Tungaloy
Member IMC Group

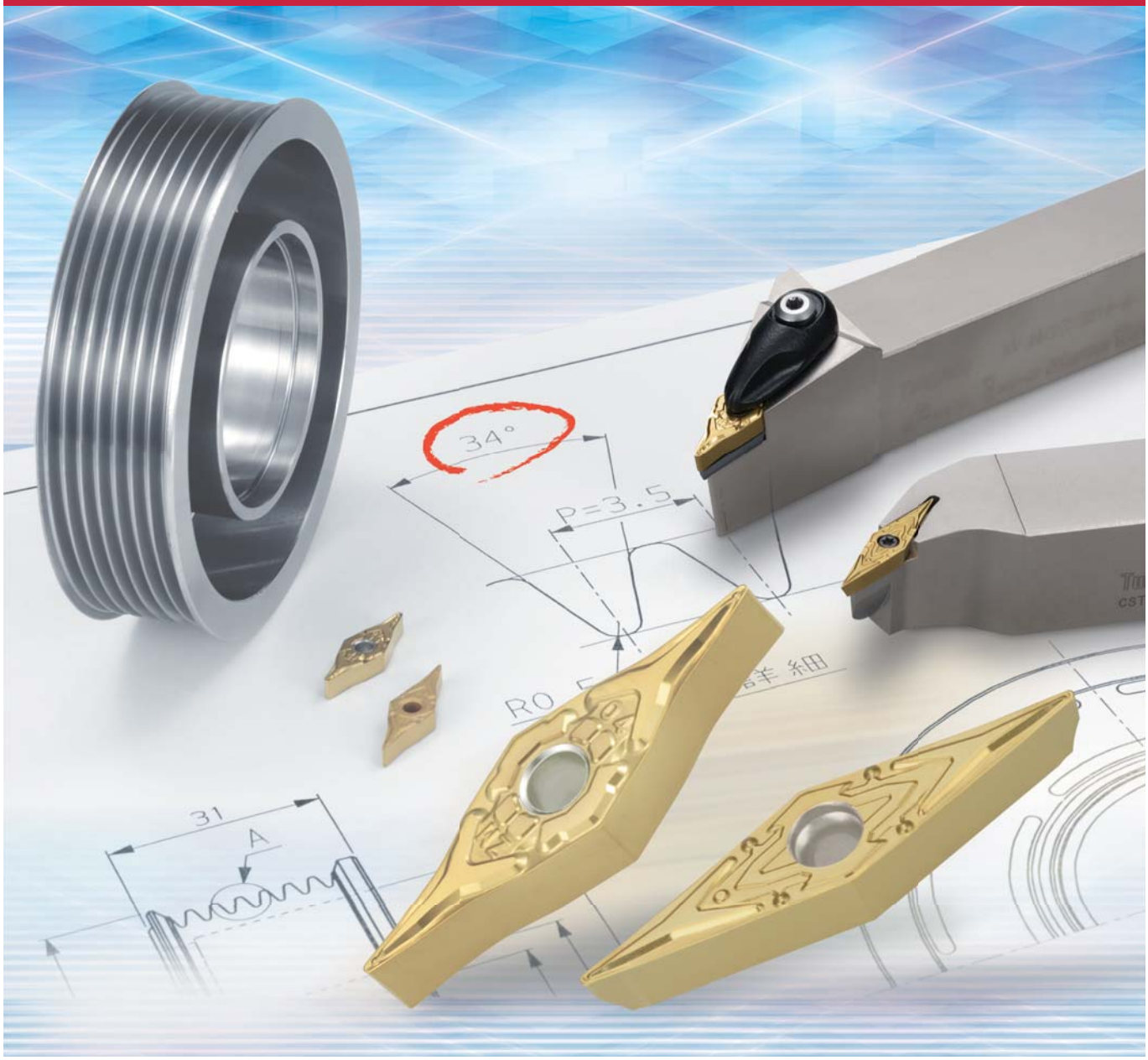
Keeping the Customer First

Tungaloy Report No. 369-E

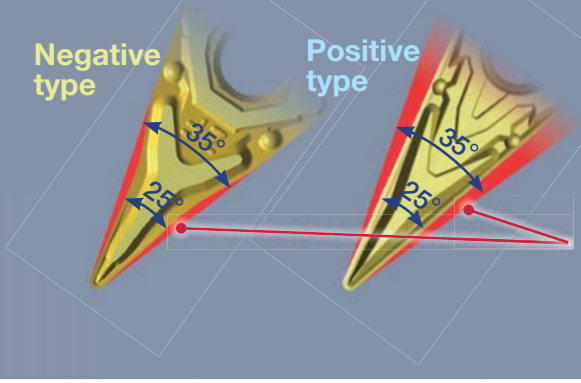
TURNLINE Profiling inserts

Y-PRO

The New Y-Pro Series of Inserts for Profiling



A new concept in profiling! Inserts with a 25° corner angle to expand machining possibilities!! (Patent Pending)



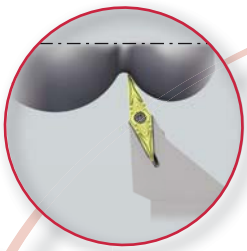
VNMG / VBMT Y-Pro series

35°→25°

This angle reduction contributes to reducing customer costs

Suitable for a wide range of machining applications

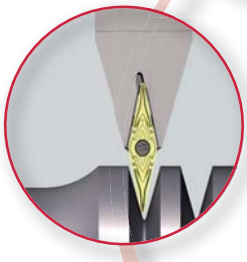
The new Y-Pro series expands the machining range of Taper cutting, undercutting and "V" grooving applications.



Negative Positive

Spherical profiling

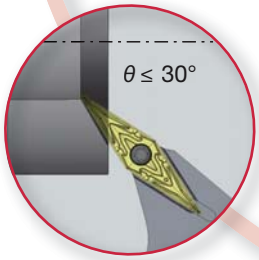
Enlarged clearance expands the interference avoidance area.



Negative Positive

"V" grooving

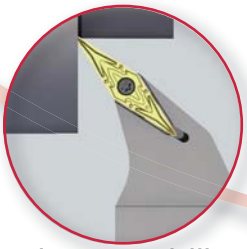
Suitable for various "V" grooving applications



Positive

Face profiling

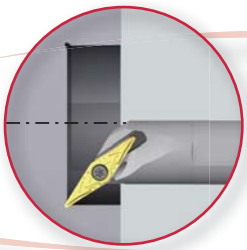
Allows drastic productivity and capability improvements



Positive

External undercutting

Allows a range of undercut forms to be machined



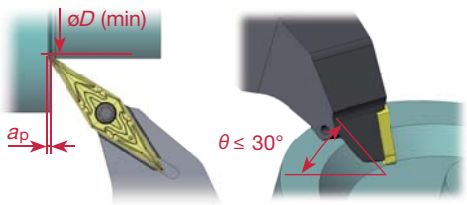
Positive

Internal undercutting and profiling

Allows undercutting of small diameters.

Comparison of undercutting capability

Reduced tool interference



Y Pro series / YWMT type

Corner R	ap (mm)	øD (mm)
0.2	0.5	ø10
	1.0	ø16
0.4	0.5	ø15
	1.0	ø18
0.8	0.5	ø21
	1.0	ø26

Corner angle 35° / VBMT type

Corner R	ap (mm)	øD (mm)
0.4	0.5	ø25
	1.0	ø30
0.8	0.5	ø45
	1.0	ø55

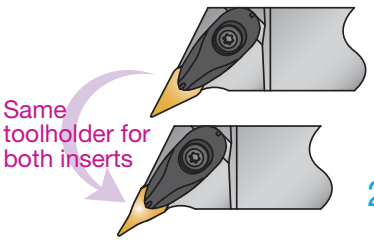
Improves the capability of small diameter machining!

Negative

YNMG type – Extremely capable and flexible insert

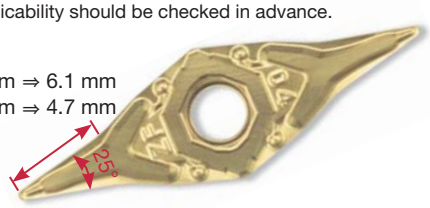
YNMG inserts are applicable for existing external and internal toolholders.

The Y-Pro series improves the application range for under cutting, V-grooving and taper machining.



For details and compatibility with toolholders, see "Instructions for use." When using competitor toolholders, the applicability should be checked in advance.

Corner radius $r\varepsilon$ 0.4 mm ⇒ 6.1 mm
Corner radius $r\varepsilon$ 0.8 mm ⇒ 4.7 mm

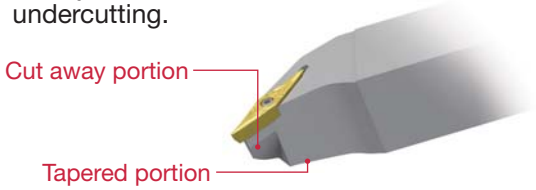


Positive

YWMT type - for a variety of machining processes

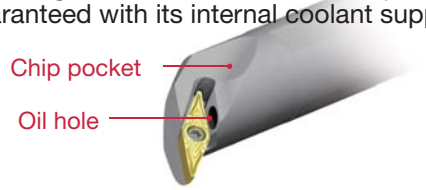
External toolholders

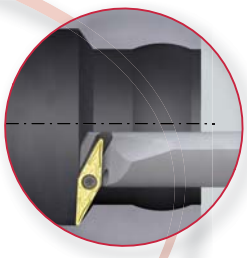
Vastly reduced tool interference in facing and undercutting.



Internal toolholders

By using the specialized "Stream Jet Bar" series of boring toolholders, excellent chip evacuation is guaranteed with its internal coolant supply.





Positive

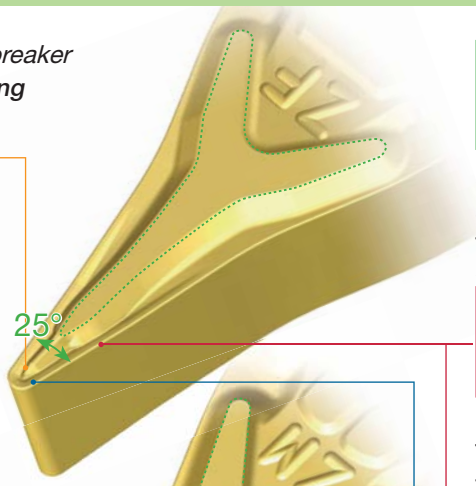
Internal profiling

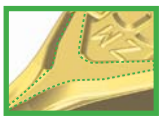
Compared to the 35°positive insert, the 25° insert can work with smaller bore diameters.

Negative insert

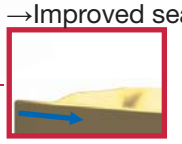
ZF *chipbreaker*
For finishing

High and broad chipbreaker
High and broad chipbreaker wall are formed near the corner point.
→Well controlled chips.





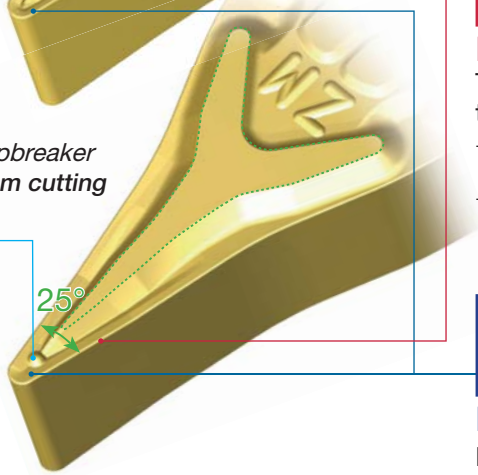
Stable insert seating
Sufficient boss face is formed along the insert outline.
→Improved seating stability



Inclination
The side rake angle is increased in the direction of the arrow.
→When profiling, chips are curled and broken.
→When undercutting, chips are evacuated smoothly.

ZM *chipbreaker*
For medium cutting

Hemispherical protrusion and chipbreaker wall
A hemispherical protrusion and high wall have been introduced.
→The hemispherical protrusion improves chip control.
→When high feed and large depth machining, the chips are controlled by the rear wall.



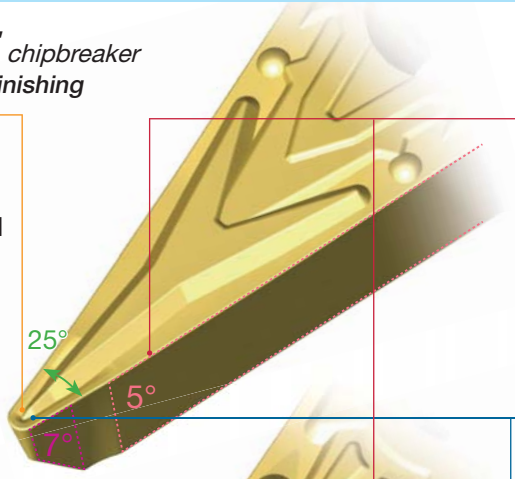
Dimple structure
Dimples are formed near the corner point.
→This reduces the contact area between the chips and the rake face, reducing thermal cracks.

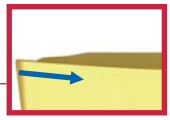
Positive insert

ZF *chipbreaker*
For finishing

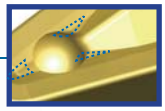
High and broad chipbreaker
High and broad chipbreaker wall is formed near the corner point.
→Well controlled chips.

Rhombic shape with 25° corner angle
An expanded interference avoidance area allows undercutting, taper cutting and spherical profiling.



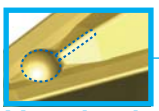


Inclination
The side rake angle is increased in the direction of the arrow.
→When profiling, chips are curled and broken.
→When undercutting, chips are evacuated smoothly.

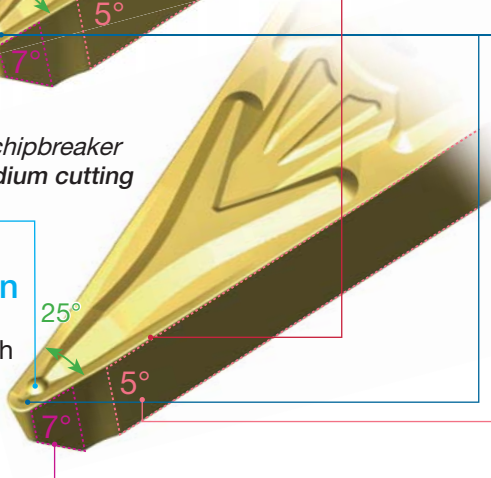


Dimple structure
Dimples are formed near the corner point.
→This reduces the contact area between the chips and the rake face, reducing thermal cracks.

ZM *chipbreaker*
For medium cutting



Hemispherical protrusion and chipbreaker wall
A hemispherical protrusion and high wall have been introduced.
→The hemispherical protrusion improves chip control.
→When high feed and large depth machining, the chips are controlled by the rear wall.



5° relief angle
Enlarged insert seating face

7° relief angle
Reduced interference

Double relief angle

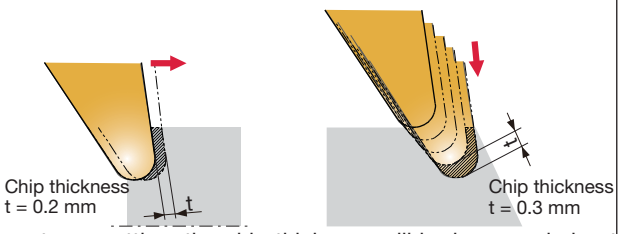
Instruction for use

Negative insert

Cutting conditions for taper cutting

■ External turning
Depth of cut: ap = 1.0 mm
Feed: *f* = 0.2 mm/rev

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



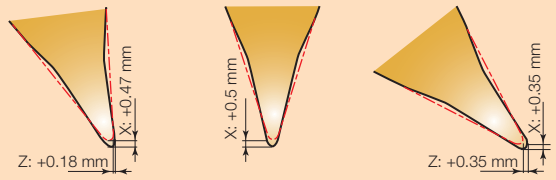
When taper cutting, the chip thickness will be increased about 1.5 times. Therefore the feed should be reduced to 70% of the recommended guidelines.

$r\varepsilon$ = 0.4 mm → Feed: *f* < 0.13 mm/rev
$r\varepsilon$ = 0.8 mm → Feed: *f* < 0.2 mm/rev

Amount of offset when using on existing toolholder

■ When changing from **VNMG160408** to **YNMG160408** → **Offset is not necessary.**

■ When changing from **VNMG160404** to **YNMG160404** → **Refer to the following drawings.**

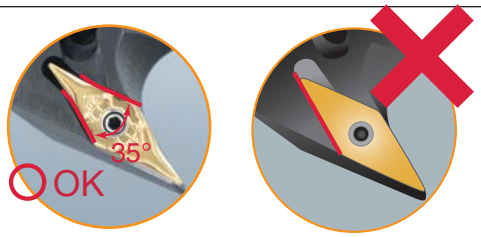


AVJNR/L **AVVNN** **AVQNR/L**

Applicability with toolholders

Pay attention to the shape of insert pocket.

The YNMG type insert can be mounted on toolholders where the walls of the insert pocket are undercut on the both sides as shown on the left.
The inserts with $r\varepsilon$ = 0.4 mm corner radius cannot be mounted on the toolholders as shown on the right where undercutting is carried out only for the one side.



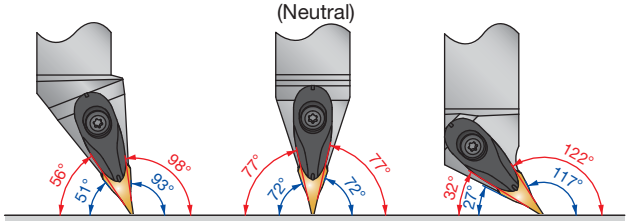
Tungaloy toolholder | Competitor's toolholder (example)

Guidelines for machining area

■ Y Pro toolholder for external cutting

When setting 25° YNMG type
When setting 35° VNMG type

Style J | *Style V* (Neutral) | *Style Q*

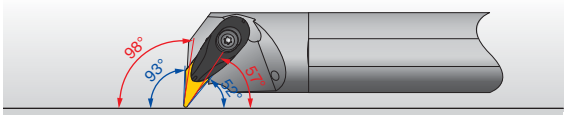


Machinable depth	Machinable depth	Machinable depth
$r\varepsilon$ = 0.4 → 4.3 mm	$r\varepsilon$ = 0.4 → 5.5 mm	$r\varepsilon$ = 0.4 → 2.8 mm
$r\varepsilon$ = 0.8 → 3.0 mm	$r\varepsilon$ = 0.8 → 4.1 mm	$r\varepsilon$ = 0.8 → 1.9 mm

*Interferences except insert nose are same as VNMG type.

■ Y Pro toolholder for internal cutting

Style U



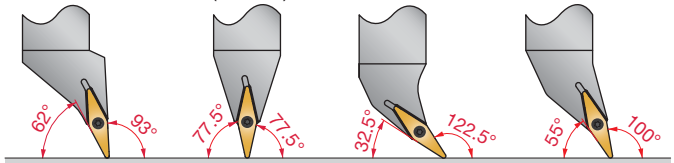
Machinable depth
$r\varepsilon$ = 0.4 → 4.3 mm
$r\varepsilon$ = 0.8 → 3.0 mm

Positive insert

Guideline for machinable area

■ Dedicated external toolholders for Y Pro inserts

Style J | *Style I* (Neutral) | *Style Q* | *Style H*

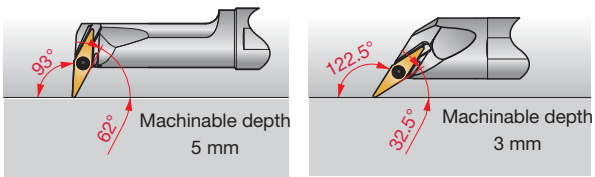


Machinable depth	Machinable depth	Machinable depth	Machinable depth
10 mm	10 mm	5 mm	10 mm

*Standard corner radius $r\varepsilon$ = 0.8 mm

■ Dedicated internal toolholders for Y Pro inserts

Style V | *Style Q*



*Standard corner radius $r\varepsilon$ = 0.4 mm

Chip control

Areas surrounded by a thick red line identify the preferable machining range for optimal chip control.

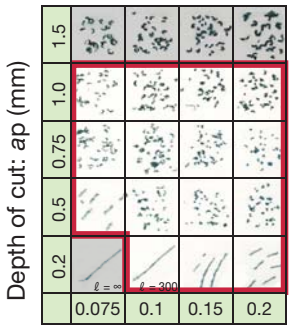
Recommended cutting conditions by insert

Negative insert

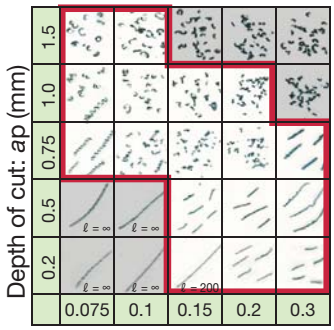
Work material: Carbon steel, Cutting speed: *Vc* = 200 m/min, Coolant: Water soluble type

ZF chipbreaker

YNMG160404-ZF

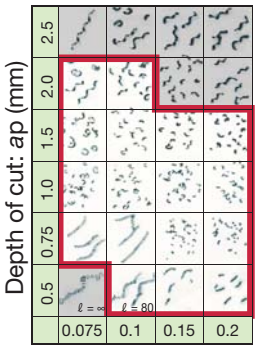


YNMG160408-ZF

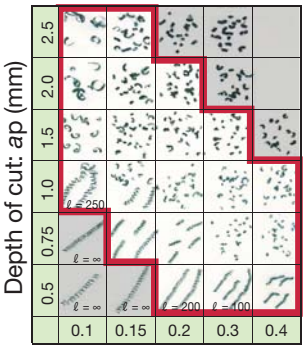


ZM chipbreaker

YNMG160404-ZM



YNMG160408-ZM

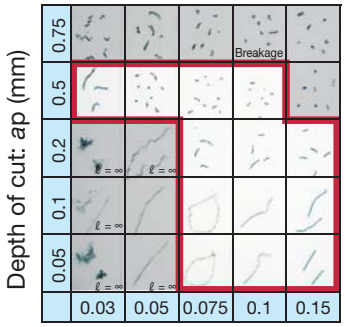


Positive insert

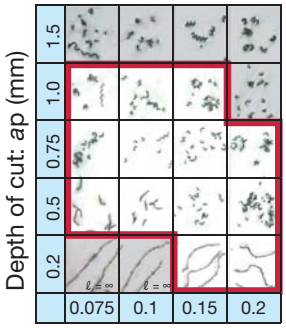
Work material: Carbon steel, Cutting speed: *Vc* = 200 m/min, Coolant: Dry cutting

ZF chipbreaker

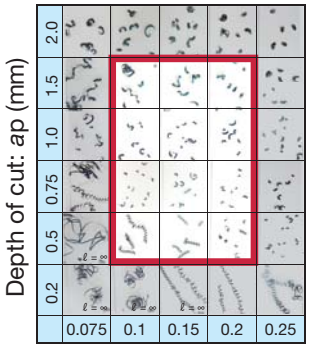
YWMT16T302-ZF



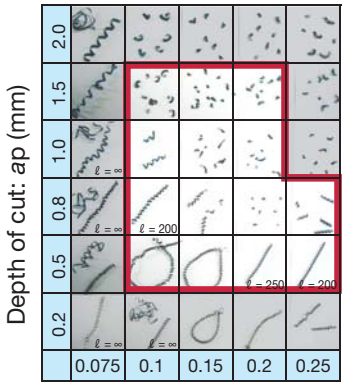
YWMT16T304-ZF



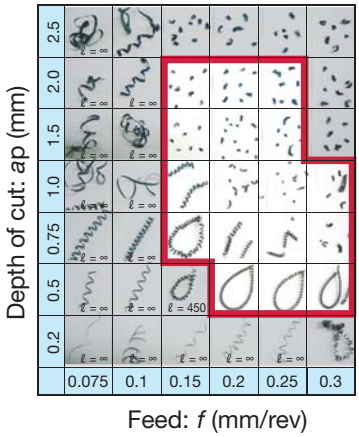
YWMT16T304-ZM



YWMT16T308-ZF

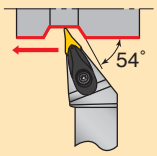
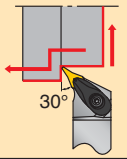
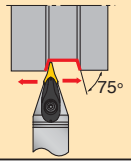


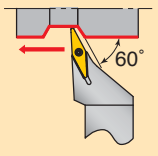
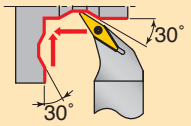
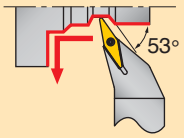
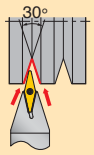
YWMT16T308-ZM



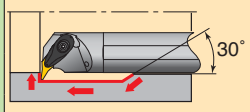
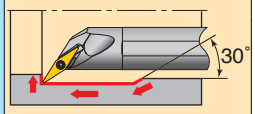
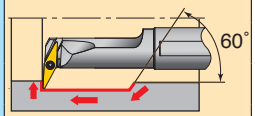
Y Pro Series Product Range

External turning

Toolholder type		
Negative rake		**AVJN R/L** Profiling Insert: YNMG1604□□ ➔P. 8
		**AVQN R/L** Profiling Insert: YNMG1604□□ ➔P. 8
		**AVVN N** Profiling Insert: YNMG1604□□ ➔P. 9

Toolholder type		
Positive rake		**SYJB R/L** Spherical surface and taper cutting Insert: YWMT16T3□□ ➔P. 10
		**SYQB R/L** Undercutting Insert: YWMT16T3□□ ➔P. 10
		**SYHB R/L** Retracting Insert: YWMT16T3□□ ➔P. 11
		**SYIB N** "V" grooving Insert: YWMT16T3□□ ➔P. 11

Internal turning

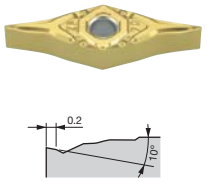
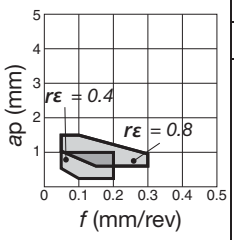
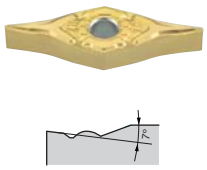
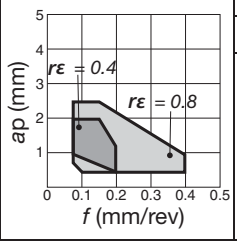
Toolholder type			Shank	Shank dia. øDs	Min. bore diameter (mm) 0 10 20 30 40 50
Negative rake		**AVUN R/L** Profiling Insert: YNMG1604□□ ➔P. 9	Steel	ø32, ø40	ø40 ø50
Positive rake		**SYQB R/L** Undercutting Insert: YWMT11T2□□ ➔P. 11	Steel	ø12, ø16	ø17 ø21.5
			Carbide	ø12, ø16	ø17 ø21.5
		**SYUB R/L** Spherical surface and taper cutting Insert: YWMT11T2□□ ➔P. 12	Steel	ø16	ø20 ø20
			Carbide	ø12, ø16	ø20 ø24.5

Standard cutting conditions

Cutting speed by grade and work material

Grades	Cutting speed: *Vc* (m/min)		
	Low carbon steels and alloy steels (< 180HB)	Medium carbon steels and alloy steels (< 240HB)	High carbon steels and alloy steels (< 300HB)
T9125 **Coated carbide**	**220** (150 ~ 300)	**180** (120 ~ 250)	**150** (100 ~ 180)
GT730 **Coated cermet**	**250** (150 ~ 300)	**200** (80 ~ 250)	**150** (80 ~ 200)

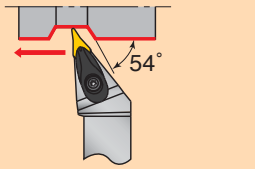
Insert 25° Rhombic, Negative

Application	Chipbreaker symbol / Shape and section	f - ap	Cat. No. (Metric)	Dimensions (mm) I.C. dia. ød	Thickness s	Hole dia. ød1	Corner radius rε	Stocked grades Coated carbide T9125	Coated carbide T9025	Coated cermet 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	●	▲	●

Note: Chipbreaker sections shown above that are marked (*) Cat. Numbers.

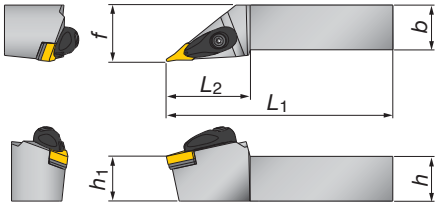
Toolholder

AVJN R/L — External & profiling — A type (Negative rake, Double clamping system)



Cutting edge style **J**

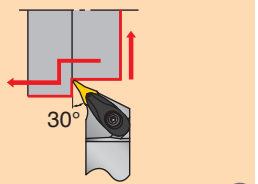
Note: For machinable area, refer to P. 5.



Right hand (R) shown.

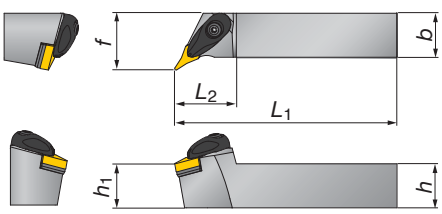
Toolholder Cat. No.	Stock R	Stock L	h	b	L1	L2	h1	f	f1	Std. corner radius rε	Applicable insert
AVJNR/L2020K16-A	●	●	20	20	125	43	20	25	–	0.8	YNMG1604□□
AVJNR/L2525M16-A	●	●	25	25	150	46	25	32	–		

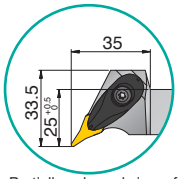
AVQN R/L — External & profiling — A type (Negative rake, Double clamping system)



Cutting edge style **Q**

Note: For machinable area, refer to P. 5.





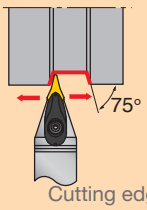
Partially enlarged view of 20 size toolholder

Right hand (R) shown.

Toolholder Cat. No.	Stock R	Stock L	h	b	L1	L2	h1	f	f1	Std. corner radius rε	Applicable insert
AVQNR/L2020K16-A	●	●	20	20	125	35	20	25	–	0.8	YNMG1604□□
AVQNR/L2525M16-A	●	●	25	25	150	35	25	32	–		

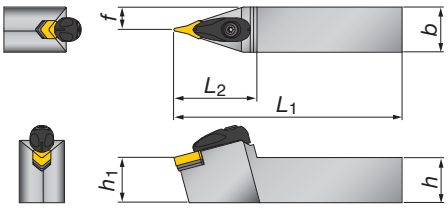
● : Stocked items
▲ : Will be replaced by new products

AVVN N External & profiling — A type (Negative rake, Double clamping system)



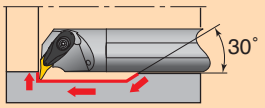
Cutting edge style **V**

Note: For machinable area, refer to P. 5.



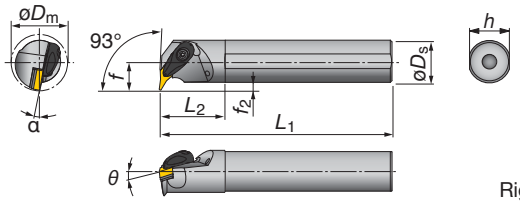
Toolholder Cat. No.	Stock	Dimensions (mm)							Std. corner radius rε	Applicable insert
		h	b	L1	L2	h1	f	f1		
AVVNN2020K16-A	●	20	20	125	46	20	10	–	0.8	YNMG1604□□
AVVNN2525M16-A	●	25	25	150	46	25	12.5	–		

A□□□-AVUN R/L Internal & profiling — A type (Negative rake, Double clamping system)



Cutting edge style **U**

Note: For machinable area, refer to P. 5.



Right hand (R) shown.

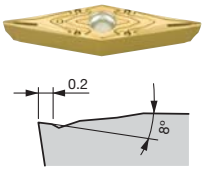
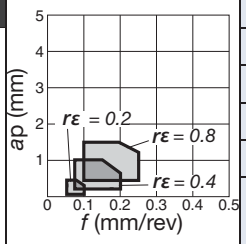
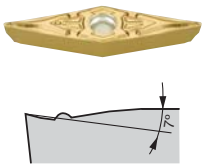
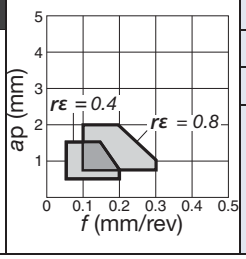
Toolholder Cat. No.	Stock		Min. bore dia.	Dimensions (mm)								Std. corner radius rε	Applicable insert
	R	L	øDm	øDs	f	L1	L2	h	f2	α	θ		
A32S-AVUNR/L16-D400	●	●	40	32	22	250	50	30	6	-10°	-6°	0.8	YNMG1604□□
A40T-AVUNR/L16-D500	●	●	50	40	27	300	55	37	7	-8°			

●Replacement parts

Toolholder Cat. No.	Applicable insert	Clamp	Clamp screw	Shim	Shim screw	Spring	Spring pin	Wrench	Recommended torque (N·m)
AVJNR/L (External)	**YNMG1604□□**	ACP3L	ACS-5W	ASV322	CSTB-3.5	BP-7	SP-2.5	T-15F	3.0
AVVNN (External)									
AVQNR/L (External)									
AVUNR/L (Internal)									

● : Stocked items

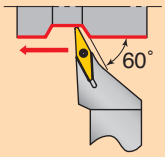
Insert 25° Rhombic, Positive

Application	Chipbreaker symbol / Shape and section	f - ap	Cat. No.	Dimensions (mm) I.C. dia. ød	Thickness s	Hole dia. ød1	Corner radius rε	Stocked grades Coated carbide T9125	Coated carbide T9025	Coated cermet GT730
Finishing to medium cutting	**ZF** 		**YWMT11T202-ZF**	4.679	2.78	2.3	0.2	●	▲	●
			YWMT11T204-ZF				0.4	●	▲	●
			YWMT16T302-ZF	7.018	3.97	2.86	0.2	●	▲	●
			* **YWMT16T304-ZF**				0.4	●	▲	●
			YWMT16T308-ZF				0.8	●	▲	●
	ZM 		**YWMT11T204-ZM**	4.679	2.78	2.3	0.4	●	▲	●
			* **YWMT16T304-ZM**	7.018	3.97	2.86	0.4	●	▲	●
			YWMT16T308-ZM				0.8	●	▲	●

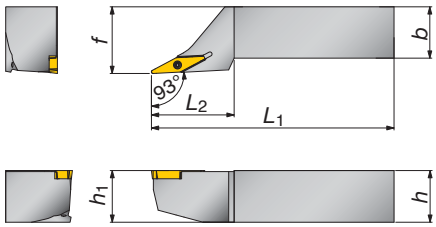
Note: Chipbreaker sections shown above that are marked (*) Cat. Numbers.

Toolholder

SYJB R/L External, spherical surface cutting & taper cutting S type (Positive rake, Screw-on system)



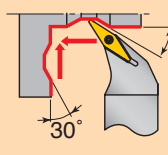
Cutting edge style **J**



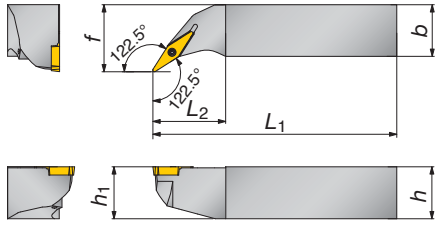
Right hand (R) shown.

Toolholder Cat. No.	Stock R	Stock L	Dimensions (mm) h	b	L1	L2	h1	f	Std. corner radius rε	Applicable insert	Replacement parts Clamping screw	Wrench
SYJBR/L2020K16	●	●	20	20	125	35	20	25	0.8	YWMT16T3□□	CSTB-2.5L080	T-8F
SYJBR/L2525M16	●	●	25	25	150	40	25	32				

SYQB R/L External & undercutting S type (Positive rake, Screw-on system)



Cutting edge style **Q**



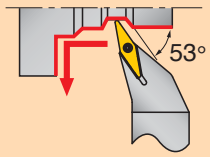
Right hand (R) shown.

Toolholder Cat. No.	Stock R	Stock L	Dimensions (mm) h	b	L1	L2	h1	f	Std. corner radius rε	Applicable insert	Replacement parts Clamping screw	Wrench
SYQBR/L2020K16	●	●	20	20	125	35	20	27	0.8	YWMT16T3□□	CSTB-2.5L080	T-8F
SYQBR/L2525M16	●	●	25	25	150	35	25	32				

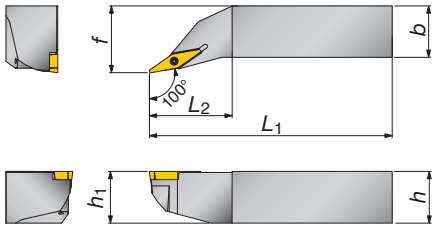
● : Stocked items
▲ : Will be replaced by new products

SYHB R/L External & retracting

S type (Positive rake, Screw-on system)



Cutting edge style **H**

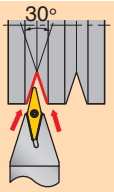


Right hand (R) shown.

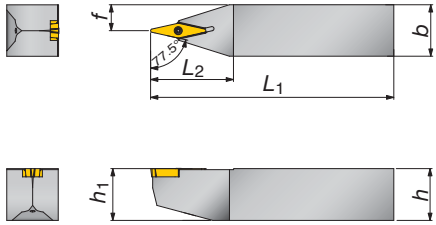
Toolholder Cat. No.	Stock		Dimensions (mm)						Std. corner radius rε	Applicable insert	Replacement parts	
	R	L	h	b	L1	L2	h1	f			Clamping screw	Wrench
SYHBR/L2020K16	●	●	20	20	125	35	20	27	0.8	YWMT16T3□□	CSTB-2.5L080	T-8F
SYHBR/L2525M16	●	●	25	25	150	40	25	32				

SYIB N External & "V" grooving

S type (Positive rake, Screw-on system)



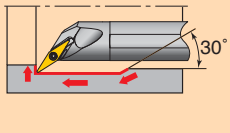
Cutting edge style **I**



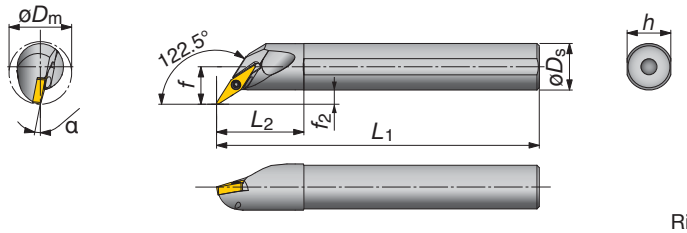
Toolholder Cat. No.	Stock		Dimensions (mm)						Std. corner radius rε	Applicable insert	Replacement parts	
	R	L	h	b	L1	L2	h1	f			Clamping screw	Wrench
SYIBN2020K16	●	●	20	20	125	32	20	10	0.8	YWMT16T3□□	CSTB-2.5L080	T-8F
SYIBN2525M16	●	●	25	25	150	40	25	12.5				

SYQB R/L Internal & undercutting

S type (Positive rake, Screw-on system)



Cutting edge style **Q**



Right hand (R) shown.

Steel shank

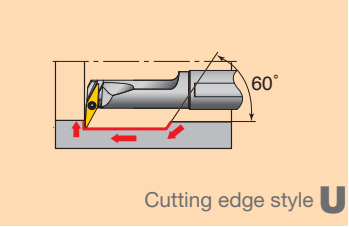
Toolholder Cat. No.	Stock		Min. bore dia. øDm	Dimensions (mm)								Std. corner radius rε	Applicable insert	Replacement parts		
	R	L		øDs	f	L1	L2	h	f2	θ	α			Clamping screw	Wrench	Recommended torque (N・m)
A12M-SYQBR/L11-D170	●	●	17	12	10.5	150	24	11	4.5	-5°	-10°	0.4	YWMT11T2□□	CSTB-2L	T-6F	0.5
A16Q-SYQBR/L11-D215	●	●	21.5	16	13	180	30	15	5		-8°					

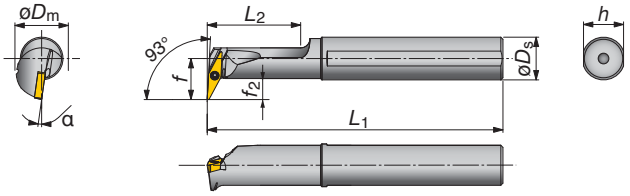
Carbide shank

Toolholder Cat. No.	Stock		Min. bore dia. øDm	Dimensions (mm)								Std. corner radius rε	Applicable insert	Replacement parts		
	R	L		øDs	f	L1	L2	h	f2	θ	α			Clamping screw	Wrench	Recommended torque (N・m)
E12Q-SYQBR/L11-D170	●	●	17	12	10.5	180	27	11	4.5	-5°	-10°	0.4	YWMT11T2□□	CSTB-2L	T-6F	0.5
E16R-SYQBR/L11-D215	●	●	21.5	16	13	200	32	15	5		-8°					

● : Stocked items

SYUB R/L Internal, profiling & taper cutting S type (Positive rake, Screw-on system)





Right hand (R) shown.

Steel shank

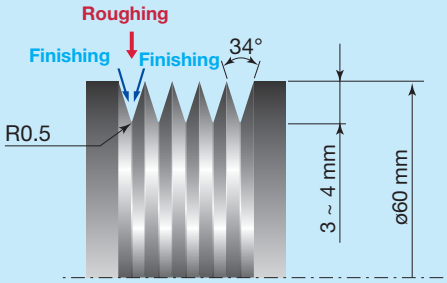
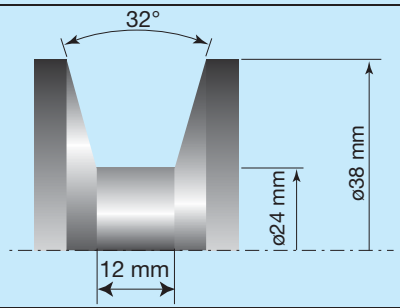
Toolholder Cat. No.	Stock		Min. bore dia.	Dimensions (mm)								Std. corner radius	Applicable insert	Replacement parts		
	R	L	øDm	øDs	f	L1	L2	h	f2	θ	α	rε		Clamping screw	Wrench	Recommended torque (N・m)
A16Q-SYUBR/L11-D200	●	●	20	16	15.5	180	35	15	8	0°	-8°	0.4	YWMT11T2□□	CSTB-2L	T-6F	0.5

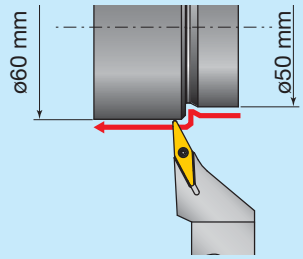
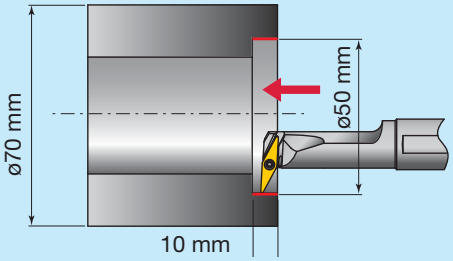
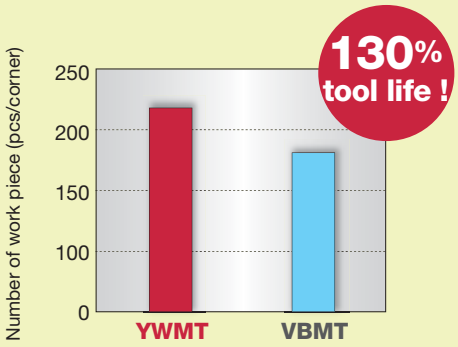
Carbide shank

Toolholder Cat. No.	Stock		Min. bore dia.	Dimensions (mm)								Std. corner radius	Applicable insert	Replacement parts		
	R	L	øDm	øDs	f	L1	L2	h	f2	θ	α	rε		Clamping screw	Wrench	Recommended torque (N・m)
E12Q-SYUBR/L11-D200	●	●	20	12	13.5	180	27	11	7.5	0°	-8°	0.4	YWMT11T2□□	CSTB-2L	T-6F	0.5
E16R-SYUBR/L11-D245	●	●	24.5	16	16	200	32	15	8							

● : Stocked items

Practical Examples

Name of workpiece		Pulley (“V” grooving)	Machine part (“V” grooving)
Insert		YNMG160404-ZF	YWMT16T308-ZF
Grade		GT730	T9125
Toolholder		AVVNN2525M16-A	SYIBN2525M16
Workpiece material		SCM415	SCr420
			
Cutting conditions	Cutting speed: Vc (m/min)	250	140
	Depth of cut: ap (mm)	0.5	1.5
	Feed: f (mm/rev)	0.1 ~ 0.2	0.1 ~ 0.2
	Coolant	Water soluble	Water soluble
Current	Insert	Competitor's special insert	Special grooving insert for roughing, VBMT insert for finishing
	Toolholder	Competitor's special holder	Special toolholder for roughing, Left and right hand toolholders for finishing
Results		Chip control was enhanced and tool life improved by 150% Total manufacturing cost reduction of 50%!	Two finishing holders were integrated into ONE Y-Pro tool. Chip control was also improved.

Name of workpiece		Machine part (external profiling)	Automotive part (internal turning)
Insert		YWMT16T304-ZF	YWMT11T204-ZF
Grade		GT730	GT730
Toolholder		SYJBR2525M16	A16Q-SYUBR11-D200
Workpiece material		SCr420H	SACM645
			
Cutting conditions	Cutting speed: *Vc* (m/min)	230	100
	Depth of cut: *ap* (mm)	0.1 - 0.25	0.5
	Feed: *f* (mm/rev)	0.1 - 0.25	0.2
	Coolant	Water soluble	Water soluble
Current	Insert	VBMT16 insert for finishing	VBMT16 insert for finishing
	Toolholder	General toolholder (J style cutting edge)	Standard internal toolholder
Results		 **Damage on edge is stable due to the improvement of chip evacuation in undercutting.**	**Chip control and surface finish are improved considerably when internal turning.**

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