NEW

MOLDINO
The Edge To Innovation

TD4N type

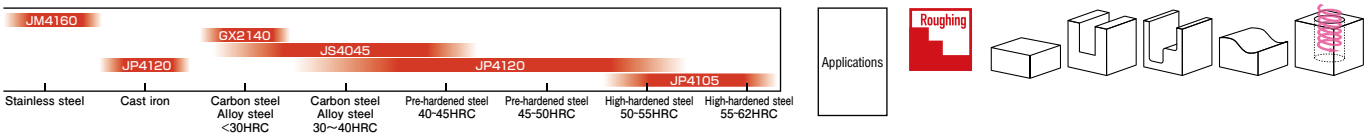
Radius Mill TD4N

1.5" & 2" bore cutters added!
Insert grade JP4105 for High hardened materials added!

MITSUBISHI MATERIALS U.S.A.

New Product News | No. H1801A-3 | 2024-06

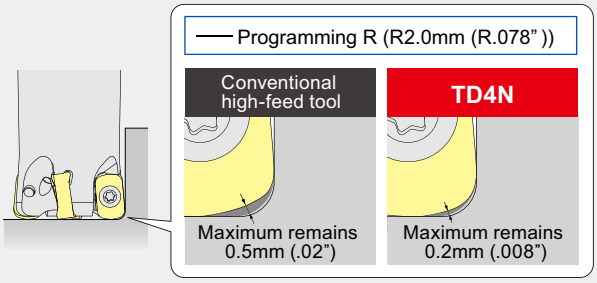
Technology



Features 01 Reduces uncut remnants on work pieces

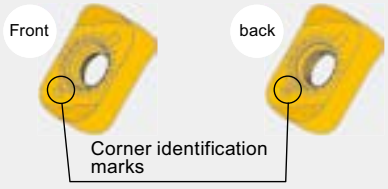
The cutting edge shape was reviewed for TD4N so that uncut remnants are reduced. This enables the load on the next process to be reduced by up to 40%compared to conventional products.

・Since it is difficult to create tool shape definitions in CAM for the complicated cutting edge shapes of high-feed tools, in many cases the tools are used with the definition for a simple R radius tool. The differences between this definition and the actual tool shape result in uncut remnants that cannot be checked on CAM and become more work for the next process.



Features 02 Economical 4-corner inserts with chip breakers for various applications

・By making it possible to use both the front and back sides of inserts, 4 corners can be used. The inserts are provided with a large rake angle which exhibits an excellent cutting force reduction effect even when compared to general positive-shape inserts.



Features of insert breaker

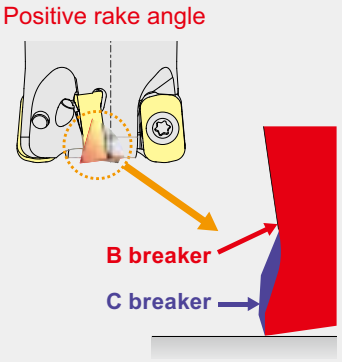
C breaker

Corresponds to our general high-feed-type inserts (EDNW, EPNW, WDNW, SDNW), and is resistant to chip jamming, vibrations, and crater wear.

B breaker

Enables reduced cutting force when cutting work materials such as stainless steels, etc. that require free-cutting performance.

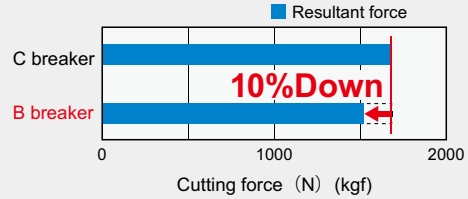
Magnified view of cutting edge cross section



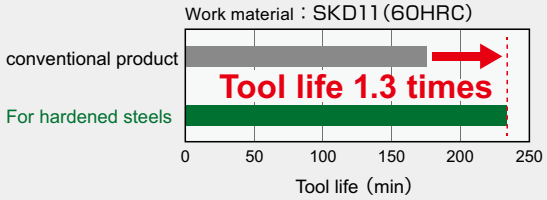
Features of insert for high-hardness materials

High-precision G-class insert suppresses dispersion in tool life.
Employs JP4105, a grade for high-hardness materials which provides long service life for machining 50HRC or harder matrials.

Comparison of cutting force

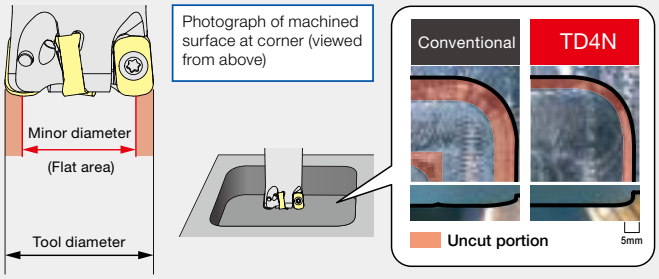


Tool life comparison with conventional products



Features 03 Large minor cutting diameter minimized stock variation

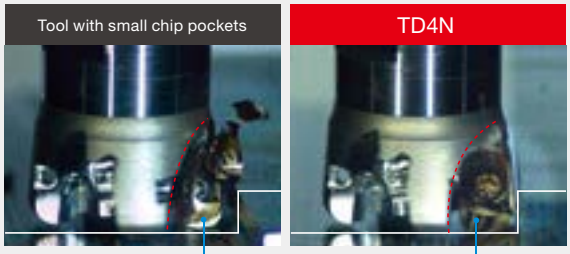
Compared to conventional high feed tools, TD4N high feed cutters have a large minor diameter. The large minor diameter minimizes the uncut material in shoulders and enables an increased width of cut -ae- for improved cutter paths and floor blends without sacrificing performance.



Features 04 Excellent chip discharge characteristics

The next generation TD4N high feed cutter excels in chip control without sacrificing performance.

The TD4N insert is designed to curl the chip up and into the new chip pocket design before discharge. The breakthrough concept in high feed milling chip control minimizes the possibility of chip jamming especially when machining shoulders.



Features 05 Lineup of insert grades

PVD Technology Grade for machining high-hardness materials **JP4105**

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

PVD Technology Grade for machining pre-hardened or hardened materials **JP4120**

- Employs a fine carbide substrate with an excellent balance between wear resistance and toughness and 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.

PVD Technology Grade for machining stainless-steel materials **JM4160**

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

PVD Technology General purpose for steel **JS4045**

- JS4045 adopts heat resistant layer, reduces the crater wear by high-speed cutting.
- JS4045 adopts heat resistant substrate, reduces the wear and improves tool life.
- Improves tool life on dry cutting.

CVD Technology General purpose for steel **GX2140**

- Smooth surfaced α-Al_2O_3 layer with improved chipping / welding resistance brings less sudden-tool-edge-chipping.
- Machining efficiency is improved for high-speed,high-feed-rate rough machining by using the layer with fine columnar structure.

Line Up

Shank type

Fig.1
(Standard type)

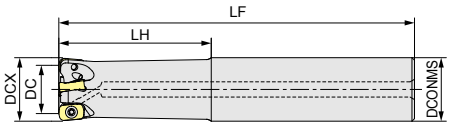
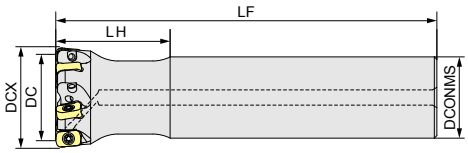


Fig.2
(Undercut type)



Inch ITD4N20○○□-○

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

Style		Item code	Stock	No. of flutes	Dimensions (Inch)					Type	Insert
					DCX	DC	LF	LH	DCONMS		
Shank Style	Regular	ITD4N2010S-2	●	2	.625	.389	4.000	1.250	.625	Fig.1	EN□U0603ER-□
		ITD4N2012S-3	●	3	.750	.514	5.000	2.000	.750		
		ITD4N2016S-4	●	4	1.000	.764	5.500	2.500	1.000		
		ITD4N2020S-5	●	5	1.250	1.014	6.000	2.750	1.250		
		ITD4N2024S-6-1.25	●	6	1.500	1.264	6.000	1.750	1.250	Fig.2	
		ITD4N2024S-6	●	6	1.500	1.264	6.000	1.750	1.500	Fig.1	
	Long	ITD4N2010L-2	●	2	.625	.389	6.000	2.000	.625		
		ITD4N2012L-3	●	3	.750	.514	6.250	3.250	.750		
		ITD4N2016L-4	●	4	1.000	.764	7.000	4.000	1.000		
		ITD4N2020L-5	●	5	1.250	1.014	8.000	5.000	1.250		
		ITD4N2024L-6-1.25	●	6	1.500	1.264	9.000	1.750	1.250	Fig.2	
		ITD4N2024L-6	●	6	1.500	1.264	9.000	1.750	1.500	Fig.1	

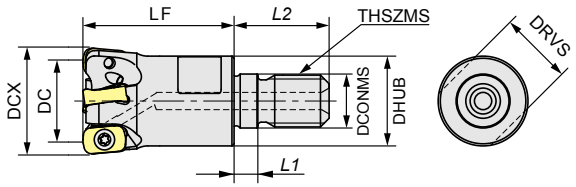
Metric TD4N20○○□(32)-○

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

Style		Item code	Stock	No. of flutes	Dimensions (mm)					Type	Insert
					DCX	DC	LF	LH	DCONMS		
Shank Style	Regular	TD4N2016S-2	●	2	16	10	100	30	16	Fig.1	EN□U0603ER-□
		TD4N2020S-3	●	3	20	14	130	50	20		
		TD4N2025S-4	●	4	25	19	140	60	25		
		TD4N2032S-5	●	5	32	26	150	70	32		
		TD4N2040S32-6	●	6	40	34	150	45	32	Fig.2	
	Long	TD4N2016L-2	●	2	16	10	150	50	16	Fig.1	
		TD4N2018L-2	●	2	18	12	150	25	16	Fig.2	
		TD4N2020L-3	●	3	20	14	160	80	20	Fig.1	
		TD4N2022L-3	●	3	22	16	160	30	20	Fig.2	
		TD4N2025L-4	●	4	25	19	180	100	25	Fig.1	
		TD4N2028L-4	●	4	28	22	180	35	25	Fig.2	
		TD4N2032L-5	●	5	32	26	200	120	32	Fig.1	
		TD4N2035L-5	●	5	35	29	200	40	32	Fig.2	
		TD4N2040L32-6	●	6	40	34	220	45	32	Fig.2	

● : Inventory maintained in US

Modular type



Inch ITD4N20○○M-○

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

Item code	Stock	No. of flutes	Dimensions (Inch)									Insert
			DCX	DC	LF	*L1*	*L2*	DCONMS	DHUB	THSZMS	DRVS	
ITD4N2010M-2	●	2	.625	.389	.984	.217	.669	.335	.504	M8	.394	EN□U0603ER-□
ITD4N2012M-3	●	3	.750	.514	1.181	.217	.748	.413	.701	M10	.591	
ITD4N2016M-4	●	4	1.000	.764	1.378	.217	.866	.492	.819	M12	.669	
ITD4N2020M-5	●	5	1.250	1.014	1.575	.236	.905	.669	1.134	M16	.866	
ITD4N2024M-6	●	6	1.500	1.264	1.575	.236	.905	.669	1.134	M16	.866	

Metric TD4N20○○M-○

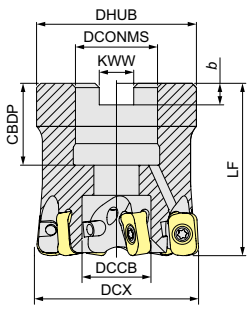
Numeric figure in a circle ○ and
Alphabetical character comes in a square □ .

Item code	Stock	No. of flutes	Dimensions (mm)									Insert
			DCX	DC	LF	*L1*	*L2*	DCONMS	DHUB	THSZMS	DRVS	
TD4N2016M-2	●	2	16	10	25	5.5	17	8.5	12.8	M8	10	EN□U0603ER-□
TD4N2018M-2	●	2	18	12	25	5.5	17	8.5	12.8	M8	10	
TD4N2020M-3	●	3	20	14	30	5.5	19	10.5	17.8	M10	15	
TD4N2022M-3	●	3	22	16	30	5.5	19	10.5	17.8	M10	15	
TD4N2025M-4	●	4	25	19	35	5.5	22	12.5	20.8	M12	17	
TD4N2028M-4	●	4	28	22	35	5.5	22	12.5	20.8	M12	17	
TD4N2032M-5	●	5	32	26	40	6	23	17	28.8	M16	22	
TD4N2035M-5	●	5	35	29	40	6	23	17	28.8	M16	22	
TD4N2040M-6	●	6	40	34	40	6	23	17	28.8	M16	22	
TD4N2042M-6	●	6	42	36	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 "dedicatedarbor".

Bore type

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



Inch ITD4N20○○B-6

Item code	Stock	No. of flutes	Dimensions (Inch)								Insert
			DCX	DHUB	LF	CBDP	KWW	b	DCONMS	DCCB	
ITD4N2024B-6	●	6	1.50	37.1mm	40mm	19mm	8mm	5mm	19.05mm	17mm	EN□U0603ER-□
ITD4N2032B-6	●	6	2.00	47.6mm	50.8mm	19mm	8mm	5mm	19.05mm	17mm	

Line Up

Insert

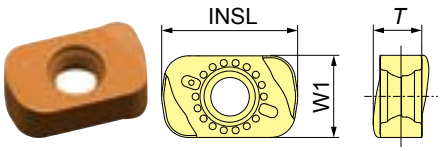


Fig.1 ENMU0603ER-B

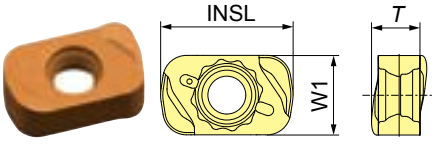


Fig.2 ENMU0603ER-C

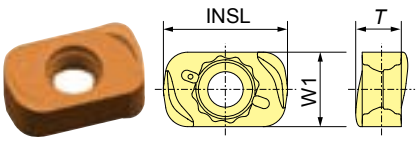


Fig.3 ENGU0603ER-C

P	Carbon steels		■		■	■
M	SUS, etc.			■		
K	FC・FCD Cast irons		■		⊔	⊔
H	Hardened steels	■	⊔			

■:General cutting, First recommendation
⊔:General cutting, Second recommendation

Item code	Tolerance class	AJ Coating			JS Coating	GX Coating	Size (mm)			Shape
		JP4105	JP4120	JM4160	JS4045	GX2140	INSL	W1	T	
ENMU0603ER-B	M		●	●	●	●	10	6	3.7	Fig.1
ENMU0603ER-C	M		●	●	●	●	10	6	3.7	Fig.2
ENGU0603ER-C	G	●					10	6	3.7	Fig.3

【Note】 Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.

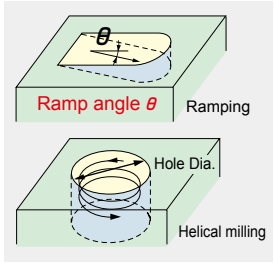
Parts

Parts	Clamp screw		Screw Driver	Screw anti-seizure agent
Shape		Fastening torque (N・m)		
Item Code	**T08-2507A**	1.1	104-T8	P-37

※ The indicated clamp screw has been changed from Dec. 2023.

【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.

Regarding ramping and helical milling diameter



RAMPING/HELICAL MILLING - METRIC DIAMETER

Tool dia. DCX (mm)	φ16	φ18	φ20	φ22	φ25	φ28	φ32	φ35	φ40	φ42
Maximum ramp angle θ	0.8°	0.8°	0.8°	0.8°	0.8°	0.6°	0.5°	0.5°	0.3°	0.3°
Hole Dia. (mm)	24～30	28～34	32～38	36～42	42～48	48～54	56～62	62～68	72～78	76～82

RAMPING/HELICAL MILLING - INCH DIAMETER

Tool dia. DCX (inch)	.625"	.750"	1.000"	1.250"	1.500"	2.000"
Maximum ramp angle θ	0.8°	0.8°	0.8°	0.5°	0.3°	0.2°
Hole Dia. (inch)	.940～1.176	1.191～1.427	1.693～1.929	2.195～2.431	2.697～2.933	3.701～3.937

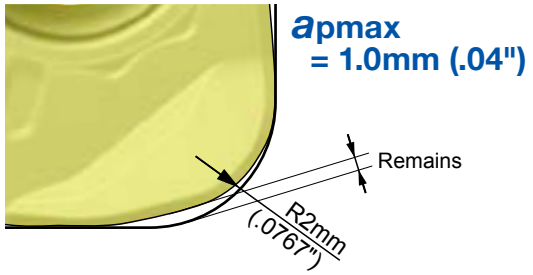
Cutting depth per rotation should be set to *a*p = 1 mm or less.

【Note】 ① It is recommended that the tool be used while performing sufficient chip removal and checking that there are no abnormal vibrations.
② The ramp angle *θ* should be set within the ranges listed above. Use at ramp angles of 0.5° or less is recommended.
③ For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

Points requiring care when creating the machining program

- In CAM, define the tool shape as an R2.0mm (.0787") radius shape.
- Use with axial-direction cutting depths ap of 1.0mm (.04") or less.

Corner R Definition in CAM	Remains (inch/mm)	Over Cut (inch/mm)
.0591" / R1.5mm	.0118" / 0.3mm	0
Recommended .0787" / R2.0mm	.0079" / 0.2mm	0
.1181" / R3.0mm	0	0.0157" / 0.4mm



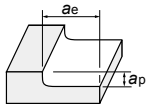
● : Inventory maintained in US No Mark : Manufactured upon request only

Recommended Cutting Conditions (Inch)

※ Red indicates primary recommended insert grade.

Work material	Recommended inserts grade	Tool dia. DCX	ϕ 5/8"(2 flutes)		ϕ 3/4"(3 flutes)		ϕ 1"(4 flutes)		ϕ 1.25"(5 flutes)		ϕ 1.5"(6 flutes)		ϕ 2"(6 flutes)	
		Overhang	~3DCX	4DCX~7DCX	~3DCX	4DCX~7DCX	~3DCX	4DCX~7DCX	~3DCX	4DCX~7DCX	~3DCX	4DCX~7DCX	~3DCX	4DCX~7DCX
Carbon Steel Alloy Steel <30HRC	※ GX2140 JS4045	*n* (min-1)	3,380	2,990	2,710	2,390	2,170	1,910	1,690	1,490	1,350	1,190	1065	940
		Vc(SFM)	558	492	558	492	558	492	558	492	558	492	558	492
		Vf(IPM)	319	282	384	339	410	361	399	352	383	337	302	266
		fz(IPT)	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047	.047
		ap(inch)	.031	.024	.031	.024	.031	.024	.031	.024	.031	.024	.031	.024
		ae(inch)	.394	.394	.551	.551	.748	.748	.866	.866	1.102	1.102	1.5	1.5
		Q (in3/min)	3.9	2.7	6.6	4.5	9.5	6.5	1.7	7.3	13.1	8.9	14	9.6
Alloy Steel Tool Steel 30 ~ 40HRC	JP4120 JS4045	*n* (min-1)	2,990	2,590	2,390	2,070	1,910	1,660	1,490	1,290	1,190	1,040	940	815
		Vc(SFM)	492	426	492	426	492	426	492	426	492	426	492	427
		Vf(IPM)	235	204	282	244	301	261	293	254	281	246	222	192
		fz(IPT)	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039	.039
		ap(inch)	.031	.024	.031	.024	.031	.024	.031	.024	.031	.024	.031	.024
		ae(inch)	.394	.394	.551	.551	.748	.748	.866	.866	1.102	1.102	1.5	1.5
		Q (in3/min)	2.9	1.9	4.8	3.2	7	4.7	7.9	5.3	9.6	6.5	1.3	6.9
Pre-Hardened Steel Alloy Steel 40 ~ 50HRC	JP4120 JS4045	*n* (min-1)	1,990	1,790	1,590	1,430	1,270	1,150	1,000	900	800	720	627	564
		Vc(SFM)	328	295	328	295	328	295	328	295	328	295	328	295
		Vf(IPM)	157	113	188	135	200	145	197	142	189	136	148	107
		fz(IPT)	.039	.031	.039	.031	.039	.031	.039	.031	.039	.031	.039	.031
		ap(inch)	.024	.02	.024	.02	.024	.02	.024	.02	.024	.02	.024	.02
		ae(inch)	.394	.394	.551	.551	.748	.748	.866	.866	1.102	1.102	1.5	1.5
		Q (in3/min)	1.5	.9	2.5	1.5	3.6	2.2	4.1	2.5	5	3	5.3	3.2
Stainless Steel	JM4160	*n* (min-1)	1,990	1,790	1,590	1,430	1,270	1,150	1,000	900	800	720	627	564
		Vc(SFM)	328	295	328	295	328	295	328	295	328	295	328	295
		Vf(IPM)	157	113	188	135	200	145	197	142	189	136	148	107
		fz(IPT)	.039	.031	.039	.031	.039	.031	.039	.031	.039	.031	.039	.031
		ap(inch)	.024	.02	.024	.02	.024	.02	.024	.02	.024	.02	.024	.02
		ae(inch)	.394	.394	.551	.551	.748	.748	.866	.866	1.102	1.102	1.5	1.5
		Q (in3/min)	1.5	.9	2.5	1.5	3.6	2.2	4.1	2.5	5	3	5.3	3.2
Cast Iron	JP4120 GX2140	*n* (min-1)	3980	3580	3180	2870	2550	2290	1990	1790	1590	1430	1253	1128
		Vc(SFM)	656	590	656	590	656	590	656	590	656	590	656	591
		Vf(IPM)	470	338	563	407	602	433	587	423	563	405	444	320
		fz(IPT)	.059	.047	.059	.047	.059	.047	.059	.047	.059	.047	.059	.047
		ap(inch)	.031	.024	.031	.024	.031	.024	.031	.024	.031	.024	.031	.024
		ae(inch)	.394	.394	.551	.551	.748	.748	.866	.866	1.102	1.102	1.5	1.5
		Q (in3/min)	5.7	3.2	9.6	5.4	14	7.8	15.8	8.8	19.2	1.7	2.6	11.5
High-hardened Steel 50 ~ 55HRC	JP4105 JP4120	*n* (min-1)	1,590	1,390	1,270	1,110	1,020	890	800	700	640	560	501	439
		Vc(SFM)	262	230	262	230	262	230	262	230	262	230	262	230
		Vf(IPM)	50	4	60	4	64	45	63	44	60	42	47	33
		fz(IPT)	.016	.013	.016	.013	.016	.013	.016	.013	.016	.013	.016	.013
		ap(inch)	.012	.008	.012	.008	.012	.008	.012	.008	.012	.008	.012	.008
		ae(inch)	.394	.394	.551	.551	.748	.748	.945	.945	1.102	1.102	1.5	1.5
		Q (in3/min)	.244	.122	.366	.183	.549	.305	.671	.366	.784	.366	.8	.4
High-hardened Steel 55 ~ 62HRC	JP4105	*n* (min-1)	1,590	1,390	1,270	1,110	1,020	890	800	700	640	560	376	376
		Vc(SFM)	197	197	197	197	197	197	197	197	197	197	197	197
		Vf(IPM)	~ 28	~ 22	~ 34	~ 27	~ 36	~ 29	~ 35	~ 28	~ 34	~ 27	~ 27	~ 21
		fz(IPT)	~ .012	~ .009	~ .012	~ .009	~ .012	~ .009	~ .012	~ .009	~ .012	~ .009	~ .012	~ .009
		ap (inch) 55~57HRC	~ .012	~ .006	~ .012	~ .006	~ .012	~ .006	~ .012	~ .006	~ .012	~ .006	~ .012	~ .006
		ap (inch) 58~62HRC	~ .008	~ .004	~ .008	~ .004	~ .008	~ .004	~ .008	~ .004	~ .008	~ .004	~ .008	~ .004
		ae(inch)	.394	.394	.551	.551	.748	.748	.945	.945	1.102	1.102	1.5	1.5
		Q (in3/min)	~ .122	~ .061	~ .244	~ .122	~ .305	~ .183	~ .366	~ .244	~ .441	~ .236	~ .486	~ .252

【Note】 ① Use the appropriate coolant for the work material and machining shape.
② Conditions are for general guidance on shoulder face milling.In actual machining conditions please adjust the parameters according to your actual machine and work-piece conditions.Especially when the chip discharge or vibration is a problem in Slotting or near machining, please adjust the cutting conditions as follows.
· Reduce depth of cut(*ap*) to 50 to 70%.
· Reduce number of revolution(*n*) and feed rate(*Vf*) to 50 to 70%.



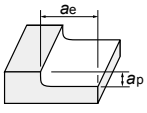
③ Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.
④ JP4105 is for the high-hardness steels. It is not suitable for Non-heat-treated steel material.
⑤ The machinability of hardened steels (55 - 62HRC) can vary significantly depending on the particular 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 GX2140 should be used for dry cutting.
⑧ To prevent tool damage due to chip clogging, always use a chip removal method such as an air blower, etc.
⑨ Ensure to exchange the insert at the correct time to ensure safety of the tool-body.
⑩ The following equation can be used to determine the metal removal rate per unit time *Q*:
Q(cm3/min)=*ap*(mm) × *ae*(mm) × *Vf*(mm/min) ／ 1000

Recommended Cutting Conditions (Metric)

※ Red indicates primary recommended insert grade.

Work material	Recommended inserts grade	Tool dia. DCX	φ16(2 flutes)		φ20(3 flutes)		φ25(4 flutes)		φ32(5 flutes)		φ40(6 flutes)	
		Overhang	～3DCX	4DCX～7DCX	～3DCX	4DCX～7DCX	～3DCX	4DCX～7DCX	～3DCX	4DCX～7DCX	～3DCX	4DCX～7DCX
Carbon Steel Alloy Steel <30HRC	※ GX2140 JS4045	*n* (min-1)	3380	2990	2710	2390	2170	1910	1690	1490	1350	1190
		Vc(m/min)	170	150	170	150	170	150	170	150	170	150
		Vf(mm/min)	6760	4780	8130	5730	10410	9160	10140	8940	9720	8560
		fz(mm/t)	1	0.8	1	0.8	1.2	1.2	1.2	1.2	1.2	1.2
		ap(mm)	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5
		ae(mm)	10	10	14	14	19	19	22	22	28	28
		Q (cm3/min)	41	29	68	48	158	104	112	98	136	120
Alloy Steel Tool Steel 30 ~ 40HRC	JP4120 JS4045	*n* (min-1)	2990	2590	2390	2070	1910	1660	1490	1290	1190	1040
		Vc(m/min)	150	130	150	130	150	130	150	130	150	130
		Vf(mm/min)	5980	4140	7170	4960	7640	6640	7450	6450	7140	6240
		fz(mm/t)	1	0.8	1	0.8	1	1	1	1	1	1
		ap(mm)	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5
		ae(mm)	10	10	14	14	19	19	22	22	28	28
		Q (cm3/min)	36	25	60	42	116	76	82	71	100	87
Pre-Hardened Steel Alloy Steel 40 ~ 50HRC	JP4120 JS4045	*n* (min-1)	1990	1790	1590	1430	1270	1150	1000	900	800	720
		Vc(m/min)	100	90	100	90	100	90	100	90	100	90
		Vf(mm/min)	3980	2860	4770	3430	5080	3680	5000	3600	4800	3450
		fz(mm/t)	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8
		ap(mm)	0.6	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5
		ae(mm)	10	10	14	14	19	19	22	22	28	28
		Q (cm3/min)	24	14	40	24	58	35	55	40	67	48
Stainless Steel	JM4160	*n* (min-1)	1990	1790	1590	1430	1270	1150	1000	900	800	720
		Vc(m/min)	100	90	100	90	100	90	100	90	100	90
		Vf(mm/min)	3980	2860	4770	3430	5080	3680	5000	3600	4800	3450
		fz(mm/t)	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8
		ap(mm)	0.6	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5
		ae(mm)	10	10	14	14	19	19	22	22	28	28
		Q (cm3/min)	24	14	40	24	58	35	55	40	67	48
Cast Iron	JP4120 GX2140	*n* (min-1)	3980	3580	3180	2870	2550	2290	1990	1790	1590	1430
		Vc(m/min)	200	180	200	180	200	180	200	180	200	180
		Vf(mm/min)	9550	7160	11440	8610	12240	9160	11940	8950	11440	8580
		fz(mm/t)	1.2	1	1.2	1	1.2	1	1.2	1	1.2	1
		ap(mm)	0.8	0.6	0.8	0.6	0.8	0.6	0.8	0.6	0.8	0.6
		ae(mm)	10	10	14	14	19	19	22	22	28	28
		Q (cm3/min)	76	43	128	72	186	104	210	118	256	144
High-hardened Steel 50 ~ 55HRC	JP4105 JP4120	*n* (min-1)	1590	1390	1270	1110	1020	890	800	700	640	560
		Vc(m/min)	80	70	80	70	80	70	80	70	80	70
		Vf(mm/min)	1270	890	1530	1070	1630	1140	1590	1110	1530	1070
		fz(mm/t)	0.4	0.32	0.4	0.32	0.4	0.32	0.4	0.32	0.4	0.32
		ap(mm)	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.2
		ae(mm)	10	10	14	14	19	19	24	24	30	30
		Q (cm3/min)	4	2	6	3	9	5	11	6	14	7
High-hardened Steel 55 ~ 62HRC	JP4105	*n* (min-1)	1190	1190	950	950	760	760	600	600	480	480
		Vc(m/min)	60	60	60	60	60	60	60	60	60	60
		Vf(mm/min)	～720	～570	～860	～690	～920	～730	～900	～720	～860	～690
		fz(mm/t)	～0.3	～0.24	～0.3	～0.24	～0.3	～0.24	～0.3	～0.24	～0.3	～0.24
		ap(mm) 55~57HRC	～0.3	～0.15	～0.3	～0.15	～0.3	～0.15	～0.3	～0.15	～0.3	～0.15
		ap(mm) 58~62HRC	～0.2	～0.1	～0.2	～0.1	～0.2	～0.1	～0.2	～0.1	～0.2	～0.1
		ae(mm)	10	10	14	14	19	19	24	24	30	30
		Q (cm3/min)	～2	～1	～4	～2	～5	～3	～6	～4	～8	～4

【Note】 ① Use the appropriate coolant for the work material and machining shape.
② Conditions are for general guidance on shoulder face milling.In actual machining conditions please adjust the parameters according to your actual machine and work-piece conditions.Especially when the chip discharge or vibration is a problem in Slotting or near machining, please adjust the cutting conditions as follows.
· Reduce depth of cut(*ap*) to 50 to 70%.
· Reduce number of revolution(*n*) and feed rate(*Vf*) to 50 to 70%.



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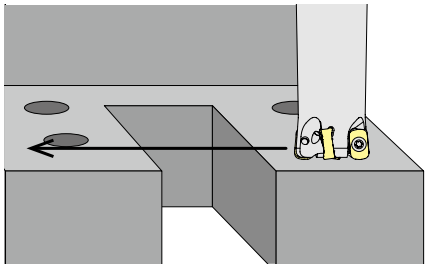
⑥ For strongly interrupted cutting, when unsupported length is long, or for wet cutting, JM4160 is recommended.
⑦ GX2140 should be used for dry cutting.
⑧ To prevent tool damage due to chip clogging, always use a chip removal method such as an air blower, etc.
⑨ Ensure to exchange the insert at the correct time to ensure safety of the tool-body.
⑩ The following equation can be used to determine the metal removal rate per unit time *Q*:
Q(cm3/min)=*ap*(mm) × *ae*(mm) × *Vf*(mm/min) ／1000

Field data

01 Shortened machining time

Interrupted machining



Cutting edge condition after 30 minutes of cutting

[Work material] Pre-hardened steel (40HRC)

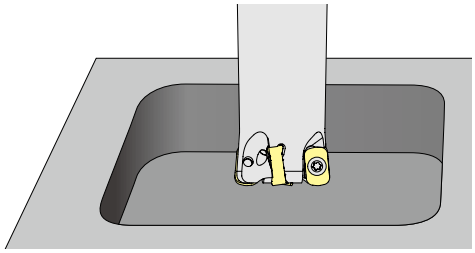
[Tool] TD4N2032S-5 (Ø1.5"-5 flutes)
ENMU0603EN-B (JP4120)

[Cutting conditions]
Vc = 100 m/min (328 sfm)
Vf = 9000 mm/min (354 ipm)
fz = 1.8 mm/t (0.071 in/tooth)
ap × ae = 0.6 × 20 mm (0.024" x 0.79")
Air-blow

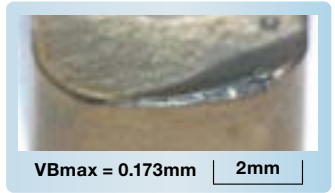
- 90-minute machining time shortened to approximately 30 minutes.

02 Improved tool life

Pocketing



Cutting edge condition after 100 minutes of cutting



[Work material] Carbon steel

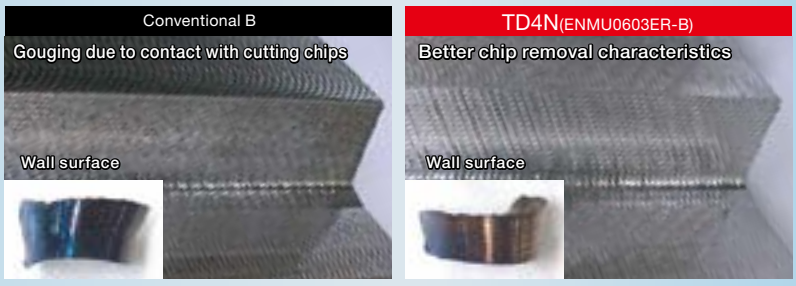
[Tool] TD4N2020S-3 (Ø 0.75"-3 flutes)
ENMU0603EN-B (JP4120)

[Cutting conditions]
Vc = 140 m/min (459 sfm)
Vf = 5000 mm/min (197 ipm)
fz = 0.75 mm/t (0.03 in/tooth)
ap × ae = 0.8 × 10 mm (0.031" x 0.394")
Emulsion oil

- There is no major chipping and damage is reduced.

03 Machining condition comparison for walls

Condition of machined wall and cutting chips



[Work material] Carbon steel

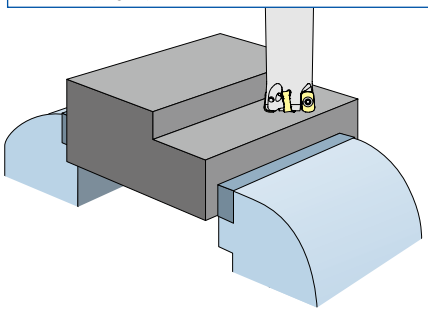
[Tool] TD4N2025S-4 (Ø1"-4 flutes)
ENMU0603EN-B (JM4160)

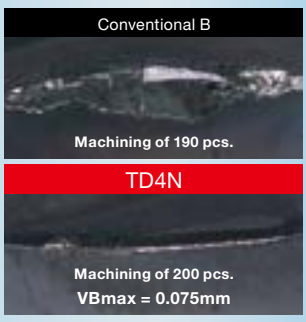
[Cutting conditions]
Vc = 180 m/min (590 sfm)
Vf = 7300 mm/min (287 ipm)
fz = 0.8 mm/t (0.031 in/tooth)
ap × ae = 0.5 × 18 mm (0.02" x 0.71")
Air-blow

- New free cutting design curls chip up and into the pocket minimizing chip discharge contact with walls.

04 High-performance machining when clamp rigidity is weak

Low clamp rigidity





[Work material] Mild steel

[Tool] TD4N2032S-5 (Ø1.5"-5 flutes)
ENMU0603EN-C (JS4045)

[Cutting conditions]
Vc = 200 m/min (656 sfm)
Vf = 8000 mm/min (315 ipm)
fz = 0.8 mm/t (0.031 in/tooth)
ap × ae = 0.5 × 20 mm (0.02" x 0.79")
Emulsion oil

- Even after machining 200 pieces, wear is minimal.

High Feed Tools Lineup

Type	Feature				Holder	Insert			Programing R mm (inch)	APMX mm (inch)	Tolerance of Holder
	Economical (No. of corners)	High accuracy (Less uncut remnants)	Supports for high-hardened steel	Efficiency (No. of Flutes)	Tool Dia. inch, mm	No. of corners	Shape	Inscribed circle code			
TR4F4000 	★★		~60HRC	★	ϕ1.25"~6" ϕ32~100mm	4	SDNW SDMT 	12	3.0mm (.118")	1.2mm (.047")	-0.1/-0.2mm
TR4F5000 					ϕ2.5"~6" ϕ63~125mm			15	3.0mm (.118") or 4.0mm (.158")	2.0mm (.079")	-0.12/-0.24mm
TD4N 	★★	★★	~62HRC	★★	ϕ.625"~2" ϕ16~42mm	4	ENMU ENGU 	06	2.0mm (.079")	1mm (.040")	-0.06/-0.11mm
ASR Multi-Flutes 		★	~62HRC	★★	ϕ.625"~2.5" ϕ16~66mm	2	EPNW EPMT ENW EDMT 	06 12	2.0mm (.079") 3.0mm (.118")	1.5mm (.059") 2.0mm (.079")	0/-0.2mm
ASRF-mini 	★★		~62HRC	★	ϕ.75"~2.5" ϕ20~63mm	4	SPNW SPMT 	07	2.0mm (.079")	1.2mm (.047")	-0.1/-0.2mm
ASRT 		★	~62HRC	★	ϕ2"~5" ϕ25~100mm	3	WDNW WDNT 	09,12,14	3.0mm (.118")	2.0mm (.079")	0/-0.2mm

※ For details of tool specifications, please check on catalog or website (www.moldino.com/en-US/)

The diagrams and table data are examples of test results, and are not guaranteed values.
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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

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