petits diamètres et permet des processus d’usinage stables.
3. La garantie d’extrêmement hautes tolérances sur les rayons et sur les queues de ces fraises permet des applications ultra fines en finitions.
4. Sur cette gamme, la tolérance standard du rayon est de : -0,007mm<=R=>+0,003mm
5. La résistance à l’usure, proche de celle du CBN, apporte une longue durée de vie même dans l’usinage direct de matières dépassant 60HRc.
6. Les diamètres de cette gamme, de 0,1 à 2, la dédicace idéalement à l’usinage de petites pièces.

EPOCH SUPER HARD BALL

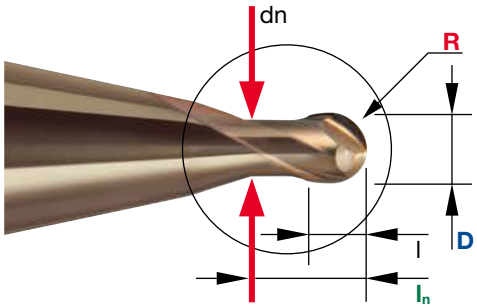
Cada vez mais, são usados materiais mais difíceis no fabrico de moldes, a maquinação é cada vez mais difícil. Além disso, a duração da ferramenta ao desgaste é muito importante para o processamento da alta precisão e ferramentas CBN, etc. foram ganhando foco além das ferramentas de metal duro. No entanto, existem muitos problemas como estilhaçar da ferramenta, assim, actualmente o processamento estável não pode ser executado. A recém-desenvolvida Epoch Super Hard Ball usa uma nova forma de navalha e novo metal duro para impulsionar os limites do nosso revestimento original TH para durabilidade ao desgaste aproximando-se das ferramentas CBN

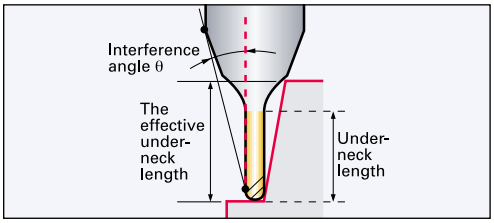
CARACTERÍSTICAS & APLICAÇÕES

1. Nova geometria da navalha oferece uma enorme redução no desgaste comparado com produtos convencionais
2. A geometria “back-draft” elimina ruídos e vibrações peculiar em ferramentas de diâmetro pequeno para permitir um processamento estável.
3. Garantia muito alta precisão R e encabadouro preciso permite um ultra acabamento
4. Produto Standard precisão R: -0.007mm<=R=>+0.003mm
5. Desgaste e durabilidade aproxima-se das ferramentas CBN e oferece uma vida útil longa mesmo quando a maquinação é directa em materiais com durezas superiores 60HRC.
6. Tamanhos dimensionais de R0.05 a R1 torna-os ideais para maquinação de peças pequenas.

Ultra Micro Grain Carbide End Mill

EPSB | Epoch Super Hard Ball





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

R	-0.007/+0.003
d	h4

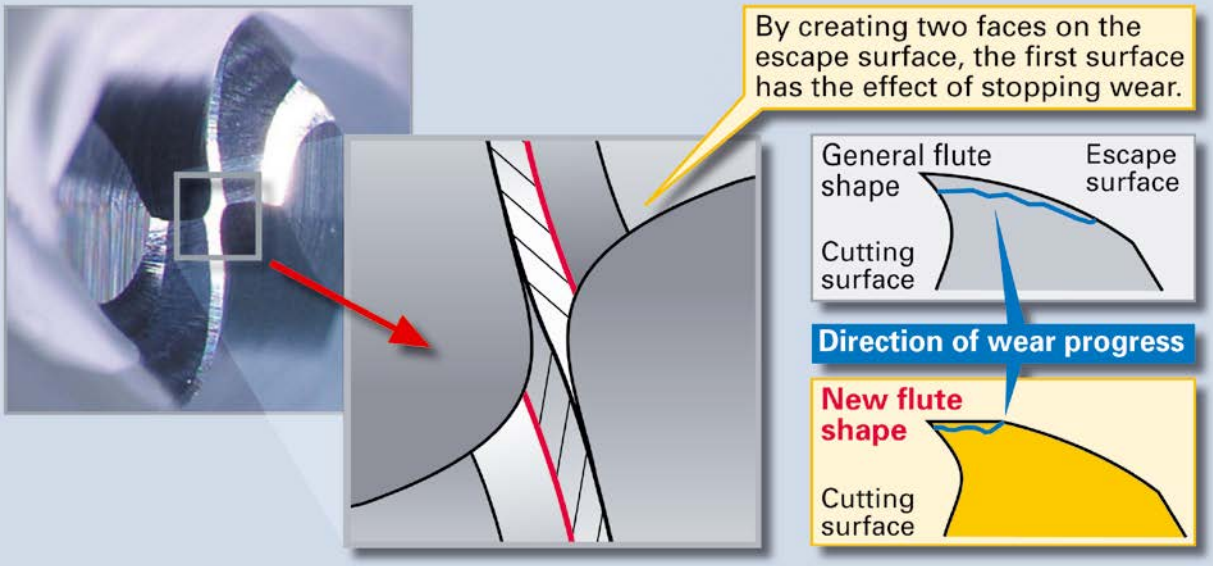
Size											The effective under-neck length for the various draft angles				
ID Code	Item Code	Stock	Z	D	R	l_n	l	dn	L	d	Neck R	0.5°	1°	2°	3°	Interference angle θ
MM001	**EPSB-2001N**	■	2	0.1	0.05	-	0.08	-	45	4	1	0.08				11.87
MM022	**EPSB-2001-0.3N**	■	2	0.1	0.05	0.3	0.08	0.08	45	4	1	0.46	0.48	0.53	0.57	11.64
MM002	**EPSB-2002N**	■	2	0.2	0.1	-	0.15	-	45	4	1	0.15				11.74
MM023	**EPSB-2002-0.6N**	■	2	0.2	0.1	0.6	0.15	0.17	45	4	1	0.80	0.83	0.88	0.93	11.30
MM003	**EPSB-2003N**	■	2	0.3	0.15	-	0.25	-	45	4	2	0.25				11.61
MM024	**EPSB-2003-0.9N**	■	2	0.3	0.15	0.9	0.25	0.27	45	4	2	1.21	1.27	1.37	1.47	11.00
MM004	**EPSB-2004N**	■	2	0.4	0.2	-	0.3	-	45	4	2	0.30				11.47
MM025	**EPSB-2004-1.2N**	■	2	0.4	0.2	1.2	0.3	0.37	45	4	2	1.52	1.59	1.71	1.82	10.69
MM005	**EPSB-2005N**	■	2	0.5	0.25	-	0.35	-	45	4	2	0.35				11.33
MM026	**EPSB-2005-1.5N**	■	2	0.5	0.25	1.5	0.35	0.47	45	4	2	1.83	1.91	2.05	2.17	10.39
MM006	**EPSB-2006N**	■	2	0.6	0.3	-	0.4	-	45	4	4	0.40				11.18
MM027	**EPSB-2006-1.8N**	■	2	0.6	0.3	1.8	0.4	0.57	45	4	4	2.30	2.44	2.68	2.88	10.08
MM007	**EPSB-2008N**	■	2	0.8	0.4	-	0.5	-	45	4	4	0.50				10.88
MM028	**EPSB-2008-2.4N**	■	2	0.8	0.4	2.4	0.5	0.77	45	4	4	2.94	3.10	3.36	3.59	9.47
MM008	**EPSB-2010N**	■	2	1	0.5	1.5	0.8	0.96	45	6	4	2.01	2.12	2.31	2.49	11.00
MM029	**EPSB-2010-3N**	■	2	1	0.5	3	0.8	0.96	45	6	4	3.61	3.78	4.06	4.30	9.88
MM009	**EPSB-2012N**	■	2	1.2	0.6	1.8	1.1	1.15	45	6	4	2.36	2.47	2.68	2.86	10.78
MM030	**EPSB-2012-3.6N**	■	2	1.2	0.6	3.6	1.1	1.15	45	6	4	4.27	4.45	4.75	5.01	9.46
MM010	**EPSB-2015N**	■	2	1.5	0.75	2.25	1.35	1.44	45	6	4	2.87	2.99	3.20	3.40	10.43
MM031	**EPSB-2015-4.5N**	■	2	1.5	0.75	4.5	1.35	1.44	45	6	4	5.24	5.44	5.76	6.04	8.84
MM011	**EPSB-2020N**	■	2	2	1	3	1.7	1.92	45	6	4	3.71	3.84	4.07	4.29	9.78
MM032	**EPSB-2020-6N**	■	2	2	1	6	1.7	1.92	45	6	4	6.84	7.07	7.43	7.89	7.81

■ = Stock | Germany

If the workpiece has draft angle, the interference length will be longer than the under-neck length.
Please refer to the effective under-neck length for the various draft angles.
In addition, the angle at which the tool will interfere with the workpiece is shown as the “interference angle θ”, and should also be referred to.

THE EFFECT OF FLUTE SHAPE, MATERIAL AND COATING:

DOUBLE-FACE EFFECT OF NEW SHAPE PREVENTS SHAPE FROM DETERIORATING

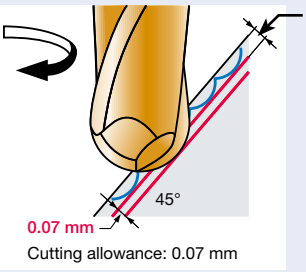


Advanced Engineering

MMC Hitachi Tool

EPSB | Epoch Super Hard Ball

No need to set a uniform cutting allowance | Problemloser Übergang vom Schrupp- in den Schlichtprozess
Non è necessario garantire un sovrametallo costante | No es necesario que el excedente previo de material sea uniforme
Il n'est pas nécessaire de préparer une surépaisseur uniforme | Não há necessidade de definir o corte uniforme



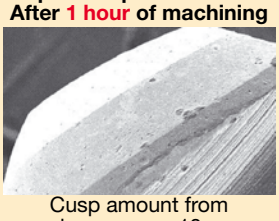
Cutting allowance: 0.07 mm

Cusp amount
from prior process

W = 1.2379 (60HRC)
R1 x 2 Flutes
n = 20,000 min^{-1}
V_f = 1,200 mm/min
a_p = 0.07 mm

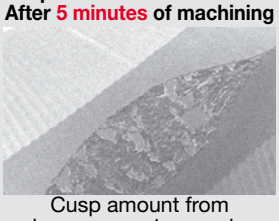
The **Epoch Super Hard Ball** performs finish processing – even if prior processing was rough.

Epoch Super Hard Ball
After 1 hour of machining



Cusp amount from
prior process: 10 µm

Competitor's conventional tool
After 5 minutes of machining



Cusp amount from
prior process: 1 µm or less

Product Range

Solid Carbide End Mills

CBN Cubic Boron Nitride
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Epoch21
MINIATURE
3D-Cut

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Indexable Milling

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