Think threads with YAMAWA

▪ Z-PRO Spiral Fluted Taps for Carbon Steels of Medium Hardness, Through Hole Use (with LH Spiral Flutes) ▪

MHSL

MHSL

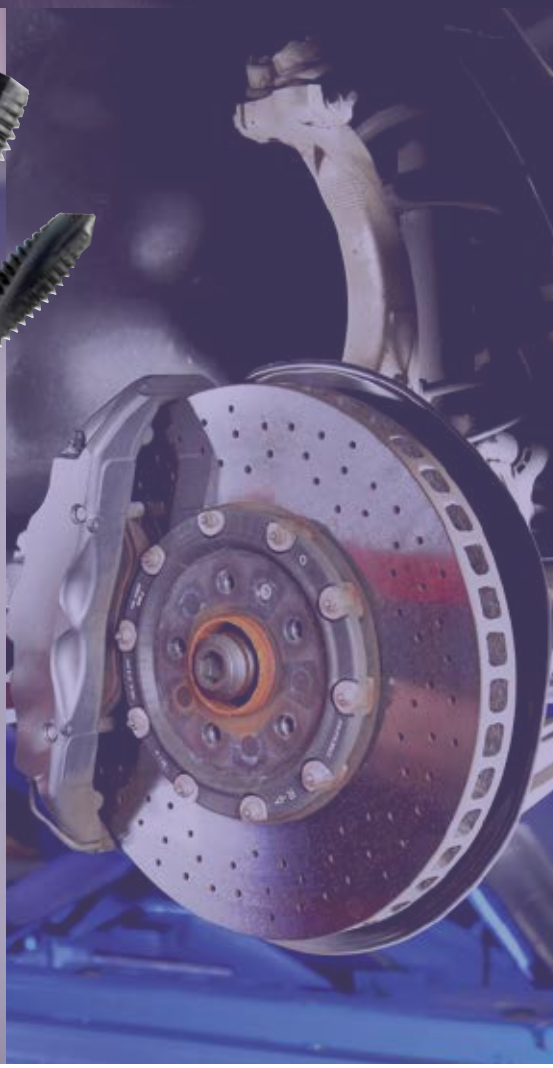
Suitable for machining through-holes in medium-hard carbon steels

Z-PRO

Ultimate Machining Taps

JIS / ANSI / DIN

Z-PRO
M2·M6～M16
M1.8·M2 Expansion of long shank taps



Spiral Fluted Taps for Carbon Steels of Medium Hardness, Through Hole Use (with LH Spiral Flutes) MHSL

What is Z-PRO?

Z-PRO is a cross between Zenith and Professional.The concept of this product is "the ultimate professional tool optimized for machining", which was developed to respond to the market trend in which multi-functional machining centers are widely used.

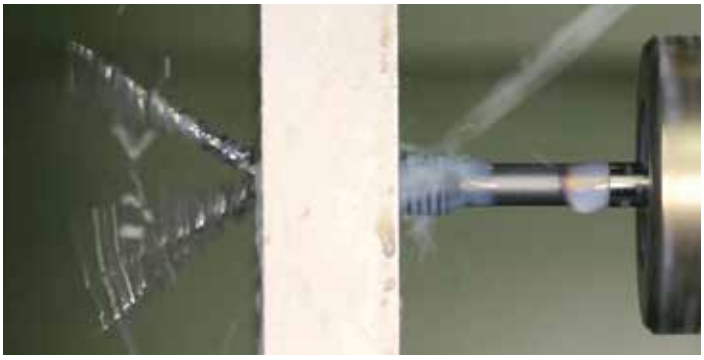
Z-PRO Features

Semi-long shape suitable for machining

Z-PRO shape

JIS shape

Appropriate overall length enables improved chip evacuation and stable supply of cutting fluid.



Adoption of wear-resistant material

Surface treatment is adopted in consideration of heat resistance and abrasion resistance!
Longer tool life is achieved!

Z-PRO
Ultimate Machining Taps

Spiral Fluted Taps for Carbon Steels of Medium Hardness, Through Hole Use (with LH Spiral Flutes)

MHSL

M1.8~M5

HSS-Co | Coating | Synchronized | <2D

Medium carbon steels	High carbon steels	Alloy steels	Thermal refined steels	Thermal refined steels	Tool steels
2~16 (m/min)	2~16 (m/min)	2~16 (m/min)	2~16 (m/min)	1~12 (m/min)	1~12 (m/min)
			25~35HRC	35~45HRC	

M2.5 L-50

M2.5 L-100

Product Features

- Long tool life……Special coating improves durability
- Improved chip evacuation……Unique flute shape realizes excellent chip evacuation
- Excellent internal thread surface finish……High machinability and excellent surface finish of internal threads.
- Overall length……Ensures proper tool protrusion and avoids interference with machining workpiece.

Suitable for tapping threads in mold parts

Suitable for creating threads for insert tip.

Tapping Data

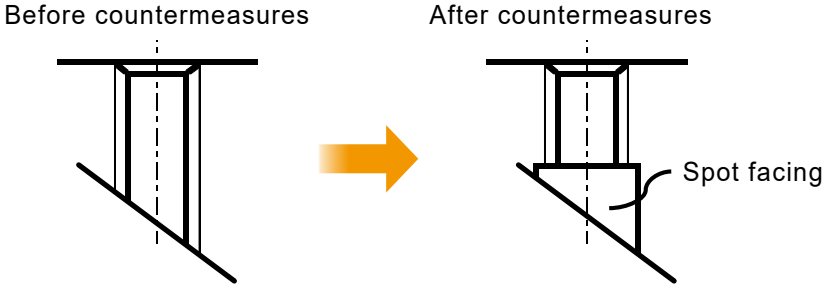
Z-PRO MHSL M1.8~M5	Size	Work piece Material	Tapping Conditions / Tapping Result						Remarks
		Material Symbol (Hardness)	Bored Hole Size (mm)	Tapping Length (mm)(※)	Cutting Speed (m/min)	Feed Mechanism	Tapping Fluid	Tool Life (Holes/pc)	
Our continuous tapping data	M2.5X0.45	SCM440(45HRC)	2.1	5(2D)	5	Synchronized	Water soluble	200 holes or more (The tap still works well)	-
 MHSL Microphotography after tapped 200 holes (Can Continue)								 Excellent thread surface	
User A	M2.5X0.45	SCM440(45HRC)	2.1	4(1.6D)	2.5	Synchronized	Water soluble	300 holes	Reduced breakage problems
User B	M2.5X0.45	SKD61(45HRC)	2.1	5(2D)	5	Synchronized	Water soluble	150 holes or more (The tap still works well)	-
User C	M4X0.7	SCM440(45HRC)	3.4	6(1.5D)	5	Synchronized	Water soluble	351 holes	Reduced tapping time

*(D) indicates the ratio of the tapping length to the outside diameter.

One Point Advice

① The recommended tapping speed for M1.8 is 1 to 3 m/min.

② When tapping internal threads in a through hole toward the slanted surface as shown on the left, spot facing as shown on the right is recommended to prevent tap breakage or other problems.



Z-PRO
Ultimate Machining Taps
JIS

Spiral Fluted Taps for Carbon Steels of Medium Hardness, Through Hole Use (with LH Spiral Flutes)

MHSL
MHSL-J

M6~M16

HSS-Co | Coating | Synchronized | <2D

Medium carbon steels	High carbon steels	Alloy steels
10~20 (m/min)	10~20 (m/min)	10~20 (m/min)

Thermal refined steels	Tool steels
10~20 (m/min)	5~15 (m/min)

25~35HRC

MHSL-J M12×1.75 L-82

MHSL M12×1.75 L-110

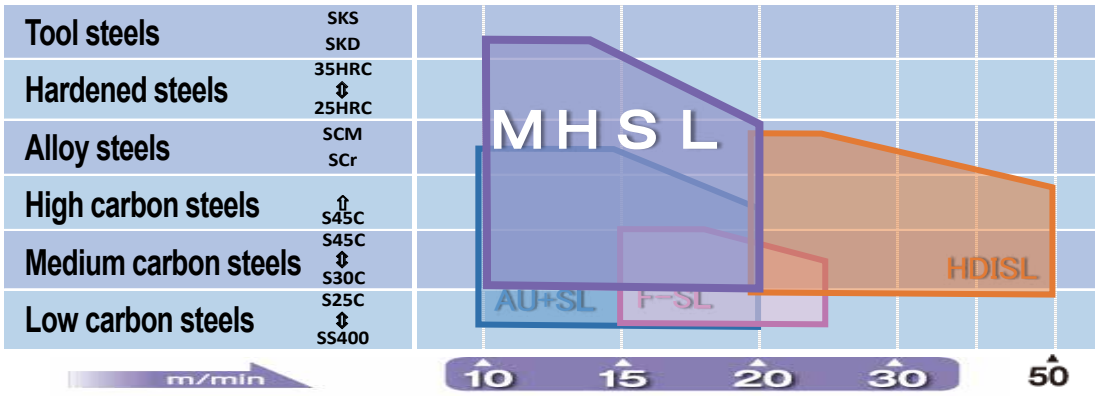
Product Features

- Long tool life……Special coating improves durability
- Improved chip evacuation……Unique flute shape realizes excellent chip evacuation
- Excellent internal thread surface finish……High machinability and excellent surface finish of internal threads.

Examples of machined parts

Excellent durability for tapping through holes in medium hard steels such as hub bearings of automotive.

Processing Area

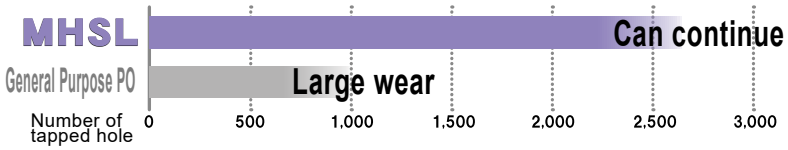


*Tapping speed differs for small diameters.

Tapping Data

Material with excellent durability and high level of abrasion resistance,together with optimal coating are used.

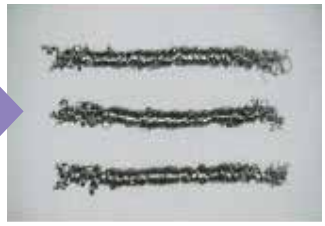
Outstanding durability



Thread size	M12X1.25
Workpiece Material	S53C Forging
Cutting Speed	30m/min
Tapping Length	12mm (Through Hole)
Machine	Horizontal machining center (Synchronized)
Tapping Fluid	Water soluble cutting fluid

LH Spiral Flutes (with coating)

MHSL



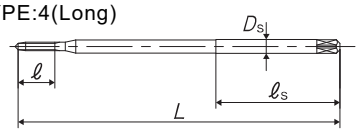
Think threads with YAMAWA

Z-PRO Ultimate Machining Taps

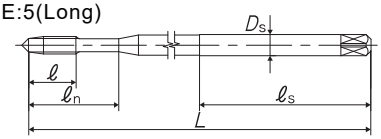
Spiral Fluted Taps for Carbon Steels of Medium Hardness, Through Hole Use (with LH Spiral Flutes)

MHSL
Long M1.8~M5

TYPE:4(Long)



TYPE:5(Long)



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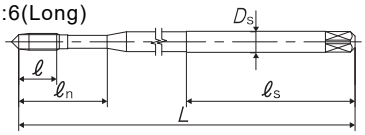


Segment:1T For Metric Threads

	Size	Class	Code	Chamfer	L (mm)	ℓ (mm)	ℓn (mm)	ℓs (mm)	Ds (mm)	No. of flutes	TYPE	MSRP
◎	M1.8X0.35	P2	2109101017	5P	70	8	-	27	3	2	4	9,680
◎	M2X0.4	P2	2209101021	5P	100	8	15	27	3	2	5	10,200
	M2.5X0.45	P3	2209101029	5P	100	8.1	15	32	3	3	5	6,320
	M3X0.5	P3	2109101035	5P	100	9	18	32	4	3	5	5,260
	M3.5X0.6	P3	2109101038	5P	100	11	20	36	5	3	5	5,260
	M4X0.7	P3	2109101042	5P	100	11	21	36	5	3	5	4,800
	M4.5X0.75	P3	2109101045	5P	100	13	24	40	5.5	3	5	5,390
	M5X0.8	P3	2109101049	5P	100	13	25	40	5.5	3	5	4,310
	M5X0.5	P3	2109101051	5P	100	9	25	40	5.5	3	6	5,390

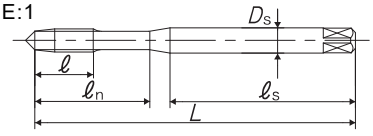
◎••••Additional Sizes

Z-PRO Ultimate Machining Taps

Spiral Fluted Taps for Carbon Steels of Medium Hardness, Through Hole Use (with LH Spiral Flutes)

MHSL
M2~M16

TYPE:1



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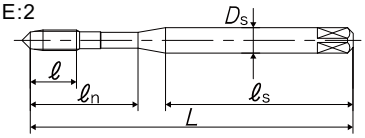

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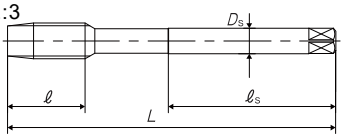


Segment:1T For Metric Threads

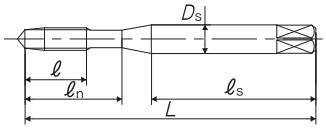
	Size	Class	Code	Chamfer	L (mm)	ℓ (mm)	ℓn (mm)	ℓs (mm)	Ds (mm)	No. of flutes	TYPE	MSRP
◎	M2X0.4	P2	1109101021	5P	45	8	15	27	3	2	1	3,780
	M2.5X0.45	P3	1109101029	5P	50	8	15	32	3	3	1	3,200
	M3X0.5	P3	1109101035	5P	56	9	18	32	4	3	1	2,900
	M3.5X0.6	P3	1109101038	5P	63	13	20	36	5	3	1	2,900
	M4X0.7	P3	1109101042	5P	63	13	21	36	5	3	1	2,850
	M4.5X0.75	P3	1109101045	5P	70	14	24	40	5.5	3	1	3,690
	M5X0.8	P3	1109101049	5P	70	14	25	40	5.5	3	1	2,880
	M5X0.5	P3	1109101051	5P	70	9	25	40	5.5	3	2	3,690
◎	M6X1	P3	1109101055	5P	80	15	30	45	6	3	1	3,180
◎	M8X1.25	P4	1109101064	5P	90	19	-	46	6.2	3	3	4,720
◎	M10X1.5	P4	1109101078	5P	100	23	-	51	7	3	3	5,460
◎	M10X1.25	P4	1109101079	5P	100	23	-	51	7	3	3	5,460
◎	M12X1.75	P5	1109101088	5P	110	26	-	56	8.5	4	3	7,830
◎	M12X1.5	P5	1109101089	5P	110	26	-	56	8.5	4	3	7,830
◎	M12X1.25	P5	1109101090	7P	110	26	-	56	8.5	4	3	7,830
◎	M14X1.5	P5	1109101102	7P	110	26	-	56	10.5	4	3	10,900
◎	M16X1.5	P5	1109101116	7P	110	26	-	56	12.5	4	3	14,100

◎••••Additional Sizes

Spiral Fluted Taps for Carbon Steels of Medium Hardness, Through Hole Use (with LH Spiral Flutes)

JIS **MHSL-J**
M6~M16

TYPE:7



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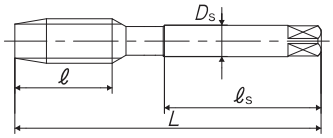


Segment:1T For Metric Threads

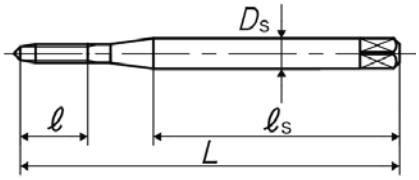
Size	Class	Code	Chamfer	L (mm)	ℓ (mm)	ℓn (mm)	ℓs (mm)	Ds (mm)	No. of flutes	TYPE	MSRP
M6X1	P3	MHSLR6.0M5	5P	62	15	26	33	6	3	7	3,120
M8X1.25	P4	MHSLS8.0N5	5P	70	19	-	36	6.2	3	8	4,060
M10X1.5	P4	MHSLS010O5	5P	75	23	-	38	7	3	8	4,750
M10X1.25	P4	MHSLS010N5	5P	75	23	-	38	7	3	8	4,750
M12X1.75	P5	MHSLT012P5	5P	82	26	-	42	8.5	4	8	6,400
M12X1.5	P5	MHSLT012O5	5P	82	26	-	42	8.5	4	8	6,400
M12X1.25	P5	MHSLT012N7	7P	82	26	-	42	8.5	4	8	6,400
M14X1.5	P5	MHSLT014O7	7P	88	26	-	45	10.5	4	8	8,660
M16X1.5	P5	MHSLT016O7	7P	95	26	-	48	12.5	4	8	11,800

Z-PRO Ultimate Machining Taps

Spiral Fluted Taps for Carbon Steels of Medium Hardness, Through Hole Use (with LH Spiral Flutes)

MHSL
M2~M16

TYPE:1



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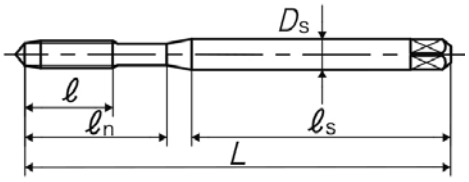

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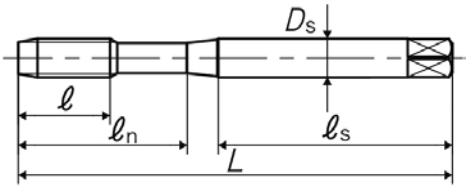

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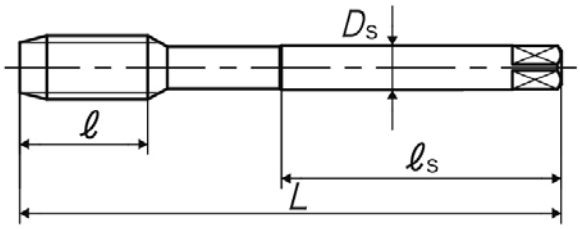


Segment:1T For Metric Threads

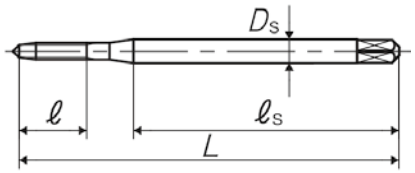
Size	Class	Code	Chamfer	L (inch)	ℓ (inch)	ℓn (inch)	ℓs (inch)	Ds (inch)	No. of flutes	TYPE
M2X0.4	D3	5109101021	5P	1.772	0.314	-	1.161	0.141	2	1
M2.5X0.45	D4	5109101029	5P	2.205	0.354	0.693	1.28	0.141	3	2
M3X0.5	D4	5109101035	5P	2.205	0.433	0.736	1.339	0.141	3	2
M3.5X0.6	D4	5109101038	5P	2.205	0.433	0.748	1.339	0.141	3	2
M4X0.7	D5	5109101042	5P	2.48	0.512	0.815	1.535	0.168	3	2
M4.5X0.75	D5	5109101045	5P	2.756	0.551	0.984	1.654	0.194	3	2
M5X0.8	D5	5109101049	5P	2.756	0.551	0.984	1.654	0.194	3	2
M5X0.5	D4	5109101051	5P	2.756	0.354	0.984	1.654	0.194	3	2
M6X1	D5	LS6.0M5FCL5	5P	3.15	0.591	1.181	1.713	0.255	3	2
M8X1.25	D5	LS8.0N5FCL5	5P	3.543	0.748	1.378	1.831	0.318	3	3
M10X1.5	D6	LS010O6FCL5	5P	3.937	0.906	1.535	2.126	0.381	3	3
M10X1.25	D6	LS010N6FCL5	5P	3.937	0.906	1.535	2.126	0.381	3	3
M12X1.75	D7	LS012P7FCL5	5P	4.331	1.024	-	2.205	0.367	4	4
M12X1.5	D6	LS012O6FCL5	5P	4.331	1.024	-	2.205	0.367	4	4
M12X1.25	D6	LS012N6FCL7	7P	4.331	1.024	-	2.205	0.367	4	4
M14X1.5	D7	LS014O7FCL7	7P	4.331	1.024	-	2.205	0.429	4	4
M16X1.5	D7	LS016O7FCL7	7P	4.331	1.024	-	2.205	0.48	4	4

Spiral Fluted Taps for Carbon Steels of Medium Hardness, Through Hole Use (with LH Spiral Flutes)

MHSL M2~M16

DIN

TYPE:1



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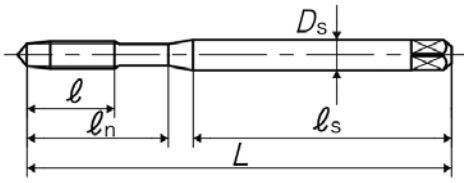

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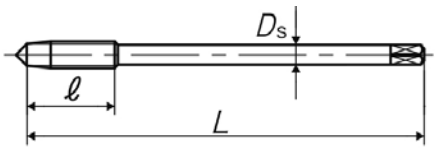

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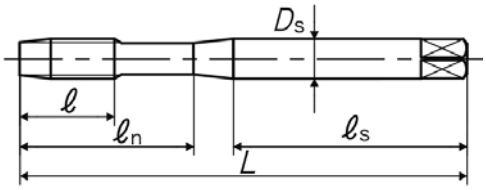

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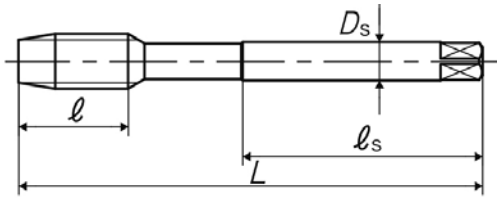


Segment:1T For Metric Threads

Size	Class	Code	Chamfer	L (mm)	ℓ (mm)	ℓn (mm)	ℓs (mm)	Ds (mm)	No. of flutes	TYPE
M2X0.4	ISO2X	3109101021	5P	45	8	-	32	2.8	2	1
M2.5X0.45	ISO2X	3109101029	5P	50	8	15	33	2.8	3	2
M3X0.5	ISO2X	3109101035	5P	56	9	18	34	3.5	3	2
M3.5X0.6	ISO2X	3109101038	5P	56	11	20	32	4	3	2
M4X0.7	ISO2X	3109101042	5P	63	13	21	38	4.5	3	2
M4.5X0.75	ISO2X	3109101045	5P	70	14	24	39	6	3	2
M5X0.8	ISO2X	3109101049	5P	70	14	25	39	6	3	2
M5X0.5	ISO2X	3109101051	5P	70	11	-	-	3.5	3	3
M6X1	ISO2X	LD6.0MBFCL5	5P	80	15	30	45	6	3	2
M8X1.25	ISO2X	LD8.0NBFCL5	5P	90	19	35	47	8	3	4
M10X1.5	ISO2X	LD010OBFCL5	5P	100	23	39	52.5	10	3	4
M10X1.25	ISO2X	LM010NBFCL5	5P	100	23	-	51	7	3	5
M12X1.75	ISO2X	LG012PBFCL5	5P	110	26	-	56	9	4	5
M12X1.5	ISO2X	LM012OBFCL5	5P	100	21	-	51	9	4	5
M12X1.25	ISO2X	LM012NBFCL7	7P	100	21	-	51	9	4	5
M14X1.5	ISO2X	LM014OBFCL7	7P	100	21	-	51	11	4	5
M16X1.5	ISO2X	LM016OBFCL7	7P	100	21	-	51	12	4	5

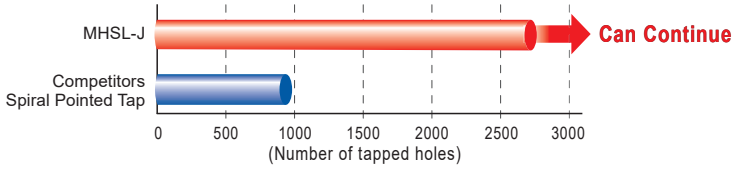
Tapping Data

Tapping Conditions [M12X1.25]

Workpiece Material	S53C(forged) / Hub bearing
Bored Hole Size	Φ10.8
Tapping Length	12mm through hole
Tapping Speed	30m/min
Machine	Horizontal machining center(full synchronized feed)
Tapping Fluid	Water soluble cutting fluid

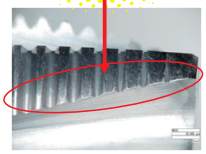
Tapping Conditions [M12X1.25]

Workpiece Material	S53C(25HRC)
Bored Hole Size	Φ10.85
Tapping Length	13mm
Tapping Speed	30m/min
Machine	Machining center
Tapping Fluid	Water soluble cutting fluid



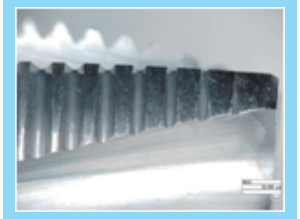
Enhanced wear resistance

The previous model caused abnormal noise after tapping 1239 holes.



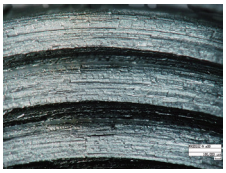
Left-hand spiral with surface treatment 1239 holes NG

Good!

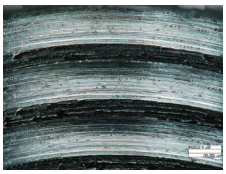


MHSL-J 2800 holes
Still works well

Improved surface finish



PO bright finish
initial tapping
Internal thread

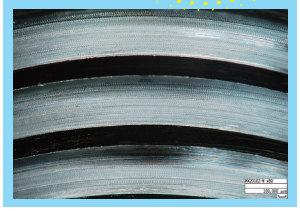


Left-hand spiral with surface treatment
initial tapping
Internal thread

Good!

MHSL-J has high cutting performance providing excellent surface finish of internal threads.

MHSL-J
initial tapping
Internal thread



Tapping Examples from the Market

MHSL-J	Workpiece Material	Tapping Conditions / Tapping Result							Remarks
Nominal Size	Material Symbol (Hardness)	Bored Hole Size (mm)	Tapping Length (mm)(⋆)	Machine	Cutting Speed (m/min)	Feed Mechanism	Tapping Fluid	Tool life (Holes / pcs)	Status of Conventional Tap / Parts
M6X1	S35C	5.1	12(2D)	Horizontal MC	7.5	Synchronized	Non-water soluble	10,000	Bad surface finish Workpiece name : Shafts
M8X1.25	S45C	6.8	8(1D)	Vertical MC	40	Synchronized	Water soluble	9,120	Replaced after tapping 5,200 holes Workpiece name : Shafts
M8X1.25	S55C (25HRC)	6.85	12(1.5D)	Vertical MC	30	Synchronized	Water soluble	2,160	Unstable tool life Workpiece name : Clutch parts
M10X1.25	S45C (23HRC)	8.8	20(2D)	Vertical MC	8	Synchronized	Water soluble	2,450	Replaced after tapping 1,600 holes Workpiece name : Shafts
M12X1.75	S55C (27HRC)	10.4	12(1D)	Vertical MC	19	Synchronized	Water soluble	2,840	Unstable tool life Workpiece name : Hub bearings
M14X1.5	S53C (25HRC)	12.6	14(1D)	Vertical MC	32	Synchronized	Water soluble	4,430	Replaced due to excessive torque after tapping 3,000 holes Workpiece name : Hub bearings
M14X1.5	S55C (23HRC)	12.6	14(1D)	Vertical MC	22	Synchronized	Water soluble	2,700	Replaced after tapping 2,000 holes Workpiece name : Hub bearings

Warning

♦Tools may shatter during use. Wear safety eye cover or eye glasses to avoid injury during tapping.
♦Use tools under the proper tapping condition.
♦Never wear gloves during turning operations as the gloves may get caught in the tools.
♦Wear safety shoes to avoid foot injury by the falling tools.
♦When attaching tools to the machine, fasten firmly to avoid chatter and run-out.
♦Fasten the workpiece firmly so it never moves during the tapping operation. Never use worn tools or damaged tools.
♦Take a special care to prevent fire during machining. High temperature during tapping can cause a fire.

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