Tungaloy

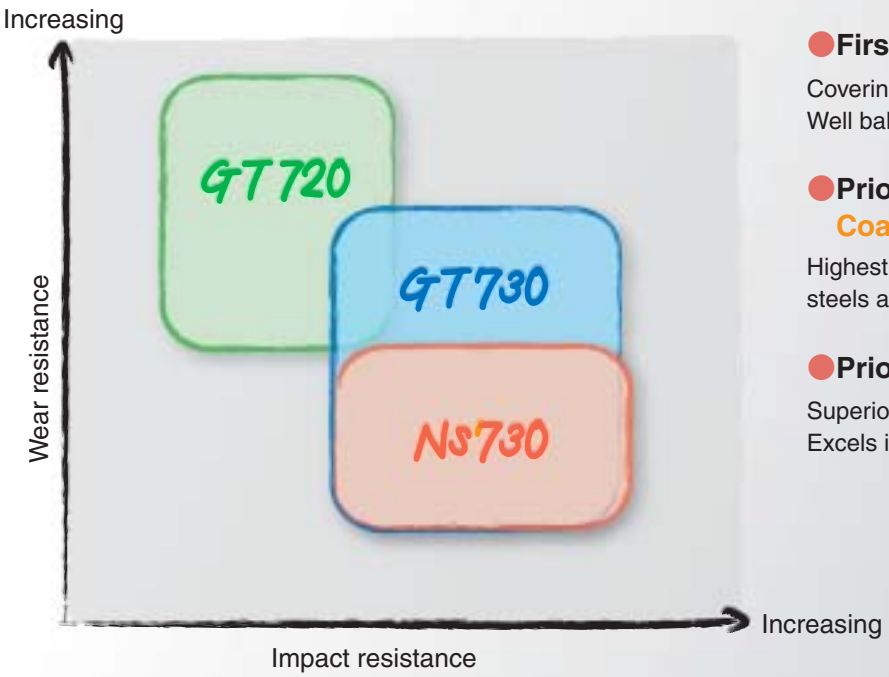
Keeping the Customer First

Tungaloy Report No.354-E

Highly Tough Cermet for Turning

GT/NS700 series

Superfine Cermet Sparkling with Superior Performance



First choice GT730 Coated cermet

Covering a wide range of cutting speeds.
Well balanced surface finish and wear resistance.

Priority on wear resistance GT720
Coated cermet

Highest wear resistance in high speed finishing of steels and cast irons.

Priority on impact resistance NS730

Superior resistance to thermal and mechanical fracture.
Excels in cost performance.

GT/NS700 : New Grain Control Technology Realizing Reinf

For higher-rank improved wear resistance:

Uniformly fine-grained structure

Minimized and uniformly developed wear resulting from the uniformly fine grained hard particles from the inner part to the surface.
Furthermore, due to the well-proven Premium Coat, GT700 series grades realized higher ranked wear resistance.

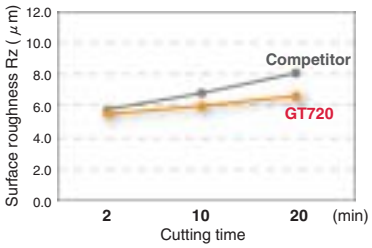
For improved impact resistance:

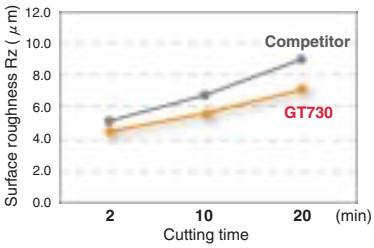
Fine-grained skeleton structure

Fine-grained hard particles composing a skeleton structure contributed to the improved toughness and the higher resistance to mechanical and thermal impacts.

Variation of surface roughness

Due to the smooth insert surface, the finished surface obtained at early stage of machining is excellent in accuracy.
Furthermore, thanks to its fine grain grade, the insert wear develops homogeneously and the degradation of the machined surface proceeds gently.





Cutting conditions

Insert:	CNMG120408
Work material:	Carbon steel JIS S53C (260HB)
Cutting speed:	*Vc*=220m/min
Depth of cut:	a_p=1.0mm
Feed:	*f* =0.15mm/rev
Cutting fluid:	Water soluble type

orced Fine Grain and Smooth Insert Surfaces

New Grain Control Technology

For obtaining higher surface quality:

Smoothed insert surface

Smoothed insert surface vastly improves the quality of the finished surface. In addition, GT700 series inserts with the smooth "Premium Coat", can produce consistently accurate surface finish.

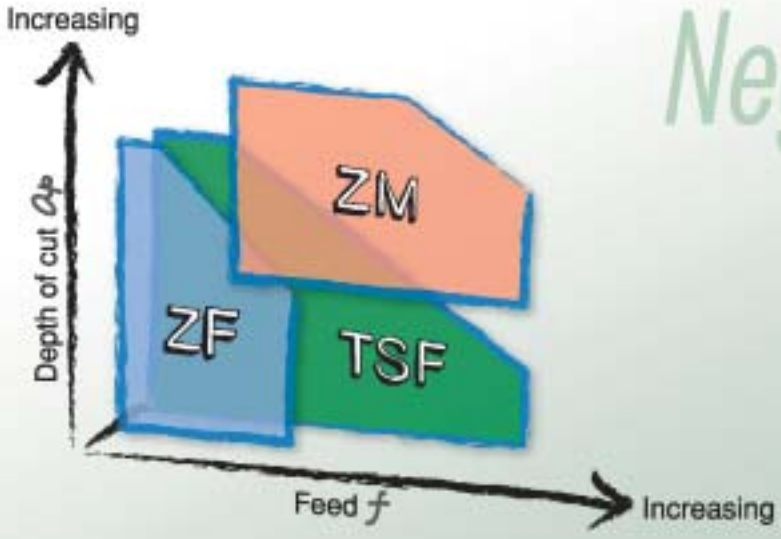
For improved resistance to plastic deformation:

Toughened fine-grain structure

Stable cermet structure obtained by increasing the bonding forces between hard particles suppresses the plastic deformation.

STANDARD CUTTING CONDITIONS

Grade	Cutting speed *Vc* (m/min)			
	Low carbon steels and alloy steels (< 180 HB)	Medium carbon steels and alloy steels (< 240 HB)	High carbon steels and alloy steels (< 300 HB)	Cast irons
GT720 Coated cermet	250 - **300** - 350	150 - **250** - 300	80 - **150** - 250	200 - **250** - 300
GT730 Coated cermet	100 - **250** - 300	80 - **200** - 250	80 - **150** - 200	-
NS730	100 - **200** - 270	80 - **170** - 220	80 - **120** - 180	-



Negative inserts

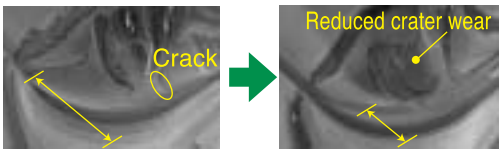
TSF type

First-choice chipbreaker for finishing steels

Improved Chip Control and Thermal Shock

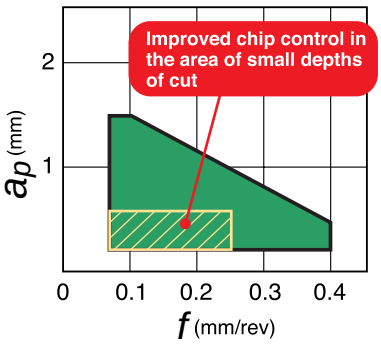
Dimple structure (PATENT PENDING)

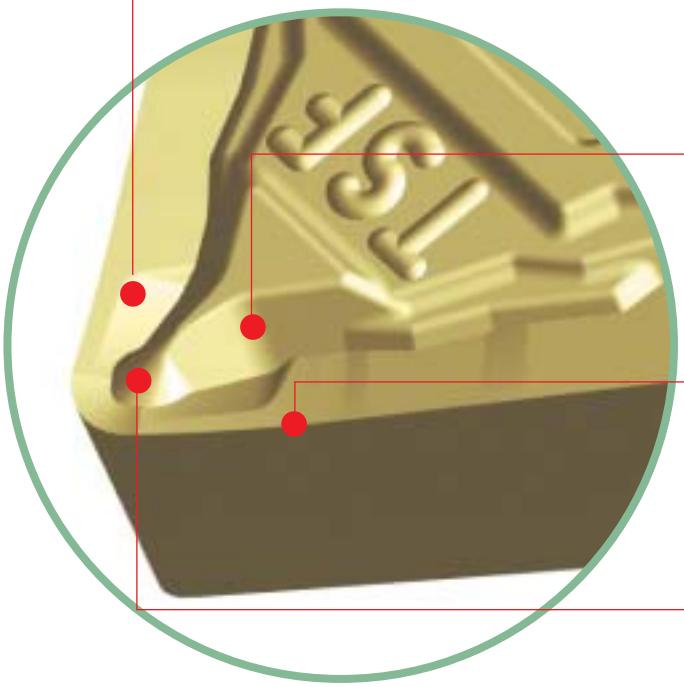
The dimple structure decreases the contact area between the insert surface and chips, resulting in significant reduction of heat occurrence.
⇒Increased resistance to thermal crack



Conventional insert　　TSF type

50 % reduction in contact area compared with conventional chip-breaker





◆Geometry

Chipbreaking protrusion

Smooth streamlined chipbreaker geometry exhausts chips smoothly.
⇒Can suppress chip packing even in large depth of cut and high-feed machining.

Cutting edge inclination

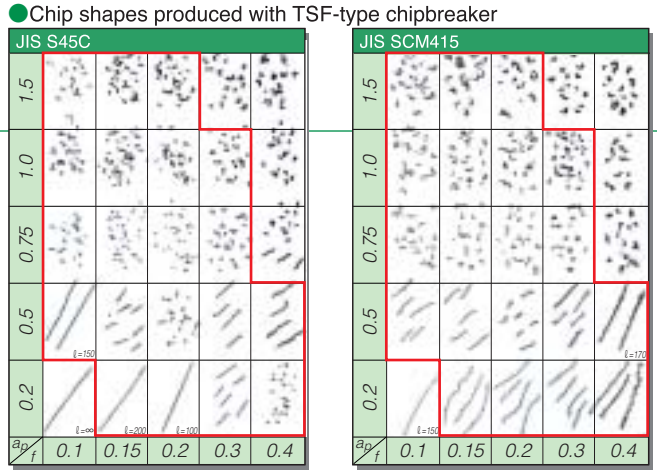
⇒Helps curl and break chips for smooth chip evacuation.

Improved chip control

The well designed three-dimensional protrusion surely curls chips even at small depth of cut smaller than the corner radius.
⇒Can eliminate chip trouble.

Resistance !

● Chip shapes produced with TSF-type chipbreaker



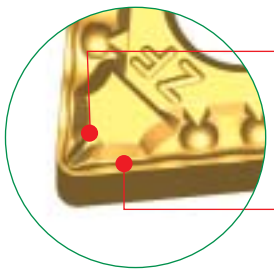
Insert: TNMG160408-TSF
Toolholder: DTGNL2525M16
Cutting speed: *Vc* =200m/min
Cutting fluid: Water soluble type

ZF/ZM types are well suited for profiling where the chips tend to entangle and for turning a radius corner where chip control is troublesome.

ZF type

Chipbreaker for finishing

Applied to profiling and turning of radius corner

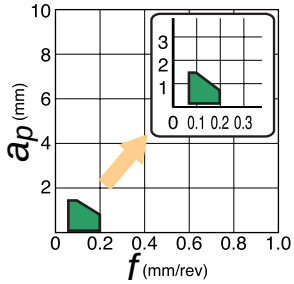


High chip-breaking wall

⇒Chips can not get over the wall even at the upper limit of recommended feeds.

Cutting edge inclination

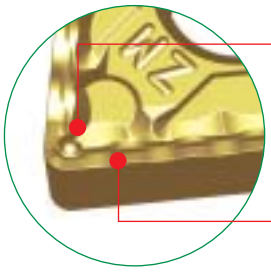
⇒In profiling, by helping chips to curl, enables chips to be broken.
⇒Enables chips to be evacuated smoothly in undercut-



ZM type

Chipbreaker for finishing to medium cutting

Applied to profiling and turning of radius corner

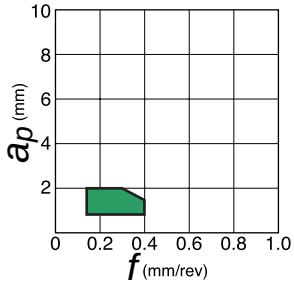


Arc-shaped protrusion & chip-breaking rear wall

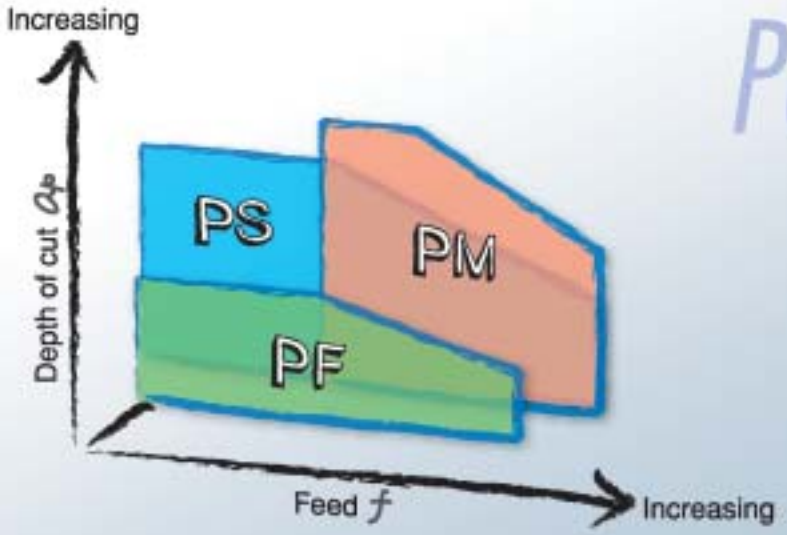
⇒The arc-shaped protrusion controls balancing of chips, realizing good chip control.
⇒In large depths of cut and high-feed machining, the rear chipbreaking wall restrains chips which get over the arc-shaped protrusion.

High inclination

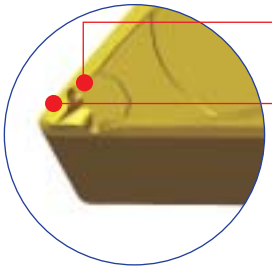
⇒Enables chips to be curled even at a large depth of cut in profiling, minimizing chip packing.
⇒Enables chips to be evacuated smoothly in undercutting.



Positive inserts

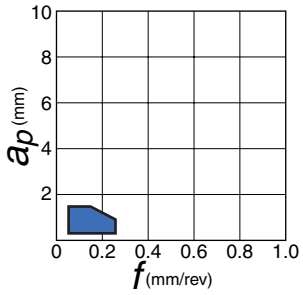


PFtype Chipbreaker for finishing

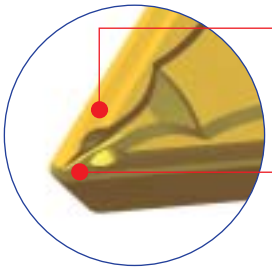


- The land provided with large rake angle contributes to low cutting forces and excellent chattering resistance.
- The wide and deep chip pocket allows restraining chips at small depth of cut.

The cutting edge geometry, designed for providing with low cutting force and excellent resistance to chattering, allows chips to be broken to small size.

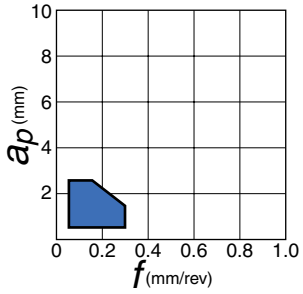


PStype Chipbreaker for finishing to medium cutting

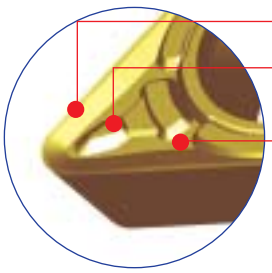


- Large rake angle contributes to low cutting forces.
- Well designed protrusion allows effective chip control in a wide range of depth of cut.

First choice chipbreaker for a wide range of machining.

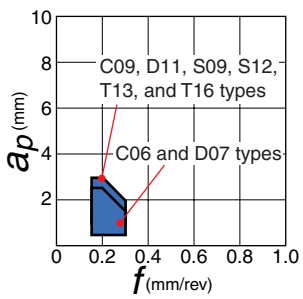


PMtype Chipbreaker for medium cutting



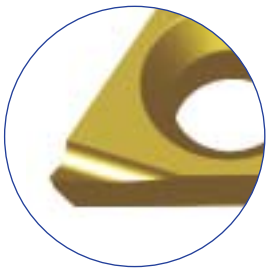
- The positive land allows low force cutting and freer cutting action.
- The wide chip pocket and the narrow width of the protrusion on the corner allow effective chip evacuation.
- The width of the land gradually spreads from the corner suppresses notch wear and edge chipping resulted from chip recutting.

The uniquely designed land of the cutting edge allows suppressing notch wear and chipping-resistant chip control.

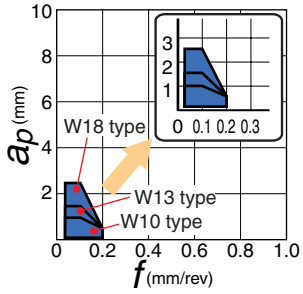


W10/W13/W18 types

Lead-type chipbreaker for finishing



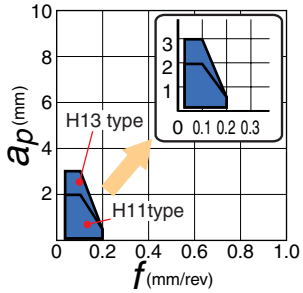
Low cutting-force chipbreakers for precision finishing.
Excels in controlling the direction of chip flow.



H11/H13 types

Parallel type chipbreaker for finishing to medium cutting

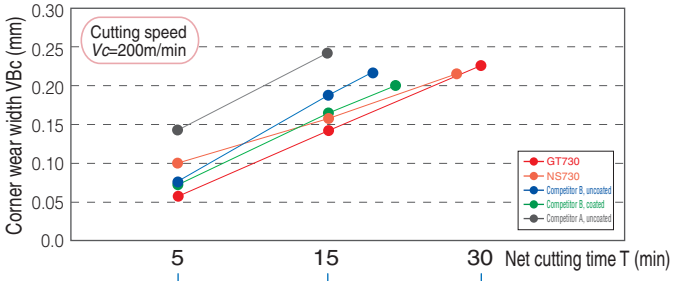
General purpose chipbreaker for finishing to medium cutting.

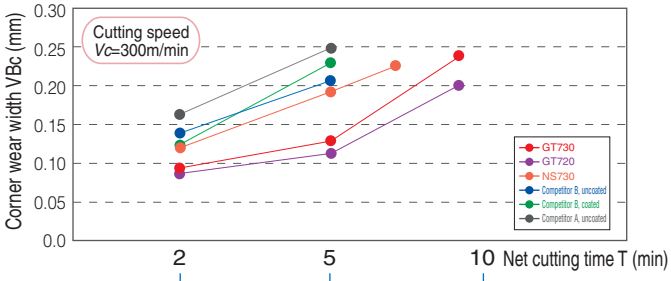


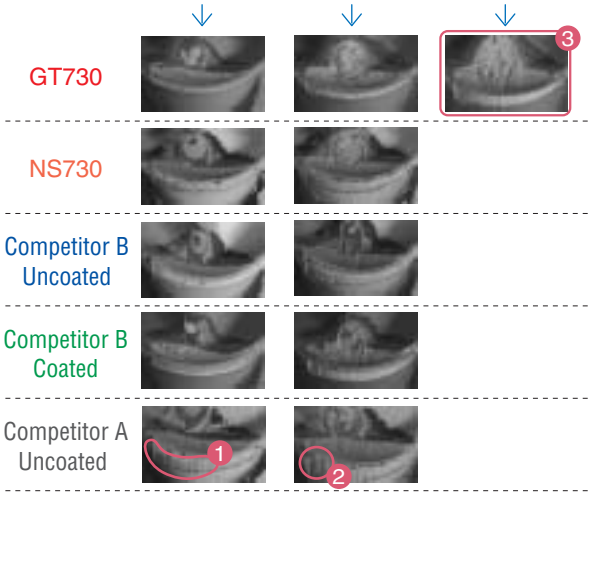
WEAR-RESISTANCE TEST

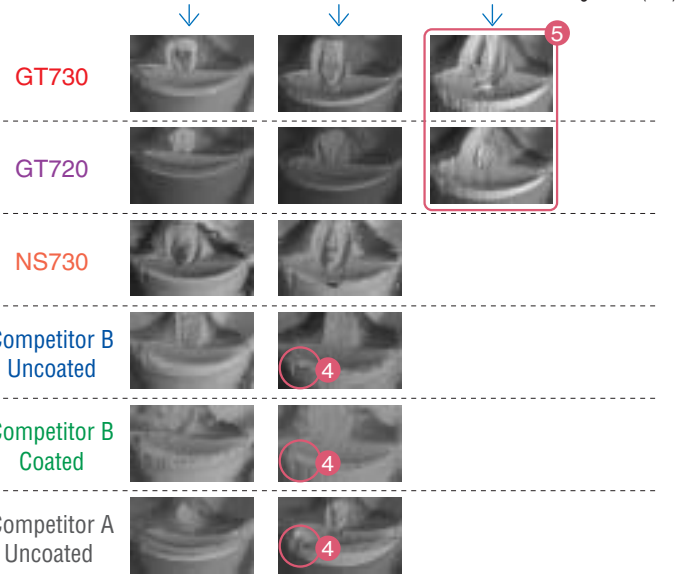
Medium carbon steel (JIS S45C), 240 HB

Depth of cut: *ap*=0.75 mm, Feed: *f*=0.2 mm/rev, Cutting fluid: Water soluble type



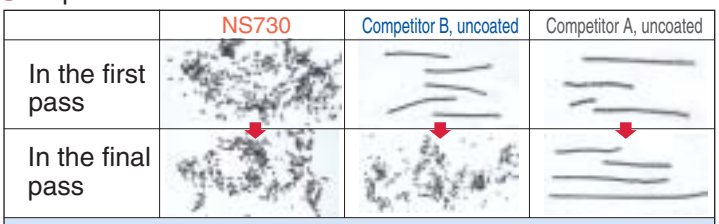






1. Large wear from the early stage of machining. Due to the uneven wear, the machined surface was dim.
2. Due to the increased wear, the cutting edge collapsed and the machined surface was fuzzy. (The test was suspended.)
3. The GT730 insert showed gradual and normal wear. Even when reaching the specified test time, the cutting edge kept the original shape and the machined surface was high quality.
4. Because both inserts of competitor A and B showed excessive wear, the tests were suspended. The inserts were chipped and the machined surfaces were poor quality.
5. GT700 series inserts showed gradual and normal wear. Uneven wear was not observed on these inserts. Even when reaching the specified test time, the surface roughness kept high accuracy.

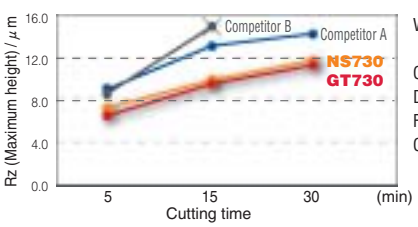
Chips



In the Competitor B's insert, the chip shapes produced in the final stage of machining are widely different from those of the early stage.
This is mainly due to the fact that crater wear formed on the rake face as machining proceeds has a large effect on chip control capabilities.
In the TSF type insert, which is a unique chipbreaker designed to excel in thermal-shock and crater-wear resistance, there is no change in the chip shapes.

VARIOUS TEST RESULTS

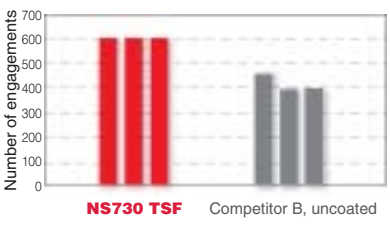
Change in surface roughness



Insert: CNMG120408-TSF
(Competitor A and B's inserts are for finishing)
Work material: Medium carbon steel (JIS S45C)
Cutting speed: *Vc*=200 m/min
Depth of cut: *ap*=0.75 mm
Feed: *f*=0.2 mm/rev
Cutting fluid: Water soluble type

In the early stage of machining, the ultra smoothness of the insert surface contributes to produce a highly accurate surface. As the machining proceeds, the homogeneously fine grained structure contributes to moderate proceeding of the cutting edge wear and less surface deterioration.

Thermal shock resistance test

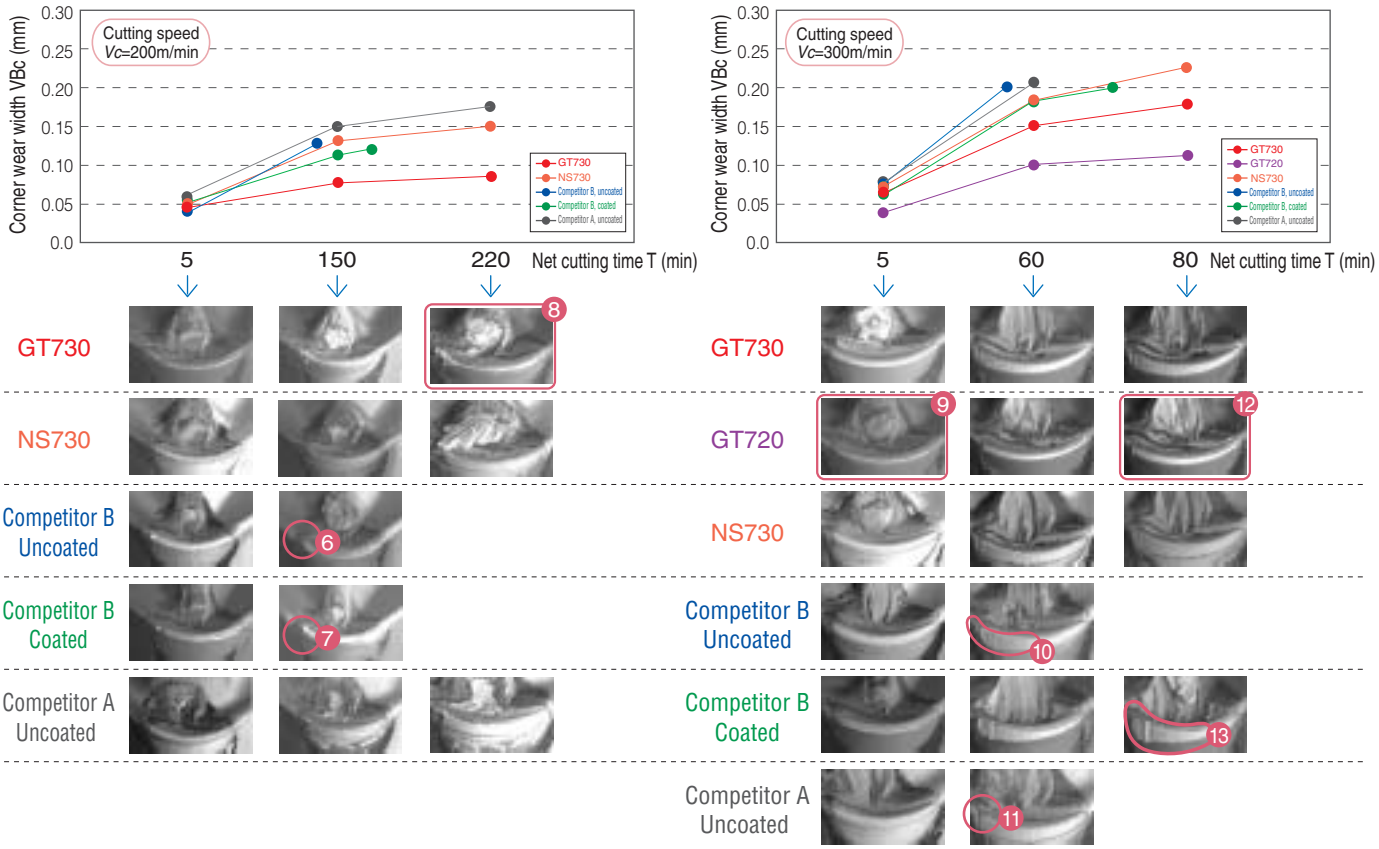


Insert: CNMG120408-TSF
(Competitor B's insert is for finishing)
Work material: Medium carbon steel (JIS S45C)
Cutting speed: *Vc*=200 m/min
Depth of cut: *ap*=1.5 mm
Feed: *f*=0.25 mm/rev
Cutting fluid: Water soluble type

These cutting tests were severe tests in which thermal and mechanical impacts, simulating real part machining, are alternatively applied to the insert.
Superior toughness of the NS730 grade having the skeleton structure was proven in these tests.

Chromium molybdenum steel (JIS SCM415), 175 HB

Depth of cut: *ap*=0.75 mm, Feed: *f*=0.2 mm/rev, Cutting fluid: Water soluble type



6 After 140 minutes of machining, chipping occurred. The test was stopped.

7 The cutting edge engaging in machining begins to collapse. The machined surface has lost the lustrous surface. After 170 minutes of machining, flaking of the coating was observed and the test was stopped.

8 The corner wear width of GT730 insert was VBc < 0.1 mm, it proved this grade had extremely high wear resistance.
Chip welding on the cutting edge was not observed and the surface finish kept high quality.

9 Wear of GT720 insert in the early stage of machining was overwhelmingly smaller than those of other grades.

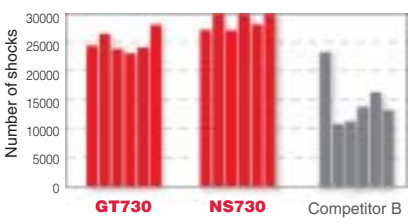
10 After 50 minutes of machining, the corner wear width exceeded VBc=0.2 mm. The test was stopped.

11 The cutting edge engaging in machining begins to collapse. The machined surface has lost the lustrous surface.

12 Even when reaching the specified test time, the corner wear width was VBc=0.13 mm, keeping the original edge shape. The surface roughness kept high quality and the insert was able to continue machining.

13 After 70 minutes of machining, the corner wear width exceeded VBc=0.2 mm. The test was stopped.

Impact resistance test

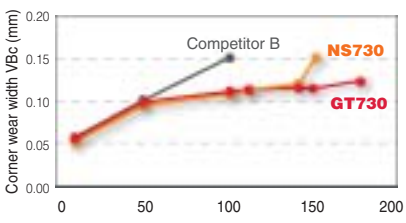


Insert: CNMG120408-TSF
(Competitor B's insert is for finishing)
Workpiece: Medium carbon steel (JIS S45C) with four slots axially
Cutting speed: *Vc*=150 m/min
Depth of cut: *ap*=0.5 mm
Feed: *f*=0.2 mm/rev
Cutting fluid: Dry cutting

■Test procedure
Tool life criterion: Cutting edge fracture
Objective number of shocks: 30,000 shocks The tests were carried out six times usingdifferent lots of workpieces.

The workpieces used in these tests had four slots cut axially along the bar. To eliminate the factor of thermal shocks, tests were carried out in dry conditions. Without lot-to-lot variation, test results proved that both grades, due to the fine grained and reinforced skeleton structure, were far superior to conventional cermet grades.

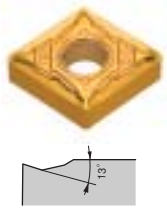
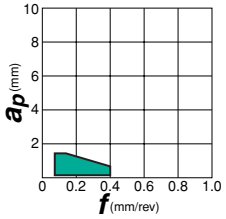
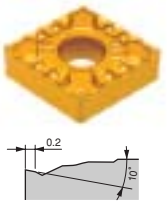
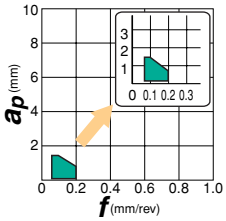
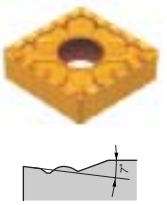
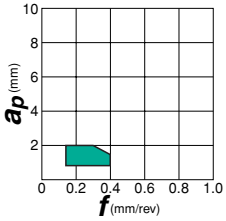
Machining tests using ground inserts



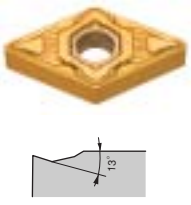
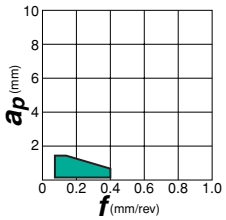
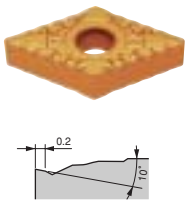
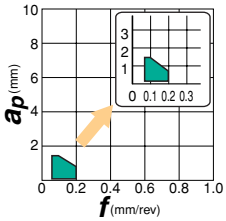
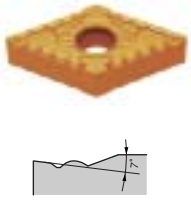
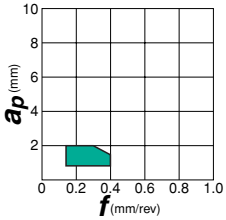
Insert: TPGH110304-W13
(Competitor B's insert: Uncoated, ground insert with angular chipbreaker)
Toolholder: ø16 mm, steel shank, 25 mm overhang
Workpiece: Medium carbon steel (JIS S45C)
Cutting speed: Vc=100 m/min
Depth of cut: ap=0.1 mm
Feed: f=0.12 mm/rev
Cutting fluid: Water soluble type
Tool life criterion: VBc=0.15 mm

Due to the homogeneously fine-grained grade, GT730 excels in sharpness of the ground edge. In the test, wear of GT730 gently proceeded. After 180 minutes of machining, the wear width of the cutting edge was smaller than those of other grades.

80° Rhombic, Negative

Application	Chipbreaker Appearance (Cross section)	ap-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	Coated cermet GT730	Cermet NS730
Finishing	**TSF** 		※CNMG120404-TSF	12.70	4.76	5.16	0.4	●	●	●
			CNMG120408-TSF				0.8	●	●	●
Finishing to medium cutting	**ZF** 		CNMG120404-ZF	12.70	4.76	5.16	0.4	●	●	●
			※CNMG120408-ZF				0.8	●	●	●
Medium cutting	**ZM** 		※CNMG120408-ZM	12.70	4.76	5.16	0.8	●	●	●
			CNMG120412-ZM				1.2		●	●

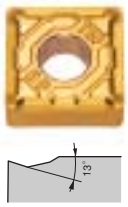
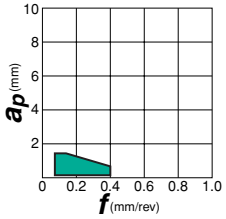
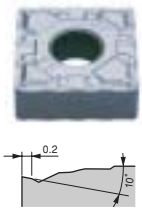
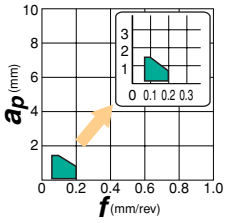
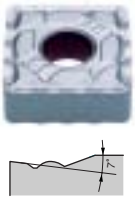
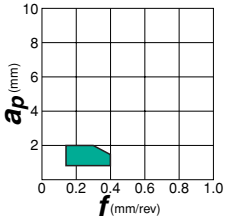
55° Rhombic, Negative

Application	Chipbreaker Appearance (Cross section)	ap-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	Coated cermet GT730	Cermet NS730
Finishing	**TSF** 		DNMG150404-TSF	12.70	4.76	5.16	0.4	●	●	●
			※DNMG150408-TSF				0.8	●	●	●
			DNMG150604-TSF		6.35		0.4	●	●	
			DNMG150608-TSF				0.8		●	
Finishing to medium cutting	**ZF** 		DNMG150404-ZF	12.70	4.76	5.16	0.4	●	●	●
			※DNMG150408-ZF				0.8	●	●	●
Medium cutting	**ZM** 		※DNMG150408-ZM	12.70	4.76	5.16	0.8	●	●	●
			DNMG150412-ZM				1.2		●	●

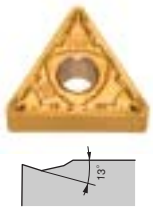
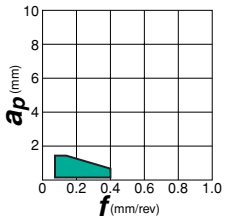
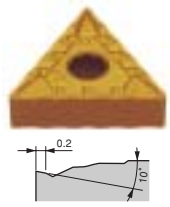
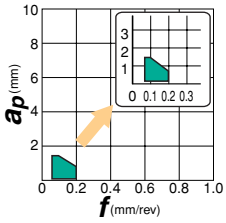
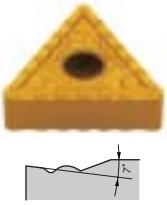
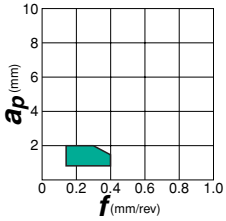
Note: Cross section of chipbreaker is of ※ marked Cat.No.

● : Stocked in Japan

90° Square, Negative

Application	Chipbreaker Appearance (Cross section)	ap-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	GT730	Cermet NS730
Finishing	**TSF** 		**SNMG120404-TSF**	12.70	4.76	5.16	0.4		●	
			※**SNMG120408-TSF**				0.8		●	●
Finishing	**ZF** 		**SNMG120404-ZF**	12.70	4.76	5.16	0.4			●
			※**SNMG120408-ZF**				0.8			●
Finishing to medium cutting	**ZM** 		※**SNMG120408-ZM**	12.70	4.76	5.16	0.8			●
			SNMG120412-ZM				1.2			●

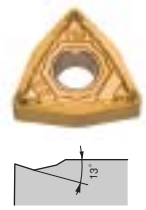
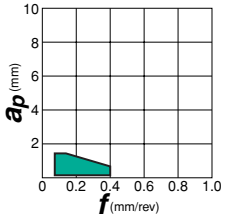
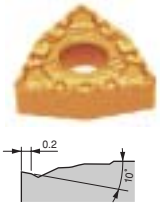
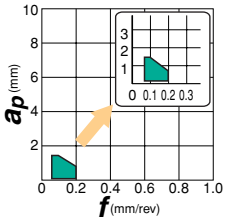
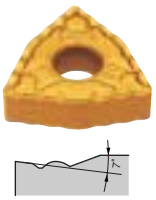
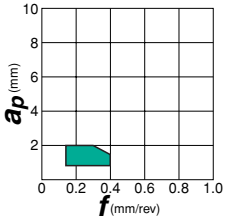
60° Triangular, Negative

Application	Chipbreaker Appearance (Cross section)	ap-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	GT730	Cermet NS730
Finishing	**TSF** 		**TNMG160402-TSF**	9.525	4.76	3.81	0.2		●	●
			※**TNMG160404-TSF**				0.4	●	●	●
			TNMG160408-TSF				0.8	●	●	●
			TNMG160412-TSF				1.2	●	●	●
Finishing	**ZF** 		**TNMG160404-ZF**	9.525	4.76	3.81	0.4	●	●	●
			※**TNMG160408-ZF**				0.8	●	●	●
Finishing to medium cutting	**ZM** 		**TNMG160404-ZM**	9.525	4.76	3.81	0.4	●	●	●
			※**TNMG160408-ZM**				0.8	●	●	●
			TNMG160412-ZM				1.2			●
			TNMG220408-ZM	12.70	4.76	5.16	0.8			●
			TNMG220412-ZM				1.2			●

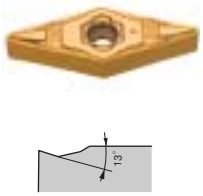
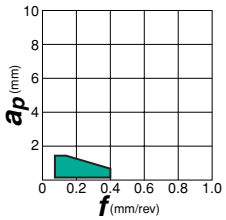
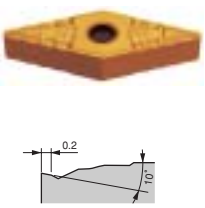
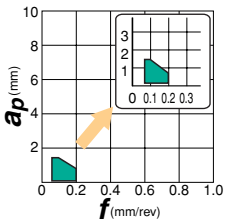
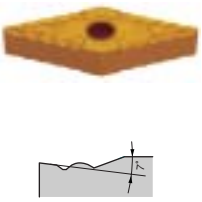
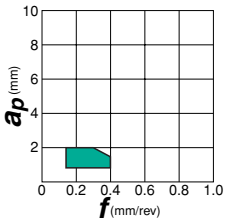
Note: Cross section of chipbreaker is of ※ marked Cat.No.

● : Stocked in Japan

80° Trigon, Negative

Application	Chipbreaker Appearance (Cross section)	ap-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	Coated cermet GT730	Cermet NS730
Finishing	**TSF** 		**WNMG080404-TSF**	12.70	4.76	5.16	0.4	●	●	●
			※**WNMG080408-TSF**				0.8		●	●
Finishing	**ZF** 		**WNMG080404-ZF**	12.70	4.76	5.16	0.4	●	●	●
			※**WNMG080408-ZF**				0.8	●	●	●
Finishing to medium cutting	**ZM** 		※**WNMG080408-ZM**	12.70	4.76	5.16	0.8	●	●	●
			WNMG080412-ZM				1.2			●

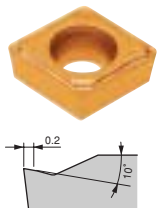
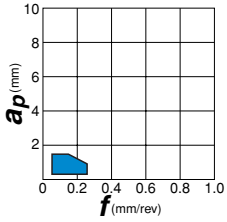
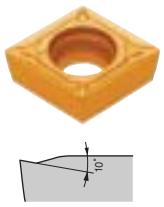
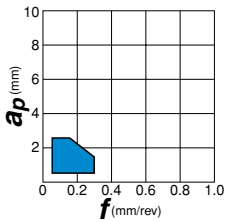
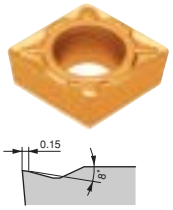
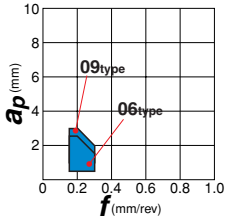
35° Rhombic, Negative

Application	Chipbreaker Appearance (Cross section)	ap-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	Coated cermet GT730	Cermet NS730
Finishing	**TSF** 		**VNMG160402-TSF**	9.525	4.76	3.81	0.2		●	●
			※**VNMG160404-TSF**				0.4	●	●	●
			VNMG160408-TSF				0.8	●	●	●
Finishing to medium cutting	**ZF** 		**VNMG160404-ZF**	12.70	4.76	5.16	0.4	●	●	●
			※**VNMG160408-ZF**				0.8	●	●	●
Finishing to medium cutting	**ZM** 		※**VNMG160408-ZM**	12.70	4.76	5.16	0.8	●	●	●
			VNMG160412-ZM				1.2			●

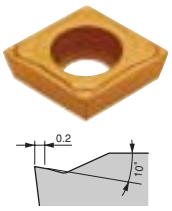
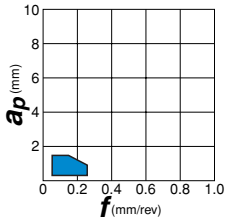
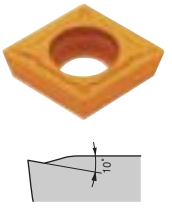
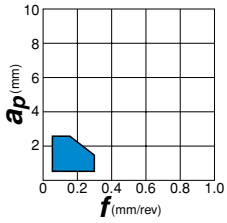
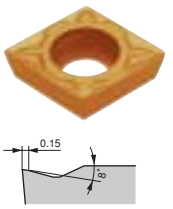
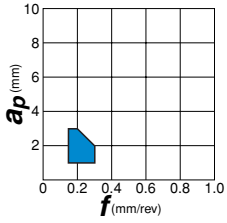
Note: Cross section of chipbreaker is of ※ marked Cat.No.

● : Stocked in Japan

80° Rhombic, 7° Positive, with Hole

Application	Chipbreaker Appearance (Cross section)	*ap-f*	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	GT730	Cermet NS730
Finishing	**PF** 		**CCMT060202-PF**	6.35	2.38	2.8	0.2		●	●
			CCMT060204-PF				0.4		●	●
			CCMT060208-PF				0.8		●	●
			CCMT09T302-PF	9.525	3.97	4.4	0.2			●
			CCMT09T304-PF				0.4		●	●
			※**CCMT09T308-PF**				0.8		●	●
Finishing to medium cutting	**PS** 		**CCMT060202-PS**	6.35	2.38	2.8	0.2		●	●
			CCMT060204-PS				0.4		●	●
			CCMT060208-PS				0.8		●	●
			CCMT09T302-PS	9.525	3.97	4.4	0.2		●	●
			※**CCMT09T304-PS**				0.4		●	●
			CCMT09T308-PS				0.8		●	●
Medium cutting	**PM** 		**CCMT060204-PM**	6.35	2.38	2.8	0.4		●	●
			CCMT060208-PM				0.8		●	●
			CCMT09T304-PM	9.525	3.97	4.4	0.4		●	●
			※**CCMT09T308-PM**				0.8		●	●

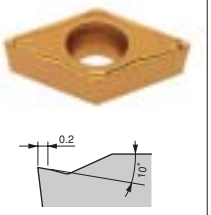
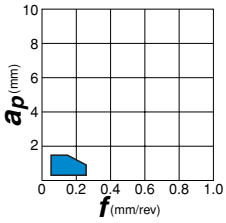
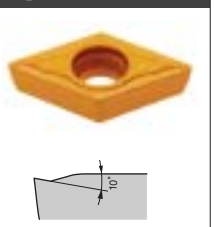
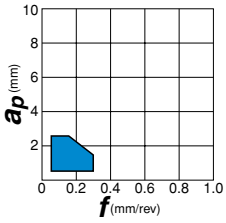
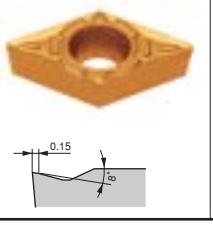
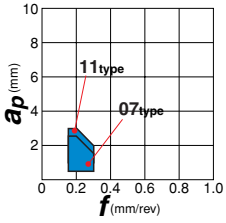
80° Rhombic, 11° Positive, with Hole

Application	Chipbreaker Appearance (Cross section)	*ap-f*	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	GT730	Cermet NS730
Finishing	**PF** 		**CPMT090302-PF**	9.525	3.18	4.4	0.2		●	●
			※**CPMT090304-PF**				0.4		●	●
			CPMT090308-PF				0.8			●
Finishing to medium cutting	**PS** 		**CPMT060202-PS**	6.35	2.38	2.8	0.2		●	●
			CPMT060204-PS				0.4		●	●
			CPMT080202-PS	7.94	2.38	3.4	0.2		●	●
			CPMT080204-PS				0.4		●	●
			CPMT080208-PS				0.8		●	●
			※**CPMT090304-PS**	9.525	3.18	4.4	0.4		●	●
			CPMT090308-PS				0.8		●	●
Medium cutting	**PM** 		※**CPMT090304-PM**	9.525	3.18	4.4	0.4		●	●
			CPMT090308-PM				0.8		●	●

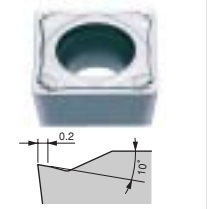
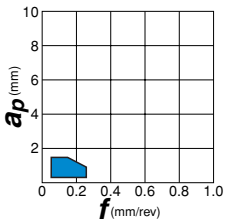
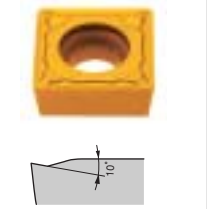
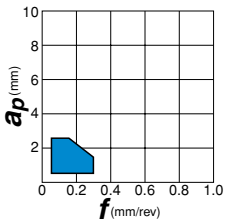
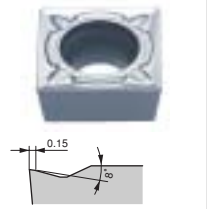
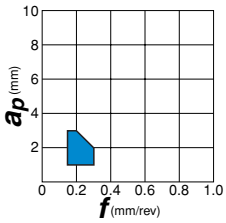
Note: Cross section of chipbreaker is of ※ marked Cat.No.

● : Stocked in Japan

55° Rhombic, 7° Positive, with Hole

Application	Chipbreaker Appearance (Cross section)	ap-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	GT730	Cermet NS730
Finishing	PF 		DCMT070202-PF	6.35	2.38	2.8	0.2		●	●
			DCMT070204-PF				0.4		●	●
			DCMT070208-PF				0.8		●	●
			DCMT11T302-PF	9.525	3.97	4.4	0.2		●	●
			DCMT11T304-PF				0.4		●	●
			※DCMT11T308-PF				0.8		●	●
Finishing to medium cutting	PS 		DCMT070202-PS	6.35	2.38	2.8	0.2		●	●
			DCMT070204-PS				0.4		●	●
			DCMT070208-PS				0.8		●	●
			DCMT11T302-PS	9.525	3.97	4.4	0.2		●	●
			※DCMT11T304-PS				0.4		●	●
			DCMT11T308-PS				0.8		●	●
Medium cutting	PM 		DCMT070204-PM	6.35	2.38	2.8	0.4		●	●
			DCMT070208-PM				0.8		●	●
			DCMT11T304-PM	9.525	3.97	4.4	0.4		●	●
			※DCMT11T308-PM				0.8		●	●

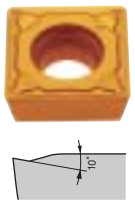
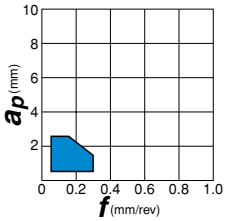
90° Square, 7° Positive, with Hole

Application	Chipbreaker Appearance (Cross section)	ap-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	GT730	Cermet NS730
Finishing	PF 		※SCMT09T304-PF	9.525	3.97	4.4	0.4			●
			SCMT09T308-PF				0.8			●
Finishing to medium cutting	PS 		※SCMT09T304-PS	9.525	3.97	4.4	0.4		●	●
			SCMT09T308-PS				0.8		●	●
			SCMT120404-PS	12.70	4.76	5.5	0.4		●	●
			SCMT120408-PS				0.8		●	●
Medium cutting	PM 		※SCMT09T304-PM	9.525	3.18	4.4	0.4			●
			SCMT09T308-PM				0.8			●
			SCMT120408-PM	12.70	4.76	5.5	0.8			●
			SCMT120412-PM				1.2			●

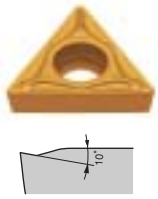
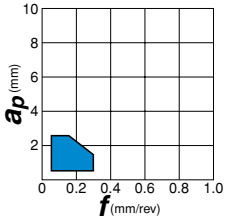
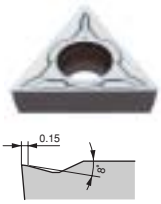
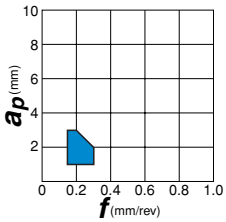
Note: Cross section of chipbreaker is of ※ marked Cat.No.

● : Stocked in Japan

90° Square, 11° Positive, with Hole

Application	Chipbreaker Appearance (Cross section)	ap-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	GT730	Cermet NS730
Finishing to medium cutting	PS 		SPMT090304-PS	9.525	3.97	4.4	0.4		●	●
			SPMT090308-PS				0.8		●	●
			SPMT120404-PS	12.70	4.76	5.5	0.4		●	●
			※SPMT120408-PS				0.8		●	●

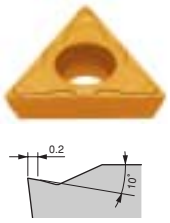
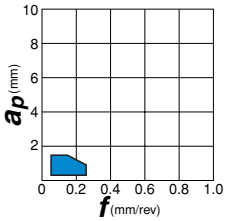
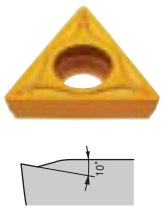
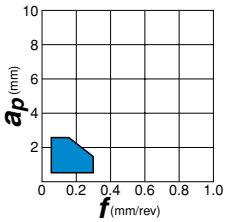
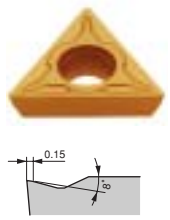
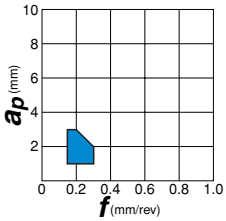
60° Triangular, 7° positive, with Hole

Application	Chipbreaker Appearance (Cross section)	ap-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	GT730	Cermet NS730
Finishing to medium cutting	PS 		TCMT110202-PS	6.35	2.38	2.8	0.2		●	●
			※TCMT110204-PS				0.4		●	●
			TCMT110208-PS				0.8		●	●
			TCMT16T304-PS	9.525	3.97	4.4	0.4		●	●
			TCMT16T308-PS				0.8		●	●
Medium cutting	PM 		TCMT110204-PM	6.35	2.38	2.8	0.4			●
			TCMT110208-PM				0.8			●
			※TCMT16T304-PM	9.525	3.97	4.4	0.4			●
			TCMT16T308-PM				0.8			●

Note: Cross section of chipbreaker is of ※ marked Cat.No.

● : Stocked in Japan

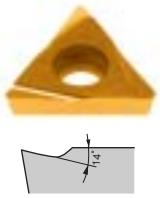
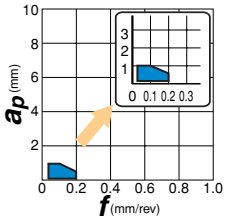
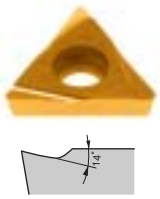
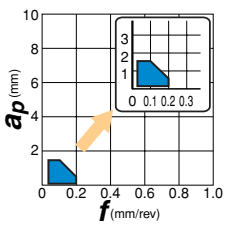
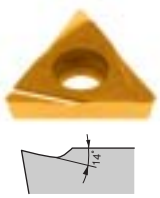
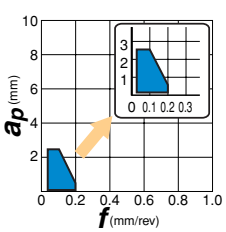
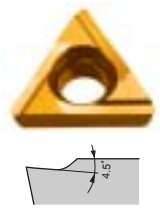
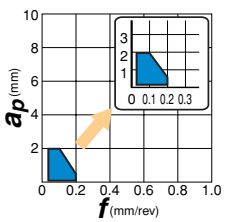
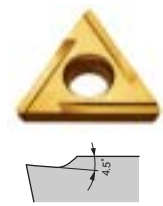
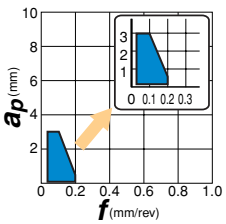
60° Triangular, 11° Positive, with Hole

Application	Chipbreaker Appearance (Cross section)	*ap-f*	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(φ)	Corner radius	Stocked grades Coated cermet GT720	GT730	Cermet NS730
Finishing	**PF** 		**TPMT110204-PF**	6.35	2.38	2.8	0.4		●	●
			TPMT110208-PF				0.8		●	●
			TPMT110302-PF		3.18	3.4	0.2			●
			TPMT110304-PF				0.4		●	●
			TPMT130304-PF	7.94	3.18	3.4	0.4		●	●
			TPMT130308-PF				0.8			●
			※**TPMT16T304-PF**	9.525	3.97	4.4	0.4		●	●
			TPMT16T308-PF				0.8			●
Finishing to medium cutting	**PS** 		**TPMT090202-PS**	5.56	2.38	2.5	0.2		●	●
			TPMT090204-PS				0.4		●	●
			TPMT090208-PS				0.8		●	●
			TPMT110202-PS	6.35	2.38	2.8	0.2		●	●
			※**TPMT110204-PS**				0.4		●	●
			TPMT110208-PS				0.8		●	●
			TPMT110304-PS		3.18	3.4	0.4		●	●
			TPMT110308-PS				0.8		●	●
			TPMT130302-PS	7.94	3.18	3.4	0.2		●	●
			TPMT130304-PS				0.4		●	●
			TPMT130308-PS				0.8		●	●
			TPMT16T304-PS	9.525	3.97	4.4	0.4		●	●
			TPMT16T308-PS				0.8		●	●
Medium cutting	**PM** 		**TPMT110204-PM**	6.35	2.38	2.8	0.4		●	●
			TPMT110208-PM				0.8		●	●
			TPMT110304-PM	9.525	2.38	2.8	0.4		●	●
			TPMT110308-PM				0.8			●
			TPMT130304-PM	7.94	3.18	3.4	0.4		●	●
			TPMT130308-PM				0.8		●	●
			※**TPMT16T304-PM**	9.525	3.97	4.4	0.4		●	●
			TPMT16T308-PM				0.8			●

Note: Cross section of chipbreaker is of ※ marked Cat.No.

● : Stocked in Japan

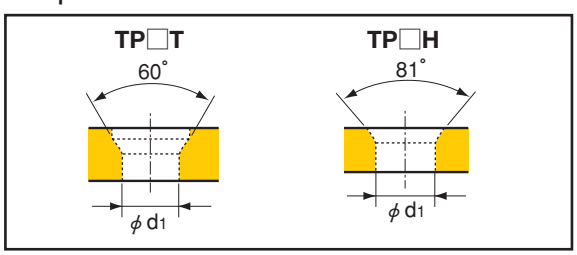
60° Triangular, 11° Positive, with Hole

Application	Chipbreaker Appearance (Cross section)	a_p-f	Insert Cat. No. (Metric)	Dimensions (mm) I.C. dia.	Thickness	Hole dia.(ϕ)	Corner radius	Stocked grades Coated cermet GT720	Coated cermet GT730	Cermet NS730
Finishing	W10 		※TPGH080202R-W10	4.76	2.38	2.3	0.2			●
			TPGH080202L-W10						●	●
			TPGH080204R-W10				0.4			●
			TPGH080204L-W10						●	●
			TPGH090202R-W10	5.56	2.38	3.0	0.2			●
			TPGH090202L-W10						●	●
			TPGH090204R-W10				0.4			●
			TPGH090204L-W10						●	●
	W13 		※TPGH110202R-W13	6.35	2.38	3.4	0.2			●
			TPGH110202L-W13						●	●
			TPGH110204R-W13				0.4			●
			TPGH110204L-W13						●	●
			TPGH110302R-W13		3.18	3.4	0.2			●
			TPGH110302L-W13						●	●
			TPGH110304R-W13				0.4			●
			TPGH110304L-W13						●	●
	W18 		※TPGH160302R-W18	9.525	3.18	4.5	0.2			●
			TPGH160302L-W18						●	●
			TPGH160304R-W18				0.4			●
			TPGH160304L-W18						●	●
Finishing to medium cutting	H11 		※TPGH110302R-H11	6.35	3.18	3.4	0.2			●
			TPGH110302L-H11						●	●
			TPGH110304R-H11				0.4			●
			TPGH110304L-H11						●	●
	H13 		※TPGH160304R-H13	9.525	3.18	4.5	0.4			●
			TPGH160304L-H13						●	●

Note: Cross section of chipbreaker is of ※ marked Cat.No.

● : Stocked in Japan

●Specification of insert hole



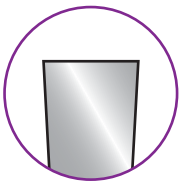
ϕ d1

	0802□□	0902□□	1102□□	1103□□	1303□□	1603□□	16T3□□
TP□T	–	2.5	2.8	3.4	3.4	–	4.4
TP□H	2.3	3.0	3.4	3.4	–	4.5	–

GB type Newly Added NS730

Applicable for various grooving and a wide range of groove widths.

●Edge geometries



GB type

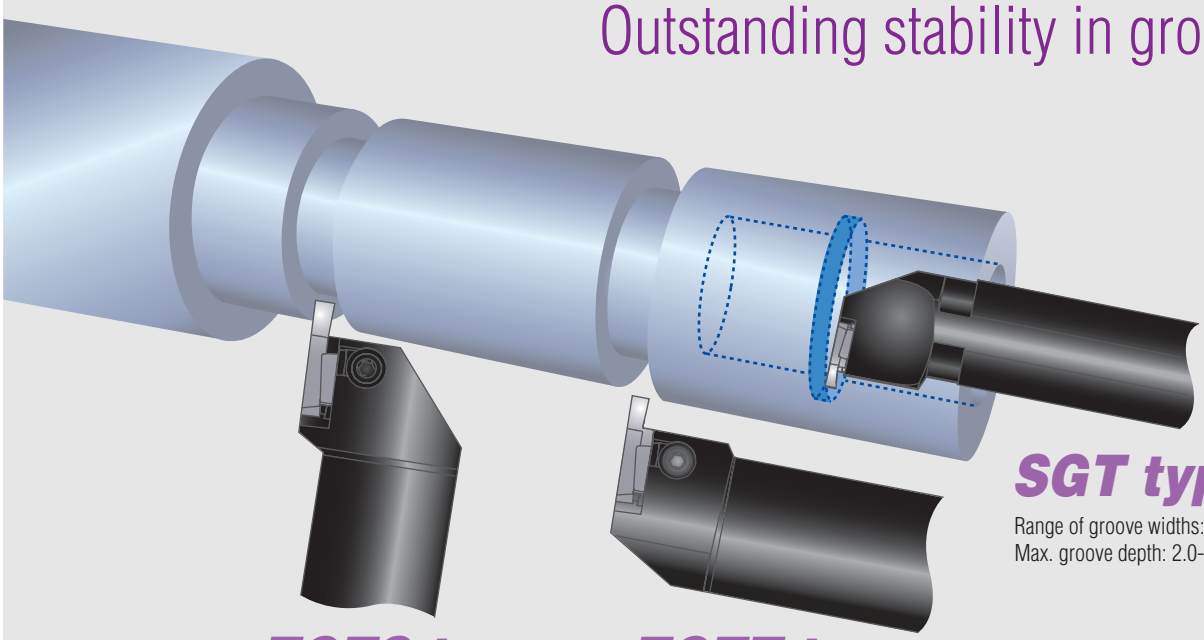
Groove shape:
Normal groove (square groove)
Range of groove widths:
0.33 mm - 4.5 mm

GB-R type

Groove shape:
Full radius (round groove)
Range of groove widths:
1.0 mm(0.5R) - 4.0 mm (2R)

TGTS, TGTT, and SGT types 3-corner grooving tools

Outstanding stability in grooving.



SGT type

Range of groove widths: 0.33-4.5 mm
Max. groove depth: 2.0-2.5 mm

TGTS type

Range of groove widths: 0.33-4.5 mm
Max. groove depth: 2.5-5.0 mm

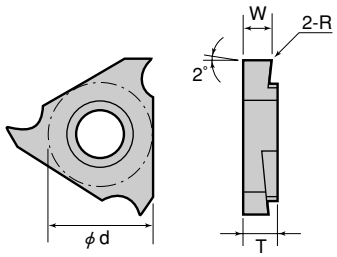
TGTT type

Range of groove widths: 0.33-4.5 mm
Max. groove depth: 2.5-5.0 mm

●Standard cutting conditions

Work material	Insert grade	Cutting speed V_c (m/min)	Feed f (m/min)
Carbon steels and alloy steels(JIS S45C, SCM415, etc.)	NS730	100 - **150** - 200	0.02 - **0.1** - 0.25

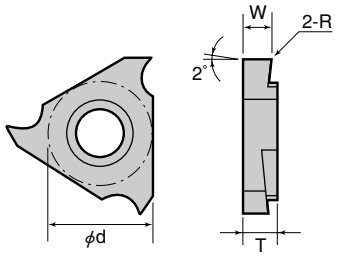
GBR/L32 type



Right hand (R) shown

Insert Cat. No.	Dimensions (mm)						Grade
	W ±0.025	Max. groove depth	R	ϕd	T	Hole dia (ϕ)	NS730
GBR/L32033	0.33	0.8	0.03	9.525	3.18	4.4	●
GBR/L32050	0.5	1.2	0.05				●
GBR/L32075	0.75	2	0.05				●
GBR/L32095	0.95	2	0.05				●
GBR/L32100	1	2	0.05				●
GBR/L32125	1.25	2	0.2				●
GBR/L32145	1.45	2	0.2				●
GBR/L32150	1.5	2	0.2				●
GBR/L32200	2	2.5	0.2				●
GBR/L32250	2.5	2.5	0.2				●

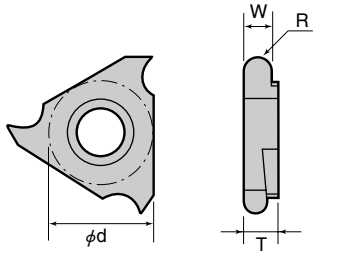
GBR/L43 type



Right hand (R) shown

Insert Cat. No.	Dimensions (mm)						Grade
	W ±0.025	Max. groove depth	R	ϕd	T	Hole dia (ϕ)	NS730
GBR/L43125	1.25	2	0.2	12.7	4.76	5.5	●
GBR/L43145	1.45	2	0.2				●
GBR/L43150	1.5	3.5	0.2				●
GBR/L43175	1.75	3.5	0.2				●
GBR/L43185	1.85	3.5	0.2				●
GBR/L43200	2	3.5	0.2				●
GBR/L43230	2.3	3.5	0.2				●
GBR/L43250	2.5	5	0.3				●
GBR/L43265	2.65	5	0.3				●
GBR/L43280	2.8	5	0.3				●
GBR/L43300	3	5	0.3				●
GBR/L43330	3.3	5	0.3				●
GBR/L43350	3.5	5	0.3				●
GBR/L43400	4	5	0.4				●
GBR/L43430	4.3	5	0.4				●
GBR/L43450	4.5	5	0.4				●

GBR/L43-R type (Full radius)



Right hand (R) shown

Insert Cat. No.	Dimensions (mm)						Grade
	W ±0.025	Max. groove depth	R	ϕd	T	Hole dia (ϕ)	NS730
GBR/L43050R	1	2	0.5	12.7	4.76	5.5	●
GBR/L43075R	1.5	3.5	0.75				●
GBR/L43100R	2	3.5	1				●
GBR/L43125R	2.5	5	1.25				●
GBR/L43150R	3	5	1.5				●
GBR/L43200R	4	5	2				●

When using TGTT and SGT type tools, right hand (R) toolholders use left hand (L) inserts and left hand (L) toolholders use right hand (R) inserts.

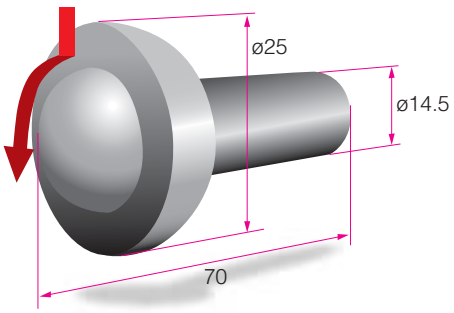
Machining examples

GT730 TSF type

Facing

Results: After machining 1200 pcs., Competitor A's insert showed inferior surface finish.
The surface finish produced by GT730 TSF insert, even after machining 2400 pcs, was within the specification. The insert could continue further machining.

Workpiece: Chromium molybdenum steel (JIS SCM420)
Cutting speed: V_C=~240m/min
Depth of cut: a_p=0.2~0.3mm
Feed: f =0.07~0.1mm/rev
Cutting fluid: Water soluble type



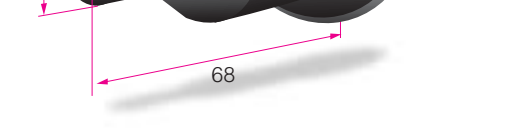
Machine component

GT730 TSF type

External turning

Results: The machined surface produced by competitor B's coated insert was whitish and cloudy surface. The other hand, GT730 TSF insert produced good, lustrous surface.

Workpiece: Chromium molybdenum steel (JIS SCM415H)
Cutting speed: V_C=150m/min
Depth of cut: a_p=0.5mm
Feed: f =0.05~0.12mm/rev
Cutting fluid: Water soluble type



Automobile component

GT720 TSF type

External turning Facing

Results: Competitor B's uncoated insert produced cloudy surface finish in cutting the small diameter shaft. From the shaft to the flange portion, chip control was unsatisfactory, occurring chip entangling and insert breakage resulting from chip-recutting.
The other hand, GT720 TSF insert produced lustrous surface. Chip control was satisfactory, realizing unmanned machining.

Workpiece: Chromium molybdenum steel (JIS SCM435)
Cutting speed: V_C=~300m/min
Depth of cut: a_p=0.2mm
Feed: f =0.1,0.15mm/rev
Cutting fluid: Water soluble type

Machine component

GT720 TSF type

External profiling

Results: Competitor B's uncoated insert could not control chips in profiling process. Therefore, it was impossible to switch to unattended machining.
The other hand, GT720 TSF insert, performing good chip control, achieved satisfactory surface finish even after machining the preset number of workpieces.
The test has been continuing to improve tool life and switch to complete unattended machining.

Workpiece: Carbon steel (JIS S45C) lead free, thermally refined
Cutting speed: V_C=250m/min
Depth of cut: a_p=0.1mm
Feed: f =0.2mm/rev
Cutting fluid: Water soluble type

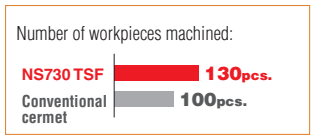
Machine component

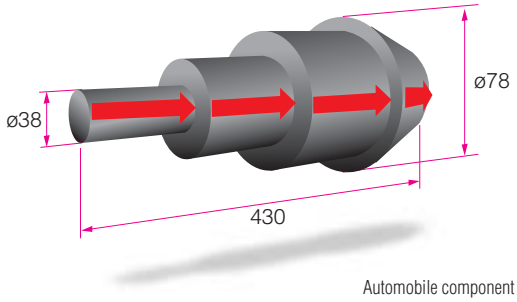
NS730 TSF type

External turning

Results: The test was carried out under the same conditions as for our conventional grade.
NS730 TSF insert could produce 130 pcs. versus 100 pcs. produced by conventional grade, realizing increased tool life by 30 %.

Workpiece: Medium carbon steel (JIS S45C)
Cutting speed: V_C=250m/min
Depth of cut: a_p=0.4mm
Feed: f =0.2mm/rev
Cutting fluid: Water soluble type





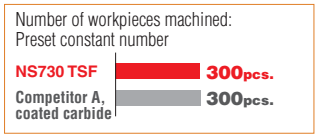
Automobile component

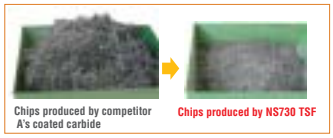
NS730 TSF type

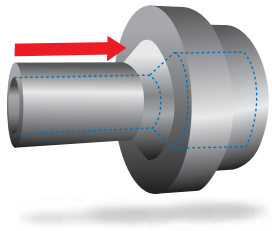
External turning

Results: Improved chip control.
Competitor A's coated carbide grade often produced prolonged chips.
NS730 TSF insert had no trouble with chip control during machining. Improved chip control contributed to bring advantage in carrying- out of chips using a chip-container.

Workpiece: High carbon steel (JIS S55C), lead free
Cutting speed: V_C=300m/min
Depth of cut: a_p=0.4mm
Feed: f =0.35mm/rev
Cutting fluid: Water soluble type







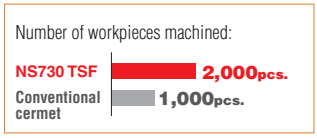
Automobile component

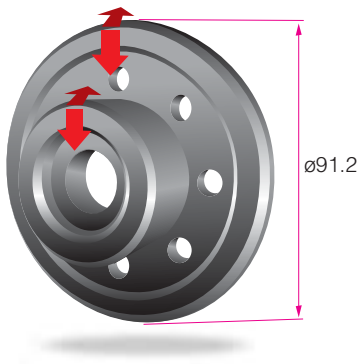
NS730 TSF type

Facing

Results: Our conventional grade produced somewhat prolonged chips.
Under the same conditions, NS730 TSF insert produced well broken chips and achieved twice the tool life. Monitored power consumption was reduced by 15 %.

Workpiece: JIS SCr415
Cutting speed: V_C=280m/min
Depth of cut: a_p=0.4～0.6mm
Feed: f =0.3mm/rev
Cutting fluid: Water soluble type





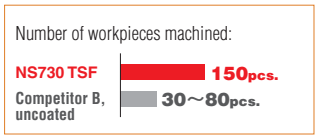
Machine component

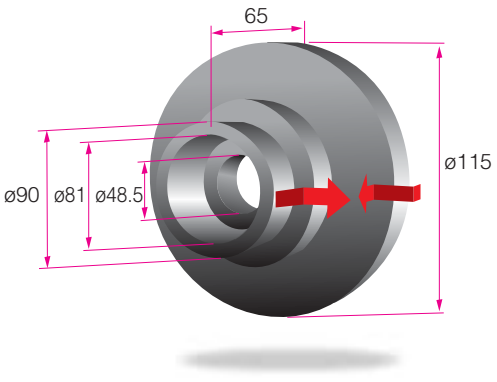
NS730 TSF type

External turning Facing

Results: Competitor B's uncoated insert had a problem in chip control. In addition, the tool life was unstable together with unsatisfactory surface finish.
NS720 TSF insert, although used at the same feed, produced superior surface finish and also solved the chip control problem.

Workpiece: Medium carbon steel (JIS S45C), Lead less
Cutting speed: V_C=250m/min
Depth of cut: a_p=0.15mm
Feed: f =0.12mm/rev
Cutting fluid: Water soluble type





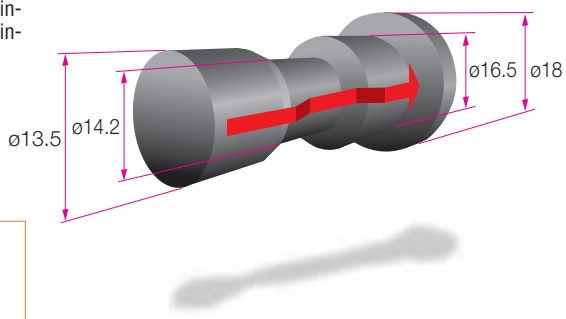
Machine component

Machining examples

GT720 ZF type

External turning

Results: Compared with the uncoated insert of company B, GT720 ZF insert increased the tool life by a wide margin. The test has been continuing to increase tool life.



Workpiece: Medium carbon steel (JIS S45C)
Cutting speed: V_C=170m/min
Depth of cut: a_p=0.4mm
Feed: f =0.15mm/rev
Cutting fluid: Water soluble type

Number of workpieces machined:

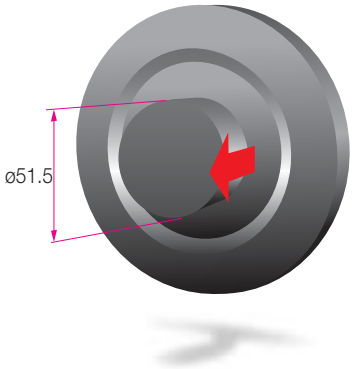
GT720 ZF	1,580pcs.
Competitor B, uncoated	1,250pcs.

Shaft

NS730 ZF type

External turning

Results: A test comparing tool life with our conventional cermet grade was carried out. The tool life criterion was placed on deterioration of the surface finish. After machining 70 pcs the surface finish produced by the conventional grade deteriorated. The other hand, NS730 could machine 140 pcs, achieving twice the tool life of the conventional grade.



Workpiece: Medium carbon steel (JIS S48C)
Cutting speed: V_C=200m/min
Depth of cut: a_p=0.1mm
Feed: f =0.2mm/rev
Cutting fluid: Dry cutting

Number of workpieces machined:

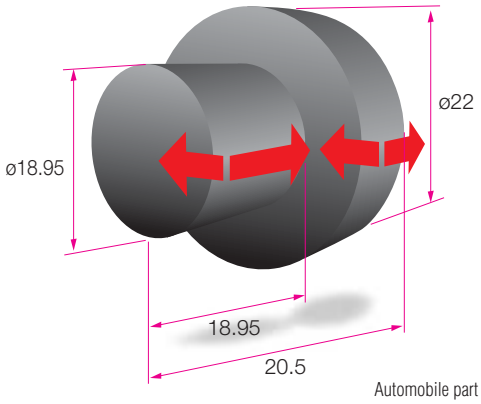
NS730 ZF	140pcs.
Conventional cermet	70pcs.

Automobile part

NS730 ZM type

External turning Facing

Results: Although both inserts reached the end of their tool life after machining the same number of workpieces, the surface finish produced by Competitor B's uncoated insert was whitish and cloudy. The surface roughness obtained with NS730 ZM insert was good and satisfactory result.



Workpiece: Mild steel (JIS SS41)
Cutting speed: V_C=148~172m/min
Depth of cut: a_p=1.0mm
Feed: f =0.22mm/rev
Cutting fluid: Water soluble type

Number of workpieces machined:
Preset constant number

NS730 ZM	3,600pcs.
Competitor B, uncoated	3,600pcs.

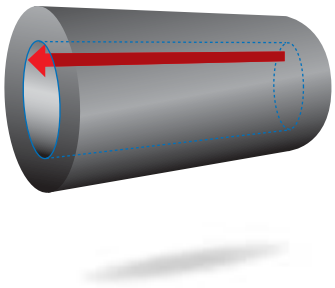
Automobile part

GT730 PS Internal turning

Results: A tool life test was carried out in internal turning. After machining 200 pcs, scratches were seen on the surface machined by competitor B's coated insert. GT730 PS insert kept good surface finish even after machining 1000 pcs. The variations in the dimensional accuracy was reduced to 50 %. All the results were good, bringing extensive improvements.

Workpiece: Free-cutting carbon steel (JIS SUM)
Cutting speed: V_C=150m/min
Depth of cut: a_p=0.5mm
Feed: f =0.05mm/rev
Cutting fluid: Water soluble type

Number of workpieces machined:



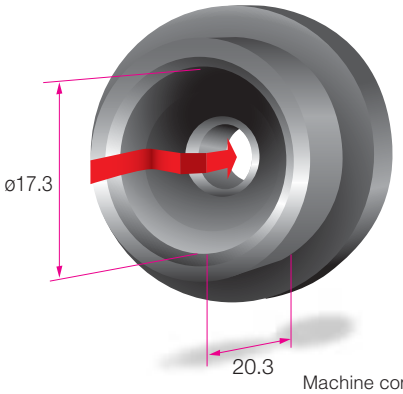
Machine component

GT730 PS Internal turning Facing

Results: Tests comparing the surface finishes produced by GT730 PS against that produced by competitor B's coated insert were carried out. After machining the same number (200 pcs) of workpieces, the surface finish produced by GT730 PS was excellent in shininess and showed that the insert would be used for further machining to prolong the tool life.

Workpiece:Medium carbon steel (JIS S45C)
Cutting speed: V_C=125m/min
Depth of cut: a_p=0.1mm
Feed: f =0.19mm/rev
Cutting fluid: Water soluble type

Number of workpieces machined:
Preset constant number



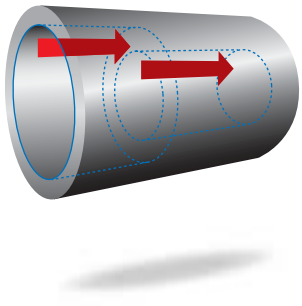
Machine component

GT720 PS Internal turning

Results: GT720 PS insert provided 50 % more tool life over a previously used competitor's grade. In addition, the surface finish excelled in shininess and the chip control was better than the competitor's insert which often had troubles of chip entangling with the toolholder

Workpiece:Chromium molybdenum steel (JIS SCM435)
Cutting speed: V_C=130m/min
Depth of cut: a_p=0.26mm
Feed: f =0.16mm/rev
Cutting fluid: Water soluble type

Number of workpieces machined:



Automobile component

Tungaloy Corporation

Head Office
Solid Square, 580 Horikawa-cho, Saiwai-ku, Kawasaki City, 212-8503 Japan
Phone: +81-44-548-9500 Facsimile: +81-44-548-9540

International Sales & Marketing Department
2-7, Sugasawa-cho, Tsurumi-ku, Yokohama City,
230-0027 Japan
Phone: +81-45-503-9040 Facsimile: +81-45-503-9042
Sales of machining tools

Tungaloy America, Inc.
1226A Michael Drive, Wood Dale, IL.60191, U.S.A.
Phone: +1-630-227-3700 Facsimile: +1-630-227-0690
Sales of machining tools

Tungaloy Europe GmbH
Elisabeth-Selbert-Strasse 3, 40764 Langenfeld, Germany
Phone: +49-2173-90420-0 Facsimile: +49-2173-90420-18
Sales of machining tools

Tungaloy France S.a.r.l.
6 Avenue des Andes, 91952 Courtaboeuf Cedex, France
Phone: +33-1-6486-4300 Facsimile: +33-1-6907-7817
Sales of machining tools

Tungaloy Italia S.p.A.
Via E. Andolfato 10, 20126 Milano, Italy
Phone: +39-02-252012-1 Facsimile: +39-02-252012-65
Sales of machining tools

Tungaloy Cutting Tool (Shanghai) Co.,Ltd.
United Plaza 1505, 1468 Nan Jing Road West, Shanghai 200040, China
Phone: +86-21-6247-0512 Facsimile: +86-21-6289-1302
Sales of machining tools

Thai Tungaloy Cutting Tool Co.,Ltd.
11th Floor, Sorachai Bldg. 23/7, Soi Sukhumvit 63,
Klongtonnue, Wattana Bangkok 10110, Thailand
Phone: +66-2-714-3130 Facsimile: +66-2-714-3134
Sales of machining tools

Tungaloy Singapore(Pte.),Ltd.
50 Kallang Avenue #06-03 Noel Corporate Building Singapore 339505
Phone:+65-6391-1833 Facsimile:+65-6299-4557
Sales of machining tools

Tungaloy de Mexico S.A.
C Los Arellano 113, Vista Alegre, Aguascalientes, AGS, Mexico 20290
Phone:+52-449-929-5410, Facsimile:+52-449-929-5411
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