

High adhesion Diamond coating

# ***HD*** Coating series



**MOLDINO Tool Engineering, Ltd.**

New Product News | No.0810E-17 | 2026-2

# New coating with amazing wear resistance and peeling resistance



HD Coating : **H**igh adhesion **D**iamond coating

## Features of HD Coating

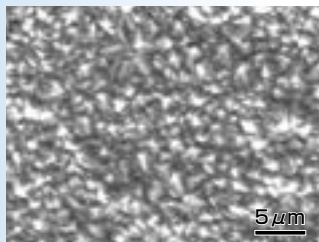
- 01** Membrane made from high-purity diamond.
- 02** Because membrane is high-purity diamond, it achieves high hardness of greater than 80 GPa.
- 03** A special base metal for diamond coating and our original pre-treatment technology are used to increase adhesion and provide a diamond coating with excellent peeling resistance.
- 04** HD Coating uses diamond with good crystallization to provide superior wear resistance, making it ideal for cutting of graphite, high-silicon aluminum alloys and fiber-reinforced plastics (FRP).



## Characteristics

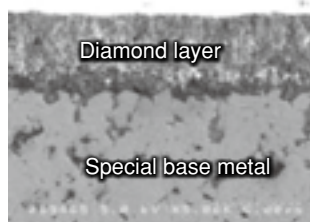
### Surface condition

Uses diamond with good crystallization. Ideal for cutting of graphite, high-silicon aluminum alloys and fiber-reinforced plastics (FRP).



## HD Coating

### Cross section of coating



Our exclusive pre-treatment technology is used to provide higher adhesion due to anchor effect.

Special material for diamond coating is adopted for base metal.

## Technical Data of HD7010

### 01 Machining example of Graphite① (HD7010)

#### <Cutting conditions>

Body : AHUL1525R-2 (φ25, Overall length 180 mm)  
 Insert : JDET150504R-FF  
 Work material : Graphite  $n=2,500\text{min}^{-1}$   
 Cutting length : 22m  $v_f=1,400\text{mm/min}$   
 $a_p \times a_e = 3 \times 3\text{mm}$  Dry

**Suppresses wear**



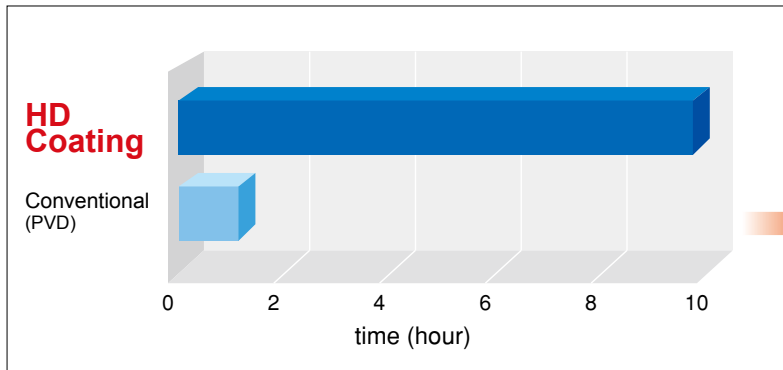
**HD7010**



VBmax=0.12mm

Conventional (PVD)

## 02 Machining example of Graphite ② (HD7010)

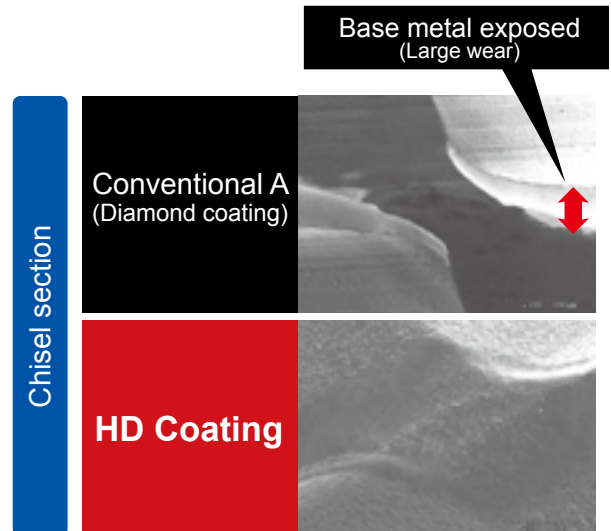
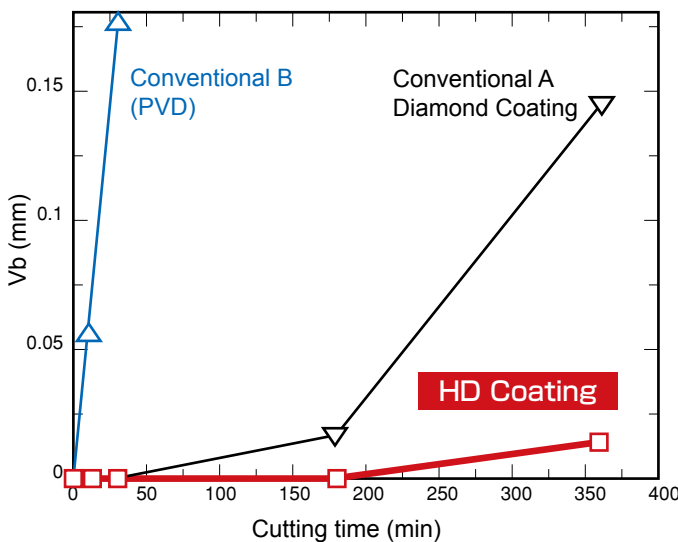


**Wear is small and interrupted cutting is possible.**  
(More than 10 times compared to non coating tools)

### <Cutting conditions>

Body : ARPF20S20  
( $\phi 20$ , Overall length 140mm)  
Insert : ZCFW200-R0.3  
Work material : Graphite  
 $n=3,600\text{min}^{-1}$   $v_f=1,250\text{mm/min}$   
 $a_p \times a_e=0.5 \times 2\text{mm}$  Dry

## 03 Machining example of Graphite ③ (HD7010)



### <Cutting conditions>

Body : ABPF16S20  
( $\phi 16$ , Overall length 130mm)  
Insert : ZPFG160-GF  
Work material : Graphite  
 $n=8,000\text{min}^{-1}$   $v_f=5,000\text{mm/min}$   
 $a_p \times a_e=0.5 \times 0.5\text{mm}$  Dry

**With HD Coating, there was virtually no wear even after 6 hours of cutting.**

Short tool life

Conventional B < Conventional A < **HD Coating**

Long tool life

## 04 Machining example of High Si aluminium alloy ①

### <Cutting conditions>

Body : AHU1032R-5 ( $\phi 32$ , Overall length 130mm)  
Insert : JDET100304R-FF  
Work material : AC4A (Cast aluminum alloy)  
 $n=2,986\text{min}^{-1}$  Cutting length : 3.25m  
 $v_f=597\text{mm/min}$  (Single flute)  
 $a_p \times a_e=2 \times 2\text{mm}$  Dry



## Ball Precision F **ABPF**

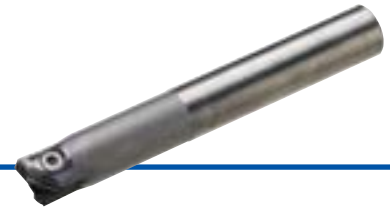


### ■ Dimensions

For ABPF type holders and inserts other than HD Coating inserts are available here: [MOLDINO Tool Engineering New Product News No.0902E](#)

| Fig.1 | DC | T | RE | INSL | LE | Item code  | Tolerance | Stock      | Size (mm) |      |      |    |     | Shape |
|-------|----|---|----|------|----|------------|-----------|------------|-----------|------|------|----|-----|-------|
|       |    |   |    |      |    |            |           | HD Coating |           |      |      |    |     |       |
| Fig.2 | DC | T | RE | INSL | LE | Item code  | Tolerance | HD7010     | RE        | LE   | INSL | DC | T   | Shape |
|       |    |   |    |      |    |            |           |            |           |      |      |    |     |       |
|       |    |   |    |      |    | ZDFG06N-SF | F         | ●          | 3         | 3    | 5    | 6  | 2   | Fig.1 |
|       |    |   |    |      |    | ZDFG080-SF |           | ●          | 4         | 4.4  | 9.7  | 8  | 2.1 | Fig.2 |
|       |    |   |    |      |    | ZDFG100-SF |           | ●          | 5         | 5.6  | 12   | 10 | 2.7 |       |
|       |    |   |    |      |    | ZDFG120-SF |           | ●          | 6         | 6.6  | 15   | 12 | 3.2 |       |
|       |    |   |    |      |    | ZDFG160-SF |           | ●          | 8         | 9    | 17   | 16 | 4.2 |       |
|       |    |   |    |      |    | ZDFG200-SF |           | ●          | 10        | 11.5 | 20   | 20 | 5.2 |       |

## Radius Precision **ARPF**



### ■ Dimensions

For ARPF type holders and inserts other than HD Coating inserts are available here: [MOLDINO Tool Engineering New Product News No.0901E](#)

| Fig.1 | DC | T | RE       | INSL | LE | Item code    | Tolerance | Stock      | Size (mm) |     |     |      |     | Shape |
|-------|----|---|----------|------|----|--------------|-----------|------------|-----------|-----|-----|------|-----|-------|
|       |    |   |          |      |    |              |           | HD Coating |           |     |     |      |     |       |
| Fig.2 | DC | T | RE       | INSL | LE | Item code    | Tolerance | HD7010     | DC        | RE  | LE  | INSL | T   | Shape |
|       |    |   |          |      |    |              |           |            |           |     |     |      |     |       |
|       |    |   | RE±0.015 |      |    | ZCFW060-R0.3 | F         | ●          | 6         | 0.3 | 2   | 5.0  | 2.0 | Fig.1 |
|       |    |   |          |      |    | ZCFW080-R0.3 |           | ●          | 8         | 0.3 | 2.5 | 9.7  | 2.1 | Fig.2 |
|       |    |   |          |      |    | ZCFW100-R0.3 |           | ●          | 10        | 0.3 | 3   | 12.0 | 2.7 |       |
|       |    |   |          |      |    | ZCFW120-R0.3 |           | ●          | 12        | 0.3 | 4   | 14.6 | 3.2 |       |
|       |    |   |          |      |    | ZCFW160-R0.3 |           | ●          | 16        | 0.3 | 5   | 16.6 | 4.2 |       |
|       |    |   |          |      |    | ZCFW200-R0.3 |           | ●          | 20        | 0.3 | 6   | 19.9 | 5.2 |       |

## High-Feed Ultra End Mill **AHU**



### ■ Dimensions

For AHU type holders and inserts other than HD Coating inserts are available here: [MOLDINO Tool Engineering New Product News No.1210E](#)

| Fig.1 | W1 | RE | INSL | 15° | Item code      | Tolerance | Stock      | Size (mm) |      |      |     |
|-------|----|----|------|-----|----------------|-----------|------------|-----------|------|------|-----|
|       |    |    |      |     |                |           | HD Coating |           |      |      |     |
| Fig.2 | W1 | RE | INSL | 15° | Item code      | Tolerance | HD7010     | RE        | INSL | W1   | S   |
|       |    |    |      |     |                |           |            |           |      |      |     |
|       |    |    |      |     | JDET100304R-FF | E         | ●          | 0.4       | 11.0 | 6.1  | 3.5 |
|       |    |    |      |     | JDET100308R-FF |           | ●          | 0.8       | 11.0 | 6.1  | 3.5 |
|       |    |    |      |     | JDET150504R-FF |           | ●          | 0.4       | 16.0 | 9.12 | 5.0 |
|       |    |    |      |     | JDET150508R-FF |           | ●          | 0.8       | 16.0 | 9.12 | 5.0 |

● : Stocked items.

# Recommended Cutting Conditions

## ABPF

| Work material                            | Insert Grade | Cutting Conditions       | $\phi 6$        |                       |           | $\phi 8$        |                       |           | $\phi 10$       |                       |           | $\phi 12$       |                       |           | $\phi 16$       |                       |           | $\phi 20$       |                       |           |
|------------------------------------------|--------------|--------------------------|-----------------|-----------------------|-----------|-----------------|-----------------------|-----------|-----------------|-----------------------|-----------|-----------------|-----------------------|-----------|-----------------|-----------------------|-----------|-----------------|-----------------------|-----------|
|                                          |              |                          | Semi finishing  |                       | Finishing | Semi finishing  |                       | Finishing | Semi finishing  |                       | Finishing | Semi finishing  |                       | Finishing | Semi finishing  |                       | Finishing | Semi finishing  |                       | Finishing |
|                                          |              |                          | General purpose | High-speed processing |           | General purpose | High-speed processing |           | General purpose | High-speed processing |           | General purpose | High-speed processing |           | General purpose | High-speed processing |           | General purpose | High-speed processing |           |
| Graphite                                 | HD7010       | $n$ (min <sup>-1</sup> ) | 15,920          | 21,220                | 21,220    | 11,940          | 15,920                | 15,920    | 9,550           | 12,740                | 12,740    | 7,960           | 10,620                | 10,620    | 5,970           | 7,960                 | 7,960     | 4,780           | 6,370                 | 6,370     |
|                                          |              | $v_c$ (m/min)            | 300             | 400                   | 400       | 300             | 400                   | 400       | 300             | 400                   | 400       | 300             | 400                   | 400       | 300             | 400                   | 400       | 300             | 400                   | 400       |
|                                          |              | $v_f$ (mm/min)           | 3,180           | 6,370                 | 4,240     | 4,780           | 9,550                 | 6,370     | 3,820           | 7,640                 | 5,100     | 3,190           | 6,370                 | 4,240     | 2,990           | 4,780                 | 3,980     | 2,390           | 3,820                 | 3,190     |
|                                          |              | $f_z$ (mm/t)             | 0.1             | 0.15                  | 0.1       | 0.2             | 0.3                   | 0.2       | 0.2             | 0.3                   | 0.2       | 0.2             | 0.3                   | 0.2       | 0.25            | 0.3                   | 0.25      | 0.25            | 0.3                   | 0.25      |
|                                          |              | $a_p$ (mm)               | 0.3             | 0.15                  | 0.15      | 0.4             | 0.2                   | 0.2       | 0.5             | 0.3                   | 0.2       | 0.6             | 0.4                   | 0.2       | 0.8             | 0.6                   | 0.1       | 1               | 0.7                   | 0.1       |
|                                          |              | $a_e$ (mm)               | 0.6             | 0.6                   | 0.2       | 0.8             | 0.8                   | 0.25      | 1.0             | 0.8                   | 0.25      | 1.2             | 0.9                   | 0.3       | 1.6             | 1.1                   | 0.3       | 2               | 1.5                   | 0.4       |
| Cast aluminum alloys<br>AC4A, ADC12 etc. | HD7010       | $n$ (min <sup>-1</sup> ) | 15,920          | 26,530                | 26,530    | 11,940          | 19,900                | 19,900    | 9,550           | 15,920                | 15,920    | 7,960           | 13,270                | 13,270    | 5,970           | 9,950                 | 9,950     | 4,780           | 7,960                 | 7,960     |
|                                          |              | $v_c$ (m/min)            | 300             | 500                   | 500       | 300             | 500                   | 500       | 300             | 500                   | 500       | 300             | 500                   | 500       | 300             | 500                   | 500       | 300             | 500                   | 500       |
|                                          |              | $v_f$ (mm/min)           | 3,180           | 10,610                | 5,310     | 4,780           | 15,920                | 7,960     | 3,820           | 12,740                | 6,370     | 3,190           | 10,620                | 5,310     | 2,990           | 7,960                 | 4,980     | 2,390           | 6,370                 | 3,980     |
|                                          |              | $f_z$ (mm/t)             | 0.1             | 0.2                   | 0.1       | 0.2             | 0.4                   | 0.2       | 0.2             | 0.4                   | 0.2       | 0.2             | 0.4                   | 0.2       | 0.25            | 0.4                   | 0.25      | 0.25            | 0.4                   | 0.25      |
|                                          |              | $a_p$ (mm)               | 0.3             | 0.15                  | 0.15      | 0.4             | 0.2                   | 0.2       | 0.5             | 0.3                   | 0.2       | 0.6             | 0.4                   | 0.2       | 0.8             | 0.6                   | 0.1       | 1               | 0.7                   | 0.1       |
|                                          |              | $a_e$ (mm)               | 0.6             | 0.6                   | 0.2       | 0.8             | 0.8                   | 0.25      | 1.0             | 0.8                   | 0.25      | 1.2             | 0.9                   | 0.3       | 1.6             | 1.1                   | 0.3       | 2               | 1.5                   | 0.4       |
| Maximum $f_z$ (mm/t)                     |              |                          | <0.2            |                       |           | <0.8            |                       |           | <0.8            |                       |           | <0.8            |                       |           | <1.0            |                       |           | <1.0            |                       |           |
| Maximum $a_p$ (mm)                       |              |                          | <3.0            |                       |           | <4.0            |                       |           | <5.0            |                       |           | <6.0            |                       |           | <8.0            |                       |           | <10.0           |                       |           |

## ARPF

| Work material                            | Insert Grade | Cutting Conditions            | φ6              |                       |           | φ8              |                       |           | φ10             |                       |           | φ12             |                       |           | φ16             |                       |           | φ20            |       |           |
|------------------------------------------|--------------|-------------------------------|-----------------|-----------------------|-----------|-----------------|-----------------------|-----------|-----------------|-----------------------|-----------|-----------------|-----------------------|-----------|-----------------|-----------------------|-----------|----------------|-------|-----------|
|                                          |              |                               | Semi finishing  |                       | Finishing | Semi finishing  |                       | Finishing | Semi finishing  |                       | Finishing | Semi finishing  |                       | Finishing | Semi finishing  |                       | Finishing | Semi finishing |       | Finishing |
|                                          |              |                               | General purpose | High-speed processing |           | General purpose | High-speed processing |           | General purpose | High-speed processing |           | General purpose | High-speed processing |           | General purpose | High-speed processing |           |                |       |           |
| Graphite                                 | HD7010       | <i>n</i> (min <sup>-1</sup> ) | 15,920          | 21,220                | 21,220    | 11,940          | 15,920                | 15,920    | 9,550           | 12,740                | 12,740    | 7,960           | 10,620                | 10,620    | 5,970           | 7,960                 | 7,960     | 4,780          | 6,370 | 6,370     |
|                                          |              | <i>V<sub>c</sub></i> (m/min)  | 300             | 400                   | 400       | 300             | 400                   | 400       | 300             | 400                   | 400       | 300             | 400                   | 400       | 300             | 400                   | 400       | 300            | 400   | 400       |
|                                          |              | <i>V<sub>f</sub></i> (mm/min) | 3,180           | 6,370                 | 4,240     | 4,780           | 9,550                 | 6,370     | 3,820           | 7,640                 | 5,100     | 3,190           | 6,370                 | 4,240     | 2,990           | 4,780                 | 3,980     | 2,390          | 3,820 | 3,190     |
|                                          |              | <i>f<sub>z</sub></i> (mm/t)   | 0.1             | 0.15                  | 0.1       | 0.2             | 0.3                   | 0.2       | 0.2             | 0.3                   | 0.2       | 0.2             | 0.3                   | 0.2       | 0.25            | 0.3                   | 0.25      | 0.25           | 0.3   | 0.25      |
|                                          |              | <i>a<sub>p</sub></i> (mm)     | 0.3             | 0.15                  | 0.15      | 0.4             | 0.2                   | 0.2       | 0.5             | 0.3                   | 0.2       | 0.6             | 0.4                   | 0.2       | 0.8             | 0.6                   | 0.2       | 1              | 0.7   | 0.2       |
|                                          |              | <i>a<sub>e</sub></i> (mm)     | 0.6             | 0.6                   | 0.2       | 0.8             | 0.8                   | 0.25      | 1.0             | 0.8                   | 0.25      | 1.2             | 0.9                   | 0.3       | 1.6             | 1.1                   | 0.3       | 2              | 1.5   | 0.4       |
| Cast aluminum alloys<br>AC4A, ADC12 etc. | HD7010       | <i>n</i> (min <sup>-1</sup> ) | 15,920          | 26,530                | 26,530    | 11,940          | 19,900                | 19,900    | 9,550           | 15,920                | 15,920    | 7,960           | 13,270                | 13,270    | 5,970           | 9,950                 | 9,950     | 4,780          | 7,960 | 7,960     |
|                                          |              | <i>V<sub>c</sub></i> (m/min)  | 300             | 500                   | 500       | 300             | 500                   | 500       | 300             | 500                   | 500       | 300             | 500                   | 500       | 300             | 500                   | 500       | 300            | 500   | 500       |
|                                          |              | <i>V<sub>f</sub></i> (mm/min) | 3,180           | 10,610                | 5,310     | 4,780           | 15,920                | 7,960     | 3,820           | 12,740                | 6,370     | 3,190           | 10,620                | 5,310     | 2,990           | 7,960                 | 4,980     | 2,390          | 6,370 | 3,980     |
|                                          |              | <i>f<sub>z</sub></i> (mm/t)   | 0.1             | 0.2                   | 0.1       | 0.2             | 0.4                   | 0.2       | 0.2             | 0.4                   | 0.2       | 0.2             | 0.4                   | 0.2       | 0.25            | 0.4                   | 0.25      | 0.25           | 0.4   | 0.25      |
|                                          |              | <i>a<sub>p</sub></i> (mm)     | 0.3             | 0.15                  | 0.15      | 0.4             | 0.2                   | 0.2       | 0.5             | 0.3                   | 0.2       | 0.6             | 0.4                   | 0.2       | 0.8             | 0.6                   | 0.2       | 1              | 0.7   | 0.2       |
|                                          |              | <i>a<sub>e</sub></i> (mm)     | 0.6             | 0.6                   | 0.2       | 0.8             | 0.8                   | 0.25      | 1.0             | 0.8                   | 0.25      | 1.2             | 0.9                   | 0.3       | 1.6             | 1.1                   | 0.3       | 2              | 1.5   | 0.4       |
| Maximum <i>f<sub>z</sub></i> (mm/t)      |              |                               | <0.2            |                       |           | <0.5            |                       |           | <0.5            |                       |           | <0.5            |                       |           | <0.6            |                       |           | <0.6           |       |           |
| Maximum <i>a<sub>p</sub></i> (mm)        |              |                               | <0.6            |                       |           | <2.5            |                       |           | <3.0            |                       |           | <4.0            |                       |           | <5.0            |                       |           | <6.0           |       |           |

## AHU

| Work material                            | Grade  |                                 | AHU10 type |                   | AHU15 type        |                   |            |
|------------------------------------------|--------|---------------------------------|------------|-------------------|-------------------|-------------------|------------|
|                                          |        |                                 | $\phi 16$  | $\phi 20 \sim 35$ | $\phi 25 \sim 50$ | $\phi 63 \sim 80$ | $\phi 100$ |
| Graphite                                 | HD7010 | Cutting speed<br>$V_c$<br>m/min | 150~300    | 150~300           | 150~300           | 150~300           | 150~300    |
|                                          |        | Feed rate<br>$f_z$<br>mm/t      | 0.10~0.20  | 0.10~0.20         | 0.1~0.25          | 0.1~0.25          | 0.1~0.25   |
| Cast aluminum alloys<br>AC4A, ADC12 etc. | HD7010 | Cutting speed<br>$V_c$<br>m/min | 200~500    | 200~500           | 200~600           | 200~600           | 200~600    |
|                                          |        | Feed rate<br>$f_z$<br>mm/t      | 0.10~0.20  | 0.10~0.20         | 0.1~0.25          | 0.1~0.25          | 0.1~0.25   |

- [Note]** ① Use the appropriate coolant for the work material and machining shape.  
 ② Cutting conditions should be set using the above table as a general reference, and then adjusted according to the actual cutting conditions.  
 ③ Since there is a danger of breakage when using this tool, be sure to use the cutting area cover, protective goggles, safety shoes, etc.

## Epoch **HD** Coating End Mill series

### 05 Machining example of Graphite ④

#### Wear condition after cutting for 1 hour

**HD Coating**

**Suppresses wear**



**Conventional Diamond coating**

Wear amount : 0.02mm



Using Tool Size : RE0.5×Under neck 20

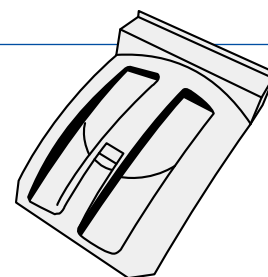
#### < Cutting Condition >

Tool = EGDB2010-20-HD Work material = Graphite (R8710)  
 $n = 10,000 \text{ min}^{-1}$   $v_f = 350 \text{ mm/min}$   $a_p \times a_e = 0.1 \text{ mm} \times 0.3 \text{ mm}$   
 Cutting time = 1 hour OH = 30mm Dry with air-blow

### 06 Machining example of Graphite ⑤

Work material : Graphite (HK2)

| Tool                             | EGB2060-HD                            | EGDB2010-10-HD                        |
|----------------------------------|---------------------------------------|---------------------------------------|
| Tool size                        | RE3×2NT                               | RE0.5×Under neck length10×2NT         |
| Revolution ( $\text{min}^{-1}$ ) | 28,000                                | 28,000                                |
| Feed rate (mm/min)               | 3,640                                 | 672                                   |
| $a_p$ (mm)                       | 0.25                                  | 0.1                                   |
| $a_e$ (mm)                       | 0.25                                  | 0.1                                   |
| Cutting time (min.)              | 80                                    | 200                                   |
| Result                           | No wear. Interrupted cutting possible | No wear. Interrupted cutting possible |



With MOLDINO Tool Engineering, even after a little over 5 hours of use, there was virtually no wear. Machining accuracy is also good.

### 07 Machining example of High Si aluminium alloy ②

Work material : ADC12 Tool : EGR2060-05-HD

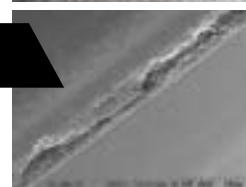
| Tool                                            | EGR2060-05-HD                                                                                        | Conventional coating radius end mill                                                                 |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Cutting condition                               | $n = 12,000 \text{ min}^{-1}$ $v_f = 600 \text{ mm/min}$<br>$a_p \times a_e = 3 \times 6 \text{ mm}$ | $n = 10,000 \text{ min}^{-1}$ $v_f = 300 \text{ mm/min}$<br>$a_p \times a_e = 3 \times 6 \text{ mm}$ |
| Y Tool cost ratio (100% = Conventional product) | 200                                                                                                  | 100                                                                                                  |
| P Tool life (m / pc.)                           | $100\text{m} + \alpha$                                                                               | 20m                                                                                                  |
| Td Tool replacement time (min. / pc.)           | 2                                                                                                    | 2                                                                                                    |
| M Machine cost (Yen / pc.)                      | ¥ 100                                                                                                | ¥ 100                                                                                                |
| Tc Machining time (min. / m)                    | 2                                                                                                    | 3                                                                                                    |
| K Manufacturing cost (Yen / m)                  | ¥ 260                                                                                                | ¥ 434                                                                                                |

#### Peripheral edge wear condition

**EGR2060-05-HD**



Conventional coating radius end mill



## 08 Machining example of Graphite ⑥

| Vf (mm/min)       | 500 | 550 | 600                  | 650 | 700 |
|-------------------|-----|-----|----------------------|-----|-----|
| EGDR2020-40-02-HD | ○   | ○   | ○                    | ○   | ○   |
| EGDB2020-40-HD    | ○   | ○   | △ Chattering occurs. |     |     |

### <Cutting Condition>

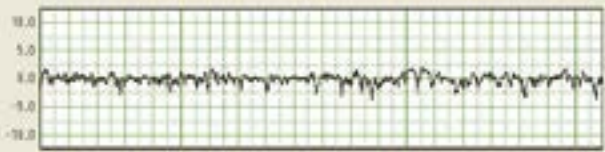
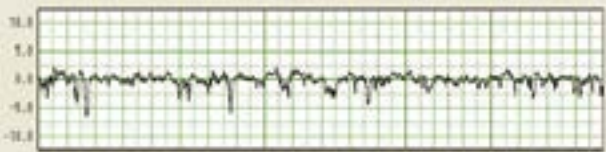
Tool : EGDR2020-40-02-HD  
EGDB2020-40-HD  
Work material = Graphite (R8710)  $n=7000\text{min}^{-1}$   
 $v_f$  = Refer upper table  $a_p \times a_e = 0.4\text{mm} \times 1.5\text{mm}$   
Cutting length = 1m OH=50mm Dry with air blow

Using Tool Size :  $\phi 2 \times$  Under neck 40

When a radius tool is used, machining with even higher efficiency than ball mills is possible.

## 09 Machining example of Graphite ⑦

### Wear condition after cutting for 1 hour

| HD Coating                                                                                                                                                   | Conventional Diamond coating                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>Suppresses wear</b></p>                                            |  <p><b>Wear amount : 0.02mm</b></p>                                       |
| <p>Ra0.58<math>\mu\text{m}</math><br/>Rz4.86<math>\mu\text{m}</math></p>  | <p>Ra0.66<math>\mu\text{m}</math><br/>Rz5.48<math>\mu\text{m}</math></p>  |

Using Tool Size : RE3 $\times$ 2 flutes

### <Cutting Condition>

Tool = EGB2060-HD Work material = Graphite(R8710)  $n=7000\text{min}^{-1}$   
 $v_f=1150\text{mm/min}$   $a_p \times a_e=3.5\text{mm} \times 0.1\text{mm}$  Cutting time=1 hour OH=50mm  
Dry with air blow

## 10 Machining example of High Si aluminium alloy ③

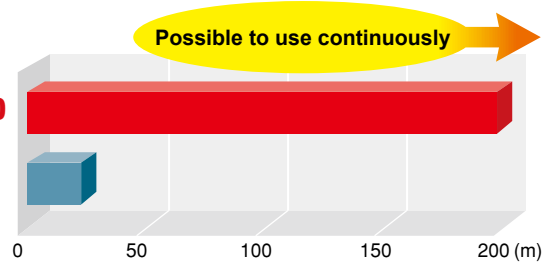
Using tool : EGB2060-HD

### <Cutting Condition>

Work material = Cast aluminum alloy material (AC4A)  
 $n = 12,000 \text{ min}^{-1}$   $v_r = 2,400 \text{ mm/min}$   
 $a_p \times a_e = 0.6 \text{ mm} \times 1.2 \text{ mm}$   $OH = 25 \text{ mm}$   
 Dry with air blow

EGB2060-HD

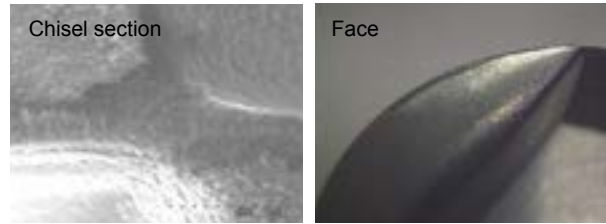
Conventional  
non coating  
end mill



Non-coating after cutting 25m (approx. 10 min.)



EGB2060-HD : After cutting 200m (approx. 80 min.)



**HD coating suppresses welding even after cutting 200m, allowing continuous use.**

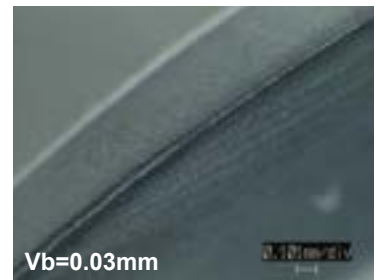
## 11 Machining example of Graphite ⑧

Using Tool Size : RE5×2 flutes EGB2100-HD  
 Work material : Graphite

|                    |                                  |                    |                    |             |                               |
|--------------------|----------------------------------|--------------------|--------------------|-------------|-------------------------------|
| Cutting conditions | Tool length (mm)                 | 85                 | 70                 | 90          | 100                           |
|                    | Revolution ( $\text{min}^{-1}$ ) | 4,200              | 4,200              | 4,500       | 3,200                         |
|                    | Feed rate (mm/min)               | 1,500              | 1,500              | 1,800       | 1,300                         |
|                    | Cutting speed $v_c$ (m/min)      | 47                 | 47                 | 57          | 41                            |
|                    | Depth of cut (z-axis mm)         | 0.8                | 0.8                | 2           | 1                             |
|                    | Depth of cut (y-axis mm)         | 1.6                | 1.6                | 4           | 1                             |
|                    | Lubricant supply status          | Air                | Air                | Air         | Air                           |
|                    | Note                             |                    |                    |             | Machining the same workpiece. |
| Result             | Cutting time (min.)              | 230                | 150                | 243         | 303<br>×2 times               |
|                    | Surface                          | No problems        | No problems        | No problems | No problems                   |
|                    | Flute condition                  | Some wear present. | Some wear present. | No problems | No problems                   |



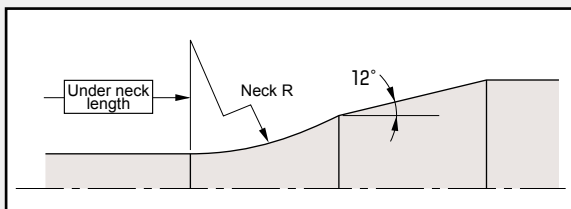
Wear condition from center to R edge



Wear condition from R to peripheral edge

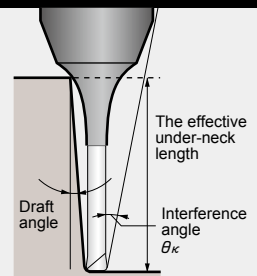
**Total cutting time : 20.5 hours**

### ○ Detailed shape below neck



#### [Note]

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  $\theta_k$ ", and should also be referred to.



# Line Up

- We have enhanced our lineup of long-neck small-diameter tools.
- Sharp cutting edge suitable for graphite machining. Contributes to long tool life.

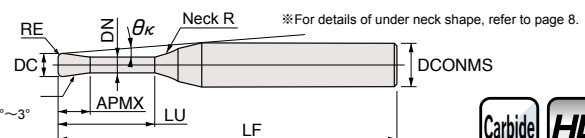
## Epoch HD Coating Deep Ball End Mill



### EGDB2- -HD

| Item code      | Stock | Size (mm)   |           |                   |           |              |                |            |        |                    | The effective under-neck length for the various draft angles |                 |                 |                 |                 |
|----------------|-------|-------------|-----------|-------------------|-----------|--------------|----------------|------------|--------|--------------------|--------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|
|                |       | Ball radius | Tool dia. | Under neck length | Neck dia. | Flute length | Overall length | Shank dia. | Neck R | Interference angle | 0.5°                                                         | 1°              | 1.5°            | 2°              | 3°              |
|                |       | RE          | DC        | LU                | DN        | APMX         | LF             | DCONMS     | θκ     | θκ                 |                                                              |                 |                 |                 |                 |
| EGDB2004-4-HD  | ●     | 0.2         | 0.4       | 4                 | 0.37      | 0.6          | 60             | 4          | 10     | 8.3                | 5.07                                                         | 5.45            | 5.78            | 6.08            | 6.63            |
| EGDB2004-8-HD  | ●     | 0.2         | 0.4       | 8                 | 0.37      | 0.6          | 60             | 4          | 10     | 6.29               | 9.37                                                         | 9.91            | 10.35           | 10.74           | 11.42           |
| EGDB2004-12-HD | ●     | 0.2         | 0.4       | 12                | 0.37      | 0.6          | 60             | 4          | 10     | 5.06               | 13.62                                                        | 14.26           | 14.79           | 15.24           | 16.02           |
| EGDB2006-5-HD  | ●     | 0.3         | 0.6       | 5                 | 0.57      | 0.9          | 60             | 4          | 10     | 7.59               | 6.14                                                         | 6.57            | 6.93            | 7.25            | 7.83            |
| EGDB2006-10-HD | ●     | 0.3         | 0.6       | 10                | 0.57      | 0.9          | 60             | 4          | 10     | 5.47               | 11.49                                                        | 12.08           | 12.57           | 12.99           | 13.72           |
| EGDB2006-15-HD | ●     | 0.3         | 0.6       | 15                | 0.57      | 0.9          | 60             | 4          | 10     | 4.28               | 16.77                                                        | 17.49           | 18.06           | 18.55           | 19.9            |
| EGDB2006-20-HD | ●     | 0.3         | 0.6       | 20                | 0.57      | 0.9          | 60             | 4          | 10     | 3.51               | 22.01                                                        | 22.82           | 23.47           | 24.01           | 26.54           |
| EGDB2010-10-HD | ●     | 0.5         | 1         | 10                | 0.96      | 1.5          | 60             | 4          | 10     | 5.15               | 11.51                                                        | 12.09           | 12.57           | 12.98           | 13.7            |
| EGDB2010-20-HD | ●     | 0.5         | 1         | 20                | 0.96      | 1.5          | 60             | 4          | 10     | 3.23               | 22.02                                                        | 22.83           | 23.47           | 24.01           | 26.51           |
| EGDB2010-30-HD | ●     | 0.5         | 1         | 30                | 0.96      | 1.5          | 80             | 4          | 10     | 2.35               | 32.42                                                        | 33.39           | 34.25           | 35.91           | No interference |
| EGDB2010-40-HD | ●     | 0.5         | 1         | 40                | 0.96      | 1.5          | 80             | 4          | 10     | 1.85               | 42.76                                                        | 43.86           | 45.65           | No interference | No interference |
| EGDB2015-20-HD | ●     | 0.75        | 1.5       | 20                | 1.44      | 2.25         | 60             | 4          | 10     | 2.84               | 22.06                                                        | 22.85           | 23.48           | 24.01           | No interference |
| EGDB2015-40-HD | ●     | 0.75        | 1.5       | 40                | 1.44      | 2.25         | 80             | 4          | 10     | 1.59               | 42.78                                                        | 43.87           | 45.67           | No interference | No interference |
| EGDB2020-20-HD | ●     | 1           | 2         | 20                | 1.92      | 3            | 60             | 4          | 10     | 2.4                | 22.1                                                         | 22.87           | 23.49           | 24.02           | No interference |
| EGDB2020-40-HD | ●     | 1           | 2         | 40                | 1.92      | 3            | 80             | 4          | 10     | 1.31               | 42.81                                                        | 43.89           | No interference | No interference | No interference |
| EGDB2020-60-HD | ●     | 1           | 2         | 60                | 1.92      | 3            | 100            | 4          | 10     | 0.9                | 63.36                                                        | No interference | No interference | No interference | No interference |
| EGDB2030-20-HD | ●     | 1.5         | 3         | 20                | 2.88      | 4.5          | 60             | 4          | 10     | 1.32               | 22.18                                                        | 22.91           | No interference | No interference | No interference |
| EGDB2030-40-HD | ●     | 1.5         | 3         | 40                | 2.88      | 4.5          | 80             | 4          | 10     | 0.69               | 42.87                                                        | No interference | No interference | No interference | No interference |
| EGDB2030-60-HD | ●     | 1.5         | 3         | 60                | 2.88      | 4.5          | 100            | 4          | 10     | 0.47               | No interference                                              | No interference | No interference | No interference | No interference |

## Epoch HD Coating Deep Radius End Mill



### EGDR2- -HD

| Item code         | Stock | Size (mm) |               |                   |           |              |                |            |        |                    | The effective under-neck length for the various draft angles |                 |                 |                 |                 |
|-------------------|-------|-----------|---------------|-------------------|-----------|--------------|----------------|------------|--------|--------------------|--------------------------------------------------------------|-----------------|-----------------|-----------------|-----------------|
|                   |       | Tool dia. | Corner radius | Under neck length | Neck dia. | Flute length | Overall length | Shank dia. | Neck R | Interference angle | 0.5°                                                         | 1°              | 1.5°            | 2°              | 3°              |
|                   |       | DC        | RE            | LU                | DN        | APMX         | LF             | DCONMS     | θκ     | θκ                 |                                                              |                 |                 |                 |                 |
| EGDR2005-5-01-HD  | ●     | 0.5       | 0.1           | 5                 | 0.47      | 0.75         | 60             | 4          | 10     | 7.55               | 6.16                                                         | 6.59            | 6.96            | 7.29            | 7.87            |
| EGDR2005-10-01-HD | ●     | 0.5       | 0.1           | 10                | 0.47      | 0.75         | 60             | 4          | 10     | 5.5                | 11.5                                                         | 12.1            | 12.59           | 13.01           | 13.75           |
| EGDR2005-15-01-HD | ●     | 0.5       | 0.1           | 15                | 0.47      | 0.75         | 60             | 4          | 10     | 4.32               | 16.78                                                        | 17.5            | 18.07           | 18.57           | 19.97           |
| EGDR2005-20-01-HD | ●     | 0.5       | 0.1           | 20                | 0.47      | 0.75         | 60             | 4          | 10     | 3.56               | 22.02                                                        | 22.84           | 23.48           | 24.03           | 26.6            |
| EGDR2010-10-02-HD | ●     | 1         | 0.2           | 10                | 0.96      | 1.5          | 60             | 4          | 10     | 5.06               | 11.53                                                        | 12.12           | 12.6            | 13.02           | 13.75           |
| EGDR2010-20-02-HD | ●     | 1         | 0.2           | 20                | 0.96      | 1.5          | 60             | 4          | 10     | 3.19               | 22.04                                                        | 22.85           | 23.49           | 24.04           | 26.6            |
| EGDR2010-30-02-HD | ●     | 1         | 0.2           | 30                | 0.96      | 1.5          | 80             | 4          | 10     | 2.33               | 32.43                                                        | 33.41           | 34.29           | 35.97           | No interference |
| EGDR2010-40-02-HD | ●     | 1         | 0.2           | 40                | 0.96      | 1.5          | 80             | 4          | 10     | 1.83               | 42.77                                                        | 43.87           | 45.69           | No interference | No interference |
| EGDR2015-20-02-HD | ●     | 1.5       | 0.2           | 20                | 1.44      | 2.25         | 60             | 4          | 10     | 2.78               | 22.09                                                        | 22.88           | 23.52           | 24.06           | No interference |
| EGDR2015-40-02-HD | ●     | 1.5       | 0.2           | 40                | 1.44      | 2.25         | 80             | 4          | 10     | 1.57               | 42.8                                                         | 43.9            | 45.75           | No interference | No interference |
| EGDR2020-20-02-HD | ●     | 2         | 0.2           | 20                | 1.92      | 3            | 60             | 4          | 10     | 2.32               | 22.13                                                        | 22.92           | 23.55           | 24.11           | No interference |
| EGDR2020-40-02-HD | ●     | 2         | 0.2           | 40                | 1.92      | 3            | 80             | 4          | 10     | 1.29               | 42.84                                                        | 43.92           | No interference | No interference | No interference |
| EGDR2020-60-02-HD | ●     | 2         | 0.2           | 60                | 1.92      | 3            | 100            | 4          | 10     | 0.89               | 63.38                                                        | No interference | No interference | No interference | No interference |
| EGDR2030-20-02-HD | ●     | 3         | 0.2           | 20                | 2.88      | 4.5          | 60             | 4          | 10     | 1.25               | 22.23                                                        | 22.99           | No interference | No interference | No interference |
| EGDR2030-40-02-HD | ●     | 3         | 0.2           | 40                | 2.88      | 4.5          | 80             | 4          | 10     | 0.67               | 42.9                                                         | No interference | No interference | No interference | No interference |
| EGDR2030-60-02-HD | ●     | 3         | 0.2           | 60                | 2.88      | 4.5          | 100            | 4          | 10     | 0.46               | No interference                                              | No interference | No interference | No interference | No interference |

● : Stocked items.

# Line Up, Recommended Cutting Conditions

## Recommended cutting conditions

### EGDB2-HD

#### Epoch HD Coating Deep Ball End Mill

|                |                           |                         |                                    |     | Work material                            | Graphite                               |                              | Cast aluminum alloys<br>AC4A,ADC12 etc.<br>(Air-brow or wet:water-soluble agent) |                              |
|----------------|---------------------------|-------------------------|------------------------------------|-----|------------------------------------------|----------------------------------------|------------------------------|----------------------------------------------------------------------------------|------------------------------|
| Item code      | Ball radius<br>RE<br>(mm) | Tool dia.<br>DC<br>(mm) | Under neck<br>length<br>LU<br>(mm) | L/D | Depth of cut<br>(mm)<br>$a_p \times a_e$ | Revolution<br>$n$<br>min <sup>-1</sup> | Feed rate<br>$v_f$<br>mm/min | Revolution<br>$n$<br>min <sup>-1</sup>                                           | Feed rate<br>$v_f$<br>mm/min |
| EGDB2004-4-HD  | 0.2                       | 0.4                     | 4                                  | 10  | 0.05×0.15                                | 18,000~21,000                          | 400~550                      | 13,000~18,000                                                                    | 350~500                      |
| EGDB2004-8-HD  | 0.2                       | 0.4                     | 8                                  | 20  | 0.04×0.12                                | 17,000~20,000                          | 350~500                      | 12,000~17,000                                                                    | 300~450                      |
| EGDB2004-12-HD | 0.2                       | 0.4                     | 12                                 | 30  | 0.03×0.10                                | 15,000~18,000                          | 300~400                      | 11,000~16,000                                                                    | 250~350                      |
| EGDB2006-5-HD  | 0.3                       | 0.6                     | 5                                  | 8   | 0.07×0.21                                | 15,000~18,000                          | 350~500                      | 13,000~18,000                                                                    | 300~450                      |
| EGDB2006-10-HD | 0.3                       | 0.6                     | 10                                 | 17  | 0.06×0.18                                | 15,000~18,000                          | 300~450                      | 13,000~18,000                                                                    | 250~400                      |
| EGDB2006-15-HD | 0.3                       | 0.6                     | 15                                 | 25  | 0.04×0.12                                | 13,000~16,000                          | 270~350                      | 11,000~16,000                                                                    | 200~350                      |
| EGDB2006-20-HD | 0.3                       | 0.6                     | 20                                 | 33  | 0.03×0.09                                | 12,000~14,000                          | 240~300                      | 9,000~14,000                                                                     | 200~300                      |
| EGDB2010-10-HD | 0.5                       | 1                       | 10                                 | 10  | 0.1×0.3                                  | 15,000~18,000                          | 350~450                      | 10,000~15,000                                                                    | 300~400                      |
| EGDB2010-20-HD | 0.5                       | 1                       | 20                                 | 20  | 0.08×0.24                                | 13,000~16,000                          | 300~400                      | 8,000~13,000                                                                     | 300~400                      |
| EGDB2010-30-HD | 0.5                       | 1                       | 30                                 | 30  | 0.06×0.18                                | 12,000~14,000                          | 270~350                      | 6,000~11,000                                                                     | 250~350                      |
| EGDB2010-40-HD | 0.5                       | 1                       | 40                                 | 40  | 0.04×0.12                                | 10,000~12,000                          | 240~300                      | 5,000~10,000                                                                     | 250~350                      |
| EGDB2015-20-HD | 0.75                      | 1.5                     | 20                                 | 13  | 0.1×0.3                                  | 15,000~18,000                          | 450~480                      | 10,000~15,000                                                                    | 350~450                      |
| EGDB2015-40-HD | 0.75                      | 1.5                     | 40                                 | 27  | 0.08×0.24                                | 12,000~15,000                          | 300~400                      | 7,000~12,000                                                                     | 300~400                      |
| EGDB2020-20-HD | 1                         | 2                       | 20                                 | 10  | 0.2×0.6                                  | 15,000~18,000                          | 450~550                      | 10,000~15,000                                                                    | 350~450                      |
| EGDB2020-40-HD | 1                         | 2                       | 40                                 | 20  | 0.16×0.48                                | 13,000~16,000                          | 350~450                      | 7,000~12,000                                                                     | 300~450                      |
| EGDB2020-60-HD | 1                         | 2                       | 60                                 | 30  | 0.12×0.36                                | 12,000~14,000                          | 250~350                      | 5,000~10,000                                                                     | 250~400                      |
| EGDB2030-20-HD | 1.5                       | 3                       | 20                                 | 7   | 0.33×1.0                                 | 15,000~18,000                          | 800~1,000                    | 10,000~15,000                                                                    | 350~450                      |
| EGDB2030-40-HD | 1.5                       | 3                       | 40                                 | 13  | 0.2×0.6                                  | 15,000~18,000                          | 500~700                      | 7,000~12,000                                                                     | 300~450                      |
| EGDB2030-60-HD | 1.5                       | 3                       | 60                                 | 20  | 0.18×0.54                                | 13,000~15,000                          | 300~500                      | 5,000~10,000                                                                     | 250~400                      |

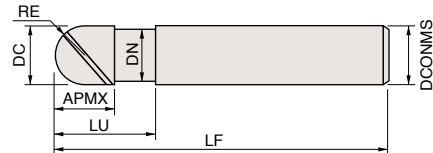
### EGDR2-HD

#### Epoch HD Coating Deep Radius End Mill

|                   |                         |                                |                                    |     | Work material                            | Graphite                               |                              | Cast aluminum alloys<br>AC4A,ADC12 etc.<br>(Air-brow or wet:water-soluble agent) |                              |
|-------------------|-------------------------|--------------------------------|------------------------------------|-----|------------------------------------------|----------------------------------------|------------------------------|----------------------------------------------------------------------------------|------------------------------|
| Item code         | Tool dia.<br>DC<br>(mm) | Corner<br>radius<br>RE<br>(mm) | Under neck<br>length<br>LU<br>(mm) | L/D | Depth of cut<br>(mm)<br>$a_p \times a_e$ | Revolution<br>$n$<br>min <sup>-1</sup> | Feed rate<br>$v_f$<br>mm/min | Revolution<br>$n$<br>min <sup>-1</sup>                                           | Feed rate<br>$v_f$<br>mm/min |
| EGDR2005-5-01-HD  | 0.5                     | 0.1                            | 5                                  | 10  | 0.05×0.4                                 | 15,000~18,000                          | 700~900                      | 13,000~18,000                                                                    | 400~600                      |
| EGDR2005-10-01-HD | 0.5                     | 0.1                            | 10                                 | 20  | 0.05×0.4                                 | 14,000~16,000                          | 650~800                      | 13,000~18,000                                                                    | 300~600                      |
| EGDR2005-15-01-HD | 0.5                     | 0.1                            | 15                                 | 30  | 0.045×0.4                                | 12,000~15,000                          | 650~750                      | 11,000~16,000                                                                    | 200~500                      |
| EGDR2005-20-01-HD | 0.5                     | 0.1                            | 20                                 | 40  | 0.04×0.4                                 | 10,000~13,000                          | 600~700                      | 9,000~14,000                                                                     | 200~400                      |
| EGDR2010-10-02-HD | 1                       | 0.2                            | 10                                 | 10  | 0.1×0.8                                  | 13,000~16,000                          | 650~800                      | 10,000~15,000                                                                    | 300~600                      |
| EGDR2010-20-02-HD | 1                       | 0.2                            | 20                                 | 20  | 0.1×0.8                                  | 12,000~14,000                          | 600~700                      | 8,000~13,000                                                                     | 300~600                      |
| EGDR2010-30-02-HD | 1                       | 0.2                            | 30                                 | 30  | 0.08×0.8                                 | 10,000~12,000                          | 550~650                      | 6,000~11,000                                                                     | 250~500                      |
| EGDR2010-40-02-HD | 1                       | 0.2                            | 40                                 | 40  | 0.06×0.8                                 | 9,000~11,000                           | 500~600                      | 5,000~10,000                                                                     | 250~500                      |
| EGDR2015-20-02-HD | 1.5                     | 0.2                            | 20                                 | 13  | 0.15×1.0                                 | 12,000~15,000                          | 700~850                      | 10,000~15,000                                                                    | 350~600                      |
| EGDR2015-40-02-HD | 1.5                     | 0.2                            | 40                                 | 27  | 0.12×1.0                                 | 10,000~12,000                          | 650~750                      | 7,000~12,000                                                                     | 300~500                      |
| EGDR2020-20-02-HD | 2                       | 0.2                            | 20                                 | 10  | 0.2×1.4                                  | 12,000~15,000                          | 650~800                      | 10,000~15,000                                                                    | 350~650                      |
| EGDR2020-40-02-HD | 2                       | 0.2                            | 40                                 | 20  | 0.16×1.4                                 | 10,000~13,000                          | 500~750                      | 7,000~12,000                                                                     | 300~550                      |
| EGDR2020-60-02-HD | 2                       | 0.2                            | 60                                 | 30  | 0.12×1.4                                 | 8,000~10,000                           | 550~700                      | 5,000~10,000                                                                     | 250~500                      |
| EGDR2030-20-02-HD | 3                       | 0.2                            | 20                                 | 7   | 0.3×2.1                                  | 10,000~13,000                          | 750~850                      | 10,000~15,000                                                                    | 350~650                      |
| EGDR2030-40-02-HD | 3                       | 0.2                            | 40                                 | 13  | 0.24×2.1                                 | 8,000~10,000                           | 650~750                      | 7,000~12,000                                                                     | 300~650                      |
| EGDR2030-60-02-HD | 3                       | 0.2                            | 60                                 | 20  | 0.2×2.1                                  | 7,000~9,000                            | 600~700                      | 5,000~10,000                                                                     | 250~600                      |

- We have a lineup of long-flute ball and radius mills.
- Using a radius end mill enables high-efficient machining when doing contour machining.

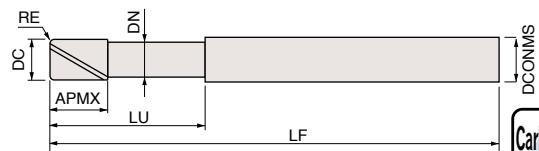
## Epoch HD Coating Ball End Mill



### EGB2000-HD

| Item code  | Stock | Size (mm)         |                 |                         |                 |                      |                      |                      |
|------------|-------|-------------------|-----------------|-------------------------|-----------------|----------------------|----------------------|----------------------|
|            |       | Ball radius<br>RE | Tool dia.<br>DC | Under neck length<br>LU | Neck dia.<br>DN | Flute length<br>APMX | Overall length<br>LF | Shank dia.<br>DCONMS |
| EGB2040-HD | ●     | 2                 | 4               | 40                      | 3.9             | 8                    | 100                  | 4                    |
| EGB2060-HD | ●     | 3                 | 6               | 60                      | 5.9             | 12                   | 120                  | 6                    |
| EGB2080-HD | ●     | 4                 | 8               | 80                      | 7.9             | 16                   | 140                  | 8                    |
| EGB2100-HD | ●     | 5                 | 10              | 100                     | 9.9             | 20                   | 150                  | 10                   |

## Epoch HD Coating Radius End Mill



### EGR2000-05-HD

| Item code     | Stock | Size (mm)       |                     |                         |                 |                      |                      |                      |
|---------------|-------|-----------------|---------------------|-------------------------|-----------------|----------------------|----------------------|----------------------|
|               |       | Tool dia.<br>DC | Corner radius<br>RE | Under neck length<br>LU | Neck dia.<br>DN | Flute length<br>APMX | Overall length<br>LF | Shank dia.<br>DCONMS |
| EGR2040-05-HD | ●     | 4               | 0.5                 | 40                      | 3.9             | 8                    | 100                  | 4                    |
| EGR2060-05-HD | ●     | 6               | 0.5                 | 60                      | 5.9             | 12                   | 120                  | 6                    |
| EGR2080-05-HD | ●     | 8               | 0.5                 | 80                      | 7.9             | 16                   | 140                  | 8                    |
| EGR2100-05-HD | ●     | 10              | 0.5                 | 100                     | 9.9             | 20                   | 150                  | 10                   |

## Recommended cutting conditions

### EGB2-HD

#### Epoch HD Coating Ball End Mill

| Work material                              | Graphite                                                           |                              | Cast aluminum alloys<br>AC4A,ADC12 etc.<br>(Air-brow or wet:water-soluble agent) |                              |
|--------------------------------------------|--------------------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------|------------------------------|
|                                            | Revolution<br>$n$<br>min <sup>-1</sup>                             | Feed rate<br>$v_f$<br>mm/min | Revolution<br>$n$<br>min <sup>-1</sup>                                           | Feed rate<br>$v_f$<br>mm/min |
| Ball radius × Tool dia.<br>RE × DC<br>(mm) |                                                                    |                              |                                                                                  |                              |
| RE2 × 4                                    | 8,000~10,000                                                       | 1,200~1,500                  | 6,000~9,000                                                                      | 800~1,200                    |
| RE3 × 6                                    | 7,000~9,000                                                        | 1,000~1,300                  | 5,000~8,000                                                                      | 700~1,100                    |
| RE4 × 8                                    | 6,000~8,000                                                        | 900~1,100                    | 4,000~7,000                                                                      | 600~1,000                    |
| RE5 × 10                                   | 5,000~7,000                                                        | 800~1,000                    | 3,000~6,000                                                                      | 500~900                      |
| Depth of cut<br>(mm)                       | <p><math>a_p \leq 0.1DC</math><br/><math>a_e \leq 0.3DC</math></p> |                              |                                                                                  |                              |

### EGR2-HD

#### Epoch HD Coating Radius End Mill

| Work material           | Graphite                                                           |                              | Cast aluminum alloys<br>AC4A,ADC12 etc.<br>(Air-brow or wet:water-soluble agent) |                              |
|-------------------------|--------------------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------|------------------------------|
|                         | Revolution<br>$n$<br>min <sup>-1</sup>                             | Feed rate<br>$v_f$<br>mm/min | Revolution<br>$n$<br>min <sup>-1</sup>                                           | Feed rate<br>$v_f$<br>mm/min |
| Tool dia.<br>DC<br>(mm) |                                                                    |                              |                                                                                  |                              |
| 4                       | 8,000~10,000                                                       | 1,300~1,600                  | 6,000~9,000                                                                      | 900~1,300                    |
| 6                       | 7,000~9,000                                                        | 1,500~1,800                  | 5,000~8,000                                                                      | 800~1,200                    |
| 8                       | 6,000~8,000                                                        | 1,700~2,000                  | 4,000~7,000                                                                      | 700~1,100                    |
| 10                      | 6,000~8,000                                                        | 1,900~2,200                  | 3,000~6,000                                                                      | 600~1,000                    |
| Depth of cut<br>(mm)    | <p><math>a_p \leq 0.1DC</math><br/><math>a_e \leq 0.8DC</math></p> |                              |                                                                                  |                              |

● : Stocked items.



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.

## **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) When preparing for use, be sure that the inserts are firmly mounted in place and that they are firmly mounted on the arbor, etc.
- (3) 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.

## **MOLDINO Tool Engineering, Ltd.**

Head Office  
Hulic Ryogoku Bldg. 8F, 4-31-11, Ryogoku, Sumida-ku, Tokyo, Japan 130-0026  
International Sales Dept. : TEL +81-3-6890-5103 FAX +81-3-6890-5128

### Official Web Site

<https://www.moldino.com/en/>

Database for selection Cutting Tool Products **[TOOL SEARCH]**

TOOLSEARCH

Search Web 

**Europe** **MOLDINO Tool Engineering Europe GmbH**  
Itterpark 12, 40724 Hilden, Germany.  
Tel +49-(0)2103-24820 Fax +49-(0)2103-248230

**America** **MITSUBISHI MATERIALS U.S.A. CORPORATION**  
Detroit office c/o RFM Inc. Customer service  
2001 Orndorf Drive, Brighton, MI 48116 U.S.A.  
Tel +1(248) 308-2620 Fax +1(248) 308-2627

**Mexico** **MITSUBISHI MATERIALS MÉXICO S.A. DE C.V.**  
Av. La Cañada No.16, Parque Industrial Bernardo Quintana, El Marques, Querétaro, CP 76246, México  
Tel +52-442-1926800

**Brazil** **MITSUBISHI MATERIALS BRASIL LTDA.**  
Rua Cincinnati Braga, 340 13° andar, Bela Vista – CEP 01333-010 São Paulo – SP., Brasil  
Tel +55(11)3506-5600 Fax +55(11)3506-5677

**Thailand** **MITSUBISHI MATERIALS (THAILAND) CO., LTD.**  
139/3 Moo 2, Tambon Khlong Chik, Amphoe Bang Pa-in,  
Phra Nakhon Si Ayutthaya 13160, Thailand  
Tel +66-3525-8024

**India** **Mitsubishi Materials India Private Limited**  
H.O.: Prasad Enclave, #118/119, 1st Floor, 2nd Stage, 5th main, BBMP Ward #11, (New #38),  
Industrial Suburb, Yeshwanthpura, Bengaluru, 560 022, Karnataka, India.  
Tel +91-80-2204-3600

DISTRIBUTED BY: