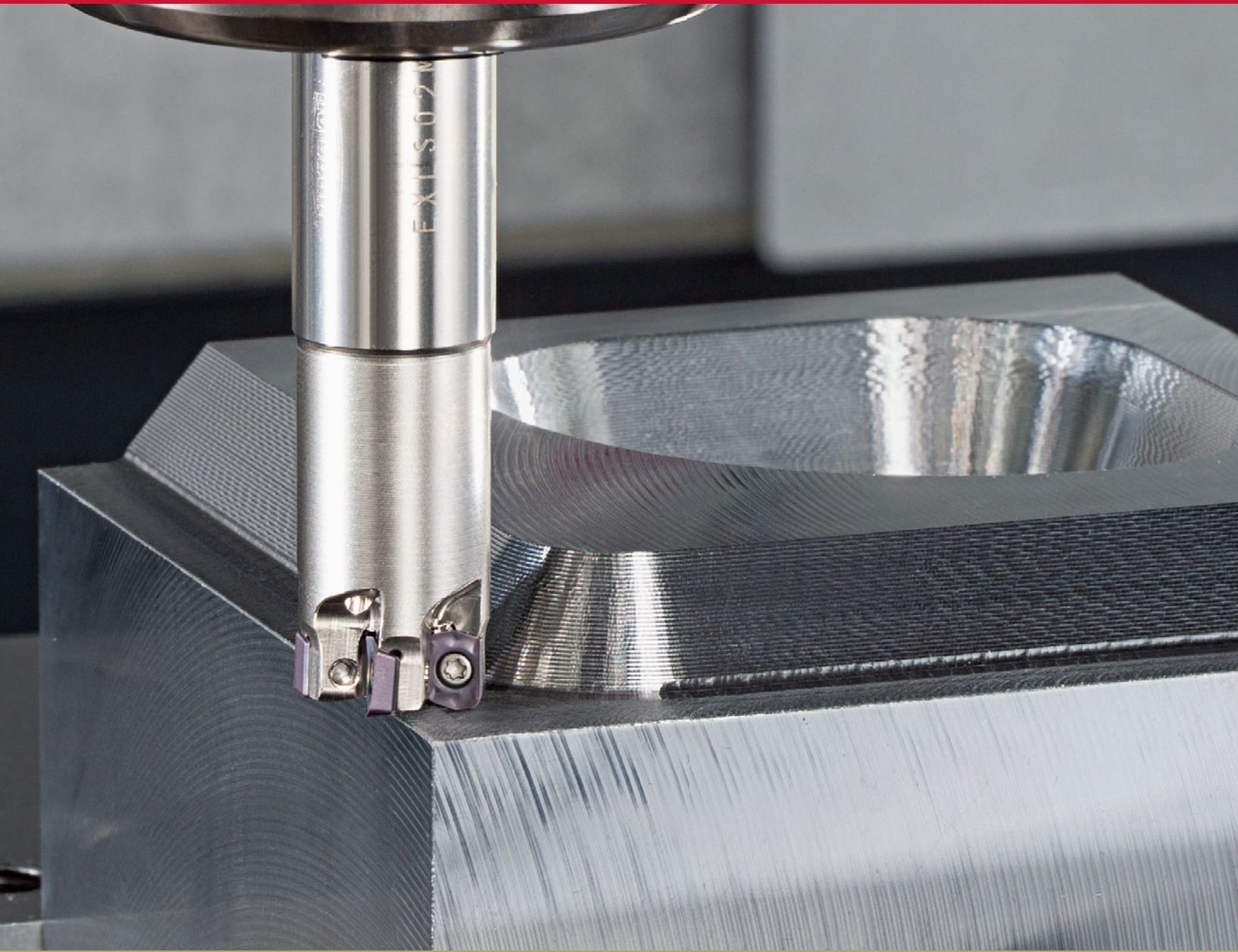


**TUNG**<sup>ORCE</sup>**FEED**

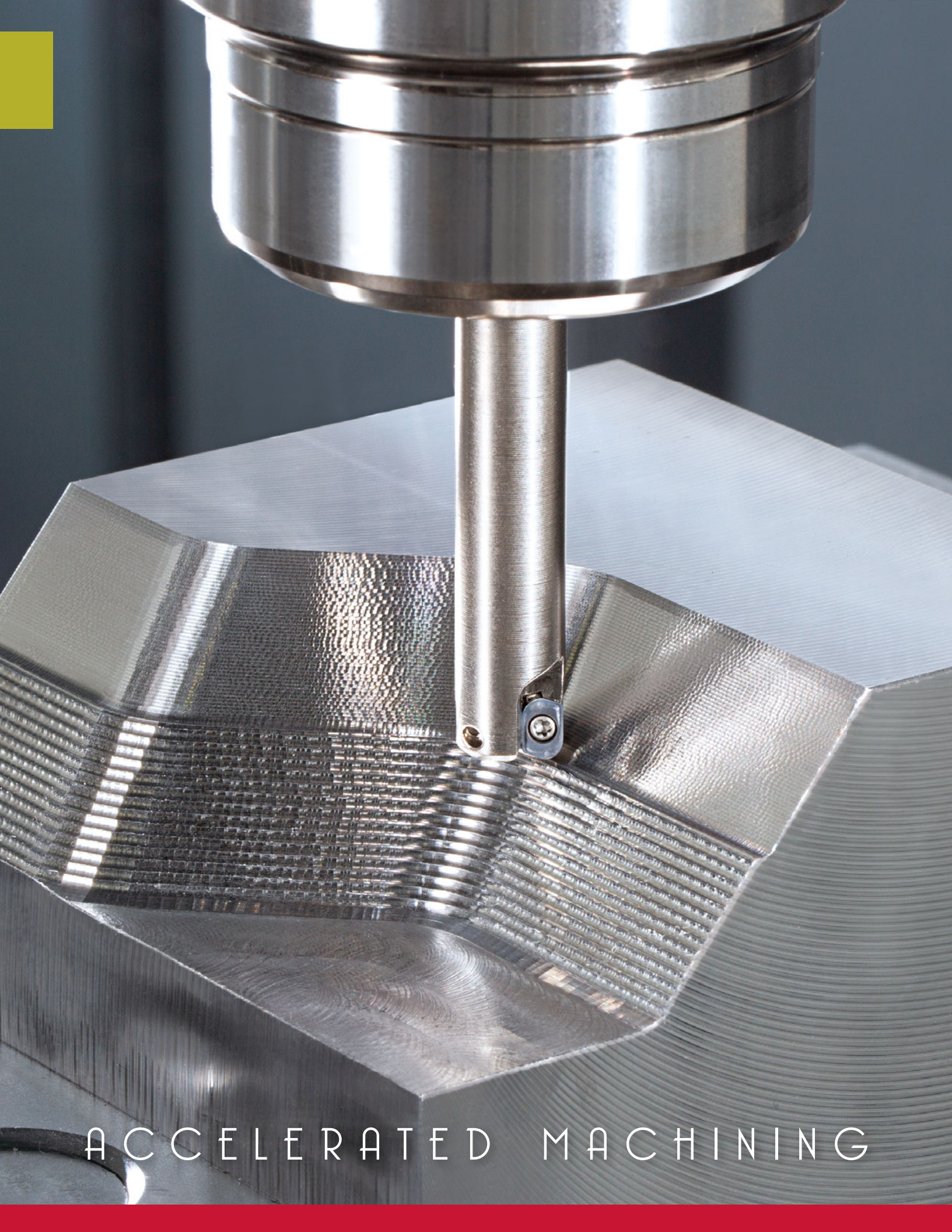
[www.tungaloy.com/us](http://www.tungaloy.com/us)

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



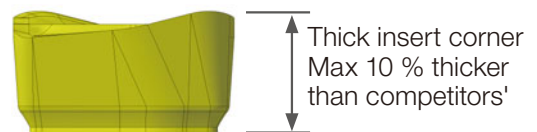
Indexable high feed milling cutter, available in as small as  $\varnothing 0.375$ " diameter, offers free cutting and effective chip control in a wide range of applications.

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

## Built to perform at higher machining conditions

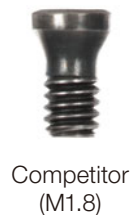
### Strong insert corner for high feed operations

- 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.

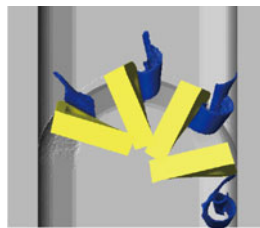
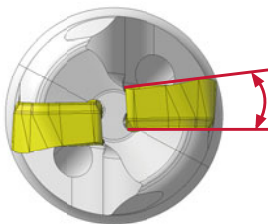


## Proper chip formation assures a reliable machining process

### 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

**TUNG<sup>ORCE</sup>FEED**

Competitor

Chip formation



**Ideal curled chips**



**Crushed chips**

<b>P</b> 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 × 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 <sup>3</sup> /min)	Number of teeth	Cutting speed (sfm)	Feed per tooth (ipt)	Depth of cut (inch)	Width of cut (inch)
<b>TUNGFFEE</b>	<b>4.836</b>	<b>5</b>	<b>656</b>	<b>0.031</b>	<b>0.020</b>	<b>0.390</b>
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

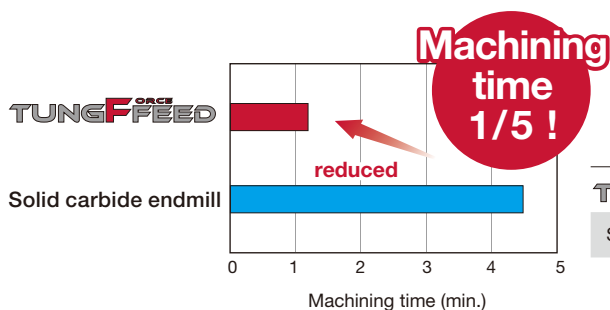
Problems with the conventional tool

- 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)

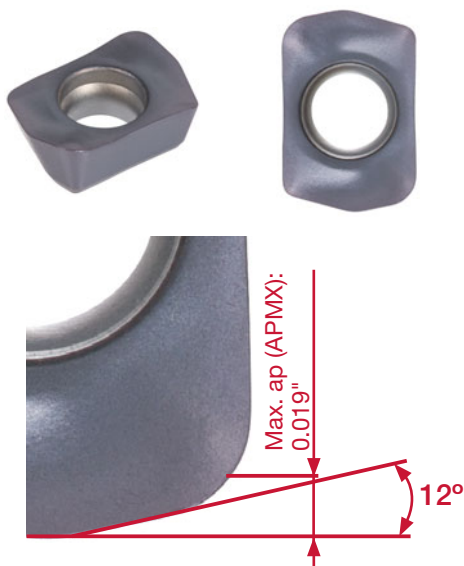


	Tool diameter	Number of teeth	Metal removal rate (in <sup>3</sup> /min)	Over hang (inch)	Cutting speed (sfm)	Feed per tooth (ipt)	Depth of cut (inch)
<b>TUNGFFEE</b>	$\phi 0.5$	2	1.159	2.362	492	0.016	0.020 x 20 passes
Solid carbide endmill	$\phi 0.5$	4	0.244	2.362	262	0.003	0.020 x 20 passes

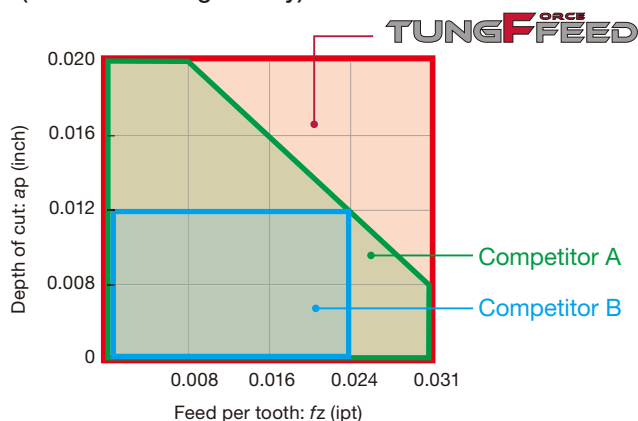
## 2 insert styles for various applications

### 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

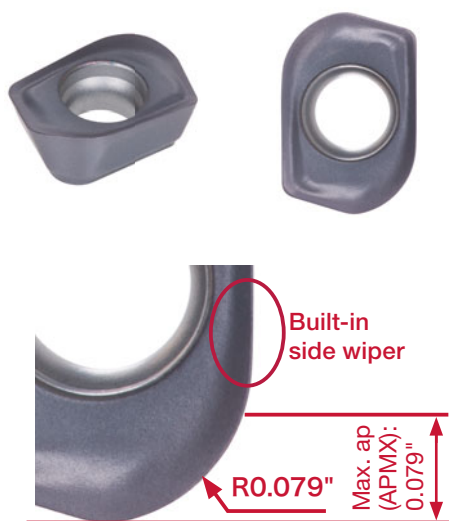


Application range  
(of standard length body)

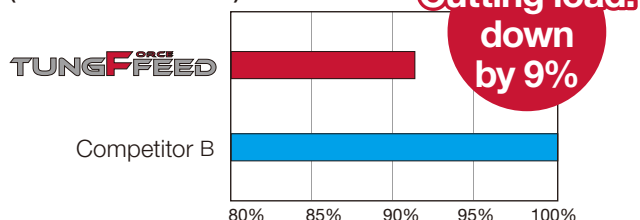


### R0.079 insert (LSMT-MM) (To be released in 2019)

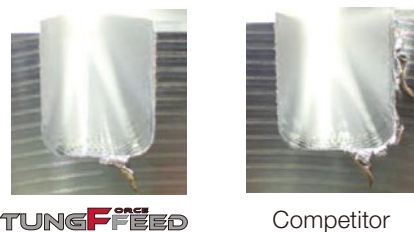
- Full profiling insert design ideal for semi-roughing and semi-finishing of die and mold parts
- Free cutting geometry eliminates chattering and improves surface finish quality
- Built-in side wiper helps reduce burr formation on walls and corners while improving wall accuracy



Cutting load comparison  
(Material: S55C/C55)



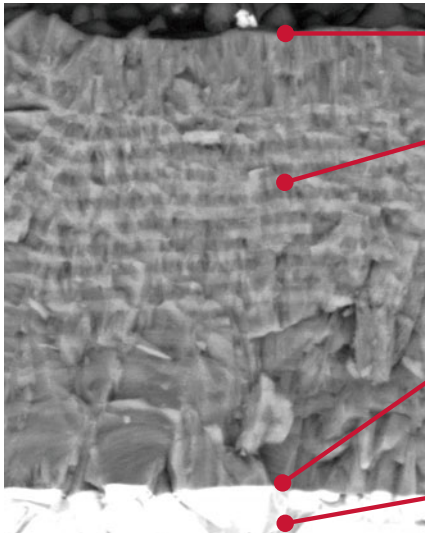
Burr formations on exit



## Grade lineup for various materials

**New****AH3225**

- 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**

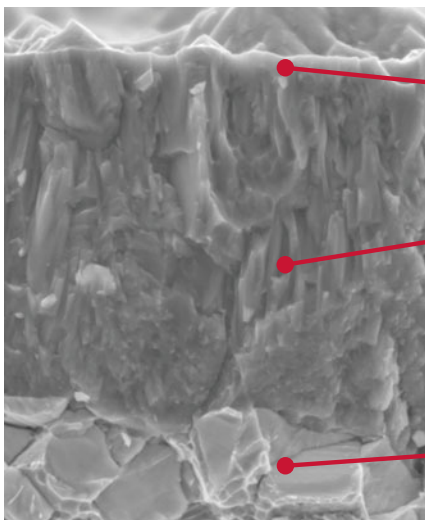
Coating is optimized for strong adhesion property with substrate to maintain strong cutting edge integrity

**Carbide substrate**

High resistance to fracture

**AH8015**

- 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

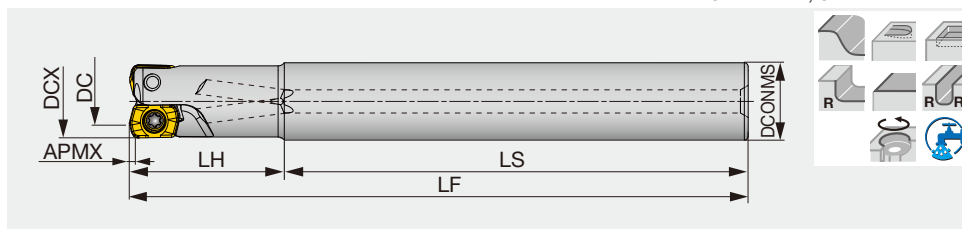
**Carbide substrate**

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...

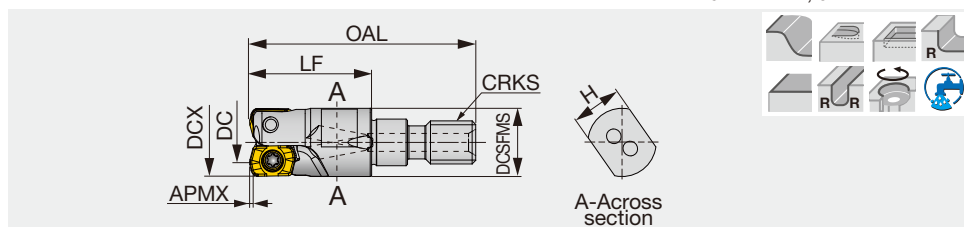
## SPARE PARTS



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

## HXLS

GAMP = +4°, GAMF = -21° ~ -17°

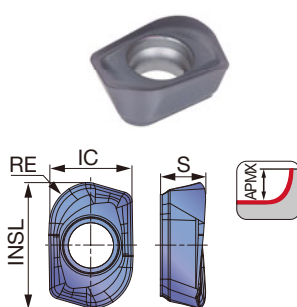
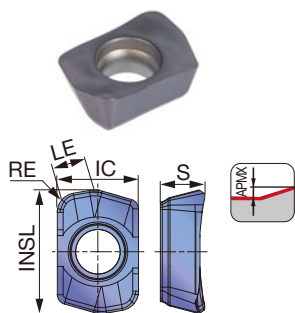


Metric	APMX	DCX	CICT	DC	OAL	LF	H	DCSFMS	CRKS	WT (kg)	Air hole	Insert
HXLS02M008M06R01	0.5	8	1	4.29	33.5	19	7	9.5	M6	0.01	With	LSMT02...
HXLS02M010M06R02	0.5	10	2	6.28	31.5	17	7	9.5	M6	0.01	With	LSMT02...
HXLS02M012M06R03	0.5	12	3	8.31	31.5	17	7	10	M6	0.01	With	LSMT02...
HXLS02M012M06R02	0.5	12	2	8.31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

## LSMT-MM (Radius)

[illegible]

★ : 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

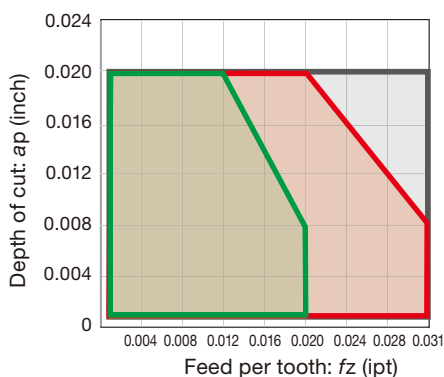
●: To be released in 2019  
●: Line up

## STANDARD CUTTING CONDITIONS

ISO	Workpiece materials	Hardness	Priority	Grades	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)
<b>P</b>	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
<b>M</b>	Stainless steels (304, 316, etc.)	- 200HB	First choice	AH3225	330 - 660	0.008 - 0.020
<b>K</b>	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
<b>S</b>	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
<b>H</b>	Hardened steel	H13, etc 40 - 50HRC	First choice	AH8015	260 - 490	0.004 - 0.020
		D2/ D3, etc 50-60HRC	First choice	AH8015	160 - 230	0.004 - 0.012

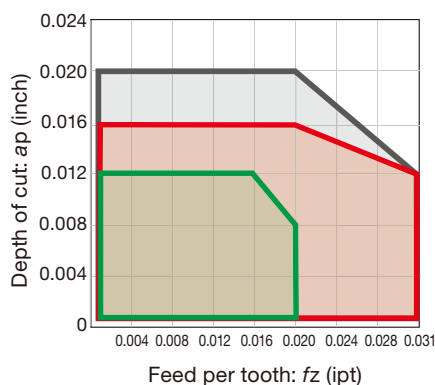
## APPLICATION

LSMT02-HM



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

LSMT02-MM



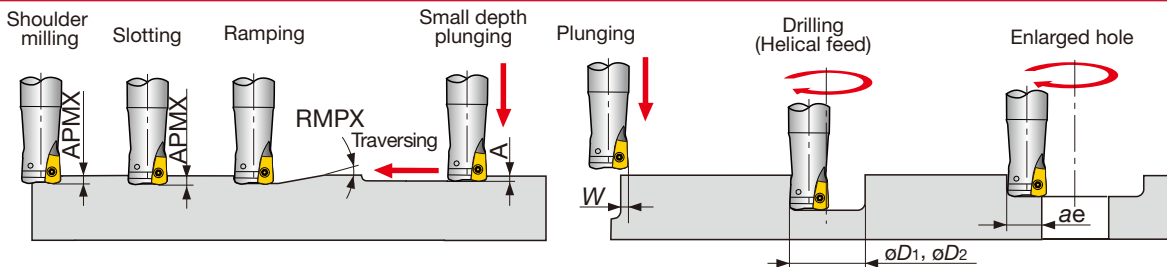
- For standard shanks in  $\leq 3xD$
- For long-neck shanks in  $\geq 4xD$
- For modular head shanks in  $\geq 7xD$

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

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

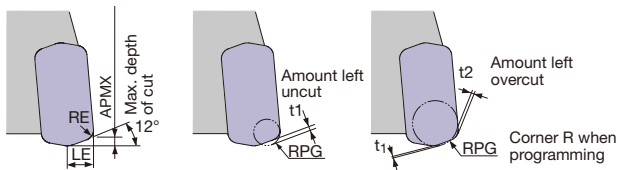
$\phi 0.375"$ , CICT = 1		$\phi 0.5"$		$\phi 0.625"$	
$n$	$V_f$	$n$	$V_f$	$n$	$V_f$
			CICT = 2    CICT = 3		CICT = 3    CICT = 5
6682	134	5011	200    301	4009	241    401
			$V_c = 656 \text{ sfm}, f_z = 0.020 \text{ ipt}$		
6682	134	5011	200    301	4009	241    401
			$V_c = 656 \text{ sfm}, f_z = 0.020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

## 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 $\phi D_1$	Max. machining $\phi D_2$	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


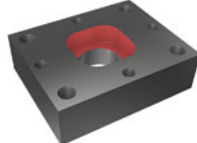
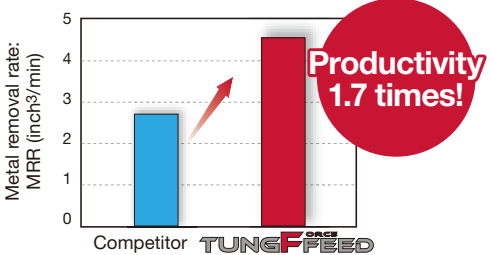
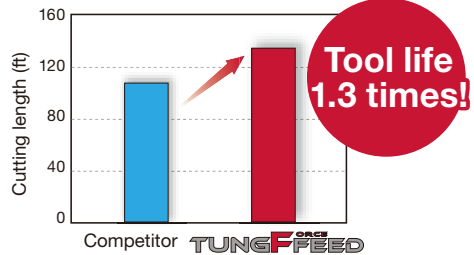


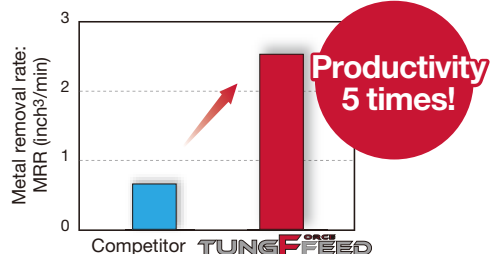
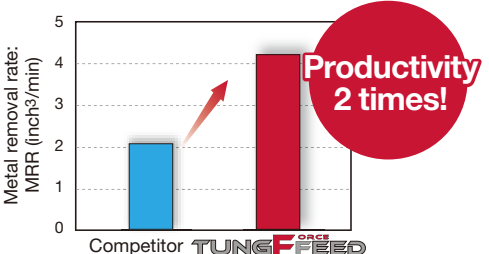
### Tool geometry on programming



### 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

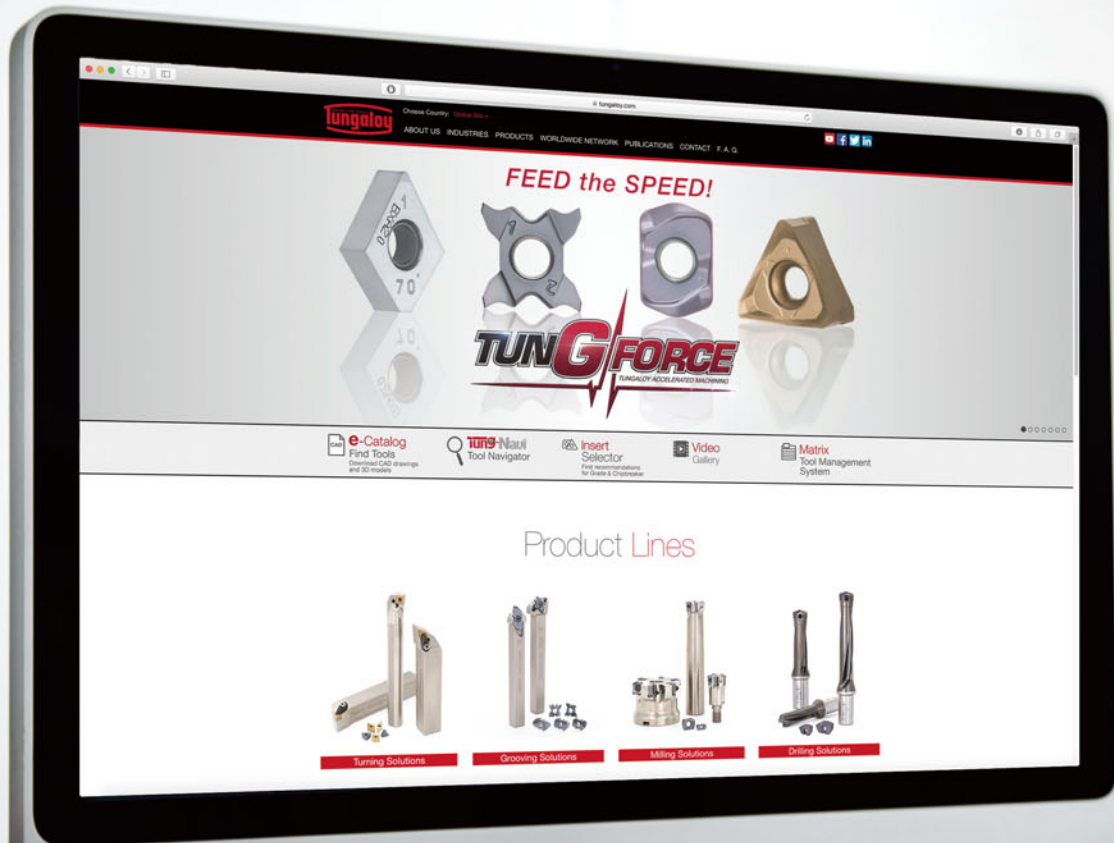
## PRACTICAL EXAMPLES

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

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26



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