



# UDC-H

Bigger sizes have been added to the UDCBH & UDCLBH to achieve higher efficient milling in cemented carbide!



Size R0.1 - R3

## UDCBH



Additional 4 models

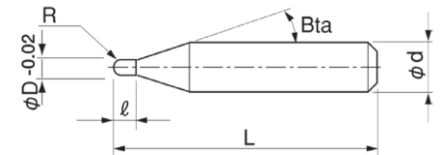
Material Applications (★ Highly Recommended ● Recommended ○ Suggested)

Work Material																		
Carbon Steels	Alloy Steels	Prehardened Steels	Hardened Steels					Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic) Materials	
			~50HRC	~55HRC	~60HRC	~65HRC	~70HRC											
S45C S55C	SK / SCM SUS	NAK HPM														○	★	● *

\* Hard Brittle (Non-Metallic) Materials: Ceramics (Alumina, Zirconia, etc.), Glasses and etc.

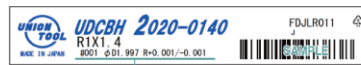
### Features

- High efficiency and long life Ball End Mills for milling cemented carbide.
- High-level treatment to reduce cutting resistance and mill at a high feed rate.
- Wear resistance improved drastically with optimized Diamond coating.
- Best for roughing and semi-finishing.



The shank taper angle shown is not an exact value.

Label Sample



#001 ØD1.997 R+0.001/-0.001

Diameter and Ball Radius accuracy measurements are printed on the label to support High Precision milling.

Total 14 models

Unit (mm)

Model Number	Radius of Ball Nose R	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter Ød
UDCBH 2002-0014	R0.1	0.14	16°	50	4
UDCBH 2003-0021	R0.15	0.21	16°	50	4
UDCBH 2004-0028	R0.2	0.28	16°	50	4
UDCBH 2005-0035	R0.25	0.35	16°	50	4
UDCBH 2006-0042	R0.3	0.42	16°	50	4
UDCBH 2007-0049	R0.35	0.49	16°	50	4
UDCBH 2008-0056	R0.4	0.56	16°	50	4
UDCBH 2010-0070	R0.5	0.7	16°	50	4
UDCBH 2015-0105	R0.75	1.05	16°	50	4
UDCBH 2020-0140	R1	1.4	16°	50	4
※ UDCBH 2030-0210	R1.5	2.1	16°	60	6
※ UDCBH 2040-0280	R2	2.8	16°	60	6
※ UDCBH 2050-0350	R2.5	3.5	16°	60	6
※ UDCBH 2060-0420	R3	4.2	16°	60	6

※ Additional model

# UDCBH Milling Conditions

WORK MATERIAL			CEMENTED CARBIDE (≥87HRA)					CEMENTED CARBIDE (<87HRA)					HARD BRITTLE MATERIALS				
Model Number	Radius of Ball Nose (mm)	Length of Cut (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)
2002-0014	R0.1	0.14	30 000	200	20	0.008	0.008	30 000	200	20	0.008	0.008	30 000	100	10	0.01	0.01
2003-0021	R0.15	0.21	30 000	250	25	0.012	0.024	30 000	250	25	0.024	0.012	30 000	125	13	0.015	0.03
2004-0028	R0.2	0.28	30 000	450	45	0.02	0.08	30 000	600	60	0.08	0.02	30 000	150	15	0.02	0.08
2005-0035	R0.25	0.35	30 000	525	53	0.025	0.11	30 000	700	70	0.11	0.025	30 000	175	18	0.025	0.11
2006-0042	R0.3	0.42	30 000	600	200	0.03	0.14	30 000	900	300	0.17	0.03	30 000	200	20	0.03	0.14
2007-0049	R0.35	0.49	30 000	690	230	0.035	0.17	30 000	1 050	350	0.18	0.035	30 000	225	23	0.035	0.17
2008-0056	R0.4	0.56	30 000	750	250	0.04	0.19	30 000	1 250	420	0.19	0.04	30 000	250	25	0.04	0.19
2010-0070	R0.5	0.7	30 000	900	300	0.05	0.22	25 000	1 300	430	0.2	0.05	30 000	300	30	0.05	0.25
2015-0105	R0.75	1.05	30 000	1 200	400	0.075	0.27	19 000	1 450	480	0.23	0.07	24 000	400	45	0.075	0.27
2020-0140	R1	1.4	30 000	1 500	500	0.1	0.3	16 500	1 600	530	0.25	0.1	18 000	600	200	0.1	0.3
2030-0210	R1.5	2.1	24 000	1 200	400	0.1	0.3	9 000	280	140	0.38	0.15	20 000	200	100	0.15	0.3
2040-0280	R2	2.8	18 000	900	300	0.125	0.325	7 200	280	140	0.5	0.2	18 000	180	90	0.175	0.32
2050-0350	R2.5	3.5	12 000	600	200	0.175	0.37	6 000	330	170	0.6	0.25	16 000	160	80	0.225	0.31
2060-0420	R3	4.2	9 000	500	166	0.2	0.4	5 500	280	140	0.65	0.28	15 000	150	75	0.3	0.3

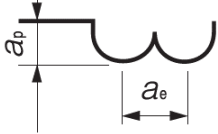
Cutting conditions equivalent to UDCLBF conditions

These milling parameters are based on VF-20, VM-40, VC-70, VU-70 (TAS standard) for Cemented Carbide, and Alumina for Hard Brittle Materials. These are for reference only.

Tool life may differ depending on the type of Cemented Carbide / Hard Brittle Materials.

For best result, fine parameter adjustments may be required, depending on the materials of Cemented Carbide / Hard Brittle Materials; milling shape and strategy; machine rigidity and spindle capability.

※ Feed Rate2: Feed rate of approach and \*connection moves.  
\*Changing from one engagement point to the next.



## Note:

- This application requires a high cutting force. A machine with poor rigidity and high vibration is not recommended.
- Allow sufficient machine and spindle warm-up time for stability and to remove any expansion of the main spindle before running the program.
- Tool setting length should achieve the least possible overhang.
- Avoid contact with the coated area of the shank. This will prevent tip vibration and tool jamming in the collet / holder.
- Run-out and vibration should be checked dynamically at the tool point while mounted in the machine and both should achieve the lowest level possible.
- Use an inclined or helical approach (Recommended inclination angle: <5 degree).
- Decrease both spindle speed and feed rate proportionally.
- Air blow is highly recommended for longer tool life. Both oil mist and oil coolant are alternatives.
- Recommend water soluble coolant for Hard Brittle (Non-Metallic) Materials.
- When milling some work pieces, heavier chips may be created. To evacuate these chips it is important to accurately position the coolant nozzle on the milling part.
- Remove chips to prevent heat generation and ignition during milling process.
- Protective gear, such as safety glasses and face guards are required when milling.
- Chips / dust generated while milling can have adverse affects on the machine parts if they are not properly evacuated. Take steps to assure proper evacuation.
- The tool life may shorten due to a large difference between the commanded feed speed and the actual machining speed caused by factors as machining model and machining machine.
- Decrease both feed rate and feed rate 2 proportionally.
- Tool damage may progress rapidly near the end of the tool life.

Size R0.2 - R3



# UDCLBH



Additional 7 models

Material Applications (★ Highly Recommended ● Recommended ○ Suggested)

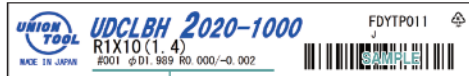
Work Material																		
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S45C S55C	SK / SCM SUS	NAK HPM														○	★	●

\* Hard Brittle (Non-Metallic) Materials: Ceramics (Alumina, Zirconia, etc.), Glasses and etc.

## Features

- Long life Long Neck Ball End Mills for milling Cemented Carbide.
- High-level treatment to reduce cutting resistance and minimize damage on cutting edge.
- Wear resistance improved drastically with optimized diamond coating.
- Best for roughing and semi-finishing.

Label Sample

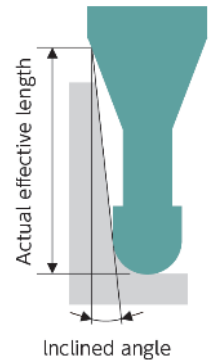


#001  $\phi D1.989 R0.000/-0.002$

Diameter and Ball Radius accuracy measurements are printed on the label to support High Precision milling.



The shank taper angle shown is not an exact value.



Total 31 models

Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length $l_1$	Length of Cut $l$	Neck Diameter $\phi d_1$	Shank Taper Angle Bta	Overall Length L	Shank Diameter $\phi d$	Effective Length by Inclined Angles				
								30'	1°	1°30'	2°	3°
UDCLBH 2004-0050	R0.2	0.5	0.28	0.375	16°	50	4	0.51	0.52	0.54	0.55	0.58
UDCLBH 2004-0100		1						1.03	1.06	1.09	1.12	1.19
UDCLBH 2006-0100	R0.3	1	0.42	0.575	16°	50	4	1.03	1.05	1.08	1.10	1.17
UDCLBH 2006-0150		1.5						1.54	1.58	1.63	1.67	1.78
UDCLBH 2006-0200		2						2.06	2.12	2.18	2.24	2.39
UDCLBH 2006-0300		3						3.09	3.18	3.28	3.38	3.61
UDCLBH 2007-0100	R0.35	1	0.49	0.675	16°	50	4	1.02	1.05	1.07	1.10	1.16
UDCLBH 2008-0200	R0.4	2	0.56	0.775	16°	50	4	2.05	2.11	2.17	2.23	2.37
UDCLBH 2008-0300		3						3.09	3.17	3.27	3.37	3.59
UDCLBH 2008-0400		4						4.12	4.24	4.37	4.51	4.82
UDCLBH 2010-0150	R0.5	1.5	0.7	0.975	16°	50	4	1.54	1.57	1.61	1.65	1.73
UDCLBH 2010-0200		2						2.05	2.10	2.16	2.22	2.35
UDCLBH 2010-0250		2.5						2.57	2.63	2.71	2.78	2.96
UDCLBH 2010-0300		3						3.08	3.17	3.26	3.35	3.57
UDCLBH 2010-0400		4						4.11	4.23	4.36	4.49	4.79
UDCLBH 2010-0500		5						5.15	5.30	5.46	5.63	6.02

Model Number	Radius of Ball Nose R	Effective Length ℓ1	Length of Cut ℓ	Neck Diameter Ød <sub>1</sub>	Shank Taper Angle Bta	Overall Length L	Shank Diameter Ød	Effective Length by Inclined Angles				
								30°	1°	1°30'	2°	3°
UDCLBH 2015-0200	R0.75	2	1.05	1.455	16°	50	4	2.08	2.12	2.17	2.22	2.33
UDCLBH 2015-0400		4						4.14	4.25	4.37	4.50	4.78
UDCLBH 2015-0600		6						6.21	6.38	6.57	6.78	7.23
UDCLBH 2020-0300	R1	3	1.4	1.915	16°	50	4	3.18	3.25	3.32	3.41	3.59
UDCLBH 2020-0400		4						4.21	4.31	4.42	4.54	4.81
UDCLBH 2020-0600		6						6.27	6.44	6.62	6.82	7.26
UDCLBH 2020-0800		8						8.33	8.57	8.83	9.10	9.71
UDCLBH 2020-1000		10						10.39	10.70	11.03	11.38	12.15
※ UDCLBH 2030-0600	R1.5	6	2.1	2.9	16°	60	6	6.28	6.44	6.60	6.78	7.18
※ UDCLBH 2030-0800		8						8.34	8.57	8.80	9.06	9.63
※ UDCLBH 2040-0800	R2	8	2.8	3.9	16°	60	6	8.33	8.53	8.76	8.99	9.52
※ UDCLBH 2040-1000		10						10.39	10.66	10.96	11.27	11.97
※ UDCLBH 2050-1000	R2.5	10	3.5	4.8	16°	60	6	10.55	10.82	11.10	11.40	12.07
※ UDCLBH 2060-1000	R3	10	4.2	5.7	16°	60	6	No Interference	No Interference	No Interference	No Interference	No Interference
※ UDCLBH 2060-1500		15						No Interference	No Interference	No Interference	No Interference	No Interference

※ Additional model

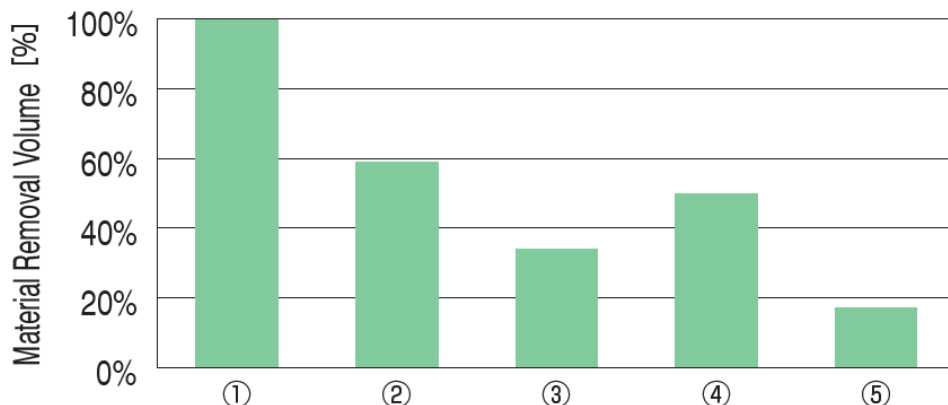
### [UDC Milling Tips]

Tool life (= material removal volume) changes depending on the difference in Cemented Carbide material. Recommend to select a material with good workability while considering the required performance (mold life).

Cemented Carbide	TAS Standard	Density g/cm <sup>3</sup>	Hardness HRA	Flexural Strength MPa	Compressive Strength MPa	Co Amount* %	Grain Size μm
①	VF-20	14.1	92.5~93	4,500~5,000	—	12	0.5
②	VM-40	14.7	90	3,240	4,700	8.8	2~3
③	VM-40	14.3	89	3,400	—	13.6	—
④	VM-50	14.2	87.5	3,160	4,070	15.1	—
⑤	—	13.1	83	2,660	2,800	28.9	—

\*In-house measurement

### UDCB R0.5 Comparison of material removal volume (① equals 100%)



※ The ratio varies depending on the series, tool design, and sizes.

# UDCLBH Milling Conditions

WORK MATERIAL			CEMENTED CARBIDE (≥87HRA)					CEMENTED CARBIDE (<87HRA)					HARD BRITTLE MATERIALS				
Model Number	Radius of Ball Nose (mm)	Effective Length (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)	Spindle Speed (min <sup>-1</sup> )	Feed Rate (mm/min)	※Feed Rate 2 (mm/min)	a <sub>p</sub> Axial Depth (mm)	a <sub>e</sub> Radial Depth (mm)
2004-0050	R0.2	0.5	30 000	450	45	0.02	0.08	30 000	600	60	0.08	0.02	30 000	150	15	0.02	0.08
2004-0100		1	30 000	300	30	0.015	0.07	30 000	300	30	0.07	0.015	30 000	100	10	0.015	0.07
2006-0100	R0.3	1	30 000	600	200	0.03	0.14	30 000	450	150	0.17	0.03	30 000	200	20	0.03	0.14
2006-0150		1.5	30 000	600	200	0.03	0.14	30 000	300	100	0.14	0.025	30 000	200	20	0.03	0.14
2006-0200		2	30 000	300	100	0.022	0.11	30 000	220	70	0.11	0.02	30 000	150	15	0.02	0.11
2006-0300		3	30 000	75	10	0.01	0.08	30 000	75	10	0.08	0.01	30 000	75	10	0.01	0.08
2007-0100	R0.35	1	30 000	690	230	0.035	0.17	30 000	525	260	0.18	0.035	30 000	225	23	0.035	0.17
2008-0200	R0.4	2	30 000	750	250	0.04	0.19	27 000	480	240	0.19	0.04	30 000	250	25	0.04	0.19
2008-0300		3	30 000	350	100	0.037	0.17	25 500	300	100	0.17	0.035	30 000	230	23	0.037	0.17
2008-0400		4	26 000	210	70	0.035	0.16	24 000	210	21	0.16	0.035	30 000	210	21	0.035	0.16
2010-0150	R0.5	1.5	30 000	900	300	0.05	0.22	25 000	650	325	0.2	0.05	30 000	300	30	0.05	0.25
2010-0200		2	30 000	900	300	0.05	0.22	24 000	580	290	0.2	0.05	30 000	300	30	0.05	0.25
2010-0250		2.5	30 000	800	300	0.05	0.22	23 500	520	260	0.2	0.05	30 000	300	30	0.05	0.25
2010-0300		3	30 000	600	200	0.05	0.22	23 000	450	220	0.2	0.05	30 000	300	30	0.05	0.25
2010-0400		4	30 000	400	100	0.05	0.22	21 000	320	160	0.2	0.05	30 000	300	30	0.05	0.25
2010-0500		5	27 000	270	100	0.045	0.2	20 000	250	125	0.2	0.05	27 000	270	30	0.045	0.2
2015-0200	R0.75	2	30 000	1 200	400	0.075	0.27	19 000	750	375	0.23	0.07	24 000	400	45	0.075	0.27
2015-0400		4	30 000	900	250	0.075	0.27	18 000	580	290	0.23	0.07	24 000	350	40	0.075	0.27
2015-0600		6	25 000	500	100	0.075	0.27	17 000	400	200	0.23	0.07	24 000	320	36	0.075	0.27
2020-0300	R1	3	30 000	1 500	500	0.1	0.3	16 500	800	400	0.25	0.1	18 000	600	200	0.1	0.3
2020-0400		4	30 000	1 500	500	0.1	0.3	15 750	750	375	0.25	0.1	18 000	500	160	0.1	0.3
2020-0600		6	20 000	850	280	0.1	0.3	15 000	620	310	0.25	0.1	18 000	400	130	0.1	0.3
2020-0800		8	13 000	400	130	0.1	0.3	14 000	520	260	0.25	0.1	18 000	350	120	0.1	0.3
2020-1000		10	10 000	200	60	0.1	0.3	13 000	420	210	0.25	0.1	18 000	300	100	0.1	0.3
2030-0600	R1.5	6	24 000	1 200	400	0.1	0.3	9 000	280	140	0.38	0.15	20 000	200	100	0.15	0.3
2030-0800		8	24 000	1 200	400	0.1	0.3	9 000	280	140	0.38	0.15	20 000	200	100	0.15	0.3
2040-0800	R2	8	18 000	900	300	0.125	0.325	7 200	280	140	0.5	0.2	18 000	180	90	0.175	0.32
2040-1000		10	18 000	900	300	0.125	0.325	7 200	280	140	0.5	0.2	18 000	180	90	0.175	0.32
2050-1000	R2.5	10	12 000	600	200	0.175	0.37	6 000	330	170	0.6	0.25	16 000	160	80	0.225	0.31
2060-1000	R3	10	9 000	500	166	0.2	0.4	5 500	280	140	0.65	0.28	15 000	150	75	0.3	0.3
2060-1500		15	9 000	500	166	0.2	0.4	5 500	280	140	0.65	0.28	15 000	150	75	0.3	0.3

Cutting conditions equivalent to UDCLBF conditions

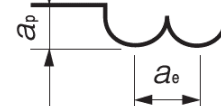
These milling parameters are based on VF-20, VM-40, VC-70, VU-70 (TAS standard) for Cemented Carbide, and Alumina for Hard Brittle Materials. These are for reference only.

Tool life may differ depending on the type of Cemented Carbide / Hard Brittle Materials. For best result, fine parameter adjustments may be required, depending on the materials of Cemented Carbide / Hard Brittle Materials; milling shape and strategy; machine rigidity and spindle capability.

### Note:

- This application requires a high cutting force. A machine with poor rigidity and high vibration is not recommended.
- Allow sufficient machine and spindle warm-up time for stability and to remove any expansion of the main spindle before running the program.
- Tool setting length should achieve the least possible overhang.
- Avoid contact with the coated area of the shank. This will prevent tip vibration and tool jamming in the collet / holder.
- Run-out and vibration should be checked dynamically at the tool point while mounted in the machine and both should achieve the lowest level possible.
- Use an inclined or helical approach (Recommended inclination angle: <5 degree).
- Decrease both spindle speed and feed rate proportionally.
- Air blow is highly recommended for longer tool life. Both oil mist and oil coolant are alternatives.
- Recommend water soluble coolant for Hard Brittle (Non-Metallic) Materials.
- When milling some work pieces, heavier chips may be created. To evacuate these chips it is important to accurately position the coolant nozzle on the milling part.
- Remove chips to prevent heat generation and ignition during milling process.
- Protective gear, such as safety glasses and face guards are required when milling.
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※ Feed Rate2: Feed rate of approach and \*connection moves.  
\*Changing from one engagement point to the next.



## UDCBH/UDCBF R1 × L1.4

Cemented Carbide Lens shaped milling Comparison of efficiency and material removal volume with UDCBH / UDCBF R1 x Length of Cut 1.4

VM-40 (90 HRA)



## UDCBH

Compared to the conventional tools, UDCBH is...

7.5  
times the  
efficiency

Over 4 times  
the removal  
volume

Tool	n (min <sup>-1</sup> )	Vf (mm/min)	a <sub>p</sub> (mm)	a <sub>e</sub> (mm)	1 side 16 pockets
UDCBH	30,000	1,500	0,1	0,3	1 Tool
UDCBF		200			4 Tools

Pocket size :  $\phi$  10 x d3,5 mm  
Material removal volume : 160 mm<sup>3</sup>/pocket  
Coolant : Air blow

Please refer to the following materials to make full use of the UDC series.

How to use  
the UDC series



UDC  
milling video



UDC  
milling examples



### Advisory for Safe Use of End Mills

Correct application and operation is strongly advised to avoid clogging, abrasion, etc, that could cause serious accidents or injuries. Ignition or sparks generated during milling could lead to fire or extreme damage to the work piece. End Mills are made with very sharp cutting edges and must be handled with extra care.

- Never touch the cutting edge with your bare hands, as this could cause serious injury. Special caution is required when opening the package.
- Dropping the tool could cause breakage or flying debris, leading to serious injury.
- During milling, unexpected impact or shock on the tool could cause breakage or flying debris. Ensure to use protective items such as safety glasses and a face guard.
- For best results, fine parameter adjustment may be required, depending on the materials; milling shape and strategy; machine rigidity and spindle capability.
- Use a machine that has high rigidity and generates a low level of vibration. Recommend setting the runout control value at 5  $\mu$ m or below for the small diameter tools  $\phi$  1 or below.
- Do not use flammable cutting oils.



<https://www.uniontool.co.jp>



0120-60-2620

Price & Specifications are subject to change without notice.

