

Tungaloy

Member IMC Group

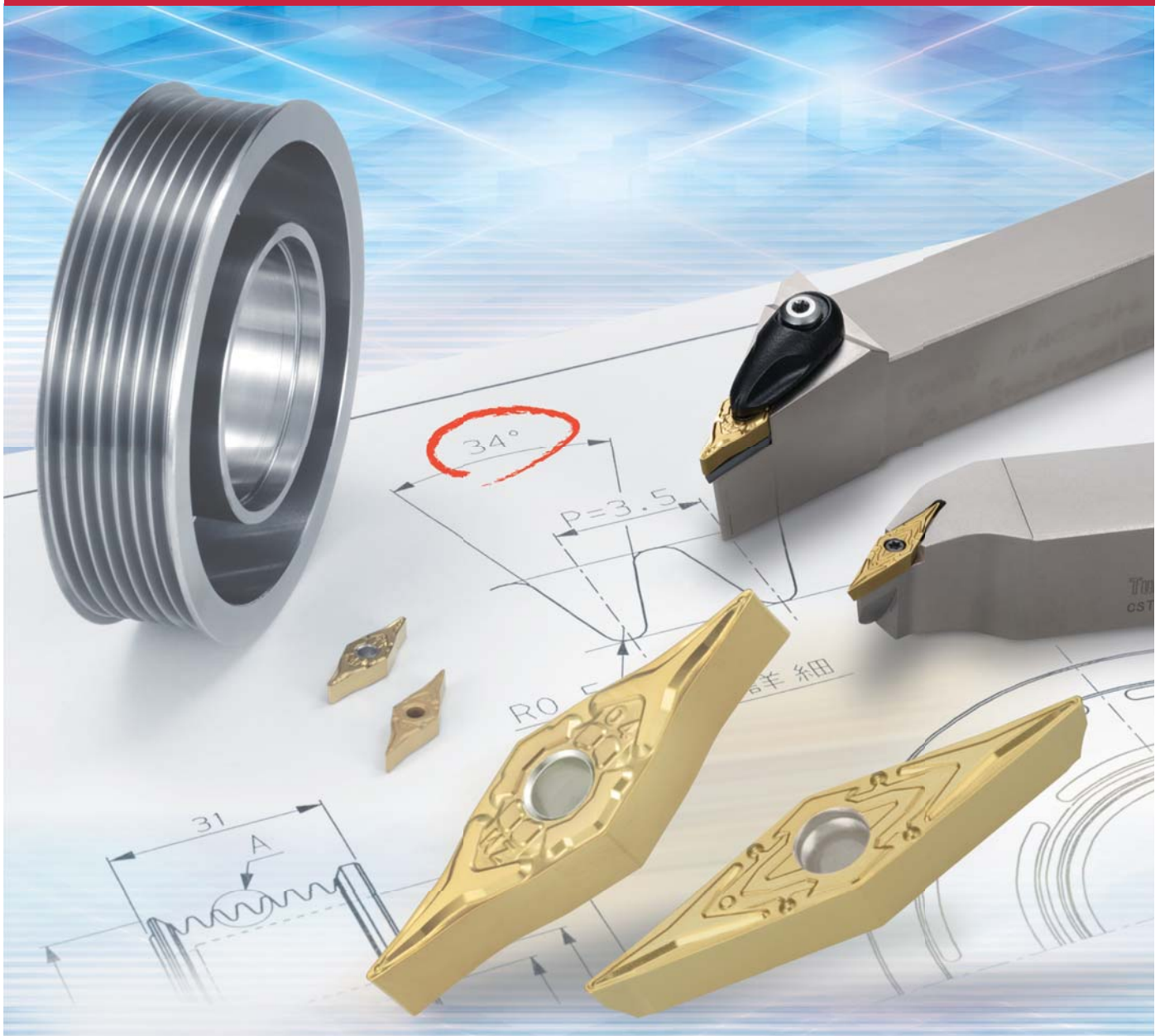
Keeping the Customer First

Tungaloy Report No. 369-US

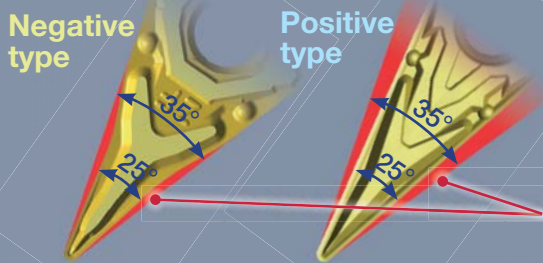
TURNLINE Profiling inserts

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.

Spherical profiling
Enlarged clearance expands the interference avoidance area.

"V" grooving
Suitable for various "V" grooving applications

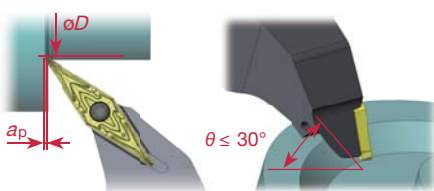
Face profiling
Allows drastic productivity and capability improvements

External undercutting
Allows a range of undercut forms to be machined

Internal undercutting and profiling
Allows undercutting of small diameters.

Comparison of undercutting capability

Reduced tool interference



Y Pro series / YWMT type

Corner R	ap (inch)	øD (inch)
.008"	.020	ø.394
	.040	ø.630
.016"	.020	ø.591
	.040	ø.709
.031"	.020	ø.827
	.040	ø1.024

Corner angle 35° / VBMT type

Corner R	ap (inch)	øD (inch)
.016"	.020	ø.984
	.040	ø1.181
.031"	.020	ø1.772
	.040	ø2.165

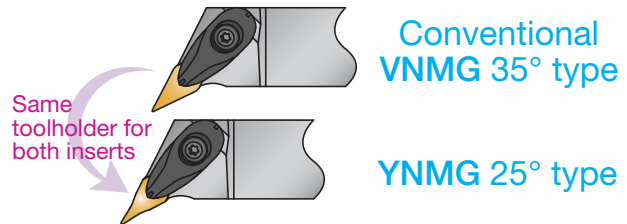
Improves the capability of small diameter machining!



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 $r\epsilon = .016"$

➔ $L = .240"$

Corner radius $r\epsilon = .031"$

➔ $L = .185"$

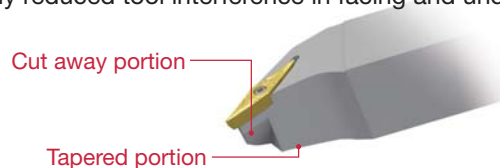


Positive

● **YWMT type** - for a variety of machining processes

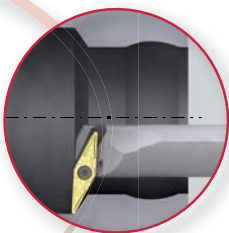
■ **External toolholders**

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 35° positive insert, can handle smaller bore diameters.

Negative insert

ZF chipbreaker
For finishing



High and broad chipbreaker

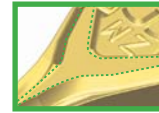
High and broad chipbreaker wall are formed near the corner point.
 ➔ Well controlled chips.

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.



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.



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.

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.



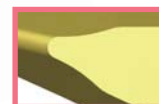
Inclination

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.



5° relief angle

Enlarged insert seating face

7° relief angle

Reduced interference

Double relief angle

Instruction for use

Negative inserts

Cutting conditions for taper cutting

■ External turning
Depth of cut: $a_p = .040''$
Feed: $f = .008$ ipr

■ 50° taper cutting
Depth of cut: $.040''$
Feed: $f = .008$ ipr



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.

$r\epsilon = .016'' \rightarrow$ Feed: $f < .006$ ipr
 $r\epsilon = .031'' \rightarrow$ Feed: $f < .008$ ipr

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 $r\epsilon = .016$ inch corner radius cannot be mounted on the toolholders as shown on the right where undercutting is carried out only for the one side.

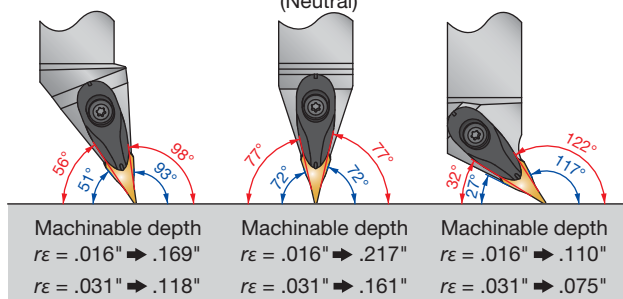
Guidelines for machining area

■ Y Pro toolholder for external cutting

Style J

Style V
(Neutral)

Style Q

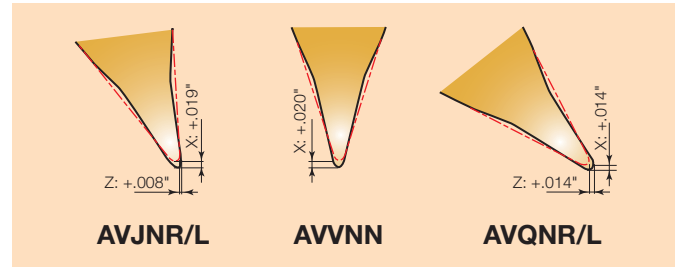


*Interferences except insert nose are same as VNMG type.

Amount of offset when using on existing toolholder

■ When changing from VNMG 332 to YNMG 332 \rightarrow Offset is not necessary.

■ When changing from VNMG 331 to YNMG 331 \rightarrow Refer to the following drawings.



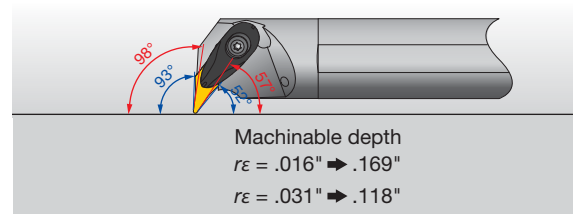
Tungaloy toolholder



Competitor's toolholder (example)

■ Y Pro toolholder for internal cutting

Style U



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

Positive inserts

Guideline for machinable area

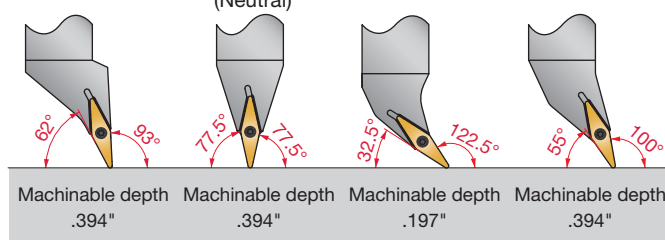
■ Dedicated external toolholders for Y Pro inserts

Style J

Style I
(Neutral)

Style Q

Style H

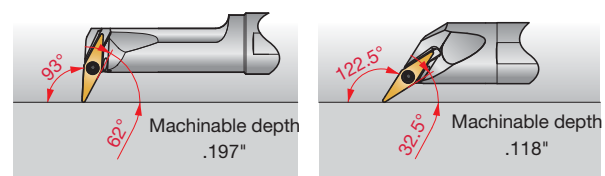


*Standard corner radius $r\epsilon = .031''$

■ Dedicated internal toolholders for Y Pro inserts

Style V

Style Q



*Standard corner radius $r\epsilon = .016''$

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: $V_c = 650$ sfm, Coolant: Wet

ZF chipbreaker

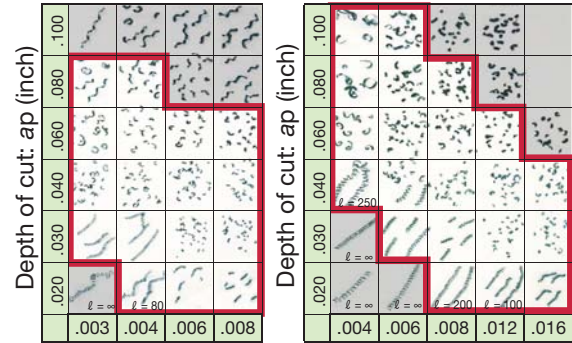
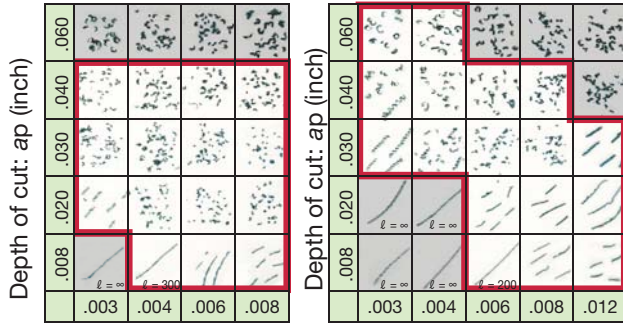
ZM chipbreaker

YNMG 331 ZF

YNMG 332 ZF

YNMG 331 ZM

YNMG 332 ZM



Feed: f (ipr)

Feed: f (ipr)

Feed: f (ipr)

Feed: f (ipr)

Positive insert

Work material: Carbon steel, Cutting speed: $V_c = 650$ sfm, Coolant: Dry

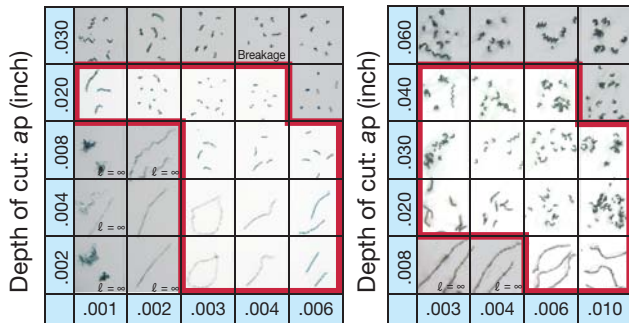
ZF chipbreaker

ZM chipbreaker

YWMT 32.50.5 ZF

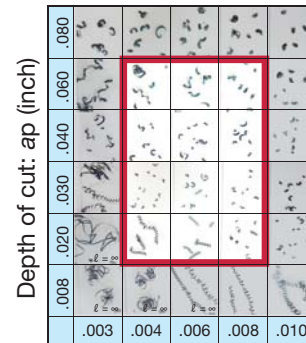
YWMT 32.51 ZF

YWMT 32.51 ZM



Feed: f (ipr)

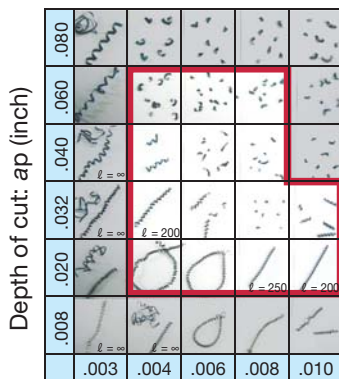
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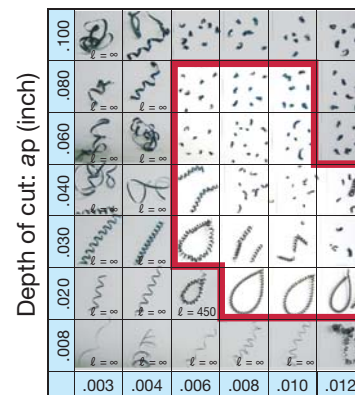
Feed: f (ipr)

YWMT 32.52 ZF

YWMT 32.52 ZM



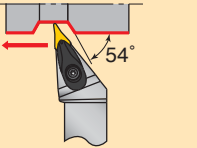
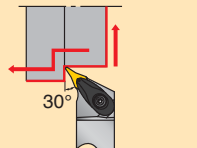
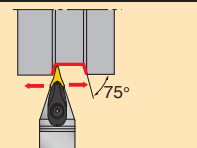
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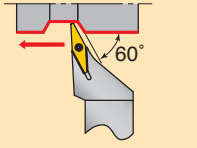
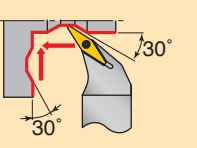
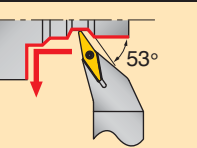
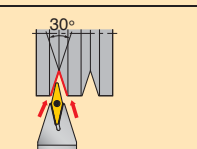


Feed: f (ipr)

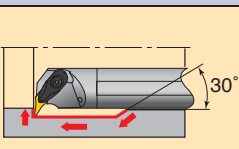
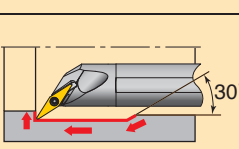
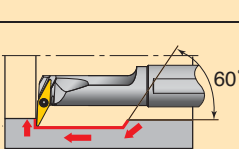
Y Pro Series Product Range

External turning

Toolholder type	
Negative rake	 <p>AVJN R/L Profiling Insert: YNMG 33□ ➔ P. 8</p>
	 <p>AVQN R/L Profiling Insert: YNMG 33□ ➔ P. 8</p>
	 <p>AVVN N Profiling Insert: YNMG 33□ ➔ P. 9</p>

Toolholder type	
Positive rake	 <p>SYJB R/L Spherical surface and taper cutting Insert: YWMT 32.5□ ➔ P. 10</p>
	 <p>SYQB R/L Undercutting Insert: YWMT 32.5□ ➔ P. 10</p>
	 <p>SYHB R/L Retracting Insert: YWMT 32.5□ ➔ P. 11</p>
	 <p>SYIB N "V" grooving Insert: YWMT 32.5□ ➔ P. 11</p>

Internal turning

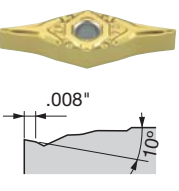
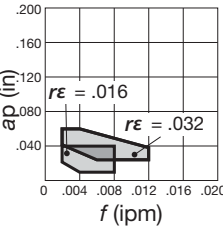
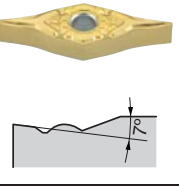
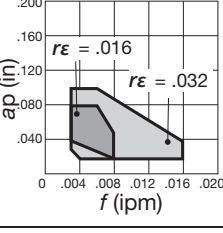
Toolholder type		Shank	Shank dia. øDs (inch)	Min. bore diameter: øDm (inch)					
				0	0.400	0.800	1.200	1.600	2.000
Negative rake	 <p>AVUN R/L Profiling Insert: YNMG 33□ ➔ P. 9</p>	Steel	ø1.250, ø1.500					ø1.563	ø2.000
	 <p>SYQB R/L Undercutting Insert: YWMT 21.7□ ➔ P. 11</p>	Steel Carbide	ø.500, ø.625 ø.500, ø.625		ø.750	ø.875			
Positive rake	 <p>SYUB R/L Spherical surface and taper cutting Insert: YWMT 21.7□ ➔ P. 12</p>	Steel Carbide	ø.625 ø.500, ø.625				ø.1000		
					ø.875	ø.1000			

Standard cutting conditions

Grades	Cutting speed: Vc (sfm)		
	Low carbon steels and alloy steels (< 180HB)	Medium carbon steels and alloy steels (< 240HB)	High carbon steels and alloy steels (< 300HB)
T9125 Coated carbide	720 (500 ~ 1000)	590 (400 ~ 820)	500 (330 ~ 590)
GT730 Coated cermet	820 (500 ~ 1000)	650 (260 ~ 820)	500 (260 ~ 650)

Inserts

25° Rhombic, negative type

Application	Chipbreaker Shape and section	$f - a_p$	Cat. No.		Dimensions (inch)				Stocked grades		
			Inch	Metric	I.C. dia. ϕd	Thickness s	Hole dia. ϕd_1	Corner radius $r\epsilon$	Coated carbide		Coated cermet
									T9125	T9025	GT730
Finishing to medium cutting	ZF 		YNMG 331 ZF	YNMG160404-ZF	.375	.187	.150	.016	●	▲	●
			*YNMG 332 ZF	YNMG160408-ZF				.032	●	▲	●
	ZM 		YNMG 331 ZM	YNMG160404-ZM	.375	.187	.150	.016	●	▲	●
			*YNMG 332 ZM	YNMG160408-ZM				.032	●	▲	●

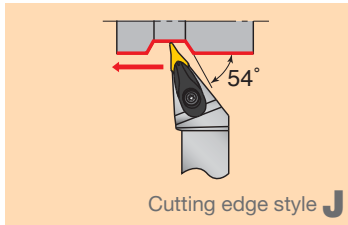
Note: Chipbreaker sections shown above that are marked (*) Cat. Numbers.

Toolholders

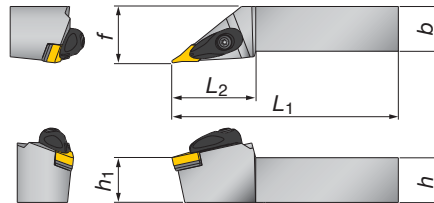
AVJN R/L

External & profiling

A type (Negative rake, Double clamping system)



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



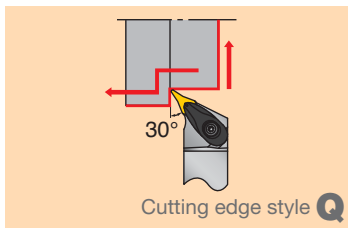
Right hand (R) shown.

Toolholder Cat. No.	Stock		Dimensions (inch)							Std. corner radius $r\epsilon$	Applicable inserts
	R	L	h	b	L_1	L_2	h_1	f	f_1		
AVJNR/L123-A	●	●	0.750	0.750	4.500	1.750	0.750	1.000	-	.031	YNMG 33□
AVJNR/L163-A	●	●	1.000	1.000	6.000	1.875	1.000	1.250	-		

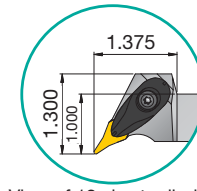
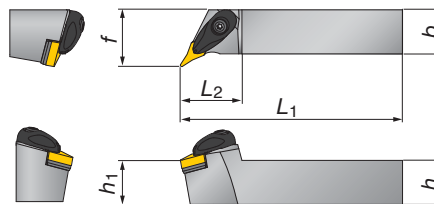
AVQN R/L

External & profiling

A type (Negative rake, Double clamping system)



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



View of 12 size toolholder

Right hand (R) shown.

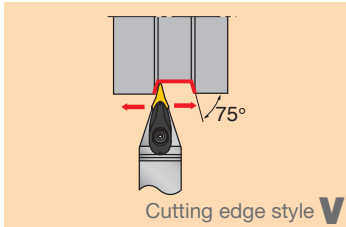
Toolholder Cat. No.	Stock		Dimensions (inch)							Std. corner radius $r\epsilon$	Applicable inserts
	R	L	h	b	L_1	L_2	h_1	f	f_1		
AVQNR/L123-A	●	●	0.750	0.750	4.500	1.375	0.750	1.000	-	.031	YNMG 33□
AVQNR/L163-A	●	●	1.000	1.000	6.000	1.375	1.000	1.250	-		

● : Stocked items
▲ : Discontinued items

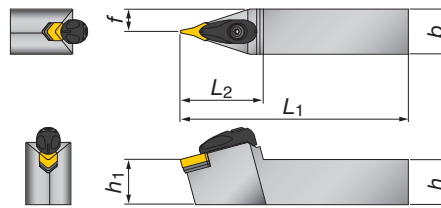
AVN N

External & profiling

A type (Negative rake, Double clamping system)



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

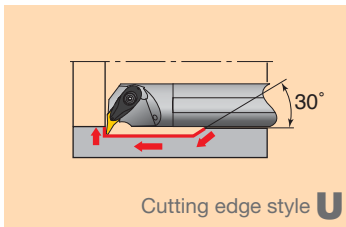


Toolholder Cat. No.	Stock	Dimensions (inch)							Std. corner radius $r\epsilon$	Applicable inserts
		h	b	L_1	L_2	h_1	f	f_1		
AVVNN123-A	●	.750	.750	4.500	1.875	.750	.375	-	.031	YNMG 33□
AVVNN163-A	●	1.000	1.000	6.000	1.875	1.000	.500	-		

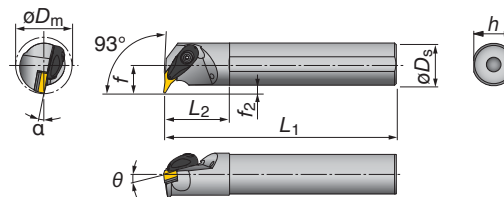
A□□□-AVUN R/L

Internal & profiling

A type (Negative rake, Double clamping system)



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



Right hand (R) shown.

Toolholder Cat. No.	Stock		Min. bore dia. ϕD_m	Dimensions (inch)							Std. corner radius $r\epsilon$	Applicable inserts	
	R	L		ϕD_s	f	L_1	L_2	h	f_2	a			θ
A20-AVUNR/L3-D25	●	●	1.563	1.250	.859	14.000	1.938	1.188	.232	10°	6°	.031	YNMG 33□
A24-AVUNR/L3-D32	●	●	2.000	1.500	1.063	14.000	2.188	1.469	.311	8°			

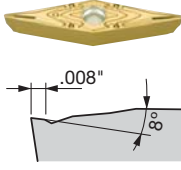
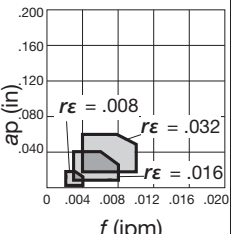
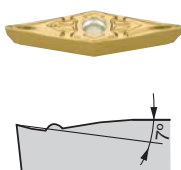
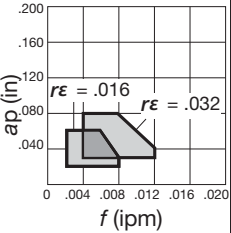
● Replacement parts

Toolholder Cat. No.	Applicable inserts	Clamp	Clamp screw	Shim	Shim screw	Spring	Spring pin	Wrench	Torque (ft-lb)
AVJNR/L (External)	YNMG 33□	ACP3L	ACS-5W	ASV322	CSTB-3.5	BP-7	SP-2.5	T-15F	2.21
AVVNN (External)									
AVQNR/L (External)									
AVUNR/L (Internal)									

● : Stocked items

Inserts

25° Rhombic, positive type

Application	Chipbreaker Shape and section	$f - ap$	Cat. No.		Dimensions (inch)				Stocked grades		
			Inch	Metric	I.C. dia. ϕd	Thickness s	Hole dia. ϕd_1	Corner radius $r\epsilon$	Coated carbide		Coated cermet
									T9125	T9025	GT730
Finishing to medium cutting	ZF 		YWMT 21.70.5 ZF	YWMT11T202-ZF	.184	.109	.091	.008	●	▲	●
			*YWMT 21.71 ZF	YWMT11T204-ZF					.016	●	▲
			YWMT 32.50.5 ZF	YWMT16T302-ZF	.276	.156	.113	.008	●	▲	●
			YWMT 32.51 ZF	YWMT16T304-ZF				.016	●	▲	●
			YWMT 32.52 ZF	YWMT16T308-ZF				.031	●	▲	●
	ZM 		YWMT 21.71 ZM	YWMT11T204-ZM	.184	.109	.091	.016	●	▲	●
			*YWMT 32.51 ZM	YWMT16T304-ZM				.016	●	▲	●
			YWMT 32.52 ZM	YWMT16T308-ZM	.276	.156	.113	.016	●	▲	●
								.031	●	▲	●

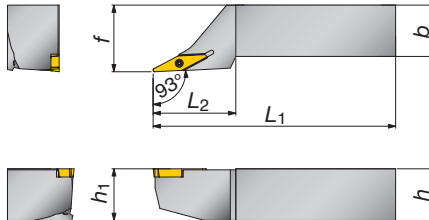
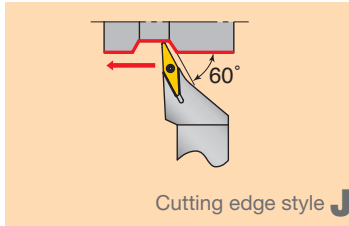
Note: Chipbreaker sections shown above that are marked (*) Cat. Numbers.

Toolholders

SYJB R/L

External, spherical surface cutting & taper cutting

S type (Positive rake, Screw-on system)



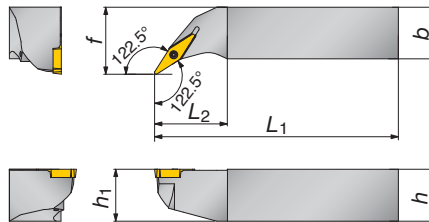
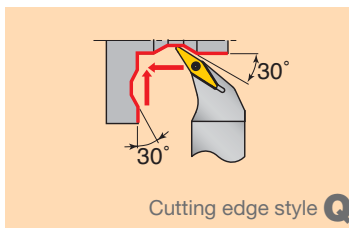
Right hand (R) shown.

Toolholder Cat. No.	Stock		Dimensions (inch)						Std. corner radius $r\epsilon$	Applicable inserts	Replacement parts	
	R	L	h	b	L_1	L_2	h_1	f			Clamping screw	Wrench
SYJBR/L123	●	●	.750	.750	4.500	1.350	.750	1.000	.031	YWMT 32.5□	CSTB-2.5L080	T-8F
SYJBR/L163	●	●	1.000	1.000	6.000	1.500	1.000	1.250				

SYQB R/L

External & undercutting

S type (Positive rake, Screw-on system)



Right hand (R) shown.

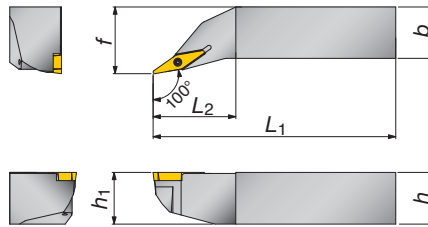
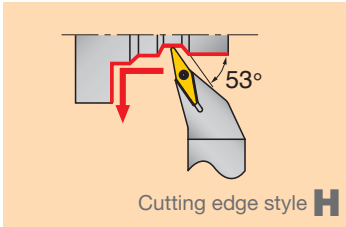
Toolholder Cat. No.	Stock		Dimensions (inch)						Std. corner radius $r\epsilon$	Applicable inserts	Replacement parts	
	R	L	h	b	L_1	L_2	h_1	f			Clamping screw	Wrench
SYQBR/L123	●	●	.750	.750	4.500	1.250	.750	1.000	.031	YWMT 32.5□	CSTB-2.5L080	T-8F
SYQBR/L163	●	●	1.000	1.000	6.000	1.500	1.000	1.250				

● : Stocked items
▲ : Discontinued items

SYHB R/L

External & retracting

S type (Positive rake, Screw-on system)



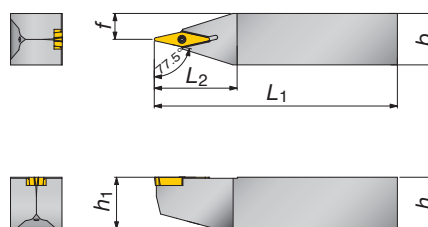
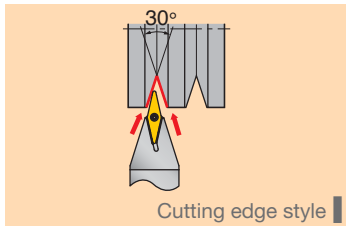
Right hand (R) shown.

Toolholder Cat. No.	Stock		Dimensions (inch)						Std. corner radius $r\epsilon$	Applicable inserts	Replacement parts	
	R	L	h	b	L_1	L_2	h_1	f			Clamping screw	Wrench
SYHBR/L123	●	●	.750	.750	4.500	1.250	.750	1.000	.031	YWMT 32.5□	CSTB-2.5L080	T-8F
SYHBR/L163	●	●	1.000	1.000	6.000	1.600	1.000	1.250				

SYIB N

External & "V" grooving

S type (Positive rake, Screw-on system)

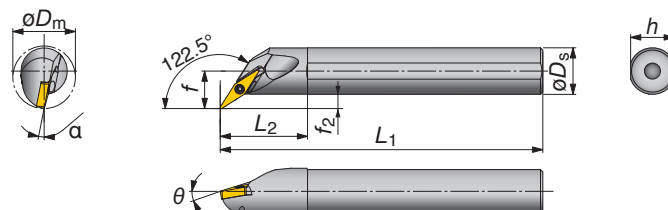
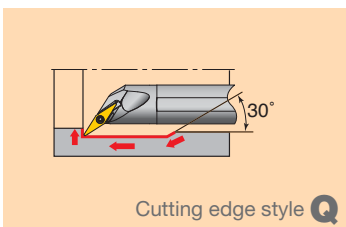


Toolholder Cat. No.	Stock		Dimensions (inch)						Std. corner radius $r\epsilon$	Applicable inserts	Replacement parts	
	R	L	h	b	L_1	L_2	h_1	f			Clamping screw	Wrench
SYIBN123	●		.750	.750	4.500	1.250	.750	.375	.031	YWMT 32.5□	CSTB-2.5L080	T-8F
SYIBN163	●		1.000	1.000	6.000	1.600	1.000	.500				

SYQB R/L

Internal & undercutting

S type (Positive rake, Screw-on system)



Right hand (R) shown.

Steel shank

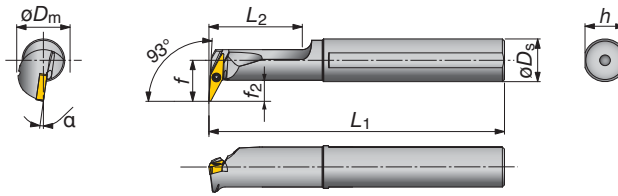
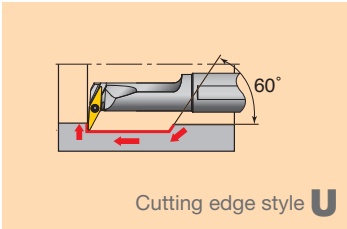
Toolholder Cat. No.	Stock		Min. bore dia. ϕD_m	Dimensions (inch)								Std. corner radius $r\epsilon$	Applicable inserts	Replacement parts		
	R	L		ϕD_s	f	L_1	L_2	h	f_2	θ	α			Clamping screw	Wrench	Torque (ft-lbs)
A08-SYQBR/L2-D12	●		.750	.500	.438	5.000	1.000	.475	.181	5°	10°	.016	YWMT 21.7□	CSTB-2L	T-6F	.37
A10-SYQBR/L2-D14	●		.875	.625	.500	7.000	1.250	.600	.181		8°					

Carbide shank

Toolholder Cat. No.	Stock		Min. bore dia. ϕD_m	Dimensions (inch)								Std. corner radius $r\epsilon$	Applicable inserts	Replacement parts		
	R	L		ϕD_s	f	L_1	L_2	h	f_2	θ	α			Clamping screw	Wrench	Torque (ft-lbs)
E08-SYQBR/L2-D12	●		.750	.500	.438	5.000	1.062	.475	.181	5°	10°	.016	YWMT 21.7□	CSTB-2L	T-6F	.37
E10-SYQBR/L2-D14	●		.875	.625	.500	7.000	1.250	.600	.181		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. ϕD_m	Dimensions (inch)							Std. corner radius $r\epsilon$	Applicable inserts	Replacement parts			
	R	L		ϕD_s	f	L_1	L_2	h	f_2	θ			α	Clamping screw	Wrench	Torque (ft-lbs)
A10-SYUBR/L2-D16	●		1.000	.625	.625	7.000	1.250	.600	.312	0°	8°	.016	YWMT 21.7□	CSTB-2L	T-6F	.37

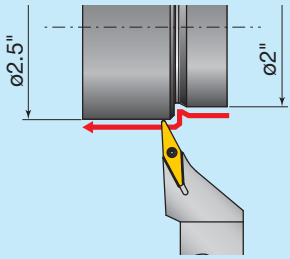
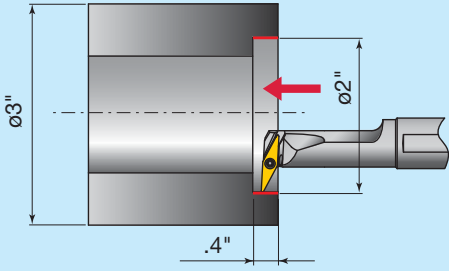
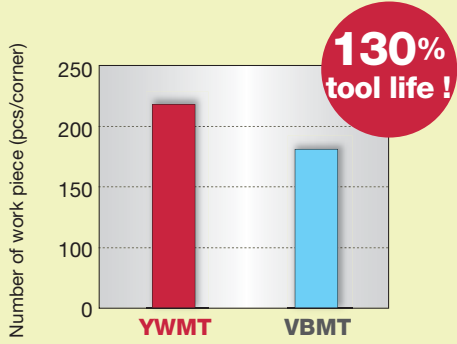
Carbide shank

Toolholder Cat. No.	Stock		Min. bore dia. ϕD_m	Dimensions (inch)							Std. corner radius $r\epsilon$	Applicable inserts	Replacement parts			
	R	L		ϕD_s	f	L_1	L_2	h	f_2	θ			α	Clamping screw	Wrench	Torque (ft-lbs)
E08-SYQBR/L2-D12	●		.875	.500	.563	5.000	1.063	.475	.307	0°	8°	.016	YWMT 21.7□	CSTB-2L	T-6F	.37
E10-SYQBR/L2-D14	●		1.000	.625	.625	7.000	1.250	.600	.307	0°	8°	.016	YWMT 21.7□	CSTB-2L	T-6F	.37

● : Stocked items

Practical examples

Name of workpiece		Pulley ("V" grooving)	Machine part ("V" grooving)
Insert		YNGM 331 ZF	YWMT 32.52 ZF
Grade		GT730	T9125
Toolholder		AVVNN163-A	SYIBN163
Workpiece material		Alloy steel	5120
Cutting conditions	Cutting speed: V_c (sfm)	820	460
	Depth of cut: a_p (inch)	.020	.060
	Feed: f (ipr)	.004 ~ .008	.004 ~ .008
	Coolant	Wet	Wet
Current	Insert	Competitor's special insert	Special grooving insert for roughing, VBMT insert for finishing
	Toolholder	Competitor's special toolholder	Special toolholder for roughing, Left and right hand toolholders for finishing
Results		<p>Chip control was enhanced and tool life improved by 150%</p> <p>Total manufacturing cost reduction of 50%!</p>	<p>Two finishing holders were integrated into ONE Y-Pro tool. Chip control was also improved.</p>

Name of workpiece		Machine part (external profiling)	Automotive part (internal turning)
Insert		YWMT 32.51 ZF	YWMT 21.71 ZF
Grade		GT730	GT730
Toolholder		SYJBR163	A10-SYUBR2-D16
Workpiece material		5120	Alloy steel
			
Cutting conditions	Cutting speed: V_c (sfm)	750	330
	Depth of cut: a_p (inch)	.004 ~ .010	.020
	Feed: f (ipr)	.004 ~ .010	.008
	Coolant	Wet	Wet
Current	Insert	VBMT 33 insert for finishing	VBMT 33 insert for finishing
	Toolholder	Standard external toolholder	Standard internal toolholder
Results		 <p>Number of work piece (pcs/corner)</p> <p>130% tool life !</p> <p>YWMT VBMT</p> <p>Damage on edge is stable due to the improvement of chip evacuation in undercutting.</p>	<p>Chip control and surface finish are improved considerably when internal turning.</p>



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