

# CONTENTS

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## General product information

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## Added products



### AH8015, AH120, AH3225, AH130, HXSW09, TXSW09

Expanded cutter and grade options for maximum high feed milling performance

[View](#)



MillLine

MILLQ<sup>UAD</sup>FEED

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

Tungaloy Report No. 502-US



A new generation of high feed milling cutter with **versatility and long life**



**INDUSTRY 4.0**  
*FEED the SPEED!*



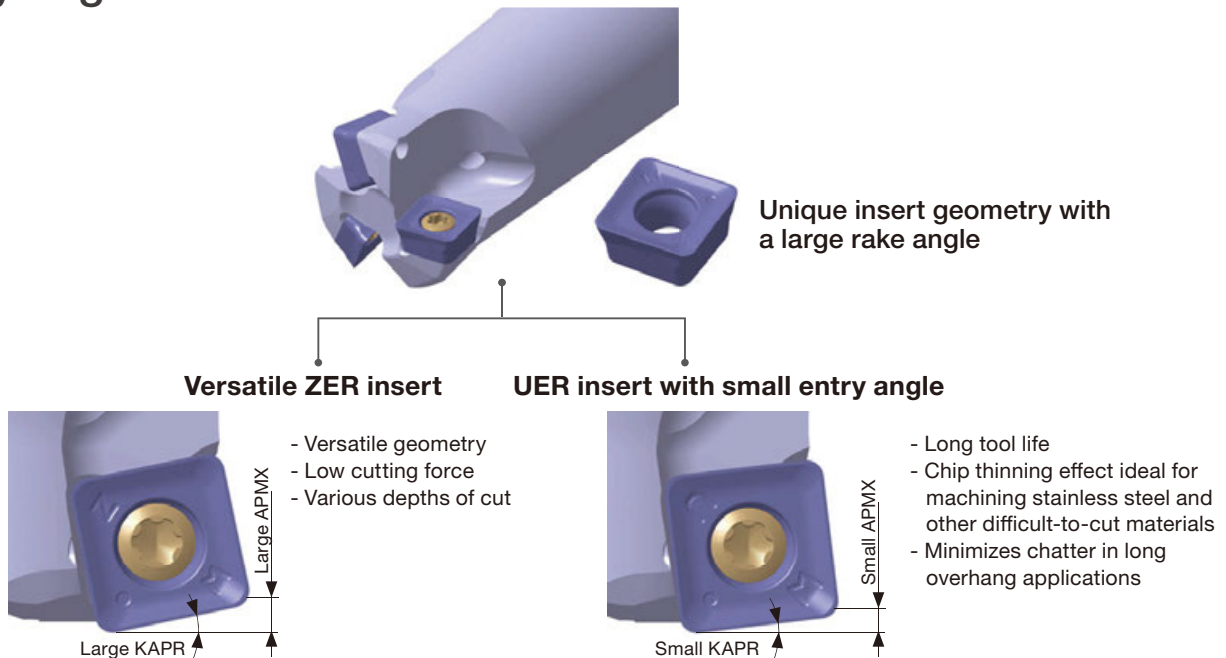
ACCELERATED MACHINING



The unique insert design **allows changing entry angles!** Optimal depth of cut can be selected in machining various workpiece materials!

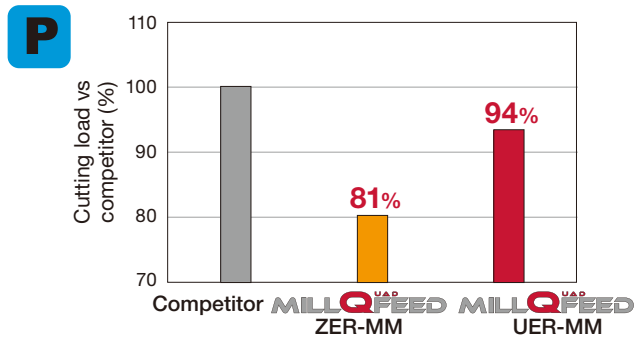
# HFM cutter with **maximum versatility and efficiency**

2 types of inserts can fit one cutter body providing two different entry angles



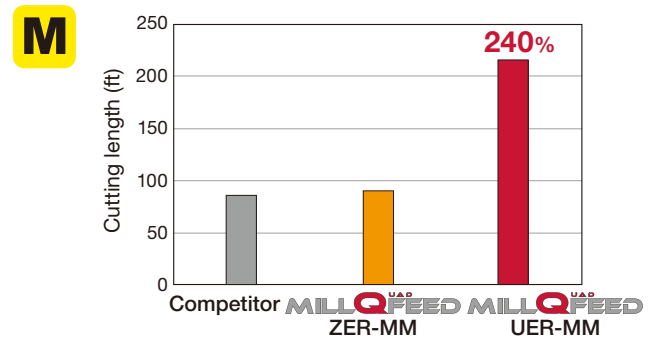
• ZER and UER types cannot be used together in machining.

## Comparison of cutting resistance



Cutter: TXSW09U2.00U0.75R07 ( $\phi 2''$ ,  $z = 7$ ),  
Insert: SWMT0904ZER-MM AH3135,  
SWMT0904UER-MM AH3135, Workpiece material:  
1055 (180HB), Cutting speed:  $V_c = 492$  sfm,  
Feed per tooth:  $f_z = 0.059$  ipt, Depth of cut:  $ap = 0.031''$ ,  
Depth of width:  $ae = 1.28''$ , Number of teeth: 1,  
Coolant: Dry, Machine: Vertical M/C, BT50

## Comparison of tool life



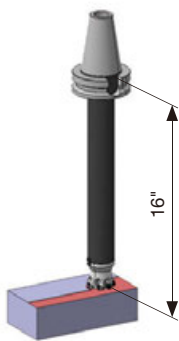
Cutter: TXSW09U2.00U0.75R07 ( $\phi 2''$ ,  $z = 7$ ),  
Insert: SWMT0904ZER-MM AH3135,  
SWMT0904UER-MM AH3135, Workpiece material:  
174 (40HRC), Cutting speed:  $V_c = 328$  sfm,  
Feed per tooth:  $f_z = 0.024$  ipt, Depth of cut:  $ap = 0.031''$ ,  
Depth of width:  $ae = 1.28''$ , Number of teeth: 1,  
Coolant: Wet, Machine: Vertical M/C, BT50

## Close-pitch design for high efficiency

Tool diameter	<b>MILLQ<sup>UP</sup>FEED</b>	A leading competitor	MillQuadFeed's insert density vs competitor
ø1"	<b>3</b> flutes	2 flutes	<b>150</b> %
ø1.25"	<b>4</b> flutes	3 flutes	<b>133</b> %
ø1.5"	<b>5</b> flutes	4 flutes	<b>125</b> %
ø2"	<b>7</b> flutes	5 flutes	<b>140</b> %



## Superior chatter stability



Tool diameter	Number of teeth	fz (ipt)		
		0.040	0.048	0.060
<b>MILLQ<sup>UP</sup>FEED</b>	<b>7</b>	O.K	O.K	O.K
Competitor	7	Chatter	Chatter	O.K
Competitor	5	Chatter	Chatter	O.K

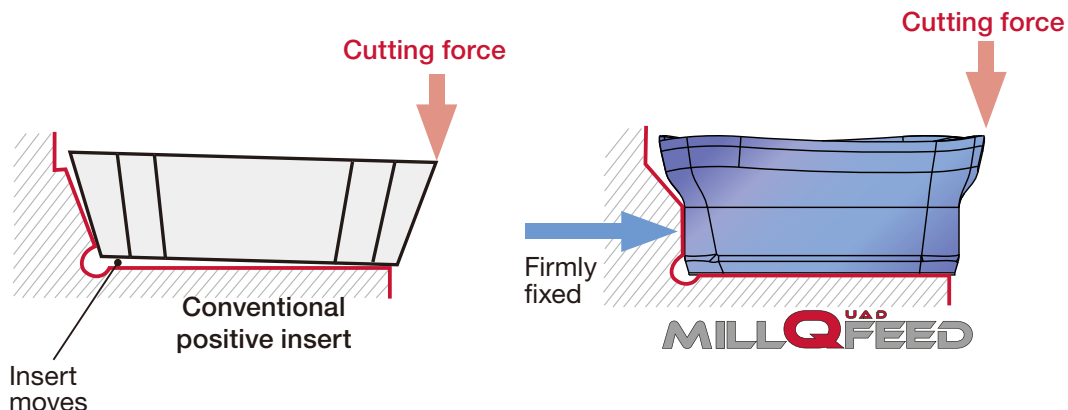
Cutter : TXSW09U2.00U0.75R07  
 (ø2", z = 7)  
 Insert : SWMT0904UER-MM  
 Workpiece material : 1055  
 Cutting speed : Vc = 394 sfm  
 Depth of cut : ap = 0.02"  
 Depth of width : ae = 1.28"  
 Number of teeth : 7  
 Coolant : Dry  
 Machine : Vertical M/C, CAT50

**A stable operation is possible due to UER-MM geometry providing a small entry angle, despite using 7 cutting edges in an 8xD tool length**

## A hybrid positive+negative configuration enables low cutting force and high insert rigidity

**The insert's straight sides secure the insert on the pocket against cutting force**

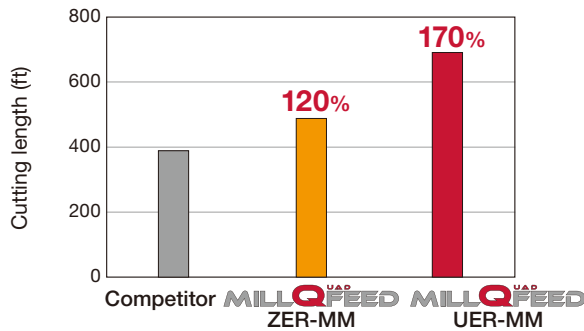
- Ensures reliability in heavy machining
- Replaces top clamp with simple screw clamping



# CUTTING PERFORMANCE

## Comparisons of tool life

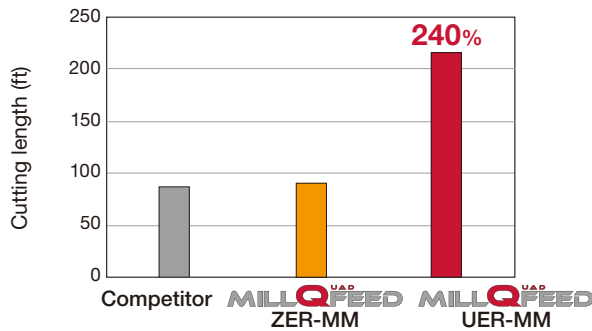
### 09 Insert



**P** Cutter : EXSW09U1.00C1.00R03 ( $\phi 1"$ ,  $z = 3$ )  
 Insert : SWMT0904ZER-MM AH3135  
           : SWMT0904UER-MM AH3135  
 Workpiece material : 1055 (180HB)  
 Cutting speed :  $V_c = 492$  sfm  
 Feed per tooth :  $f_z = 0.059$  ipt  
 Depth of cut :  $a_p = 0.031"$   
 Depth of width :  $a_e = 0.354"$   
 Number of teeth : 1  
 Coolant : Dry  
 Machine : Vertical M/C, CAT50

**Wear-resistant MM geometry with sharp cutting edges has increased the tool life by 1.7x**

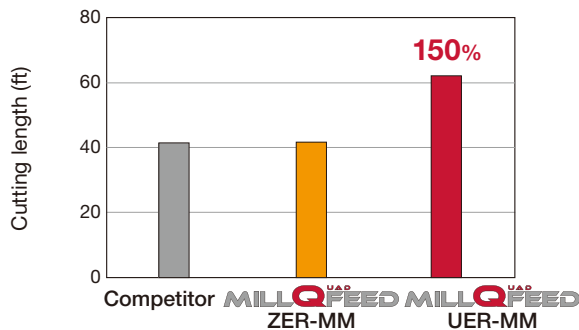
### 09 Insert



**M** Cutter : TXSW09U2.00U0.75R07 ( $\phi 2"$ ,  $z = 7$ )  
 Insert : SWMT0904ZER-MM AH3135  
           : SWMT0904UER-MM AH3135  
 Workpiece material : 174 (40HRC)  
 Cutting speed :  $V_c = 328$  sfm  
 Feed per tooth :  $f_z = 0.024$  ipt  
 Depth of cut :  $a_p = 0.031"$   
 Depth of width :  $a_e = 1.28"$   
 Number of teeth : 1  
 Coolant : Wet  
 Machine : Vertical M/C, CAT50

**UER-MM geometry extends insert life by 2.4x thanks to low cutting temperatures generated by a small entry angle**

### 15 Insert



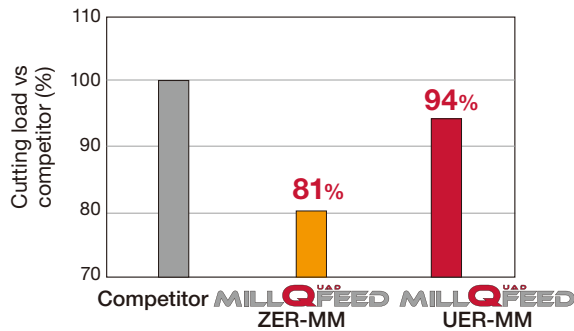
**M** Cutter : TXSW15U3.00B1.00R05 ( $\phi 3"$ ,  $z = 5$ )  
 Insert : SWMT1506ZER-MM AH3135  
           : SWMT1506UER-MM AH3135  
 Workpiece material : 174 (40HRC)  
 Cutting speed :  $V_c = 328$  sfm  
 Feed per tooth :  $f_z = 0.024$  ipt  
 Depth of cut :  $a_p = 0.039"$   
 Depth of width :  $a_e = 1.8"$   
 Number of teeth : 1  
 Coolant : Wet  
 Machine : Vertical M/C, CAT50

**UER-MM geometry extends insert life by 1.5x thanks to its small entry angle generating low cutting temperatures**



## Comparisons of cutting loads

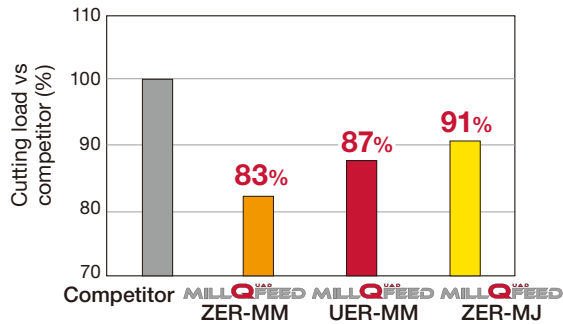
### 09 Insert



<b>P</b>	Cutter	: TXSW09U2.00U.0.75R07 (ø2", z = 7)
	Insert	: SWMT0904ZER-MM AH3135 : SWMT0904UER-MM AH3135
	Workpiece material	: 1055 (180HB)
	Cutting speed	: Vc = 492 sfm
	Feed per tooth	: fz = 0.059 ipr
	Depth of cut	: ap = 0.031"
	Depth of width	: ae = 1.28"
	Number of teeth	: 1
	Coolant	: Dry
	Machine	: Vertical M/C, CAT50

**Optimized chipbreaker geometry reduces cutting load by nearly 20%**

### 15 Insert



<b>P</b>	Cutter	: TXSW15U3.00B1.00R05 (ø3", z = 5)
	Insert	: SWMT1506ZER-MM AH3135 : SWMT1506UER-MM AH3135
	Workpiece material	: 1055 (180HB)
	Cutting speed	: Vc = 492 sfm
	Feed per tooth	: fz = 0.079 ipt
	Depth of cut	: ap = 0.079"
	Depth of width	: ae = 1.875"
	Number of teeth	: 1
	Coolant	: Dry
	Machine	: Vertical M/C, CAT50

**Cutting load has been reduced by nearly 20% due to optimal chipbreaker geometry**

Choice of tools: MillQuadFeed and DoFeed

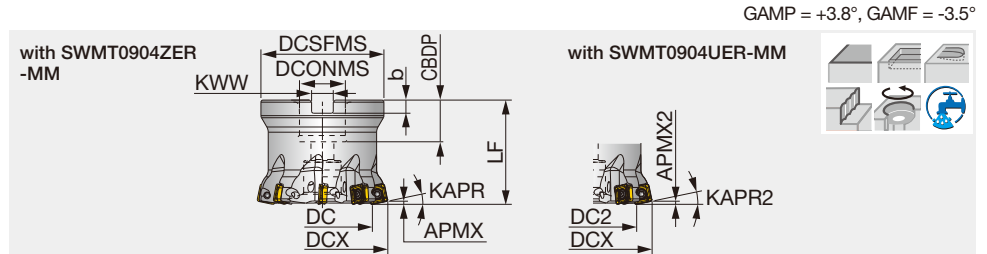
⊙ : First choice  
○ : Supplementary

Series	<b>MILLQ<sup>UAD</sup>FEED</b>	<b>DOFEED</b>
Tool image		
Tool diameter (inch)	ø1 - ø6	ø0.625 - ø6
Max. depth of cut (inch)	0.04 - 0.1	0.04, 0.06
No. of edges per insert	4	4
Efficiency (density)	○	⊙
Tool life	⊙	○
Light cutting	○	⊙
Chip evacuation	○	⊙
Ramping	⊙	○
Corner radius deviation	○	⊙
Long overhang applications	⊙	○

**New**

## TXSW09

High feed mill for 4-corner, single sided inserts



Inch	APMX	APMX2	DCX	CICT	DC	DC2	DCSFMS	DCONMS	CBDF	LF	KWW	b	KAPR	KAPR2	WT(lb)	Air hole	Insert
TXSW09U1.50B0.50R05	0.059	0.039	1.5	5	0.909	0.870	1.378	0.500	0.630	1.575	0.258	0.157	12°	7°	0.180	With	SWMT09...
TXSW09U2.00B0.75R07	0.059	0.039	2	7	1.405	1.366	1.772	0.750	0.750	1.969	0.315	0.197	12°	7°	0.380	With	SWMT09...

### SPARE PARTS

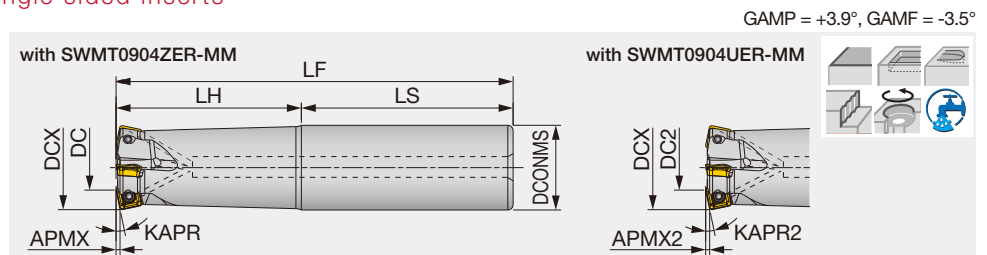
Designation	Clamping screw	Torx bit	Grip	Shell locking bolt	Lubricant
TXSW09...	CSPD-3	BLDIP10/S7	H-TB2W	CM10X30H	M-1000

• Recommended clamping torque (N·m): CSPD-3=2.5

**New**

## EXSW09

High feed mill for 4-corner, single sided inserts



Inch	APMX	APMX2	DCX	CICT	DC	DC2	DCONMS	LF	LH	LS	KAPR	KAPR2	WT(lb)	Air hole	Insert
EXSW09U1.00C1.00R03	0.059	0.039	1	3	0.409	0.370	1.000	5.500	2.500	3.000	12°	7°	0.460	With	SWMT09...
EXSW09U1.00C1.00R03L	0.059	0.039	1	3	0.409	0.370	1.000	7.000	4.000	3.000	12°	7°	0.580	With	SWMT09...
EXSW09U1.25C1.25R04	0.059	0.039	1.25	4	0.657	0.618	1.250	6.000	3.000	3.000	12°	7°	0.810	With	SWMT09...
EXSW09U1.25C1.25R04L	0.059	0.039	1.25	4	0.657	0.618	1.250	8.000	5.000	3.000	12°	7°	1.070	With	SWMT09...

### SPARE PARTS

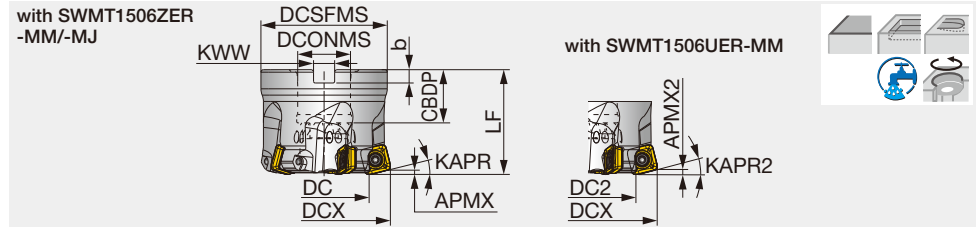
Designation	Clamping screw	Wrench	Lubricant
EXSW09...	CSPD-3	IP-10D	M-1000

• Recommended clamping torque (N·m): CSPD-3=2.5

## TXSW15

High feed mill for 4-corner, single sided inserts

GAMP = +5°, GAMF = 0°



Inch	APMX	APMX2	DCX	CICT	DC	DC2	DCSFMS	LF	DCONMS	CBDP	KWW	b	KAPR	KAPR2	WT(lb)	Air hole	Insert
TXSW15U2.00B0.75R03	0.098	0.079	2	3	0.929	0.905	1.850	1.969	0.750	0.750	0.315	0.197	14°	10°	0.950	With	SWMT15...
TXSW15U2.50B0.75R04	0.098	0.079	2.5	4	1.480	1.405	2.323	1.969	0.750	0.750	0.315	0.197	14°	10°	1.520	With	SWMT15...
TXSW15U3.00B1.00R05	0.098	0.079	3	5	1.980	1.905	2.835	2.480	1.000	1.024	0.374	0.236	14°	10°	2.710	With	SWMT15...
TXSW15U4.00B1.50R06	0.098	0.079	4	6	2.980	2.905	3.819	2.480	1.500	1.063	0.626	0.394	14°	10°	4.870	With	SWMT15...
TXSW15U5.00B1.50R07	0.098	0.079	5	7	3.980	3.905	3.819	2.480	1.500	1.614	0.626	0.394	14°	10°	6.370	With	SWMT15...
TXSW15U6.00B2.00R08	0.098	0.079	6	8	4.980	4.905	4.331	2.480	2.000	1.496	0.748	0.433	14°	10°	8.290	With	SWMT15...

### SPARE PARTS

Designation	Clamping screw	Grip	Lubricant	Shell locking bolt 1	Shell locking bolt 2	Shell locking bolt 3	Torx bit
TXSW15U2.00B0.75R03	TS50115I	H-TB2W	M-1000	-	-	SR 5/16-32UNEF_3/8-24UNF	BT20S
TXSW15U2.50B0.75R04	TS50115I	H-TB2W	M-1000	-	(SD-06-A6)	-	BT20S
TXSW15U3.00B1.00R05	TS50115I	H-TB2W	M-1000	-	(C0.500x1.375H)	-	BT20S
TXSW15U4.00B1.50R06	TS50115I	H-TB2W	M-1000	-	(SD-12-99)	-	BT20S
TXSW15U5.00B1.50R07	TS50115I	H-TB2W	M-1000	(TMBA-0.750H)	-	-	BT20M
TXSW15U6.00B2.00R08	TS50115I	H-TB2W	M-1000	-	-	-	BT20M

• Recommended clamping torque (N·m): TS50115I=5

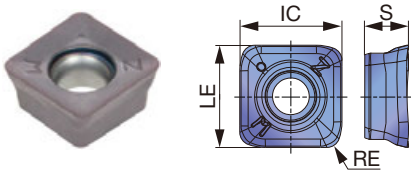
### When installing TXSW15U2.00B0.75R03 on the arbor

- Always use the dedicated shell locking bolt (part code: SRPS118-0273) included in the package.
- Thoroughly read the installation manual included in the package before installation.

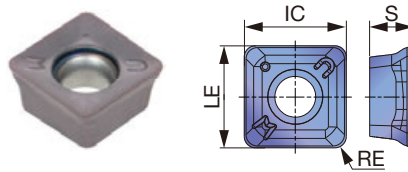


## INSERTS

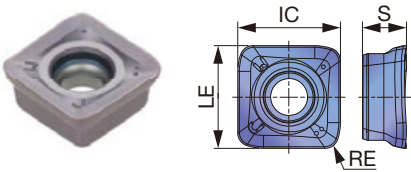
**SWMT09/15ZER-MM**



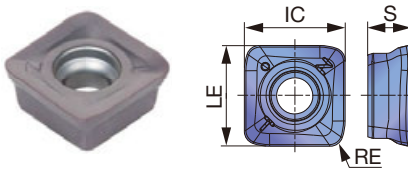
**SWMT09/15UER-MM**



**SWMT15ZER-MJ**



**SWMT15ZER-MT**



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

★ : First choice  
☆ : Second choice

Designation	RE	APMX	Coated		LE	IC	S
			AH120	AH3135			
SWMT0904ZER-MM	0.039	0.059	●		0.339	0.339	0.157
SWMT0904UER-MM	0.039	0.039	●		0.356	0.356	0.157
SWMT1506ZER-MM	0.079	0.098	●	●	0.630	0.630	0.268
SWMT1506UER-MM	0.079	0.079	●		0.641	0.641	0.268
SWMT1506ZER-MJ	0.079	0.098	▲	▲	0.627	0.627	0.268
SWMT1506ZER-MT	0.079	0.098	●	●	0.627	0.627	0.268

\*SWMT15...-MJ inserts will be replaced with SWMT15...-MT inserts as soon as the existing stocks are consumed. Insert description and ID inscriptions on the insert will be updated accordingly. This change will not adversely affect insert performance.

● : Line up  
▲ : To be discontinued

## STANDARD CUTTING CONDITIONS

### 09 type

ISO	Workpiece material	Hardness	Priority	Entry angle symbol	Chip-breaker	Grade	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)
P	Carbon steel 1045, 1055, etc.	- 300HB	First choice	ZER	MM	AH3135	330 - 990	0.020 - 0.060
			for wear resistance	UER	MM	AH3135	330 - 990	0.020 - 0.060
	Alloy steel 4140, etc.	- 300HB	First choice	ZER	MM	AH3135	330 - 660	0.020 - 0.060
			for wear resistance	UER	MM	AH3135	330 - 660	0.020 - 0.060
Prehardened steel NAK80, PX5, etc.	30 - 40HRC	First choice	ZER	MM	AH3135	330 - 660	0.020 - 0.047	
		for wear resistance	UER	MM	AH3135	330 - 660	0.020 - 0.047	
M	Austenitic stainless steel 304, etc.	- 200HB	First choice	UER	MM	AH3135	330 - 490	0.020 - 0.047
			Low cutting load	ZER	MM	AH3135	330 - 490	0.020 - 0.047
	Precipitation hardening stainless steel 174, etc.	28HRC - (H1150)	First choice	UER	MM	AH3135	260 - 490	0.012 - 0.047
			Low cutting load	ZER	MM	AH3135	260 - 490	0.012 - 0.047
		40HRC - (H900)	First choice	UER	MM	AH3135	260 - 400	0.012 - 0.031
			Low cutting load	ZER	MM	AH3135	260 - 400	0.012 - 0.031
K	Gray cast iron No.250B, No.300B, etc.	150 - 250HB	First choice	ZER	MM	AH3135	330 - 990	0.020 - 0.080
	Ductile cast iron 80-55-06, etc.	150 - 250HB	First choice	ZER	MM	AH3135	260 - 660	0.020 - 0.080
S	Titanium alloys Ti-6Al-4V, etc.	- 40HRC	First choice	UER	MM	AH3135	100 - 200	0.012 - 0.028
			Low cutting load	ZER	MM	AH3135	100 - 200	0.012 - 0.028
	Heat-resistance alloys Inconel, Hastelloy, etc.	- 40HRC	First choice	UER	MM	AH3135	70 - 170	0.004 - 0.012
for wear resistance			ZER	MM	AH3135	70 - 170	0.004 - 0.012	
H	Hardened steel	H13, etc.	40 - 50HRC	First choice	ZER	MM	260 - 430	0.004 - 0.012

Tool dia.: DC (inch), Number of revolutions:  $n$  ( $\text{min}^{-1}$ ), Feed speed:  $V_f$  (ipm), Number of inserts:  $z$

$\phi 1"$ , $z = 3$		$\phi 1.25"$ , $z = 4$		$\phi 1.5"$ , $z = 5$		$\phi 2"$ , $z = 7$	
$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$
2,550	301	1,990	313	1,590	313	1,270	350
				Vc = 660 sfm, fz = 0.040 ipt			
1,910	226	1,490	235	1,190	234	960	265
				Vc = 490 sfm, fz = 0.040 iptt			
1,910	180	1,490	188	1,190	187	960	212
				Vc = 490 sfm, fz = 0.031 ipt			
1,530	144	1,190	150	960	151	760	168
				Vc = 400 sfm, fz = 0.031 ipt			
1,530	144	1,190	150	960	151	760	168
				Vc = 400 sfm, fz = 0.031 ipt			
1,270	90	1,000	94	800	94	640	106
				Vc = 330 sfm, fz = 0.024 ipt			
2,550	361	1,990	376	1,590	376	1,270	420
				Vc = 660 sfm, fz = 0.047 ipt			
1,910	271	1,490	281	1,190	281	1,270	420
				Vc = 490 sfm, fz = 0.047 ipt			
510	30	400	31	320	31	250	35
				Vc = 150 sfm, fz = 0.020 ipt			
380	9	300	9	240	9	190	11
				Vc = 120 sfm, fz = 0.008 ipt			
1,270	30	1,000	31	800	31	640	35
				Vc = 100 sfm, fz = 0.200 ipt			

# STANDARD CUTTING CONDITIONS

## 15 type

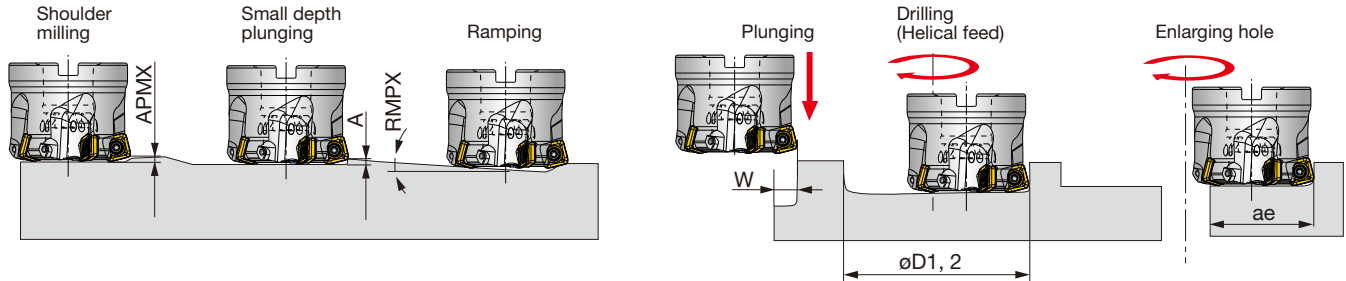
ISO	Workpiece material	Hardness	Priority	Entry angle symbol	Chip-breaker	Grade	Cutting speed Vc (sfm)	Feed per tooth fz (ipt)
P	Carbon steel 1045, 1055, etc.	- 300HB	First choice	ZER	MM	AH3135	330 - 990	0.020 - 0.060
			for wear resistance	ZER	MM	AH120	330 - 990	0.020 - 0.060
			for impact resistance	ZER	MT	AH3135	330 - 990	0.020 - 0.080
	Alloy steel 4140, etc.	- 300HB	First choice	ZER	MM	AH3135	330 - 660	0.020 - 0.060
			for wear resistance	ZER	MM	AH120	330 - 660	0.020 - 0.060
			for impact resistance	ZER	MT	AH3135	330 - 660	0.020 - 0.080
	Prehardened steel NAK80, PX5, etc.	30 - 40HRC	First choice	ZER	MM	AH3135	330 - 660	0.020 - 0.047
			for wear resistance	ZER	MM	AH120	330 - 660	0.020 - 0.047
			for impact resistance	ZER	MT	AH3135	330 - 660	0.020 - 0.060
M	Austenitic stainless steel 304, etc.	- 200HB	First choice	UER	MM	AH3135	330 - 490	0.020 - 0.047
			Low cutting load	ZER	MM	AH3135	330 - 490	0.020 - 0.047
	Precipitation hardening stainless steel 174, etc.	28HRC - (H1150)	First choice	UER	MM	AH3135	260 - 490	0.012 - 0.047
			Low cutting load	ZER	MM	AH3135	260 - 490	0.012 - 0.047
		40HRC - (H900)	First choice	UER	MM	AH3135	260 - 400	0.012 - 0.031
			Low cutting load	ZER	MM	AH3135	260 - 400	0.012 - 0.031
K	Gray cast iron No.250B, No.300B, etc.	150 - 250HB	First choice	ZER	MT	AH120	330 - 990	0.020 - 0.080
			for impact resistance	ZER	MT	AH3135	330 - 990	0.020 - 0.080
			Low cutting load	ZER	MM	AH120	330 - 990	0.020 - 0.060
	Ductile cast iron 80-55-06, etc.	150 - 250HB	First choice	ZER	MT	AH120	260 - 660	0.020 - 0.080
			for impact resistance	ZER	MT	AH3135	260 - 660	0.020 - 0.080
			Low cutting load	ZER	MM	AH120	260 - 660	0.020 - 0.060
S	Titanium alloys Ti-6Al-4V, etc.	- 40HRC	First choice	UER	MM	AH3135	100 - 200	0.012 - 0.028
			Low cutting load	ZER	MM	AH3135	100 - 200	0.012 - 0.028
			for impact resistance	ZER	MT	AH3135	100 - 200	0.012 - 0.028
	Heat-resistance alloys Inconel, Hastelloy, etc.	- 40HRC	First choice	UER	MM	AH3135	70 - 170	0.004 - 0.012
			for wear resistance	ZER	MM	AH120	70 - 170	0.004 - 0.012
H	Hardened steel	H13, etc. 40 - 50HRC	First choice	ZER	MT	AH3135	260 - 430	0.004 - 0.012
			for wear resistance	ZER	MT	AH120	260 - 430	0.004 - 0.012
	D2, etc. 50 - 60HRC	First choice	ZER	MT	AH120	160 - 230	0.002 - 0.008	



Tool dia.: DC (inch), Number of revolutions:  $n$  ( $\text{min}^{-1}$ ), Feed speed:  $V_f$  (ipm), Number of inserts:  $z$

$\phi 2''$ , $z = 3$		$\phi 2.5''$ , $z = 4$		$\phi 3''$ , $z = 5$		$\phi 4''$ , $z = 6$		$\phi 5''$ , $z = 7$		$\phi 6''$ , $z = 8$	
$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$	$n$	$V_f$
1,270	150	1,010	159	800	157	640	151	510	141	400	126
$V_c = 660 \text{ sfm}, fz = 0.040 \text{ ipt}$											
1,270	180	1,010	191	800	189	640	181	510	169	400	151
$V_c = 660 \text{ sfm}, fz = 0.047 \text{ ipt}$											
960	113	760	120	600	118	480	113	380	105	300	94
$V_c = 490 \text{ sfm}, fz = 0.040 \text{ ipt}$											
960	136	760	144	600	142	480	136	380	126	300	113
$V_c = 490 \text{ sfm}, fz = 0.047 \text{ ipt}$											
960	91	760	96	600	94	480	91	380	84	300	76
$V_c = 490 \text{ sfm}, fz = 0.031 \text{ ipt}$											
960	113	760	120	600	118	480	113	380	105	300	94
$V_c = 490 \text{ sfm}, fz = 0.040 \text{ ipt}$											
760	72	610	77	480	76	380	72	310	69	240	61
$V_c = 400 \text{ sfm}, fz = 0.031 \text{ ipt}$											
760	72	610	77	480	76	380	72	310	69	240	61
$V_c = 400 \text{ sfm}, fz = 0.031 \text{ ipt}$											
640	45	510	48	400	47	320	45	250	41	200	38
$V_c = 330 \text{ sfm}, fz = 0.024 \text{ ipt}$											
1,270	180	1,010	191	800	189	640	181	510	169	400	151
$V_c = 660 \text{ sfm}, fz = 0.047 \text{ ipt}$											
1,270	150	1,010	159	800	157	640	151	510	141	400	126
$V_c = 660 \text{ sfm}, fz = 0.040 \text{ ipt}$											
960	136	760	144	600	142	480	136	380	126	300	113
$V_c = 490 \text{ sfm}, fz = 0.047 \text{ ipt}$											
960	113	760	120	600	118	480	113	380	105	300	94
$V_c = 490 \text{ sfm}, fz = 0.040 \text{ ipt}$											
250	15	200	16	160	16	130	15	100	14	80	13
$V_c = 150 \text{ sfm}, fz = 0.020 \text{ ipt}$											
200	5	150	5	120	5	100	5	80	4	60	4
$V_c = 120 \text{ sfm}, fz = 0.008 \text{ ipt}$											
640	15	510	16	400	16	320	15	250	14	200	13
$V_c = 100 \text{ sfm}, fz = 0.200 \text{ ipt}$											
380	6	300	6	240	6	190	6	150	5	120	5
$V_c = 60 \text{ sfm}, fz = 0.120 \text{ ipt}$											

## APPLICATION RANGE



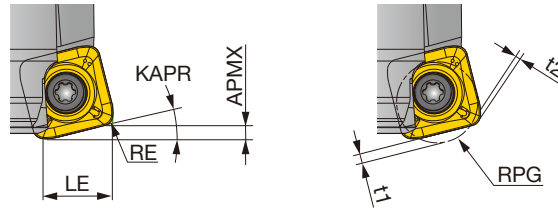
### 09 type

Designation	Tool dia. DCX	Max. depth of cut		Max. plunging depth	Max. ramping angle		Max. cutting width in plunging		Min. machining dia.		Max. machining dia.		Max. cutting width in enlarging	
		APMX		A	RMPX		W		$\phi D1$		$\phi D2$		ae	
		SWMT 09**ZER	SWMT 09**UER		SWMT 09**ZER	SWMT 09**UER	SWMT 09**ZER	SWMT 09**UER	SWMT 09**ZER	SWMT 09**UER	SWMT 09**ZER	SWMT 09**UER	SWMT 09**ZER	SWMT 09**UER
EXSW09U1.00...	1.00	0.059	0.039	0.012	4.6	5.8	0.275	0.295	1.370	1.331	1.881	1.881	0.665	0.645
EXSW09U1.25...	1.25	0.059	0.039	0.012	2.7	3.2	0.275	0.295	1.870	1.831	2.381	2.381	0.914	0.894
TXSW09U1.50...	1.50	0.059	0.039	0.012	1.9	2.2	0.275	0.295	2.370	2.331	2.881	2.881	1.165	1.145
TXSW09U2.00...	2.00	0.059	0.039	0.012	1.2	1.4	0.275	0.295	3.370	3.331	3.881	3.881	1.663	1.643

### 15 type

Designation	Tool dia. DCX	Max. depth of cut		Max. plunging depth	Max. ramping angle	Max. cutting width in plunging		Min. machining dia.	Max. machining dia.	Max. cutting width in enlarging	
		APMX		A	RMPX	W		$\phi D1$	$\phi D2$	ae	
		SWMT 15**ZER	SWMT 15**UER			SWMT 15**ZER	SWMT 15**UER			SWMT 15**ZER	SWMT 15**UER
TXSW15M050B...	2.00	0.098	0.079	0.028	4.6	0.591	0.630	2.787	3.772	1.433	1.393
TXSW15M063B...	2.50	0.098	0.079	0.028	2.9	0.591	0.630	3.819	4.803	1.949	1.909
TXSW15J, M080B...	3.00	0.098	0.079	0.028	2.1	0.591	0.630	4.819	5.803	2.449	2.409
TXSW15J, M100B...	4.00	0.098	0.079	0.028	1.4	0.591	0.630	6.819	7.803	3.449	3.409
TXSW15J, M125B...	5.00	0.098	0.079	0.028	1.0	0.591	0.630	8.819	9.803	4.449	4.409
TXSW15J, M160B...	6.00	0.098	0.079	0.028	0.8	0.591	0.630	10.819	11.803	5.449	5.409

## TOOL GEOMETRY ON PROGRAM



### 09 type


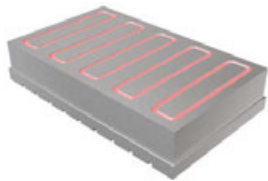
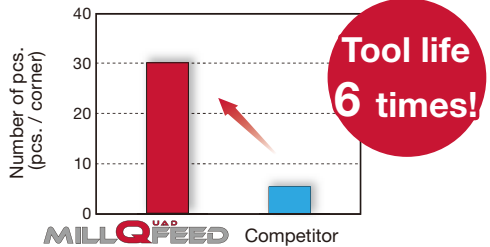
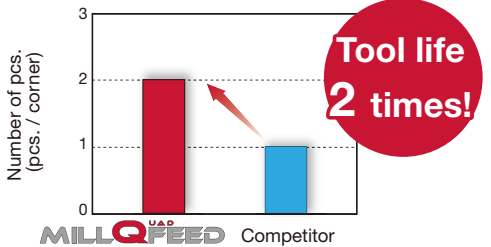

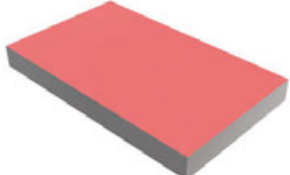
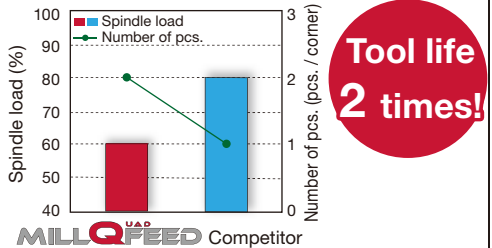
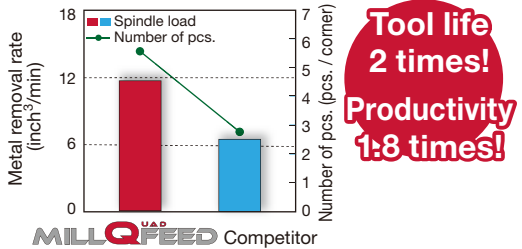
APMX (inch)		Actual corner radius RE (inch)	LE (inch)		KAPR		Programmed corner radius RPG	Uncut amount: t1 (inch)		Overcut amount: t2 (inch)	
SWMT 09**ZER	SWMT 09**UER		SWMT 09**ZER	SWMT 09**UER	SWMT 09**ZER	SWMT 09**UER		SWMT 09**ZER	SWMT 09**UER	SWMT 09**ZER	SWMT 09**UER
0.059	0.039	0.039	0.291	0.311	12°	7°	0.025	0.054	0.033	-	-
0.059	0.039	0.039	0.291	0.311	12°	7°	0.050	0.049	0.031	-	-
0.059	0.039	0.039	0.291	0.311	12°	7°	0.075	0.045	0.028	-	0.0002
0.059	0.039	0.039	0.291	0.311	12°	7°	0.100	0.040	0.025	0.001	0.006
0.059	0.039	0.039	0.291	0.311	12°	7°	0.125	0.036	0.022	0.006	0.015



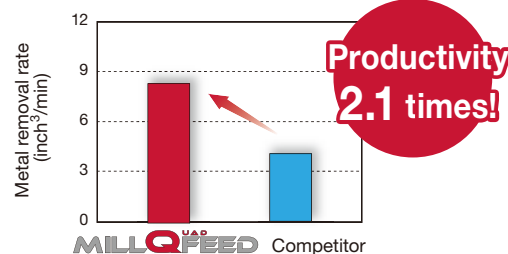
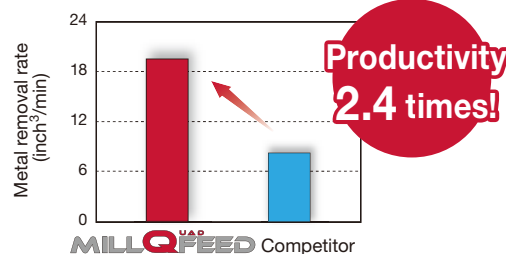
### 15 type

APMX (inch)		Actual corner radius RE (inch)	LE (inch)		KAPR		Programmed corner radius RPG	Uncut amount: t1 (inch)		Overcut amount: t2 (inch)	
SWMT 15**ZER	SWMT 15**UER		SWMT 15**ZER	SWMT 15**UER	SWMT 15**ZER	SWMT 15**UER		SWMT 15**ZER	SWMT 15**UER	SWMT 15**ZER	SWMT 15**UER
0.098	0.079	0.079	0.500	0.543	14°	10°	0.138	0.083	0.073	-	-
0.098	0.079	0.079	0.500	0.543	14°	10°	0.157	0.078	0.070	-	-
0.098	0.079	0.079	0.500	0.543	14°	10°	0.178	0.074	0.067	-	0.001
0.098	0.079	0.079	0.500	0.543	14°	10°	0.197	0.070	0.063	0.0003	0.005

The above table shows the uncut (t1) and overcut (t2) amounts for the programmed corner radius.

## PRACTICAL EXAMPLES

Workpiece type		Rod end bearing part	Magnetic chuck
Cutter		EXSW09U1.25C1.25R04 (ø1.25", z=4)	EXSW09U1.00C1.00R03 (ø1", z=3)
Insert		SWMT0904UER-MM	SWMT0904UER-MM
Grade		AH3135	AH3135
Workpiece material		Pre-hardened stainless steel, 38HRC  <b>M</b>	Low carbon steel  <b>P</b>
Cutting conditions	Cutting speed : Vc (sfm)	656	840
	Feed per tooth : fz (ipt)	0.03	0.033
	Depth of cut : ap (inch)	0.024	0.028
	Width of cut : ae (inch)	0.5	1.0
	Machining	Face milling	Grooving
	Coolant	Wet	Wet
Machine		Multi task machine	Horizontal M/C, CAT50
Results		 <p><b>Tool life 6 times!</b></p> <p>UER-MM has provided 6x the tool life in difficult-to-cut material over the competitor's insert.</p>	 <p><b>Tool life 2 times!</b></p> <p>Competitor's tool had chattered when machining corners. UER-MM eliminated chatter while doubling the tool life in long reach areas.</p>
Workpiece type		Chamber	Plate
Cutter		TXSW15U6.00B2.00R08 (ø6", z=8)	TXSW15U5.00B1.50R07 (ø5", z=7)
Insert		SWMT1506ZER-MM	SWMT1506UER-MM
Grade		AH3135	AH3135
Workpiece material		304  <b>M</b>	304  <b>M</b>
Cutting conditions	Cutting speed : Vc (sfm)	492	492
	Feed per tooth : fz (ipt)	0.039	0.047
	Depth of cut : ap (inch)	0.039	0.02
	Width of cut : ae (inch)	4.9	3.9
	Machining	Face milling	Face milling
	Coolant	Dry	Dry
Machine		Horizontal M/C, CAT50	Vertical M/C, CAT50
Results		 <p><b>Tool life 2 times!</b></p> <p>Free-cutting ZER-MM geometry could reduce spindle load by 20% while doubling the tool life thanks to reduced cutting temperatures.</p>	 <p><b>Tool life 2 times!</b> <b>Productivity 1:8 times!</b></p> <p>Thanks to UER-MM's chip thinning effect and low cutting temperature generation, MRR has increased by 1.8x with less thermal deflection of the workpiece. Tool life has also doubled.</p>

Workpiece type	Casting mold	Joint for thermal power part	
Cutter	TXSW15U4.00B1.50R06 ( $\phi 4"$ , $z = 6$ )	TXSW15U4.00B1.50R06 ( $\phi 4"$ , $z = 6$ )	
Insert	SWMT1506ZER-MJ	SWMT1506ZER-MJ	
Grade	AH3135	AH3135	
Workpiece material	Tool steel	High chromium steel	
	 <b>P</b>	 <b>P</b>	
Cutting conditions	Cutting speed : $V_c$ (sfm)	328	394 (Competitor: $V_c = 328$ )
	Feed per tooth : $f_z$ (ipt)	0.016 (Competitor: $f_z = 0.013$ )	0.039
	Feed speed : $V_f$ (ipm)	30 (Competitor: $V_f = 23$ )	90 (Competitor: $V_f = 75$ )
	Depth of cut : $a_p$ (inch)	0.1 (Competitor: $a_p = 0.06$ )	0.079 (Competitor: $a_p = 0.039$ )
	Width of cut : $a_e$ (inch)	2.8	2.8
	Machining	Face milling (Re-sinking)	Face milling
	Coolant	Dry	Air
	Machine	Vertical M/C, CAT50	Vertical M/C, CAT40
Results	 <p><b>Productivity 2.1 times!</b></p> <p>MILLQ<sup>UP</sup>FEED Competitor</p> <p>Ability to machine large depth at high feed improves productivity in mold machining.</p>	 <p><b>Productivity 2.4 times!</b></p> <p>MILLQ<sup>UP</sup>FEED Competitor</p> <p>Outstanding cutting performance of MillQuadFeed allows depth of cut to be increased even in high feed machining.</p>	

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Tungaloy Report No. 502S1-US



# Expanded cutter and grade options for maximum high feed milling performance



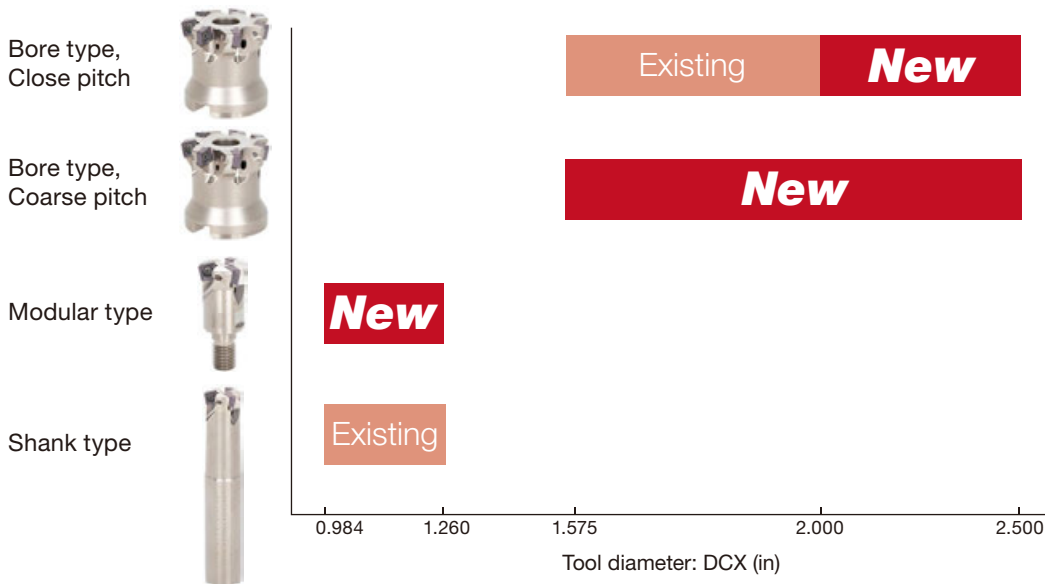
**INDUSTRY 4.0**  
*FEED the SPEED!*



For more information

# MillQuadFeed-09 offers expanded application coverage

In addition to a new modular style cutter head, additional cutter diameter options are available for up to 2.500" in a close or coarse pitch design for chatter solutions

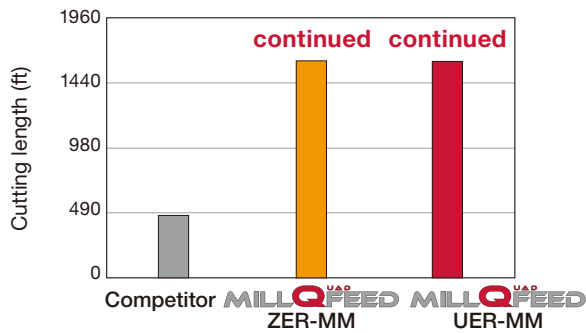


Expanded insert grade options for expanded materials coverage



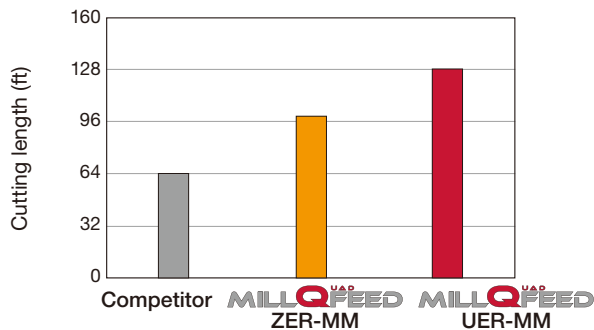
## CUTTING PERFORMANCE

## Comparisons of tool life



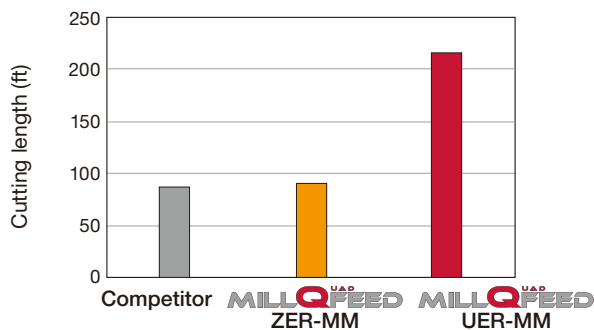
**P** Cutter : EXSW09U1.00C1.00R03 ( $\phi 1"$ , z = 3)  
 Insert : SWMT0904ZER-MM AH3225  
 : SWMT0904UER-MM AH3225  
 Workpiece material : 1055 (180HB)  
 Cutting speed :  $V_c = 492$  sfm  
 Feed per tooth :  $f_z = 0.059$  ipt  
 Depth of cut :  $a_p = 0.031"$   
 Depth of width :  $a_e = 0.354"$   
 Number of teeth : 1  
 Coolant : Dry  
 Machine : Vertical M/C, BT50

**Over 300% tool life with AH3225 grade**



**M** Cutter : TXSW09U2.00U0.75R07 ( $\phi 2"$ , z = 7)  
 Insert : SWMT0904ZER-MM AH130  
 : SWMT0904UER-MM AH130  
 Workpiece material : 304SS  
 Cutting speed :  $V_c = 394$  sfm  
 Feed per tooth :  $f_z = 0.031$  ipt  
 Depth of cut :  $a_p = 0.031"$   
 Depth of width :  $a_e = 1.260"$   
 Number of teeth : 1  
 Coolant : Wet  
 Machine : Vertical M/C, BT50

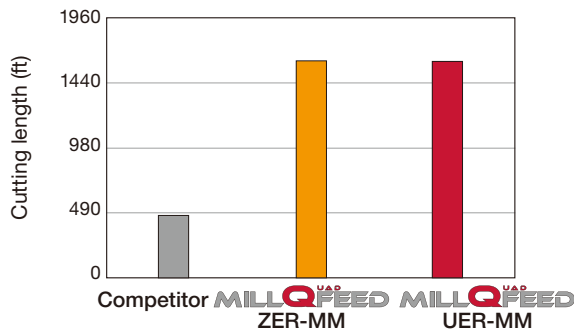
**200% tool life with AH130 grade and UER insert**



**M** Cutter : TXSW09U2.00U0.75R07 ( $\phi 2"$ , z = 7)  
 Insert : SWMT0904ZER-MM AH130  
 : SWMT0904UER-MM AH130  
 Workpiece material : 174 (40HRC)  
 Cutting speed :  $V_c = 328$  sfm  
 Feed per tooth :  $f_z = 0.024$  ipt  
 Depth of cut :  $a_p = 0.031"$   
 Depth of width :  $a_e = 1.260"$   
 Number of teeth : 1  
 Coolant : Wet  
 Machine : Vertical M/C, BT50

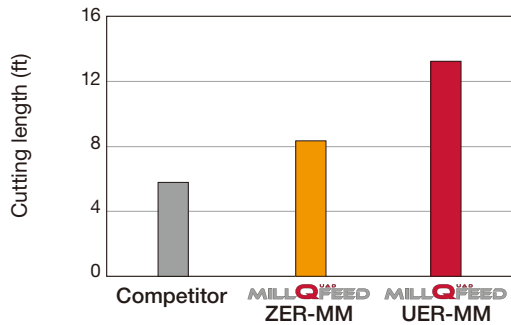
**240% tool life with AH130 grade and UER insert**

## Comparisons of tool life



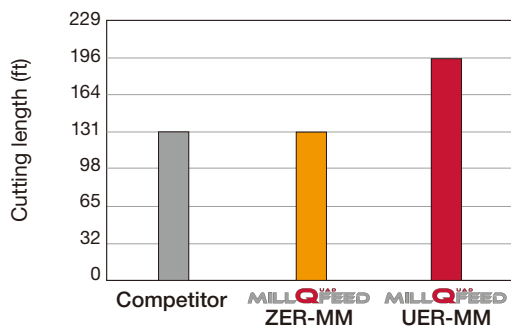
**S** Cutter : TXSW09U2.00B0.75R07 ( $\phi 2''$ , z = 7)  
 Insert : SWMT0904ZER-MM AH130  
 : SWMT0904UER-MM AH130  
 Workpiece material : Ti-6Al-4V (42HRC)  
 Cutting speed :  $V_c = 197$  sfm  
 Feed per tooth :  $f_z = 0.028$  ipt  
 Depth of cut :  $a_p = 0.031''$   
 Depth of width :  $a_e = 1.260''$   
 Number of teeth : 1  
 Coolant : Wet  
 Machine : Vertical M/C, BT50

**320% tool life with AH130 grade and UER insert**



**S** Cutter : TXSW09U2.00B0.75R07 ( $\phi 2''$ , z = 7)  
 Insert : SWMT0904ZER-MM AH8015  
 : SWMT0904UER-MM AH8015  
 Workpiece material : Inconel718 (40HRC)  
 Cutting speed :  $V_c = 131$  sfm  
 Feed per tooth :  $f_z = 0.016$  ipt  
 Depth of cut :  $a_p = 0.031''$   
 Depth of width :  $a_e = 1.260''$   
 Number of teeth : 1  
 Coolant : Wet  
 Machine : Vertical M/C, BT50

**220% tool life with AH8015 grade and UER insert**



**H** Cutter : TXSW09U2.00B0.75R07 ( $\phi 2''$ , z = 7)  
 Insert : SWMT0904ZER-MM AH8015  
 : SWMT0904UER-MM AH8015  
 Workpiece material : H13 (52HRC)  
 Cutting speed :  $V_c = 262$  sfm  
 Feed per tooth :  $f_z = 0.020$  ipt  
 Depth of cut :  $a_p = 0.031''$   
 Depth of width :  $a_e = 1.260''$   
 Number of teeth : 1  
 Coolant : Dry  
 Machine : Vertical M/C, BT50

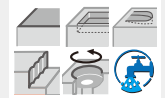
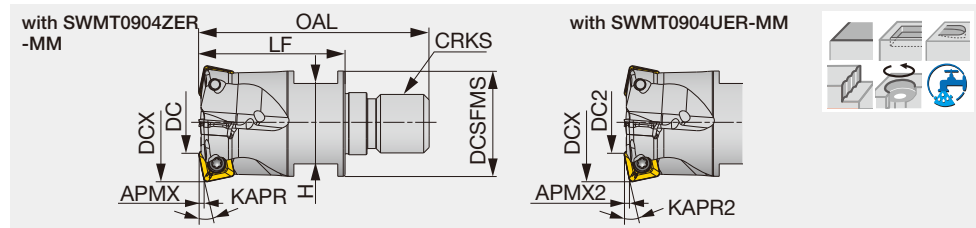
**150% tool life with AH8015 grade and UER insert**

**New**

## HXSW09

High feed mill, modular type, for 4-corner single sided inserts

GAMP = +3.8°, GAMF = -3.5°



Metric	APMX	APMX2	DCX	CICT	DC	DC2	OAL	LF	H	DCSFMS	KAPR	KAPR2	CRKS	WT (kg)	Air hole	Insert
HXSW09M025M12R03	1.5	1	25	3	10	9	57	35	17	20.8	12°	7°	M12	0.09	With	SWMT09...
HXSW09M032M16R04	1.5	1	32	4	17	16	63	40	22	28.8	12°	7°	M16	0.18	With	SWMT09...

### SPARE PARTS

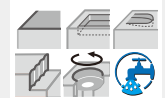
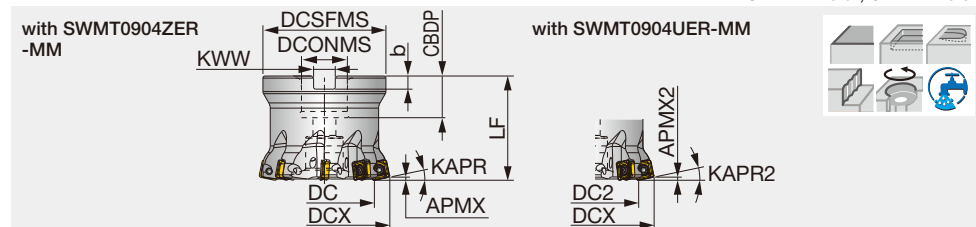
Designation	Clamping screw	Mono block wrench	Lubricant
HXSW09...	CSPD-3	IP-10D	M-1000

·Recommended clamping torque (N·m): CSPD-3=2.5

## TXSW09

High feed mill, for 4-corner single sided inserts

GAMP = +3.8°, GAMF = -3.5°



	Inch	APMX	APMX2	DCX	CICT	DC	DC2	DCSFMS	DCONMS	CBDP	LF	KWW	b	KAPR	KAPR2	WT (lb)	Air hole	Insert
<b>New</b>	TXSW09U1.50B0.50R04	0.059	0.039	1.500	4	0.909	0.870	1.378	0.500	0.630	1.575	0.258	0.157	12°	7°	0.40	With	SWMT09...
	TXSW09U1.50B0.50R05	0.059	0.039	1.500	5	0.909	0.870	1.378	0.500	0.630	1.575	0.258	0.157	12°	7°	0.40	With	SWMT09...
<b>New</b>	TXSW09U2.00B0.75R05	0.059	0.039	2.000	5	1.406	1.366	1.772	0.750	0.750	1.969	0.315	0.197	12°	7°	0.82	With	SWMT09...
	TXSW09U2.00B0.75R07	0.059	0.039	2.000	7	1.406	1.366	1.772	0.750	0.750	1.969	0.315	0.197	12°	7°	0.84	With	SWMT09...
<b>New</b>	TXSW09U2.50B0.75R06	0.059	0.039	2.500	6	1.906	1.866	2.323	0.750	0.750	1.969	0.315	0.197	12°	7°	1.59	With	SWMT09...
<b>New</b>	TXSW09U2.50B0.75R08	0.059	0.039	2.500	8	1.906	1.866	2.323	0.750	0.750	1.969	0.315	0.197	12°	7°	1.61	With	SWMT09...
<b>New</b>	TXSW09U3.00B1.00R07	0.059	0.039	3.000	7	2.406	2.366	2.835	1.000	1.024	2.480	0.374	0.236	12°	7°	3.00	With	SWMT09...
<b>New</b>	TXSW09U3.00B1.00R10	0.059	0.039	3.000	10	2.406	2.366	2.835	1.000	1.024	2.480	0.374	0.236	12°	7°	3.06	With	SWMT09...
<b>New</b>	TXSW09U4.00B1.50R08	0.059	0.039	4.000	8	3.406	3.366	3.819	1.500	1.181	2.480	0.626	0.394	12°	7°	4.67	With	SWMT09...

### SPARE PARTS

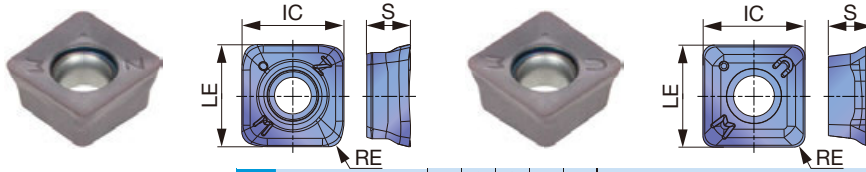
Designation	Clamping screw	Torx bit	Grip	Lubricant
TXSW09U...	CSPD-3	BLDIP10/S7	H-TB2W	M-1000

·Recommended clamping torque (lb·ft): CSPD-3=1.84

## INSERTS

### SWMT0904ZER-MM

### SWMT0904UER-MM



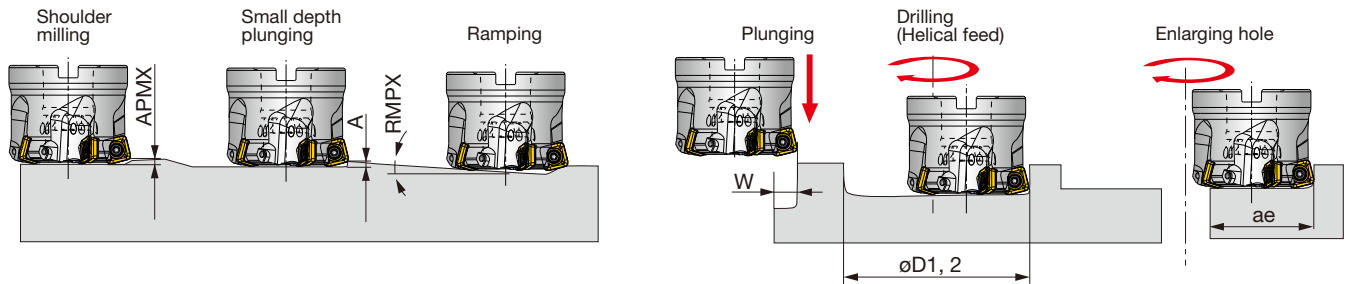
<b>P</b> Steel		☆	★															
<b>M</b> Stainless	★	☆	☆															
<b>K</b> Cast iron		☆	☆	★														
<b>N</b> Non-ferrous																		
<b>S</b> Titanium	★	☆																
<b>S</b> Heat resistant alloy					☆	★												
<b>H</b> Hard materials			☆	☆	★													

★ : First choice  
☆ : Second choice

Designation	RE	APMX	Coated					LE	IC	S
			AH130	AH3135	AH3225	AH120	AH8015			
SWMT0904ZER-MM	0.0393	0.059	●	●	●	●	●	0.339	0.339	0.157
SWMT0904UER-MM	0.0394	0.039	●	●	●	●	●	0.356	0.356	0.157

● : New lineup

## APPLICATION RANGE



### 09 type

Designation	Tool dia. DCX	Max. depth of cut		Max. plunging depth	Max. ramping angle		Max. cutting width in plunging		Min. machining dia.		Max. machining dia.		Max. cutting width in enlarging	
		APMX		A	RMPX		W		øD1		øD2		ae	
		SWMT 09**ZER	SWMT 09**UER	A	SWMT 09**ZER	SWMT 09**UER	SWMT 09**ZER	SWMT 09**UER	SWMT 09**ZER	SWMT 09**UER	SWMT 09**ZER	SWMT 09**UER	SWMT 09**ZER	SWMT 09**UER
TXSW09U1.50B0.50R04	0.157	0.059	0.039	0.012	1.9	2.2	0.276	0.295	2.370	2.331	2.882	2.882	1.165	1.146
TXSW09U2.00B0.75R05	0.197	0.059	0.039	0.012	1.2	1.4	0.276	0.295	3.370	3.331	3.882	3.882	1.665	1.646
TXSW09U2.50B0.75R06	0.197	0.059	0.039	0.012	0.9	0.9	0.276	0.295	4.370	4.331	4.882	4.882	2.165	2.146
TXSW09U2.50B0.75R08	0.197	0.059	0.039	0.012	0.9	0.9	0.276	0.295	4.370	4.331	4.882	4.882	2.165	2.146
<b>New</b> TXSW09U3.00B1.00R07	0.236	0.059	0.039	0.012	0.7	0.8	0.276	0.295	5.370	5.331	5.882	5.882	2.665	2.646
<b>New</b> TXSW09U3.00B1.00R10	0.236	0.059	0.039	0.012	0.4	0.6	0.276	0.295	5.370	5.331	5.882	5.882	2.665	2.646
TXSW09U4.00B1.50R08	0.394	0.059	0.039	0.012	0.5	0.6	0.276	0.295	7.370	7.331	7.882	7.882	3.665	3.646

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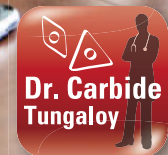
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