

NPA # 005M:DOPENT

Date: Aug , 2009



10 Cutting Edges on an Insert!!

The DOPENT line features..

- Lower cutting force achieved due to the unique tool and inserts configuration.
- Inserts with MJ, AJ chipbreaker are available; as well Wiper insert for improved surface quality.
- The DOPENT line is consisting Shank and Face type tools. The Face type tools have coarse, close and fine close pitch for large variety of applications.
- Coolant through in DOPENT cutters, pinpointed direct to the machining area.

Product category: Face milling cutter (20° lead angle)

Application Area: Semi-finish to medium facing of aluminum, cast iron, steels and stainless steels cutting.

Target market: General machining

Features & Benefits



MJ



Wiper



AJ

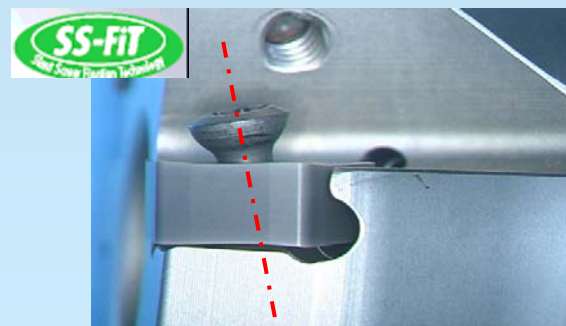


Fig.1

- Increased the number of cutting edge.
⇒ *Double sided pentagonal insert. (10 cutting edges)*
- Inclined cutting edge.
⇒ *Positive rake angle can be achieved and features lower cutting force.*
- MJ, AJ breakers or Wiper inserts are available.
⇒ *For wide application. (versatility)*
MJ for general purpose
AJ for aluminum
Wiper for finish
- Choice between 3 types of cutter body. (Coarse, Close, Extra close pitch)
⇒ *The strength around the screw hole is improved by SS-FiT.
And It's possible to have more inserts in a cutter due to the slanted screw. (Fig.1, only Extra close pitch)*
- Coolant through in cutters.
⇒ *Excellent chip evacuation. Coolant can be used for steady cutting performance.*

Standard Cutting Condition

■ Metric (JIS)

Material		Hardness	Vc	fz	Recommending Grade
		HB	m/min	mm/t	
Steel	Low Carbon (S15C, SS400 etc.)	~200	100- 180 -250	0.2- 0.3 -0.6	AH725
	High Carbon (S45C, S55C etc.)	200~300	100- 150 -230	0.2- 0.28 -0.5	
	Alloyed Steel (SCM440, SCr415 etc.)	150~300	100-120-180	0.2- 0.28 -0.5	
	Tool Steel (SK, SKH etc.)	~300	100-120-180	0.2- 0.28 -0.5	
Stainless Steel	Austenitic (SUS304, 316 etc.)	-	60- 120 -140	0.17- 0.25 -0.45	AH140
Cast Iron	Gray irons (FC250,300 etc.)	150~250	140- 180 -250	0.17- 0.3 -0.6	AH120
	Ductile irons (FCD400 etc.)				
Aluminum	(Si<12%)	-	500- 800 -1500	0.12- 0.25 -0.5	KS15F
	(Si>13%)		100- 200 -300		

■ Metric (ISO)

Material		Hardness	Vc	fz	Recommending Grade
		HB	m/min	mm/t	
Steel	Low Carbon (C15E etc.)	~200	100- 180 -250	0.2- 0.3 -0.6	AH725
	High Carbon (C45, C55 etc.)	200~300	100- 150 -230	0.2- 0.28 -0.5	
	Alloyed Steel (42CrMo4, 17Cr3 etc.)	150~300	100-120-180	0.2- 0.28 -0.5	
	Tool Steel (X 155 CrVMo 12 1 etc.)	~300	100-120-180	0.2- 0.28 -0.5	
Stainless Steel	300 Series, X 5 CrNi 18 9	-	60- 120 -140	0.17- 0.25 -0.45	AH140
Cast Iron	Gray irons	150~250	140- 180 -250	0.17- 0.3 -0.6	AH120
	Ductile irons				
Aluminum	(Si<12%)	-	500- 800 -1500	0.12- 0.25 -0.5	KS15F
	(Si>13%)		100- 200 -300		

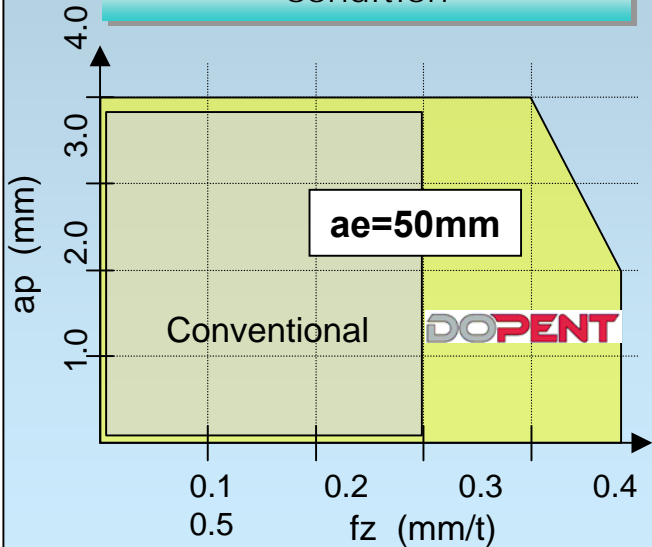
■ Inch (ANSI)

Material		Hardness	Vc	fz	Recommending Grade
		HB	feet/min	in/t	
Steel	Low Carbon 1018, 8620	~200	350- 600 -800	.008- 0.012 -.024	AH725
	High Carbon F-6180	200~300	350- 500 -750	.008- 0.011 -.020	
	Alloyed Steel 4140, 4340	150~300	350- 400 -600	.008- 0.011 -.020	
	Tool Steel A-6, D-1, D-2	~300	350- 400 -600	.008- 0.011 -.020	
Stainless Steel	300 Series, 304, 316	-	200- 400 -450	.007- 0.010 -.018	AH140
Cast Iron	Gray irons	150~250	450- 600 -800	.007- 0.012 -.024	AH120
	Ductile irons				
Aluminum	(Si<12%)	-	1600- 2600 -5000	.005- 0.010 -.020	KS15F
	(Si>13%)		350- 650 -1000		

Cutting Performance

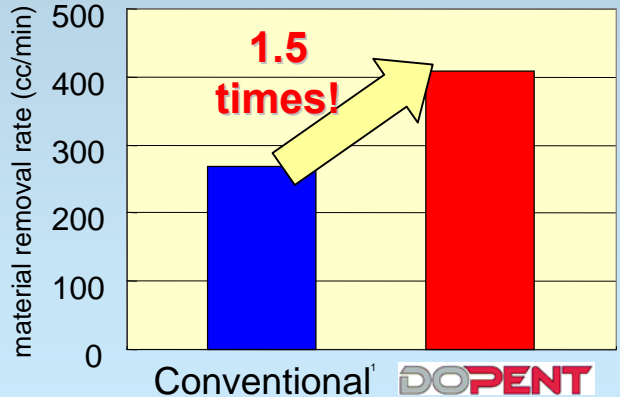
Comparison of toughness between DOPENT & conventional tool

Comparison of Cutting condition



(Cutting condition)
Work material: S55C (200HB), dim. ϕ 100,
Vc=200m/min

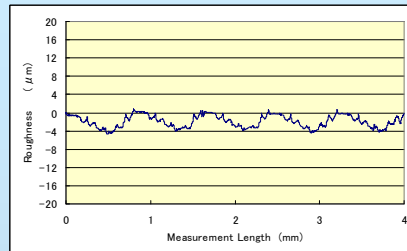
Comparison of productivity



(Cutting condition)
Work material : S55C (200HB),dim. ϕ 100,
Vc=200m/min,
Fz=0.4mm/t (DOPENT), fz=0.3mm/t (Conventional),
Ae=50mm, ap=4mm

Roughness

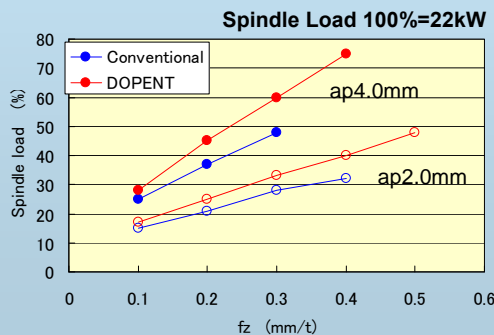
Fine finish



Work material: High carbon steel JIS-S55C(200HB),
Machine: BT40 22kW max20000min-1, Holder: BBT40-FMC22-45,
Cutting Speed Vc=250m/min, Feed Rate fz=0.1mm/t, Cutting Width ae=50mm, Depth of cut: ap=0.5mm,
Dry, Center cut

Comparison of spindle load between DOPENT & conventional tool

DOPENT
VS
Conventional
tool

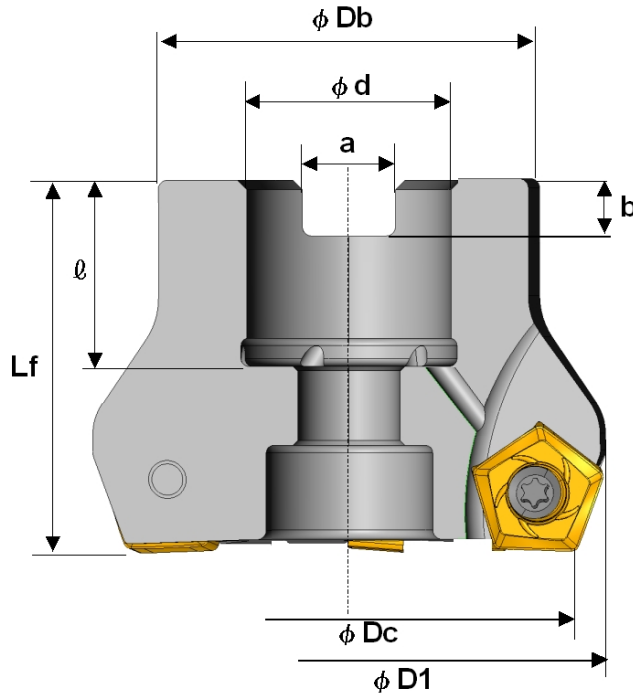


Work material: High carbon steel JIS-S55C(200HB)
Machine: VU65A (Mitsui Seiki) **BT50**
Holder: BT50-SMA32-75
Cutting Speed: Vc=200m/min
Feed Rate: fz=0.1-0.5mm/t
Cutting Wide: ae=80mm
Depth of cut: ap=2.0, 4.0mm
Dry, Center cut

Spindle load of DOPENT is 10-20% higher than conventional tool

Stock Items

■ Bore type

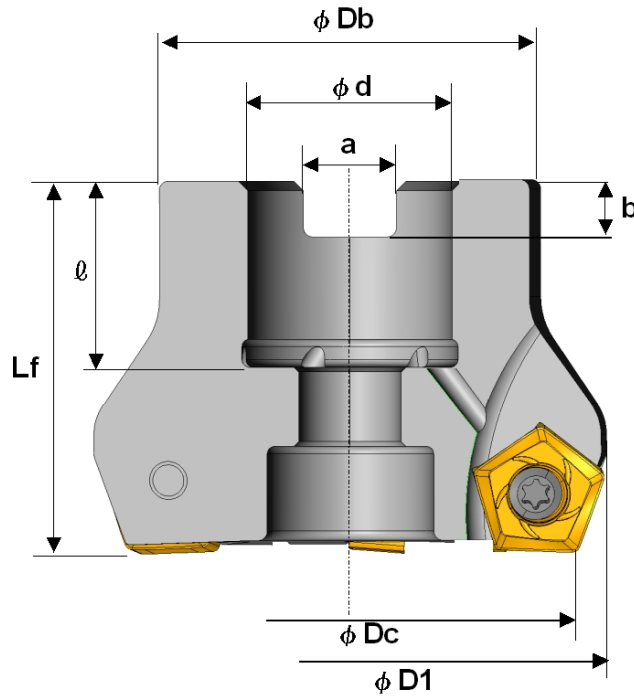


Metric (JIS)

	Designation	Stock	Number of tooth	Dimensions(mm)								Weight (Kg)	Coolant Hole	Coolant Thru Center Bolt	Insert
				φDc	φD1	φDb	φd	ℓ	Lf	b	a				
coarse pitch	TEN09R050M22.0-03	●	3	50	56	41	22	20	40	6	10	0.32	with	CM10x30H	PNCU0905GNER-MJ PNCU0905GNER-W PNCU0905GNFR-AJ
	TEN09R063M22.0-04	●	4	63	69	41	22	20	40	6	10	0.46	with	CM10x30H	
	TEN09R080M25.4-04	●	4	80	86	46	25.4	26	50	6	9.5	0.86	with	CM12x30H	
	TEN09R100M31.7-05	●	5	100	106	60	31.75	32	50	8	12.7	1.28	with	TMBA-M16H	
	TEN09R125M38.1-06	●	6	125	131	80	38.1	38	63	10	15.9	2.6	with	TMBA-M20H	
close pitch	TEN09R160M50.8-07	●	7	160	166	100	50.8	46	63	11	19	4.36	without	-	
	TEN09R050M22.0-04	●	4	50	56	41	22	20	40	6	10	0.31	with	CM10x30H	
	TEN09R063M22.0-06	●	6	63	69	41	22	20	40	6	10	0.45	with	CM10x30H	
	TEN09R080M25.4-07	●	7	80	86	46	25.4	26	50	6	9.5	0.85	with	CM12x30H	
	TEN09R100M31.7-08	●	8	100	106	60	31.75	32	50	8	12.7	1.3	with	TMBA-M16H	
extra close pitch	TEN09R125M38.1-10	●	10	125	131	80	38.1	38	63	10	15.9	2.73	with	TMBA-M20H	
	TEN09R160M50.8-12	●	12	160	166	100	50.8	46	63	11	19	4.6	without	-	
	TEN09R050M22.0-06	●	6	50	56	41	22	20	40	6	10	0.32	with	CM10x30H	
	TEN09R063M22.0-08	●	8	63	69	41	22	20	40	6	10	0.47	with	CM10x30H	
	TEN09R080M25.4-10	●	10	80	86	46	25.4	26	50	6	9.5	0.91	with	CM12x30H	
	TEN09R100M31.7-12	●	12	100	106	60	31.75	32	50	8	12.7	1.35	with	TMBA-M16H	
	TEN09R125M38.1-16	●	16	125	131	80	38.1	38	63	10	15.9	2.9	with	TMBA-M20H	
	TEN09R160M50.8-20	●	20	160	166	100	50.8	46	63	11	19	4.85	without	-	

Stock Items

■ Bore type

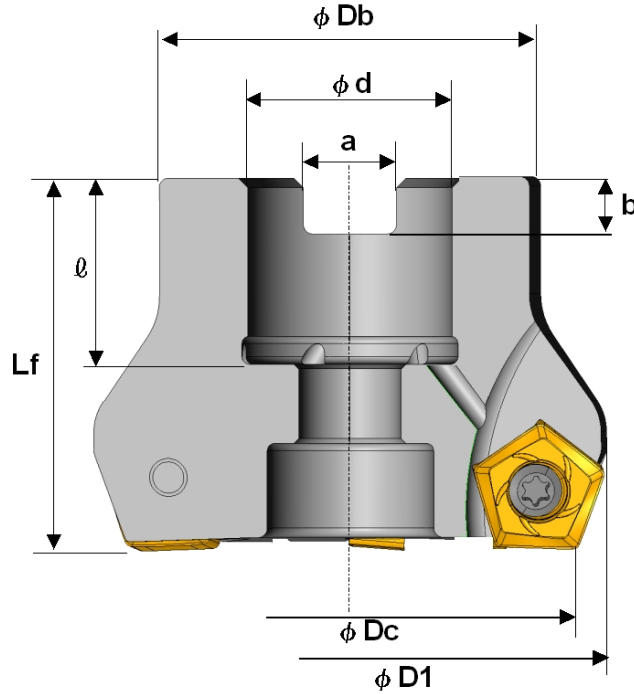


Metric (ISO)

	Designation	Stock	Number of tooth	Dimensions(mm)								Weight (Kg)	Coolant Hole	Coolant Thru Center Bolt	Insert
				ϕDc	$\phi D1$	ϕDb	ϕd	l	Lf	b	a				
close pitch	TEN09R050M22.0E04		4	50	55.8	41	22	20	40	6.3	10.4	0.32	with	CM10x30H	PNCU0905GNFR-MJ PNCU0905GNFR-W PNCU0905GNFR-AJ
	TEN09R063M22.0E06		6	63	68.8	41	22	20	40	6.3	10.4	0.45	with	CM10x30H	
	TEN09R080M27.0E07		7	80	85.8	50	27	22	50	7	12.4	0.94	with	CM12x30H	
	TEN09R100M32.0E08		8	100	105.8	60	32	28.5	50	8	14.4	1.3	with	TMBA-M16H	
	TEN09R125M40.0E10		10	125	130.7	71	40	32	63	9	16.4	2.3	with	TMBA-M20H	
TEN09R160M40.0E12		12	160	165.7	100	40	29	63	9	16.4	4	Without	-		
extra close pitch	TEN09R050M22.0E06		6	50	55.8	41	22	20	40	6.3	10.4	0.31	with	CM10x30H	
	TEN09R063M22.0E08		8	63	68.8	41	22	20	40	6.3	10.4	0.47	with	CM10x30H	
	TEN09R080M27.0E10		10	80	85.8	50	27	22	50	7	12.4	1	with	CM12x30H	
	TEN09R100M32.0E12		12	100	105.8	60	32	28.5	50	8	14.4	1.4	with	TMBA-M16H	
	TEN09R125M40.0E16		16	125	130.7	71	40	32	63	9	16.4	2.5	with	TMBA-M20H	
	TEN09R160M40.0E20		20	160	165.7	100	40	29	63	9	16.4	4.3	Without	-	

Stock Items

■ Bore type



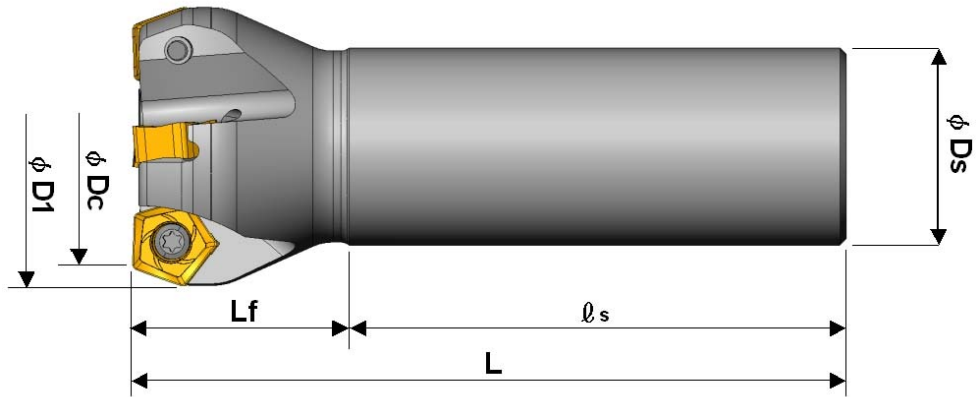
Inch (ANSI)

	Designation	Stock	Number of tooth	Dimensions(mm)								Weight (Kg)	Coolant Hole	Coolant Thru Center Bolt	Insert
				φDc	φD1	φDb	φd	ℓ	Lf	b	a				
coarse pitch	TEN09R200U0075A03		3	50.8	56.6	43	19.05	19.05	40	5	8	0.36	with	(C0.375x1.125H)	PNCU0905GNER-MJ PNCU0905GNER-W PNCU0905GNFR-AJ
	TEN09R250U0075A04		4	63.5	69.29	43	19.05	19.05	40	5	8	0.5	with	(C0.375x1.125H)	
	TEN09R300U0100A04		4	76.2	82.01	50	25.4	26	50	6	9.5	0.87	with	(C0.500x1.375H)	
	TEN09R400U0150A05		5	101.6	107.4	80	38.1	35	50	10	15.9	1.56	with	(TMBA-0.750H)	
	TEN09R500U0150A06		6	127	132.7	80	38.1	37	63	10	15.9	2.7	with	(TMBA-0.750H)	
close pitch	TEN09R600U0200A07		7	152.4	158.1	100	50.8	38	63	11	19	3.8	without	-	
	TEN09R200U0075A04		4	50.8	56.6	43	19.05	19.05	40	5	8	0.37	with	(C0.375x1.125H)	
	TEN09R250U0075A06		6	63.5	69.29	43	19.05	19.05	40	5	8	0.5	with	(C0.375x1.125H)	
	TEN09R300U0100A07		7	76.2	82.01	50	25.4	26	50	6	9.5	0.86	with	(C0.500x1.375H)	
	TEN09R400U0150A08		8	101.6	107.4	80	38.1	35	50	10	15.9	1.6	with	(TMBA-0.750H)	
Extra close pitch	TEN09R500U0150A10		10	127	132.7	80	38.1	37	63	10	15.9	2.8	with	(TMBA-0.750H)	
	TEN09R600U0200A12		12	152.4	158.1	100	50.8	38	63	11	19	4.1	without	-	
	TEN09R200U0075A06		6	50.8	56.58	43	19.05	19.05	40	5	8	0.36	with	(C0.375x1.125H)	
	TEN09R250U0075A08		8	63.5	69.29	43	19.05	19.05	40	5	8	0.52	with	(C0.375x1.125H)	
	TEN09R300U0100A10		10	76.2	82.02	50	25.4	26	50	6	9.5	0.92	with	(C0.500x1.375H)	
	TEN09R400U0150A12		12	101.6	107.4	80	38.1	35	50	10	15.9	1.7	with	(TMBA-0.750H)	
	TEN09R500U0150A16		16	127	132.8	80	38.1	37	63	10	15.9	2.98	with	(TMBA-0.750H)	
	TEN09R600U0200A20		20	152.4	158.2	100	50.8	38	63	11	19	4.3	without	-	

*Bolt is option.
(ANSI)

Stock Items

■ Shank type



Metric (JIS & ISO)

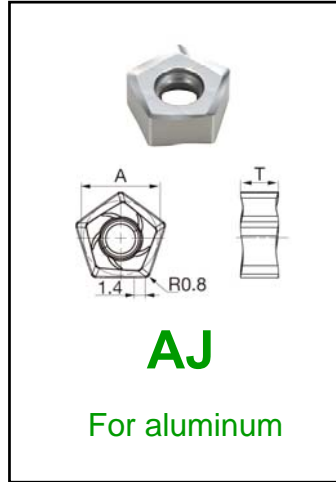
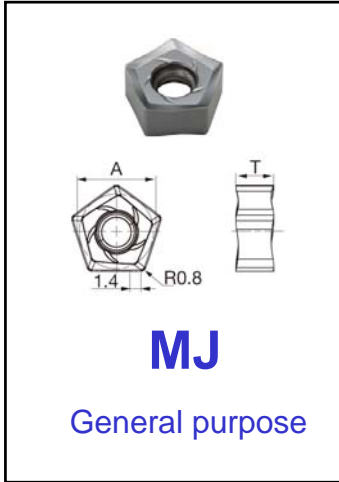
Designation	Stock	Number of tooth	Dimensions(mm)						Weight (Kg)	Coolant Hole	Insert
			φDc	φD1	φDs	ls	Lf	L			
EEN09R032M32.0-03	●	3	32	38	32	80	35	115	0.65	with	PNCU0905GNER-MJ PNCU0905GNER-W PNCU0905GNFR-AJ
EEN09R040M32.0-04	●	4	40	46	32	80	35	115	0.7	with	
EEN09R050M32.0-04	●	4	50	56	32	80	40	120	0.87	with	
EEN09R063M32.0-06	●	6	63	69	32	80	40	120	1	with	
EEN09R080M32.0-07	●	7	80	86	32	80	40	120	1.25	with	

Inch (ANSI)

Designation	Stock	Number of tooth	Dimensions(mm)						Weight (Kg)	Coolant Hole	Insert
			φDc	φD1	φDs	ls	Lf	L			
EEN09R125U0125W03		3	31.75	37.57	31.75	57.944	38.1	96.044	0.55	with	PNCU0905GNER-MJ PNCU0905GNER-W PNCU0905GNFR-AJ
EEN09R150U0125W04		4	38.1	43.91	31.75	57.944	50.8	108.74	0.6	with	

Stock Items

Insert



Only 2 cutting edges are available.

Designation	Accuracy	Honing	Grades					Size(mm)		Shape
			AH725	AH120	AH140	T3130	KS15F	A	T	
PNCU0905GNER-MJ	C	with	●	●	●	●		12.2	5.926	MJ
PNCU0905GNER-W	C	with	●					12.2	5.926	Wiper
PNCU0905GNFR-AJ	C	without					●	12.2	6.290	AJ

Installation of the extra close pitch cutter inserts

●The screw of extra close pitch cutter is slanted. So the center of insert hole and screw hole are not straight. To install the inserts properly, please install as shown below.

1. Make insert up and then fasten the screw. (Fig. A)
2. Fasten the screw from slanted direction.
3. Appropriate torque is 3.5 Nm.
4. After fasten the screw, please ensure that there is no space between Cutter body and inset.(Fig. B)

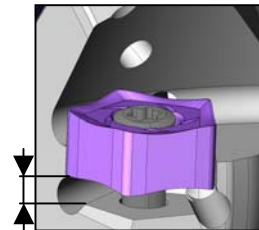


Fig. A

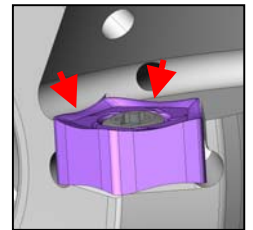
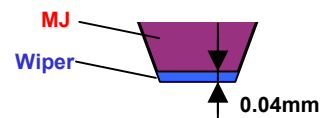


Fig. B

●The distance from MJ to Wiper insert cutting edge is 0.04mm.



Note on use of wiper insert

- When requiring good surface finish, using a wiper insert is recommended.
- When using the wiper insert, install the insert as shown in Fig.C. And be sure that the groove is in front as shown in Fig.D.
- When the feed is over 3.0mm/rev, please use two wiper inserts. If the feed is less than that, use one insert.
- The wiper insert has two wiping corners. (Fig. D)
- Do not use the other corners to prevent breaking of the tool body.

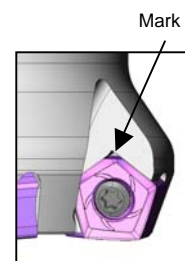


Fig. C

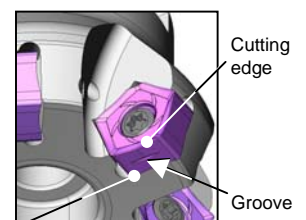


Fig. D

Cutting edge