Size R0.25～R1

HWLB

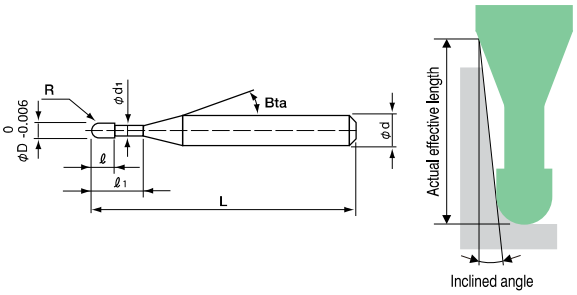
Super MG | HMW COAT | 30° | R ±0.003 | Shank Dia 0/-0.004 | Back Taper Geometry

NEW

Back taper geometry does not apply to R0.45 or below, and ℓ1 / D ≦ 10.

Material Applications（★ Highly Recommended ● Recommended ○ Suggested）

Work Material																
Carbon Steels S45C S55C	Alloy Steels SK / SCM SUS	Prehardened Steels NAK HPM	Hardened Steels ～50HRC	Hardened Steels ～55HRC	Hardened Steels ～60HRC	Hardened Steels ～65HRC	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
○	○	●	★	★	★	●	●	○			○			○	○		



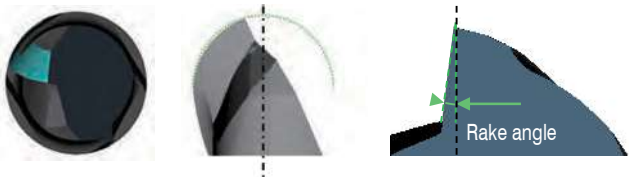
The shank taper angle shown is not an exact value and to avoid contact with the workpiece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.

◆ Variable rake angle design

Optimized rake angles are designed from the ball tip to the peripheral cutting edge.

Tip point

Negative rake angle design prevents fracture and chipping.



Peripheral cutting edge

Slightly negative rake angle design reduces cutting resistance and prevents chattering.

◆ High Accuracy

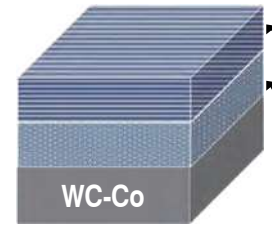
Even higher accuracy than our conventional tools!

Unit（mm）

Radius of Ball Nose	Diameter Tolerance	Ball Radius Accuracy	Shank Diameter Torerance
R0.25 ～ R1	0/-0.006	± 0.003	0/-0.004 (h4)

New coating HMWCOAT

New coating that is best suited for around 60HRC.

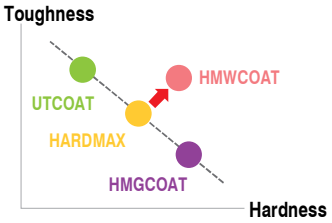


Ultra-high hardness layer

Nano-laminated structure prevents peeling and cracking on high hardness layer.

Shock absorption layer

Nanocomposite structure offers both hardness and toughness.



Higher hardness and toughness than conventional coating

Improved wear resistance compared to HARDMAX coating for milling around 60HRC.

How to find the best coating for your steel applications

Coating series	COPPER	CARBON STEELS	PREHARDENED STEELS	HARDENED STEELS ~ 50 HRC	~ 55 HRC	~ 60 HRC	~ 65 HRC	~ 70 HRC
HMG COAT **HMGCOAT** Best suited for milling high speed steel materials of 65HRC or above.			○	○	○	●	★	★
HMW COAT **HMWCOAT** Improved wear resistance compared to HARDMAX coating for around 60HRC.	○	○	●	●	●	★	●	●
HARD MAX **HARDMAX** Best suited for Prehardened Steels to Hardened Steels of 60HRC. Poplular multi-purpose coating.	○	○	●	●	●	●	○	
UT COAT **UTCOAT** High lubricity and toughness. Suited for a wide range of materials including raw materials and SUS.	●	●	●	●	○			

How to find the best long neck ball series for your steel applications

Series	Features	Ball tip design	COPPER	CARBON STEELS	PREHARDENED STEELS	HARDENED STEELS ~ 50 HRC	~ 55 HRC	~ 60 HRC	~ 65 HRC	~ 70 HRC
HGLB	Best suited for Hard Materials	Super Negative			○	●	●	●	★	★
HWLB	For Hard Materials	Negative	○	○	●	★	★	★	●	●
HSLB HSLB-S	For Hard Materials Multi-purpose	Negative	○	○	●	●	●	●	○	
HLB	Multi-purpose	Positive	●	○	●	●	●	○		
CSELB	Multi-purpose Excellent surface quality	Standard	●	●	●	●	●			

2 Flutes　HMWCOAT

Total 43 models　　Unit（mm）

Model Number	Radius of Ball Nose R	Effective Length ℓ1	Length of Cut ℓ	Neck Diameter φd1	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd	Suggested Retail Price ¥	Effective Length by Inclined Angles				
									30′	1°	1°30′	2°	3°
HWLB 2005-010	R0.25	1	0.4	0.49	16°	45	4	4,380	1.15	1.19	1.22	1.26	1.34
HWLB 2005-015		1.5				45	4	4,380	1.65	1.71	1.76	1.82	1.94
HWLB 2005-020		2				45	4	4,380	2.18	2.24	2.31	2.39	2.55
HWLB 2005-030		3				45	4	4,380	3.21	3.31	3.41	3.53	3.77
HWLB 2005-040		4				45	4	4,380	4.24	4.37	4.51	4.66	5.00
HWLB 2006-010	R0.3	1	0.48	0.59	16°	45	4	3,740	1.14	1.18	1.22	1.25	1.33
HWLB 2006-015		1.5				45	4	3,380	1.65	1.71	1.76	1.81	1.93
HWLB 2006-020		2				45	4	3,380	2.17	2.24	2.31	2.38	2.54
HWLB 2006-025		2.5				45	4	3,460	2.69	2.77	2.86	2.95	3.15
HWLB 2006-030		3				45	4	3,460	3.21	3.31	3.41	3.52	3.76
HWLB 2006-040		4				45	4	3,560	4.24	4.37	4.51	4.66	4.99
HWLB 2006-050		5				45	4	3,560	5.27	5.44	5.61	5.80	6.21
HWLB 2006-060		6				45	4	3,560	6.30	6.50	6.71	6.93	7.43
HWLB 2006-080		8				45	4	4,740	8.37	8.63	8.91	9.21	9.88
HWLB 2006-100		10				50	4	4,830	10.43	10.76	11.11	11.49	12.33
HWLB 2008-020	R0.4	2	0.64	0.79	16°	45	4	3,380	2.17	2.23	2.30	2.37	2.52
HWLB 2008-030		3				45	4	3,560	3.21	3.30	3.40	3.50	3.74
HWLB 2008-040		4				45	4	3,560	4.24	4.36	4.50	4.64	4.97
HWLB 2008-060		6				45	4	3,560	6.30	6.49	6.70	6.92	7.41
HWLB 2008-080		8				45	4	3,560	8.36	8.62	8.90	9.20	9.86
HWLB 2010-020	R0.5	2	0.8	0.98	16°	45	4	2,820	2.18	2.24	2.30	2.36	2.51
HWLB 2010-025		2.5				45	4	2,820	2.70	2.77	2.85	2.93	3.12
HWLB 2010-030		3				45	4	2,820	3.21	3.30	3.40	3.50	3.73
HWLB 2010-040		4				45	4	3,190	4.24	4.37	4.50	4.64	4.96
HWLB 2010-050		5				45	4	3,190	5.28	5.43	5.60	5.78	6.18
HWLB 2010-060		6				45	4	3,460	6.31	6.50	6.70	6.92	7.40
HWLB 2010-080		8				45	4	3,460	8.37	8.63	8.90	9.20	9.85
HWLB 2010-100		10				45	4	3,460	10.43	10.76	11.10	11.47	12.30
HWLB 2010-120		12				45	4	3,460	12.50	12.89	13.30	13.75	14.75
HWLB 2015-030	R0.75	3	1.2	1.47	16°	45	4	3,280	3.10	3.18	3.26	3.35	3.55
HWLB 2015-040		4				45	4	3,280	4.13	4.24	4.36	4.49	4.77
HWLB 2015-060		6				45	4	3,280	6.19	6.37	6.56	6.76	7.22
HWLB 2015-080		8				45	4	3,460	8.25	8.50	8.76	9.04	9.67
HWLB 2015-100		10				45	4	3,740	10.32	10.63	10.96	11.32	12.11
HWLB 2020-030	R1	3	1.6	1.98	16°	45	4	2,820	3.07	3.14	3.21	3.29	3.47
HWLB 2020-040		4				45	4	2,820	4.10	4.21	4.32	4.43	4.70
HWLB 2020-060		6				45	4	3,190	6.17	6.33	6.52	6.71	7.14
HWLB 2020-080		8				45	4	3,460	8.23	8.46	8.72	8.99	9.59
HWLB 2020-100		10				45	4	3,460	10.29	10.59	10.92	11.27	12.04
HWLB 2020-120		12				45	4	3,460	12.35	12.72	13.12	13.54	14.49
HWLB 2020-140		14				50	4	3,460	14.42	14.85	15.32	15.82	16.93
HWLB 2020-160		16				50	4	3,460	16.48	16.98	17.52	18.10	19.38
HWLB 2020-200		20				55	4	3,460	20.60	21.24	21.92	22.65	No Interference

Milling example
R0.5 × EL2

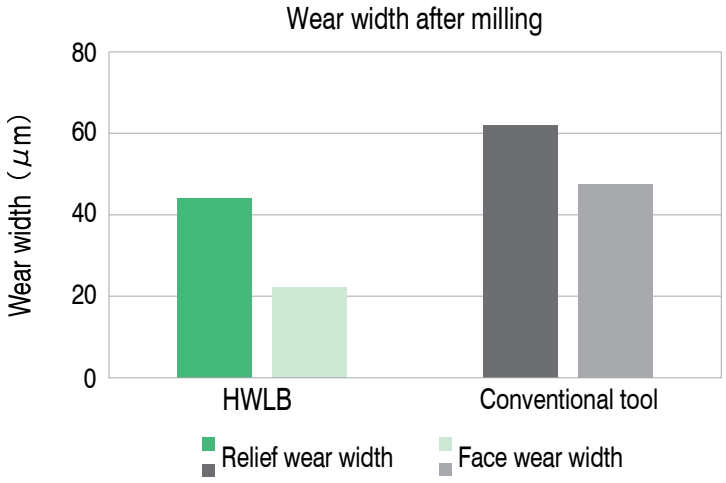
SKD11（60HRC）

HWLB

Conventional tool

Spindle Speed	24,000 min^{-1}
Feed Rate	2,000 mm/min
a_p	0.1 mm
a_e	0.3 mm
Coolant	Air Blow
Milling Shape	Square Pocket 118 × 16 × 0.9 mm
Cycle Time	32 min

HWLB shows little wear on the relief and face.

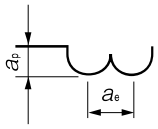


Milling Conditions for HWLB

WORK MATERIAL			PREHARDENED STEELS HARDENED STEELS NAK / STAVAX(～55HRC)				HARDENED STEELS SKD11 (55～62HRC)				HARDENED STEELS HAP10 (62～66HRC)				HARDENED STEELS HAP72 (66～70HRC)			
Model Number	Radius of Ball Nose (mm)	Effective Length (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2005	**R0.25**	1	44,000	650	0.015	0.04	33,000	530	0.01	0.02	30,000	300	0.007	0.01	22,500	150	0.007	0.01
		1.5	44,000	650	0.015	0.04	33,000	530	0.01	0.02	30,000	300	0.007	0.01	22,500	150	0.007	0.01
		2	44,000	650	0.015	0.04	33,000	530	0.01	0.02	30,000	300	0.007	0.01	22,500	150	0.007	0.01
		3	40,000	500	0.01	0.02	31,000	400	0.007	0.01	28,550	230	0.005	0.008	21,400	115	0.005	0.008
		4	32,700	180	0.005	0.015	27,150	150	0.003	0.008	25,650	100	0.002	0.005	19,900	50	0.002	0.005
2006	**R0.3**	1	40,000	1,400	0.045	0.15	30,000	1,500	0.03	0.13	26,500	1,000	0.015	0.09	20,000	500	0.015	0.09
		1.5	40,000	1,100	0.03	0.13	30,000	1,200	0.02	0.1	26,500	800	0.01	0.075	20,000	400	0.01	0.075
		2	40,000	1,100	0.03	0.13	30,000	1,200	0.02	0.1	26,500	800	0.01	0.075	20,000	400	0.01	0.075
		2.5	40,000	800	0.02	0.1	30,000	800	0.015	0.09	26,500	520	0.008	0.065	20,000	260	0.008	0.065
		3	40,000	800	0.02	0.1	30,000	800	0.015	0.09	26,500	520	0.008	0.065	20,000	260	0.008	0.065
		4	40,000	500	0.015	0.09	30,000	500	0.01	0.075	26,500	340	0.006	0.05	20,000	170	0.006	0.05
		5	32,000	400	0.01	0.075	25,000	390	0.007	0.05	23,000	260	0.005	0.04	18,000	130	0.005	0.04
		6	24,000	300	0.007	0.06	21,000	320	0.005	0.04	19,500	210	0.004	0.03	15,000	105	0.004	0.03
		8	16,000	200	0.005	0.05	16,000	240	0.003	0.02	16,000	160	0.003	0.02	12,000	80	0.003	0.02
		10	14,900	175	0.003	0.02	14,900	175	0.002	0.015	14,900	115	0.002	0.015	11,100	55	0.002	0.015
2008	**R0.4**	2	35,000	1,600	0.06	0.21	27,000	1,600	0.04	0.17	23,500	1,000	0.02	0.12	17,500	500	0.02	0.12
		3	35,000	1,400	0.05	0.19	27,000	1,400	0.03	0.15	23,500	900	0.015	0.1	17,500	450	0.015	0.1
		4	35,000	1,200	0.04	0.17	27,000	1,200	0.025	0.135	23,500	600	0.012	0.095	17,500	300	0.012	0.095
		6	28,000	600	0.02	0.12	23,000	600	0.012	0.095	20,500	400	0.006	0.065	15,500	200	0.006	0.065
		8	19,500	330	0.012	0.095	18,000	375	0.007	0.07	17,000	285	0.005	0.06	12,750	140	0.005	0.06
2010	**R0.5**	2	30,000	1,750	0.2	0.4	24,000	2,000	0.1	0.3	21,000	1,750	0.05	0.2	16,000	875	0.05	0.2
		2.5	30,000	1,750	0.2	0.4	24,000	2,000	0.1	0.3	21,000	1,750	0.05	0.2	16,000	875	0.05	0.2
		3	30,000	1,750	0.1	0.3	24,000	2,000	0.05	0.2	21,000	1,750	0.03	0.17	16,000	875	0.03	0.17
		4	30,000	1,750	0.1	0.3	24,000	2,000	0.05	0.2	21,000	1,750	0.03	0.17	16,000	875	0.03	0.17
		5	30,000	1,750	0.1	0.3	24,000	2,000	0.05	0.2	21,000	1,750	0.03	0.17	16,000	875	0.03	0.17
		6	30,000	1,150	0.06	0.23	21,500	1,250	0.03	0.17	19,700	1,050	0.025	0.15	14,500	525	0.025	0.15
		8	24,000	800	0.025	0.155	18,500	580	0.015	0.12	18,400	480	0.015	0.12	13,800	240	0.015	0.12
		10	22,000	600	0.018	0.13	14,800	430	0.01	0.09	14,700	360	0.01	0.09	11,100	180	0.01	0.09
		12	14,150	320	0.015	0.12	13,400	380	0.008	0.08	13,300	290	0.008	0.08	9,950	145	0.008	0.08
2015	**R0.75**	3	30,000	2,450	0.25	0.55	17,000	2,000	0.12	0.4	15,000	1,750	0.06	0.29	11,250	875	0.06	0.29
		4	30,000	2,450	0.25	0.55	17,000	2,000	0.12	0.4	15,000	1,750	0.06	0.29	11,250	875	0.06	0.29
		6	30,000	2,450	0.15	0.45	17,000	2,000	0.07	0.31	15,000	1,750	0.04	0.24	11,250	875	0.04	0.24
		8	23,500	1,300	0.1	0.37	15,000	1,250	0.045	0.25	14,000	1,050	0.03	0.21	10,500	525	0.03	0.21
		10	23,500	1,300	0.1	0.37	15,000	1,250	0.045	0.25	14,000	1,050	0.03	0.21	10,500	525	0.03	0.21

Milling Conditions for HWLB

WORK MATERIAL			PREHARDENED STEELS HARDENED STEELS NAK / STAVAX(～55HRC)				HARDENED STEELS SKD11 (55～62HRC)				HARDENED STEELS HAP10 (62～66HRC)				HARDENED STEELS HAP72 (66～70HRC)			
Model Number	Radius of Ball Nose (mm)	Effective Length (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2020	**R1**	3	28,000	2,900	0.3	0.7	14,000	2,100	0.15	0.5	12,250	1,800	0.08	0.35	9,200	900	0.08	0.35
		4	28,000	2,900	0.3	0.7	14,000	2,100	0.15	0.5	12,250	1,800	0.08	0.35	9,200	900	0.08	0.35
		6	28,000	2,900	0.2	0.6	14,000	2,100	0.1	0.4	12,250	1,800	0.06	0.3	9,200	900	0.06	0.3
		8	28,000	2,900	0.2	0.6	14,000	2,100	0.1	0.4	12,250	1,800	0.06	0.3	9,200	900	0.06	0.3
		10	28,000	2,900	0.2	0.6	14,000	2,100	0.1	0.4	12,250	1,800	0.06	0.3	9,200	900	0.06	0.3
		12	19,500	1,350	0.12	0.45	12,400	1,350	0.06	0.34	11,500	1,100	0.045	0.27	8,650	550	0.045	0.27
		14	19,500	1,350	0.12	0.45	12,400	1,350	0.06	0.34	11,500	1,100	0.045	0.27	8,650	550	0.045	0.27
		16	10,800	500	0.05	0.3	10,800	600	0.03	0.24	10,700	490	0.03	0.24	8,000	245	0.03	0.24
		20	8,650	375	0.035	0.25	8,650	450	0.02	0.19	8,560	370	0.02	0.19	6,400	185	0.02	0.19



Note:
・Decrease the feed rate more than 50% from the milling parameters when slot milling.
・Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed, or when chattering and red-hot occur.
・Every coolant offers stable milling.