

MillLine

MILLQ^{UAD}FEED

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Tungaloy Report No. 502S1-G

Member IMC Group
Tungaloy
INDUSTRY 4.0

Expanded cutter and grade options

for maximum high feed milling performance

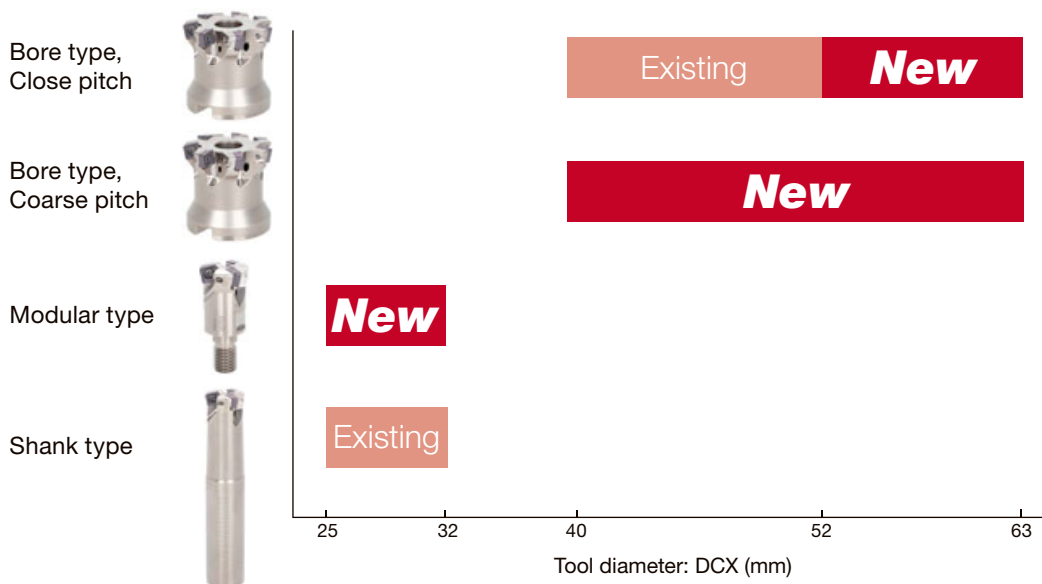


INDUSTRY 4.0
FEED the SPEED!

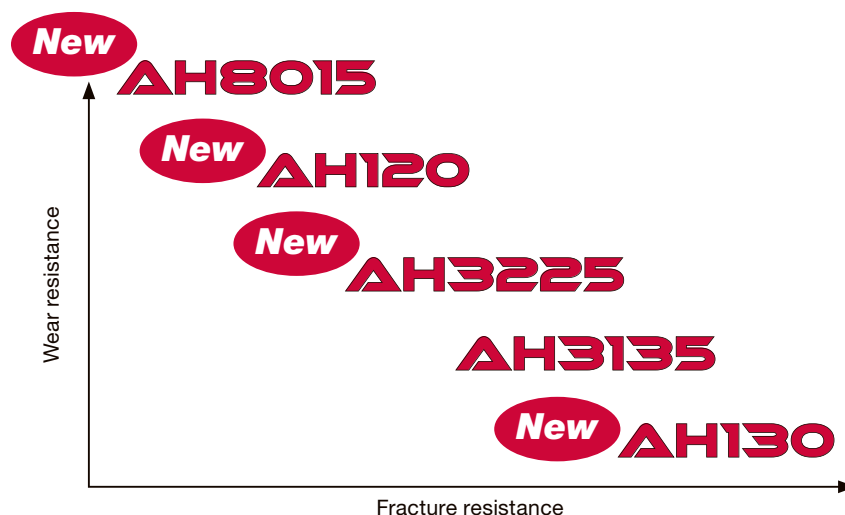


MillQuadFeed-09 offers expanded application coverage

In addition to a new modular style cutter head, additional cutter diameter options are available for up to 63 mm in a close or coarse pitch design for chatter solutions

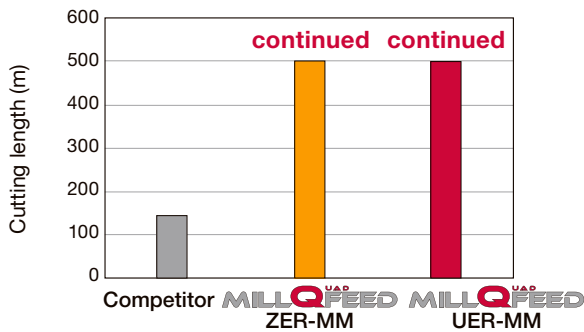


Expanded insert grade options for expanded materials coverage



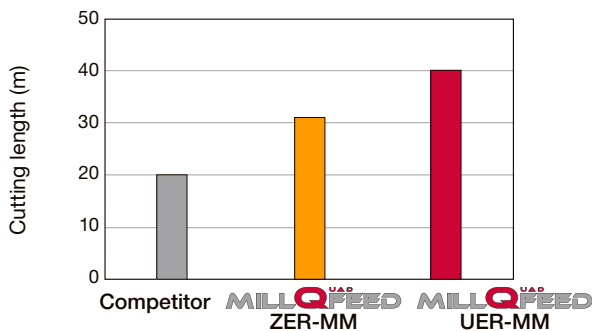
CUTTING PERFORMANCE

Comparisons of tool life



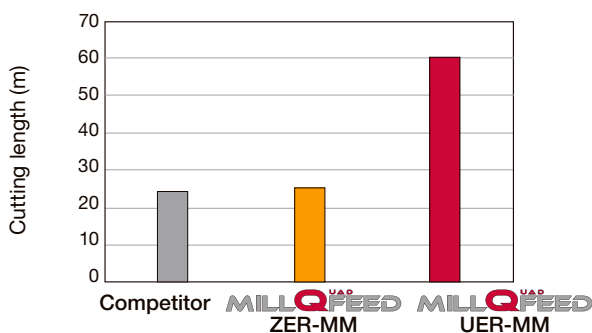
P Cutter : EXSW09M025C25.0R03 (ϕ 25 mm, z = 3)
 Insert : SWMT0904ZER-MM AH3225
 : SWMT0904UER-MM AH3225
 Workpiece material : S55C / C55 (180HB)
 Cutting speed : $V_c = 150$ m/min
 Feed per tooth : $f_z = 1.5$ mm/t
 Depth of cut : $a_p = 0.8$ mm
 Depth of width : $a_e = 9$ mm
 Number of teeth : 1
 Coolant : Dry
 Machine : Vertical M/C, BT50

Over 300% tool life with AH3225 grade



M Cutter : TXSW09M050B22.0R07 (ϕ 50 mm, z = 7)
 Insert : SWMT0904ZER-MM AH130
 : SWMT0904UER-MM AH130
 Workpiece material : SUS304 / X5CrNi18-9
 Cutting speed : $V_c = 120$ m/min
 Feed per tooth : $f_z = 0.8$ mm/t
 Depth of cut : $a_p = 0.8$ mm
 Depth of width : $a_e = 32$ mm
 Number of teeth : 1
 Coolant : Wet
 Machine : Vertical M/C, BT50

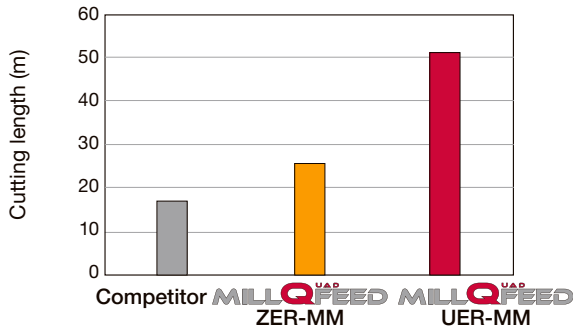
200% tool life with AH130 grade and UER insert



M Cutter : TXSW09M050B22.0R07 (ϕ 50 mm, z = 7)
 Insert : SWMT0904ZER-MM AH130
 : SWMT0904UER-MM AH130
 Workpiece material : SUS630 / X5CrNi18-9 (40HRC)
 Cutting speed : $V_c = 100$ m/min
 Feed per tooth : $f_z = 0.6$ mm/t
 Depth of cut : $a_p = 0.8$ mm
 Depth of width : $a_e = 32$ mm
 Number of teeth : 1
 Coolant : Wet
 Machine : Vertical M/C, BT50

240% tool life with AH130 grade and UER insert

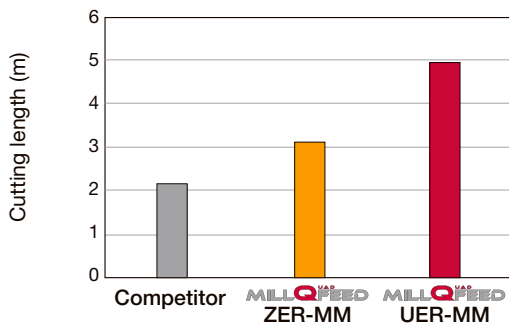
Comparisons of tool life



S

Cutter : TXSW09M050B22.0R07 (ϕ 50 mm, z = 7)
 Insert : SWMT0904ZER-MM AH130
 : SWMT0904UER-MM AH130
 Workpiece material : Ti-6Al-4V (42HRC)
 Cutting speed : $V_c = 60$ m/min
 Feed per tooth : $f_z = 0.7$ mm/t
 Depth of cut : $a_p = 0.8$ mm
 Depth of width : $a_e = 32$ mm
 Number of teeth : 1
 Coolant : Wet
 Machine : Vertical M/C, BT50

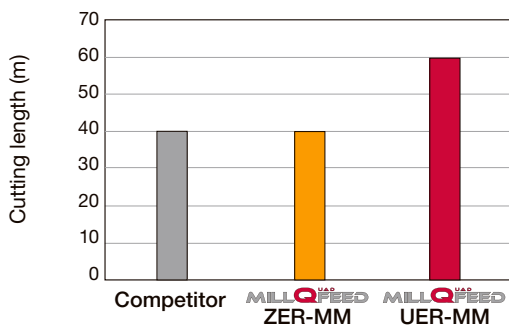
320% tool life with AH130 grade and UER insert



S

Cutter : TXSW09M050B22.0R07 (ϕ 50 mm, z = 7)
 Insert : SWMT0904ZER-MM AH8015
 : SWMT0904UER-MM AH8015
 Workpiece material : Inconel718 (40HRC)
 Cutting speed : $V_c = 40$ m/min
 Feed per tooth : $f_z = 0.4$ mm/t
 Depth of cut : $a_p = 0.8$ mm
 Depth of width : $a_e = 32$ mm
 Number of teeth : 1
 Coolant : Wet
 Machine : Vertical M/C, BT50

220% tool life with AH8015 grade and UER insert



H

Cutter : TXSW09M050B22.0R07 (ϕ 50 mm, z = 7)
 Insert : SWMT0904ZER-MM AH8015
 : SWMT0904UER-MM AH8015
 Workpiece material : SKD61 / X40CrMoV5-1 (52HRC)
 Cutting speed : $V_c = 80$ m/min
 Feed per tooth : $f_z = 0.5$ mm/t
 Depth of cut : $a_p = 0.8$ mm
 Depth of width : $a_e = 32$ mm
 Number of teeth : 1
 Coolant : Dry
 Machine : Vertical M/C, BT50

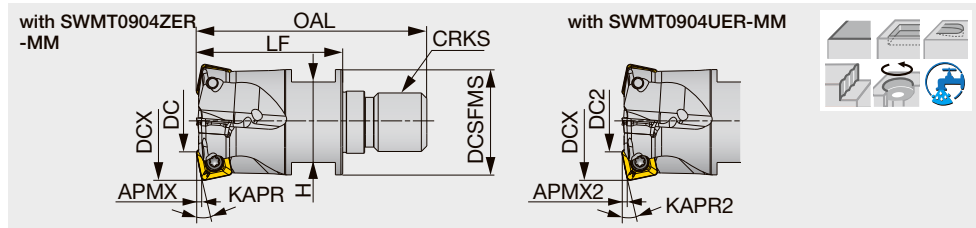
150% tool life with AH8015 grade and UER insert

New

HXSW09

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

GAMP = +3.8°, GAMF = -3.5°



Designation	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

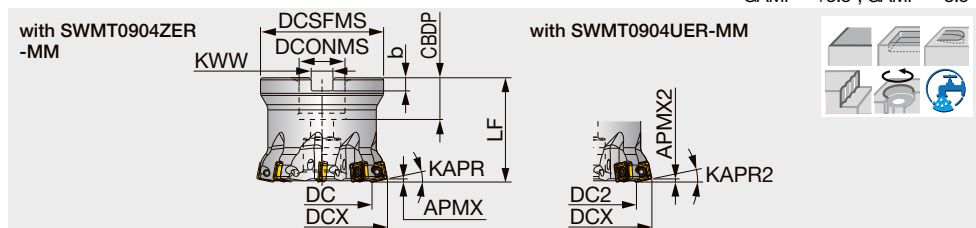
Designation	Clamping screw	Mono block wrench	Lubricant
HXSW09...	CSPD-3	IP-10D	M-1000

• 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°



Designation	APMX	APMX2	DCX	CICT	DC	DC2	DCSFMS	DCONMS	CBDP	LF	KWW	b	KAPR	KAPR2	WT(kg)	Air hole	Insert
New TXSW09M040B16.0R04	1.5	1	40	4	25	24	38	16	18	40	8.4	5.6	12°	7°	0.2	With	SWMT09...
TXSW09M040B16.0R05	1.5	1	40	5	25	24	38	16	18	40	8.4	5.6	12°	7°	0.2	With	SWMT09...
New TXSW09M050B22.0R05	1.5	1	50	5	35	34	47	22	20	50	10.4	6.3	12°	7°	0.37	With	SWMT09...
TXSW09M050B22.0R07	1.5	1	50	7	35	34	47	22	20	50	10.4	6.3	12°	7°	0.38	With	SWMT09...
New TXSW09M052B22.0R05	1.5	1	52	5	37	36	49	22	20	50	10.4	6.3	12°	7°	0.42	With	SWMT09...
New TXSW09M052B22.0R07	1.5	1	52	7	37	36	49	22	20	50	10.4	6.3	12°	7°	0.38	With	SWMT09...
New TXSW09M063B22.0R06	1.5	1	63	6	48	47	59	22	20	50	10.4	6.3	12°	7°	0.69	With	SWMT09...
New TXSW09M063B22.0R08	1.5	1	63	8	48	47	59	22	20	50	10.4	6.3	12°	7°	0.7	With	SWMT09...

SPARE PARTS

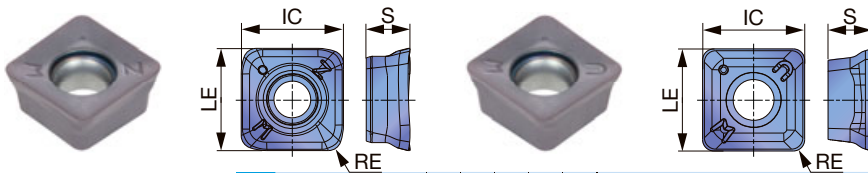
Designation	Clamping screw	Torx bit	Grip	Shell locking bolt	Lubricant
TXSW09M04...	CSPD-3	BLDIP10/S7	H-TB2W	FSHM8-30H	M-1000
TXSW09M05...	CSPD-3	BLDIP10/S7	H-TB2W	FSHM10-40H	M-1000
TXSW09M06...	CSPD-3	BLDIP10/S7	H-TB2W	CM10X30H	M-1000

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

INSERTS

SWMT0904ZER-MM

SWMT0904UER-MM



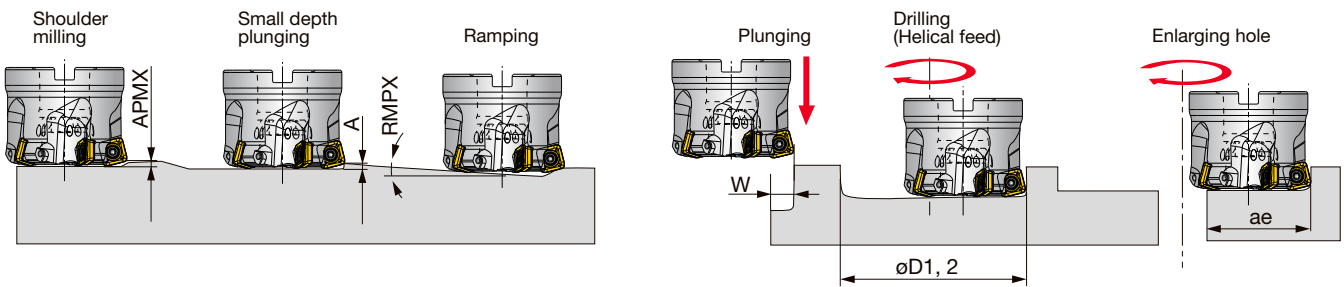
P	Steel		☆	★										
M	Stainless	★	☆	☆										
K	Cast iron		☆	☆	★									
N	Non-ferrous													
S	Titanium	★	☆											
S	Heat resistant alloy				☆	★								
H	Hard materials			☆	☆	★								

★ : First choice
☆ : Second choice

Designation	RE	APMX	Coated					LE	IC	S
			AH130	AH3135	AH3225	AH120	AH8015			
SWMT0904ZER-MM	1	1.5	●	●	●	●	●	8.605	8.605	4
SWMT0904UER-MM	1	1	●	●	●	●	●	9.05	9.05	4

● : New lineup

APPLICATION RANGE



09 type

Designation	Tool dia. DCX	Max. depth of cut		Max. plunging depth A	Max. ramping angle		Max. cutting width in plunging		Min. machining dia.		Max. machining dia.		Max. cutting width in enlarging	
		APMX			RMPX		W		øD1		øD2		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	SWMT 09**ZER
E/HXSW09M025...	25	1.5	1	0.3	4.8	6	7	7.5	34	33	47	47	16.5	16
E/HXSW09M032...	32	1.5	1	0.3	2.7	3.2	7	7.5	48	47	61	61	23.5	23
TXSW09M040...	40	1.5	1	0.3	1.8	2.1	7	7.5	64	63	77	77	31.5	31
TXSW09M050...	50	1.5	1	0.3	1.2	1.4	7	7.5	84	83	97	97	41.5	41
New TXSW09M052...	52	1.5	1	0.3	1.2	1.4	7	7.5	88	87	101	101	43.5	43
New TXSW09M063...	63	1.5	1	0.3	0.8	1.1	7	7.5	110	109	123	123	54.5	54

STANDARD CUTTING CONDITIONS

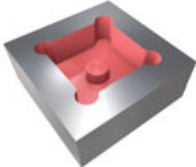

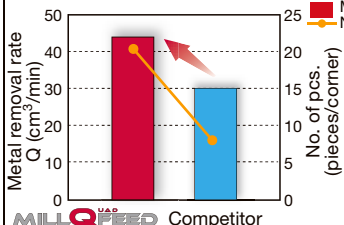
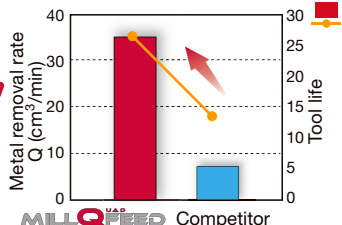
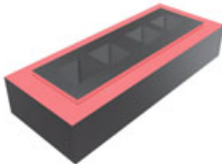
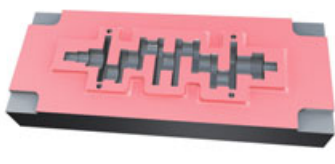
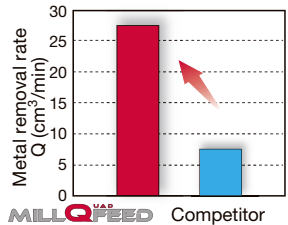
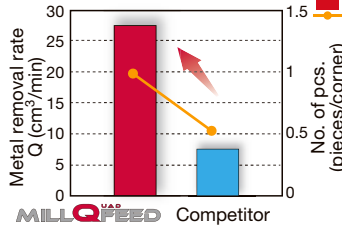
09 type

ISO	Workpiece material	Hardness	Priority	Insert type	Grade	Chip-breaker	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
P	Carbon steel S45C, S55C, etc. C45, C55, etc.	- 300HB	First choice	ZER	AH3225	MM	100 - 300	0.5 - 1.5
			Fracture resistance	ZER	AH3135	MM	100 - 300	0.5 - 1.5
			Wear resistance	UER	AH3225	MM	100 - 300	0.5 - 1.5
	Alloy steel SCM440, etc. 42CrMo4, etc.	- 300HB	First choice	ZER	AH3225	MM	100 - 200	0.5 - 1.5
			Fracture resistance	ZER	AH3135	MM	100 - 200	0.5 - 1.5
			Wear resistance	UER	AH3225	MM	100 - 200	0.5 - 1.5
	Prehardened steel NAK80, PX5, etc.	30 - 40HRC	First choice	ZER	AH3225	MM	100 - 200	0.5 - 1.2
			Fracture resistance	ZER	AH3135	MM	100 - 200	0.5 - 1.2
			Wear resistance	UER	AH3225	MM	100 - 200	0.5 - 1.2
M	Austenitic stainless steel SUS304, etc. X5CrNi18-9, etc.	- 200HB	First choice	UER	AH3135	MM	100 - 150	0.5 - 1.2
			Fracture resistance	UER	AH130	MM	100 - 150	0.5 - 1.2
			Low cutting force	ZER	AH3135	MM	100 - 150	0.5 - 1.2
	Precipitation hardening stainless steel SUS630, etc. X20CrNiCuNb-16-4, etc.	28HRC - (H1150)	First choice	UER	AH3135	MM	80 - 150	0.3 - 1.2
			Fracture resistance	UER	AH130	MM	80 - 150	0.3 - 1.2
			Low cutting force	ZER	AH3135	MM	80 - 150	0.3 - 1.2
		40HRC - (H900)	First choice	UER	AH3135	MM	80 - 120	0.3 - 0.8
			Fracture resistance	UER	AH130	MM	80 - 120	0.3 - 0.8
			Low cutting force	ZER	AH3135	MM	80 - 120	0.3 - 0.8
K	Gray cast iron FC250, FC300, etc., 250, 300, etc.	150 - 250HB	First choice	ZER	AH8015	MM	100 - 300	0.5 - 2
			Fracture resistance	ZER	AH120	MM	100 - 300	0.5 - 2
			Low cutting force	ZER	AH8015	MM	80 - 200	0.5 - 2
	Ductile cast iron FCD600, etc., 600-3, etc.	150 - 250HB	First choice	ZER	AH8015	MM	80 - 200	0.5 - 2
			Fracture resistance	ZER	AH120	MM	80 - 200	0.5 - 2
			Low cutting force	ZER	AH8015	MM	80 - 200	0.5 - 2
S	Titanium alloys Ti-6Al-4V, etc.	- 40HRC	First choice	UER	AH130	MM	30 - 60	0.3 - 0.7
			Wear resistance	UER	AH8015	MM	30 - 60	0.3 - 0.7
			Low cutting force	ZER	AH130	MM	30 - 60	0.3 - 0.7
	Heat-resistance alloys Inconel, Hastelloy, etc.	- 40HRC	First choice	UER	AH8015	MM	20 - 50	0.1 - 0.3
			Fracture resistance	UER	AH130	MM	20 - 50	0.1 - 0.3
			Low cutting force	ZER	AH8015	MM	20 - 50	0.1 - 0.3
H	Hardened steel SKD61, etc. X40CrMoV5-1, etc.	40 - 50HRC	First choice	UER	AH8015	MM	80 - 130	0.1 - 0.3
			Fracture resistance	UER	AH130	MM	80 - 130	0.1 - 0.3
			Low cutting force	ZER	AH8015	MM	80 - 130	0.1 - 0.3

15 type

ISO	Workpiece material	Hardness	Priority	Insert type	Grade	Chip-breaker	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
P	Carbon steel S45C, S55C, etc. C45, C55, etc.	- 300HB	First choice	ZER	AH3135	MM	100 - 300	0.5 - 1.5
			Wear resistance	ZER	AH120	MM	100 - 300	0.5 - 1.5
			Fracture resistance	ZER	AH3135	MT	100 - 300	0.5 - 2
	Alloy steel SCM440, etc. 42CrMo4, etc.	- 300HB	First choice	ZER	AH3135	MM	100 - 200	0.5 - 1.5
			Wear resistance	ZER	AH120	MM	100 - 200	0.5 - 1.5
			Fracture resistance	ZER	AH3135	MT	100 - 200	0.5 - 2
	Prehardened steel NAK80, PX5, etc.	30 - 40HRC	First choice	ZER	AH3135	MM	100 - 200	0.5 - 1.2
			Wear resistance	ZER	AH120	MM	100 - 200	0.5 - 1.2
			Fracture resistance	ZER	AH3135	MT	100 - 200	0.5 - 1.5
M	Austenitic stainless steel SUS304, etc., X5CrNi18-9, etc.	- 200HB	First choice	UER	AH3135	MM	100 - 150	0.5 - 1.2
			Low cutting force	ZER	AH3135	MM	100 - 150	0.5 - 1.2
	Precipitation hardening stainless steel SUS630, etc. X20CrNiCuNb-16-4, etc.	28HRC - (H1150)	First choice	UER	AH3135	MM	80 - 150	0.3 - 1.2
			Low cutting force	ZER	AH3135	MM	80 - 150	0.3 - 1.2
		40HRC - (H900)	First choice	UER	AH3135	MM	80 - 120	0.3 - 0.8
			Low cutting force	ZER	AH3135	MM	80 - 120	0.3 - 0.8
K	Gray cast iron FC250, FC300, etc. 250, 300, etc.	150 - 250HB	First choice	ZER	AH120	MT	100 - 300	0.5 - 2
			Fracture resistance	ZER	AH3135	MT	100 - 300	0.5 - 2
			Low cutting force	ZER	AH120	MM	100 - 300	0.5 - 1.5
	Ductile cast iron FCD600, etc. 600-3, etc.	150 - 250HB	First choice	ZER	AH120	MT	80 - 200	0.5 - 2
			Fracture resistance	ZER	AH3135	MT	80 - 200	0.5 - 2
			Low cutting force	ZER	AH120	MM	80 - 200	0.5 - 1.5
S	Titanium alloys Ti-6Al-4V, etc.	- 40HRC	First choice	UER	AH3135	MM	30 - 60	0.3 - 0.7
			Low cutting force	ZER	AH3135	MM	30 - 60	0.3 - 0.7
			Fracture resistance	ZER	AH3135	MT	30 - 60	0.3 - 0.7
Heat-resistance alloys Inconel, Hastelloy, etc.	- 40HRC	First choice	UER	AH3135	MM	20 - 50	0.1 - 0.3	
		Wear resistance	ZER	AH120	MM	20 - 50	0.1 - 0.3	
		Low cutting force	ZER	AH3135	MM	20 - 50	0.1 - 0.3	
H	Hardened steel SKD61, etc. X40CrMoV5-1, etc.	40 - 50HRC	First choice	ZER	AH3135	MT	80 - 130	0.1 - 0.3
			Wear resistance	ZER	AH120	MT	80 - 130	0.1 - 0.3
	SKD11, etc. X153CrMoV12, etc.	50 - 60HRC	First choice	ZER	AH120	MT	50 - 70	0.05 - 0.2
			Wear resistance	ZER	AH120	MT	50 - 70	0.05 - 0.2

PRACTICAL EXAMPLES

Workpiece type		Mold	Blisk	
Cutter		HXSW09M025M12R03 (ø25, z = 3)	HXSW09M032M16R04 (ø32, z=4, Comperitor: ø32, z = 5)	
Insert		SWMT0904ZER-MM	SWMT0904ZER-MM	
Grade		AH3225	AH130	
Workpiece material		S45C / C45	Ti-6Al-4V	
		 P	 S	
Cutting conditions	Cutting speed : Vc (m/min)	157	60 (Comperitor: Vc = 40)	
	Feed per tooth: fz (mm/t)	0.6	1 (Comperitor: fz = 0.5)	
	Depth of cut : ap (mm)	0.5	1.2 (Comperitor: ap = 0.5)	
	Width of cut : ae (mm)	- 25	12	
	Machining	Pocket Milling	Face Milling	
	Coolant	Dry	Wet	
	Machine	Vertical M/C, BT40, 15kW	Vertical M/C, BT50, 22kW	
Results	 <p>Productivity 1.5 times! Tool life 3 times!</p> <p>MILLQFEED Competitor</p> <p>The latest insert grade, AH3225, has dramatically reduced tool wear, increasing tool life by 300%. Machining efficiency has also improved by 150% due to increased insert density.</p>		 <p>Productivity 5 times! Tool life 2 times!</p> <p>MILLQFEED Competitor</p> <p>Optimized for machining exotic materials, MQF has improved MRR by over 500% and tool life by over 200%.</p>	
	<p>The latest insert grade, AH3225, has dramatically reduced tool wear, increasing tool life by 300%. Machining efficiency has also improved by 150% due to increased insert density.</p>		<p>Optimized for machining exotic materials, MQF has improved MRR by over 500% and tool life by over 200%.</p>	
Workpiece type		Machine base	Crank shaft	
Cutter		EXSW09M025C25.0R03 (ø25, z = 3, Comperitor: ø25, z = 4)	TXSW09M050B22.0R07 (ø50, z = 7, Comperitor: ø50, z = 5)	
Insert		SWMT0904UER-MM	SWMT0904UER-MM	
Grade		AH120	AH8015	
Workpiece material		FC250 / 250 / GG25	SKD61 / X40CrMoV5-1 (50HRC)	
		 K	 H	
Cutting conditions	Cutting speed : Vc (m/min)	250 (Comperitor: Vc = 147)	80	
	Feed per tooth: fz (mm/t)	1 (Comperitor: fz = 0.8)	0.5 (Comperitor: fz = 0.2)	
	Depth of cut : ap (mm)	0.8	0.5	
	Width of cut : ae (mm)	- 25	30	
	Machining	Face Milling	Face Milling	
	Coolant	Dry	Dry	
	Machine	Horizontal M/C, BT50, 22kW	Vertical M/C, BT50, 22kW	
Results	 <p>Productivity 1.6 times!</p> <p>MILLQFEED Competitor</p> <p>Thanks to wear resistant AH120 grade insert, a higher speed has been achieved, improving machining efficiency by 160%.</p>		 <p>Productivity 3.5 times! Tool life 2 times!</p> <p>MILLQFEED Competitor</p> <p>Due to close-pitch cutter design and small entering angle of UER insert, MRR has improved by 350%. Wear resistant AH8015 grade has increased tool life by 200%.</p>	
	<p>Thanks to wear resistant AH120 grade insert, a higher speed has been achieved, improving machining efficiency by 160%.</p>		<p>Due to close-pitch cutter design and small entering angle of UER insert, MRR has improved by 350%. Wear resistant AH8015 grade has increased tool life by 200%.</p>	

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