## Size φ1～φ12

# CXS

Super MG | UT COAT | 37°~40° | Flatland | Shank Dia 0/-0.005 | Variable Pitch | Variable Lead

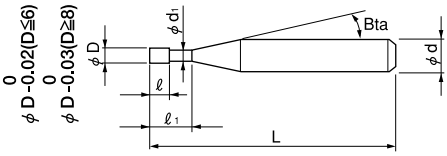
Material Applications (☆ Highly Recommended ◎ Recommended ○ Suggested)

| Work Material | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carbon Steels S45C S55C | Alloy Steels SK / SCM SUS | Prehardened Steels NAK HPM | Hardened Steels ~55HRC | Hardened Steels ~60HRC | Hardened Steels ~70HRC | Cast Iron | Aluminum Alloys | Graphite | Copper | Plastics | Glass Filled Plastics | Titanium Alloys | Heat Resistant Alloys | Cemented Carbide | Hard Brittle (Non-Metallic) Materials |
| ◎ | ◎ | ◎ | ○ | | | ○ | | | ◎ | | | ○ | ○ | | |

Square
Long Neck Square
Radius
Long Neck Radius
Ball / Long Shank Ball
Long Neck Ball
Taper Neck Ball
Taper
Spiral V Cutter
Drill Thread Mill
EURO Series
Technical Data

**Features**

**Eccentric division and pitch minimizes vibration and chattering.**
**A tougher carbide grade material and finely tuned features like the special flute shape, offer a highly durable end mill.**
**Although focusing on high durability, a good surface finishing is also achieved when used as a finishing tool.**
**UTCOAT's low coeffecient of friction offers excellent chip evacuation and longer life.**




The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.

Total 11 models

Unit (mm)

| Model Number | Outside Diameter φD | Effective Length ℓ1 | Length of Cut ℓ | Neck Diameter φd1 | Shank Taper Angle Bta | Overall Length L | Shank Diameter φd | Price (¥) | Effective Length by Inclined Angles 30' | 1° | 1° 30' | 2° | 3° |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CXS 4010-030** | 1 | 3 | 1.5 | 0.96 | 16° | 50 | 4 | 6,520 | 3.25 | 3.35 | 3.47 | 3.59 | 3.86 |
| **CXS 4015-045** | 1.5 | 4.5 | 2.25 | 1.46 | | 50 | 4 | 6,520 | 4.66 | 4.81 | 4.97 | 5.15 | 5.53 |
| **CXS 4020-060** | 2 | 6 | 3 | 1.94 | | 50 | 4 | 6,100 | 6.24 | 6.44 | 6.66 | 6.89 | 7.41 |
| **CXS 4025-075** | 2.5 | 7.5 | 3.75 | 2.44 | | 50 | 4 | 6,100 | 7.79 | 8.04 | 8.31 | 8.60 | 9.25 |
| **CXS 4030-090** | 3 | 9 | 4.5 | 2.95 | | 50 | 6 | 7,000 | 9.34 | 9.64 | 9.97 | 10.31 | 11.09 |
| **CXS 4040-120** | 4 | 12 | 6 | 3.86 | | 50 | 6 | 7,350 | 12.61 | 13.02 | 13.46 | 13.92 | 14.97 |
| **CXS 4050-150** | 5 | 15 | 7.5 | 4.86 | | 50 | 6 | 7,900 | 15.70 | 16.21 | 16.76 | No Interference | No Interference |
| **CXS 4060-180** | 6 | 18 | 9 | 5.86 | — | 50 | 6 | 8,500 | No Interference | No Interference | No Interference | No Interference | No Interference |
| **CXS 4080-240** | 8 | 24 | 12 | 7.82 | | 60 | 8 | 10,500 | No Interference | No Interference | No Interference | No Interference | No Interference |
| **CXS 4100-300** | 10 | 30 | 15 | 9.82 | | 70 | 10 | 12,500 | No Interference | No Interference | No Interference | No Interference | No Interference |
| **CXS 4120-360** | 12 | 36 | 18 | 11.82 | | 90 | 12 | 17,800 | No Interference | No Interference | No Interference | No Interference | No Interference |

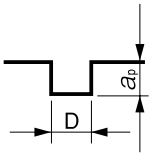
# Milling Condition for CXS

◆ Side milling

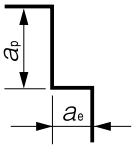
| WORK MATERIAL | | CARBON STEELS S45C / S50C (~225HB) | | ALLOY STEELS SK / SCM (225~325HB) | | STAINLESS STEELS Use water soluble coolant | | PREHARDENED STEELS HPM / NAK (30~45HRC) | | HARDENED STEELS SKD / SKT / STAVAX (45~55HRC) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Number | Outside Diameter (mm) | Spindle Speed ($min^{-1}$) | Feed Rate (mm/min) | Spindle Speed ($min^{-1}$) | Feed Rate (mm/min) | Spindle Speed ($min^{-1}$) | Feed Rate (mm/min) | Spindle Speed ($min^{-1}$) | Feed Rate (mm/min) | Spindle Speed ($min^{-1}$) | Feed Rate (mm/min) |
| **4010-030** | **1** | 18,000 | 780 | 18,000 | 600 | 14,500 | 400 | 12,900 | 400 | 12,900 | 180 |
| **4015-045** | **1.5** | 13,500 | 970 | 13,500 | 750 | 13,300 | 420 | 10,500 | 500 | 9,500 | 280 |
| **4020-060** | **2** | 11,000 | 1,170 | 11,000 | 900 | 12,200 | 450 | 9,350 | 560 | 8,200 | 390 |
| **4025-075** | **2.5** | 9,500 | 1,180 | 9,500 | 900 | 11,000 | 550 | 8,300 | 610 | 7,800 | 510 |
| **4030-090** | **3** | 8,500 | 1,200 | 8,500 | 900 | 10,000 | 640 | 7,400 | 630 | 7,400 | 630 |
| **4040-120** | **4** | 7,200 | 1,350 | 6,700 | 1,000 | 7,500 | 730 | 5,900 | 650 | 5,900 | 650 |
| **4050-150** | **5** | 6,000 | 1,500 | 5,400 | 1,100 | 5,400 | 810 | 4,800 | 680 | 4,800 | 670 |
| **4060-180** | **6** | 5,000 | 1,600 | 4,500 | 1,200 | 4,500 | 810 | 4,000 | 680 | 4,000 | 680 |
| **4080-240** | **8** | 3,000 | 1,300 | 2,900 | 1,050 | 2,900 | 720 | 2,500 | 600 | 2,500 | 630 |
| **4100-300** | **10** | 1,600 | 1,000 | 1,500 | 900 | 1,500 | 580 | 1,500 | 430 | 1,500 | 570 |
| **4120-360** | **12** | 1,200 | 800 | 1,200 | 750 | 1,200 | 540 | 1,000 | 320 | 1,200 | 530 |
| Milling Amount (mm) | | $a_p$: 1.0D $a_e$: 0.3D | | $a_p$: 1.0D $a_e$: 0.3D | | $a_p$: 1.0D $a_e$: 0.3D | | $a_p$: 1.0D $a_e$: 0.3D | | $a_p$: 1.0D $a_e$: 0.15D | |

◆ Slotting

| WORK MATERIAL | | CARBON STEELS S45C / S50C (~225HB) | | ALLOY STEELS SK / SCM (225~325HB) | | STAINLESS STEELS Use water soluble coolant | | PREHARDENED STEELS HPM / NAK (30~45HRC) | | HARDENED STEELS SKD / SKT / STAVAX (45~55HRC) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Number | Outside Diameter (mm) | Spindle Speed ($min^{-1}$) | Feed Rate (mm/min) | Spindle Speed ($min^{-1}$) | Feed Rate (mm/min) | Spindle Speed ($min^{-1}$) | Feed Rate (mm/min) | Spindle Speed ($min^{-1}$) | Feed Rate (mm/min) | Spindle Speed ($min^{-1}$) | Feed Rate (mm/min) |
| **4010-030** | **1** | 18,000 | 300 | 18,000 | 300 | 14,500 | 280 | 12,900 | 170 | 12,900 | 60※ |
| **4015-045** | **1.5** | 13,500 | 450 | 13,500 | 400 | 13,300 | 300 | 10,500 | 230 | 9,500 | 120※ |
| **4020-060** | **2** | 11,000 | 600 | 11,000 | 400 | 12,200 | 320 | 9,350 | 280 | 8,200 | 180※ |
| **4025-075** | **2.5** | 9,500 | 600 | 9,500 | 400 | 11,000 | 340 | 8,300 | 300 | 7,800 | 270※ |
| **4030-090** | **3** | 8,500 | 600 | 8,500 | 400 | 10,000 | 360 | 7,400 | 320 | 7,400 | 360 |
| **4040-120** | **4** | 7,200 | 650 | 6,700 | 450 | 7,500 | 400 | 5,900 | 390 | 5,900 | 380 |
| **4050-150** | **5** | 6,000 | 700 | 5,400 | 500 | 5,400 | 460 | 4,800 | 440 | 4,800 | 410 |
| **4060-180** | **6** | 5,000 | 700 | 4,500 | 500 | 4,500 | 460 | 4,000 | 440 | 4,000 | 440 |
| **4080-240** | **8** | 3,000 | 500 | 2,900 | 360 | 2,900 | 360 | 2,500 | 390 | 2,500 | 340 |
| **4100-300** | **10** | 1,600 | 380 | 1,500 | 270 | 1,500 | 220 | 1,500 | 220 | 1,500 | 240 |
| **4120-360** | **12** | 1,200 | 300 | 1,200 | 210 | 1,200 | 180 | 1,000 | 180 | 1,200 | 220 |
| Milling Amount (mm) | | $a_p$: 1.0D | | $a_p$: 1.0D | | $a_p$: 0.5D | | $a_p$: 1.0D | | $a_p$: 0.5D ※ $a_p$: 0.25D | |




Slotting
$a_p$ : Axial Depth (mm)
D : Outside Diamater (mm)

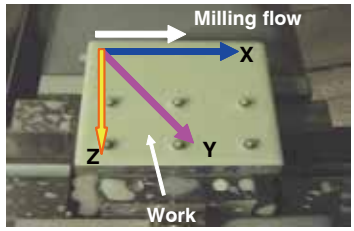



Side Milling
$a_p$ : Axial Depth (mm)
$a_e$ : Radial Depth (mm)

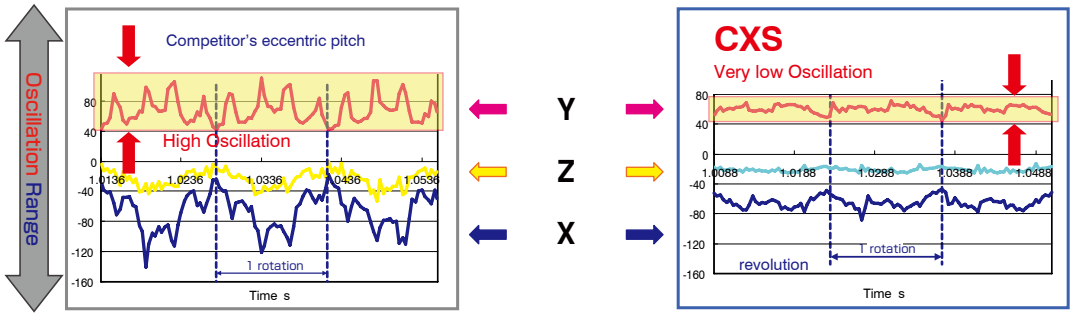
**CXS Series SUS304 Milling Video**

Note:
・Decrease both spindle speed and feed rate proportionally in case of chattering.
・These milling parameters are calculated based on the shortest overhang length. Longer overhangs may require an adjustment to the milling parameters.
・Reduce the milling amount and feed rate in accordance with required milling precision.
・Every coolant offers stable milling.
・Recommend water soluble or oil coolant for Stainless Steels and Copper.

## Milling Example: SKD61 (50HRC) Cutting Load Comparison with CXS φ8




| | |
|---|---|
| Spindle Speed | 4,200 min$^{-1}$ |
| Feed Rate | **770 mm/min** |
| Axial Depth *a*p | 8mm |
| Radial Depth *a*e | **0.3mm** |
| Coolant | Water Soluble |




High oscillation is a major influence for damage to the tool and milling surface.

CXS resists vibration due to very low oscillation!

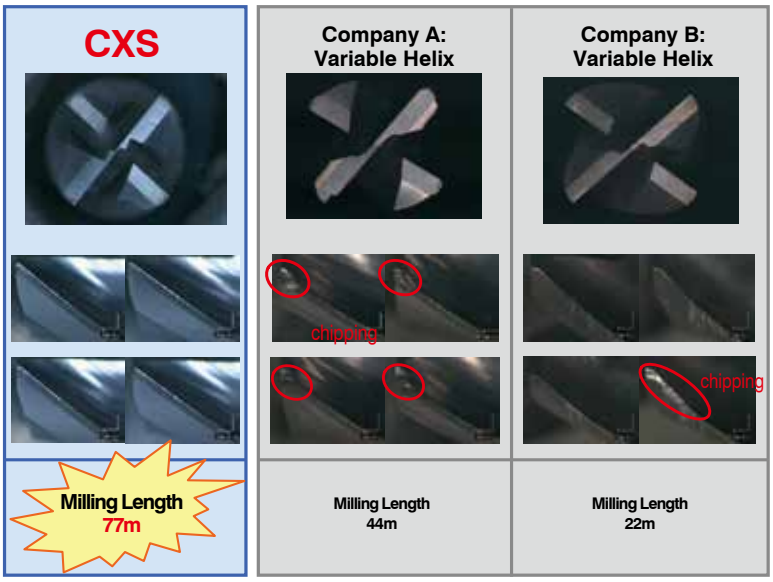
## Milling Example: SUS304 Heavy Cutting with CXS φ8


| | |
|---|---|
| Spindle Speed | 5,000 min$^{-1}$ |
| Feed Rate | **600 mm/min** |
| Axial Depth *a*p | 8mm |
| Radial Depth *a*e | **3mm** |
| Coolant | Water Soluble |
| Milling Length | 5.4m |

Using company B's milling condition

**Designed for a heavy roughing cut, even up to 50HRC**

## Milling Example: SKD61 (50HRC) Heavy Cutting with CXS $\phi$8

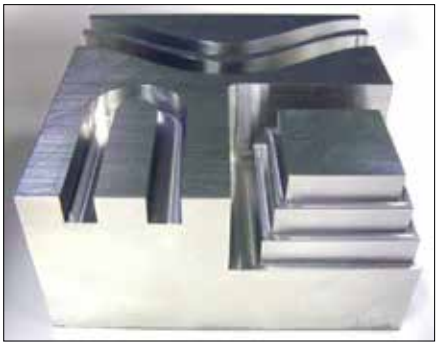



| | |
|---|---|
| Spindle Speed | 4,200 min$^{-1}$ |
| Feed Rate | **770 mm/min** |
| Axial Depth $a_p$ | 8mm |
| Radial Depth $a_e$ | **1mm** |
| Coolant | Water Soluble |

Using company B's milling condition.

**Designed for heavy cut without chipping.**

## Milling Example: SUS304 with CXS $\phi$8



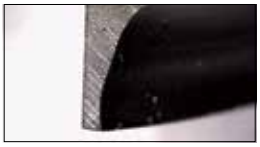
Size：100×100×50(mm)

| | |
|---|---|
| Milling Method | Side milling, Slotting (One way) |
| Spindle Speed | 2900min$^{-1}$ |
| Feed Rate | 360mm/min Slotting<br>720mm/min Side milling |
| Axial Depth $a_p$ | **8mm (1D)** |
| Radial Depth $a_e$ | 2.4mm |
| Coolant | Water Soluble |
| Cycle Time | **5 minutes** |

**Despite a high efficiency milling strategy, CXS cuts even SUS304!**

### ◆Tool after Milling

**Flatland**



**Tip point**

**8mm from tip point (ap：8mm)**

**Even when combining heavy cut and finishing, excellent tool life is obtained.**