## 2 Flute cBN Long Neck Radius End Mills for Finishing

## 



Material Applications（ڭ̧ Highly Recommended © Recommended $\bigcirc$ Suggested）

| 被 削材 Work Material |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CARBON STEELS S45CS55C | ALLOY <br> STEELS <br> SK／SCM SUS | $\begin{array}{\|c\|} \hline \text { PREHARDENED } \\ \text { STEELS } \\ \text { NAK } \\ \text { HPM } \end{array}$ | HARDENED STEELS |  |  | CAST IRON | ALUMINUM | GRAPHITE | COPPER | PLASTICS | GLASS | TITANIUM |  | CEMENTED | HARD BrITLE |
|  |  |  | $\sim 55 \mathrm{HRC}$ | $\sim 60 \mathrm{HRC}$ | $\sim 70 \mathrm{HRC}$ |  |  |  |  |  | PLASTICS |  | RESISTANT ALLOYS |  | MATERIALS |
|  |  | O | （0） | （0） | $\stackrel{\bigcirc}{\sim}$ |  |  |  |  |  |  |  |  |  |  |



The shank taper angle shown is not an exact value and to avoid contact with the workpiece，we recommend the user controls the precise value of this angle． Shank taper angle should not make contact with the work piece．
Diameter and CR accuracy measurements are printed on the label to support High Precision milling．
Total 24 models

| Model <br> Number | Outside Diameter $\phi \mathrm{D}$ | Corner Radius CR | Effective Length $\ell_{1}$ | Length of Cut \＆ | Neck Diameter $\phi \mathrm{d} 1$ | Shank Taper Angle <br> Bta | Overall Length L | Shank Diameter $\phi$ d |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CBN－LR 2003－002－005 | 0.3 | RO．02 | 0.5 | 0.13 | 0.27 | $11^{\circ}$ | 45 | 4 |
| CBN－LR 2003－002－010 |  |  | 1 |  |  |  |  |  |
| CBN－LR 2003－005－005 |  | R0．05 | 0.5 |  |  |  |  |  |
| CBN－LR 2003－005－010 |  |  | 1 |  |  |  |  |  |
| CBN－LR 2004－002－010 | 0.4 | RO．02 | 1 | 0.24 | 0.37 |  |  |  |
| CBN－LR 2004－002－015 |  |  | 1.5 |  |  |  |  |  |
| CBN－LR 2004－005－010 |  | R0．05 | 1 |  |  |  |  |  |
| CBN－LR 2004－005－015 |  |  | 1.5 |  |  |  |  |  |
| CBN－LR 2005－002－010 | 0.5 | R0．02 | 1 | 0.3 | 0.47 |  |  |  |
| CBN－LR 2005－002－015 |  |  | 1.5 |  |  |  |  |  |
| CBN－LR 2005－005－010 |  | R | 1 |  |  |  |  |  |
| CBN－LR 2005－005－015 |  | R0．05 | 1.5 |  |  |  |  |  |
| CBN－LR 2006－002－010 |  |  | 1 |  |  |  |  |  |
| CBN－LR 2006－002－015 | 0.6 |  | 1.5 |  | 0.57 |  |  |  |
| CBN－LR 2006－005－010 |  | 80.05 | 1 |  |  |  |  |  |
| CBN－LR 2006－005－015 |  | R0．05 | 1.5 |  |  |  |  |  |
| CBN－LR 2008－002－010 |  | R0． | 1 |  |  |  |  |  |
| CBN－LR 2008－002－020 | 0.8 | R0．02 | 2 | ， | 0.77 |  |  |  |
| CBN－LR 2008－005－010 | 0.8 | R0． 05 | 1 |  |  |  |  |  |
| CBN－LR 2008－005－020 |  | R0．05 | 2 |  |  |  |  |  |
| CBN－LR 2010－002－010 | 1 | RO．02 | 1 | 0.7 | 0.96 |  |  |  |
| CBN－LR 2010－002－020 |  |  | 2 |  |  |  |  |  |
| CBN－LR 2010－005－010 |  | R0．05 | 1 |  |  |  |  |  |
| CBN－LR 2010－005－020 |  |  | 2 |  |  |  |  |  |


| WORK MATERIAL | PREHARDENED STEELS / HARDENED STEELS NAK80 / STAVAX / ELMAX (~ 62HRC) |  |  |  | HARDENED STEELS YXR7 ( $\sim 68 \mathrm{HRC}$ ) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Outside Diameter | Spindle Speed $\left(\mathrm{min}^{-1}\right)$ | Feed Rate (mm/min) | Axial Depth <br> (mm) | Radial Depth <br> (mm) | Spindle Speed $\left(\mathrm{min}^{-1}\right)$ | Feed Rate (mm/min) | Axial Depth (mm) | $\begin{aligned} & a e \\ & \text { Radial Depth } \\ & (\mathrm{mm}) \end{aligned}$ |
| ¢0.3 | 50.000 | 400 | 0.003 | 0.05 | 50,000 | 200 | 0.003 | 0.03 |
| ¢0.4 | 50,000 | 450 | 0.007 | 0.12 | 40,000 | 240 | 0.007 | 0.08 |
| ¢0.5 | 40,000 | 500 | 0.012 | 0.2 | 32,000 | 300 | 0.012 | 0.15 |
| ¢0.6 | 40,000 | 600 | 0.012 | 0.24 | 26,600 | 310 | 0.012 | 0.2 |
| ф0.8 | 37,500 | 720 | 0.012 | 0.32 | 20,000 | 330 | 0.012 | 0.3 |
| ¢ 1 | 30,000 | 900 | 0.012 | 0.4 | 16,000 | 350 | 0.012 | 0.4 |

## CBN-LR Milling Example

ELMAX (60HRC) LED Mold Milling

| Tool | Milling <br> Process | Spindle <br> Speed <br> $\left(\mathrm{min}^{-1}\right)$ | Feed <br> Rate <br> $(\mathrm{mm} / \mathrm{min})$ | $a_{p}$ <br> Axial Depth <br> $(\mathrm{mm})$ | $a_{e}$ <br> Radial Depth <br> $(\mathrm{mm})$ | Coolant | Cycle Time |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $2005-005-015$ | Finishing | 45,000 | 500 | 0.006 | 0 | Oil Mist | 1 h 24 min 40 sec |
| $2010-002-020$ | Finishing | 45,000 | 500 | 0.001 | 0 | Oil Mist | 1h 10 min 56 sec |



HPM31 (61HRC) Slotting

| Tool | Milling <br> Process | Spindle <br> Speed <br> $\left(\mathrm{min}^{-1}\right)$ | Feed <br> Rate | $a_{p}$ <br> (mm/min) | $a e$ <br> $(\mathrm{~mm})$ | $a^{2}$ <br> $(\mathrm{~mm})$ | Cepth |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Radial Depth |  |  |  |  |  |  |  |
| Coolant | Cycle Time |  |  |  |  |  |  |
| $2005-005-010$ | Finishing | 30,000 | 440 | 0.015 | 0.005 | Oil Mist | 2 h 7 min |



## Note:

- Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed.
- Recommend oil mist to avoid tool damage.


## UNION <br> TOOL <br> UNION TOOL CO. http://www.uniontool.co.jp

## HEADQUARTERS

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Price \& Specifications are subject to change without notice.

