MillLine

BALLFINISH-NOSE

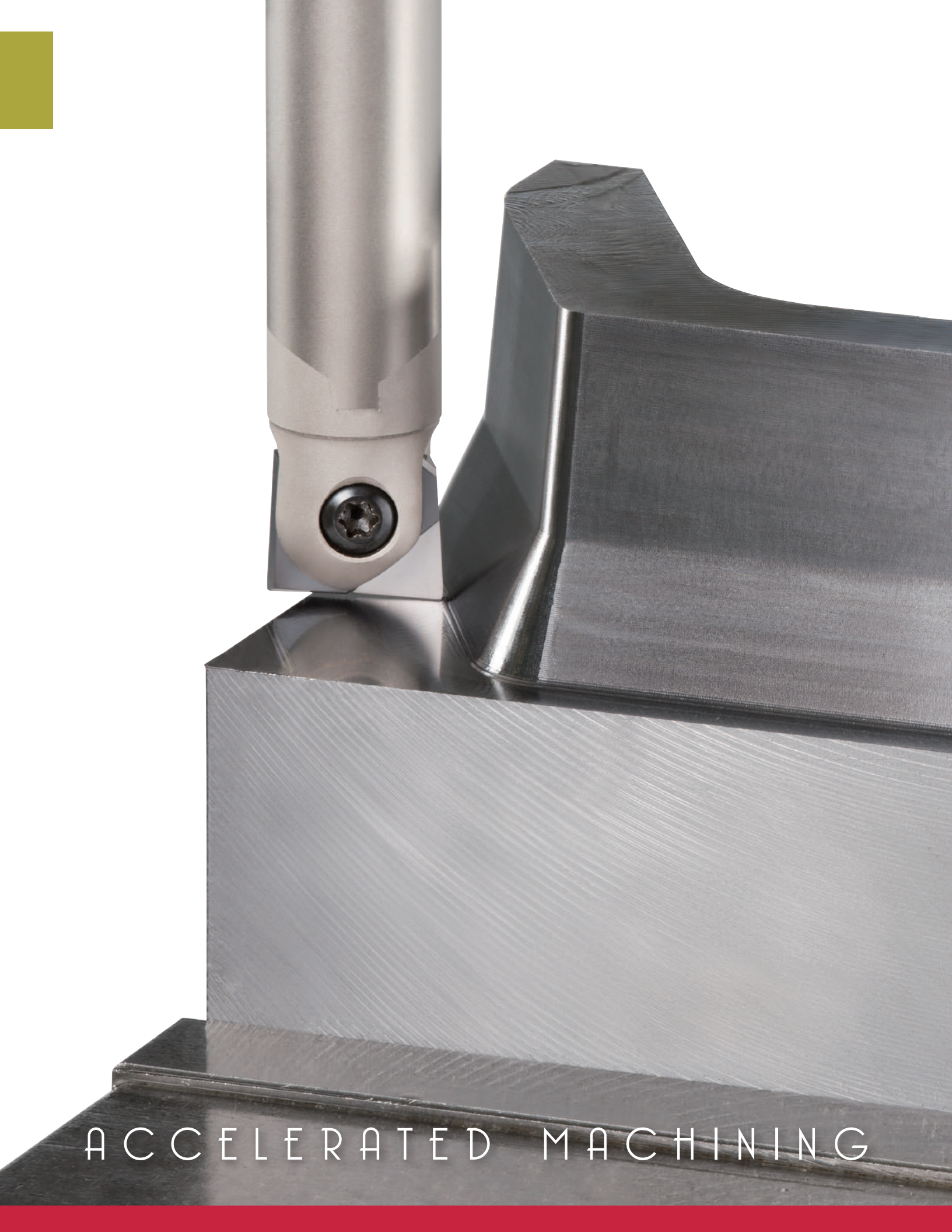
www.tungaloyamerica.com

Tungaloy Report No. 431-US

BALLFINISH-NOSE

Indexable endmill for high precision finishing

Member IMC Group Tungaloy


ACCELERATED MACHINING

MillLine

FINISH BALLNOSE

TUNGALOY

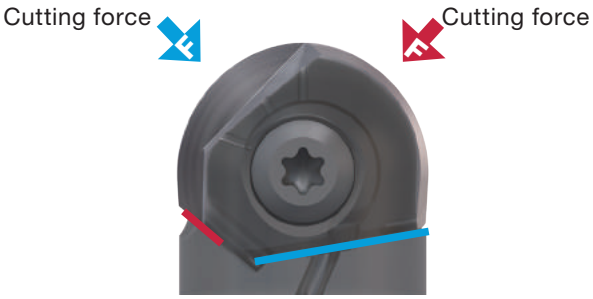
Excellent surface finish and stable machining due to **secure clamping and minimum run out**

BALL FINISH NOSE
TUNGALOY

New indexable endmill for die & mold and aerospace industries.

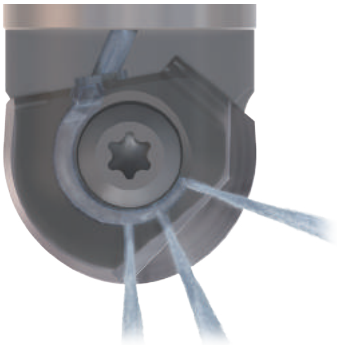
Secure clamping mechanism

The screw contacts the flat portion of the insert screwhole and directs the clamping forces in a specific direction ensuring reliability in clamping. This also improves rigidity and reduces run-out.



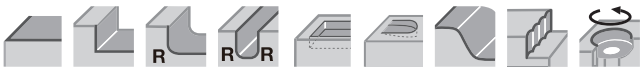
Asymmetric shape of the insert and directed clamping force maintains centrality of the insert under 3 dimensional cutting force.

Unique coolant delivery system

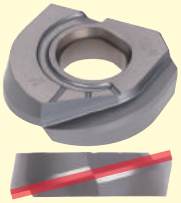


- Coolant channel on the insert surface delivers coolant to the cutting edge in three directions.
- Excellent chip evacuation and cooling effect provides good surface finish and long tool life in machining of hardened steel.

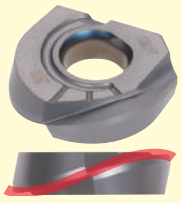
Two insert varieties



Ball nose type: ZFBU



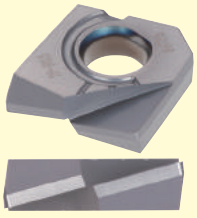
MJ
-For general purpose
-First choice



ML
-For lower cutting force

- Suitable for finishing and three dimensional milling of die & mold
- Applicable for a wide range of operations

Radius type: ZFRU



MJ

- Suitable for finishing of die & mold
- Designed for milling corners & shoulders

Versatile grade

AH725 P Steel M Stainless K Cast iron H Hard Materials

For steel, stainless steel, cast iron and hard materials

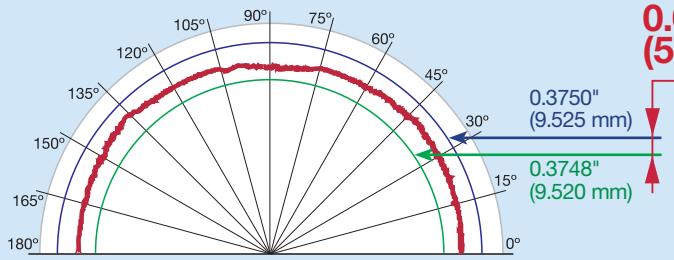
Application	Grade	Substrate			Coating layer		Features
	Application code	Relative density	Hardness HRA	T. R. S. (GPa)	Main Composition	Thickness (µm)	
P M K H	AH725 P20 - P30	14.4	91.5	3.0	(Ti, Al)N	2	For general purpose Good balance between wear and fracture resistance

First choice

Workpiece material	P Carbon steel, Alloy steel	M Stainless steel	P Prehardend steel, Die & mold tool steel	H High hardened steel	K Cast iron
Hardness	85 - 280 HB	135 - 200 HB	HRC 40 - 48	HRC 48 - 60	150 - 240 HB
AH725	←	←	←	←	←

Excellent machining accuracy

High radius accuracy

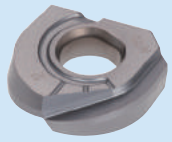


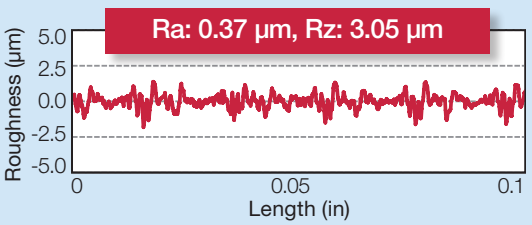
Ball nose insert has high radius accuracy within 0.0002" and precisely meets dimensional requirements.

Shank: EBFU075T100S0700
Insert: ZFBU075R00-MJ
Tool diameter: øDc = ø0.750" (rε = 0.375")

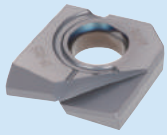
Good surface finish

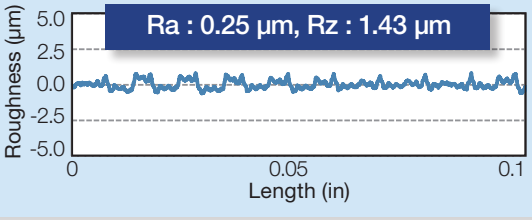
Ball nose type
ZFBU075R00-MJ





Radius type
ZFRU075R006-MJ





Shank : EBFU075T100S0700
Workpiece material: 1045
Cutting speed: Vc = 656 sfm
Feed per tooth: fz = 0.006 ipt
Depth of cut: ap =0.020"
Coolant: Wet

ENDMILLS - STEEL SHANK

BallFinishNose EBF

Fig-1

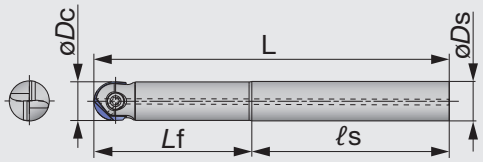
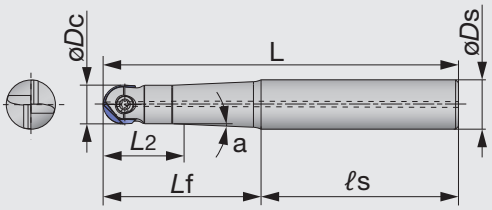
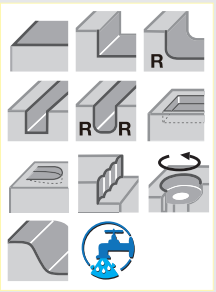


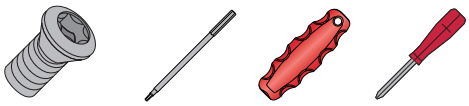
Fig-2





Designation	øDc	øDs	ℓs	Lf	L	L2	a	Fig.	Insert
EBFU037T050S0400	0.375	0.500	3.000	1.000	4.000	0.625	9.0°	2	ZF*U037
EBFU037T062S0600	0.375	0.625	3.500	2.500	6.000	0.625	3.5°	2	ZF*U037
EBFU050S050S0437	0.500	0.500	3.187	1.188	4.375	-	-	1	ZF*U050
EBFU050T062S0637	0.500	0.625	4.000	2.375	6.375	1.000	2.5°	2	ZF*U050
EBFU062T075S0500	0.625	0.750	3.000	2.000	5.000	0.563	2.0°	2	ZF*U062
EBFU062T075S0637	0.625	0.750	3.625	2.750	6.375	0.563	1.5°	2	ZF*U062
EBFU075T100S0700	0.750	1.000	4.000	3.000	7.000	1.563	4.5°	2	ZF*U075
EBFU075T100S0875	0.750	1.000	4.000	4.750	8.750	1.000	1.5°	2	ZF*U075
EBFU100T125S0800	1.000	1.250	4.000	4.000	8.000	1.250	2.5°	2	ZF*U100
EBFU100T125S1000	1.000	1.250	4.000	6.000	10.000	1.188	1.4°	2	ZF*U100
EBFU125S125S1000	1.250	1.250	6.000	4.000	10.000	-	-	1	ZF*U125

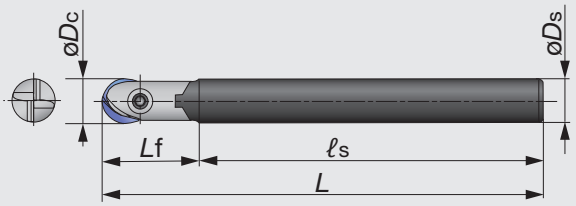
SPARE PARTS

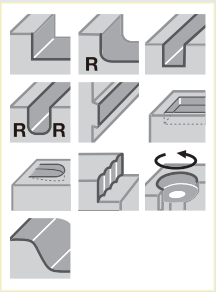


Designation	Clamping Screw	Wrench		Mono block type wrench
		Torx Bit	Grip	
EBFU037...	TS30F100A	-	-	T10D
EBFU050...	TS40F120A	-	-	T15D
EBFU062...	TS50F160A	-	-	T-T20
EBFU075...	TS60F200A	BLDT25/M7	SW6-T	-
EBFU100...	TS70F250A	BLDT25/M7	SW6-T	-
EBFU125...	TS70F300A	-	-	T-T30

ENDMILLS - CARBIDE SHANK

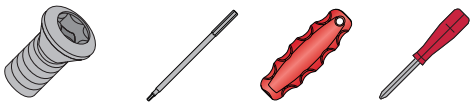
BallFinishNose EBF





Designation	øDc	øDs	ℓs	Lf	L	Insert
EBFU037S037C0550	0.375	0.375	2.500	3.000	5.500	ZF*U037
EBFU037S037C0875	0.375	0.375	3.250	5.500	8.750	ZF*U037
EBFU050S050C0637	0.500	0.500	2.750	3.625	6.375	ZF*U050
EBFU050S050C0875	0.500	0.500	2.750	6.000	8.750	ZF*U050
EBFU062S062C0637	0.625	0.625	3.375	3.000	6.375	ZF*U062
EBFU062S062C0875	0.625	0.625	2.750	6.000	8.750	ZF*U062
EBFU075S075C0875	0.750	0.750	4.000	4.750	8.750	ZF*U075
EBFU075S075C1200	0.750	0.750	3.250	8.750	12.000	ZF*U075
EBFU100S100C0875	1.000	1.000	4.000	4.750	8.750	ZF*U100
EBFU100S100C1200	1.000	1.000	3.250	8.750	12.000	ZF*U100
EBFU125S125C1200	1.250	1.250	3.250	8.750	12.000	ZF*U125

SPARE PARTS

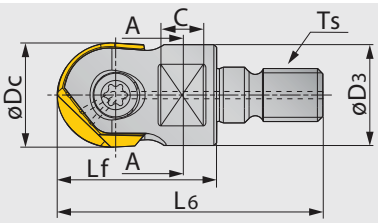


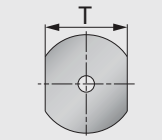
Designation	Clamping Screw	Wrench		Mono block type wrench
		Torx Bit	Grip	
EBFU037...	TS30F100A	-	-	T10D
EBFU050...	TS40F120A	-	-	T15D
EBFU062...	TS50F160A	-	-	T-T20
EBFU075...	TS60F200A	M7/BLDT25	T-SW6	-
EBFU100...	TS70F250A	M7/BLDT25	T-SW6	-
EBFU125...	TS70F300A	-	-	T-T30

ENDMILLS - MODULAR TYPE

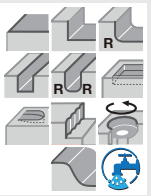
BallFinishNose HBFM

Indexable endmills with TungFlex threaded adaptation for high precision finish





A - A cross section



Designation	øDc	L6	Lf	C	T	ø D3	Ts*	Air Hole	Insert
HBFM10M06	0.375	1.35	0.78	0.19	0.27	0.38	M6	with	ZF*U037
HBFM12M06	0.5	1.47	0.90	0.19	0.27	0.45	M6	with	ZF*U050
HBFM12M08	0.5	1.57	0.90	0.31	0.39	0.51	M8	with	ZF*U050
HBFM16M08	0.625	1.85	1.18	0.31	0.39	0.51	M8	with	ZF*U062
HBFM20M10	0.750	1.92	1.18	0.39	0.59	0.74	M10	with	ZF*U075
HBFM25M12	1.00	2.24	1.37	0.39	0.66	0.94	M12	with	ZF*U100
HBFM32M16	1.25	2.59	1.69	0.47	0.86	1.16	M16	with	ZF*U125

SPARE PARTS

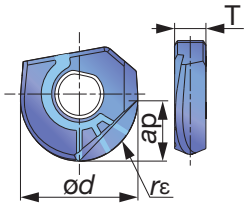



Designation	Clamping screw	Torx bit	Grip	Wrench
HBFM10...	TS 30F100A	-	-	T-10D
HBFM12...	TS 40F120A	-	-	T-15D
HBFM16...	TS 50F160A	BT20S	H-TB2W	-
HBFM20...	TS 60F200A	BLDT25/M7	H-TB2W	-
HBFM25...	TS 70F250A	BLDT25/M7	H-TB2W	-
HBFM32...	TS 80F300A	-	-	T-T30

* Metric thread sizes

INSERT

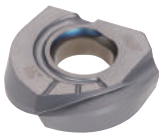
ZFBU-MJ

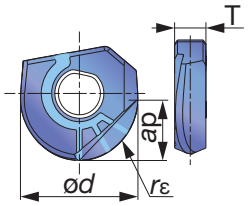


Designation	Max. ap	ød	T	rε	AH725				
ZFBU037R00-MJ	0.188	0.375	0.114	0.188	●	○	●	○	○
ZFBU050R00-MJ	0.250	0.500	0.134	0.250	●	○	●	○	○
ZFBU062R00-MJ	0.313	0.625	0.173	0.313	●	○	●	○	○
ZFBU075R00-MJ	0.375	0.750	0.213	0.375	●	○	●	○	○
ZFBU100R00-MJ	0.500	1.000	0.252	0.500	●	○	●	○	○
ZFBU125R00-MJ	0.625	1.250	0.291	0.625	●	○	●	○	○
					P	M	K	N	H

● First choice

ZFBU-ML



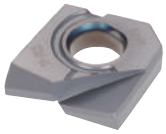


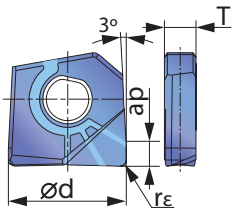
Designation	Max. ap	ød	T	rε	AH725				
ZFBU037R00-ML	0.188	0.375	0.114	0.188	●	●	○	●	●
ZFBU050R00-ML	0.250	0.500	0.134	0.250	●	●	○	●	●
ZFBU062R00-ML	0.313	0.625	0.173	0.313	●	●	○	●	●
ZFBU075R00-ML	0.375	0.750	0.213	0.375	●	●	○	●	●
ZFBU100R00-ML	0.500	1.000	0.252	0.500	●	●	○	●	●
ZFBU125R00-ML	0.625	1.250	0.291	0.625	●	●	○	●	●
					P	M	K	N	H

• First choice

INSERT

ZFRU - MJ





Designation	Max. ap	ød	T	rε	AH725				
ZFRU037R003-MJ	0.070	0.375	0.114	0.031	●	●	○	●	○
ZFRU050R003-MJ	0.078	0.500	0.134	0.031	●	●	○	●	○
ZFRU050R006-MJ	0.109	0.500	0.134	0.062	●	●	○	●	○
ZFRU050R012-MJ	0.172	0.500	0.134	0.125	●	●	○	●	○
ZFRU062R003-MJ	0.094	0.625	0.173	0.031	●	●	○	●	○
ZFRU062R006-MJ	0.125	0.625	0.173	0.062	●	●	○	●	○
ZFRU062R012-MJ	0.188	0.625	0.173	0.125	●	●	○	●	○
ZFRU075R003-MJ	0.110	0.750	0.213	0.031	●	●	○	●	○
ZFRU075R006-MJ	0.141	0.750	0.213	0.062	●	●	○	●	○
ZFRU075R012-MJ	0.204	0.750	0.213	0.125	●	●	○	●	○
ZFRU100R003-MJ	0.129	1.000	0.252	0.031	●	●	○	●	○
ZFRU100R006-MJ	0.160	1.000	0.252	0.062	●	●	○	●	○
ZFRU100R012-MJ	0.223	1.000	0.252	0.125	●	●	○	●	○
ZFRU125R003-MJ	0.157	1.250	0.291	0.031	●	●	○	●	○
ZFRU125R006-MJ	0.188	1.250	0.291	0.062	●	●	○	●	○
ZFRU125R012-MJ	0.251	1.250	0.291	0.125	●	●	○	●	○
					P	M	K	N	H

● First choice

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Grades	Recommended		Max. axial depth of cut ap (in)	Cutting speed Vc (sfm)	Feed per tooth: fz (ipt)					
				Selection criteria	Chip-breaker			øDc (in)					
								ø0.375	ø0.500	ø0.625	ø0.750	ø1.000	ø1.250
P	Low carbon steel, alloy steel	85 - 180 HB	AH725	First choice	MJ	≤0.04D	590 - 850	0.008	0.008	0.010	0.010	0.012	0.014
		85 - 180 HB	AH725	For wear resistance	ML	≤0.04D	590 - 850	0.008	0.008	0.010	0.010	0.012	0.014
	High carbon steel, alloy steel	180 - 280 HB	AH725	First choice	MJ	≤0.03D	490 - 750	0.008	0.008	0.010	0.010	0.012	0.014
		180 - 280 HB	AH725	For wear resistance	ML	≤0.03D	490 - 750	0.008	0.008	0.010	0.010	0.012	0.014
	Prehardened steel Die & mold tool steel	HRC 40 - 48	AH725	First choice	ML	≤0.03D	590 - 980	0.008	0.008	0.010	0.010	0.012	0.014
		HRC 40 - 48	AH725	For impact resistance	MJ	≤0.03D	590 - 980	0.008	0.008	0.010	0.010	0.012	0.014
M	Stainless steel	135 - 200 HB	AH725	First choice	ML	≤0.03D	330 - 820	0.006	0.008	0.008	0.010	0.010	0.012
		135 - 200 HB	AH725	For impact resistance	MJ	≤0.03D	330 - 820	0.006	0.008	0.008	0.010	0.010	0.012
K	Cast iron	150 - 240 HB	AH725	First choice	MJ	≤0.04D	300 - 1150	0.008	0.010	0.012	0.012	0.014	0.016
		150 - 240 HB	AH725	For wear resistance	ML	≤0.04D	300 - 1150	0.008	0.010	0.012	0.012	0.014	0.016
N	Aluminum	-	AH725	First choice	ML	≤0.03D	660 - 1310	0.010	0.014	0.014	0.014	0.016	0.018
		-	AH725	For impact resistance	MJ	≤0.03D	660 - 1310	0.010	0.014	0.014	0.014	0.016	0.018
H	High hardened steel	HRC 48 - 60	AH725	First choice	ML	≤0.02D	330 - 720	0.003	0.004	0.005	0.006	0.008	0.010
		HRC 48 - 60	AH725	For impact resistance	MJ	≤0.02D	330 - 720	0.003	0.004	0.005	0.006	0.008	0.010

- Standard cutting conditions should be used only as references for each workpiece material.
- These conditions are based on the use of steel shank.
  For carbide shank, depth of cut and feed per tooth can be increased by 20 - 30%.

How to clamp the insert

1. Clear chips and dust from the pocket.
2. Place the insert in the pocket. The insert can be placed only in one direction.
3. Tighten the screw while pressing the insert into the pocket.

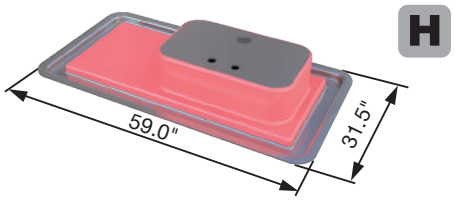
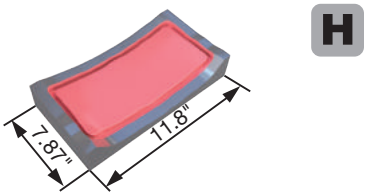
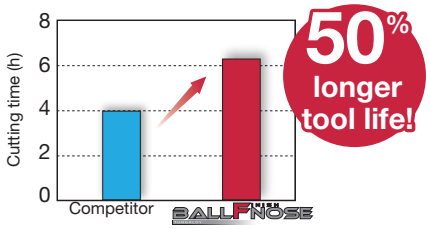
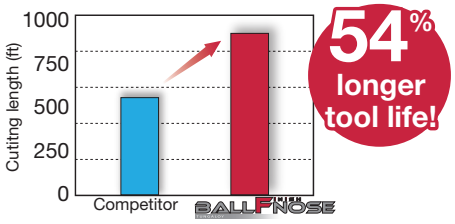
How to check the run-out

1. Clamp the insert on the shank.
2. Clamp the shank on a high precision arbor.
3. Measure the run-out on tool presetter or by dial gauge.

Notes:

1. Due to the helical cutting edge, it is important that the run-out is inspected with the insert clamped on the shank.
2. Do not use micrometer or caliper to inspect the insert diameter as inaccurate dimensions may be provided.

Practical examples

Workpiece type		Carrier	Cylinder
Cutter		EBFU075S075C0875	EBFU050S050S0437
Insert		ZFBU075R00-MJ	ZFBU050R00-MJ
Grade		AH725	AH725
Workpiece material		SKD11	STAVAX
			
Cutting conditions	Cutting speed: Vc (sfm)	1148	1180
	Feed per tooth: fz (ipt)	0.006	0.004
	Depth of cut: ap (in)	0.008	0.02
	Pick feed: pf (in)	0.012	0.039
	Method of machining	Profiling	Profiling
	Coolant	Dry	Internal supply, water-soluble coolant
	Machine	M/C, CAT50	Vertical M/C, CAT40
Results		 BallFinishNose tool life was 50% longer than the competitor's due to high wear resistance.	 BallFinishNose cutting length was 54% longer than the competitor's due to excellent chip evacuation.

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www.tungaloyamerica.com

Tungaloy Canada

432 Elgin St. Unit 3, Brantford, Ontario N3S 7P7, Canada
Phone: +1-519-758-5779 Fax: +1-519-758-5791
www.tungaloy.com/ca

Tungaloy de Mexico S.A.

C Los Arellano 113, Parque Industrial Siglo XXI
Aguascalientes, AGS, Mexico 20290
Phone:+52-449-929-5410 Fax:+52-449-929-5411
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Jan. 2017 (TA)