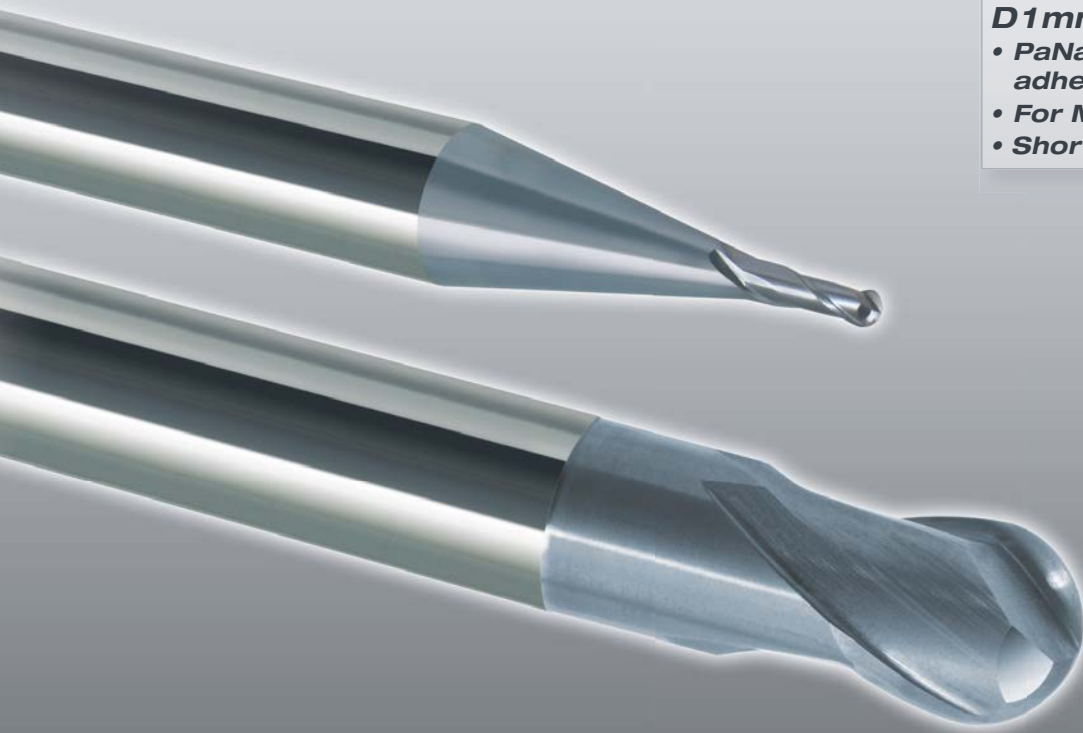


# **PaNacea *ECO* HECOB-2-PN**

## **Solid Carbide End Mill**

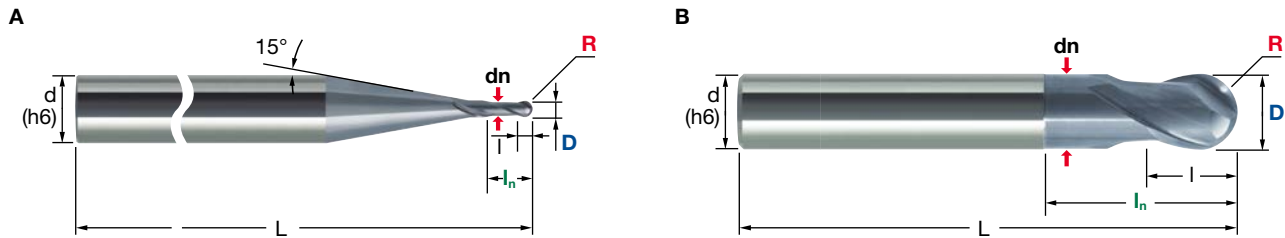


**D1mm ~ D12mm**

- **PaNacea Coating** for high adhesion & wear resistance
- For Materials  $\leq 50\text{HRC}$
- Short Length:  $l_n 2.5 \times D$

**PN**Coating

## HECOB-2-PN | PaNacea ECO



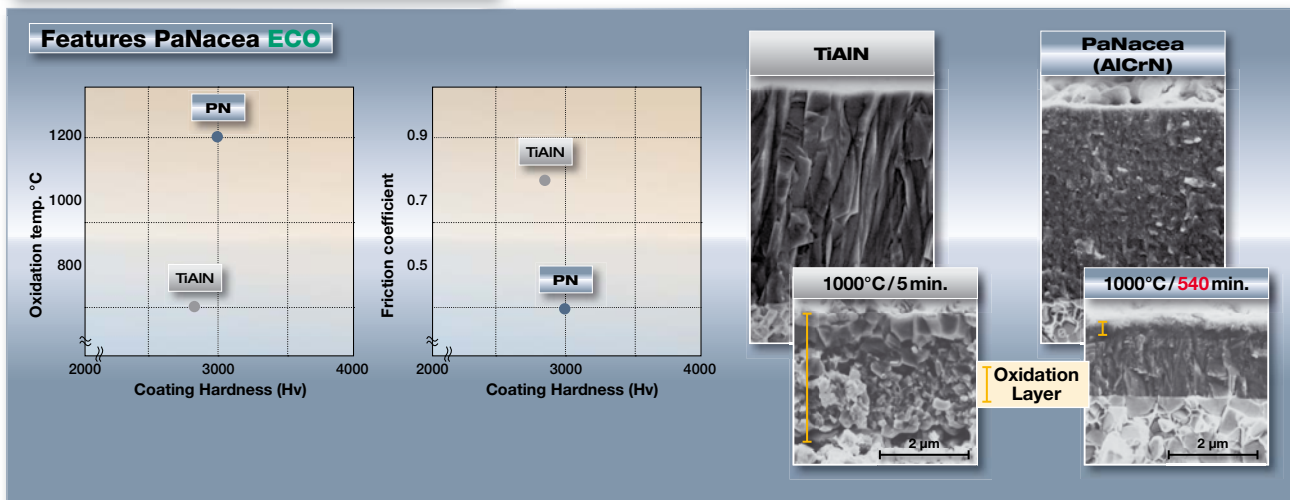
Carbide	PN	Rake Angle
Micro Grain	PaNacea Coating	Positive

Helix Angle	R Tol. [mm]	d Tol.
30°	+/-0.005	h6

ID Code	Item Code	Z	D	R	I	I <sub>n</sub>	dn	L	d	Type
EL057	HECOB-2010-PN	2	1	0.5	1	2.5	0.95	40	4	A
EL058	HECOB-2020-PN		2	1	2	5	1.95	45	6	
EL059	HECOB-2030-PN		3	1.5	3	7.5	2.9			
EL060	HECOB-2040-PN		4	2	4	10	3.9			
EL061	HECOB-2050-PN		5	2.5	5	12.5	4.9	50		
EL062	HECOB-2060-PN		6	3	6	15	5.9			
EL063	HECOB-2080-PN		8	4	8	20	7.9	60	8	B
EL064	HECOB-2100-PN		10	5	10	25	9.9	65	10	
EL065	HECOB-2120-PN		12	6	12	30	11.9	75	12	

### PaNacea ECO Coating

high adhesion and wear resistance





## HECOB-2-PN | Recommended Cutting Conditions

### HECOB-2-PN



		D1/R0.5		D2/R1		D3/R1.5		D4/R2		D5/R2.5	
		▽	▽▽▽	▽	▽▽▽	▽	▽▽▽	▽	▽▽▽	▽	▽▽▽
		Roughing	Finishing	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Copper, Aluminium	V <sub>c</sub> (m/min)	190	190	250	280	250	280	250	280	250	280
	n (min <sup>-1</sup> )	60000	60000	39800	44600	26500	29700	19900	22300	15900	17800
	f <sub>z</sub> (mm/tooth)	0.021	0.019	0.043	0.037	0.065	0.056	0.086	0.074	0.108	0.093
	V <sub>f</sub> (mm/min)	2520	2280	3420	3300	3450	3330	3420	3300	3430	3310
	a <sub>p</sub> (mm)	0.080	0.05	0.160	0.1	0.240	0.12	0.320	0.14	0.400	0.16
Carbon steel, Alloy steel, Cast iron (180~250HB)	a <sub>e</sub> (mm)	0.320	0.05	0.640	0.1	0.960	0.12	1.280	0.14	1.600	0.16
	V <sub>c</sub> (m/min)	190	190	200	220	200	220	200	220	200	220
	n (min <sup>-1</sup> )	60000	60000	31800	35000	21200	23300	15900	17500	12700	14000
	f <sub>z</sub> (mm/tooth)	0.020	0.019	0.040	0.037	0.062	0.056	0.083	0.074	0.105	0.093
	V <sub>f</sub> (mm/min)	2400	2280	2540	2590	2630	2610	2640	2590	2670	2600
Stainless steel (20~40HRC)	a <sub>p</sub> (mm)	0.080	0.05	0.160	0.1	0.240	0.12	0.320	0.14	0.400	0.16
	a <sub>e</sub> (mm)	0.320	0.05	0.640	0.1	0.960	0.12	1.280	0.14	1.600	0.16
	V <sub>c</sub> (m/min)	170	190	170	200	170	200	170	200	170	200
	n (min <sup>-1</sup> )	54100	60000	27100	31800	18000	21200	13500	15900	10800	12700
	f <sub>z</sub> (mm/tooth)	0.018	0.015	0.036	0.032	0.055	0.048	0.074	0.065	0.093	0.082
Alloy steel, Tool steel (25~35HRC)	V <sub>f</sub> (mm/min)	1950	1800	1950	2040	1980	2040	2000	2070	2010	2080
	a <sub>p</sub> (mm)	0.070	0.05	0.140	0.1	0.210	0.12	0.280	0.14	0.350	0.16
	a <sub>e</sub> (mm)	0.280	0.05	0.560	0.1	0.840	0.12	1.120	0.14	1.400	0.16
	V <sub>c</sub> (m/min)	180	190	180	200	180	200	180	200	180	200
	n (min <sup>-1</sup> )	57300	60000	28600	31800	19100	21200	14300	15900	11500	12700
Alloy steel, Tool steel (35~45HRC)	f <sub>z</sub> (mm/tooth)	0.018	0.015	0.036	0.032	0.055	0.048	0.074	0.065	0.093	0.082
	V <sub>f</sub> (mm/min)	2060	1800	2060	2040	2100	2040	2120	2070	2140	2080
	a <sub>p</sub> (mm)	0.070	0.05	0.140	0.1	0.210	0.12	0.280	0.14	0.350	0.16
	a <sub>e</sub> (mm)	0.280	0.05	0.560	0.1	0.840	0.12	1.120	0.14	1.400	0.16
	V <sub>c</sub> (m/min)	150	180	150	180	150	180	150	180	150	180
Hardened Steel, Tool Steels (hot&cold) (45~50HRC)	n (min <sup>-1</sup> )	47700	57300	23900	28600	15900	19100	11900	14300	9500	11500
	f <sub>z</sub> (mm/tooth)	0.015	0.015	0.030	0.031	0.046	0.046	0.062	0.062	0.077	0.078
	V <sub>f</sub> (mm/min)	1430	1720	1430	1770	1460	1760	1480	1770	1460	1790
	a <sub>p</sub> (mm)	0.060	0.05	0.120	0.1	0.180	0.12	0.240	0.14	0.300	0.16
	a <sub>e</sub> (mm)	0.240	0.05	0.480	0.1	0.720	0.12	0.960	0.14	1.200	0.16
Hardened Steel, Tool Steels (hot&cold) (45~50HRC)	V <sub>c</sub> (m/min)	120	150	120	150	120	150	120	150	120	150
	n (min <sup>-1</sup> )	38200	47700	19100	23900	12700	15900	9500	11900	7600	9500
	f <sub>z</sub> (mm/tooth)	0.014	0.013	0.028	0.027	0.042	0.042	0.054	0.055	0.066	0.070
	V <sub>f</sub> (mm/min)	1070	1240	1070	1290	1070	1340	1030	1310	1000	1330
	a <sub>p</sub> (mm)	0.050	0.05	0.100	0.1	0.150	0.12	0.200	0.14	0.250	0.16
	a <sub>e</sub> (mm)	0.200	0.05	0.400	0.1	0.600	0.12	0.800	0.14	1.000	0.16

### HECOB-2-PN



		D6/R3		D8/R4		D10/R5		D12/R6	
		▽	▽▽▽	▽	▽▽▽	▽	▽▽▽	▽	▽▽▽
		Roughing	Finishing	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Copper, Aluminium	V <sub>c</sub> (m/min)	250	280	250	280	250	280	250	280
	n (min <sup>-1</sup> )	13300	14900	9900	11100	8000	8900	6600	7400
	f <sub>z</sub> (mm/tooth)	0.130	0.111	0.177	0.150	0.220	0.186	0.260	0.222
	V <sub>f</sub> (mm/min)	3460	3310	3500	3330	3520	3310	3430	3290
	a <sub>p</sub> (mm)	0.480	0.18	0.640	0.2	0.800	0.23	0.960	0.25
Carbon steel, Alloy steel, Cast iron (180~250HB)	a <sub>e</sub> (mm)	1.920	0.18	2.560	0.2	3.200	0.23	3.840	0.25
	V <sub>c</sub> (m/min)	200	220	200	220	200	220	200	220
	n (min <sup>-1</sup> )	10600	11700	8000	8800	6400	7000	5300	5800
	f <sub>z</sub> (mm/tooth)	0.125	0.111	0.165	0.150	0.200	0.186	0.235	0.222
	V <sub>f</sub> (mm/min)	2650	2600	2640	2640	2560	2600	2490	2580
Stainless steel (20~40HRC)	a <sub>p</sub> (mm)	0.480	0.18	0.640	0.2	0.800	0.23	0.960	0.25
	a <sub>e</sub> (mm)	1.920	0.18	2.560	0.2	3.200	0.23	3.840	0.25
	V <sub>c</sub> (m/min)	170	200	170	200	170	200	170	200
	n (min <sup>-1</sup> )	9000	10600	6800	8000	5400	6400	4500	5300
	f <sub>z</sub> (mm/tooth)	0.112	0.098	0.150	0.130	0.185	0.165	0.220	0.190
Alloy steel, Tool steel (25~35HRC)	V <sub>f</sub> (mm/min)	2020	2080	2040	2080	2000	2110	1980	2010
	a <sub>p</sub> (mm)	0.420	0.18	0.560	0.2	0.700	0.23	0.840	0.25
	a <sub>e</sub> (mm)	1.680	0.18	2.240	0.2	2.800	0.23	3.360	0.25
	V <sub>c</sub> (m/min)	180	200	180	200	180	200	180	200
	n (min <sup>-1</sup> )	9500	10600	7200	8000	5700	6400	4800	5300
Alloy steel, Tool steel (35~45HRC)	f <sub>z</sub> (mm/tooth)	0.112	0.098	0.150	0.130	0.185	0.165	0.220	0.190
	V <sub>f</sub> (mm/min)	2130	2080	2160	2080	2110	2110	2110	2010
	a <sub>p</sub> (mm)	0.420	0.18	0.560	0.2	0.700	0.23	0.840	0.25
	a <sub>e</sub> (mm)	1.680	0.18	2.240	0.2	2.800	0.23	3.360	0.25
	V <sub>c</sub> (m/min)	150	180	150	180	150	180	150	180
Hardened Steel, Tool Steels (hot&cold) (45~50HRC)	n (min <sup>-1</sup> )	8000	9500	6000	7200	4800	5700	4000	4800
	f <sub>z</sub> (mm/tooth)	0.091	0.094	0.120	0.120	0.150	0.145	0.180	0.173
	V <sub>f</sub> (mm/min)	1460	1790	1440	1730	1440	1650	1440	1660
	a <sub>p</sub> (mm)	0.360	0.18	0.480	0.2	0.600	0.23	0.720	0.25
	a <sub>e</sub> (mm)	1.440	0.18	1.920	0.2	2.400	0.23	2.880	0.25
Hardened Steel, Tool Steels (hot&cold) (45~50HRC)	V <sub>c</sub> (m/min)	120	150	120	150	120	150	120	150
	n (min <sup>-1</sup> )	6400	8000	4800	6000	3800	4800	3200	4000
	f <sub>z</sub> (mm/tooth)	0.080	0.084	0.105	0.110	0.130	0.140	0.155	0.168
	V <sub>f</sub> (mm/min)	1020	1340	1010	1320	990	1340	990	1340
	a <sub>p</sub> (mm)	0.300	0.18	0.400	0.2	0.500	0.23	0.600	0.25
	a <sub>e</sub> (mm)	1.200	0.18	1.600	0.2	2.000	0.23	2.400	0.25

**Always up to date: Please check our P50 QuickFinder**



### **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.

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**Specifications for the products listed in this catalog are subject to change without notice due to replacement or modification.**

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