Tungaloy

Keeping the Customer First

Tungaloy Report TE0308-E1

The Complete Solution
OSG TUNGALOY Global Alliance

Indexable inserts for profiling

YNMG16

NEW

25° corner angle applicable for a variety of machining

YNMG16

YNMG is **Tungaloy**'s most recent innovative development to master difficult conditions in profiling and taper cutting.

"**Y**" stands for a corner angle of 25°, which is 10° smaller than in conventional VNMG inserts. This innovative tool concept reduces undesired interference with the workpiece and realizes machining operations in restricted areas where 35° inserts are no longer applicable.

Special tools, often very cost intensive, are no longer needed as the new **YNMG** insert can be mounted in conventional toolholders.

YNMG – yet another **Tungaloy** innovation to substantially reduce your production costs.

Tungaloy
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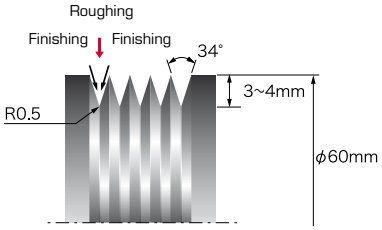
Machining example

Workpiece



Existing toolholder	:	Competitor's special toolholder
Existing insert	:	Competitor's special insert
Tungaloy toolholder	:	**MVVNN2525M16**
Tungaloy insert	:	**YNMG160404-ZF**
Grade	:	**GT730**
Work material	:	15CrMo5
Cutting speed	:	V_C = 250 m/min
Depth of cut	:	$a_p \leq 0.5$ mm
Feed rate	:	f = 0.1 ~ 0.2 mm/rev
Coolant	:	Emulsion

Results

Chip control capability
Existing competitor's inserts (specially designed ground inserts) had a problem in chip control. After switching to ZF-type insert, productivity was improved due to the excellent chip control capability.

Tool life
Due to the improved wear resistance, tool life was increased by 50%. In combination with super fine cermet GT730, the surface finish and the consistency were greatly improved.

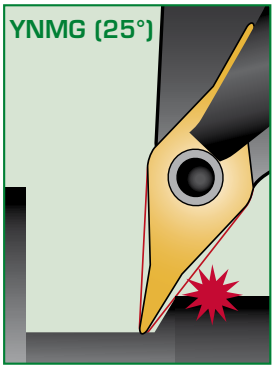
Tool costs
Due to the standard items, the tool costs were reduced by 30%/piece.

53% reduced total costs

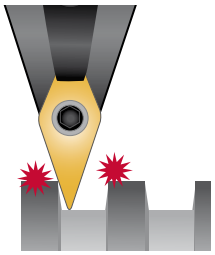
Technical information

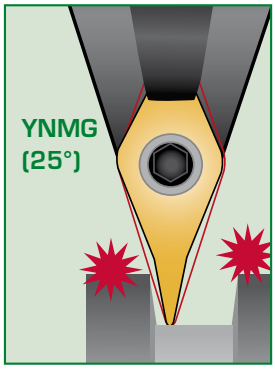
Application in standard toolholders in profiling

Existing VNMG (35°)



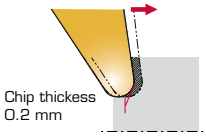
Existing VNMG (35°)



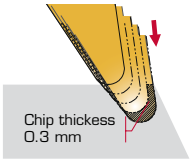


Cutting conditions for taper cutting

External turning
Depth of cut : a_p = 1.0 mm
Feed rate : f = 0.2 mm/rev



50° taper cutting
Depth of cut : a_p = 1.0 mm
Feed rate : f = 0.2 mm/rev



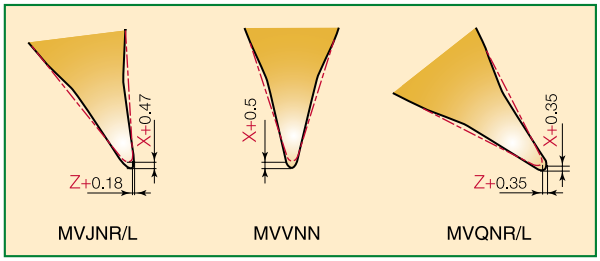
Although the depth of cut is identical for external turning, the chip thickness is increased (about 1.5 times) in taper cutting. Therefore reduce the feed within 2/3 of recommended feeds.

Nose radius R0.4 → Feed rate ***f*** < 0.13 mm/rev
Nose radius R0.8 → Feed rate ***f*** < 0.20 mm/rev

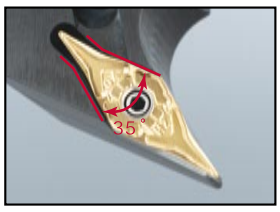
Amount of offset when using on existing toolholder

When chaniging from VNMG160408 to YNMG160408
- Offset is not necessary

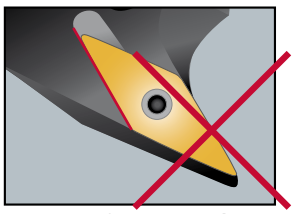
When chaniging from VNMG160404 to YNMG160404
- Refer to following drawings:



Application with toolholder



Tungaloy M-type toolholder = OK

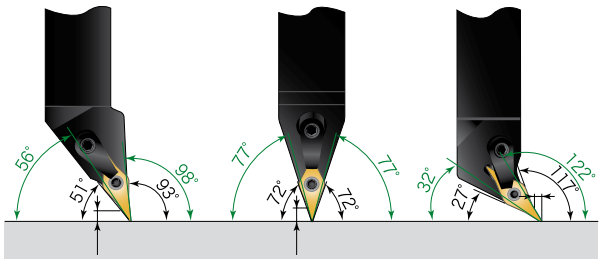


Impossible for insert with R0.4.

Pay attention to the undercut shape of the insert pocket.
YNMG type can be mounted on toolholders in which the walls of the insert pocket are undercut on both sides of the insert corner as shown at left.
The inserts with R0.4 corner radius can not be mounted on the toolholders as shown at right in which undercut is carried out only for one side of the insert corner.

Guide to machinable area

VNMG YNMG

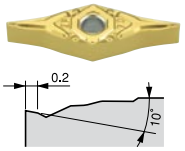
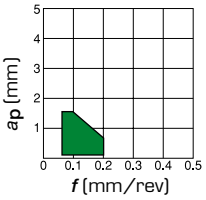
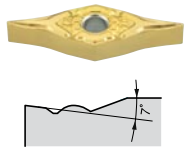
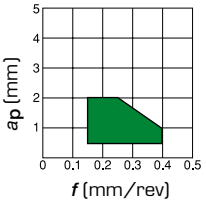


a_p max
Nose radius R0.4 : 5.5 mm
Nose radius R0.8 : 4.1 mm

a_p max
Nose radius R0.4 : 4.3 mm
Nose radius R0.8 : 3.0 mm

a_p max
Nose radius R0.4 : 2.8 mm
Nose radius R0.8 : 1.9 mm

Rhombic 25° Negative

Application	Chipbreaker	ap - f	Item code	Dimensions (mm) Inscribed Circle	Thickness	Hole ø	Corner radius R	Grades Coated T9025	Cermet c. GT730
Finishing to medium cutting	ZF 		YNMG160404-ZF	9.525	4.76	3.81	0.4	●	●
			*YNMG160408-ZF				0.8	●	●
	ZM 		YNMG160404-ZM	9.525	4.76	3.81	0.4	●	●
			*YNMG160408-ZM				0.8	●	●

*Insert type as reference for geometry section. ● Standard stock in Europe ○ Standard stock in Japan

Standard cutting conditions and chip-control capability

Recommended cutting speeds by grade and work material

Grade	Cutting speed V_C (m/min) Low carbon steels and alloy steels (<180HB)	Medium carbon steels and alloy steels (<240HB)	High carbon steels and alloy steels (<300HB)
T9025 Coated	150 - **220** - 300	120 - **180** - 250	100 - **150** - 180
GT730 Cermet c.	100 - **250** - 300	80 - **200** - 250	80 - **150** - 200

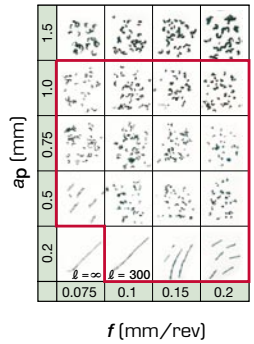
Recommended machining conditions by chipbreaker type and corner radius

ZF

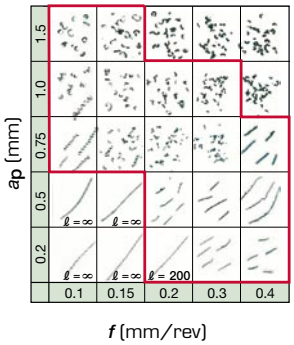
Work material : Carbon steel (C45)
Cutting speed : V_C = 200 m/min
Cutting fluid : Emulsion

ZM

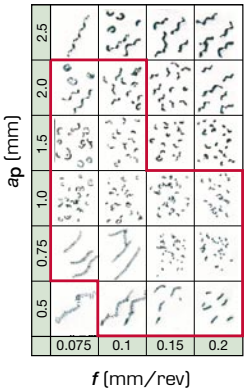
YNMG160404-ZF



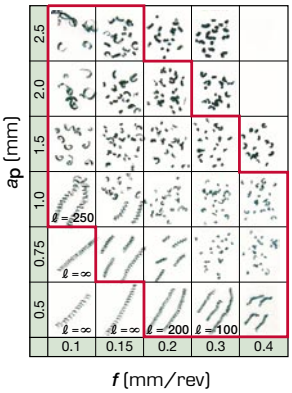
YNMG160408-ZF



YNMG160404-ZM

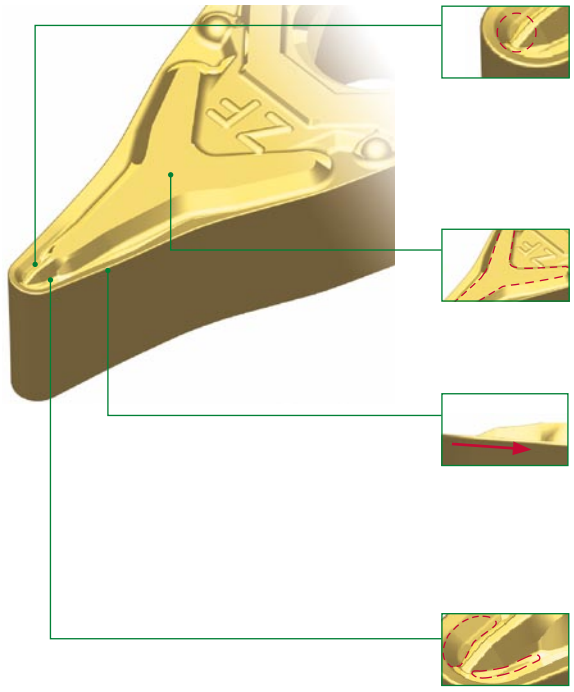


YNMG160408-ZM



shows preferable machining area in which snarled and overbroken chips are not produced.

ZF-type chipbreaker for finishing



High chipbreaker wall

By lowering the cutting edge height, a high and broad chipbreaker wall can be formed near the corner point.

- Can restrict thin chips formed in finishing
- Even at the allowable highest feed, chips do not surmount the chipbreaker wall

Stable insert seating

Sufficient boss face is formed along the insert outline.

- Improved seating stability obtained for the whole insert

Inclination

By inclining the cutting edge the side rake angle is increased in direction of the arrow.

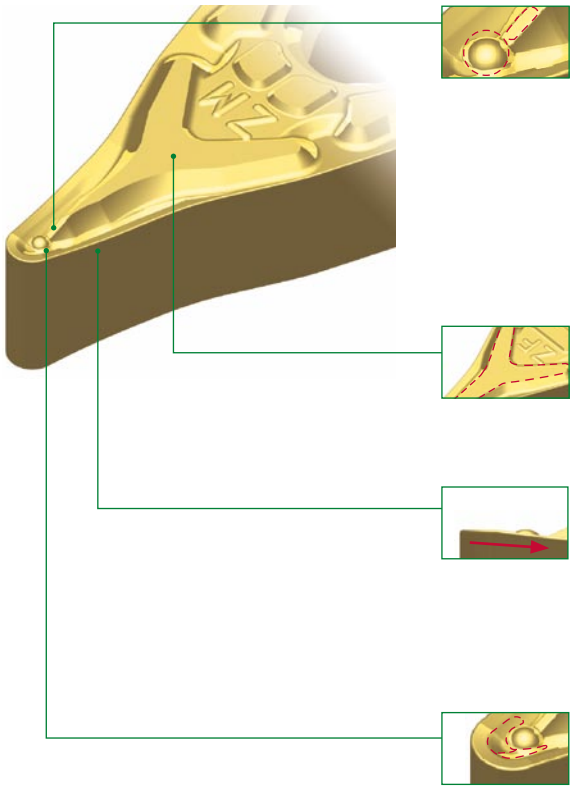
- In profiling, chips are forced to curl sideward and be broken
- In undercutting, chips are evacuated smoothly

Dimple structure

A dimple is formed near the corner point on the rake face.

- Can reduce the contacting area between chips and the rake face, suppressing the occurrence of thermal cracks

ZM-type chipbreaker for medium cutting



Hemispherical protrusion and back chipbreaker wall

A hemispherical protrusion and a high chipbreaker wall are formed on the rake face.

- Optimal balance of chiprestriction and chip packing, realizing excellent chip control
- In high feed and large depht cutting, chips which overcome the protrusion are restricted by the rear wall

Stable insert seating

Sufficient boss face is formed along the insert outline.

- Improved seating stability obtained for the whole insert

Inclination

By inclining the cutting edge the side rake angle is increased in direction of the arrow.

- In profiling, chips are forced to curl sideward and be broken
- In undercutting, chips are evacuated smoothly

Dimple structure

A dimple is formed near the corner point on the rake face.

- Can reduce the contacting area between chips and the rake face, suppressing the occurrence of thermal cracks

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