NEW

MOLDINO
The Edge To Innovation

TR4F type

Radius Mill TR4F type

LF breaker featuring sharp cutting edge added to range of inserts

JS4160 grade added for outstanding cutting performance when working with carbon or alloy steel

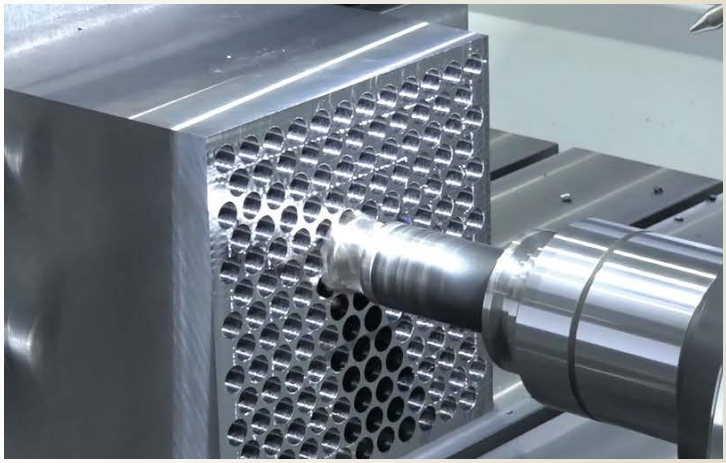
MOLDINO Tool Engineering, Ltd.
New Product News | No.2003E-10 | 2026-2

Overcomes all major issues encountered in mold machining, thanks to TR4F's three unique features

POINT 1

Even with interrupted cutting

High chipping resistance



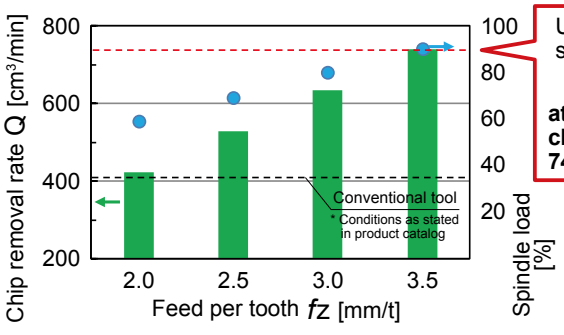
The definitive type —even with

Selection of close pitch type **4000** Type

1mm × 2mm
Cutting depth / Feed per tooth

Tool performance that maximizes the machine's full capabilities

Rugged cutting, regardless of load, thanks to the unique insert shape



Use of pre-hardened steel (30HRC)
740cm³/min attains a remarkable chip removal rate of 740cm³/min!

[Cutting conditions] TR4F5000 type
Tool dia. :φ63 Cutting speed :*Vc*=130m/min
Depth of cut :*ap*×*ae*=2.0×40mm
Work material :Pre-hardened steels (30HRC)
Machine : 3-axis MC horizontal type (BT50,37kw)

POINT 3

Even in chips

Minimized

for rough machining large molds

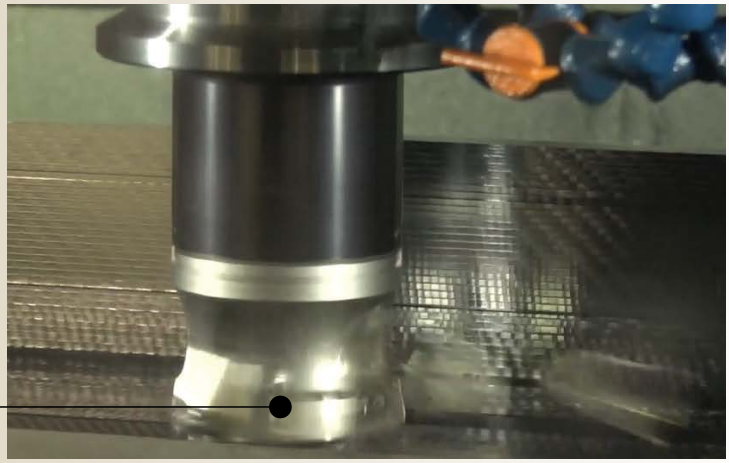
Deep cutting **5000** Type

2mm × 2mm
Cutting depth / Feed per tooth

POINT 2

Even with wall face processing

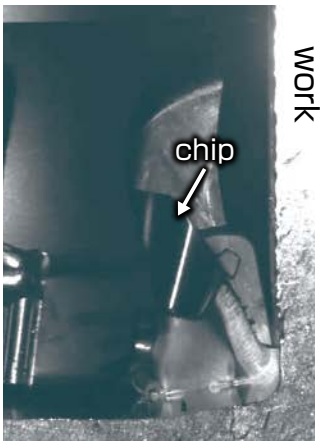
Prevents scraping



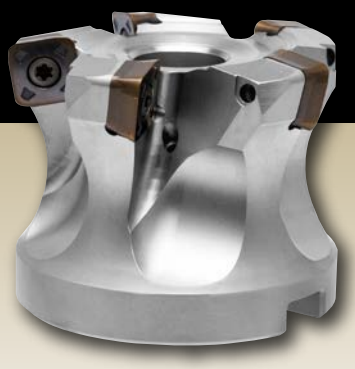
biting risk

Chip ejection path away from work surface

Prevents scraping due to chip breakage and bending, which often occurs during wall face machining, whether cutting up or down.



【Cutting conditions】 TR4F5000 type
Tool dia. :ϕ63 Cutting speed :V_c=100m/min
Feed rate :f_z=2.0mm/t Depth of cut :$a_p \times a_e$=2.0×37.8mm
Work material :Pre-hardened steels (32HRC)



Exclusive high-efficiency cutting, resulting from unique insert and body shapes

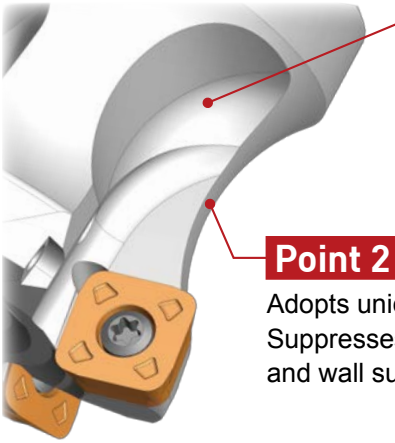
TR4F type to meet specific challenges posed by high-efficiency cutting

Issue 01

Although high-feed cutting is performed for shaping, resulting severe chip clogging and biting may reduce shaping efficiency.

Proposed solutions

●Adopts new body shape to enhance chip removal.
Suppresses chip clogging, even when cutting long overhangs.



Point 1

Offers excellent chip removal performance thanks to large open pocket.

Point 2

Adopts unique constricted shape.
Suppresses chip clogging between tools and wall surfaces.

■ Generation of smooth twist-free chips

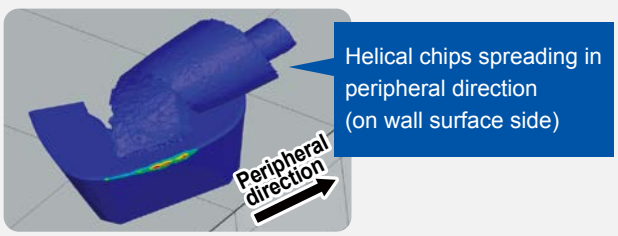
Conventional tool **TR4F type**

[Cutting conditions]

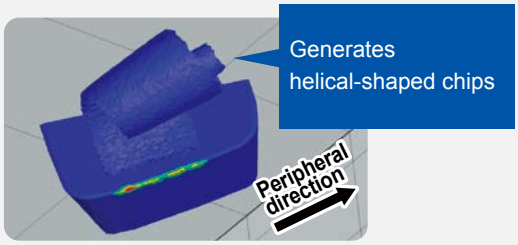
Tool dia. : ϕ63
Cutting speed : Vc =130m/min
Feed rate : f_z=1.0mm/t
Depth of cut : $a_p \times a_e$=1.0×38mm
Work material : S50C（220HB）

Point Cutting edge designed to control chip flow

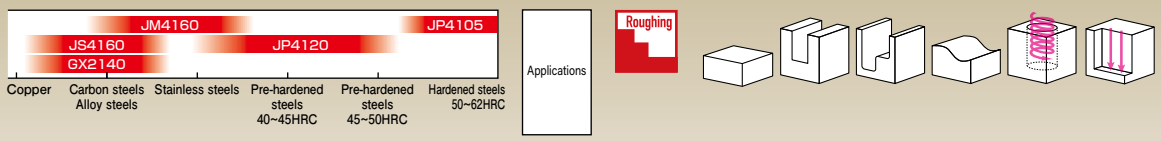
●Optimizes cutting edge design to achieve smooth chip removal flow; keeps chips away from wall surfaces.
Suppresses clogging from the time chip generation starts.



Conventional tool



TR4F type

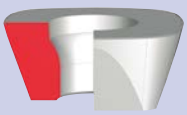


Issue 02

New equipment installed to improve the efficiency of the roughing process.
The goal is to reduce machining times with high-feed cutting. But higher feed rates reduce tool life and keep the machine away from delivering its full potential.

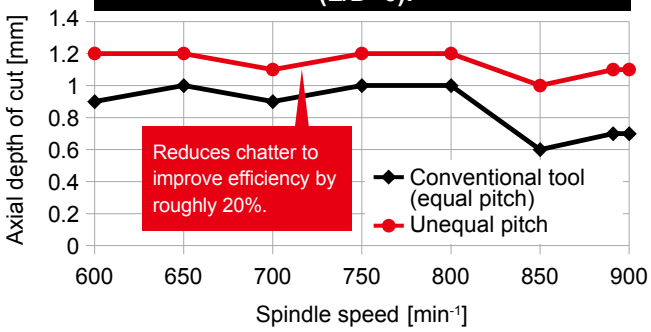
Proposed solutions

- Developed a unique insert shape. Performs stable machining despite large cutting load generated during high-feed cutting with large cross-sectional and constraint areas.
- Adopts unique unequal pitch method to reduce chattering during cutting.

	Conventional tool	TR4F type
Cross-sectional area	 100%	 110%
Constraint area	 100%	 135%

- Secures insert strength and constraint force by enlarging cross-sectional and constraint areas even in high-load cutting.

Comparison of the maximum depth of cut (L/D=6).

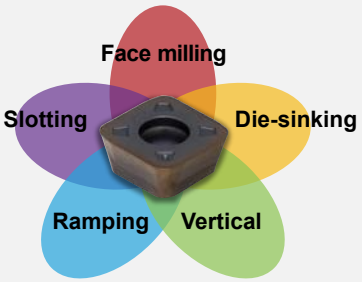


【Cutting conditions】
Tool dia. : ϕ50, No. of Flutes : 4 Flutes,
f_z=1.0mm/t, a_e=35mm, OH=300mm
Work material : S50C (220HB)

- Unequal pitch reduces a vibration, a major factor of chattering.

Point — Meets the requirements of various applications and steel types.

- The unique cross-sectional shape and cutting edge design of a single insert meets the needs of a wide range of cutting modes.
- Diverse lineup of insert grades to meet the demands posed by a wide range of work materials.



Line Up

Shank type TR4F40○○□32-○

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

Fig.1（Standard type）

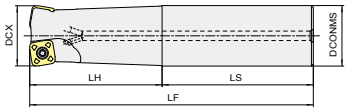
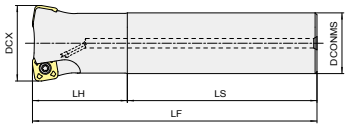


Fig.2（Undercut type）

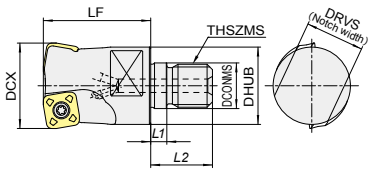


With air hole

Type	Item code	Stock	No.of flutes	Size (mm) DCX	LF	LH	LS	DCONMS	Shape	Recommended insert
Regular	TR4F4032S32-2	●	2	32	150	70	80	32	Fig.1	SDNW120520TR(-P) SDMT120520TR SDMT120520ER-LF
	TR4F4040S32-3	●	3	40	150	50	100	32	Fig.2	
Long	TR4F4032L32-2	●	2	32	200	120	80	32	Fig.1	
	TR4F4040L32-3	●	3	40	250	50	200	32	Fig.2	

Modular type TR4F40○○M-○

Numeric figure comes in a circle ○.

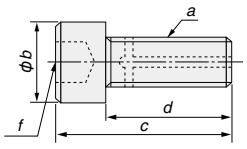


With air hole

Item code	Stock	No.of flutes	Size (mm) DCX	LF	L1	L2	DCONMS	DHUB	THSZMS	DRVS	Recommended insert
TR4F4032M-2	●	2	32	40	6	23	17	28.8	M16	22	SDNW120520TR(-P) SDMT120520TR SDMT120520ER-LF
TR4F4040M-3	●	3	40	40	6	23	17	28.8	M16	22	

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

Parts

Parts	Clamp screw		Wrench	Screw anti-seizure agent	Arbor screw					
Shape / Cutter body		Fastening torque (N·m)				a	ϕb	c	d	f
TR4F40○○ S/L/M (32)-○					—	—	—	—	—	—
TR4F4050 B□-○					100-178	M10×1.5	16	35	25	8
TR4F4063 B□-○	262-141	2.9	105-T15							
TR4F4080 BM-○					100-179	M12×1.75	18	42	30	10
TR4F4080 B-○					100-180	M16×2.0	24	51	35	14
TR4F4100 B□-○										
TR4F5063 B□-4				P-37	100-178	M10×1.5	16	35	25	8
TR4F5080 BM-5					100-179	M12×1.75	18	42	30	10
TR4F5080 B-5	555-141	4.9	105-T20		100-180	M16×2.0	24	51	35	14
TR4F5100 B□-6										
TR4F5125 B□-○					—	—	—	—	—	—

【Note】The clamp screw is a consumable part. Since replacement life depends on the use environment, it is recommended that it be replaced at an early stage.
Includes one spare clamp screw for shank type and modular, two spare clamp screws for bore type.

● : Stocked items.

Bore type

TR4F○○○○B□-○

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

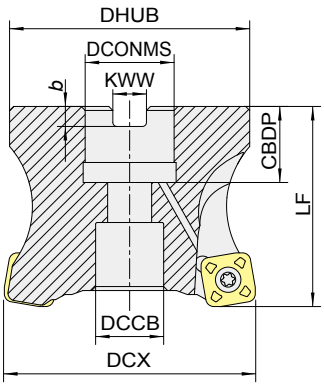


Fig.1（With air hole）

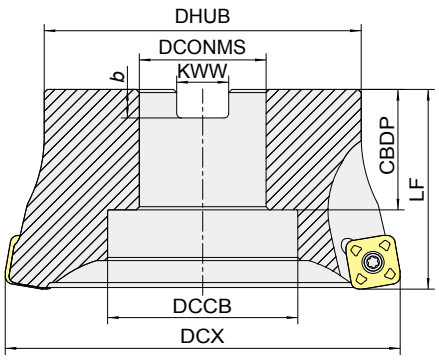


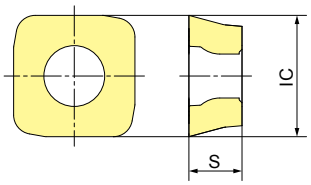
Fig.2（Without air hole）

Type		Item code	Stock	No.of flutes	Size (mm) DCX	DHUB	LF	CBDP	KWW	b	DCONMS	DCCB	Shape	Recommended insert
Bore type	Internal diameter inch size	TR4F4050B-3	●	3	50	47	50	19	8.4	5	22.225	17	Fig.1	SDNW120520TR(-P) SDMT120520TR SDMT120520ER-LF
		TR4F4050B-4	●	4										
		TR4F4050B-5	●	5										
		TR4F4063B-4	●	4	63	60	50	19	8.4	5	22.225	17		
		TR4F4063B-5	●	5										
		TR4F4063B-6	●	6										
		TR4F4080B-5	●	5	80	76	70	32	12.7	8	31.75	26		
		TR4F4080B-7	●	7										
		TR4F4100B-6	●	6	100	96	70	32	12.7	8	31.75	26		
		TR4F4100B-8	●	8										
		TR4F5063B-4	●	4	63	60	50	19	8.4	5	22.225	17		SDNW150525ZTR SDMT150525ZTR SDMT150525ZER-LF
		TR4F5080B-5	●	5	80	76	70	32	12.7	8	31.75	26		
		TR4F5100B-6	●	6	100	96	70	32	12.7	8	31.75	26		
		TR4F5125B-6	●	6	125	100	63	38	15.9	10	38.1	60	Fig.2	
		TR4F5125B-7	●	7										
	Internal diameter mm size	TR4F4050BM-3	●	3	50	47	50	20	10.4	6.3	22	17	Fig.1	SDNW120520TR(-P) SDMT120520TR SDMT120520ER-LF
		TR4F4050BM-4	●	4										
		TR4F4050BM-5	●	5										
		TR4F4063BM-4	●	4	63	60	50	20	10.4	6.3	22	17		
		TR4F4063BM-5	●	5										
		TR4F4063BM-6	●	6										
		TR4F4080BM-5	●	5	80	76	70	22	12.4	7	27	20		
		TR4F4080BM-7	●	7										
		TR4F4100BM-6	●	6	100	96	70	25.5	14.4	8	32	26		
		TR4F4100BM-8	●	8										
		TR4F5063BM-4	●	4	63	60	50	20	10.4	6.3	22	17		SDNW150525ZTR SDMT150525ZTR SDMT150525ZER-LF
		TR4F5080BM-5	●	5	80	76	70	22	12.4	7	27	20		
		TR4F5100BM-6	●	6	100	96	70	25.5	14.4	8	32	26		
		TR4F5125BM-6	●	6	125	100	63	38	16.4	9	40	60	Fig.2	
		TR4F5125BM-7	●	7										

【Note】Arbor screw is not included.

Line Up

Insert



P	Carbon steels		■		■		■	■ : General cutting, First recommendation 凸 : General cutting, Second recommendation
M	SUS, etc.			■				
K	FC・FCD Cast irons		■		凸		凸	
H	Hardened steels	■	凸					

Item code	Tolerance class	AJ-Coating			JS-Coating		GX-Coating	Size (mm)	
		JP4105	JP4120	JM4160	JS4160	JS4060	GX2140	IC	S
SDNW120520TR	N	●	●	●	★	△	●	12.7	5.56
SDNW120520TR-P	N		●※1					12.7	5.56
SDNW150525ZTR	N	●	●	●	★	△	●	15.875	5.56
SDMT120520TR	M		●	●	★	△	●	12.7	5.76
SDMT120520ER-LF	M		★	★	★			12.7	5.596
SDMT150525ZTR	M		●	●	★	△	●	15.875	5.61
SDMT150525ZER-LF	M		★	★	★			15.875	5.596

※ 1 : Can be used to process the precipitation hardening stainless steel.
【Note】 Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.

Proper use of inserts

Toughness of cutting edge — Easy cutting

SDNW120520TR SDNW150525ZTR

The recommended default insert offers superior cutting edge strength. Ideal for general high-feed cutting.

SDNW120520TR-P

Recommended for relatively continuous (uninterrupted) cutting with short overhangs.
Ideal for pre-hardened steels (P20 and P21 materials).

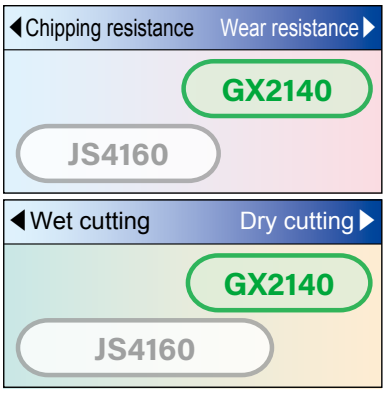
SDMT120520TR SDMT150525ZTR

Breaker type insert.
Ideal for rough machining with low-rigidity work materials and low-horsepower M/C.

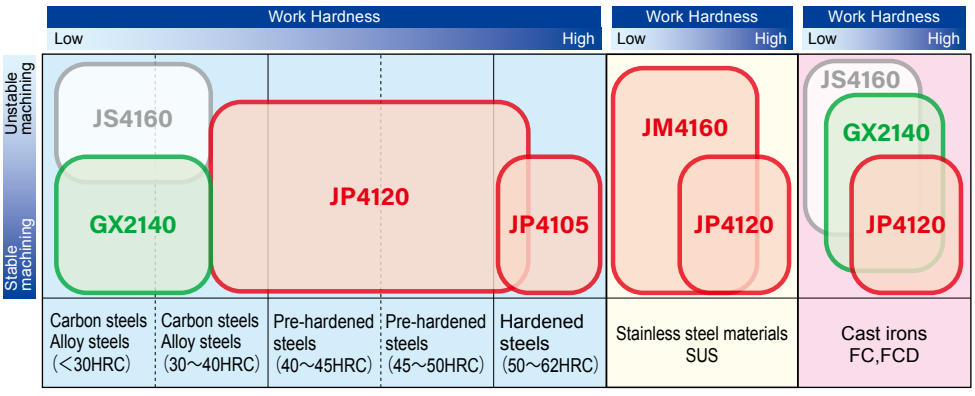
SDMT120520ER-LF SDMT150525ZER-LF

Sharp, helical cutting edge ensures low cutting resistance.

Grade map for less than 35HRC



Grade map for work materials

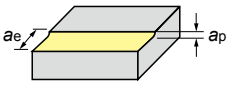


● : Stocked items. △ : The sale ends when all the stock is out. No mark : Contact with our sales department.

Recommended Cutting Conditions

①Shank type / Modular type

TR4F4000type(TR4F40○○S/M/L(32)-○)
Numeric figure in a circle ○



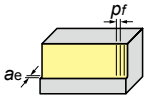
Standard cutting conditions for contour roughing

Work material	Recommended inserts grade	Type / Tool dia. DCX / Overhang	Shank Type φ32(2 Flutes) <3DCX General purpose	Shank Type φ32(2 Flutes) <3DCX High-speed Cutting	Shank Type φ40(3 Flutes) <3DCX General purpose	Shank Type φ40(3 Flutes) <3DCX High-speed Cutting	Modular Type φ32(2 Flutes) <3DCX General purpose	Modular Type φ32(2 Flutes) <3DCX High-speed Cutting	Modular Type φ32(2 Flutes) 3DCX-5DCX	Modular Type φ40(3 Flutes) <3DCX General purpose	Modular Type φ40(3 Flutes) <3DCX High-speed Cutting	Modular Type φ40(3 Flutes) 3DCX-5DCX
Carbon steels Alloy steels (＜30HRC)	GX2140 JS4160	n (min-1)	1490	1990	1190	1590	1490	1990	1490	1190	1590	1190
		Vc(m/min)	150	200	150	200	150	200	150	150	200	150
		Vf(mm/min)	5360	7960	6430	9540	5360	7960	5360	6430	9540	6430
		fz(mm/t)	1.8	2.0	1.8	2.0	1.8	2.0	1.8	1.8	2.0	1.8
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	14	14	22	22	14	14	14	22	22	22
		Q(cm3/min)	75	111	141	210	75	111	75	141	210	141
Carbon steels Alloy steels (30～40HRC)	GX2140 JS4160 JP4120	n (min-1)	1490	1990	1190	1590	1490	1990	1490	1190	1590	1190
		Vc(m/min)	150	200	150	200	150	200	150	150	200	150
		Vf(mm/min)	5360	7960	6430	9540	5360	7960	5360	6430	9540	6430
		fz(mm/t)	1.8	2.0	1.8	2.0	1.8	2.0	1.8	1.8	2.0	1.8
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	14	14	22	22	14	14	14	22	22	22
		Q(cm3/min)	75	111	141	210	75	111	75	141	210	141
Pre-hardened steels (40～45HRC)	JP4120	n (min-1)	1290	1490	1030	1190	1290	1490	1290	1030	1190	1030
		Vc(m/min)	130	150	130	150	130	150	130	130	150	130
		Vf(mm/min)	4640	5960	5560	7140	4640	5960	4640	5560	7140	5560
		fz(mm/t)	1.8	2.0	1.8	2.0	1.8	2.0	1.8	1.8	2.0	1.8
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	14	14	22	22	14	14	14	22	22	22
		Q(cm3/min)	65	83	122	157	65	83	65	122	157	122
Pre-hardened steels (45～50HRC)	JP4120	n (min-1)	990	990	800	800	990	990	990	800	800	800
		Vc(m/min)	100	100	100	100	100	100	100	100	100	100
		Vf(mm/min)	990	1580	1200	1920	990	1580	990	1200	1920	1200
		fz(mm/t)	0.5	0.8	0.5	0.8	0.5	0.8	0.5	0.5	0.8	0.5
		ap(mm)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
		ae(mm)	14	14	22	22	14	14	14	22	22	22
		Q(cm3/min)	11	18	21	34	11	18	11	21	34	21
Stainless steels SUS	JM4160	n (min-1)	990	1990	800	1590	990	1990	990	800	1590	800
		Vc(m/min)	100	200	100	200	100	200	100	100	200	100
		Vf(mm/min)	1980	3980	2400	4770	1980	3980	1980	2400	4770	2400
		fz(mm/t)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	14	14	22	22	14	14	14	22	22	22
		Q(cm3/min)	28	56	53	105	28	56	28	53	105	53
Cast irons FC FCD	JP4120	n (min-1)	1490	1990	1190	1590	1490	1990	1490	1190	1590	1190
		Vc(m/min)	150	200	150	200	150	200	150	150	200	150
		Vf(mm/min)	5960	7960	7140	9540	5960	7960	5960	7140	9540	7140
		fz(mm/t)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	14	14	22	22	14	14	14	22	22	22
		Q(cm3/min)	83	111	157	210	83	111	83	157	210	157
Hardened steels (50～55HRC)	JP4105 JP4120	n (min-1)	800	900	640	720	800	900	800	640	720	640
		Vc(m/min)	80	90	80	90	80	90	80	80	90	80
		Vf(mm/min)	800	1440	960	1730	800	1440	800	960	1730	960
		fz(mm/t)	0.5	0.8	0.5	0.8	0.5	0.8	0.5	0.5	0.8	0.5
		ap(mm)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
		ae(mm)	14	14	22	22	14	14	14	22	22	22
		Q(cm3/min)	9	16	17	30	9	16	9	17	30	17
Hardened steels (55～62HRC)	JP4105 JP4120	n (min-1)	600	600	480	480	600	600	600	480	480	480
		Vc(m/min)	60	60	60	60	60	60	60	60	60	60
		Vf(mm/min)	360	600	430	720	360	600	360	430	720	430
		fz(mm/t)	0.3	0.5	0.3	0.5	0.3	0.5	0.3	0.3	0.5	0.3
		ap(mm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		ae(mm)	14	14	22	22	14	14	14	22	22	22
		Q(cm3/min)	3	4	5	8	3	4	3	5	8	5

Standard cutting conditions for vertical roughing

Work material	Recommended inserts grade	Tool dia. DCX / Overhang	φ32(2 Flutes) <3DCX	φ32(2 Flutes) 3DCX-5DCX	φ40(3 Flutes) <3DCX	φ40(3 Flutes) 3DCX-5DCX
Cast irons FC FCD	JP4120	n (min-1)	1990	1990	1590	1590
		Vc(m/min)	200	200	200	200
		Vf(mm/min)	600	600	720	720
		fz(mm/t)	0.15	0.15	0.15	0.15
		pf(mm)	≦ 0.5DCX		≦ 0.5DCX	
		ae(mm)	≦ 9.0		≦ 9.0	

【Note】 ① This table provides general guidelines for cutting conditions; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions. In particular, when performing shoulder milling in combination with slotting or machining of cutting widths close to slots, etc., chattering vibrations may occur, which can lead to trouble. Therefore, please consider the following when adjusting the conditions;
- Reduce rotation speed and table feed rate by 50 to 70%
- Reduce cutting depth ap by 50 to 70%
- Reduce cutting width ae by 50 to 70%



② Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.
③ JP4105 is for the high-hardness steels. It is not suitable for Non-heat-treated steel material.
④ The machinability of hardened steels (50 - 62HRC) can vary significantly depending on the particular steel type and tool overhang. Adjust the table feed rate and cutting depth ap to suit machining conditions.
⑤ For strongly interrupted cutting, when unsupported length is long, or for wet cutting, JM4160 is recommended.
⑥ To prevent tool damage due to chip clogging, always use a chip removal method such as an air blower, etc.
⑦ Since there is a danger of the removed chips flying out and causing injury to workers, fire, or damage to eyes, during use be sure to cover the work area with a safety cover and have workers wear protective equipment such as glasses, etc. to make the work area safe.
⑧ Perform insert replacement at an early stage to prevent chipping due to excessive use.
⑨ Use of the MOLDINO anti-vibration arbor is recommended for overhang of 5DCX or more.
⑩ The following equation can be used to determine the metal removal rate per unit time Q; $Q(cm^3/min) = ap(mm) \times ae(mm) \times Vf(mm/min) / 1000$

Recommended Cutting Conditions

②Bore type TR4F4000 type(TR4F4050B□-○,TR4F4063B□-○)

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

○ Standard cutting conditions for contour roughing

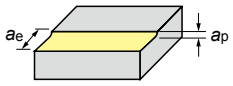
Work material	Recommended inserts grade	Tool dia. DCX	φ50(3 Flutes)			φ50(4 Flutes)			φ50(5 Flutes)		
		Overhang	<3DCX		3DCX-5DCX	<3DCX		3DCX-5DCX	<3DCX		3DCX-5DCX
			General purpose	High-speed Cutting		General purpose	High-speed Cutting		General purpose	High-speed Cutting	
Carbon steels Alloy steels (＜30HRC)	GX2140 JS4160	*n* (min-1)	950	1270	950	950	1270	950	950	1270	950
		Vc(m/min)	150	200	150	150	200	150	150	200	150
		Vf(mm/min)	5130	7620	5130	6840	10160	6840	8550	12700	8550
		fz(mm/t)	1.8	2.0	1.8	1.8	2.0	1.8	1.8	2.0	1.8
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	30	30	30	30	30	30	30	30	30
		Q(cm3/min)	154	229	154	205	305	205	257	381	257
Carbon steels Alloy steels (30～40HRC)	GX2140 JS4160 JP4120	*n* (min-1)	950	1270	950	950	1270	950	950	1270	950
		Vc(m/min)	150	200	150	150	200	150	150	200	150
		Vf(mm/min)	5130	7620	5130	6840	10160	6840	8550	12700	8550
		fz(mm/t)	1.8	2.0	1.8	1.8	2.0	1.8	1.8	2.0	1.8
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	30	30	30	30	30	30	30	30	30
		Q(cm3/min)	154	229	154	205	305	205	257	381	257
Pre-hardened steels (40～45HRC)	JP4120	*n* (min-1)	830	950	830	830	950	830	830	950	830
		Vc(m/min)	130	150	130	130	150	130	130	150	130
		Vf(mm/min)	4480	5700	4480	5980	7600	5980	7470	9500	7470
		fz(mm/t)	1.8	2.0	1.8	1.8	2.0	1.8	1.8	2.0	1.8
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	30	30	30	30	30	30	30	30	30
		Q(cm3/min)	134	171	134	179	228	179	224	285	224
Pre-hardened steels (45～50HRC)	JP4120	*n* (min-1)	640	640	640	640	640	640	640	640	640
		Vc(m/min)	100	100	100	100	100	100	100	100	100
		Vf(mm/min)	960	1540	960	1280	2050	1280	1600	2560	1600
		fz(mm/t)	0.5	0.8	0.5	0.5	0.8	0.5	0.5	0.8	0.5
		ap(mm)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
		ae(mm)	30	30	30	30	30	30	30	30	30
		Q(cm3/min)	23	37	23	31	49	31	38	61	38
Stainless steels SUS	JM4160	*n* (min-1)	640	1270	640	640	1270	640	640	1270	640
		Vc(m/min)	100	200	100	100	200	100	100	200	100
		Vf(mm/min)	1920	3810	1920	2560	5080	2560	3200	6350	3200
		fz(mm/t)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	30	30	30	30	30	30	30	30	30
		Q(cm3/min)	58	114	58	77	152	77	96	191	96
Cast irons FC FCD	JP4120	*n* (min-1)	950	1270	950	950	1270	950	950	1270	950
		Vc(m/min)	150	200	150	150	200	150	150	200	150
		Vf(mm/min)	5700	7620	5700	7600	10160	7600	9500	12700	9500
		fz(mm/t)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	30	30	30	30	30	30	30	30	30
		Q(cm3/min)	171	229	171	228	305	228	285	381	285
Hardened steels (50～55HRC)	JP4105 JP4120	*n* (min-1)	510	570	510	510	570	510	510	570	510
		Vc(m/min)	80	90	80	80	90	80	80	90	80
		Vf(mm/min)	770	1370	770	1020	1820	1020	1280	2280	1280
		fz(mm/t)	0.5	0.8	0.5	0.5	0.8	0.5	0.5	0.8	0.5
		ap(mm)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
		ae(mm)	30	30	30	30	30	30	30	30	30
		Q(cm3/min)	18	33	18	24	44	24	31	55	31
Hardened steels (55～62HRC)	JP4105 JP4120	*n* (min-1)	380	380	380	380	380	380	380	380	380
		Vc(m/min)	60	60	60	60	60	60	60	60	60
		Vf(mm/min)	340	570	340	460	760	460	570	950	570
		fz(mm/t)	0.3	0.5	0.3	0.3	0.5	0.3	0.3	0.5	0.3
		ap(mm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		ae(mm)	30	30	30	30	30	30	30	30	30
		Q(cm3/min)	5	9	5	7	11	7	9	14	9

○ Standard cutting conditions for vertical roughing

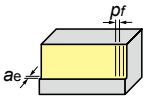
Work material	Recommended inserts grade	Tool dia. DCX	φ50(3 Flutes)		φ50(4 Flutes)		φ50(5 Flutes)	
		Overhang	<3DCX	3DCX-5DCX	<3DCX	3DCX-5DCX	<3DCX	3DCX-5DCX
Cast irons FC FCD	JP4120	*n* (min-1)	1270	1270	1270	1270	1270	1270
		Vc(m/min)	200	200	200	200	200	200
		Vf(mm/min)	760	760	1020	1020	1270	1270
		fz(mm/t)	0.2	0.2	0.2	0.2	0.2	0.2
		pf(mm)	≦ 0.5DCX		≦ 0.5DCX		≦ 0.5DCX	
		ae(mm)	≦ 9.0		≦ 9.0		≦ 9.0	

【Note】
① This table provides general guidelines for cutting conditions; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions. In particular, when performing shoulder milling in combination with slotting or machining of cutting widths close to slots, etc., chattering vibrations may occur, which can lead to trouble. Therefore, please consider the following when adjusting the conditions;
- Reduce rotation speed and table feed rate by 50 to 70%
- Reduce cutting depth *ap* by 50 to 70%
- Reduce cutting width *ae* by 50 to 70%

② Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.
③ JP4105 is for the high-hardness steels. It is not suitable for Non-heat-treated steel material.
④ The machinability of hardened steels (50 - 62HRC) can vary significantly depending on the particular steel type and tool overhang. Adjust the table feed rate and cutting depth *ap* to suit machining conditions.
⑤ For strongly interrupted cutting, when unsupported length is long, or for wet cutting, JM4160 is recommended.
⑥ To prevent tool damage due to chip clogging, always use a chip removal method such as an air blower, etc.
⑦ Since there is a danger of the removed chips flying out and causing injury to workers, fire, or damage to eyes, during use be sure to cover the work area with a safety cover and have workers wear protective equipment such as glasses, etc. to make the work area safe.
⑧ Perform insert replacement at an early stage to prevent chipping due to excessive use.
⑨ Use of the MOLDINO anti-vibration arbor is recommended for overhang of 5DCX or more.
⑩ The following equation can be used to determine the metal removal rate per unit time *Q*; $Q(cm^3/min) = ap(mm) \times ae(mm) \times Vf(mm/min) \div 1000$



ϕ63(4 Flutes)			ϕ63(5 Flutes)			ϕ63(6 Flutes)			Work material
<3DCX		3DCX-5DCX	<3DCX		3DCX-5DCX	<3DCX		3DCX-5DCX	
General purpose	High-speed Cutting		General purpose	High-speed Cutting		General purpose	High-speed Cutting		
760	1010	760	760	1010	760	760	1010	760	Carbon steels Alloy steels (＜30HRC)
150	200	150	150	200	150	150	200	150	
5470	8080	5470	6840	10100	6840	8210	12120	8210	
1.8	2.0	1.8	1.8	2.0	1.8	1.8	2.0	1.8	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
44	44	44	44	44	44	44	44	44	
241	356	241	301	444	301	361	533	361	
760	1010	760	760	1010	760	760	1010	760	Carbon steels Alloy steels (30～40HRC)
150	200	150	150	200	150	150	200	150	
5470	8080	5470	6840	10100	6840	8210	12120	8210	
1.8	2.0	1.8	1.8	2.0	1.8	1.8	2.0	1.8	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
44	44	44	44	44	44	44	44	44	
241	356	241	301	444	301	361	533	361	
660	760	660	660	760	660	660	760	660	Pre-hardened steels (40～45HRC)
130	150	130	130	150	130	130	150	130	
4750	6080	4750	5940	7600	5940	7130	9120	7130	
1.8	2.0	1.8	1.8	2.0	1.8	1.8	2.0	1.8	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
44	44	44	44	44	44	44	44	44	
209	268	209	261	334	261	314	401	314	
510	510	510	510	510	510	510	510	510	Pre-hardened steels (45～50HRC)
100	100	100	100	100	100	100	100	100	
1020	1630	1020	1280	2040	1280	1530	2450	1530	
0.5	0.8	0.5	0.5	0.8	0.5	0.5	0.8	0.5	
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
44	44	44	44	44	44	44	44	44	
36	57	36	45	72	45	54	86	54	
510	1010	510	510	1010	510	510	1010	510	Stainless steels SUS
100	200	100	100	200	100	100	200	100	
2040	4040	2040	2550	5050	2550	3060	6060	3060	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
44	44	44	44	44	44	44	44	44	
90	178	90	112	222	112	135	267	135	
760	1010	760	760	1010	760	760	1010	760	Cast irons FC FCD
150	200	150	150	200	150	150	200	150	
6080	8080	6080	7600	10100	7600	9120	12120	9120	
2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
44	44	44	44	44	44	44	44	44	
268	356	268	334	444	334	401	533	401	
400	450	400	400	450	400	400	450	400	Hardened steels (50～55HRC)
80	90	80	80	90	80	80	90	80	
800	1440	800	1000	1800	1000	1200	2160	1200	
0.5	0.8	0.5	0.5	0.8	0.5	0.5	0.8	0.5	
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
44	44	44	44	44	44	44	44	44	
28	51	28	35	63	35	42	76	42	
300	300	300	300	300	300	300	300	300	Hardened steels (55～62HRC)
60	60	60	60	60	60	60	60	60	
360	600	360	450	750	450	540	900	540	
0.3	0.5	0.3	0.3	0.5	0.3	0.3	0.5	0.3	
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
44	44	44	44	44	44	44	44	44	
8	13	8	10	17	10	12	20	12	



ϕ63(4 Flutes)		ϕ63(5 Flutes)		ϕ63(6 Flutes)		Work material
<3DCX	3DCX-5DCX	<3DCX	3DCX-5DCX	<3DCX	3DCX-5DCX	
1010	1010	1010	1010	1010	1010	Cast irons FC FCD
200	200	200	200	200	200	
810	810	1010	1010	1210	1210	
0.2	0.2	0.2	0.2	0.2	0.2	
≦ 0.5DCX		≦ 0.5DCX		≦ 0.5DCX		
≦ 9.0		≦ 9.0		≦ 9.0		

Recommended Cutting Conditions

②Bore type TR4F4000 type(TR4F4080B□-○,TR4F4100B□-○)

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

Standard cutting conditions for contour roughing

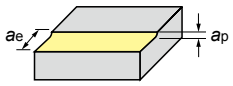
Work material	Recommended inserts grade	Tool dia. DCX	ϕ80(5 Flutes)			ϕ80(7 Flutes)		
		Overhang	<3DCX		3DCX-5DCX	<3DCX		3DCX-5DCX
			General purpose	High-speed Cutting		General purpose	High-speed Cutting	
Carbon steels Alloy steels (<30HRC)	GX2140 JS4160	*n* (min-1)	600	800	600	600	800	600
		Vc(m/min)	150	200	150	150	200	150
		Vf(mm/min)	5400	8000	5400	7560	11200	7560
		fz(mm/t)	1.8	2.0	1.8	1.8	2.0	1.8
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	60	60	60	60	60	60
		Q(cm3/min)	324	480	324	454	672	454
Carbon steels Alloy steels (30～40HRC)	GX2140 JS4160 JP4120	*n* (min-1)	600	800	600	600	800	600
		Vc(m/min)	150	200	150	150	200	150
		Vf(mm/min)	5400	8000	5400	7560	11200	7560
		fz(mm/t)	1.8	2.0	1.8	1.8	2.0	1.8
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	60	60	60	60	60	60
		Q(cm3/min)	324	480	324	454	672	454
Pre-hardened steels (40～45HRC)	JP4120	*n* (min-1)	520	600	520	520	600	520
		Vc(m/min)	130	150	130	130	150	130
		Vf(mm/min)	4680	6000	4680	6550	8400	6550
		fz(mm/t)	1.8	2.0	1.8	1.8	2.0	1.8
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	60	60	60	60	60	60
		Q(cm3/min)	281	360	281	393	504	393
Pre-hardened steels (45～50HRC)	JP4120	*n* (min-1)	400	400	400	400	400	400
		Vc(m/min)	100	100	100	100	100	100
		Vf(mm/min)	1000	1600	1000	1400	2240	1400
		fz(mm/t)	0.5	0.8	0.5	0.5	0.8	0.5
		ap(mm)	0.8	0.8	0.8	0.8	0.8	0.8
		ae(mm)	60	60	60	60	60	60
		Q(cm3/min)	48	77	48	67	108	67
Stainless steels SUS	JM4160	*n* (min-1)	400	800	400	400	800	400
		Vc(m/min)	100	200	100	100	200	100
		Vf(mm/min)	2000	4000	2000	2800	5600	2800
		fz(mm/t)	1.0	1.0	1.0	1.0	1.0	1.0
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	60	60	60	60	60	60
		Q(cm3/min)	120	240	120	168	336	168
Cast irons FC FCD	JP4120	*n* (min-1)	600	800	600	600	800	600
		Vc(m/min)	150	200	150	150	200	150
		Vf(mm/min)	6000	8000	6000	8400	11200	8400
		fz(mm/t)	2.0	2.0	2.0	2.0	2.0	2.0
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	60	60	60	60	60	60
		Q(cm3/min)	360	480	360	504	672	504
Hardened steels (50～55HRC)	JP4105 JP4120	*n* (min-1)	320	360	320	320	360	320
		Vc(m/min)	80	90	80	80	90	80
		Vf(mm/min)	800	1440	800	1120	2020	1120
		fz(mm/t)	0.5	0.8	0.5	0.5	0.8	0.5
		ap(mm)	0.8	0.8	0.8	0.8	0.8	0.8
		ae(mm)	60	60	60	60	60	60
		Q(cm3/min)	38	69	38	54	97	54
Hardened steels (55～62HRC)	JP4105 JP4120	*n* (min-1)	240	240	240	240	240	240
		Vc(m/min)	60	60	60	60	60	60
		Vf(mm/min)	360	600	360	500	840	500
		fz(mm/t)	0.3	0.5	0.3	0.3	0.5	0.3
		ap(mm)	0.5	0.5	0.5	0.5	0.5	0.5
		ae(mm)	60	60	60	60	60	60
		Q(cm3/min)	11	18	11	15	25	15

Standard cutting conditions for vertical roughing

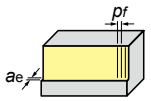
Work material	Recommended inserts grade	Tool dia. DCX	ϕ80(5 Flutes)		ϕ80(7 Flutes)	
		Overhang	<3DCX	3DCX-5DCX	<3DCX	3DCX-5DCX
Cast irons FC FCD	JP4120	*n* (min-1)	800	800	800	800
		Vc(m/min)	200	200	200	200
		Vf(mm/min)	800	800	1120	1120
		fz(mm/t)	0.2	0.2	0.2	0.2
		pf(mm)	≦ 0.5DCX		≦ 0.5DCX	
		ae(mm)	≦ 9.0		≦ 9.0	

【Note】
① This table provides general guidelines for cutting conditions; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions. In particular, when performing shoulder milling in combination with slotting or machining of cutting widths close to slots, etc., chattering vibrations may occur, which can lead to trouble. Therefore, please consider the following when adjusting the conditions;
- Reduce rotation speed and table feed rate by 50 to 70%
- Reduce cutting depth *ap* by 50 to 70%
- Reduce cutting width *ae* by 50 to 70%

② Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.
③ JP4105 is for the high-hardness steels. It is not suitable for Non-heat-treated steel material.
④ The machinability of hardened steels (50 - 62HRC) can vary significantly depending on the particular steel type and tool overhang. Adjust the table feed rate and cutting depth *ap* to suit machining conditions.
⑤ For strongly interrupted cutting, when unsupported length is long, or for wet cutting, JM4160 is recommended.
⑥ To prevent tool damage due to chip clogging, always use a chip removal method such as an air blower, etc.
⑦ Since there is a danger of the removed chips flying out and causing injury to workers, fire, or damage to eyes, during use be sure to cover the work area with a safety cover and have workers wear protective equipment such as glasses, etc. to make the work area safe.
⑧ Perform insert replacement at an early stage to prevent chipping due to excessive use.
⑨ Use of the MOLDINO anti-vibration arbor is recommended for overhang of 5DCX or more.
⑩ The following equation can be used to determine the metal removal rate per unit time Q; $Q(cm^3/min) = ap(mm) \times ae(mm) \times Vf(mm/min) / 1000$



ϕ100(6 Flutes)			ϕ100(8 Flutes)			Work material
<3DCX		3DCX-5DCX	<3DCX		3DCX-5DCX	
General purpose	High-speed Cutting		General purpose	High-speed Cutting		
480	640	480	480	640	480	Carbon steels Alloy steels (＜30HRC)
150	200	150	150	200	150	
5180	7680	5180	6910	10240	6910	
1.8	2.0	1.8	1.8	2.0	1.8	
1.0	1.0	1.0	1.0	1.0	1.0	
80	80	80	80	80	80	
414	614	414	553	819	553	
480	640	480	480	640	480	Carbon steels Alloy steels (30～40HRC)
150	200	150	150	200	150	
5180	7680	5180	6910	10240	6910	
1.8	2.0	1.8	1.8	2.0	1.8	
1.0	1.0	1.0	1.0	1.0	1.0	
80	80	80	80	80	80	
414	614	414	553	819	553	
410	480	410	410	480	410	Pre-hardened steels (40～45HRC)
130	150	130	130	150	130	
4430	5760	4430	5900	7680	5900	
1.8	2.0	1.8	1.8	2.0	1.8	
1.0	1.0	1.0	1.0	1.0	1.0	
80	80	80	80	80	80	
354	461	354	472	614	472	
320	320	320	320	320	320	Pre-hardened steels (45～50HRC)
100	100	100	100	100	100	
960	1540	960	1280	2050	1280	
0.5	0.8	0.5	0.5	0.8	0.5	
0.8	0.8	0.8	0.8	0.8	0.8	
80	80	80	80	80	80	
61	99	61	82	131	82	
320	640	320	320	640	320	Stainless steels SUS
100	200	100	100	200	100	
1920	3840	1920	2560	5120	2560	
1.0	1.0	1.0	1.0	1.0	1.0	
1.0	1.0	1.0	1.0	1.0	1.0	
80	80	80	80	80	80	
154	307	154	205	410	205	
480	640	480	480	640	480	Cast irons FC FCD
150	200	150	150	200	150	
5760	7680	5760	7680	10240	7680	
2.0	2.0	2.0	2.0	2.0	2.0	
1.0	1.0	1.0	1.0	1.0	1.0	
80	80	80	80	80	80	
461	614	461	614	819	614	
250	290	250	250	290	250	Hardened steels (50～55HRC)
80	90	80	80	90	80	
750	1390	750	1000	1860	1000	
0.5	0.8	0.5	0.5	0.8	0.5	
0.8	0.8	0.8	0.8	0.8	0.8	
80	80	80	80	80	80	
48	89	48	64	119	64	
190	190	190	190	190	190	Hardened steels (55～62HRC)
60	60	60	60	60	60	
340	570	340	460	760	460	
0.3	0.5	0.3	0.3	0.5	0.3	
0.5	0.5	0.5	0.5	0.5	0.5	
80	80	80	80	80	80	
14	23	14	18	30	18	



ϕ100(6 Flutes)		ϕ100(8 Flutes)		Work material
<3DCX	3DCX-5DCX	<3DCX	3DCX-5DCX	
640	640	640	640	Cast irons FC FCD
200	200	200	200	
770	770	1020	1020	
0.2	0.2	0.2	0.2	
≦ 0.5DCX		≦ 0.5DCX		
≦ 9.0		≦ 9.0		

Recommended Cutting Conditions

②Bore type TR4F5000 type(TR4F5○○○B□-○)

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

Standard cutting conditions for contour roughing

Work material	Recommended inserts grade	Tool dia. DCX	φ63(4 Flutes)			φ80(5 Flutes)		
		Overhang	<3DCX		3DCX-5DCX	<3DCX		3DCX-5DCX
			General purpose	High efficiency		General purpose	High efficiency	
Carbon steels Alloy steels (＜30HRC)	GX2140 JS4160	*n* (min-1)	760	910	760	600	720	600
		Vc(m/min)	150	180	150	150	180	150
		Vf(mm/min)	4560	7280	5470	4500	7200	5400
		fz(mm/t)	1.5	2.0	1.8	1.5	2.0	1.8
		ap(mm)	2.0	2.0	1.0	2.0	2.0	1.0
		ae(mm)	38	38	38	56	56	56
		Q(cm3/min)	347	553	208	504	806	302
Carbon steels Alloy steels (30～40HRC)	GX2140 JS4160 JP4120	*n* (min-1)	760	910	760	600	720	600
		Vc(m/min)	150	180	150	150	180	150
		Vf(mm/min)	4560	7280	5470	4500	7200	5400
		fz(mm/t)	1.5	2.0	1.8	1.5	2.0	1.8
		ap(mm)	2.0	2.0	1.0	2.0	2.0	1.0
		ae(mm)	38	38	38	56	56	56
		Q(cm3/min)	347	553	208	504	806	302
Pre-hardened steels (40～45HRC)	JP4120	*n* (min-1)	660	760	660	520	600	520
		Vc(m/min)	130	150	130	130	150	130
		Vf(mm/min)	4750	6080	4750	4680	6000	4680
		fz(mm/t)	1.8	2.0	1.8	1.8	2.0	1.8
		ap(mm)	1.5	1.5	1.0	1.5	1.5	1.0
		ae(mm)	38	38	38	56	56	56
		Q(cm3/min)	271	347	181	393	504	262
Pre-hardened steels (45～50HRC)	JP4120	*n* (min-1)	510	510	510	400	400	400
		Vc(m/min)	100	100	100	100	100	100
		Vf(mm/min)	1020	1630	1020	1000	1600	1000
		fz(mm/t)	0.5	0.8	0.5	0.5	0.8	0.5
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	38	38	38	56	56	56
		Q(cm3/min)	39	62	39	56	90	56
Stainless steels SUS	JM4160	*n* (min-1)	510	1010	510	400	800	400
		Vc(m/min)	100	200	100	100	200	100
		Vf(mm/min)	2040	4040	2040	2000	4000	2000
		fz(mm/t)	1.0	1.0	1.0	1.0	1.0	1.0
		ap(mm)	1.5	1.5	1.0	1.5	1.5	1.0
		ae(mm)	38	38	38	56	56	56
		Q(cm3/min)	116	230	78	168	336	112
Cast irons FC FCD	JP4120	*n* (min-1)	760	910	760	600	720	600
		Vc(m/min)	150	180	150	150	180	150
		Vf(mm/min)	6080	8370	6080	6000	8280	6000
		fz(mm/t)	2.0	2.3	2.0	2.0	2.3	2.0
		ap(mm)	2.0	2.0	2.0	2.0	2.0	2.0
		ae(mm)	38	38	38	56	56	56
		Q(cm3/min)	462	636	462	672	927	672
Hardened steels (50～55HRC)	JP4105 JP4120	*n* (min-1)	400	450	400	320	360	320
		Vc(m/min)	80	90	80	80	90	80
		Vf(mm/min)	800	1440	800	800	1440	800
		fz(mm/t)	0.5	0.8	0.5	0.5	0.8	0.5
		ap(mm)	1.0	1.0	1.0	1.0	1.0	1.0
		ae(mm)	38	38	38	56	56	56
		Q(cm3/min)	30	55	30	45	81	45
Hardened steels (55～62HRC)	JP4105 JP4120	*n* (min-1)	300	300	300	240	240	240
		Vc(m/min)	60	60	60	60	60	60
		Vf(mm/min)	360	600	360	360	600	360
		fz(mm/t)	0.3	0.5	0.3	0.3	0.5	0.3
		ap(mm)	0.5	0.5	0.5	0.5	0.5	0.5
		ae(mm)	38	38	38	56	56	56
		Q(cm3/min)	7	11	7	10	17	10

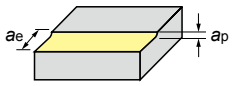
Standard cutting conditions for vertical roughing

Work material	Recommended inserts grade	Tool dia. DCX	φ63(4 Flutes)		φ80(5 Flutes)	
		Overhang	<3DCX	3DCX-5DCX	<3DCX	3DCX-5DCX
Cast irons FC FCD	JP4120	*n* (min-1)	1010	1010	800	800
		Vc(m/min)	200	200	200	200
		Vf(mm/min)	810	810	800	800
		fz(mm/t)	0.2	0.2	0.2	0.2
		pf(mm)	≦ 0.5DCX		≦ 0.5DCX	
		ae(mm)	≦ 11.0		≦ 11.0	

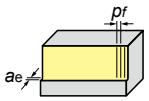
【Note】
① This table provides general guidelines for cutting conditions; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions. In particular, when performing shoulder milling in combination with slotting or machining of cutting widths close to slots, etc., chattering vibrations may occur, which can lead to trouble. Therefore, please consider the following when adjusting the conditions;
- Reduce rotation speed and table feed rate by 50 to 70%
- Reduce cutting depth *ap* by 50 to 70%
- Reduce cutting width *ae* by 50 to 70%

② If the machine has insufficient power, first try reducing the cutting depth. Next, try reducing the rotation speed and table feed rate.
③ Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.
④ JP4105 is for the high-hardness steels. It is not suitable for Non-heat-treated steel material.
⑤ The machinability of hardened steels (50 - 62HRC) can vary significantly depending on the particular steel type and tool overhang. Adjust the table feed rate and cutting depth *ap* to suit machining conditions.
⑥ For strongly interrupted cutting, when unsupported length is long, or for wet cutting, JM4160 is recommended.
⑦ To prevent tool damage due to chip clogging, always use a chip removal method such as an air blower, etc.
⑧ Since there is a danger of the removed chips flying out and causing injury to workers, fire, or damage to eyes, during use be sure to cover the work area with a safety cover and have workers wear protective equipment such as glasses, etc. to make the work area safe.
⑨ Perform insert replacement at an early stage to prevent chipping due to excessive use.
⑩ Use of the MOLDINO anti-vibration arbor is recommended for overhang of 5DCX or more.
⑪ The following equation can be used to determine the metal removal rate per unit time *Q*; $Q(cm^3/min)=ap(mm)\times ae(mm)\times Vf(mm/min) \div 1000$

※ To ensure high-efficiency conditions, we recommend checking the machine's power/torque chart and using a rotation speed that can maintain the rated power of the spindle.



ϕ100(6 Flutes)			ϕ125(6 Flutes)			ϕ125(7 Flutes)			Work material
<3DCX		3DCX-5DCX	<3DCX		3DCX-5DCX	<3DCX		3DCX-5DCX	
General purpose	High efficiency		General purpose	High efficiency		General purpose	High efficiency		
480	570	480	380	460	380	380	460	380	Carbon steels Alloy steels (＜30HRC)
150	180	150	150	180	150	150	180	150	
4320	6840	5180	3420	5520	4100	3990	6440	4790	
1.5	2.0	1.8	1.5	2.0	1.8	1.5	2.0	1.8	
2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0	1.0	
75	75	75	100	100	100	100	100	100	
648	1026	389	684	1104	410	798	1288	479	
480	570	480	380	460	380	380	460	380	Carbon steels Alloy steels (30～40HRC)
150	180	150	150	180	150	150	180	150	
4320	6840	5180	3420	5520	4100	3990	6440	4790	
1.5	2.0	1.8	1.5	2.0	1.8	1.5	2.0	1.8	
2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0	1.0	
75	75	75	100	100	100	100	100	100	
648	1026	389	684	1104	410	798	1288	479	
410	480	410	330	380	330	330	380	330	Pre-hardened steels (40～45HRC)
130	150	130	130	150	130	130	150	130	
4430	5760	4430	3560	4560	3560	4160	5320	4160	
1.8	2.0	1.8	1.8	2.0	1.8	1.8	2.0	1.8	
1.5	1.5	1.0	1.5	1.5	1.0	1.5	1.5	1.0	
75	75	75	100	100	100	100	100	100	
498	648	332	534	684	356	624	798	416	
320	320	320	250	250	250	250	250	250	Pre-hardened steels (45～50HRC)
100	100	100	100	100	100	100	100	100	
960	1540	960	750	1200	750	880	1400	880	
0.5	0.8	0.5	0.5	0.8	0.5	0.5	0.8	0.5	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
75	75	75	100	100	100	100	100	100	
72	116	72	75	120	75	88	140	88	
320	640	320	250	510	250	250	510	250	Stainless steels SUS
100	200	100	100	200	100	100	200	100	
1920	3840	1920	1500	3060	1500	1750	3570	1750	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
1.5	1.5	1.0	1.5	1.5	1.0	1.5	1.5	1.0	
75	75	75	100	100	100	100	100	100	
216	432	144	225	459	150	263	536	175	
480	570	480	380	460	380	380	460	380	Cast irons FC FCD
150	180	150	150	180	150	150	180	150	
5760	7870	5760	4560	6350	4560	5320	7410	5320	
2.0	2.3	2.0	2.0	2.3	2.0	2.0	2.3	2.0	
2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
75	75	75	100	100	100	100	100	100	
864	1181	864	912	1270	912	1064	1482	1064	
250	290	250	200	230	200	200	230	200	Hardened steels (50～55HRC)
80	90	80	80	90	80	80	90	80	
750	1390	750	600	1100	600	700	1290	700	
0.5	0.8	0.5	0.5	0.8	0.5	0.5	0.8	0.5	
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
75	75	75	100	100	100	100	100	100	
56	104	56	60	110	60	70	129	70	
190	190	190	150	150	150	150	150	150	Hardened steels (55～62HRC)
60	60	60	60	60	60	60	60	60	
340	570	340	270	450	270	320	530	320	
0.3	0.5	0.3	0.3	0.5	0.3	0.3	0.5	0.3	
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
75	75	75	100	100	100	100	100	100	
13	21	13	14	23	14	16	27	16	



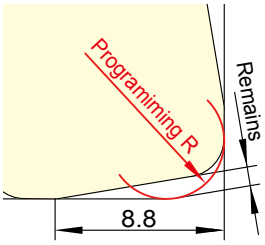
ϕ100(6 Flutes)		ϕ125(6 Flutes)		ϕ125(7 Flutes)		Work material
<3DCX	3DCX-5DCX	<3DCX	3DCX-5DCX	<3DCX	3DCX-5DCX	
640	640	510	510	510	510	Cast irons FC FCD
200	200	200	200	200	200	
770	770	610	610	710	710	
0.2	0.2	0.2	0.2	0.2	0.2	
≦ 0.5DCX		≦ 0.5DCX		≦ 0.5DCX		
≦ 11.0		≦ 11.0		≦ 11.0		

Precautions for use

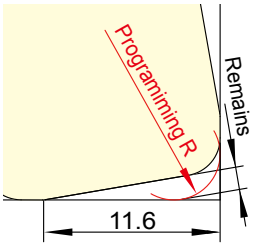
Programming R and maximum cutting depth

● Please define the tool shape in the CAM as indicated in the following table:

Insert	Programming R	Remains (mm)	Maximum cutting depth(mm)
SDNW120520TR(-P) SDMT120520TR SDMT120520ER-LF	R3.0	1.0	1.2
SDNW150525ZTR SDMT150525ZTR SDMT150525ZER-LF	R3.0	1.47	2.0
	R4.0	1.32	



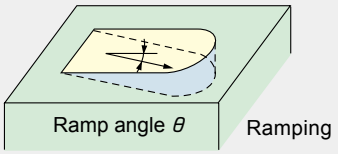
SDNW120520TR(-P)
SDMT120520TR
SDMT120520ER-LF

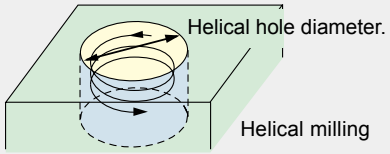


SDNW150525ZTR
SDMT150525ZTR
SDMT150525ZER-LF

Maximum ramp angle and helical hole diameter

● Since the cutting flute do 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.





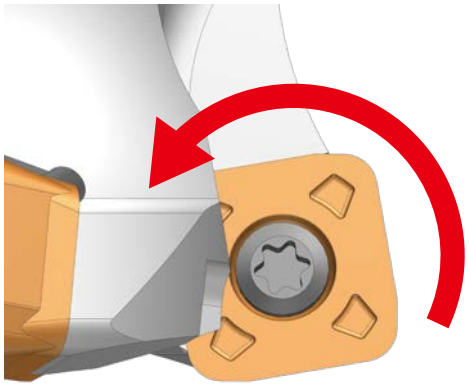
● **For ramping and helical cutting, please set the "*Vf*" to around 50% of recommended cutting condition.**

Inserts		Modular/ Shank Type		Bore Type							
		SDNW120520TR(-P) SDMT120520TR SDMT120520ER-LF						SDNW150525ZTR SDMT150525ZTR SDMT150525ZER-LF			
Tool dia. DCX (mm)		φ32	φ40	φ50	φ63	φ80	φ100	φ63	φ80	φ100	φ125
Ramping	Maximum ramp angle θ	1°	1.4°	2°	2°	1.5°	1°	3°	2°	1.5°	1°
	Recommendation	1°						2°	1°		0.5°
Helical milling	Helical hole diameter	46～60	62～76	82～96	108～122	142～156	182～196	102～121	136～155	176～195	226～245

【Note】① The ramp angle θ should be set within the ranges listed above. Do not exceed the recommended value.
② For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.
③ It is recommended that the tool be used while performing sufficient chip removal and checking that there are no abnormal vibrations.

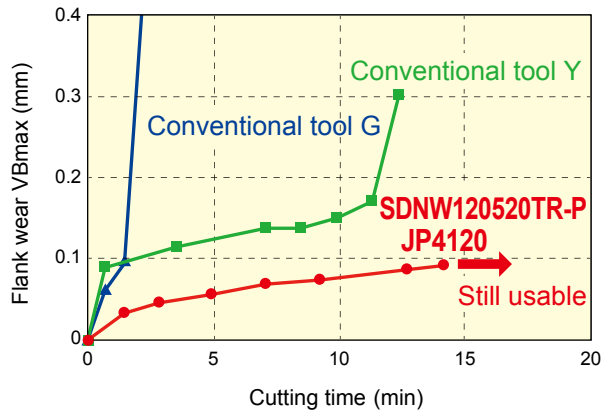
Attention for the corner change

● Turn the insert counterclockwise upon corner change.



Cutting performance

Tool life curve with pre-hardened steels (40 HRC)

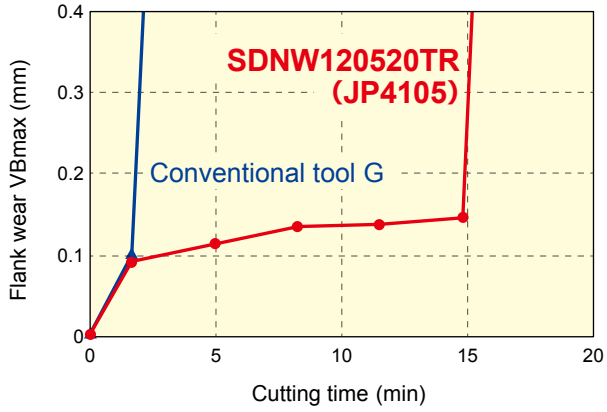


Cutting Conditions

Work material	Pre-hardened steels (40HRC)
Tool	TR4F4063BM-5
Insert model	SDNW120520TR-P : JP4120
Cutting speed	v_c = 140m/min
Feed per tooth	f_z = 2.0mm/t
Cutting depth	$a_p \times a_e$ = 1.0×45mm
Overhang	200mm
Air-blow	Single flute cutting

Surpasses life of conventional tools for high-feed cutting at *f*z=2.0mm/t.

Tool life curve with quench-tempered steels (52 HRC)

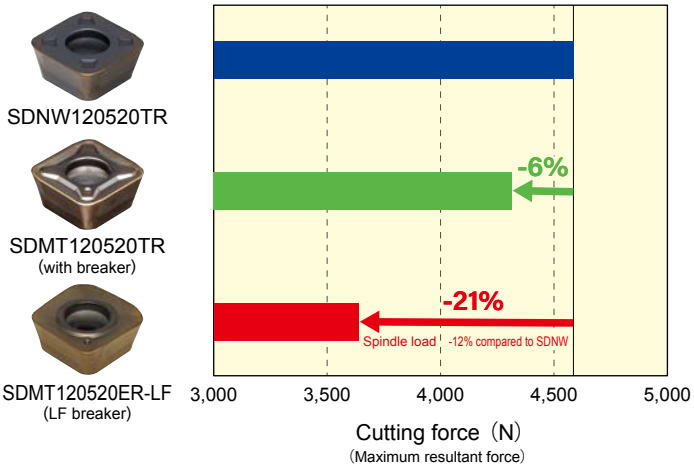


Cutting Conditions

Work material	Quench-tempered steels (52 HRC) *Equivalent to SUS420J2
Tool	TR4F4063BM-5
Insert model	SDNW120520TR : JP4105
Cutting speed	v_c = 90m/min
Feed per tooth	f_z = 1.0mm/t
Cutting depth	$a_p \times a_e$ = 1.0×35mm
Overhang	200mm
Air-blow	Single flute cutting

Surpasses life of conventional tools for more efficient cutting of high-hardness materials

Comparison of cutting force



Cutting Conditions

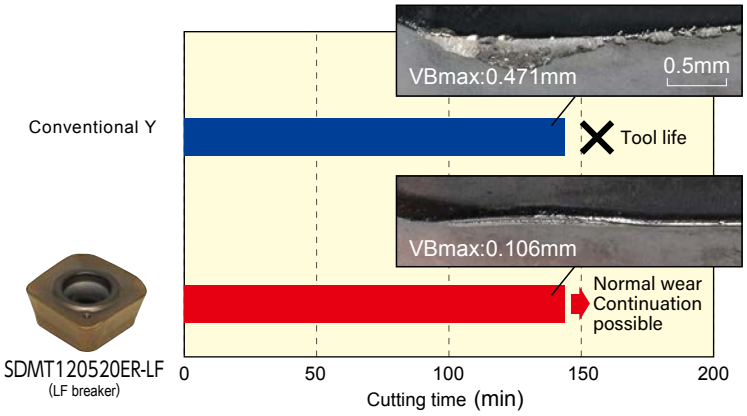
Work material	S50C(220HB)
Tool	TR4F4063B-6(φ63 6 flutes)
Cutting speed	v_c = 150m/min
Feed per tooth	f_z = 1.0mm/t
Cutting depth	$a_p \times a_e$ = 1.0×38mm

Dry, with full set

Cutting performance

Low cutting force LF breaker

Interrupted cutting performance



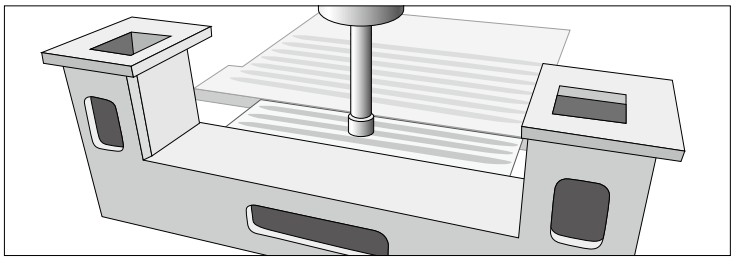
Features easy-cutting edge geometry;
also suitable for general interrupted cutting.

Cutting Conditions

Work material	SCM440(32HRC) Pre-drilled material
Tool diameter	ϕ63
Cutting speed	V_c = 110m/min
Feed per tooth	f_z = 1.5mm/t
Cutting depth	$a_p \times a_e$ = 1.0×38mm
Overhang	300mm(L/D=4.8)

Dry, Single flute cutting

Field data

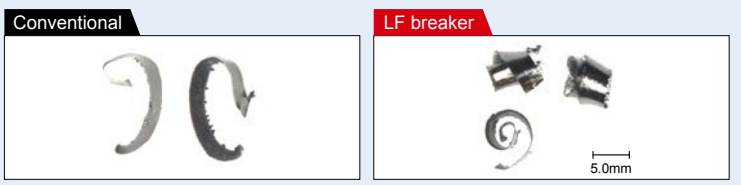


Features lower machining noise levels compared to conventional products.
Minimizes chatter and vibration even with long overhangs to double efficiency.

Cutting Conditions

Work material	Cast steels
Tool model	TR4F4100BM-6
Insert model	SDMT120520ER-LF : JS4160
Cutting speed	V_c = 207m/min
Feed per tooth	f_z = 1.5mm/t
Cutting depth	$a_p \times a_e$ = 0.6～1.0×80～100mm
Overhang	450mm(L/D=4.5)

Dry



Reduces spindle load compared to conventional products.
Produces smaller, well-formed chips.
Doubles based on the original efficiency and increases tool life threefold.

Cutting Conditions

Work material	Titanium alloys (33HRC)
Tool model	TR4F4050B-5
Insert model	SDMT120520ER-LF : JM4160
Cutting speed	V_c = 64m/min
Feed per tooth	f_z = 0.89mm/t
Cutting depth	$a_p \times a_e$ = 0.8×30mm

Wet (Water base)

PVD Technology General purpose for steel JS4160

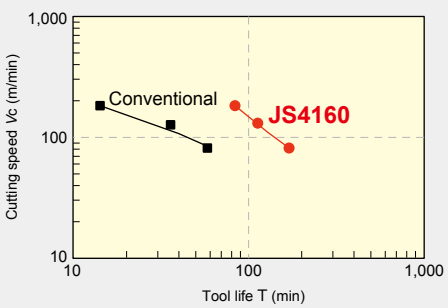
Features

- Features a coating with outstanding heat and welding resistance, reducing crater wear that occurs during high-efficiency cutting.
- Features a carbide base metal that combines toughness with heat resistance to ensure consistent long tool life and high efficiency in cutting.

Strong fields

- From unstable to high-efficiency cutting, and wet cutting of materials like SS, SC, SCM measuring less than 35 HRC in hardness.

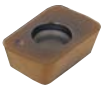
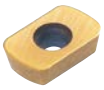
Figure Cutting performance



Cutting Conditions

Work Material	SKD11(240HB)
Tool	ASRS2032R-5
Inserts	EPNW0603TN-8
Cutting Speed	V_c = 80,130,180m/min
Feed per tooth	f_z = 1.3mm/t
Cutting depth	$a_p \times a_e$ = 0.5 × 21mm
Coolant	Dry cutting Single-flute cutting

High-feed tools lineup

Type	Feature				Holder	Insert			Programming R (mm)	APMX (mm)
	Economical (No. of corners)	High accuracy (Less uncut remnants)	Supports for high-hardened steel	Efficiency (No. of Flutes)	Tool dia. (mm)	No. of corners	Shape	Inscribed circle code		
TR2F 		○	○ ~62HRC	◎ High Efficiency multiflutes	ϕ16~52	2		06	2.0	0.5
TD4N 	◎	◎	○ ~62HRC	◎ High Efficiency multiflutes	ϕ16~40	4		06	2.0	1.0
ASR Multi-Flutes 		○	○ ~62HRC	◎ High Efficiency multiflutes	ϕ16~66	2		06	2.0	1.5
								12	3.0	2.0
ASRF mini 	◎		○ ~62HRC	○ General	ϕ20~63	4		07	2.0	1.2
ASR 		○	○ ~60HRC	○ General	ϕ20~100	2		08~15	3.0	2.0
ASRT 	○	○	○ ~62HRC	○ General	ϕ25~100	3		09~14		
ASRF 	◎		○ ~60HRC	○ General	ϕ32~100	4		12	4.5	
TD6N 	◎	○	~50HRC	○ General	ϕ50~125	6		14	3.0	1.5
								14		3.0
TR4F 	◎		○ ~62HRC	○ General	ϕ32~125	4		12		1.2
								15		2.0

Various other tools for roughing are also available.
For more information on tool specifications, please refer to our general catalog or visit our website. (http://www.moldino.com)

MOLDINO

The Edge To Innovation

The diagrams and table data are examples of test results, and are not guaranteed values.
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⚠ Attentions on Safety

1. Attentions regarding handling

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

2. Attentions regarding mounting

(1) When preparing for use, be sure that the inserts are firmly mounted in place and that they are firmly mounted on the arbor, etc.
(2) If abnormal chattering occurs during use, stop the machine immediately and remove the cause of the chattering.

3. Attentions during use

(1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
(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) The inserts are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be installed and safety equipment such as safety glasses should be worn to create a safe environment for work.
・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.

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