MOLDINO
The Edge To Innovation

Indexable Square End Mill

ASM

Super Excellent Mini ASM

All sizes are now coolant-through.

MOLDINO Tool Engineering, Ltd.

New Product News | No. H2002A-2 | 2022-05

Indexable mill using advanced small-diameter inserts. Pocket design and 3D-shaped cutting edge allows for high-efficient machining with small diameter sizes.

Small dia.

Lineup of small diameter sizes from φ8mm to φ32mm and φ3/8" to φ1.25"
▶ **Can be used instead of solid carbide end mills.**

Multi-function

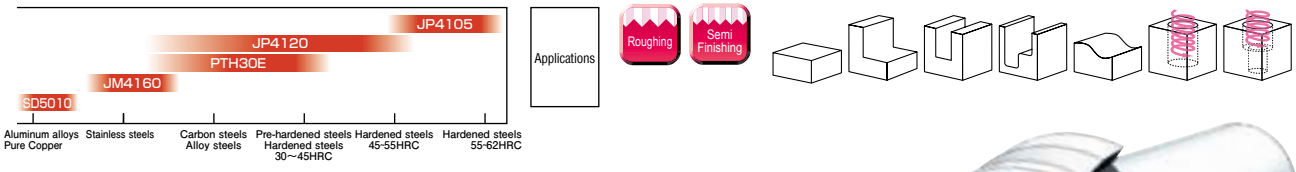
JDMT-type inserts for shoulder cutting and EDMT-type inserts for low-depth, high-feed-rate machining can be used in the same holder.
▶ **Wide selection of roughing tools available.**
Variety of modular options, including carbide shanks and special arbors, for specific cutting depths and shapes, that are required.
▶ **Wide cutting range**

Easy cutting

Utilizes a low-resistance, free-cutting shaped insert.
▶ **Compatible with low-powered, small-sized machines equivalent to a BT-30 spindle.**

Environment

▶ **Economical insert with 2 cutting edges**
▶ **Special environmentally-friendly, high-hardness, corrosion-resistant surface treatment applied on the holder.**



Features 01 2 types of applications by changing inserts

・High-efficient tooling system to match cutting depth or cutting shape

1 **Steel Shank type**
2 **Carbon Shank**
3 **Modular Arbor**

EDMT-type insert for machining efficiency

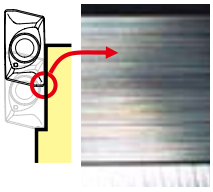
Utilizes R2.0mm(.079") cutting edge shape.
- No uncut remnants peculiar to high feed tools
- Low cutting resistance

Work material：S50C
Tools：ASMM0710R-2(φ10-2NT)
+ASC10-6.5-114-49
Cutting Conditions：v_c=160m/min
v_f=6,115mm/min
$a_p \times a_e$=0.25×5mm
Tool overhang 80mm

JDMT-type insert for high-grade machined surfaces

Utilizes Fine Wall (FW) shape.
- Decrease unevenness of machined surfaces
- Decrease burring

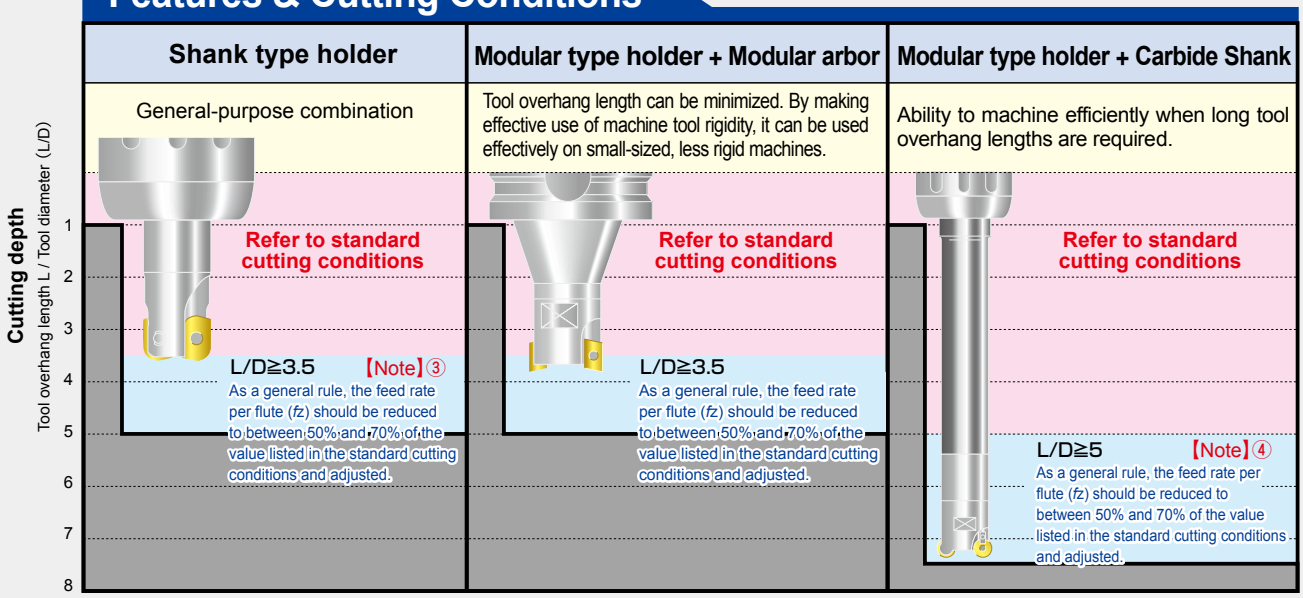
Work material：S50C
Tools：ASM0712S12R-2(φ12-3NT)
+ASC10-6.5-114-49
Cutting Conditions：v_c=200m/min
v_f=800mm/min
$a_p \times a_e$=5×0.5mm×2
Tool overhang 25mm



High-efficient tooling system and selecting of cutting conditions

・ASM allows for high-efficient machining, with various tool setups, to achieve desired cutting shape.

Features & Cutting Conditions



【Note】 ①This table shows general conditions for shoulder cutting. Adjustments should be made according to machine rigidity or tooling and the shape of the subject for cutting.
②When using ASM Ø20mm to Ø32mm inserts in a BT30 or BT40 arbor, the use of a combination of modular type holder and modular arbor is recommended. Furthermore, this is not suitable for cutting where L/D ≥ 2.
③When using an ASM0710S08R-2 or ASM0712S10R-2 undercut type shank, the feed rate per flute (*fz*) should be reduced to 50~70% of the value listed in the standard cutting conditions.
④When L/D>5 when using the carbide shank: ASC10-6.5-114-49/24, use a feed rate (*fz*) of 0.3mm/t with a depth (*ap*) that is less than 0.2mm.

2 kinds of insert geometry

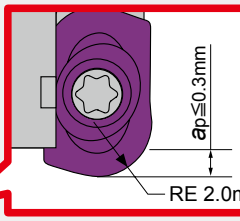
・2 kinds of inserts are available: Standard type inserts (T-type) and low-cutting force-type inserts.
・Low-resistance cutting force-type inserts reduce cutting force at the corners when pocketting by approximately 10%.

Standard type Insert
(EDMT070220R-T)

Low-resistance type Insert
(EDMT070220R)

Cutting programs

・Regular R shape is used for corner R. There is no need for an approximate R definition.



•Tool corner is R2.0mm (.079")
(Different from common high-feed tools in that it leaves no uncut areas.)
•Axial direction cutting depth ap should be set to 0.3 mm (.012") or less. (*ap* ≦ 0.3 mm)

【Note】
①Cutting dia. =DCX - 4(mm)
②When performing pocket cutting, be careful of the cutting width (a_e) and generated variations due to remaining work to cut. (Recommended Cutting width a_e=Cutting dia.×0.5～0.8(mm))
③When cutting the corner area of a vertical wall, setting the tool path corner area to R will achieve more stable cutting.

Technology

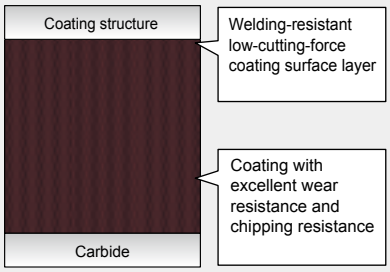
Features of AJ Coating series

- Employs an AlTiN layer with a new composition created by increasing the Al content of conventional layers.
- Excellent wear resistance, chipping resistance, and heat resistance!

New technology!!

- The new layer with high Al content employs a new composition and optimizes the crystal structure to improve wear resistance and chipping resistance!
- Employs a low-friction-effect coating with excellent welding resistance as the top-most surface layer. This reduces welding to the work and decreases cutting force!

Layer structure **AJ Coating**



PVD Technology

Grade for machining pre-hardened or hardened materials JP4120

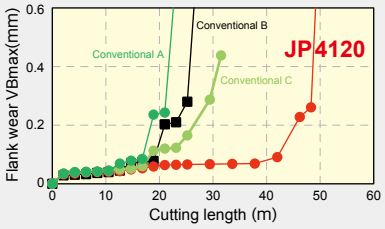
Features

- Employs a fine carbide substrate with an excellent balance between wear resistance and toughness along with the new "AJ Coating" to provide improved wear resistance and chipping resistance.
- Highly versatile with excellent wear resistance and chipping resistance when machining steel materials with hardnesses of 30 to 50 HRC.

Strong fields

- Exhibits excellent cutting performance when machining pre-hardened or hardened steel with hardnesses of 30 to 50 HRC.
- Exhibits excellent wear resistance even on difficult-to-cut diecast tool steel or precipitation-hardened stainless steel, or for finishing.

Cutting performance



Work material : H13(40HRC)
Tool : ASRT5063R-4 Insert : WDNW140520
Cutting conditions :
v_c=90m/min f_z=0.8mm/t $a_p \times a_e$=1×44mm
Dry ※Single-flute cutting

PVD Technology

Grade for machining stainless-steel materials JM4160

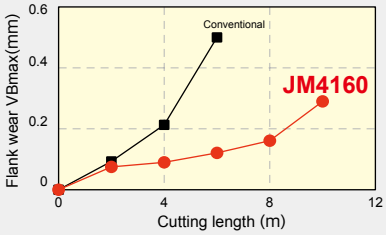
Features

- Employs a carbide substrate with high toughness along with the new "AJ Coating" to improve wear resistance and chipping resistance when machining stainless-steel materials.
- Employs AJ Coating with excellent welding resistance to reduce the welding to work material that occurs when machining stainless steel materials.

Strong fields

- Provides long tool life for general processing of stainless-steel materials

Cutting performance



Work material : 304 Stainless Steel
Tool : ASRS2032R-5 Insert : EPMT0603EN-8LF
Cutting conditions :
v_c=180m/min f_z=0.5mm/t $a_p \times a_e$=0.8×21mm
Wet ※Single-flute cutting

PVD Technology

Grade for machining high-hardness materials JP4105

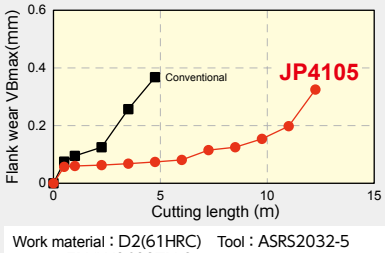
Features

- Employs an ultra-fine cemented carbide substrate along with the new "AJ Coating" to improve wear resistance.
- Excellent wear resistance when machining high hardness materials of 50HRC or higher.

Strong fields

- Ability to machine hardened steels (50 to 60 HRC): H13, D2, 420 Stainlesss Steel.

Cutting performance

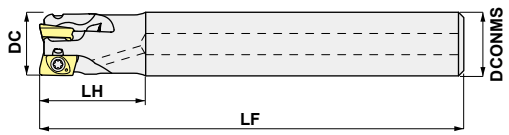


Work material : D2(61HRC) Tool : ASRS2032-5
Insert : EPNW0603TN-8
Cutting conditions :
v_c=80m/min f_z=0.2mm/t $a_p \times a_e$=0.5×21mm
Dry ※Single-flute cutting

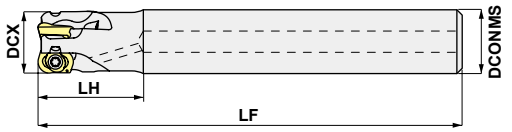
Inch

Shank type IASM□07○○S○○R-○

Numeric figure in a circle ○ and alphabetical character comes in a square □.



Standard type JDMT insert



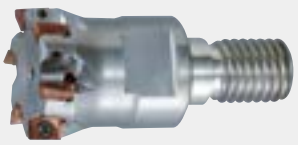
Standard type EDMT insert

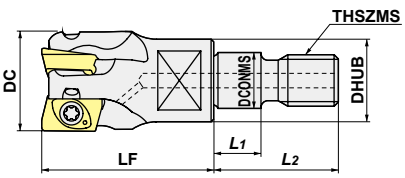
Maximum tightening torque **0.5Nm**
Spare screw included

Item code	Stock	# of Flutes	Size (Inch) DC DCX	LF	LH	DCONMS	Fig	Insert
IASM0706S06R-2	●	2	.375	3.0	.75	.375	Standard type	JDMT0702○○R EDMT070220R(-T)
IASM0708S08R-3	●	3	.5	3.0	.75	.5	Standard type	
IASM0710S10R-4	●	4	.625	3.5	1.0	.625	Standard type	
IASM0712S12R-5	●	5	.75	4.0	1.0	.75	Standard type	
IASML0710S10R-4	●	4	.625	4.5	2.0	.625	Standard type	
IASML0712S12R-5	●	5	.75	5.5	2.5	.750	Standard type	

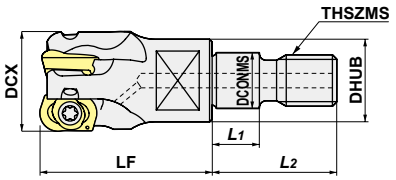
Modular type IASMM07○○R-○

Numeric figure in a circle ○.





JDMT insert



EDMT insert

Maximum tightening torque **0.5Nm**
Spare screw included

Item code	Stock	# of Flutes	Size (Inch) DC DCX	LF	DCONMS	THSZMS	DHUB	L_1	L_2	DRVS	Insert
IASMM0706R-2	●	2	.375	.787	.256	M6	.37	.217	.571	.276	JDMT0702○○R EDMT070220R-(T)
IASMM0708R-3	●	3	.5	.787	.256	M6	.386	.217	.571	.276	
IASMM0710R-4	●	4	.625	.984	.335	M8	.504	.217	.669	.394	
IASMM0712R-5	●	5	.75	1.181	.413	M10	.701	.217	.748	.591	
IASMM0716R-6	●	6	1.0	1.181	.492	M12	.819	.217	.866	.669	
IASMM0720R-8	●	8	1.25	1.181	.669	M16	1.134	.236	.906	.866	

【Note】 Do not apply lubricants such as grease, etc. to the "contact faces" and "modular screws" of the "modular mill", "special shanks" and "special arbor".

●:Inventory maintained in US

Metric

Shank type ASM□07○○S○○R-○

Numeric figure in a circle ○ and alphabetical character comes in a square □.

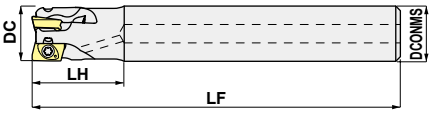


Fig-1 Standard type JDMT insert

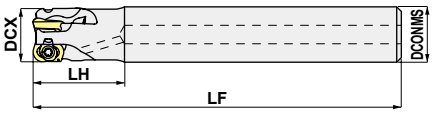


Fig-2 Standard type EDMT insert

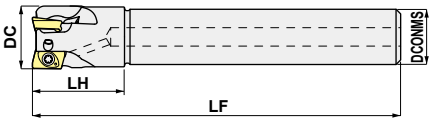


Fig-3 Undercut type JDMT insert

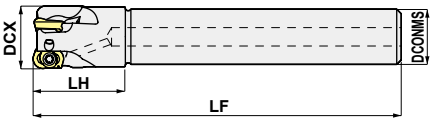


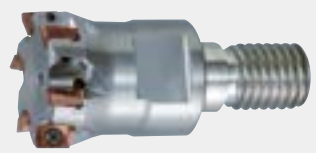
Fig-4 Undercut type EDMT insert

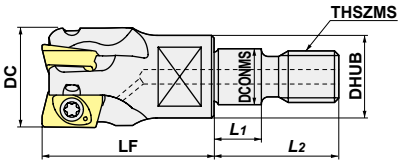
Maximum tightening torque **0.5Nm** Spare screw included

Item code	Stock	# of Flutes	Size (mm) DC DCX	LF	LH	DCONMS	Fig	Insert
ASM0708S10R-1	★	1	8	75	16	10	Standard type (Fig-1,2)	JDMT0702○○R EDMT070220R(-T)
ASM0710S10R-2	●	2	10	80	20	10	Standard type (Fig-1,2)	
ASM0710S08R-2	★	2	10	80	20	8	Undercut type (Fig-3,4)	
ASM0711S10R-2	★	2	11	80	20	10	Undercut type (Fig-3,4)	
ASM0712S12R-3	●	3	12	80	20	12	Standard type (Fig-1,2)	
ASM0712S10R-3	★	3	12	80	20	10	Undercut type (Fig-3,4)	
ASM0714S12R-3	★	3	14	80	20	12	Undercut type (Fig-3,4)	
ASM0716S16R-4	●	4	16	90	25	16	Standard type (Fig-1,2)	
ASML0716S16R-4	●	4	16	115	50	16	Standard type (Fig-1,2)	
ASM0717S16R-4	★	4	17	115	20	16	Undercut type (Fig-3,4)	
ASM0720S20R-5	●	5	20	105	25	20	Standard type (Fig-1,2)	
ASML0720S20R-5	●	5	20	140	60	20	Standard type (Fig-1,2)	
ASM0721S20R-5	★	5	21	140	20	20	Undercut type (Fig-3,4)	

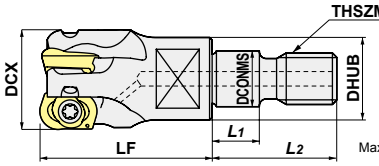
Modular type ASMM07○○R-○

Numeric figure in a circle ○.





JDMT insert



EDMT insert

Maximum tightening torque **0.5Nm** Spare screw included

Item code	Stock	# of Flutes	Size (mm) DC DCX	LF	DCONMS	THSZMS	DHUB	L_1	L_2	DRVS	Insert
ASMM0708R-1	★	1	8	20	6.5	M6	9.8	5.5	14.5	7	JDMT0702○○R EDMT070220R-(T)
ASMM0710R-2	●	2	10	20	6.5	M6	9.4	5.5	14.5	7	
ASMM0711R-2	★	2	11	20	6.5	M6	9.8	5.5	14.5	7	
ASMM0712R-3	●	3	12	20	6.5	M6	9.8	5.5	14.5	7	
ASMM0716R-4	●	4	16	25	8.5	M8	12.8	5.5	17	10	
ASMM0720R-5	●	5	20	30	10.5	M10	17.8	5.5	19	15	
ASMM0725R-6	★	6	25	30	12.5	M12	20.8	5.5	22	17	
ASMM0732R-8	★	8	32	30	17	M16	28.8	6	23	22	

【Note】 Do not apply lubricants such as grease, etc. to the "contact faces" and "modular screws" of the "modular mill", "special shanks" and "special arbor".

●:Inventory maintained in US ★:Inventory maintained in Japan

Inserts

Fig-3 JDMT07020◌R
Insert with 5mm(.197") cutting edge for shoulder cutting
a_{pmax}=5.0mm(.197")

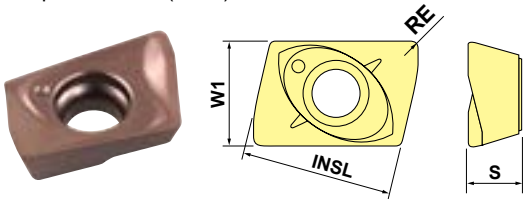
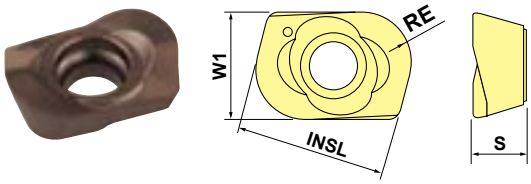


Fig-4 EDMT070220R(-T)
Insert with 2.0mm(.079") corner RE for small-depth, high-feed-rate cutting
a_{pmax}=0.3mm(.012")



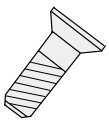
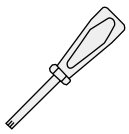
P	Carbon steel		■		■		⊓	
M	Stainless Steel		⊓	■	⊓	■	■	
K	Cast Iron・Ductile Cast Iron						⊓	
N	Aiuminum Alloy		⊓		⊓		⊓	■
H	Hardened steel	■	⊓		⊓			

■ : General cutting, First recommended

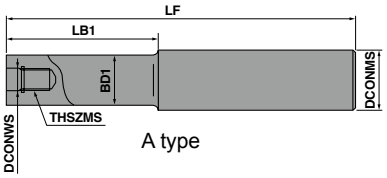
⊓ : General cutting, Second recommended

Item code	Tolerance Class	AJ Coated NEW			JP Coated	JM Coated	TH Coated	DLC Coated	Size (mm)				Shape
		JP4105	JP4120	JM4160	JP4020	JM4060	PTH30E	SD5010	INSL	W1	RE	S	
JDMT070202R	M	●	●	●	●	●	●	●	6.4	4.3	0.2	2.45	Fig-3
JDMT070204R		●	●	●	●	●	●	●	6.4	4.3	0.4	2.45	
JDMT070208R		●	●	●	●	●	●	●	6.4	4.3	0.8	2.45	
EDMT070220R-T		●	●	●	●	●			6.4	4.3	2	2.5	Fig-4 Standard type
EDMT070220R		●	●	●	●	●			6.4	4.3	2	2.5	Fig-4 Low-resistance type

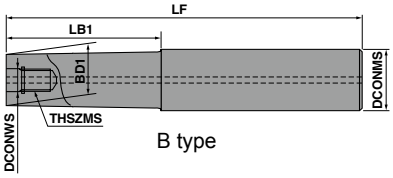
Parts

Parts	Clamp screw		Screw Driver	Screw anti-seizure agent
Shape / Cutter body		Fastening torque (N・m)		
All ASM Cutter	240-140	0.5	104-T6	P-37

Inch



A type



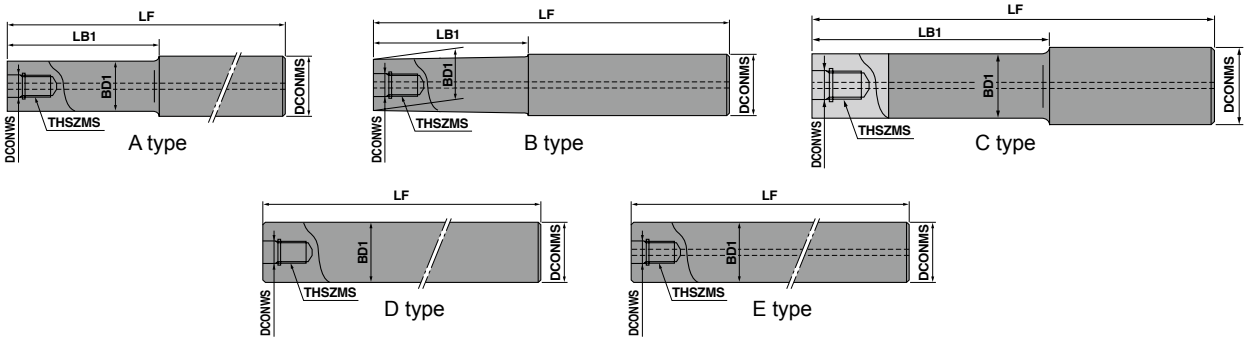
B type

Item code	Stock	Size (Inch)						Type	Cutter body	Coolant hole
		DCONWS	THSZMS	LF	LB1	BD1	DCONMS			
IASC0.375-M6-3-1	●	6.5mm	M6	3	1	.3661	.375	A	ϕ3/8″※1 ϕ1/2″ ϕ8mm※1 ϕ10mm※1 ϕ11mm※1 ϕ12mm※1	—
IASC0.5-M6-4-2	●		M6	4	2	.453	.5	A		—
IASC0.5-M6-6-3	●		M6	6	3	.453	.5	A		—
IASC0.625-M8-4-2	●	8.5mm	M8	4	2	.571	.625	B	ϕ5/8″※1 ϕ16mm	○
IASC0.625-M8-6-3	●		M8	6	3	.571	.625	B		○
IASC0.75-M10-5-2.5Z	●	10.5mm	M10	5	2.5	.689	.75	B	ϕ3/4″※1 ϕ20mm	○
IASC0.75-M10-8-4Z	●		M10	8	4	.689	.75	B		○
IASC1-M12-6-3Z	●	12.5mm	M12	6	3	.906	1	B	ϕ1″※1 ϕ25mm※1	○
IASC1-M12-8-4Z	●		M12	8	4	.906	1	B		○

●= Inventory Maintained in US ○= Tool with coolant hole

※1 Cutter Dia. is same or smaller than the shank dia.. Interference may occures.

Metric



Item code	Stock	Size (mm)						Type	Cutter body	Coolant hole
		DCONWS	THSZMS	LF	LB1	BD1	DCONMS			
NEW ASC10-6.5-74-24Z	●	6.5	M6	74	24	9.3	10	A	ϕ8※1 ϕ10※1 ϕ11 ϕ12 ϕ3/8″※1 ϕ1/2″※1	○
NEW ASC10-6.5-84-34Z	●			84	34			A		○
NEW ASC10-6.5-114-49Z	★			114	49			A		○
NEW ASC10-6.5-114-24Z	★				24			A		○
NEW ASC12-6.5-74-24Z	●	6.5	M6	74	24	11	12	B		○
NEW ASC12-6.5-94-44Z	●			94	44			B		○
ASC12-M6-100-0	●			100	-	12		D		—
NEW ASC12-6.5-129-64Z	★			129	64	11		B		○
NEW ASC12-6.5-129-24Z	★				24			B		○
ASC16-8.5-95-30Z	●	8.5	M8	95	30	14.5	16	B	ϕ16※1 ϕ5/8″※1	○
ASC16-8.5-120-55Z	●			120	55					
ASC16-8.5-140-75Z	●			140	75					
ASC16-8.5-160-95Z	★			160	95					
ASC16-8.5-160-30Z	★			160	30					
ASC18-M10-125-0Z	●	10.5	M10	125	-	18	18	E	ϕ20※1 ϕ3/4″※1	○
ASC20-10.5-120-50Z	★			120	50	18.5	20	B		○
ASC20-10.5-170-90Z	●			170	90					
ASC20-10.5-220-120Z	●			220	120					
ASC20-10.5-270-150Z	★			270	150					
ASC20-10.5-220-50Z	★	10.5	M10	220	50	18.5	20	B		○
ASC20-10.5-270-50Z	★			270						
ASC25-12.5-145-65	★	12.5	M12	145	65	23	25	C	ϕ25※1 ϕ1″	○
ASC25-M12-150-0Z	●			150	-	25		E		
ASC25-12.5-215-115	●			215	115	23		C		
ASC25-12.5-265-145	●			265	145					
ASC25-12.5-315-195	★			315	195					
ASC25-12.5-265-65	★	12.5	M12	265	65	23	25	C		○
ASC25-12.5-315-65	★			315						
ASC32-17-160-80	★	17	M16	160	80	28	32	C	ϕ30※1 ϕ32※1 ϕ1.25″※1	○
ASC32-17-210-110	●			210	110					
ASC32-17-260-140	●			260	140					
ASC32-17-310-190	★			310	190					
ASC32-17-360-240	★			360	240					
ASC32-17-260-80	★	17	M16	260	80	28	32	C		○
ASC32-17-310-80	★			310						
ASC32-17-360-80	★			360						

●= Inventory Maintained in US ★= Inventory Maintained in Japan ○= Tool with coolant hole
※1 Cutter Dia. is same or smaller than the shank dia.. Interference may occures.

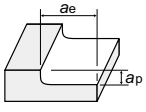
Recommended Cutting Conditions (Inch)

Side Milling standard cutting conditions for EDMT-type inserts：Low cutting depth, high feed rate

※Red indicates primary recommended grade.

Work material	Recommended grade	Tool dia.	ϕ.375 / 2 Flutes	ϕ.5 / 3 Flutes	ϕ.625 / 4 Flutes	ϕ.75 / 5 Flutes	ϕ1 / 6 Flutes	ϕ1.25 / 8 Flutes
Carbon Steel Alloy Steel <30HRC	※ JP4120 (SFM=328～590)	n(min^{-1})	4,000	3,000	2,408	2,007	1,505	1,204
		SFM	394	394	394	394	394	394
		IPM	～189	～212	～303	～316	～284	～303
		IPT	～.024	～.024	～.032	～.032	～.032	～.032
		a_p(inch)	.012	.012	.012	.012	.012	.012
		a_e(inch)	～.1875	～.291	～.39	～.412	～.68	～.859
		Q(inch^3/min)	.427	.732	1.403	1.525	2.258	3.051
Carbon Steel Alloy Steel 30～40HRC	JP4120 (SFM=328～524)	n(min^{-1})	3,667	2,750	2,200	1,833	1,375	1,100
		SFM	360	360	360	360	360	360
		IPM	～173	～194.7	～277	～288.7	～260	～277.2
		IPT	～.024	～.024	～.032	～.032	～.032	～.032
		a_p(inch)	.012	.012	.012	.012	.012	.012
		a_e(inch)	～.1875	～.291	～.39	～.412	～.68	～.859
		Q(inch^3/min)	.366	.671	1.281	1.403	2.075	2.807
Hardened Steel 40～50HRC	JP4120 (SFM=262～393)	n(min^{-1})	3,005	2,254	1,803	1,502	1,127	900
		SFM	295	295	295	295	295	295
		IPM	～94.4	～106.2	～170.2	～177.2	～159.6	～170
		IPT	～.016	～.016	～.024	～.024	～.024	～.024
		a_p(inch)	.012	.012	.012	.012	.012	.012
		a_e(inch)	～.1875	～.291	～.39	～.412	～.68	～.859
		Q(inch^3/min)	.183	.366	.793	.854	1.281	1.709
Stainless Steel	JM4160 JP4120 (SFM=262～393)	n(min^{-1})	3,005	2,254	1,803	1,502	1,127	900
		SFM	295	295	295	295	295	295
		IPM	～94.4	～106.2	～170.2	～177.2	～159.6	～170
		IPT	～.016	～.016	～.024	～.024	～.024	～.024
		a_p(inch)	.012	.012	.012	.012	.012	.012
		a_e(inch)	～.1875	～.291	～.39	～.412	～.68	～.859
		Q(inch^3/min)	.183	.366	.793	.854	1.281	1.709
Cast Iron/ Ductile Cast Iron	JP4120 (SFM=363～720)	n(min^{-1})	5,011	3,759	3,007	2,506	1,879	1,503
		SFM	492	492	492	492	492	492
		IPM	～236.5	～266.1	～378.9	～394.7	～355.1	～378.8
		IPT	～.024	～.024	～.032	～.032	～.032	～.032
		a_p(inch)	.012	.012	.012	.012	.012	.012
		a_e(inch)	～.1875	～.291	～.39	～.412	～.68	～.859
		Q(inch^3/min)	.549	.915	1.77	1.953	2.868	3.845
Hardened Steel 50～60HRC	JP4105 JP4120 (SFM=197～328)	n(min^{-1})	2,007	1,505	1,204	1,003	752	600
		SFM	197	197	197	197	197	197
		IPM	～47.4	～53.3	～75.6	～78.7	～70.8	～75.3
		IPT	～.012	～.012	～.016	～.016	～.016	～.016
		a_p(inch)	.008	.008	.008	.008	.008	.008
		a_e(inch)	～.1875	～.291	～.39	～.412	～.68	～.859
		Q(inch^3/min)	.061	.122	.183	.183	.366	.488

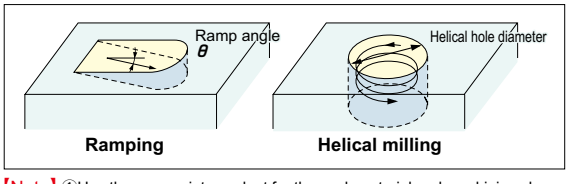
【Note】①Use the appropriate coolant for the work material and machining shape.
②These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
③For slotting or ramping, feed rate should be set to 70% as general criteria.
④Ensure to index the insert at the correct time to ensure safety of the tool-body.
⑤The evacuation of swarf can cause burns, cuts or damage to the eyes please ensue the correct safety cover is fitted around the machine, and necessary personal protection equipment is worn by the machine operator.
⑥Due to fire risks do not use neat cutting oil as a coolant.



Ramping with EDMT-type inserts

Since the cutting flute does not extend to the center, there are limitations on the ramp angle and hole diameter, but as shown below, cutting by direct milling without a pilot hole is possible for ramping and helical milling.

(inch)



Inserts	EDMT0702○○					
Tool dia.	ϕ.375	ϕ.5	ϕ.625	ϕ.75	ϕ1	ϕ1.25
Recommended θ	Less than 0.5 °					
Hole Dia	.512"～.748"	.670"～.905"	.985"～1.22"	1.30"～1.535"	1.693"～1.929"	2.245"～2.49"

【Note】①Use the appropriate coolant for the work material and machining shape.
②These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
③For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

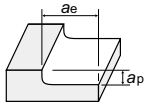
Recommended Cutting Conditions (Metric)

Side Milling standard cutting conditions for EDMT-type inserts：Low cutting depth, high feed rate

※Red indicates primary recommended grade.

Work material	Recommended grade	Tool dia.	ϕ8 / 1 Flute	ϕ10 / 2 Flutes	ϕ12 / 3 Flutes	ϕ14 / 3 Flutes	ϕ16 / 4 Flutes	ϕ20 / 5 Flutes	ϕ25 / 6 Flutes	ϕ32 / 8 Flutes
Carbon Steel Alloy Steel <30HRC	※ JP4120 (vc=100~180)	n(min-1)	4,780	3,820	3,180	2,730	2,390	1,910	1,530	1,190
		vc(m/min)	120	120	120	120	120	120	120	120
		vf(mm/min)	~2,870	~4,590	~5,730	~6,550	~7,640	~7,640	~7,340	~7,640
		fz(mm/t)	~0.6	~0.6	~0.6	~0.8	~0.8	~0.8	~0.8	~0.8
		ap(mm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		ae(mm)	~3	~5	~7	~8	~10	~11	~17	~22
		Q(cm3/min)	3	7	12	16	23	25	37	50
Carbon Steel Alloy Steel 30~40HRC	JP4120 (vc=100~160)	n(min-1)	4,380	3,500	2,920	2,500	2,190	1,750	1,400	1,090
		vc(m/min)	110	110	110	110	110	110	110	110
		vf(mm/min)	~2,630	~4,200	~5,260	~6,010	~7,010	~7,010	~6,730	~7,010
		fz(mm/t)	~0.6	~0.6	~0.6	~0.8	~0.8	~0.8	~0.8	~0.8
		ap(mm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		ae(mm)	~3	~5	~7	~8	~10	~11	~17	~22
		Q(cm3/min)	2	6	11	14	21	23	34	46
Hardened Steel 40~50HRC	JP4120 (vc=80~120)	n(min-1)	3,580	2,870	2,390	2,050	1,790	1,430	1,150	900
		vc(m/min)	90	90	90	90	90	90	90	90
		vf(mm/min)	~1,430	~2,290	~2,870	~3,690	~4,300	~4,300	~4,130	~4,300
		fz(mm/t)	~0.4	~0.4	~0.4	~0.6	~0.6	~0.6	~0.6	~0.6
		ap(mm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		ae(mm)	~3	~5	~7	~8	~10	~11	~17	~22
		Q(cm3/min)	1	3	6	9	13	14	21	28
Stainless Steel	JM4160 JP4120 (vc=80~120)	n(min-1)	3,580	2,870	2,390	2,050	1,790	1,430	1,150	900
		vc(m/min)	90	90	90	90	90	90	90	90
		vf(mm/min)	~1,430	~2,290	~2,870	~3,690	~4,300	~4,300	~4,130	~4,300
		fz(mm/t)	~0.4	~0.4	~0.4	~0.6	~0.6	~0.6	~0.6	~0.6
		ap(mm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		ae(mm)	~3	~5	~7	~8	~10	~11	~17	~22
		Q(cm3/min)	1	3	6	9	13	14	21	28
Cast Iron/ Ductile Cast Iron	JP4120 (vc=120~220)	n(min-1)	5,970	4,780	3,980	3,410	2,990	2,390	1,910	1,490
		vc(m/min)	150	150	150	150	150	150	150	150
		vf(mm/min)	~3,580	~5,730	~7,170	~8,190	~9,550	~9,550	~9,170	~9,550
		fz(mm/t)	~0.6	~0.6	~0.6	~0.8	~0.8	~0.8	~0.8	~0.8
		ap(mm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		ae(mm)	~3	~5	~7	~8	~10	~11	~17	~22
		Q(cm3/min)	3	9	15	20	29	32	47	63
Hardened Steel 50~60HRC	JP4105 JP4120 (vc=60~100)	n(min-1)	2,390	1,910	1,590	1,360	1,190	950	760	600
		vc(m/min)	60	60	60	60	60	60	60	60
		vf(mm/min)	~720	~1,150	~1,430	~1,630	~1,900	~1,900	~1,820	~1,900
		fz(mm/t)	~0.3	~0.3	~0.3	~0.4	~0.4	~0.4	~0.4	~0.4
		ap(mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		ae(mm)	~3	~5	~7	~8	~10	~11	~17	~22
		Q(cm3/min)	0.4	1	2	2	3	3	6	8

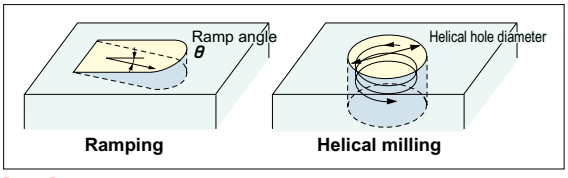
【Note】①Use the appropriate coolant for the work material and machining shape.
②These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
③For slotting or ramping, feed rate should be set to 70% as general criteria.
④Ensure to index the insert at the correct time to ensure safety of the tool-body.
⑤The evacuation of swarf can cause burns, cuts or damage to the eyes please ensue the correct safety cover is fitted around the machine, and necessary personal protection equipment is worn by the machine operator.
⑥Due to fire risks do not use neat cutting oil as a coolant.
⑦When using an ASM0710S08R-2 or ASM0712S10R-2 undercut type shank, as a general rule the feed rate per flute (f_z) should be reduced to 50~70% of the value listed in the standard cutting conditions.



Ramping with EDMT-type inserts

Since the cutting flute does not extend to the center, there are limitations on the ramp angle and hole diameter, but as shown below, cutting by direct milling without a pilot hole is possible for ramping and helical milling.

(mm)



Inserts	EDMT0702○○									
Tool dia.	ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ17	ϕ20	ϕ21	ϕ25	ϕ32
Recommended θ	Less than 0.5 °									
Hole Dia	10~15	13~19	17~23	21~27	25~31	27~33	33~39	35~41	43~49	57~63

【Note】①Use the appropriate coolant for the work material and machining shape.
②These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
③For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

Recommended Cutting Conditions (Inch)

Side Milling standard cutting conditions for JDMT-type inserts

It is make standard that the depth cut *ap* and the cutting width *ae* be as shown in Tool Overhang (OH) and Cutting Region on the Page 13.
Work Hardness > Please use the conditions in the table as a guideline for the cut depth *ap* and width *ae* of 40HRC.

※Red indicates primary recommended grade.

Work material	Recommended grade	Cutting speed (SFM) / Feed rate per tooth (IPT)	Tool dia.	ϕ.375 / 2 Flutes	ϕ.5 / 3 Flutes	ϕ.625 / 4 Flutes	ϕ.75 / 5 Flutes	ϕ1 / 6 Flutes	ϕ1.25 / 8 Flutes
Carbon Steel Alloy Steel <30HRC	※ JP4120 PTH30E	SFM=492～656	n(min^{-1})	5,730	4,780	3,580	2,870	2,290	1,790
			SFM	590	590	590	590	590	590
		IPT=.002～.004	IPM	31.5	39.4	39.4	39.4	37.8	39.4
			IPT	.00275	.00275	.00275	.00275	.00275	.00275
Die Tool Steel <30HRC	JP4120 PTH30E	SFM=426～590	n(min^{-1})	4,780	3,980	2,990	2,390	1,910	1,490
			SFM	492	492	492	492	492	492
		IPT=.002～.003	IPM	22.4	28.3	28.3	28.3	27.2	28.3
			IPT	.00236	.00236	.00236	.00236	.00236	.00236
Pre-Hardened Steel Alloy Steel Die Tool Steel 30～40HRC	JP4120 PTH30E	SFM=328～492	n(min^{-1})	3,820	3,180	2,390	1,910	1,530	1,190
			SFM	394	394	394	394	394	394
		IPT=.002～.003	IPM	18.1	22.4	22.4	22.4	21.7	22.4
			IPT	.00236	.00236	.00236	.00236	.00236	.00236
Pre-Hardened Steel Alloy Steel Die Tool Steel 40～50HRC	JP4120	SFM=262～394	n(min^{-1})	2,860	2,390	1,790	1,430	1,150	900
			SFM	295	295	295	295	295	295
		IPT=.002～.003	IPM	13.4	16.9	16.9	16.9	16.1	16.9
			IPT	.00236	.00236	.00236	.00236	.00236	.00236
			a_p(inch)	.079	.079	.079	.079	.079	.079
			a_e(inch)	.05DC	.05DC	.05DC	.05DC	.05DC	.05DC
Stainless Steel	JM4160 PTH30E JP4120	SFM=328～492	n(min^{-1})	3,820	3,180	2,390	1,910	1,530	1,190
			SFM	394	394	394	394	394	394
		IPT=.002～.004	IPM	18.1	22.4	22.4	22.4	21.7	22.4
			IPT	.00236	.00236	.00236	.00236	.00236	.00236
Cast Iron/ Ductile Cast Iron	JP4120 PTH30E	SFM=426～590	n(min^{-1})	4,780	3,980	2,990	2,390	1,910	1,490
			SFM	492	492	492	492	492	492
		IPT=.002～.004	IPM	26.4	33.1	33.1	33.1	31.5	33.1
			IPT	.00275	.00275	.00275	.00275	.00275	.00275
Alminum Alloy (Wet Condition)	SD5010 PTH30E JP4120	SFM=656～1,640	n(min^{-1})	9,550	7,960	5,970	4,780	3,820	2,990
			SFM	984	984	984	984	984	984
		IPT=.002～.005	IPM	60.2	75.2	75.2	75.2	72	75.2
			IPT	.00315	.00315	.00315	.00315	.00315	.00315
Hardened Steel 50～60HRC	JP4105 JP4120	SFM=197～328	n(min^{-1})	1,910	1,590	1,190	950	760	600
			SFM	197	197	197	197	197	197
		IPT=.002～.003	IPM	9.0	11.4	11.4	11.4	10.6	11.4
			IPT	.00236	.00236	.00236	.00236	.00236	.00236
			a_p(inch)	.079	.079	.079	.079	.079	.079
			a_e(inch)	.05DC	.05DC	.05DC	.05DC	.05DC	.05DC

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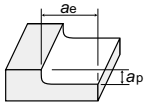
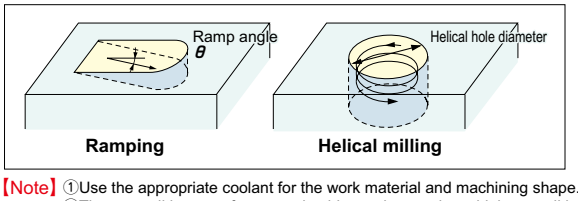


Ramping with JDMT-type inserts

Since the cutting flute does not extend to the center, there are limitations on the ramp angle and hole diameter, but as shown below, cutting by direct milling without a pilot hole is possible for ramping and helical milling.

(inch)



Inserts	JDMT0702○○					
Tool dia.	ϕ.375	ϕ.5	ϕ.625	ϕ.75	ϕ1	ϕ1.25
Recommended θ	Less than 1 °					
Hole Dia	.512"～.748"	.670"～.905"	.985"～1.22"	1.30"～1.535"	1.693"～1.929"	2.245"～2.49"

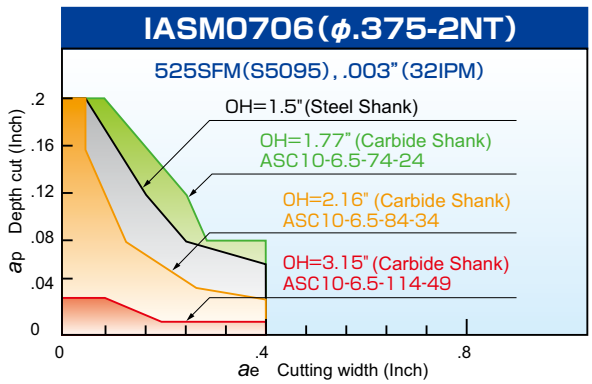
【Note】①Use the appropriate coolant for the work material and machining shape.
②These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
③For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

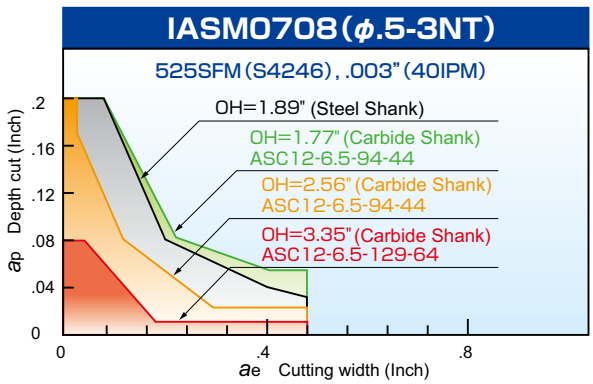
Field data (Inch)

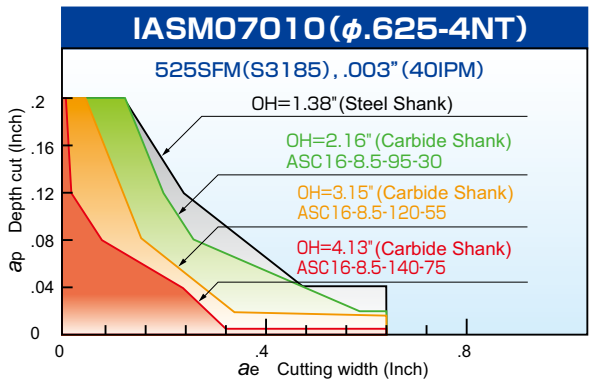
Relation between Tool Overhang（OH）and Limits of the cutting region

The cutting region curves shown below indicate criteria for selecting cutting conditions at each overhang (OH).
If chattering occurs near the limits of the cutting region, make adjustments by reducing the per-flute feed rate (*f*z).

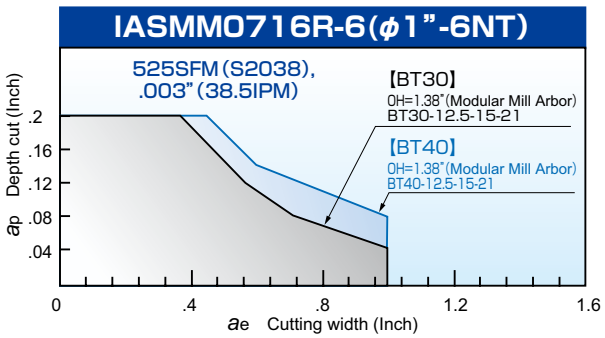
Milling Conditions | Machine：BT30 5.5/3.7kw
Work material：Carbon Steel　Cutting Conditions：525SFM, .003"

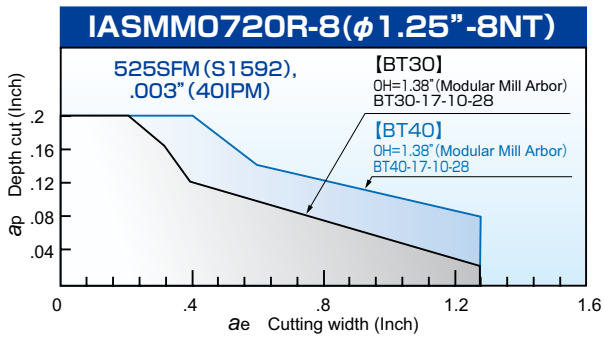






Milling Conditions | Machine：BT40 11kw
Work material：Carbon Steel　Cutting Conditions：525SFM, .003"





Recommended Cutting Conditions (Metric)

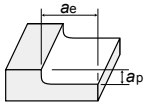
Side Milling standard cutting conditions for JDMT-type inserts

It make standard that the depth cut *ap* and the cutting width *ae* be as shown in Tool Overhang (OH) and Cutting Region on the Page 15.
Work Hardness > Please use the conditions in the table as a guideline for the cut depth *ap* and width *ae* of 40HRC.

※Red indicates primary recommended grade.

Work material	Recommended grade	Cutting speed v_c (m/min) / Feed rate per tooth f_z (mm/t)	Tool dia.	φ8 / 1 Flute	φ10 / 2 flutes	φ12 / 3 Flutes	φ14 / 3 Flutes	φ16 / 4 Flutes	φ20 / 5 Flutes	φ25 / 6 Flutes	φ32 / 8 Flutes
Carbon Steel Alloy Steel <30HRC	※ JP4120 PTH30E	v_c=150～200	n(min^{-1})	7,170	5,730	4,780	4,090	3,580	2,870	2,290	1,790
			v_c(m/min)	180	180	180	180	180	180	180	180
		f_z=0.04～0.09	v_f(mm/min)	500	800	1,000	860	1,000	1,000	960	1,000
			f_z(mm/t)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Die Tool Steel <30HRC	JP4120 PTH30E	v_c=130～180	n(min^{-1})	5,970	4,780	3,980	3,410	2,990	2,390	1,910	1,490
			v_c(m/min)	150	150	150	150	150	150	150	150
		f_z=0.04～0.07	v_f(mm/min)	360	570	720	610	720	720	690	720
			f_z(mm/t)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Pre-Hardened Steel Alloy Steel Die Tool Steel 30～40HRC	JP4120 PTH30E	v_c=100～150	n(min^{-1})	4,780	3,820	3,180	2,730	2,390	1,910	1,530	1,190
			v_c(m/min)	120	120	120	120	120	120	120	120
		f_z=0.04～0.07	v_f(mm/min)	290	460	570	490	570	570	550	570
			f_z(mm/t)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Pre-Hardened Steel Alloy Steel Die Tool Steel 40～50HRC	JP4120	v_c=80～120	n(min^{-1})	3,580	2,860	2,390	2,050	1,790	1,430	1,150	900
			v_c(m/min)	90	90	90	90	90	90	90	90
		f_z=0.04～0.07	v_f(mm/min)	220	340	430	370	430	430	410	430
			f_z(mm/t)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
			a_p(mm)	2	2	2	2	2	2	2	2
			a_e(mm)	0.05DC	0.05DC	0.05DC	0.05DC	0.05DC	0.05DC	0.05DC	0.05DC
Stainless Steel	JM4160 PTH30E JP4120	v_c=100～150	n(min^{-1})	4,780	3,820	3,180	2,730	2,390	1,910	1,530	1,190
			v_c(m/min)	120	120	120	120	120	120	120	120
		f_z=0.04～0.09	v_f(mm/min)	290	460	570	490	570	570	550	570
			f_z(mm/t)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Cast Iron/ Ductile Cast Iron	JP4120 PTH30E	v_c=130～180	n(min^{-1})	5,970	4,780	3,980	3,410	2,990	2,390	1,910	1,490
			v_c(m/min)	150	150	150	150	150	150	150	150
		f_z=0.04～0.10	v_f(mm/min)	420	670	840	720	840	840	800	840
			f_z(mm/t)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Alminum Alloy (Wet Condition)	SD5010 PTH30E JP4120	v_c=200～500	n(min^{-1})	11,940	9,550	7,960	6,820	5,970	4,780	3,820	2,990
			v_c(m/min)	300	300	300	300	300	300	300	300
		f_z=0.04～0.12	v_f(mm/min)	960	1,530	1,910	1,640	1,910	1,910	1,830	1,910
			f_z(mm/t)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Hardened Steel 50～60HRC	JP4105 JP4120	v_c=60～100	n(min^{-1})	2,390	1,910	1,590	1,360	1,190	950	760	600
			v_c(m/min)	60	60	60	60	60	60	60	60
		f_z=0.04～0.07	v_f(mm/min)	140	230	290	240	290	290	270	290
			f_z(mm/t)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
			a_p(mm)	2	2	2	2	2	2	2	2
			a_e(mm)	0.05DC	0.05DC	0.05DC	0.05DC	0.05DC	0.05DC	0.05DC	0.05DC

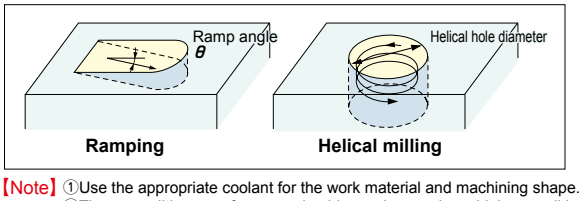
【Note】①Use the appropriate coolant for the work material and machining shape.
②These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
③For slotting or ramping, feed rate should be set to 70% as general criteria.
④Ensure to index the insert at the correct time to ensure safety of the tool-body.
⑤The evacuation of swarf can cause burns, cuts or damage to the eyes please ensue the correct safety cover is fitted around the machine, and necessary personal protection equipment is worn by the machine operator.
⑥Due to fire risks do not use neat cutting oil as a coolant.



Ramping with JDMT-type inserts

Since the cutting flute does not extend to the center, there are limitations on the ramp angle and hole diameter, but as shown below, cutting by direct milling without a pilot hole is possible for ramping and helical milling.

(mm)



Inserts	JDMT0702○○									
Tool dia.	φ8	φ10	φ12	φ14	φ16	φ17	φ20	φ21	φ25	φ32
Recommended θ	Less than 1 °									
Hole Dia	10～15	13～19	17～23	21～27	25～31	27～33	33～39	35～41	43～49	57～63

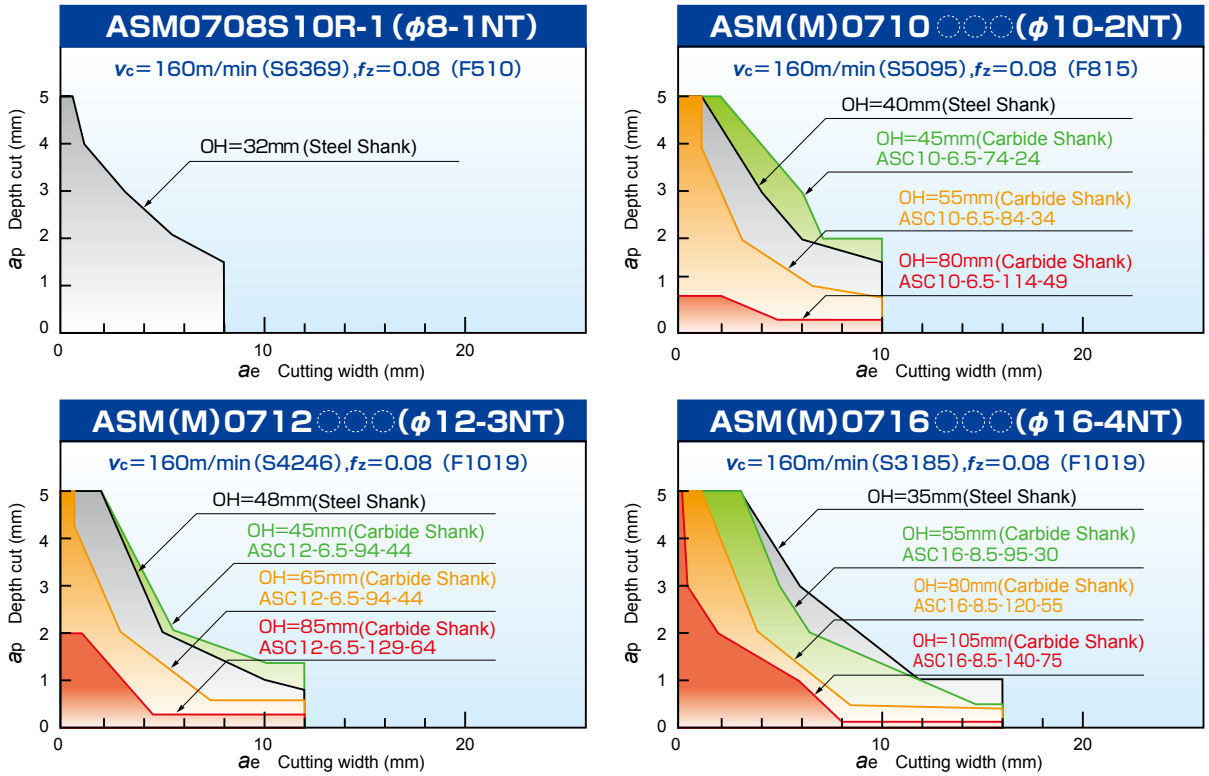
【Note】①Use the appropriate coolant for the work material and machining shape.
②These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
③For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

Field data (Metric)

Relation between Tool Overhang（OH）and Limits of the cutting region

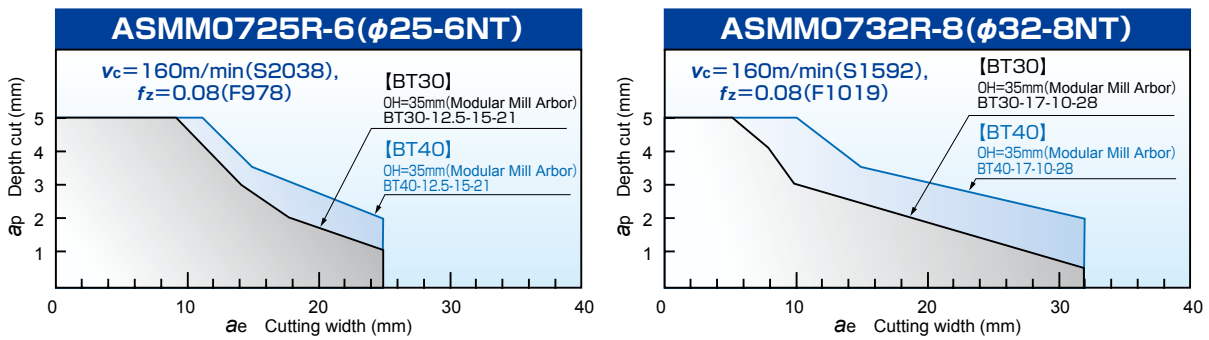
The cutting region curves shown below indicate criteria for selecting cutting conditions at each overhang (OH).
If chattering occurs near the limits of the cutting region, make adjustments by reducing the per-flute feed rate (*f*z).

Milling Conditions | Machine：BT30 5.5/3.7kw
Work material：Carbon Steel　Cutting Conditions：*v*c=160m/min,　*f*z=0.08mm/t



※As a general rule, the cutting amount for ASM0710S08R-2 undercut type shank should be set within 50% of the cutting region for ASM0710S10R-2, and the cutting amount for ASM0712S10R-2 should be set within the cutting region for ASM0710S10R-2.

Milling Conditions | Machine：BT40 11kw
Work material：Carbon Steel　Cutting Conditions：*v*c=160m/min,　*f*z=0.08mm/t



Field data

No.	Tool dia. DC(mm)	Cutter	Insert	Work material	Test conditions	Result Note
1	12	ASM0712S12R-3	JDMT070204R (Material equivalent to P30)	304 Stainless Steel	*v*c=120m/min, *v*f=670mm/min *a*p×*a*e=1×8mm, Dry	1.5times tool life of insert tools from conventional.
2	20	ASMM0720R-5	EDMT070220R (Material equivalent to P10)	40HRC Pre-hardened Steel	*v*c=90m/min, *v*f=4,300mm/min *a*p×*a*e=0.3×10mm, Dry	Good cutting performance and good tool life with O.H.80mm.
3	10	ASMM0710R-2	JDMT070208R (SD5010)	Graphite	*v*c=1,000m/min, *v*f=10,000mm/min *a*p×*a*e=0.6×4.0mm, Dry	Good cutting performance with O.H.90mm. 2×the tool life of conventional products.

Cutting conditions for aluminum alloy and copper

<Shoulder cutting> : *a*e=0.5D <Recommended grade> : SD5010

Inch

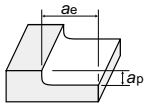
Work material		ϕ.375	ϕ.5	ϕ.625	ϕ.75	ϕ1	ϕ1.25
Expanded aluminum alloy material 5052,7075, etc. (Wet : Water-soluble agent)	*n* (min^{-1})	12,700	10,600	9,900	9,500	7,600	6,000
	IPM	80.1	100.2	124.7	149.6	143.6	151.2
	IPT	.00315	.00315	.00315	.00315	.00315	.00315
	SFM	1,312	1,312	1,640	1,968	1,968	1,968
	*a*p (inch)	.079	.079	.079	.079	.079	.079
Cast aluminum alloy material 383.0, etc. (Wet : Water-soluble agent)	*n* (min^{-1})	11,100	9,300	8,000	8,000	6,400	5,000
	IPM	69.9	87.9	100.8	126.0	121.0	126.0
	IPT	.00315	.00315	.00315	.00315	.00315	.00315
	SFM	1,148	1,148	1,312	1,640	1,640	1,640
	*a*p (inch)	.079	.079	.079	.079	.079	.079
Pure copper C11000,C10200, etc. (Wet : Water-soluble agent)	*n* (min^{-1})	9,500	8,000	6,000	4,800	3,820	3,000
	IPM	59.9	75.6	75.6	75.6	72.2	75.6
	IPT	.00315	.00315	.00315	.00315	.00315	.00315
	SFM	984	984	984	984	984	984
	*a*p (inch)	.079	.079	.079	.079	.079	.079

Metric

Work material		ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ17	ϕ20	ϕ21	ϕ25	ϕ32
Expanded aluminum alloy material 5052,7075, etc. (Wet : Water-soluble agent)	*n* (min^{-1})	11,900	12,700	10,600	11,400	9,900	9,400	9,500	9,100	7,600	6,000
	*v*f (mm/min)	950	2,040	2,550	2,730	3,180	3,000	3,820	3,640	3,670	3,820
	*f*z (mm/t)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	*v*c (m/min)	300	400	400	500	500	500	600	600	600	600
	*a*p (mm)	2	2	2	2	2	2	2	2	2	2
Cast aluminum alloy material 383.0, etc. (Wet : Water-soluble agent)	*n* (min^{-1})	9,900	11,100	9,300	9,100	8,000	7,500	8,000	7,600	6,400	5,000
	*v*f (mm/min)	800	1,780	2,230	2,180	2,550	2,400	3,180	3,030	3,060	3,180
	*f*z (mm/t)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	*v*c (m/min)	250	350	350	400	400	400	500	500	500	500
	*a*p (mm)	2	2	2	2	2	2	2	2	2	2
Pure copper C11000,C10200, etc. (Wet : Water-soluble agent)	*n* (min^{-1})	9,900	9,500	8,000	6,800	6,000	5,600	4,800	4,500	3,820	3,000
	*v*f (mm/min)	800	1,530	1,910	1,640	1,910	1,800	1,910	1,820	1,830	1,910
	*f*z (mm/t)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	*v*c (m/min)	250	300	300	300	300	300	300	300	300	300
	*a*p (mm)	2	2	2	2	2	2	2	2	2	2

【Note】

❶Use the appropriate coolant for the work material and machining shape.
❷The cutting conditions shown in the above table are for reference and should be adjusted according to the actual machining circumstances.
❸When cutting grooves, reduce the feed rate by 30% (set it to 0.7 times the value shown above).
❹When L/D=4 or higher, reduce rotation speed and feed rate by 50% (set to 0.5× stated values) as general criteria. In addition, when machining copper, set cutting depth in axial direction to 1mm or less.
❺Use on a machine equipped with splashguards. During use, be sure to wear protective equipment such as safety glasses, and always perform work in a safe environment.
❻When using a machine that cannot provide the rotation speed shown above, set the highest rotation speed possible and calculate the feed rate using the *f*z value.
❼Be sure to use this tool at rotation speeds within the acceptable range for the milling chuck being used. If the acceptable rotation speed range is below the rotation speed shown above, set the highest acceptable rotation speed and calculate the feed rate using the *f*z value.



Safety Considerations

1. Handling

(1) When removing tool from packaging, be careful not to drop the tool on your foot or fingers.
(2) When actually setting the inserts, be careful not to touch the cutting flute directly with your bare hands.

2. Mounting

(1) When preparing to use, be sure that the insert is firmly screwed in the pocket and cutter is properly mounted on the tool holder.
(2) If abnormal chattering occurs during use, stop the machine immediately, identify the cause of the chatter and take corrective action.

3. Usage

(1) Before use confirm all dimensions, verify work material and programmed tool rotation.
(2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
(3) Inserts are made of hard material and may break and be expelled from cutter at high speeds. Since there is a danger of injury to workers from chip evacuation, insert breakage or fire safety precautions must be observed at all times. Including, but not limited to: safety glasses, machine enclosures or other means to create a safe environment for work. If you have questions on safety, contact your supervisor.
- Do not use where there is a risk of fire or explosion.
- Do not use non-water-soluble cutting oils. Such oils may result in fire.

(4) Do not use the tool for any purpose other than that for which it is intended, and do not modify it.

Notes

Notes

Notes

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