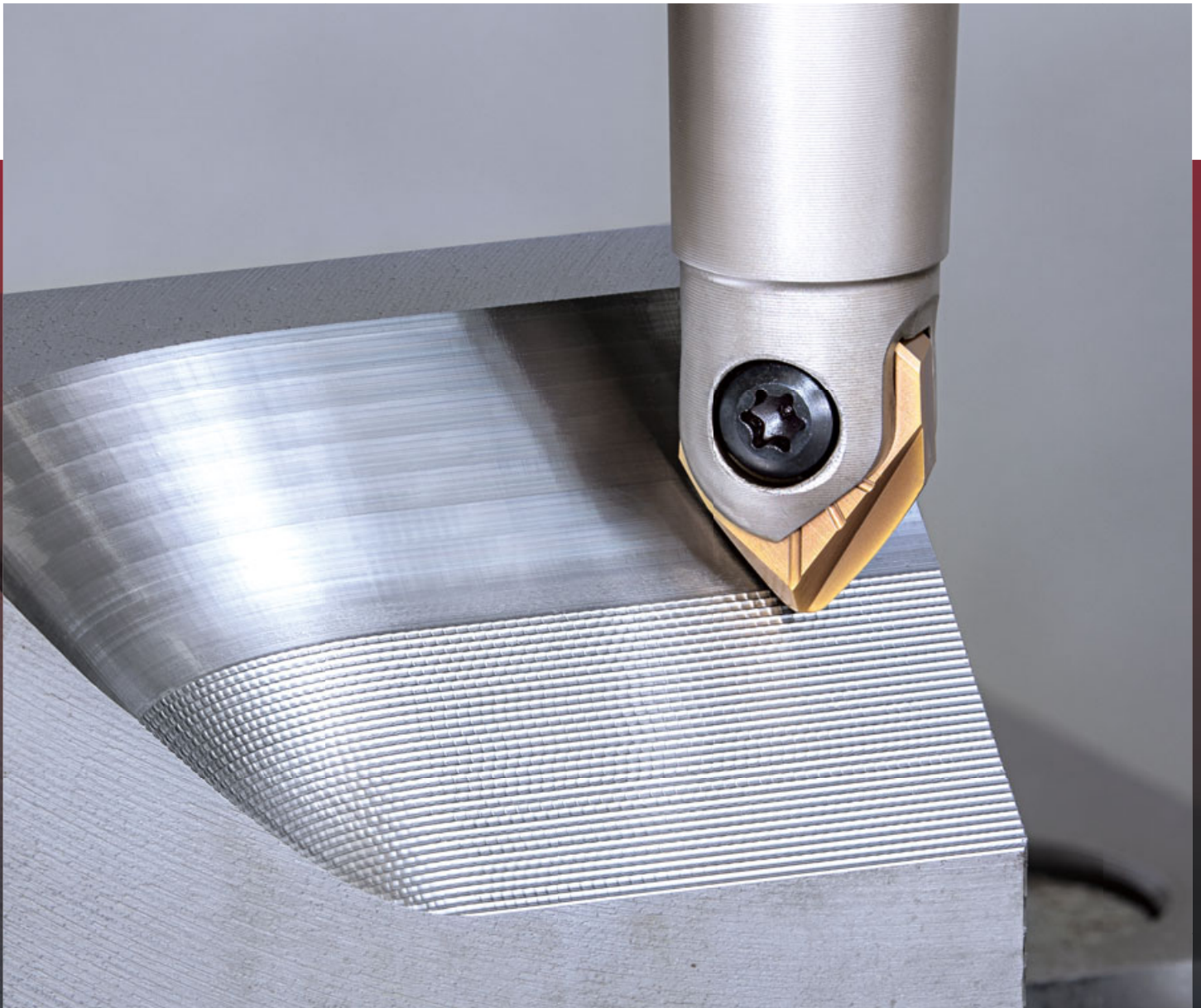


Profile milling cutter

BALL^{FINISH}**NOSE**

Tungaloy Report No. 431S1-G

New barrel type insert with large R cutting edge for high productivity

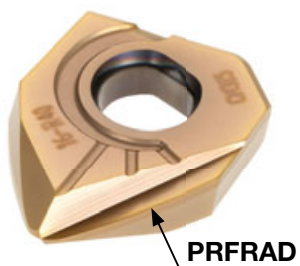




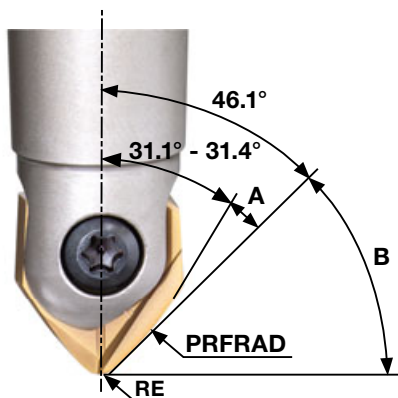
Large R cutting edge for high productivity and high accuracy

The barrel insert has a 5 times larger profile radius (PRFRAD) than the ball nose insert of the same tool diameter, enabling high part quality and increased efficiency.

BALLFINISHNOSE Barrel type insert vs ball type insert



When the cusp heights are equal		When the stepdowns are equal	
New Barrel type insert	Ball type insert	New Barrel type insert	Ball type insert
Improved productivity Barrel type insert provide larger stepdowns than ball type insert, reducing the number of tool passes.		Good surface finish Barrel type insert can reduce the cusp height generated by ball type insert, substantially increasing surface quality.	



Applicable tilt angle ranges

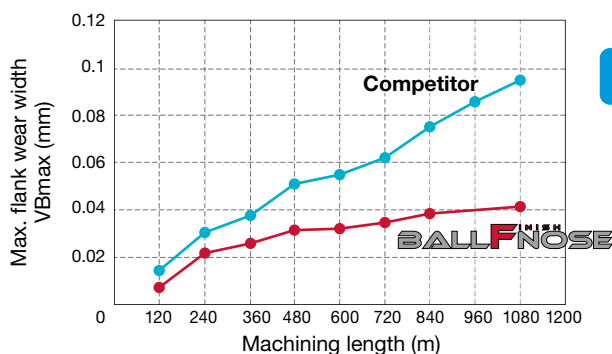
Designation	Tool dia. (mm)	PRFRAD (mm)	Applicable ranges of tilt angles on workpiece	
			A (PRFRAD)	B (RE)
ZFCBM120R300-MM	ø12	30	31.4° - 46.1°	46.1° - 90°
ZFCBM160R400-MM	ø16	40	31.4° - 46.1°	46.1° - 90°
ZFCBM200R500-MM	ø20	50	31.4° - 46.1°	46.1° - 90°
ZFCBM250R625-MM	ø25	62.5	31.2° - 46.1°	46.1° - 90°
ZFCBM300R750-MM	ø30	75	31.1° - 46.1°	46.1° - 90°

GRADE

CH315 **P M K S H**

- Unique grade with high wear resistance
- Suitable for semi-finishing to finishing applications

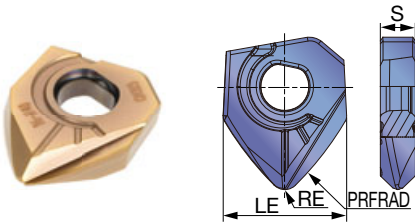
Tool life machining carbon steel



Cutter : EBFM16T20S130 (DCX = 16 mm, CICT = 2)
 Insert : ZFCBM160R400-MM CH315
 Workpiece material : S55C / C55 (204HB)
 Cutting speed : $V_c = 550$ m/min
 Feed per tooth : $f_z = 0.2$ mm/t
 Pitch : $p = 0.15$ mm
 Width of cut : $a_e = 0.1$ mm
 Coolant : Dry
 Overhang length : 80 mm
 Machine : Vertical M/C, BT40

INSERTS

ZFCBM-MM



P	Steel	★
M	Stainless	★
K	Cast iron	★
N	Non-ferrous	☆
S	Superalloy	★
H	Hard materials	★

★ : First choice
☆ : Second choice

Designation	PRFRAD	RE	Coated										LE	S	Cutter
			CH315												
ZFCBM120R300-MM	30	1.5	●										12	3.4	E/HBFM12...
ZFCBM160R400-MM	40	2	●										16	4.4	E/HBFM16...
ZFCBM200R500-MM	50	2.5	●										20	5.4	E/HBFM20...
ZFCBM250R625-MM	62.5	3	●										25	6.4	E/HBFM25...
ZFCBM300R750-MM	75	3.5	●										30	7.4	E/HBFM30...

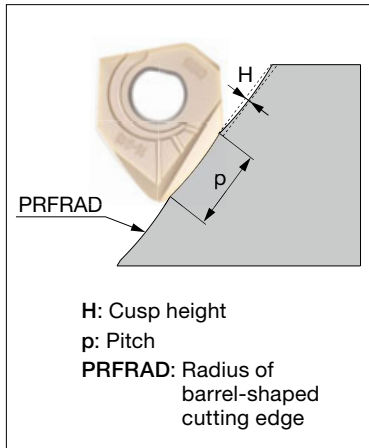
With ZFCBM insert, the functional length (LF) of the EBFM and HBFM cutters becomes longer for the amount as indicated below:
For E/HBFM12, +2.6 mm; E/HBFM16, +4 mm; E/HBFM20, +4.4 mm; E/HBFM25, +5.8 mm; and E/HBFM30, +5.9 mm.

● : Line up

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Cutting speed V _c (m/min)	Feed per tooth f _z (mm/t)	Width of cut a _e (mm)
P	Low carbon steel S15C, SS400, etc. C15E4, E275A, etc.	- 200HB	100 - 600	0.05 - 0.3	< 0.3
	Carbon steel S45C, S55C, etc. C45, C55, etc.	- 300HB	100 - 600	0.05 - 0.3	< 0.3
	Prehardened steel NAK80, PX5, etc.	30 - 40HRC	100 - 600	0.05 - 0.3	< 0.3
M	Austenitic stainless steel SUS304, SUS316, etc. X5CrNi18-9, X5CrNiMo17-12-2, etc.	- 200HB	100 - 600	0.05 - 0.3	< 0.3
	Precipitation hardening stainless steel SUS630, etc. X5CrNiCuNb16-4, etc.	- 45HRC	100 - 300	0.05 - 0.25	< 0.2
K	Grey cast iron FC250, FC300, etc. 250, 300, etc.	150 - 250HB	100 - 600	0.05 - 0.3	< 0.3
	Ductile cast iron FCD400, etc. 400-15, 600-3, etc.	150 - 250HB	100 - 600	0.05 - 0.3	< 0.3
S	Titanium alloys Ti-6Al-4V, etc.	- 45HRC	40 - 120	0.05 - 0.2	< 0.2
	Superalloys Inconel718, etc.	- 45HRC	20 - 80	0.05 - 0.2	< 0.2
H	Hardened steel SKD61, etc. X40CrMoV5-1, etc.	40 - 55HRC	50 - 300	0.05 - 0.2	< 0.2

■ Cusp height and pitch



To obtain the pitch (p) from the given cusp height (H)

H (mm) \ PRFRAD (mm)	0.001	0.002	0.003	0.004	0.005	0.01	0.015	0.02
30 (ZFCBM120R300...)	0.49	0.69	0.85	0.98	1.1	1.55	1.9	2.19
40 (ZFCBM160R400...)	0.57	0.8	0.98	1.13	1.26	1.79	2.19	2.53
50 (ZFCBM200R500...)	0.63	0.89	1.1	1.26	1.41	2	2.45	2.83
62.5 (ZFCBM250R625...)	0.71	1	1.22	1.41	1.58	2.24	2.74	3.16
75 (ZFCBM300R750...)	0.77	1.1	1.34	1.55	1.73	2.45	3	3.46

$$p = \sqrt{8 \times H \times \text{PRFRAD}}$$

(mm)

To obtain the cusp height (H) from the given pitch (p)

p (mm) \ PRFRAD (mm)	0.5	0.75	1	1.25	1.5	1.75	2
30 (ZFCBM120R300...)	0.001	0.002	0.004	0.007	0.009	0.013	0.017
40 (ZFCBM160R400...)	0.001	0.002	0.003	0.005	0.007	0.01	0.013
50 (ZFCBM200R500...)	0.001	0.001	0.003	0.004	0.006	0.008	0.01
62.5 (ZFCBM250R625...)	0.001	0.001	0.002	0.003	0.005	0.006	0.008
75 (ZFCBM300R750...)	< 0.001	0.001	0.002	0.003	0.004	0.005	0.007

$$H = \frac{p^2}{8 \times \text{PRFRAD}}$$

(mm)



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