MITSUBISHI
MITSUBISHI MATERIALS

MITSUBISHI CARBIDE

2008.4 Update B030E

Indexable Insert with Wiper Edge Geometry

MW/SW breaker

Indexable insert with wiper geometry for simultaneous roughing and finishing.

Indexable Insert with Wiper Edge Geometry

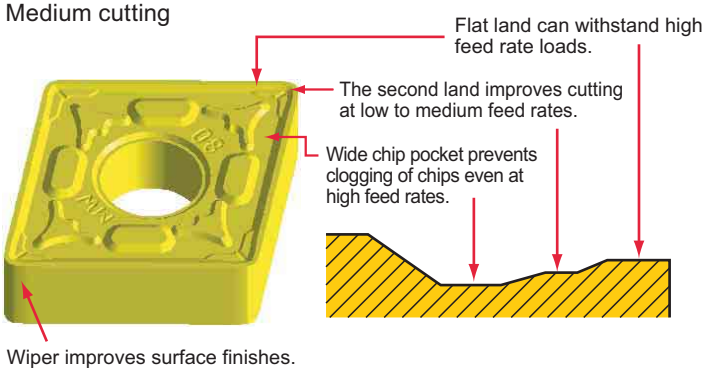
MW/SW breaker

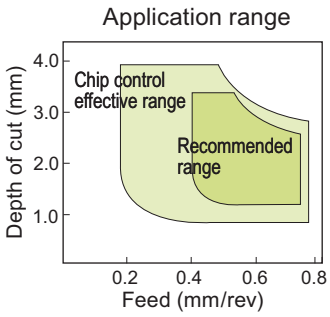
Features

High efficiency insert, surface finish doesn't deteriorate even when the feed rate is increased!

MW breaker (Negative Insert)

Medium cutting

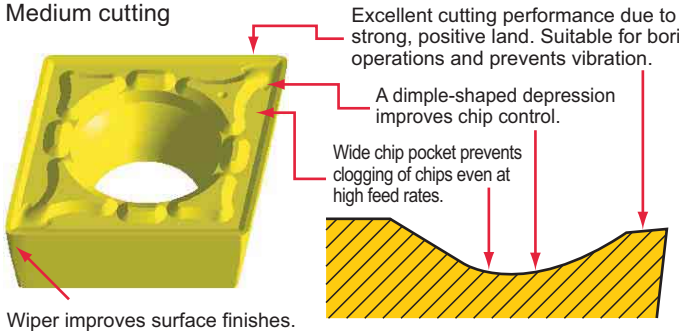


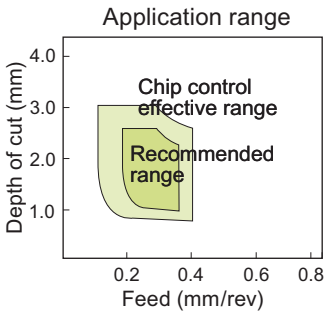


<Cutting conditions>
Insert : CNMG120408-MW
Workpiece : DIN Ck45
Cutting speed : 200m/min
Coolant : Wet cutting

MW breaker (Positive Insert)

Medium cutting

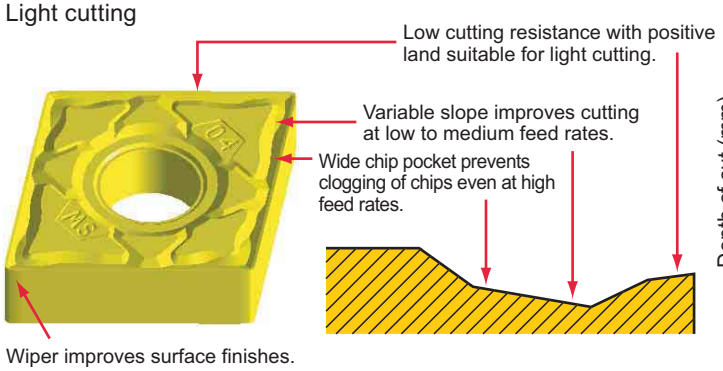


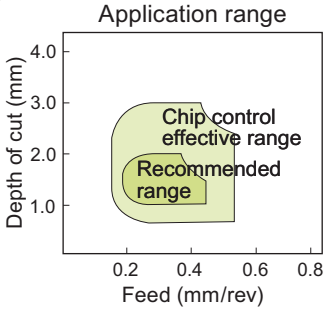


<Cutting conditions>
Insert : CCMT09T308-MW
Workpiece : DIN 20Cr4
Cutting speed : 150m/min
Coolant : Wet cutting

SW breaker (Negative Insert)

Light cutting

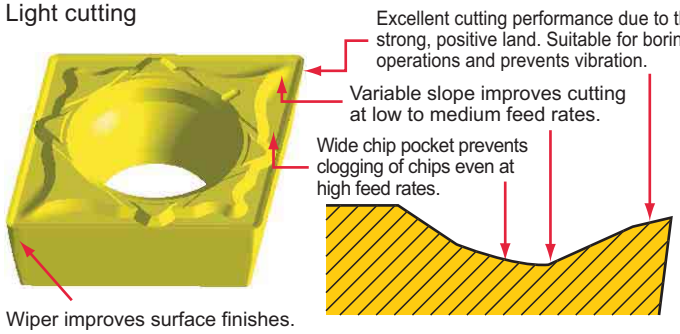


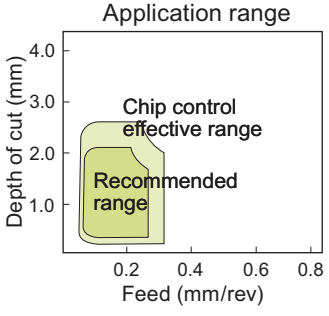


<Cutting conditions>
Insert : CNMG120408-SW
Workpiece : DIN Ck45
Cutting speed : 200m/min
Coolant : Wet cutting

SW breaker (Positive Insert)

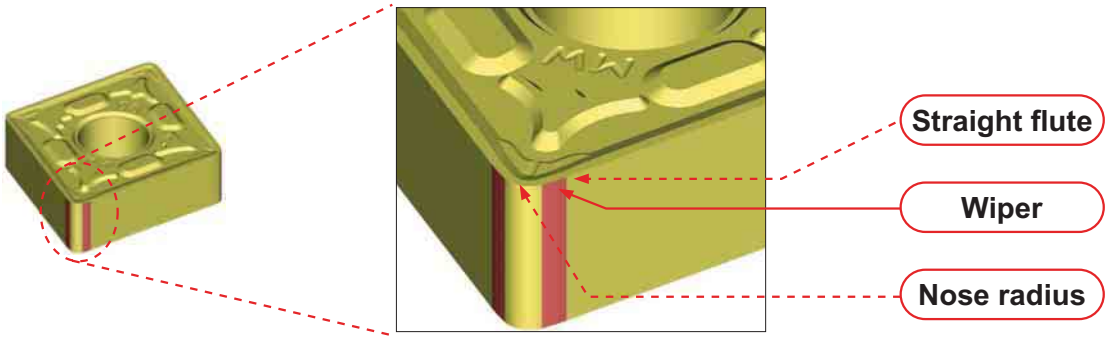
Light cutting

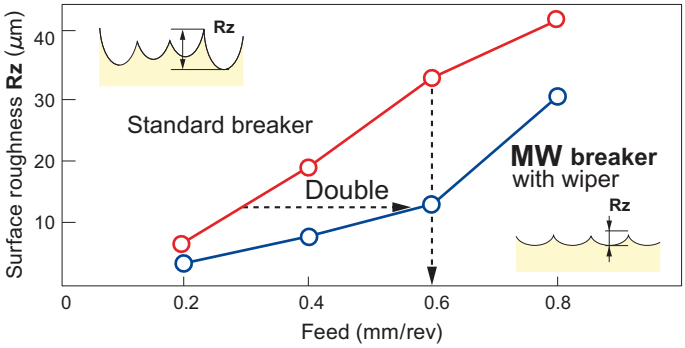




<Cutting conditions>
Insert : CCMT09T304-SW
Workpiece : DIN 20Cr4
Cutting speed : 150m/min
Coolant : Wet cutting

Advantages





The wiper geometry is positioned between the nose radius and the straight edge of the insert. Even if the feed rate is doubled, the surface finish doesn't deteriorate.

<Cutting conditions>
Insert : CNMG120408-○○
Workpiece : DIN Ck45
Cutting speed: 200m/min
Coolant : Wet cutting

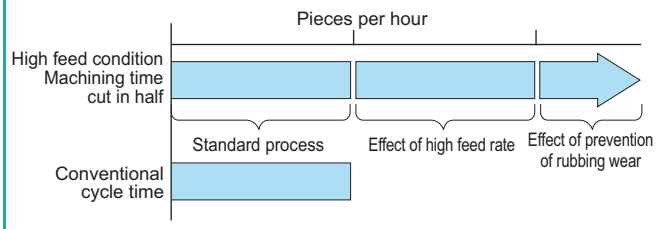
Effective Use

Replacing a conventional indexable insert with an **MW** breaker or **SW** breaker has the following advantages.

High Feed Rate

Improved productivity

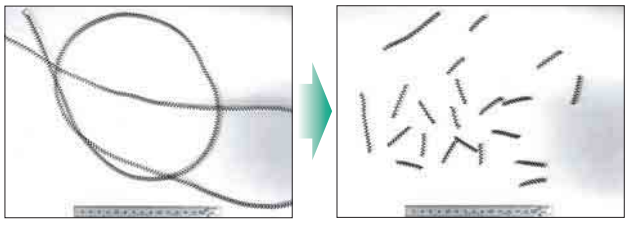
When changing to high feed conditions,



the cycle time is decreased, so more parts can be machined with each insert.
In addition, rubbing wear is prevented, delaying the progression of wear and prolonging tool life.

Improved chip control

When changing to high feed conditions,



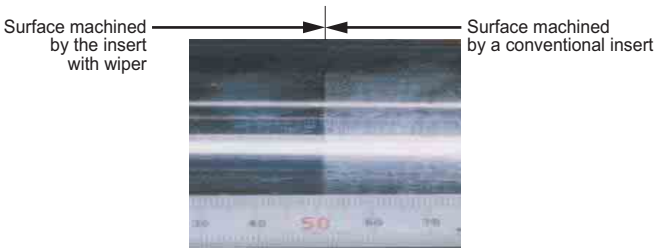
Chips under a conventional feed condition　　Chips under the high feed condition

the chips become thicker and are easily broken.

The Given Parameters

Improved surface roughness

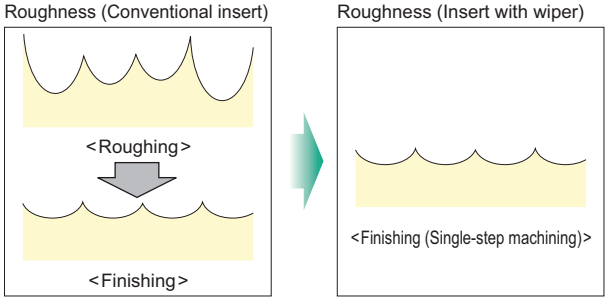
Using the same cutting speed but with double the feed rate,



the surface finish can be improved.

Improved Productivity

The high feed rate shortens cycle times and can also eliminate finishing operations.



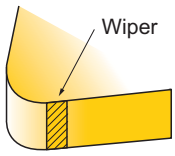
2 step (Roughing and finishing)　　Reducing 1 step

Indexable Insert with Wiper Edge Geometry

MW/SW breaker

Wiper Insert

- The wiper insert is designed with a wiper edge that is situated where the straight edge meets the corner radius.
- In comparison to conventional breakers, the surface finish does not deteriorate even if the feed rate is doubled.
- Machining at high feed rates improves cutting efficiency.



Improving Surface Finish
Under the same machining conditions as conventional breakers, but with the feed rate increased, the surface finish of the workpiece can be improved.

Improving Efficiency
High feed rates not only shorten machining times but also make it possible to combine roughing and finishing operations.

Increased Tool Life
When changing to high feed conditions, the time required to cut one component is decreased, thus more parts can be machined with each insert. In addition, the high feed rate prevents rubbing, therefore, delaying the progression of wear and increasing the tool life of the insert.

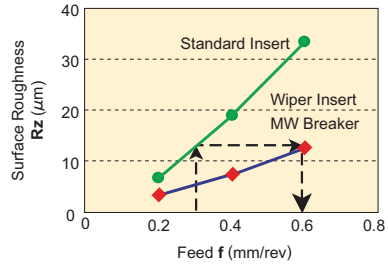
Improving Chip Control
Under high feed conditions, the chips generated become thicker and are more easily broken, thus, chip control is improved.

Wiper insert + High feed (The feed rate is doubled.)

Finished surface Same surface roughness =

Standard insert + The conventional feed condition

*Please use a wiper insert at high feed rate.



<Cutting Conditions>
Workpiece: DIN Ck45
Insert : CNMG120408-○○
Cutting Speed=200m/min
Depth of Cut=1.5mm
Feed Speed=0.2—0.6mm/rev
Wet Outer Diameter Cutting

<Ex>The surface roughness does not deteriorate even if the feed rate is **doubled** (0.3→0.6)!

A wiper insert + machining at high feed rate
- Reduced machining time (per workpieces)
- Increased number of workpieces (per definitive time period)
- Improving chip control

A wiper insert + machining at conventional feed rate
- Eliminating the finishing step by roughing and finishing together (Separate roughing and finishing steps → Single-step machining)

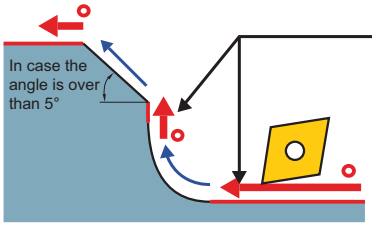
- Reducing cycle times
- Increased productivity
- Avoiding Line-Stoppage

The realisation of Reduced Costs!!

The estimate of finished surface roughness when using a wiper insert

The effects of wiper inserts on external machining, boring and facing.

*The surface roughness when machining at corner R or taper angle over 5°, is the same as machining with standard inserts.



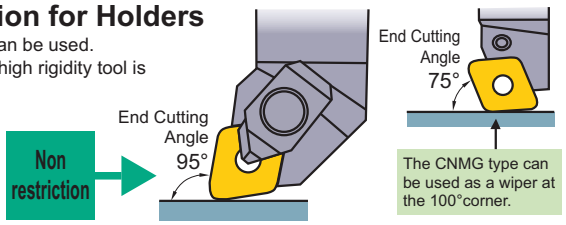
Rz(W)=Rz×0.5

Rz(W)=Finished surface roughness when using a wiper insert.
Rz : Finished surface roughness from conventional conditions. (When using a standard insert)

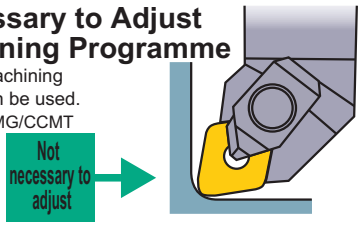
Effective usage of a wiper insert
Non effective usage of a wiper insert

Special attention is not necessary when using CNMG / WNMG / CCMT types

No Restriction for Holders
Standard holders can be used.
(*A double clamp, high rigidity tool is recommended.)



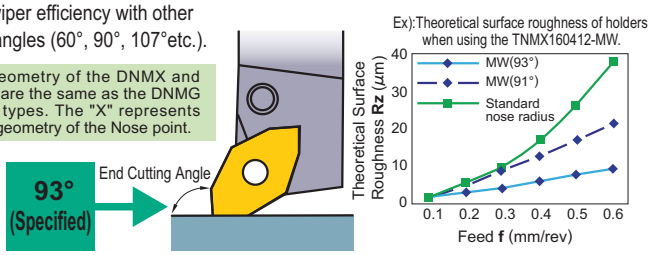
Not Necessary to Adjust the Machining Programme
Conventional machining programmes can be used.
(The CNMG/WNMG/CCMT types are based on the ISO/ANSI.)



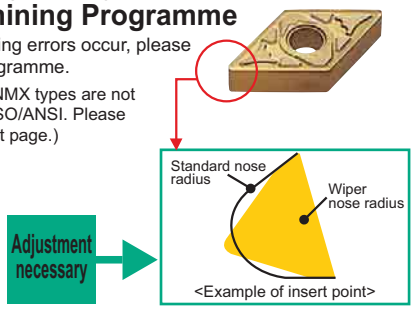
Special attention is necessary when using the DNMX / TNMX types due to the special top face geometry

Restriction for Holders
Use a holder with an end cutting angle of 93° for improving wiper efficiency. A holder with an end cutting angle of 91 ° can improve wiper efficiency (see the following figure), however, there is no wiper efficiency with other end cutting angles (60°, 90°, 107°etc.).

The hole geometry of the DNMX and TNMX type are the same as the DNMG and TNMG types. The "X" represents the special geometry of the Nose point.



Necessary to Adjust the Machining Programme
When machining errors occur, please adjust the programme.
(The DNMX/TNMX types are not based on the ISO/ANSI. Please refer to the next page.)

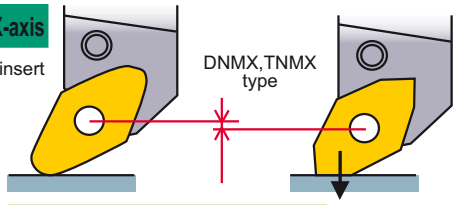


Adjustment of machining programmes for DNMX / TNMX types

Basic Process) Adjusting Toward X-axis and Z-axis

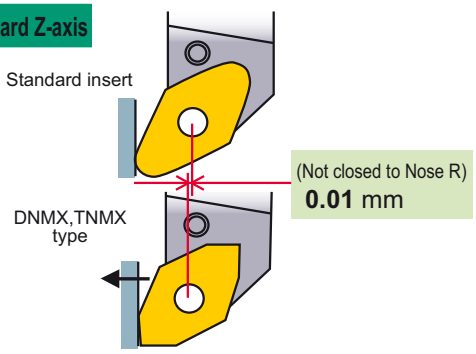
Adjusting the differential between a standard insert and Z-axis / X-axis.

Adjustment toward X-axis



Nose radius 0.4,0.8 : **0.04** mm
Nose radius 1.2 : **0.05** mm

Adjustment toward Z-axis

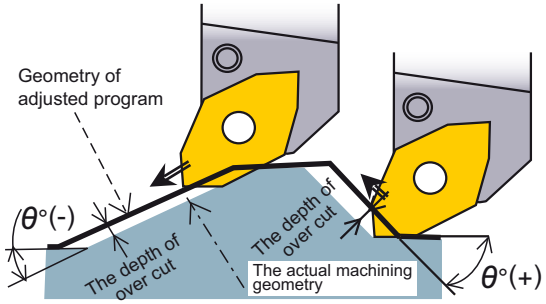


(Not closed to Nose R) **0.01** mm

A) Adjusting a Taper *Necessary to maintain a correct taper.

Adjust the relief angle toward the normal line.

Note) Adjust the angle toward the normal line in the case where the adjustment number is minus (θ =60°—70°) and is not machined completely.



Classification

Nose Radius	Taper Angle θ°															
	-25—-15	-10	-5	**0**	5	10	15	20—35	40	45	50	55	60—65	70	75—85	**90**
1.2	0.04	0.03	0.01	**0**	0.02	0.03	0.04	0.05	0.04	0.04	0.02	0.01	-0.01	0	0.01	**0**
0.8	0.03	0.02	0.01	**0**	0.01	0.02	0.03	0.04	0.03	0.03	0.02	0	-0.01	0	0.01	**0**
0.4	0.02	0.01	0.01	**0**	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0	-0.01	-0.01	0	**0**

The number→+numbers:adjustment of relief angle, -numbers:adjustment of drive-in angle (mm)

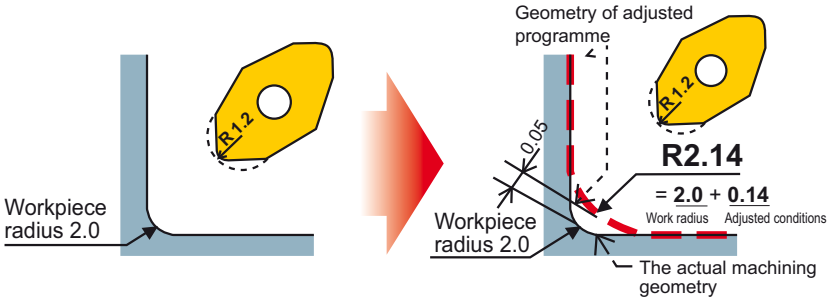
B) Adjusting a Corner R *Necessary to maintain a correct corner radius.

Adjust the work diameter to the same as the taper to prevent over-cut.

The value of adjustment to workpiece R = Workpiece R + the adjustment value
*No adjusting of the nose radius in this case.

The nose radius of the insert	The adjustment amount on the workpiece radius.
Nose Radius 0.4 →	Work Radius **+0.05**(mm)
Nose Radius 0.8 →	Work Radius **+0.11**(mm)
Nose Radius 1.2 →	Work Radius **+0.14**(mm)

Ex) : In case of machining R 2.0 when using a nose R 1.2 type insert.



The Easy-to-correct Method

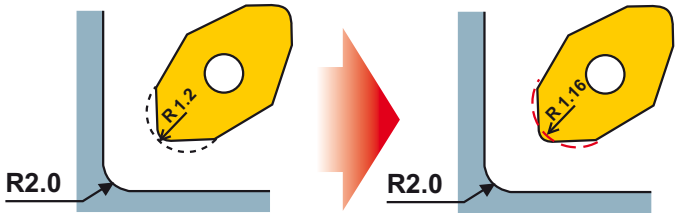
In correcting nose radius:
It is not necessary to adjust the machining programme, however, machining errors can occur within max. ±0.03mm due to correcting by an approximate number.

Nose Radius Correction Input the correction number of each nose radius.

The value of corrected nose radius = approximation
*No need to adjust the programme in this case.

The nose radius of the insert	The value of corrected nose radius = approximation
Nose Radius 0.4 →	**R0.36**(mm)
Nose Radius 0.8 →	**R0.76**(mm)
Nose Radius 1.2 →	**R1.16**(mm)

Ex): In the case of machining a corner with a radius R 2.0 when using an insert with a nose radius R 1.2.

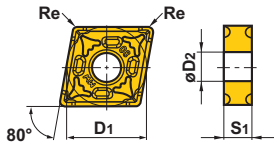
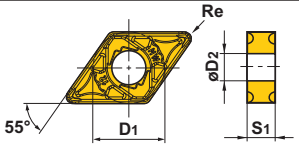
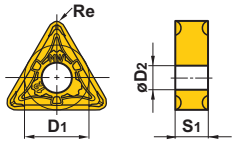
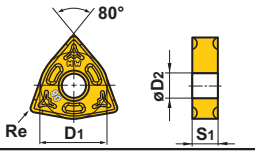


Others) The value of correction is same for both DNMX and TNMX. Discriminate them by the size of nose radius.

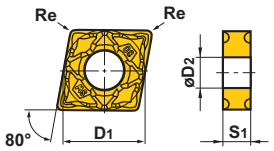
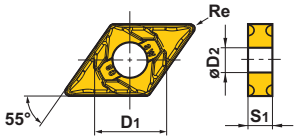
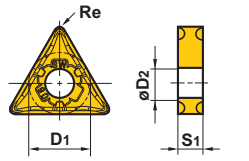
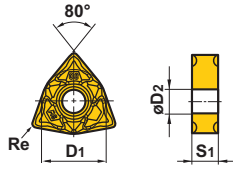
MW/SW breaker

● Negative Inserts

Standard Inserts for MW Breaker

Shape	Order Number	Class	Coated							Dimensions (mm)				Geometry
			UE6005	UE6110	UE6020	UC6010	US7020	UC5105	UC5115	D1	S1	Re	D2	
MW Breaker  Medium Cutting (Wiper)	**CNMG120408-MW**	M	●	●	●	▲	●	●	●	12.7	4.76	0.8	5.16	
	120412-MW	M	●	●	●	▲	●	●	●	12.7	4.76	1.2	5.16	
MW Breaker  Medium Cutting (Wiper)	**DNMX150408-MW**	M	●	●	●		●	●	●	12.7	4.76	0.8	5.16	
	150412-MW	M	●	●	●		●	●	●	12.7	4.76	1.2	5.16	
	150608-MW	M	●	●	●		●	●	●	12.7	6.35	0.8	5.16	
	150612-MW	M	●	●	●		●	●	●	12.7	6.35	1.2	5.16	
MW Breaker  Medium Cutting (Wiper)	**TNMX160408-MW**	M	●	●	●		●	●	●	9.525	4.76	0.8	3.81	
	160412-MW	M	●	●	●		●	●	●	9.525	4.76	1.2	3.81	
MW Breaker  Medium Cutting (Wiper)	**WNMG060408-MW**	M	●	●	●		●	●	●	9.525	4.76	0.8	3.81	
	060412-MW	M	●	●	●		●	●	●	9.525	4.76	1.2	3.81	
	080408-MW	M	●	●	●	▲	●	●	●	12.7	4.76	0.8	5.16	
	080412-MW	M	●	●		▲	●	●	●	12.7	4.76	1.2	5.16	

Standard Inserts for SW Breaker

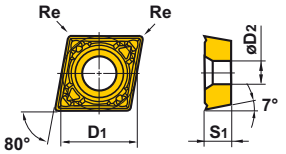
Shape	Order Number	Class	Coated				Cermet		Dimensions (mm)				Geometry
			UE6005	UE6110	US7020	UC5115	NX2525	NX3035	D1	S1	Re	D2	
SW Breaker  Light Cutting (Wiper)	**CNMG120404-SW**	M	●	●	●	★	●	●	12.7	4.76	0.4	5.16	
	120408-SW	M	●	●	●	●	●	●	12.7	4.76	0.8	5.16	
	NEW **120412-SW**	M		●	●		●	●	12.7	4.76	1.2	5.16	
SW Breaker  Light Cutting (Wiper)	**DNMX150404-SW**	M	●	●	●		●	●	12.7	4.76	0.4	5.16	
	150408-SW	M	●	●	●		●	●	12.7	4.76	0.8	5.16	
	NEW **150412-SW**	M		●	●		●	●	12.7	4.76	1.2	5.16	
	150604-SW	M	●	●	●		●	●	12.7	6.35	0.4	5.16	
	150608-SW	M	●	●	●		●	●	12.7	6.35	0.8	5.16	
	NEW **150612-SW**	M		●	●		●	●	12.7	6.35	1.2	5.16	
SW Breaker  Light Cutting (Wiper)	**TNMX160404-SW**	M	●	●	●		●	●	9.525	4.76	0.4	3.81	
	160408-SW	M	●	●	●		●	●	9.525	4.76	0.8	3.81	
SW Breaker  Light Cutting (Wiper)	**WNMG060404-SW**	M	●	●	●		●		9.525	4.76	0.4	3.81	
	060408-SW	M	●	●	●		●		9.525	4.76	0.8	3.81	
	080404-SW	M	●	●	●	★	●	●	12.7	4.76	0.4	5.16	
	080408-SW	M	●	●	●	●	●	●	12.7	4.76	0.8	5.16	
	NEW **080412-SW**	M		●	●		●	●	12.7	4.76	1.2	5.16	

The hole geometry of the DNMX and TNMX type is the same as the DNMG and TNMG type.
The "X" in the order number represents the special nose shape.

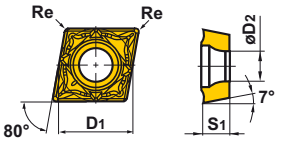
● : Inventory maintained. ★ : Inventory maintained in Japan.
□ : Non stock, produced to order only. ▲ : Inventory maintained. To be replaced by new products.

Positive Inserts

Standard Inserts for MW Breaker

Shape	Order Number	Class	Coated UE6005	Coated UE6110	Coated UE6020	Coated US7020	Coated UC5115	Cermet NX2525	Coated Cermet VP25N	D1	S1	Re	D2	Geometry
MW Breaker	**CCMT060204-MW**	M			●	●		●	□	6.35	2.38	0.4	2.8	
	**060208-MW**	M		●	●	●		●	□	6.35	2.38	0.8	2.8	
	09T304-MW	M		●	●	●		●	□	9.525	3.97	0.4	4.4	
	09T308-MW	M		●	●	●		●	□	9.525	3.97	0.8	4.4	
	120404-MW	M		●	●	●	□	●	□	12.7	4.76	0.4	5.5	
Medium Cutting (Wiper)	**120408-MW**	M	●	●	●	●	●	●	□	12.7	4.76	0.8	5.5	

Standard Inserts for SW Breaker

Shape	Order Number	Class	Coated UE6110	Coated UE6020	Coated US7020	Coated UC5115	Cermet NX2525	Coated Cermet VP25N	D1	S1	Re	D2	Geometry
SW Breaker	**CCMT060202-SW**	M	●	●	●		●	□	6.35	2.38	0.2	2.8	
	**060204-SW**	M	●	●	●	●	●	□	6.35	2.38	0.4	2.8	
	09T302-SW	M	●	●	●	□	●	□	9.525	3.97	0.2	4.4	
	09T304-SW	M	●	●	●	●	●	□	9.525	3.97	0.4	4.4	
Light Cutting (Wiper)													

Recommended Cutting Conditions

MW Breaker (Negative Inserts)

Work Material		Hardness	Grade	Cutting speed (m/min)
P	Mild Steel	≤180HB	**UE6005**	330 (235—430)
			UE6110	310 (230—390)
			UE6020	200 (155—250)
			US7020	200 (155—250)
	Carbon Steel Alloy Steel	180—280HB	**UE6005**	250 (175—325)
			UE6110	210 (150—260)
			UE6020	170 (125—205)
M	Stainless Steel	180—220HB	**US7020**	170 (95—245)
K	Cast Iron	Tensile Strength ≤350N/mm²	**UC5105**	240 (165—305)
			UC5115	230 (160—295)

MW Breaker (Positive Inserts)

Work Material		Hardness	Grade	Cutting Speed (m/min)
P	Mild steel	≤180HB	**UE6005**	270 (190—350)
			UE6110	250 (180—310)
			UE6020	160 (120—195)
			NX2525	160 (130—185)
			VP25N	200 (155—245)
	Carbon Steel Alloy Steel	180—280HB	**UE6005**	200 (145—260)
			UE6110	170 (120—210)
			UE6020	130 (100—165)
			NX2525	120 (95—135)
			VP25N	150 (115—180)
M	Stainless Steel	180—220HB	**US7020**	140 (75—195)
K	Cast Iron	Tensile Strength ≤350N/mm²	**UC5115**	180 (130—235)

SW Breaker (Negative Inserts)

Work Material		Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UE6005**	370 (260—470)
			UE6110	340 (250—430)
			US7020	230 (170—280)
			NX2525	220 (185—260)
			NX3035	210 (175—250)
	Carbon Steel Alloy Steel	180—280HB	**UE6005**	280 (195—335)
			UE6110	230 (170—285)
			NX2525	160 (135—190)
			NX3035	160 (130—180)
M	Stainless Steel	180—220HB	**US7020**	190 (105—270)
K	Cast Iron	Tensile Strength ≤350N/mm²	**UC5115**	250 (175—325)

SW Breaker (Positive Inserts)

Work Material		Hardness	Grade	Cutting Speed (m/min)
P	Mild Steel	≤180HB	**UE6110**	300 (220—370)
			UE6020	190 (145—240)
			NX2525	190 (160—225)
			VP25N	240 (190—295)
	Carbon Steel Alloy Steel	180—280HB	**UE6110**	200 (150—250)
			UE6020	160 (125—200)
			NX2525	140 (115—165)
			VP25N	180 (140—220)
M	Stainless Steel	180—220HB	**US7020**	170 (95—235)
K	Cast Iron	Tensile Strength ≤350N/mm²	**UC5115**	220 (155—285)

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