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General product information

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Added products



ø20, ø25

TungForceFeed is now available in the new range of ø8 - ø25 mm

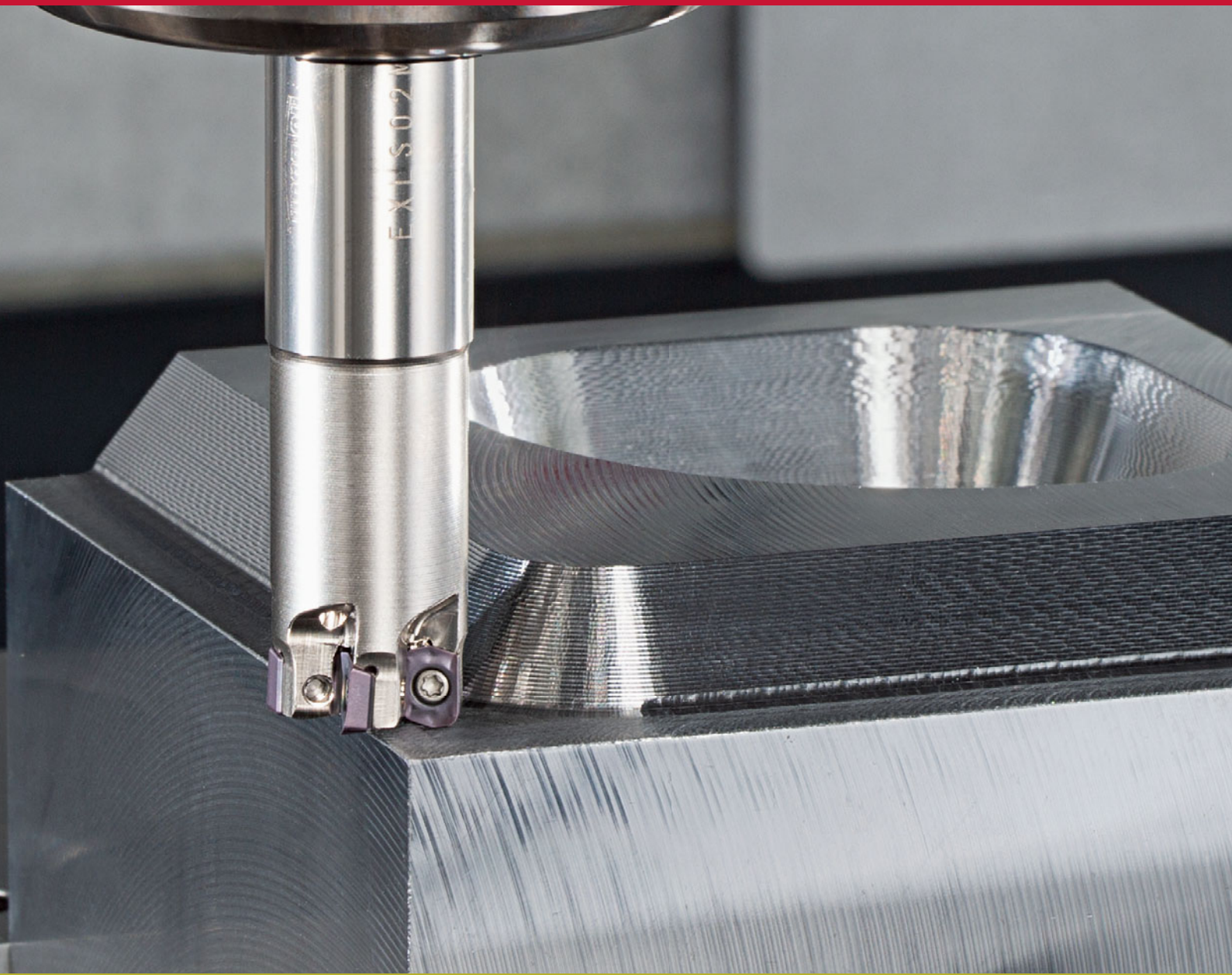
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TUNG**F**ORCE FEED

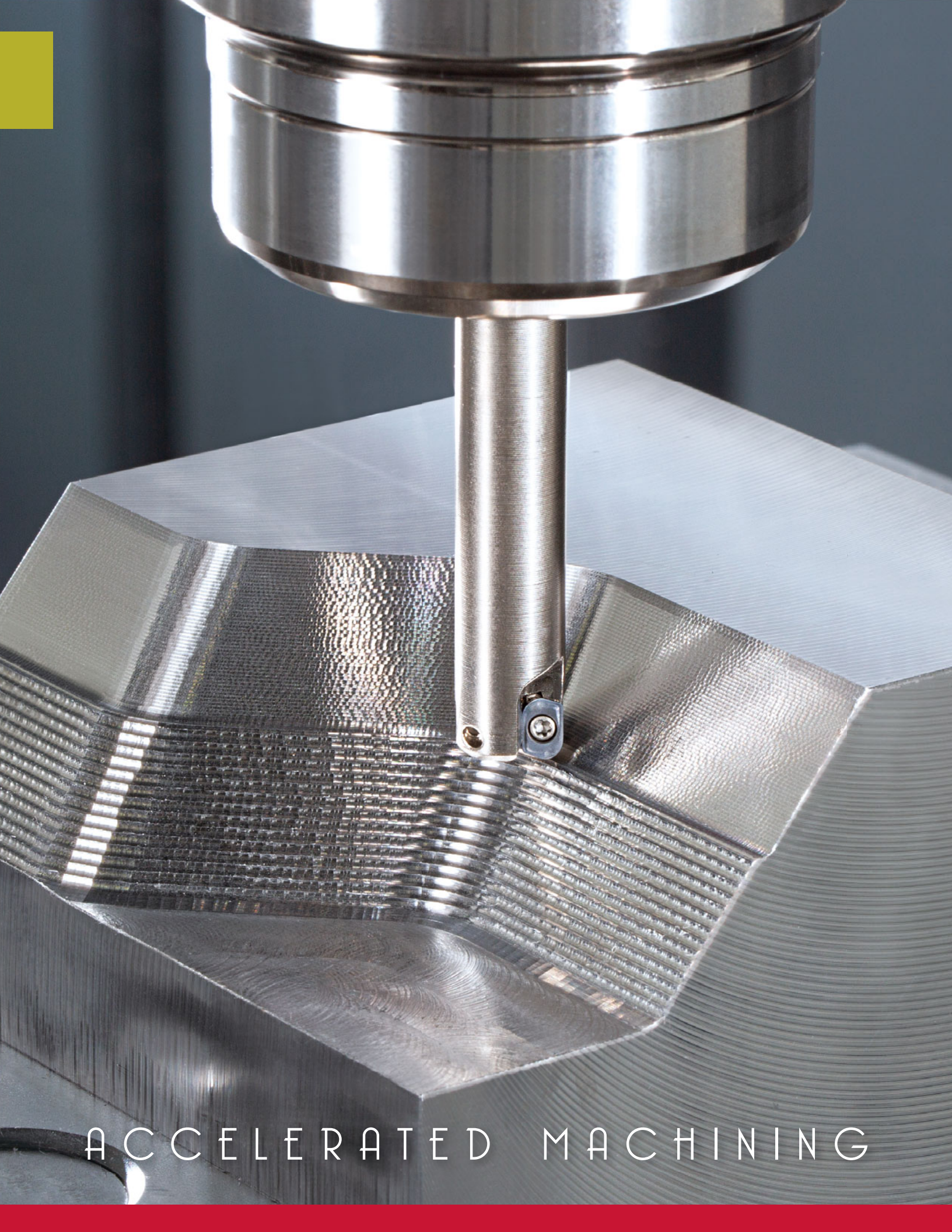
www.tungaloy.com/us

Tungaloy Report No. 521-US

Small diameter high feed milling cutter
with robust design for stability and efficiency



INDUSTRY 4.0
FEED the SPEED!



ACCELERATED MACHINING

MillLine

TUNG^{ORCE}**FF**EEED
TUNGALOY



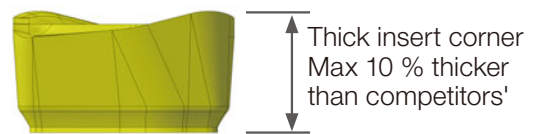
Indexable high feed milling cutter, available in as small as $\varnothing 0.375$ " diameter, offers free cutting and effective chip control in a wide range of applications.

Small diameter high feed milling cutter with impressive machining efficiency and reliability

Built to perform at higher machining conditions

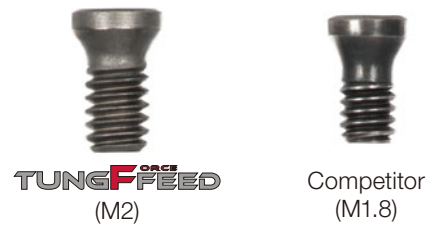
Strong insert corner for high feed operations

- Thick insert corner is designed to withstand fracturing force



Robust and easy-to-handle insert screws

- M2 screws reduce screw neck shears under high cutting forces. A larger screw enhances insert's fixation and easy handling.

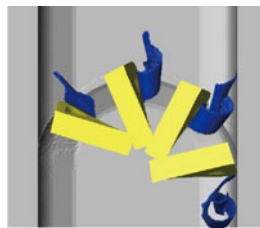
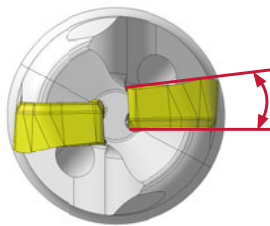


Proper chip formation assures a reliable machining process

Positive inclination angle of the insert promotes smooth chip evacuation

- The positive cutting edge position contributes to a controlled chip formation and easy chip evacuation when machining next to shoulder and slotting operations.

Positive inclination angle



Proper chip control eliminates recuts and premature insert failure

Chip formation



Ideal curled chips

Competitor



Crushed chips

P Cutter	: EXLS02U0.50C0.50LH2.00R02
Insert	: LSMT0202ZER-HM AH3225
Workpiece material	: 1055
Cutting speed	: Vc = 656 sfm
Application	: Slotting
Depth of cut	: ap = 0.020 mm x 20 passes
Coolant	: Dry
Machine	: Vertical M/C, CAT40

Ensures high efficient machining in various operations

Effective in various 3D milling applications including helical interpolation and ramping



Face milling



Shoulder milling



Helical interpolation



Ramping

and more

Improved machining efficiency thanks to close pitch design and wider application capability

MRR is improved as much as 5 times!

Table below shows tool performance comparisons when machining 1055 carbon steel with a tool diameter of $\phi 0.625$ "

	Metal removal rate (inch ³ /min)	Number of teeth	Cutting speed (sfm)	Feed per tooth (ipt)	Depth of cut (inch)	Width of cut (inch)
TUNGFFEEED	4.836	5	656	0.031	0.020	0.390
Competitor's high feed cutter	0.998	4	656	0.008	0.020	0.390
Competitor's shoulder mill	3.744	4	656	0.003	0.200	0.390
Solid carbide endmill	2.340	5	328	0.003	0.200	0.390

High feed capability improves tool life and machining efficiency

Designed with a small entry angle for chatter stability, TungForceFeed's insert significantly improves efficiency and tool life even when machining in long reach areas



Long reach areas



Deep slots



Deep shouldering

and more

Applications requiring a long overhang tool to avoid fixture or workpiece interference

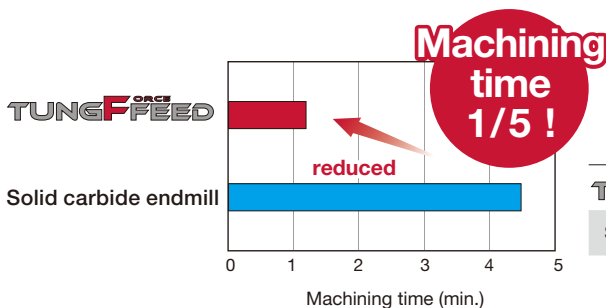
Problems with the conventional tool

- Chatter is more common with long reach areas, preventing higher parameters to be applied
- Chipping and fracture occurs due to chatter



TungForceFeed, with long overhang tool, performs at the highest efficiency and reliability in long reach machining application

Machining time compared with the conventional tool (L/D = 5, pocketing)

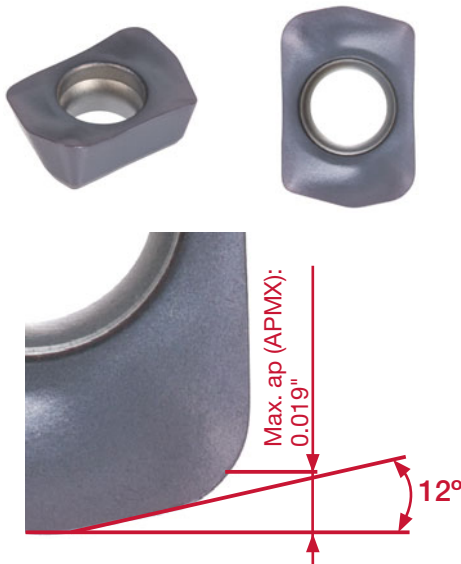


	Tool diameter	Number of teeth	Metal removal rate (in ³ /min)	Over hang (inch)	Cutting speed (sfm)	Feed per tooth (ipt)	Depth of cut (inch)
TUNGFFEEED	$\phi 0.5$	2	1.159	2.362	492	0.016	0.020 x 20 passes
Solid carbide endmill	$\phi 0.5$	4	0.244	2.362	262	0.003	0.020 x 20 passes

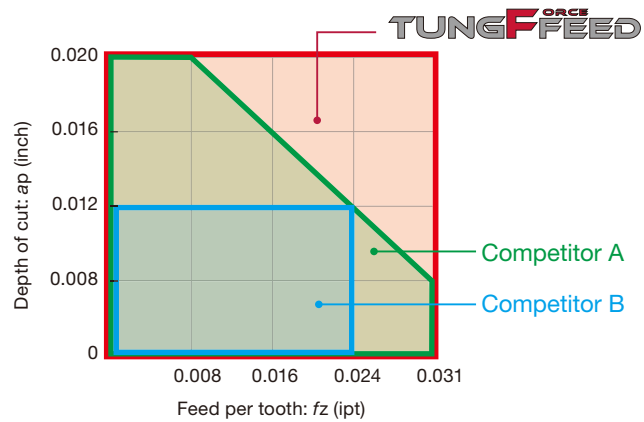
2 insert styles for various applications

High feed insert (LSMT-HM)

- Provides machining efficiency in a wide range of applications
- First choice insert for various applications including slotting, pocketing, or for long reach areas

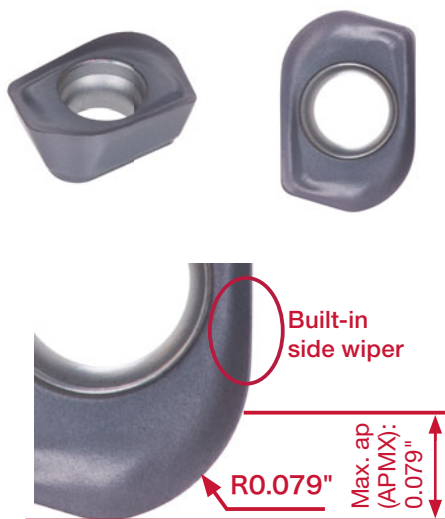


Application range
(of standard length body)

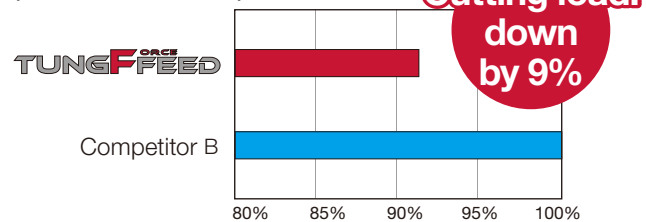


R0.079 insert (LSMT-MM) (To be released in 2019)

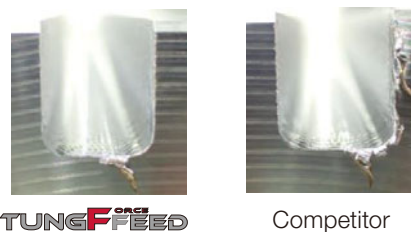
- Full profiling insert design ideal for semi-roughing and semi-finishing of die and mold parts
- Free cutting geometry eliminates chattering and improves surface finish quality
- Built-in side wiper helps reduce burr formation on walls and corners while improving wall accuracy



Cutting load comparison
(Material: S55C/C55)



Burr formations on exit

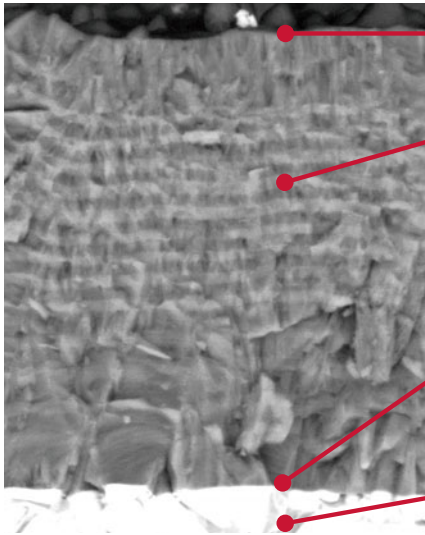


Grade lineup for various materials

New

AH3225**P M**

- Nano multi-layer coating technology with three major properties for optimal cutting edge integrity
- Increased resistance to wear, fracture, oxidation, built-up edge, and delamination

**Technology 1 - Resistance to built-up edge**

The coating surface prevents built-up edge

Technology 2 - Resistance to wear, oxidation, and fracture

Multi-layered coating is designed to resist wear and oxidation, while preventing micro-cracks from propagating in the coating layer for improved resistance to edge chipping

Technology 3 - Strong coating/substrate adhesion

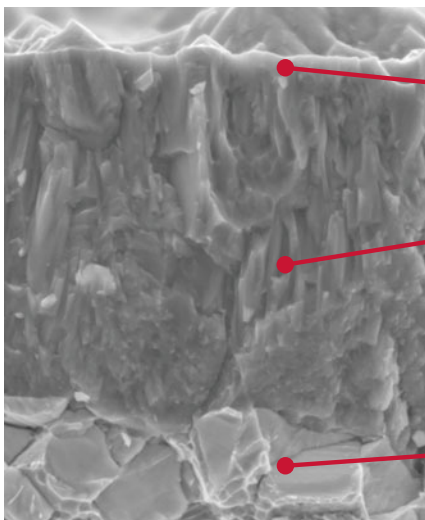
Coating is optimized for strong adhesion property with substrate to maintain strong cutting edge integrity

Carbide substrate

High resistance to fracture

AH8015**H S K P**

- Incorporates a hard coating layer and carbide substrate.
- Strong resistance to wear, heat, and built-up edge, ideal for machining hard or difficult materials.

**Special surface technology****PREMIUMTEC**

TUNGALOY

Smooth insert surface prevents chip adhesion!

Extremely hard layer of nano multi-layered AlTiN coating with high Al content

Increases hardness by 20 %

Prevents micro cracks from developing

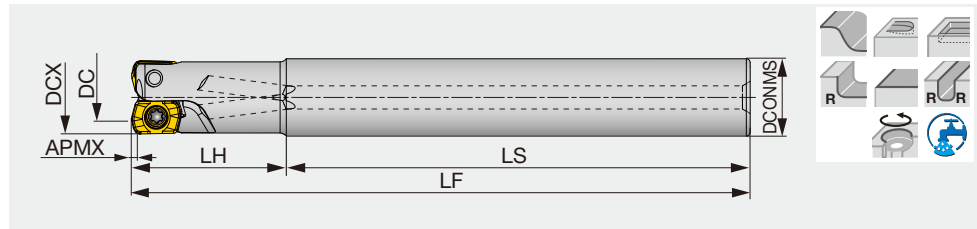
Carbide substrate

High resistance to wear

EXLS

Cylindrical type holder for high-feed milling, screw-on

GAMP = +4°, GAMF = -21° ~ -17°



Inch	APMX	DCX	CICT	DC	DCONMS	LS	LH	LF	WT (lbs)	Air hole	Insert
EXLS02U0.37C0.37LH0.75R01	0.019	0.375	1	0.228	0.375	2.250	0.750	3.000	0.088	With	LSMT02...
EXLS02U0.37C0.37LH1.25R01	0.019	0.375	1	0.228	0.375	2.250	1.250	3.500	0.110	With	LSMT02...
EXLS02U0.37C0.31LH0.75R01	0.019	0.375	1	0.228	0.3125	2.250	0.750	3.000	0.066	With	LSMT02...
EXLS02U0.50C0.50LH0.75R03	0.019	0.500	3	0.354	0.500	2.250	0.750	3.000	0.132	With	LSMT02...
EXLS02U0.50C0.50LH2.00R02	0.019	0.500	2	0.354	0.500	2.250	2.000	4.250	0.176	With	LSMT02...
EXLS02U0.50C0.37LH0.75R03	0.019	0.500	3	0.354	0.375	2.250	0.750	3.000	0.088	With	LSMT02...
EXLS02U0.62C0.62LH1.50R05	0.019	0.625	5	0.479	0.625	2.500	1.500	4.000	0.308	With	LSMT02...
EXLS02U0.62C0.62LH2.00R03	0.019	0.625	3	0.479	0.625	2.500	2.000	4.500	0.375	With	LSMT02...

Metric	APMX	DCX	CICT	DC	DCONMS	LS	LH	LF	WT (kg)	Air hole	Insert
EXLS02M008C08.0LH16R01	0.5	8	1	4.29	8	59	16	75	0.02	With	LSMT02...
EXLS02M008C08.0LH30R01	0.5	8	1	4.29	8	59	31	90	0.03	With	LSMT02...
EXLS02M010C10.0LH20R02	0.5	10	2	6.28	10	60	20	80	0.04	With	LSMT02...
EXLS02M010C10.0LH40R02	0.5	10	2	6.28	10	60	40	100	0.05	With	LSMT02...
EXLS02M010C08.0LH20R02	0.5	10	2	6.28	8	60	20	80	0.03	With	LSMT02...
EXLS02M012C12.0LH20R03	0.5	12	3	8.31	12	60	20	80	0.06	With	LSMT02...
EXLS02M012C12.0LH50R02	0.5	12	2	8.31	12	60	50	110	0.08	With	LSMT02...
EXLS02M012C10.0LH20R03	0.5	12	3	8.31	10	60	20	80	0.04	With	LSMT02...
EXLS02M016C16.0LH30R05	0.5	16	5	12.31	16	70	30	100	0.14	With	LSMT02...
EXLS02M016C16.0LH50R03	0.5	16	3	12.31	16	70	50	120	0.17	With	LSMT02...

SPARE PARTS



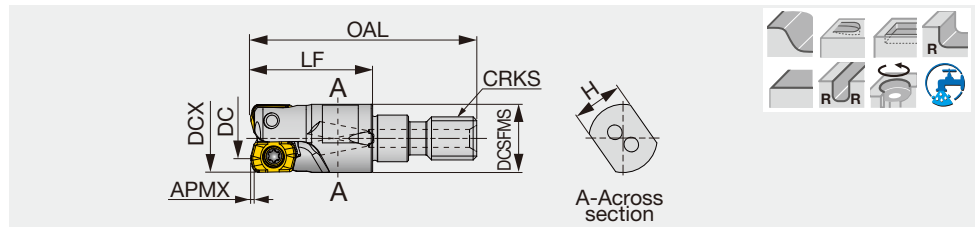
Designation	Clamping screw	Lubricant	Wrench
EXLS02U...	CSPB-2H	M-1000	IP-6DB

TUNGFLEX

HXLS

Modular head for high-feed milling, screw-on (TungFlex)

GAMP = +4°, GAMF = -21° ~ -17°



Metric	APMX	DCX	CICT	DC	OAL	LF	H	DCSFMS	CRKS	WT (kg)	Air hole	Insert
HXLS02M008M06R01	0.5	8	1	4.29	33.5	19	7	9.5	M6	0.01	With	LSMT02...
HXLS02M010M06R02	0.5	10	2	6.28	31.5	17	7	9.5	M6	0.01	With	LSMT02...
HXLS02M012M06R03	0.5	12	3	8.31	31.5	17	7	10	M6	0.01	With	LSMT02...
HXLS02M012M06R02	0.5	12	2	8.31	31.5	17	7	10	M6	0.01	With	LSMT02...
HXLS02M016M08R05	0.5	16	5	12.31	40	23	10	13	M8	0.03	With	LSMT02...
HXLS02M016M08R03	0.5	16	3	12.31	40	23	10	13	M8	0.03	With	LSMT02...

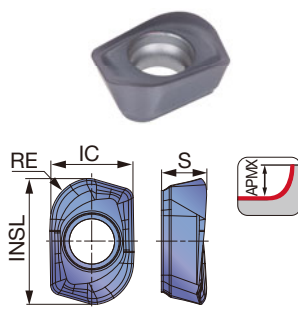
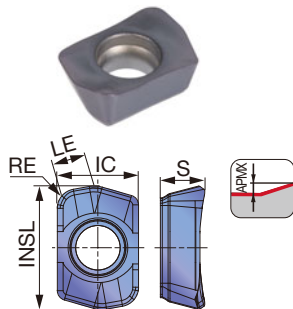
SPARE PARTS

Designation	Clamping screw	Lubricant	Wrench
HXLS02M...	CSPB-2H	M-1000	IP-6DB

INSERTS

LSMT-HM (High feed)

LSMT-MM (Radius)



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

★ : First choice
☆ : Second choice

Designation	RE	APMX	Coated		LE	INSL	IC	S
			AH3225	AH8015				
LSMT0202ZER-HM	0.039	0.019	●	●	0.067	0.252	0.165	0.091
LSMT0202R2-MM	0.079	0.079	●	●	-	0.252	0.169	0.091

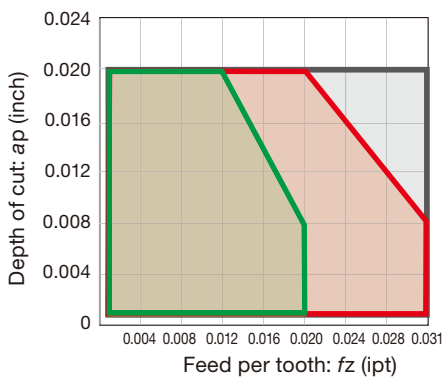
● : To be released in 2019
● : Line up

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)
P	Carbon steels (1045, 1055, etc.)	- 300HB	First choice	AH3225	330 - 990	0.008 - 0.031
		- 300HB	For wear resistance	AH8015	330 - 990	0.008 - 0.031
	Alloy steels (4140, SCr415, etc.)	- 300HB	First choice	AH3225	330 - 990	0.008 - 0.031
		- 300HB	For wear resistance	AH8015	330 - 990	0.008 - 0.031
	Prehardened steels (NAK80, PX5, etc.)	30 - 40HRC	First choice	AH8015	330 - 660	0.008 - 0.020
		30 - 40HRC	For impact resistance	AH3225	330 - 660	0.008 - 0.020
M	Stainless steels (304, 316, etc.)	- 200HB	First choice	AH3225	330 - 660	0.008 - 0.020
K	Gray cast irons (No.250B, etc.)	150 - 250HB	First choice	AH8015	330 - 990	0.008 - 0.031
		150 - 250HB	For impact resistance	AH3225	330 - 990	0.008 - 0.031
	Ductile cast irons (65-45-12, etc.)	150 - 250HB	First choice	AH8015	260 - 660	0.008 - 0.031
		150 - 250HB	For impact resistance	AH3225	260 - 660	0.008 - 0.031
S	Titanium alloy (Ti-6Al-4V, etc)	- 40HRC	First choice	AH3225	100 - 200	0.004 - 0.012
		- 40HRC	For wear resistance	AH8015	100 - 200	0.004 - 0.012
	Heat resistance alloy (Inconel, Hastelloy, etc)	- 40HRC	First choice	AH8015	70 - 170	0.004 - 0.012
		- 40HRC	For impact resistance	AH3225	70 - 170	0.004 - 0.012
H	Hardened steel	H13, etc	40 - 50HRC	First choice	AH8015	260 - 490
		D2/ D3, etc	50-60HRC	First choice	AH8015	160 - 230

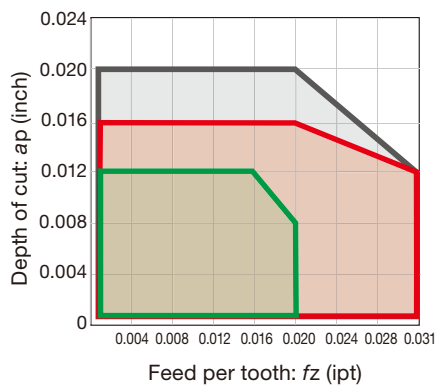
APPLICATION

LSMT02-HM



- For standard shanks in $\leq 3xD$
- For long-neck shanks in $\geq 4xD$
- For modular head shanks in $\geq 7xD$

LSMT02-MM



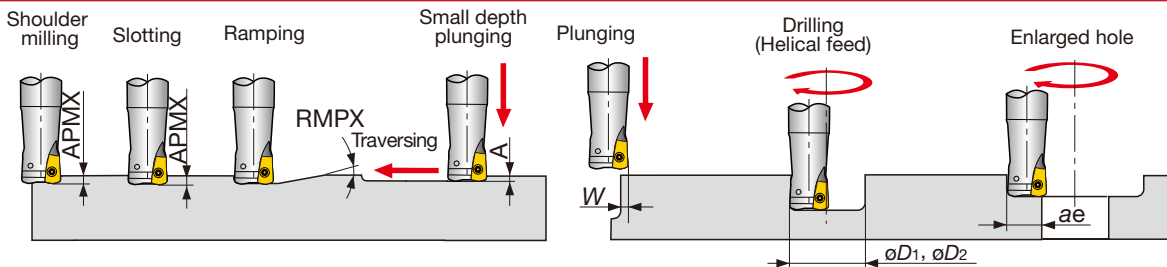
- For standard shanks in $\leq 3xD$
- For long-neck shanks in $\geq 4xD$
- For modular head shanks in $\geq 7xD$

* When the DOC is 0.020" or more, the feed less than 0.006 ipt is recommended.

Tool dia.: ϕD_c (inch), Number of revolutions: n (rpm), Feed speed: V_f (ipm), Max. depth of cut: $ap = 0.020"$, Number of teeth: CICT

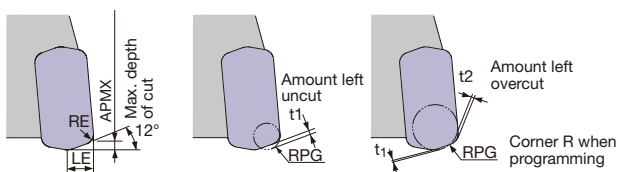
$\phi 0.375"$, CICT = 1		$\phi 0.5"$		$\phi 0.625"$			
n	V_f	n	V_f	n	V_f		
			CICT = 2	CICT = 3			
					CICT = 3	CICT = 5	
6682	134	5011	200	301	4009	241	401
Vc = 656 sfm, fz = 0.020 ipt							
6682	134	5011	200	301	4009	241	401
Vc = 656 sfm, fz = 0.020 ipt							
5011	80	3759	120	180	3007	144	241
Vc = 492 sfm, fz = 0.016 ipt							
4013	64	3010	96	144	2408	116	193
Vc = 394 sfm, fz = 0.016 ipt							
6682	134	5011	200	301	4009	241	401
Vc = 656 sfm, fz = 0.020 ipt							
5011	100	3759	150	226	3007	180	301
Vc = 492 sfm, fz = 0.020 ipt							
1334	11	1001	16	24	801	19	32
Vc = 131 sfm, fz = 0.008 ipt							
998	8	749	12	18	599	14	24
Vc = 98 sfm, fz = 0.008 ipt							
4013	48	3010	72	108	2408	87	144
Vc = 394 sfm, fz = 0.012 ipt							
2007	16	1505	24	36	1204	29	48
Vc = 197 sfm, fz = 0.008 ipt							

MACHINING APPLICATIONS



Designation	DC	Max. depth of cut APMX	Max. ramping angle RMPX	Max. plunging depth A	Max. cutting width in plunging W	Min. machining ϕD_1	Max. machining ϕD_2	Max. cutting width in enlarged hole ae
EXLS02U0.37...	0.375	0.019	3.6°	0.007	0.078	0.513	0.730	0.292
EXLS02U0.50...	0.500	0.019	1.8°	0.007	0.078	0.763	0.980	0.417
EXLS02U0.62...	0.625	0.019	1.3°	0.007	0.078	1.013	1.230	0.542


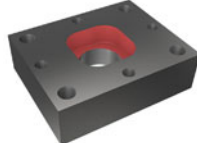
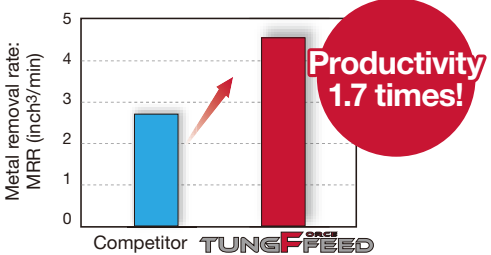
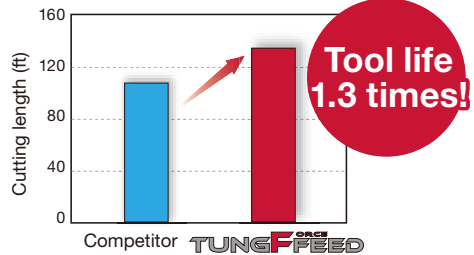


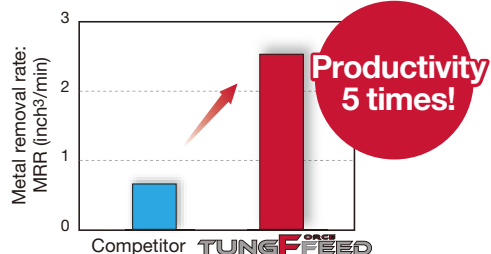
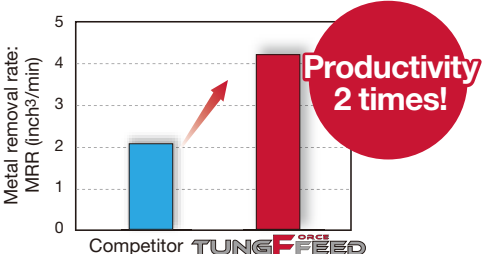
Tool geometry on programming



LSMT02...-HM

Corner R when programming: RPG	Amount left uncut t1 (inch)	Amount left overcut t2 (inch)
0.039 <small>Recommend</small>	0.006	0
0.059	0.003	0.006
0.079	0	0.013

PRACTICAL EXAMPLES

Workpiece type		Stator shaft	Stamping die part	
Cutter		EXLS02U0.37C0.31LH0.75R01 (ø0.375", CICT = 1)	HXLS02M010M06R02 (ø10mm, CICT = 2)	
Insert		LSMT0202ZER-HM	LSMT0202ZER-HM	
Grade		AH3225	AH3225	
		1045	H13(before hardening)	
Workpiece material		 P	 P	
Cutting conditions	Cutting speed : Vc (sfm)	492	394	
	Feed per tooth: fz (ipt)	0.020 (Competitor : fz = 0.012)	0.024	
	Depth of cut : ap (inch)	0.012	0.012	
	Width of cut : ae (inch)	0.315	0.197	
	Machining	Grooving	Pocketing	
	Coolant	Wet	Dry	
	Machine	Vertical M/C, CAT30	Vertical M/C, CAT40	
Results	 <p>TungForceFeed insert's light cutting action ensured reliable high feed milling improving MRR by 1.7x</p>		 <p>AH3225 prevented wear and chipping, while improving tool life by 1.3 times.</p>	
Workpiece type		Stamping die part	Turbine blade	
Cutter		EXLS02U0.50C0.50LH2.00R02 (ø0.5", CICT = 2)	EXLS02U0.37C0.31LH0.75R01 (ø0.375", CICT = 1)	
Insert		LSMT0202ZER-HM	LSMT0202ZER-HM	
Grade		AH3225	AH8015	
		H13 (45HRC)	Inconel 939	
Workpiece material		 H	 S	
Cutting conditions	Cutting speed : Vc (sfm)	371	98	
	Feed per tooth: fz (ipt)	0.020 (Competitor : fz = 0.004)	0.008 (Competitor : fz = 0.002)	
	Depth of cut : ap (inch)	0.012	0.012	
	Width of cut : ae (inch)	0.472	0.315	
	Machining	Face milling	Grooving	
	Coolant	Air	Dry	
	Machine	Vertical M/C, CAT50	Vertical M/C, CAT50	
Results	 <p>Strong TungForceFeed inserts ensured reliable machining of hard material, improving MRR by 5 times.</p>		 <p>Higher feed per tooth improved MRR by double, while reducing tool cost thanks to indexability.</p>	

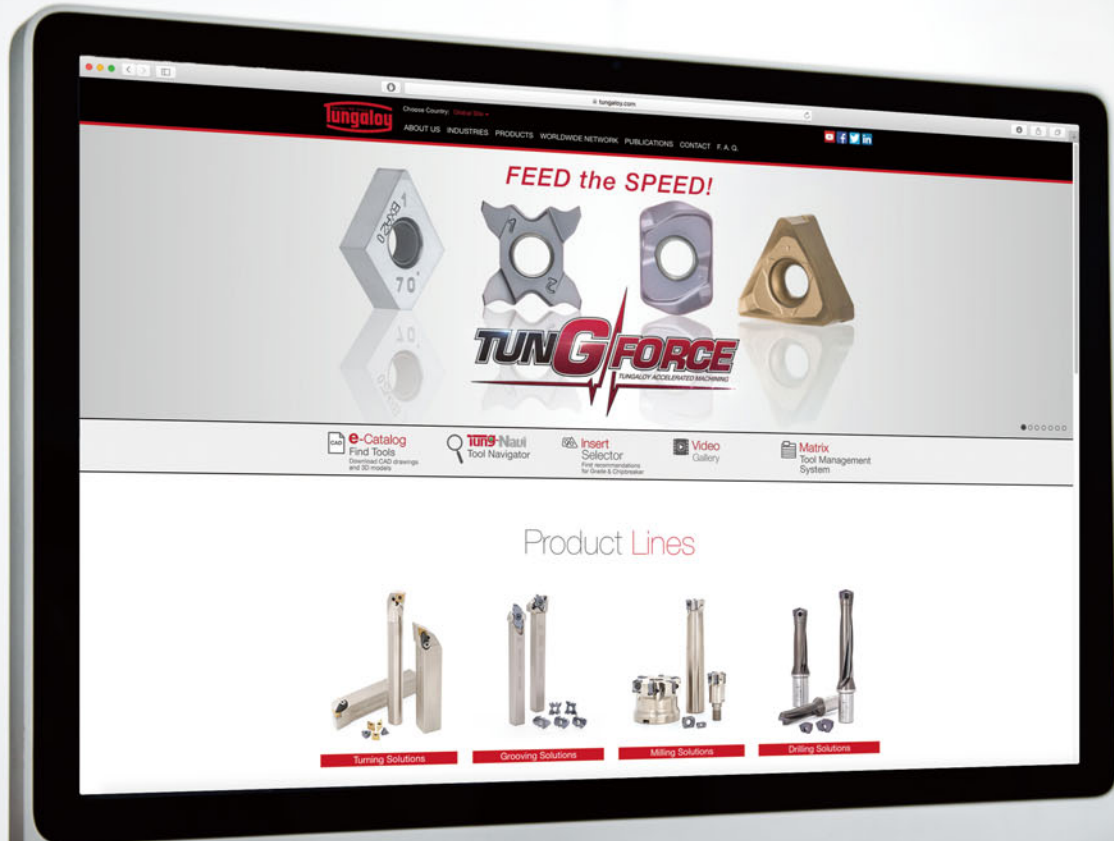
MEMO

A large grid of graph paper, consisting of 20 columns and 30 rows of small squares, intended for writing a memo.

MEMO

A large grid of graph paper, consisting of 20 columns and 30 rows of small squares, intended for taking notes or drawing.

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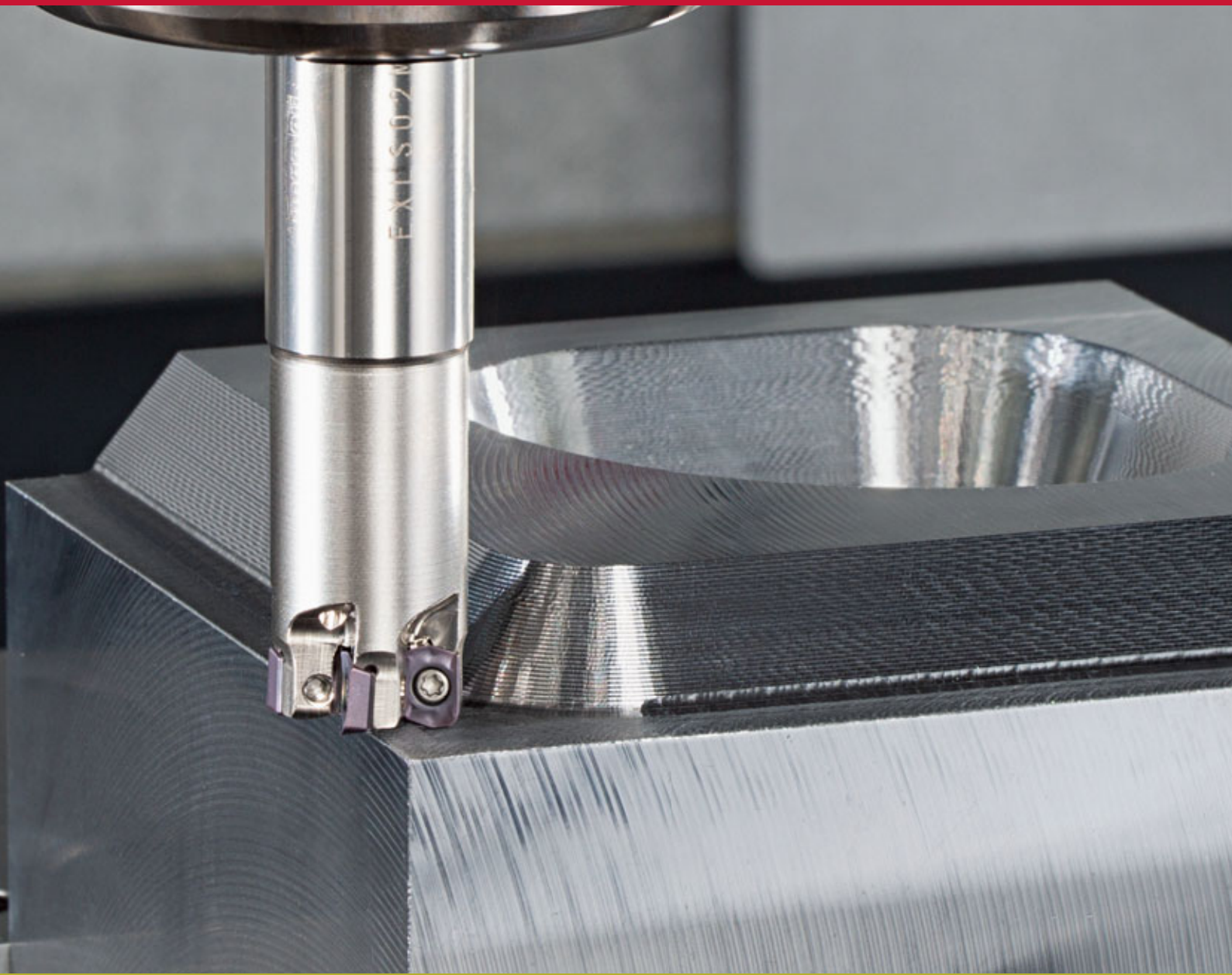
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TUNG**F**ORCE**FEED**

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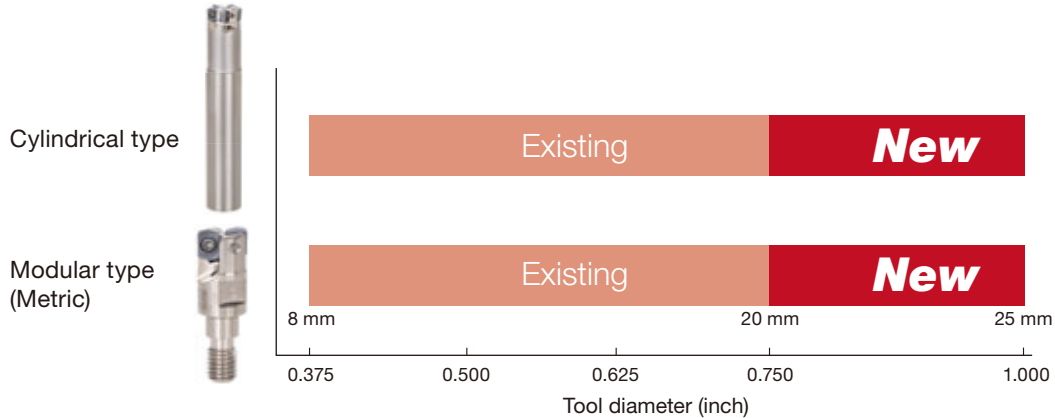
Tungaloy Report No. 521S1-US

TungForceFeed expansion! Now available
in diameter ranges from **0.375 to 1.000**



Expansion of $\varnothing 0.750''$, $\varnothing 1.000''$

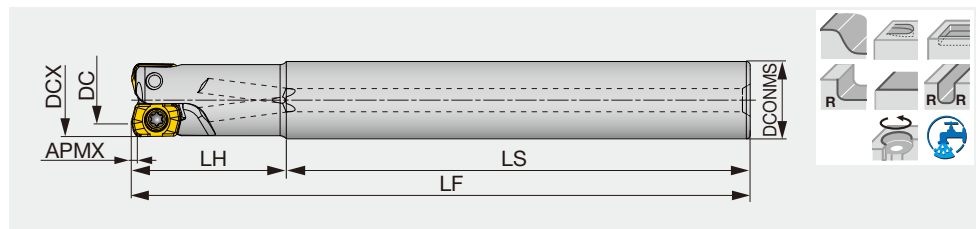
Improve table feeds thanks to a higher insert density



EXLS

Cylindrical type holder for high-feed milling, screw-on

GAMP = +4°, GAMF = -21° ~ -17°



Inch	APMX	DCX	CICT	DC	DCONMS	LS	LH	LF	WT (lbs)	Air hole	Insert
EXLS02U0.37C0.37LH0.75R01	0.019	0.375	1	0.228	0.375	2.250	0.750	3.000	0.088	With	LSMT02...
EXLS02U0.37C0.37LH1.25R01	0.019	0.375	1	0.228	0.375	2.250	1.250	3.500	0.110	With	LSMT02...
EXLS02U0.37C0.31LH0.75R01	0.019	0.375	1	0.228	0.3125	2.250	0.750	3.000	0.066	With	LSMT02...
EXLS02U0.50C0.50LH0.75R03	0.019	0.500	3	0.354	0.500	2.250	0.750	3.000	0.132	With	LSMT02...
EXLS02U0.50C0.50LH2.00R02	0.019	0.500	2	0.354	0.500	2.250	2.000	4.250	0.176	With	LSMT02...
EXLS02U0.50C0.37LH0.75R03	0.019	0.500	3	0.354	0.375	2.250	0.750	3.000	0.088	With	LSMT02...
EXLS02U0.62C0.62LH1.50R05	0.019	0.625	5	0.479	0.625	2.500	1.500	4.000	0.308	With	LSMT02...
EXLS02U0.62C0.62LH2.00R03	0.019	0.625	3	0.479	0.625	2.500	2.000	4.500	0.375	With	LSMT02...
New EXLS02U0.75C0.75LH2.00R05	0.019	0.750	5	0.602	0.750	3.000	2.000	5.000	0.529	With	LSMT02...
New EXLS02U0.75C0.75LH2.00R06	0.019	0.750	6	0.602	0.750	3.000	2.000	5.000	0.529	With	LSMT02...
New EXLS02U0.75C0.75LH3.50R05	0.019	0.750	5	0.602	0.750	3.000	3.500	6.500	0.683	With	LSMT02...
New EXLS02U1.00C1.00LH2.50R06	0.019	1.000	6	0.850	1.000	3.000	2.500	5.500	1.036	With	LSMT02...
New EXLS02U1.00C1.00LH2.50R08	0.019	1.000	8	0.850	1.000	3.000	2.500	5.500	1.036	With	LSMT02...
New EXLS02U1.00C1.00LH4.00R06	0.019	1.000	6	0.850	1.000	3.000	4.000	7.000	1.279	With	LSMT02...

Metric	APMX	DCX	CICT	DC	DCONMS	LS	LH	LF	WT (kg)	Air hole	Insert
EXLS02M008C08.0LH16R01	0.5	8	1	4.29	8	59	16	75	0.02	With	LSMT02...
EXLS02M008C08.0LH30R01	0.5	8	1	4.29	8	59	31	90	0.03	With	LSMT02...
EXLS02M010C10.0LH20R02	0.5	10	2	6.28	10	60	20	80	0.04	With	LSMT02...
EXLS02M010C10.0LH40R02	0.5	10	2	6.28	10	60	40	100	0.05	With	LSMT02...
EXLS02M010C08.0LH20R02	0.5	10	2	6.28	8	60	20	80	0.03	With	LSMT02...
EXLS02M012C12.0LH20R03	0.5	12	3	8.31	12	60	20	80	0.06	With	LSMT02...
EXLS02M012C12.0LH50R02	0.5	12	2	8.31	12	60	50	110	0.08	With	LSMT02...
EXLS02M012C10.0LH20R03	0.5	12	3	8.31	10	60	20	80	0.04	With	LSMT02...
EXLS02M016C16.0LH30R05	0.5	16	5	12.31	16	70	30	100	0.14	With	LSMT02...
EXLS02M016C16.0LH50R03	0.5	16	3	12.31	16	70	50	120	0.17	With	LSMT02...
New EXLS02M020C20.0LH50R05	0.5	20	5	16.31	20	80	50	130	0.27	With	LSMT02...
New EXLS02M020C20.0LH50R06	0.5	20	6	16.31	20	80	50	130	0.27	With	LSMT02...
New EXLS02M020C20.0LH80R05	0.5	20	5	16.31	20	80	80	160	0.33	With	LSMT02...
New EXLS02M025C25.0LH60R06	0.5	25	6	21.31	25	80	60	140	0.45	With	LSMT02...
New EXLS02M025C25.0LH60R08	0.5	25	8	21.31	25	80	60	140	0.47	With	LSMT02...
New EXLS02M025C25.0LH100R06	0.5	25	6	21.31	25	80	100	180	0.57	With	LSMT02...

SPARE PARTS

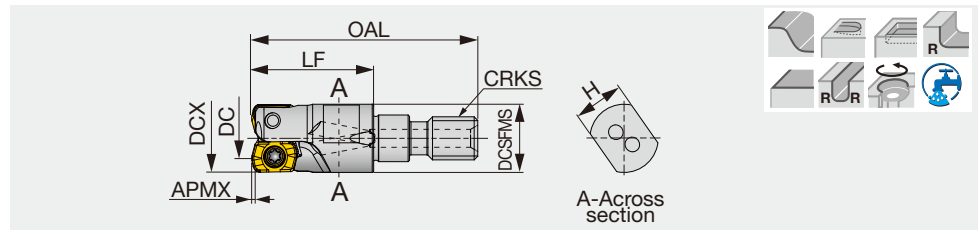
Designation	Clamping screw	Lubricant	Wrench
EXLS02U...	CSPB-2H	M-1000	IP-6DB

*Recommended clamping torque (N·m): CSPB-2H=0.7

TUNGFLX

HXLS

Modular head for high-feed milling, screw-on (TungFlex)



Metric	APMX	DCX	CICT	DC	OAL	LF	H	DCSFMS	CRKS	WT (kg)	Air hole	Insert
HXLS02M008M06R01	0.5	8	1	4.29	33.5	19	7	9.5	M6	0.01	With	LSMT02...
HXLS02M010M06R02	0.5	10	2	6.28	31.5	17	7	9.5	M6	0.01	With	LSMT02...
HXLS02M012M06R03	0.5	12	3	8.31	31.5	17	7	10	M6	0.01	With	LSMT02...
HXLS02M012M06R02	0.5	12	2	8.31	31.5	17	7	10	M6	0.01	With	LSMT02...
HXLS02M016M08R05	0.5	16	5	12.31	40	23	10	13	M8	0.03	With	LSMT02...
HXLS02M016M08R03	0.5	16	3	12.31	40	23	10	13	M8	0.03	With	LSMT02...
New HXLS02M020M10R05	0.5	20	5	16.31	49	30	15	17.8	M10	0.05	With	LSMT02...
New HXLS02M020M10R06	0.5	20	6	16.31	49	30	15	17.8	M10	0.05	With	LSMT02...
New HXLS02M025M12R06	0.5	25	6	21.31	57	30	17	20.8	M12	0.08	With	LSMT02...
New HXLS02M025M12R08	0.5	25	8	21.31	57	30	17	20.8	M12	0.08	With	LSMT02...

SPARE PARTS

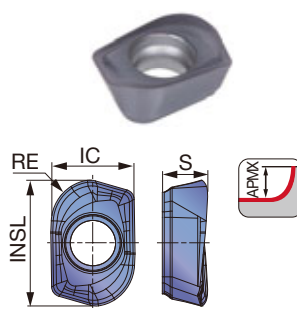
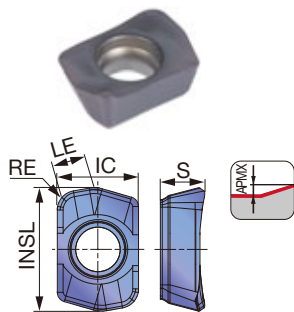
Designation	Clamping screw	Lubricant
HXLS02M...	CSPB-2H	M-1000

*Recommended clamping torque (N·m): CSPB-2H=0.7

INSERTS

LSMT-HM (High feed)

LSMT-MM (Radius)



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

★ : First choice
☆ : Second choice

Designation	RE	APMX	Coated		LE	INSL	IC	S
			AH3225	AH8015				
LSMT0202ZER-HM	0.039	0.019	●	●	0.067	0.252	0.165	0.091
LSMT0202R2-MM	0.079	0.079	●	●	-	0.252	0.169	0.091

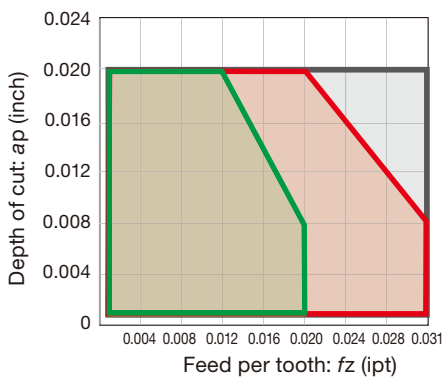
● : Line up

STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)	
P	Carbon steels (1045, 1055, etc.)	- 300HB	First choice	AH3225	330 - 990	0.008 - 0.031	
		- 300HB	For wear resistance	AH8015	330 - 990	0.008 - 0.031	
	Alloy steels (4140, etc.)	- 300HB	First choice	AH3225	330 - 990	0.008 - 0.031	
		- 300HB	For wear resistance	AH8015	330 - 990	0.008 - 0.031	
	Prehardened steels (NAK80, PX5, etc.)	30 - 40HRC	First choice	AH8015	330 - 660	0.008 - 0.020	
		30 - 40HRC	For impact resistance	AH3225	330 - 660	0.008 - 0.020	
M	Stainless steels (304, 316, etc.)	- 200HB	First choice	AH3225	330 - 660	0.008 - 0.020	
K	Gray cast irons (No.250B, etc.)	150 - 250HB	First choice	AH8015	330 - 990	0.008 - 0.031	
		150 - 250HB	For impact resistance	AH3225	330 - 990	0.008 - 0.031	
	Ductile cast irons (65-45-12, etc.)	150 - 250HB	First choice	AH8015	260 - 660	0.008 - 0.031	
		150 - 250HB	For impact resistance	AH3225	260 - 660	0.008 - 0.031	
S	Titanium alloy (Ti-6Al-4V, etc)	- 40HRC	First choice	AH3225	100 - 200	0.004 - 0.012	
		- 40HRC	For wear resistance	AH8015	100 - 200	0.004 - 0.012	
	Heat resistant alloy (Inconel, Hastelloy, etc)	- 40HRC	First choice	AH8015	70 - 170	0.004 - 0.012	
		- 40HRC	For impact resistance	AH3225	70 - 170	0.004 - 0.012	
	H	Hardened steel	H13, etc	First choice	AH8015	260 - 490	0.004 - 0.020
			D2, D3, etc	First choice	AH8015	160 - 230	0.004 - 0.012

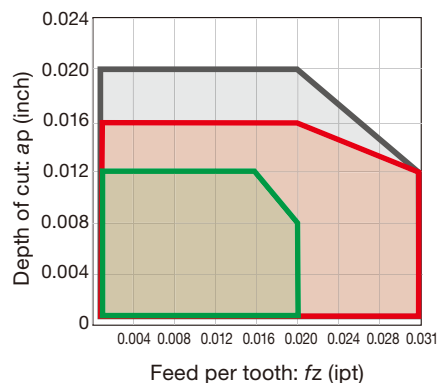
APPLICATION

LSMT02-HM



- For standard shanks in $\leq 3xD$
- For long-neck shanks in $\geq 4xD$
- For modular head shanks in $\geq 7xD$

LSMT02-MM



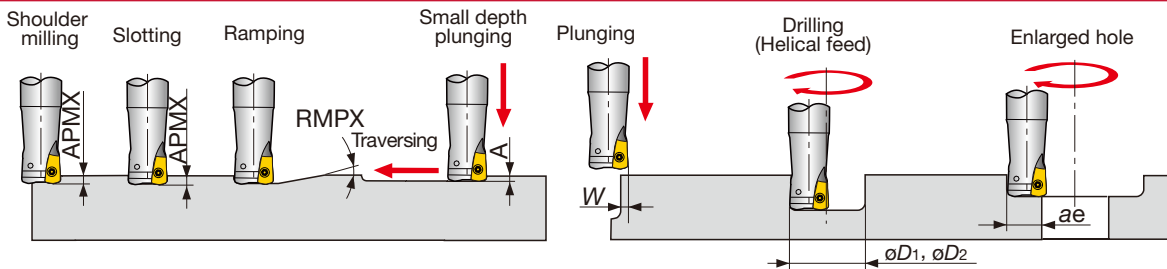
- For standard shanks in $\leq 3xD$
- For long-neck shanks in $\geq 4xD$
- For modular head shanks in $\geq 7xD$

* When the DOC is 0.020" or more, the feed less than 0.006 ipt is recommended.

Tool dia.: (inch), Number of revolutions: n (rpm), Feed speed: V_f (ipm), Max. depth of cut: $ap = 0.020"$, Number of teeth: CICT

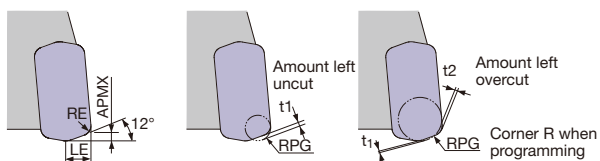
$\phi 0.375"$, CICT = 1		$\phi 0.5"$		$\phi 0.625"$		$\phi 0.750"$		$\phi 1.000"$					
n	V_f	n	V_f	n	V_f	n	V_f	n	V_f				
		CICT = 2	CICT = 3	CICT = 3	CICT = 5	CICT = 5	CICT = 6	CICT = 5	CICT = 8				
6682	134	5011	200	301	4009	241	401	3341	334	401	2506	301	401
$V_c = 656$ sfm, $f_z = 0.020$ ipt													
6682	134	5011	200	301	4009	241	401	3341	334	401	2506	301	401
$V_c = 656$ sfm, $f_z = 0.020$ ipt													
5011	80	3759	120	180	3007	144	241	2506	200	241	1879	180	241
$V_c = 492$ sfm, $f_z = 0.016$ ipt													
4013	64	3010	96	144	2408	116	193	2007	161	193	1505	144	193
$V_c = 394$ sfm, $f_z = 0.016$ ipt													
6682	134	5011	200	301	4009	241	401	3341	334	401	2506	301	401
$V_c = 656$ sfm, $f_z = 0.020$ ipt													
5011	100	3759	150	226	3007	180	301	2506	251	301	1879	225	301
$V_c = 492$ sfm, $f_z = 0.020$ ipt													
1334	11	1001	16	24	801	19	32	667	27	32	500	24	32
$V_c = 131$ sfm, $f_z = 0.008$ ipt													
998	8	749	12	18	599	14	24	499	20	24	374	18	24
$V_c = 98$ sfm, $f_z = 0.008$ ipt													
4013	48	3010	72	108	2408	87	144	2007	120	145	1505	108	144
$V_c = 394$ sfm, $f_z = 0.012$ ipt													
2007	16	1505	24	36	1204	29	48	1003	40	48	752	36	48
$V_c = 197$ sfm, $f_z = 0.008$ ipt													

MACHINING APPLICATIONS



Designation	DC	Max. depth of cut APMX	Max. ramping angle RMPX	Max. plunging depth A	Max. cutting width in plunging W	Min. machining ϕD_1	Max. machining ϕD_2	Max. cutting width in enlarged hole ae
EXLS02U0.37...	0.375	0.019	3.6°	0.007	0.078	0.513	0.730	0.292
EXLS02U0.50...	0.500	0.019	1.8°	0.007	0.078	0.763	0.980	0.417
EXLS02U0.62...	0.625	0.019	1.3°	0.007	0.078	1.013	1.230	0.542
EXLS02U0.75...	0.750	0.019	1.2°	0.007	0.078	1.260	1.460	0.660
EXLS02U1.00...	1.000	0.019	1.0°	0.007	0.078	1.760	1.960	0.910


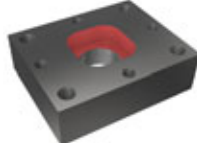
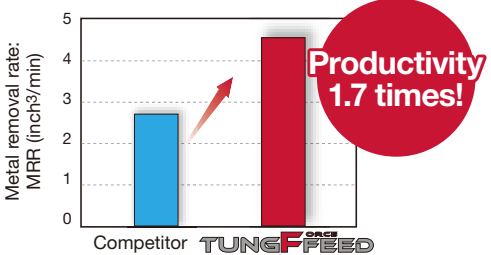
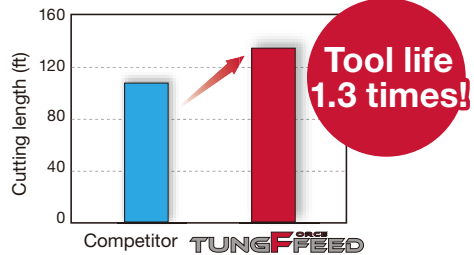


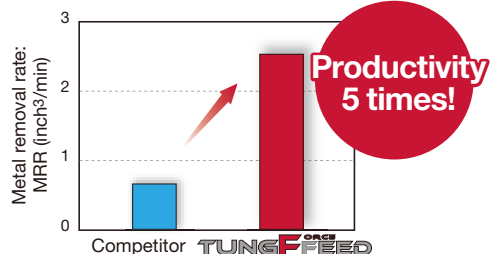
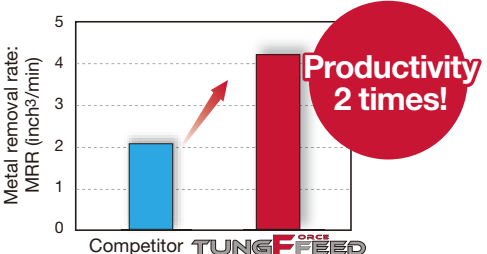
Tool geometry on programming



LSMT02...-HM

Corner R when programming: RPG	Amount left uncut t_1 (inch)	Amount left overcut t_2 (inch)
0.039 _{Recommend}	0.006	0
0.059	0.003	0.006
0.079	0	0.013

PRACTICAL EXAMPLES

Workpiece type		Stator shaft	Stamping die part
Cutter		EXLS02U0.37C0.31LH0.75R01 ($\phi 0.375"$, CICT = 1)	HXLS02M010M06R02 ($\phi 10\text{mm}$, CICT = 2)
Insert		LSMT0202ZER-HM	LSMT0202ZER-HM
Grade		AH3225	AH3225
		1045	H13(before hardening)
Workpiece material		 P	 P
Cutting conditions	Cutting speed : Vc (sfm)	492	394
	Feed per tooth: fz (ipt)	0.020 (Competitor: fz = 0.012)	0.024
	Depth of cut : ap (inch)	0.012	0.012
	Width of cut : ae (inch)	0.315	0.197
	Machining	Grooving	Pocketing
	Coolant	Wet	Dry
	Machine	Vertical M/C, CAT30	Vertical M/C, CAT40
Results	 <p>TungForceFeed insert's light cutting action ensured reliable high feed milling improving MRR by 1.7x</p>	 <p>AH3225 prevented wear and chipping, while improving tool life by 1.3 times.</p>	
Workpiece type		Stamping die part	Turbine blade
Cutter		EXLS02U0.50C0.50LH2.00R02 ($\phi 0.5"$, CICT = 2)	EXLS02U0.37C0.31LH0.75R01 ($\phi 0.375"$, CICT = 1)
Insert		LSMT0202ZER-HM	LSMT0202ZER-HM
Grade		AH3225	AH8015
		H13 (45HRC)	Inconel 939
Workpiece material		 H	 S
Cutting conditions	Cutting speed : Vc (sfm)	371	98
	Feed per tooth: fz (ipt)	0.020 (Competitor: fz = 0.004)	0.008 (Competitor: fz = 0.002)
	Depth of cut : ap (inch)	0.012	0.012
	Width of cut : ae (inch)	0.472	0.315
	Machining	Face milling	Grooving
	Coolant	Air	Dry
	Machine	Vertical M/C, CAT50	Vertical M/C, CAT50
Results	 <p>Strong TungForceFeed inserts ensured reliable machining of hard material, improving MRR by 5 times.</p>	 <p>Higher feed per tooth improved MRR by double, while reducing tool cost thanks to indexability.</p>	

MEMO

A large grid of graph paper, consisting of 20 columns and 30 rows of small squares, intended for writing a memo.

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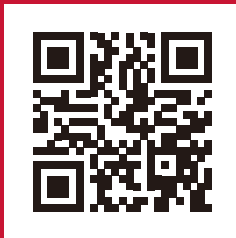
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