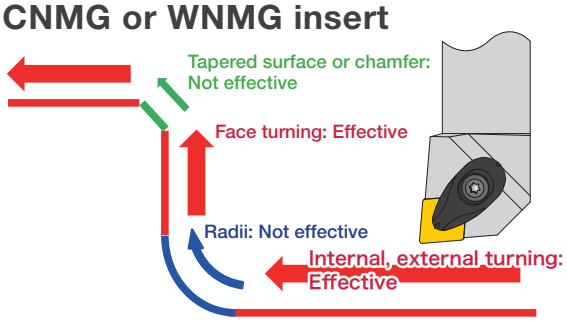
Machining program compensation for wiper -SW / -FW insert

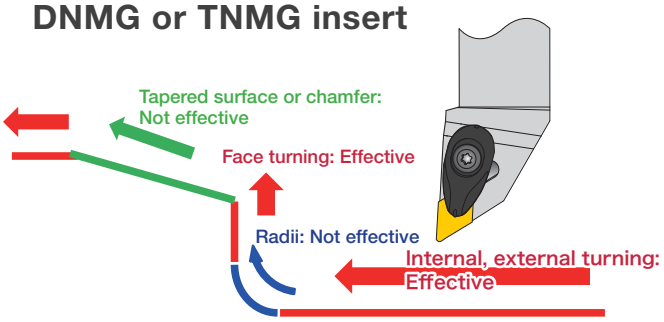
The nose radius on a wiper insert has a different configuration from that on standard ISO insert's. Machining program adjustments are, therefore, required to generate a correct offset for the wiper insert to machine the correct workpiece dimension. No compensation is needed, however, for the positive, CCMT-SW wiper insert.

Wiper effectiveness (surface finish quality improvement) by applications

CNMG or WNMG insert

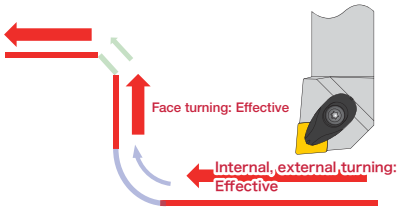
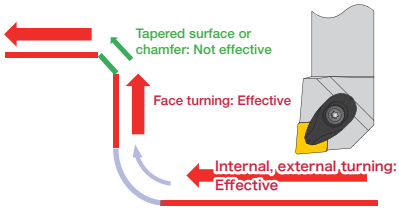
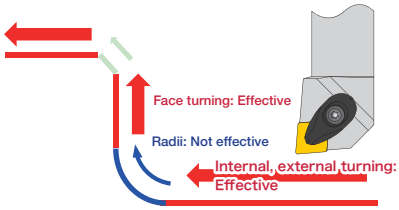
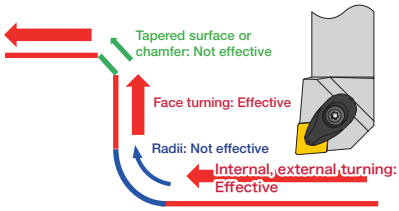


DNMG or TNMG insert



Program compensations by insert shapes and applications

Match your insert shape and application to find the proper compensation method.

Application \ Insert shape	CNMG/WNMG -SW/FW	DNMG/TNMG -SW/FW	CCMT-SW
	Type **L**	Type **J, G, F**	Type **L**
Internal, External and Face turning 	Proceed to Compensation ① (See Page G060)	Proceed to Compensation ④ (See Page G061)	No compensation needed
Including tapered surface 	Proceed to Compensation ①, ② (See Page G060)	Proceed to Compensation ④, ⑤ (See Page G061)	↑
Including corner radius 	Proceed to Compensation ①, ③ (See Page G060)	Proceed to Compensation ④ (See Page G061) Proceed to Compensation ⑥ (See Page G062)	↑
Including tapered surface and corner radius 	Proceed to Compensation ①, ②, ③ (See Page G060)	Proceed to Compensation ④, ⑤, ⑥ (See Page G061 - G062)	↑

Compensations for CNMG/WNMG -SW / -FW

Compensations ① Tool offsets (Compensations for X- and Z-axis)

Match the insert approach angle and the insert style to find the value and compensate the machining program for the insert radius.
*This compensation procedure will not be necessary if the insert is compensated with the built-in tool presetter after insert replacement.

CNMG/WNMG-SW/-FW(Type L)

Nose Radius	X-axis direction	Z-axis direction
R0.4	0.03	0.03
R0.8	0.05	0.05
R1.2	0.05	0.05

Compensations ② Program compensations for tapered surface (proceed after ①)

To machine tapered surfaces, compensate the nose radius position in the x-axis position to obtain the correct workpiece dimension.

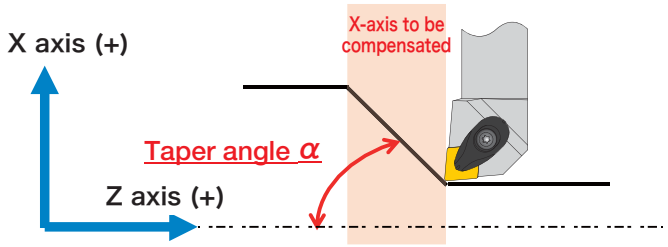
Compensations for x-axis when using CNMG or WNMG-SW/-FW (Tool approach angle: L) insert

Match the insert nose radius and the angle of the surface taper to find the value in Table 1 below to compensate the x-axis position.

For CNMG/WNMG-SW/-FW (Type L)

Compensation values for x-axis (mm)

Nose radius (mm)	Taper angle α (θ)																		
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
R0.4	0	0.01	0.02	0.03	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.10	0.11	0.11	0.11	0.11	0
R0.8	0	0.01	0.03	0.05	0.06	0.07	0.08	0.09	0.09	0.10	0.11	0.13	0.14	0.16	0.17	0.18	0.17	0.13	0
R1.2	0	0.01	0.03	0.05	0.06	0.07	0.08	0.09	0.10	0.10	0.11	0.13	0.14	0.16	0.17	0.18	0.18	0.16	0



Compensations③ Program compensation for corner radii (proceed after ①)

To achieve the correct corner radius dimension on the workpiece, compensate the tool position, using the values listed below for respective insert styles.

CNMG/WNMG-SW/-FW(Type L)

Nose Radius	Deviation on the corner radius	Compensate radius by
R0.4	0.05	+0.12
R0.8	0.07	+0.17
R1.2	0.07	+0.18

Compensations for CNMG/WNMG -SW / -FW

Compensations ① Tool offsets (Compensations for X- and Z-axis)

Match the insert approach angle and the insert style to find the value and compensate the machining program for the insert radius.
*This compensation procedure will not be necessary if the insert is compensated with the built-in tool presetter after insert replacement.

DNMG-SW/-FW (Type J)

Nose Radius	X-axis direction	Z-axis direction
R0.4	0.24	0.03
R0.8	0.23	0.04
R1.2	0.12	0.03

TNMG-SW/-FW (Type J)

Nose Radius	X-axis direction	Z-axis direction
R0.4	0.24	0.04
R0.8	0.21	0.05
R1.2	0.16	0.04

TNMG-SW/-FW (Type G)

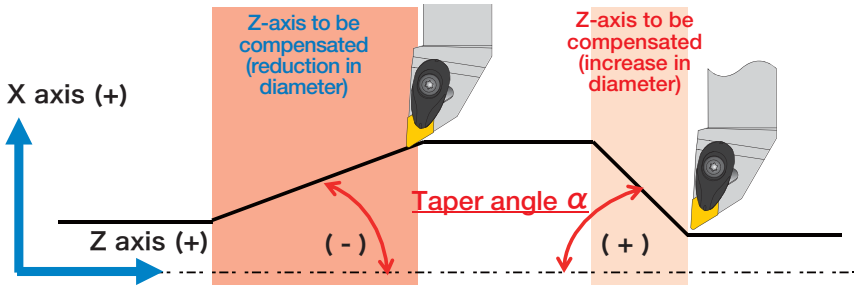
Nose Radius	X-axis direction	Z-axis direction
R0.4	0.24	0.02
R0.8	0.21	0.02
R1.2	0.15	0.02

TNMG-SW/-FW (Type F)

Nose Radius	X-axis direction	Z-axis direction
R0.4	0.02	0.24
R0.8	0.02	0.21
R1.2	0.02	0.15

Compensations ⑤ Program compensations for tapered surface (proceed after ④)

To machine tapered surfaces with DNMG or TNMG-SW/-FW insert, compensate both the x-axis and z-axis positions. Since these inserts are commonly used for profiling, to machine a tapered surface with a gradual reduction in diameter, the z-axis position has to be compensated in the negative direction.



Compensations for x- and z-axes when using DNMG or TNMG-SW/-FW

Match the insert nose radius and the angle of the surface taper to find the value in below to compensate the x-axis and/or z-axis positions.

For DNMG-SW/-FW (Type J)

X-axis compensation values for plus-tapered surface (increase in diameter)

Nose radius (mm)	Taper angle α (θ)																		
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
R0.4	0	-0.01	-0.01	-0.01	-0.01	-0.02	-0.03	-0.04	-0.06	-0.08	-0.10	-0.14	-0.19	-0.20	-0.20	-0.19	-0.19	-0.19	0
R0.8	0	0.01	0.02	0.02	0.03	0.03	0.02	0.01	-0.00	-0.02	-0.05	-0.09	-0.15	-0.17	-0.15	-0.13	-0.12	-0.11	0
R1.2	0	0.02	0.04	0.05	0.06	0.07	0.07	0.06	0.04	0.02	-0.02	-0.09	-0.17	-0.19	-0.16	-0.14	-0.13	-0.15	0

Z-axis compensation values for minus-tapered surface (reduction in diameter)

Nose radius (mm)	Taper angle α (θ)				
	-25	-20	-15	-10	-5
R0.4	0.33	0.34	0.34	0.34	0.34
R0.8	0.30	0.32	0.33	0.34	0.34
R1.2	0.33	0.35	0.38	0.40	0.40

* Match the taper angle and insert nose radius to find the value in Table 2 and compensate the NC program by either adding or deducting the value.
Example:
Tapering a surface of +45° (increase in diameter) with a R0.8 mm insert.
Current NC program: X100
Compensation value: -0.02
Parameter after compensation: X99.98

Compensations for DNMG / TNMG -SW / -FW

Compensations ⑤ Program compensations for tapered surface (proceed after ④)

For TNMG-SW/-FW (Type J)

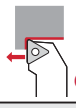
X-axis compensation values for plus-tapered surface (increase in diameter)

Nose radius (mm)	Taper angle α (θ)																		
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
R0.4	0	0	0	-0.01	-0.01	-0.02	-0.03	-0.04	-0.05	-0.07	-0.10	-0.14	-0.18	-0.25	-0.28	-0.28	-0.27	-0.27	0
R0.8	0	0.01	0.02	0.03	0.04	0.04	0.04	0.03	0.02	0.00	-0.02	-0.06	-0.11	-0.19	-0.22	-0.20	-0.19	-0.21	0
R1.2	0	0.02	0.05	0.07	0.08	0.09	0.10	0.09	0.08	0.06	0.03	-0.02	-0.10	-0.22	-0.26	-0.25	-0.25	-0.31	0

Z-axis compensation value for minus-tapered surface (reduction in diameter)

Nose radius (mm)	Taper angle α (θ)				
	-25	-20	-15	-10	-5
R0.4	0.42	0.42	0.42	0.41	0.40
R0.8	0.35	0.32	0.33	0.34	0.33
R1.2	0.42	0.36	0.38	0.39	0.37

For TNMG-SW/-FW (Type G)



X-axis compensation values for plus-tapered surface (increase in diameter)

Nose radius (mm)	Taper angle α (θ)																		
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
R0.4	0	0.00	-0.01	-0.01	-0.02	-0.03	-0.04	-0.05	-0.07	-0.09	-0.12	-0.16	-0.22	-0.28	-0.29	-0.29	-0.29	-0.32	0
R0.8	0	0.01	0.02	0.02	0.03	0.02	0.02	0.01	-0.01	-0.03	-0.06	-0.10	-0.17	-0.25	-0.25	-0.25	-0.28	-0.40	0
R1.2	0	0.03	0.06	0.08	0.09	0.10	0.11	0.10	0.09	0.07	0.04	-0.01	-0.09	-0.18	-0.18	-0.18	-0.20	-0.34	0

For TNMG-SW/-FW (Type F)

X-axis compensation values for plus-tapered surface (increase in diameter)

Nose radius (mm)	Taper angle α (θ)																		
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
R0.4	0	-0.03	-0.05	-0.08	-0.10	-0.13	-0.13	-0.11	-0.10	-0.09	-0.08	-0.07	-0.06	-0.05	-0.05	-0.04	-0.03	-0.02	0
R0.8	0	-0.04	-0.05	-0.07	-0.09	-0.12	-0.10	-0.07	-0.05	-0.03	-0.01	0.01	0.03	0.05	0.07	0.09	0.11	0.13	0
R1.2	0	-0.03	-0.04	-0.05	-0.07	-0.09	-0.05	-0.01	0.03	0.07	0.11	0.15	0.18	0.22	0.25	0.28	0.32	0.35	0

Compensations ⑥ Program compensation for corner radii (proceed after ④)

To achieve the correct corner radius dimension on the workpiece, compensate the tool position, using the values listed below for respective insert styles.

DNMG-SW/-FW (Type J)

Nose Radius	Deviation on the corner radius	Compensate radius by
R0.4	0	0
R0.8	0.02	+0.20
R1.2	0.10	+0.34

TNMG-SW/-FW(Type J)

Nose Radius	Deviation on the corner radius	Compensate radius by
R0.4	0	0
R0.8	0.03	+0.13
R1.2	0.11	+0.36

TNMG-SW/-FW(Type G, Type F)

Nose Radius	Deviation on the corner radius	Compensate radius by
R0.4	0	0
R0.8	0.02	+0.15
R1.2	0.09	+0.38

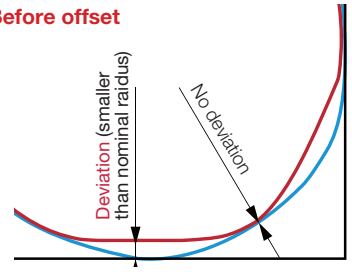
Additional information on offsetting -SW / -FW wiper inserts

Compensations ① , ④ Tool offsets (Compensations for X- and Z-axis)

Why need to offset ? Ex. When using DNMG150412

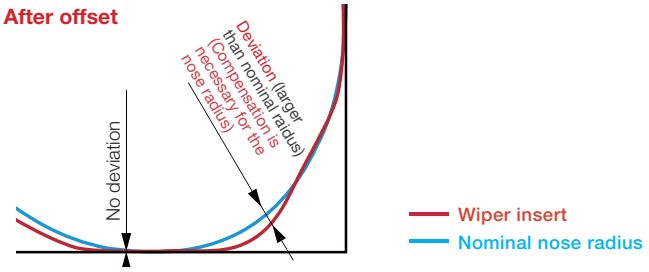
The wiper insert does not provide the exact corner radius. A deviation from the standard nose radius shape as shown below will always occur when going into a corner. An additional program adjustment is, therefore, required to achieve the correct corner radius or tapered surface dimension on the workpiece.

Before offset



Wiper nose radius' contour is slightly smaller than the nominal radius.
⇒ The nose radius profile deviates from the required corner radius, thus the actual corner profile will be incorrect.

After offset



Wiper nose radius' contour is partially larger than the nominal radius.
⇒ No compensations necessary for ID, OD, or face turning.
Meanwhile, due to these deviations, compensations to the NC program are necessary when turning corners and tapered surfaces for the correct workpiece dimensions.

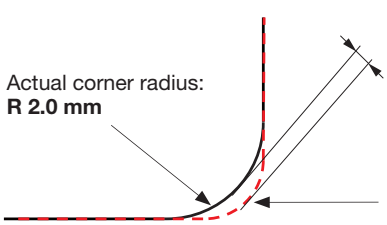
Compensations ③ , ⑥ Program compensation for corner radii (proceed after ① , ④)

Compensation for corner radius Ex. When using DNMG150412

Example: to machine a corner radius = R2.0 mm, using insert nose radius = R1.2 mm.

For standard ISO insert: DNMG150412-**
Input R0.8 for G2 or G3 (circular interpolation) to compensate the nose radius deviation.

Wiper insert
For wiper insert: DNMG150412-SW/-FW
Input **R1.14** (= R1.2 + 0.34 from the list) for the nose radius, instead of R0.8, to compensate the nose radius deviation.



The deviation generated when using the ISO insert parameters for the wiper insert.
0.1 mm

Theoretical corner radius shape when R1.2 (=nominal nose radius) is programmed for the wiper insert
The actual corner radius becomes smaller than the required radius due to the insert radius deviation.

Corner radius = R1.66 mm (R2.0 - 0.34)