T-CLAMP ULTRA PLUS System

This guide presents basic information that will enable you to obtain full benefit from T-CLAMP ULTRA PLUS System.

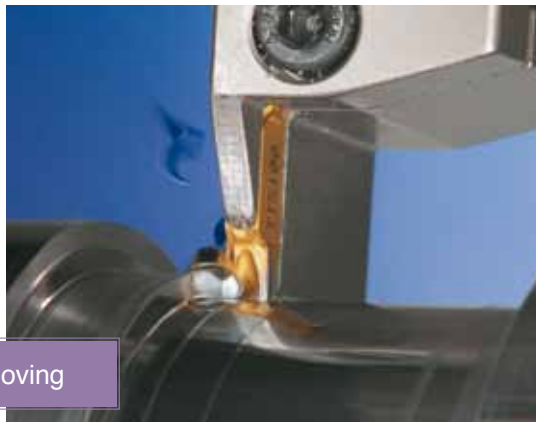
T-CLAMP ULTRA PLUS enables multi-functional operations in one system:

- Deep Grooving
- Parting and Grooving
- Shallow Grooving
- Turning and Grooving
- Precision Grooving and Recessing
- Face Grooving and Face Turning
- Undercutting and Recessing

Parting

Inserts

- Accuracy with good repeatability
- Molded chipbreaker
- Top and bottom prism hold the insert firmly and accurately in the correct position
- TDJ/C is a unique double-ended insert for grooving and parting
- TSJ/C is a unique single-ended insert for deep grooving and parting
- TDT double-ended insert for side turning and grooving
- TDA double-ended insert for aluminum wheel machining



Turning & Grooving

Blades

- Simple, accurate and rapid indexing
- Top and bottom seated insert alignment
- No additional spare parts
- Uses standard tool blocks

Integral Tool Shanks

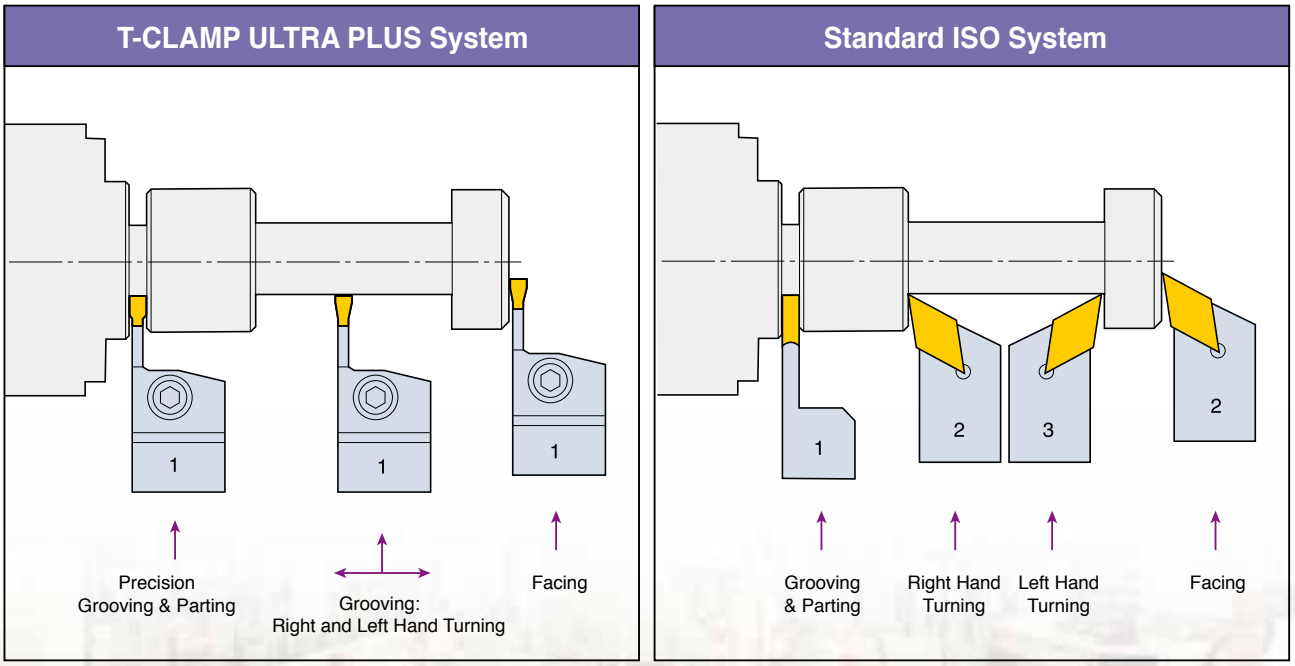
- Simple, accurate and rapid indexing
- Top and bottom seated insert alignment
- Stable support against side forces
- No additional spare parts
- Standard shank dimensions

Face Grooving & Turning

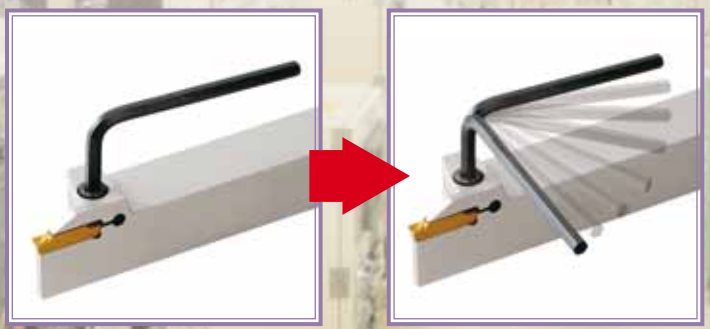
Advantages of T-CLAMP ULTRA PLUS System

- T-CLAMP ULTRA PLUS is available as either double-ended or single ended insert for maximum economy.
- Multifunction use
  - Right-hand and left-hand turning, grooving and parting with a single tool.
- T-CLAMP ULTRA PLUS replaces a multitude of ISO tools.
  - Reduces number of tools per operation.
  - Reduces inventory.
- Short cycle time
  - Short setup with less downtime
  - Reduces need for turret indexing.
- Improved Cycle Time
  - The excellent surface finish obtained from rough turning may eliminate finish turning.

T-CLAMP ULTRA PLUS System vs Standard ISO System



Toolholder Screw Clamping Force



Screw	Recommended Torque (N·m)
SH M5X0.8	5.5
SH M6X1	8.0
SH M8X1.25	12.0

Selecting Inserts

To match the correct insert to the cutting condition, the following variables must be considered:

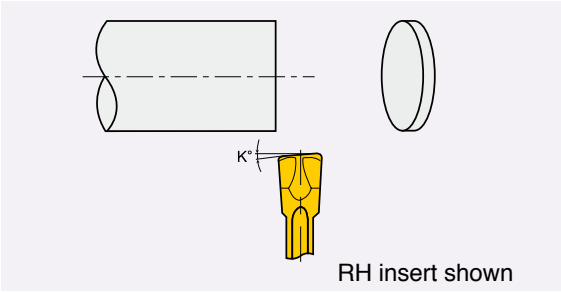
- Width of cut (width of insert)
- Chipbreaker style
- Lead angle
- Corner radii
- Carbide grade

Width of Cut (WOC) and Depth of Cut (DOC)

- To select the proper width and depth of cut, the application must be considered. The ratio DOC = 8 x WOC can be used when cutting steel. For example, the maximum DOC for a 3mm wide insert is 24mm for parting a 48mm diameter bar.
- Neutral inserts with a 0 lead angle provide the maximum DOC.

Lead Angle

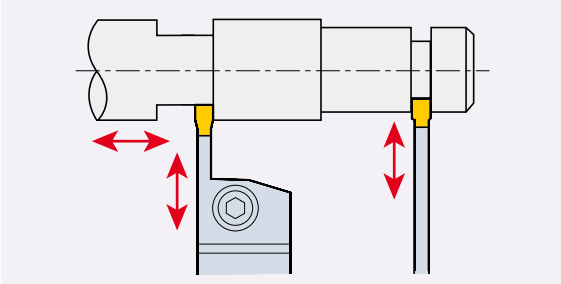
- Use inserts with a lead angle to minimize pips or burrs.
- Inserts are available with either R or L hand, with the point of angle toward the finished surface.
- Increasing the lead angle reduces the pips or burrs, but will also produce a poor surface finish and short tool life. Neutral inserts are recommended when a pip/burr is acceptable.



RH insert shown

Insert Support

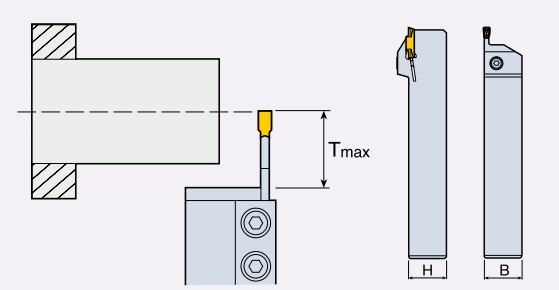
- Integral shank toolholders offer the best rigidity.
- A self clamp holder is only recommended for radial machining.
- A screw clamp holder is recommended for axial and radial machining.



Blade or Holder Size

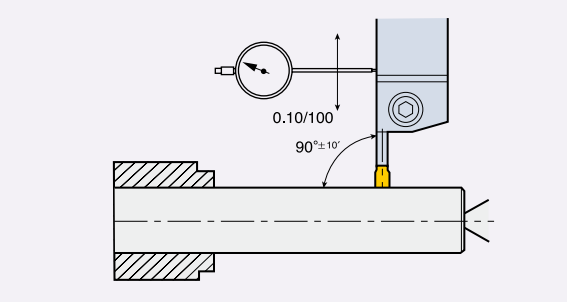
To minimize vibration and deflection choose:

- Blade or toolholder with the smallest possible overhang (Tmax)
- Toolholder with the maximum shank size (H).
- Blade height that is larger than Tmax
- Blade or toolholder with the maximum blade width (largest possible insert seat size)



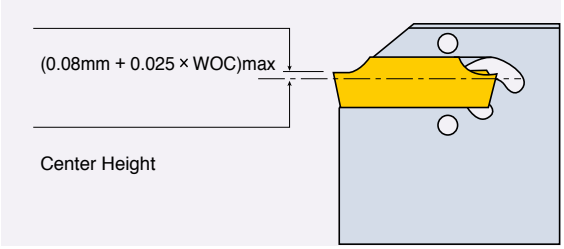
90° Mounting

- The insert must be mounted 90° to the workpiece to obtain perpendicular surfaces and minimize vibration.



Setup

- The center height of the insert should be maintained within ±0.1mm.
- The parting operation should be as close to the chuck as possible.



Selecting Preference Priority

- Use insert with 0° lead angle
- Use the largest blade size possible
- The smallest appropriate width of cut

Machining

- Consistency of speed and feed improve performance.
- Apply coolant abundantly (excluding Ceramic AB30).
- Secure insert into clean pockets.
- Cutting forces on soft workpiece materials may be insufficient to push insert well into pocket. Tap insert into place using a plastic hammer.
- On a conventional lathe, lock the carriage to prevent axial motion during parting-off.

Usage

- Replace worn inserts immediately. The price of a new insert is much less than the risk of damage from continuing with a worn edge.
- Replace blade or damaged pockets.
- Never try to repair damaged pockets.

Chipbreaker

The chipbreaker's function is to narrow the chip - it occurs near the cutting edge at high temperature.

Producing chips that are narrower than the groove gives the following advantages:

- Eliminates friction with groove walls.
- Prevents chip overload.
- Permits higher feeds.
- Produces unscratched surfaces, eliminating additional facing.

Curling chips into compact spirals or breaking chips simplifies disposal.

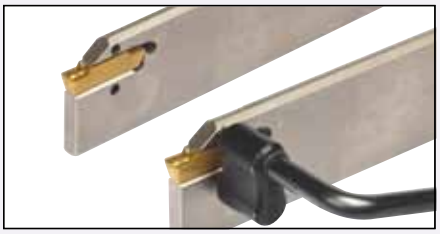
Curling is affected by the chipbreaker type and the machining conditions.

Select an appropriate chipformer for the specific application.

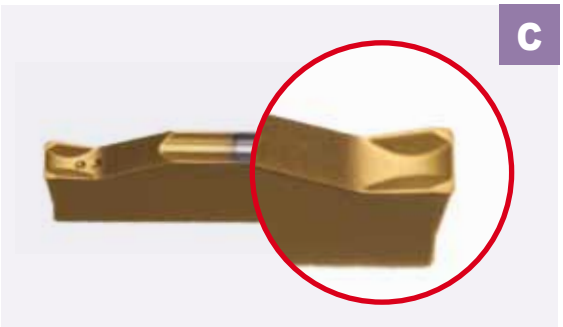
Extraction of Insert

Insert Clamping

Extractor (EDG-23B, EDG-33B) for Blades



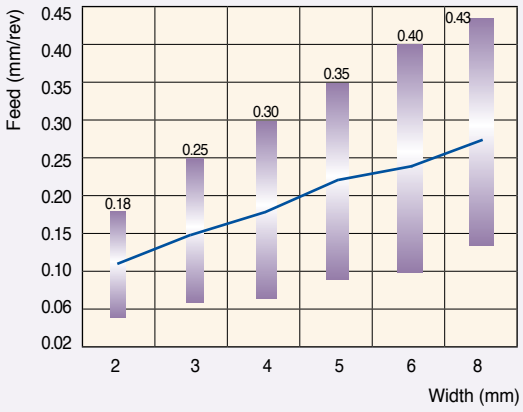
Selection of Chipbreakers



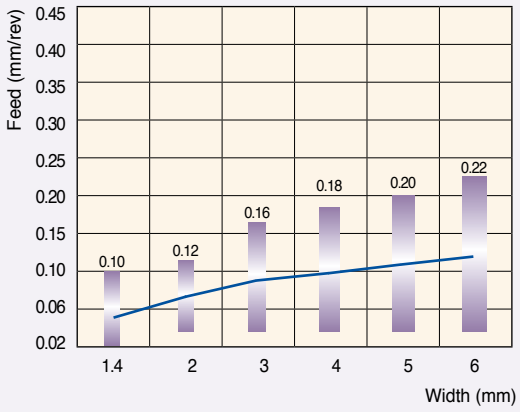
- For hard materials and tough applications
- For general applications on steel, alloy steel and stainless steel
- Medium-to-high feeds

- For soft materials, parting of tubes, small diameters and thin-walled parts
- Low forces and smaller burrs
- Improved straightness
- Low-to-medium feeds

Recommended feed range as a function of insert width
Material; SAE4140 (HB240)
Recommendations are for neutral inserts - for R/L inserts reduce feeds by 20 - 40%



"C"

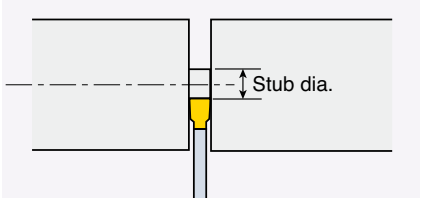


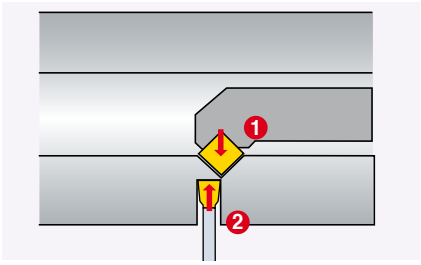
"J"

Workpiece Materials					
	Alloy Steel	Austenitic Stainless	High - Temp Alloys	Nonferrous Materials	Cast Iron
High ↑ Feed ↓ Low	C J	C J	C J Titanium	C Brass J Aluminum	C

Practical Trouble shooting

1. To Reduce Burr



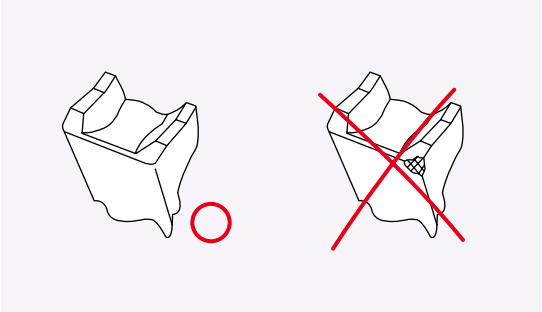


- On a CNC machine, reduce feed by 50% when approaching center stub diameters ≅ WOC
- Check center height of cutting edge
- Use insert with lead angle
- If 0° lead angle must be used for whatever reason, apply narrow WOC
- Apply a supporting part-catcher (or adjust concentricity)
- For hollow bars, it is better to machine chamfers using ID boring tool prior to parting operation. (See picture)

2. To Improve Surface Finish

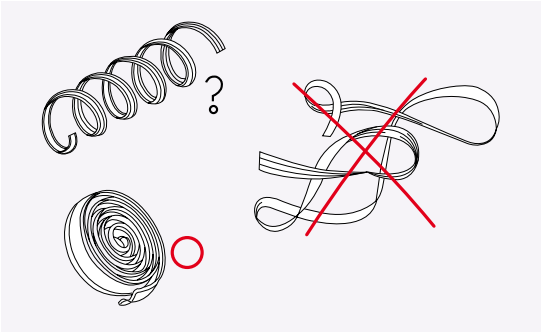
- Increase cutting speed
- Use neutral inserts
- Select chipformer that provides optimum chip control
- Use coated carbide
- Improve coolant application
- Eliminate chatter

3. To Improve Flatness



- Check inserts and replace any that show wear
- Use neutral inserts
- Use largest blade possible, i.e., TGB 32- instead of TGB 26-
- Increase blade thickness and insert width
- Minimize blade overhang
- Check alignment and perpendicularity of tool to machine axis
- Optimize workpiece chucking
- Lock the carriage on manually operated lathes
- Apply coolant abundantly (excluding Ceramic AB30)
- Reduce feed

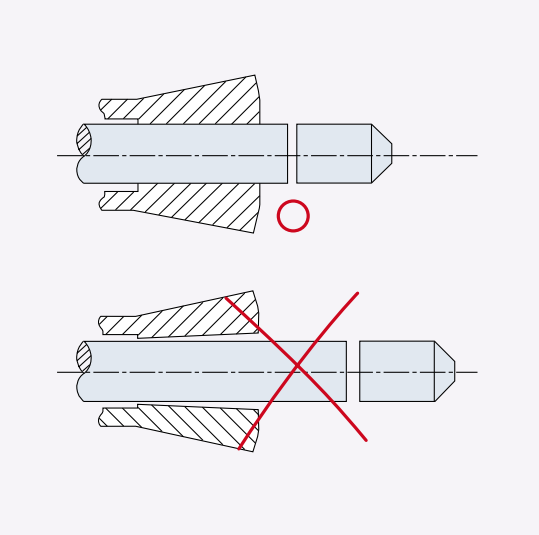
4. To Improve Chip Control



- Replace worn inserts
- Choose a more appropriate chipbreaker
- Use a neutral insert
- Check alignment and perpendicularity of tool to machine axis
- Apply coolant abundantly
- Increase feed
- At initial groove depth, interrupt feed momentarily to let the chip enter slot

5. To Eliminate Chatter

- Part-off as close to chuck as possible
- Minimize blade overhang
- Improve chucking and monitor tool setup
- Change the RPM
- Increase the feed
- Lock the carriage on manually operated lathes

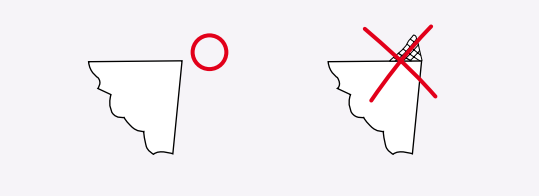


6. To Prevent Chipping of Cutting Edge

- Use appropriate carbide grade and geometry
- Use insert with larger corner radii
- Reduce feed at end of cut
- Eliminate chatter
- Increase speed
- Use strong grade
- Increase tool and setup rigidity
- Eliminate built-up edges

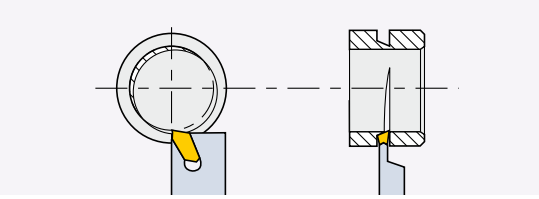
7. To Prevent or Reduce Built-up Edge

- Use appropriate carbide grade and geometry
- Increase speed
- Reduce feed
- Increase coolant flow/concentration



8. Parting on Eccentric Tubes

- Inserts with 4 degree lead angle are usually recommended for tubes; however, the combination of an eccentric bore and a robust machine may increase feed-snap on breakthrough and damage the cutting edge. Changing to an 8 degree lead angle insert will regulate the breakthrough.



Machining Data for Parting

ISO	Material		Condition	Tensile Strength Rm(N/mm²)	Hardness HB	Coated		Uncoated
						TT9080 / TT7220	TT8020	K10
P	Non-alloy steel, cast steel, free cutting steel	<0.25 %C	Annealed	420	125	140-250	80-120	
		>=0.25 %C	Annealed	650	190	130-220	80-110	
		<0.55 %C	Quenched and tempered	850	250	90-200	70-90	
		>=0.55%C	Annealed	750	220	100-220	70-100	
			Quenched and tempered	1000	300	70-170	40-70	
	Low alloy steel and cast steel (less than 5% alloying elements)		Annealed	600	200	90-120	70-100	
			Quenched and tempered	930	275	80-170	50-70	
				1000	300	70-130	40-60	
				1200	350	50-120	30-50	
	High alloy steel, cast steel and tool steel.		Annealed	680	200	60-140	50-80	
			Quenched and tempered	1100	325	50-70	30-60	
M	Stainless steel and cast steel		Ferritic/martensitic	680	200	70-170	80-120	
			Martensitic	820	240	60-150	60-90	
			Austenitic	600	180	90-180	60-90	
K	Gray cast iron (GG)		Ferritic		160	100-230		60-80
			Pearlitic		250	90-180		50-70
	Cast iron nodular (GGG)		Ferritic		130	190-300		70-100
			Pearlitic		230	120-220		70-90
	Malleable cast iron		Ferritic		180	120-250		60-85
			Pearlitic		260	100-210		45-75
S	High temp. alloys	Fe based	Annealed		200	40-70		35-50
			Cured		280	30-50		25-40
		Ni or Co based	Annealed		250	30-40		20-30
			Cured		350	15-25		15-20
			Cast		320	15-30		15-20
	Titanium, Ti alloys			Rm 400		90-190		150-200
			Alpha+beta alloys cured	Rm 1050		30-60		50-80

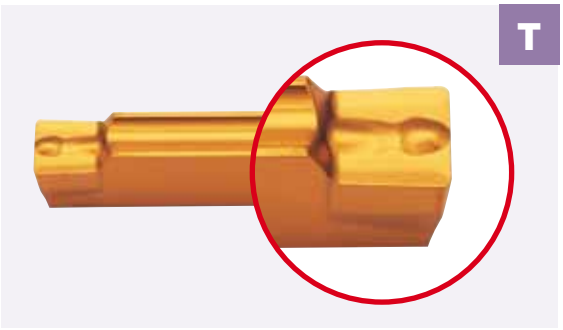
* For more information of material groups,
see the TaeguTec concise catalogue “ Material Conversion Table” section.

Steel Stainless Steel Cast Iron Nonferrous High Temp. Alloys Hardened Steel

Chipbreaker Style: “T” Chipbreaker

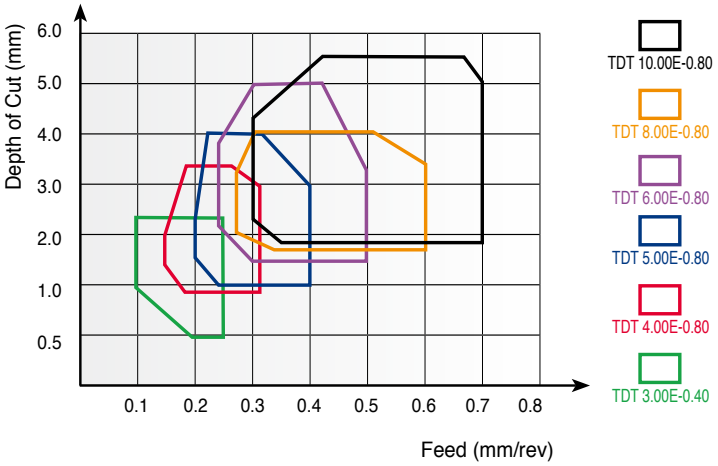
- The “T” chipbreaker is available for turning and grooving of steel, alloy steel and stainless steel.
- Inserts with “T” style chipbreaker contain a central chipbreaking island for multi-direction chip control.

“T” Type



- Inserts are available with various corner radii for turning applications and profiling inserts are ground with a full radius.

Workpiece: SAE 1045 (C45)
Cutting Speed: Vc=100 - 180 m/min



Reduce Cutting Speed 20 - 30% for Internal & Face Machining

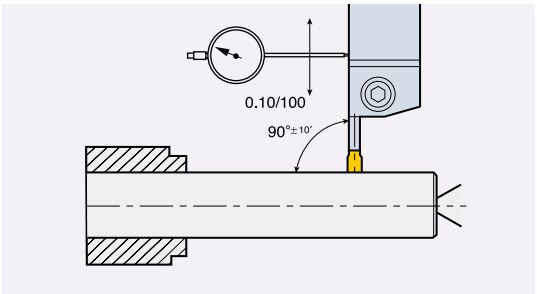
Toolholder or Blade Size

To minimize risk of vibration and deflection always choose:

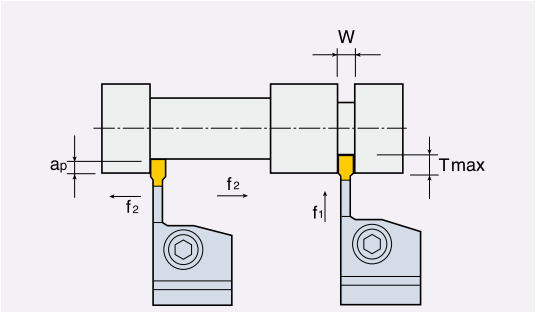
- Toolholder or blade with the smallest possible overhang
- Toolholder with maximum shank dimension

90° Mounting

It is very important that the insert is mounted at 90° to the center line of the workpiece in order to obtain a perpendicular surface and reduce the risk of vibration.



Machining Definitions



Grooving

- Vc - Cutting Speed (m/min)
- T - Maximum Depth (mm)
- f_1 - Feed in Radial Direction (mm/rev)

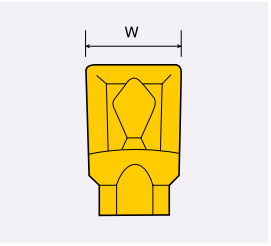
Turning

- Vc - Cutting Speed (m/min)
- $a_p$max - Maximum Depth of Cut (mm)
- f_2 - Feed in Lateral Direction (mm/rev)

Selecting Inserts

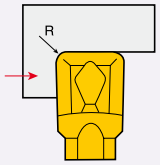
Insert Width

- Insert width strongly affects strength.
- For most efficient machining select the widest possible insert.
- Chipbreaking range depends on insert width.
- A narrow width improves chipbreaking at lower feed rates.
- Wide inserts and strong blades require high forces and feed rates to achieve a frontal clearance angle.



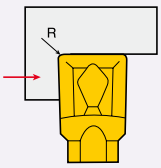
Corner Radii - Lateral Turning

- Choose large corner radii for long tool life.



Large radii - Small side forces

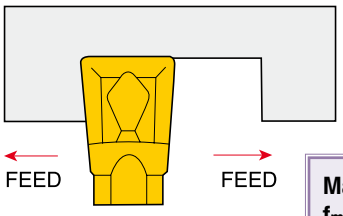
- Choose small corner radii to reduce cutting load and lower feed with narrow inserts.



Small radii - Strong side forces

Turning Feed

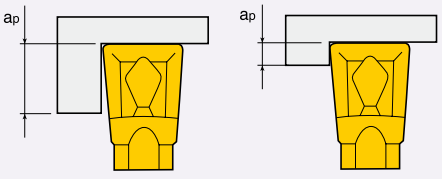
- Feed depends on chipbreaking range of the insert.
- Maximum feed depends on insert width and is relative to the maximum load.
- High feed with small corner radii may reduce tool life.
- Maximum feed should not exceed the corner radii.
- For better chip formation when grooving, feed can be interrupted at small intervals.



Maximum Feed:
$f_{max} = W \times 0.075$

Depth of Cut

- Minimum depth of cut equals the corner radii.
- Maximum depth of cut depends on maximum possible load.
- Depth of cut depends on chipbreaking range.



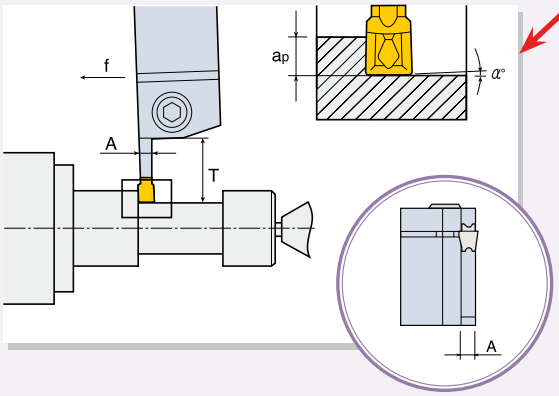
Maximum Depth of Cut: $a_{pmax} = W \times 0.8$

Large depth of cut causes large deflection and large frontal clearance.

With a small depth of cut the deflection and frontal clearance may be too small.

Principle of Turning with T-CLAMP ULTRA PLUS Tools

• The clearance angle α° is a function of the side cutting forces and is not constant as is the case with ISO inserts.



Clearance angle between the insert and workpiece

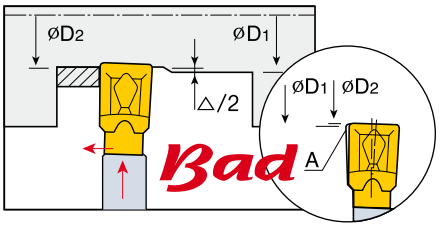
The deflection is influenced by:

- **Feed: f**
- **Depth of cut: ap**
- **Overhang: T**
- **Cutting speed: Vc**
- **Workpiece Material**

✻ When these factors are properly applied, the insert (α°) creates a "Wiper" action providing excellent surface quality and tolerance.

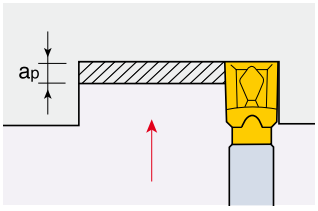
Finishing Operation: Diameter Compensation

• A compensation factor for the finish diameter must be used in the final machining operation. After grooving to the desired diameter, the machining direction changes to longitudinal turning. At this point deflection occurs. If machining continues without tool compensation, corner A will penetrate the workpiecs as a result of the deflection phenomenon (See picture). This will result in two different diameters ØD1 from the grooving operation and ØD2 from the turning operation. The difference between ØD1 and ØD2 is the change in diameter, designated at Delta △. Tool compensation factor is calculated as shown:

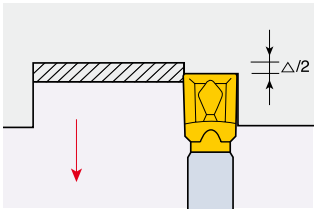


$$\frac{\triangle}{2} = \frac{ØD_1 - ØD_2}{2}$$

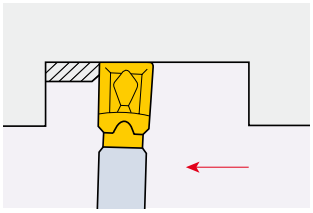
• Using the compensation factor will eliminate the difference in part diameter. Follow this simple procedure during machining.



1. Groove to the final diameter



2. Pull the tool back, a distance equal to the value of △/2

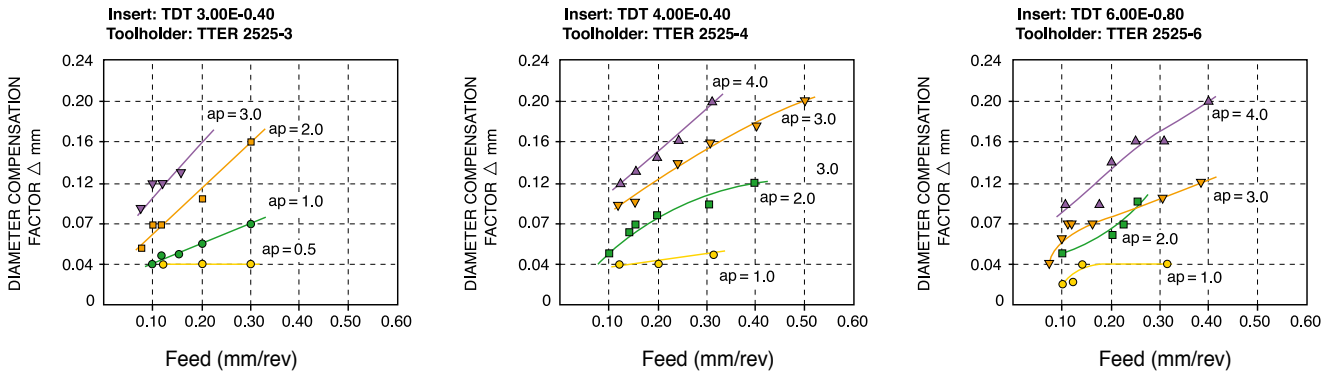


3. Continue the finish turning operation

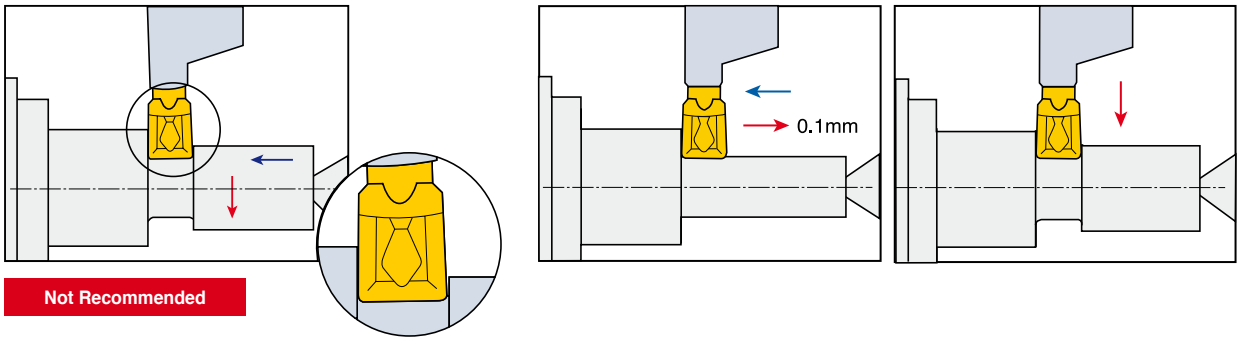
• **The diagrams show experimental results for specific machining conditions.**
These are sample values that will vary with different workpiece materials and different holder types.

Recommendation:

Measure the △value for your finishing operation in a short test using your selected finishing conditions.
Do not run your test using the final diameter.

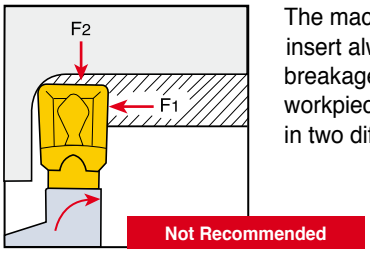


Multifunction Operations



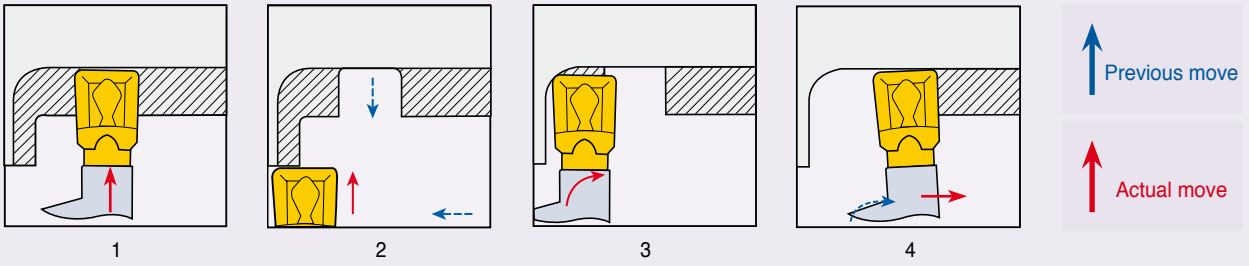
The multifunctional tools can operate in a sequence of grooving and turning modes. Moving from turning to grooving requires consideration of each basic principle. This will eliminate the possibility of insert breakage. In this situation, customers must release the side deflection necessary in turning but not recommended in grooving.

Machining a Radius or Chamfer



The machining of a corner with a radius or a chamfer larger than the radius of the insert always requires the combination of movement in two directions. Problems such as insert breakage result when this combined operation is used while the insert is plunged into the workpiece with material on all sides. Insert breakage is caused by forces acting simultaneously in two different directions as shown in F_1 and F_2.

Recommended procedure to optimize machining and eliminate insert breakage

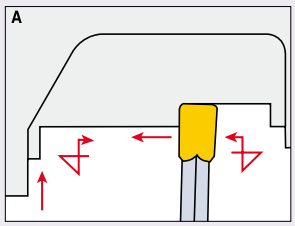


Machining Between Walls

One of the most important advantages of the T-CLAMP ULTRA PLUS system is the ability to machine between walls.
To achieve the best result - follow the recommended sequence:

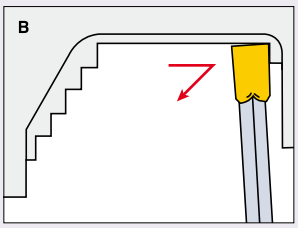
Leave steps near the wall. Do not arrive at the same Z value!!!

Roughing 1

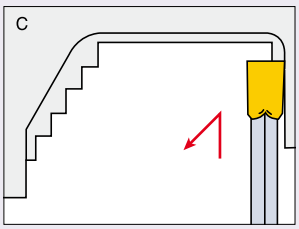


Z value=0.2 - 0.3mm

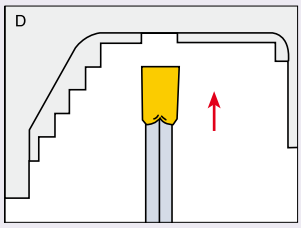
Roughing 2



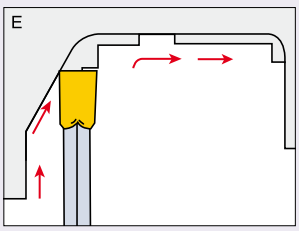
Finishing 3



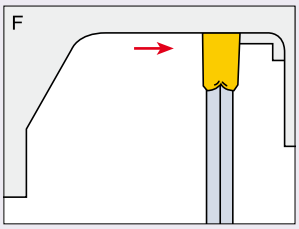
Finishing 4



Finishing 5



Finishing 6

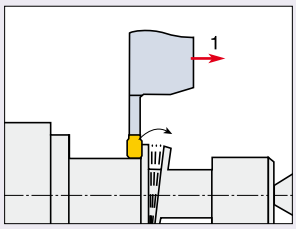


Eliminating a ‘Hanging Ring’

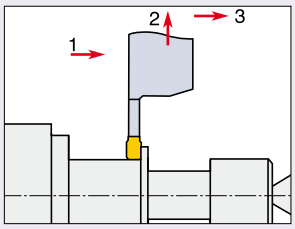
When turning at the end of a bar or toward a recess between two walls, a 'Hanging Ring' may be formed.

To eliminate the ‘Hanging Ring’:

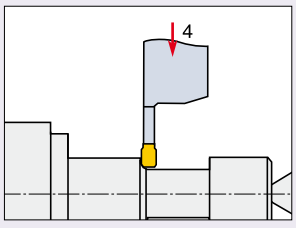
Roughing (Incorrect)



Roughing (Correct)

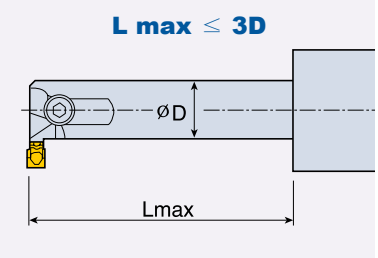


Finishing (Correct)

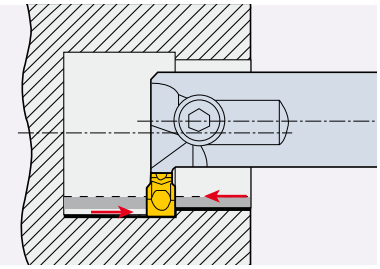


Optimizing Internal Machining

1. The first pass uses one corner for roughing.
2. The other corner is used on the return path for semi-finishing or finishing.
3. Tool position looks out of sequence with the amount of material that is removed.
4. Rapid position back to initial groove and then continue with face turning toward the center.



Toolholder Overhang

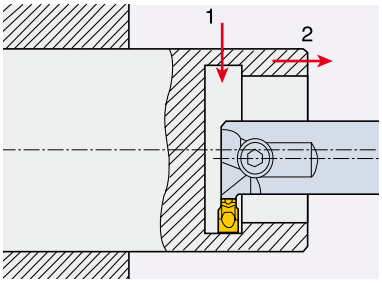


Efficient use of Insert corners

Improving Internal Turning in a Blind Hole

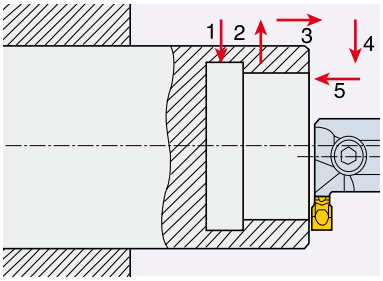
Internal turning in a blind hole brings about the problem of chip evacuation.
When the tool reaches the rear side wall, chips may be caught between the wall and the insert, causing breakage.

Two solutions that can eliminate this problem:



First Solution

1. Start by grooving at the rear wall
2. Continue by turning from the inside toward the outside.



Second Solution

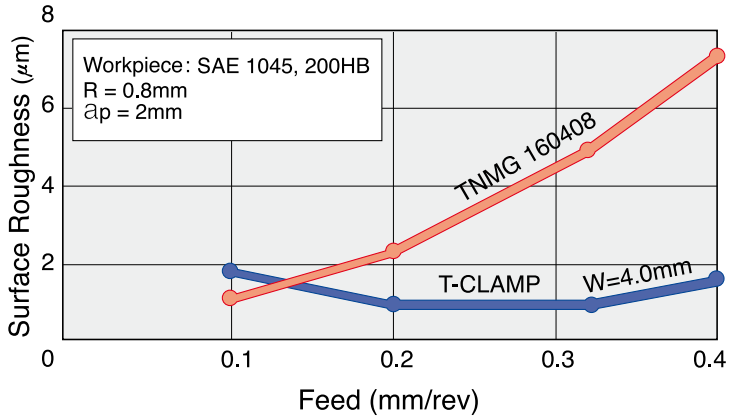
1. Start by grooving at the rear wall.
2. Pull the tool back to the outside. Turn the final diameter from outside toward the groove.

Surface Quality

Eliminating Grinding Operations

Turning with T-CLAMP ULTRA PLUS Tools gives a surface quality superior to anything possible when using standard ISO tools. In fact, turning with T-CLAMP ULTRA PLUS Tools can produce a surface quality comparable to grinding.

T-CLAMP ULTRA PLUS vs ISO Turning Inserts



Calculation of Required Machine Power

Turning

$$P = \frac{Kc \cdot ap \cdot f \cdot Vc}{\eta \cdot 45 \cdot 10^3} \quad [HP]$$

Grooving/Parting

$$P = \frac{Kc \cdot W \cdot f \cdot Vc}{\eta \cdot 45 \cdot 10^3} \quad [HP]$$

Face Grooving

$$P = \frac{Kc \cdot W \cdot f \cdot Vc}{\eta \cdot 45 \cdot 10^3} \quad [HP]$$

Turning

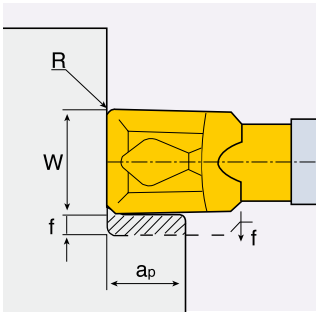
$$P = \frac{Kc \cdot ap \cdot f \cdot Vc}{\eta \cdot 61 \cdot 10^3} \quad [kw]$$

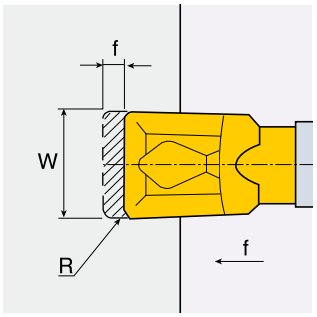
Grooving/Parting

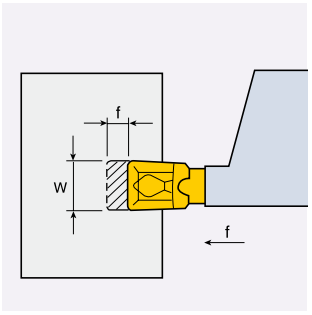
$$P = \frac{Kc \cdot W \cdot f \cdot Vc}{\eta \cdot 61 \cdot 10^3} \quad [kw]$$

Face Grooving

$$P = \frac{Kc \cdot W \cdot f \cdot Vc}{\eta \cdot 61 \cdot 10^3} \quad [kw]$$





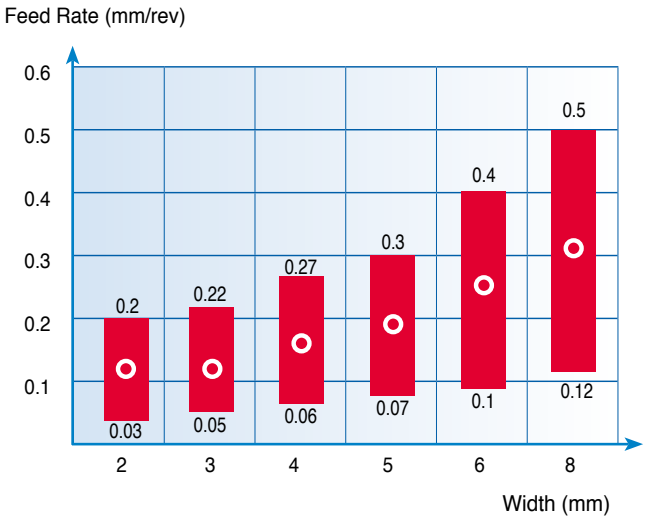


Where Kc appears - Specific Cutting Forces (N/mm²) could be used.

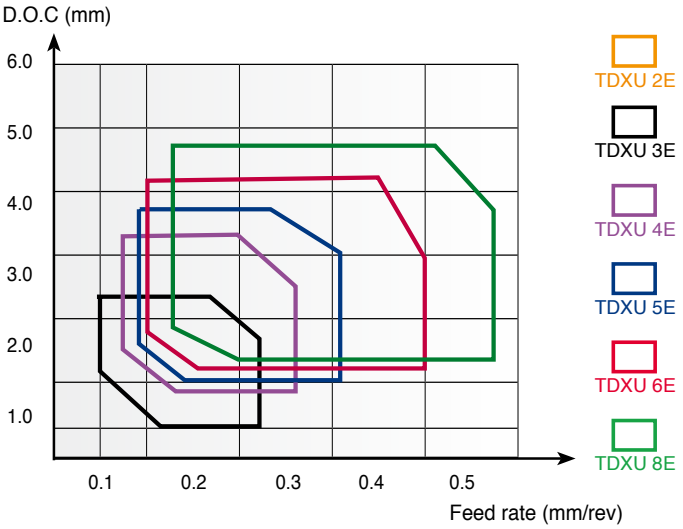
η - Efficiency ($\eta \approx 0.8$)

TDXU Cutting Condition Table

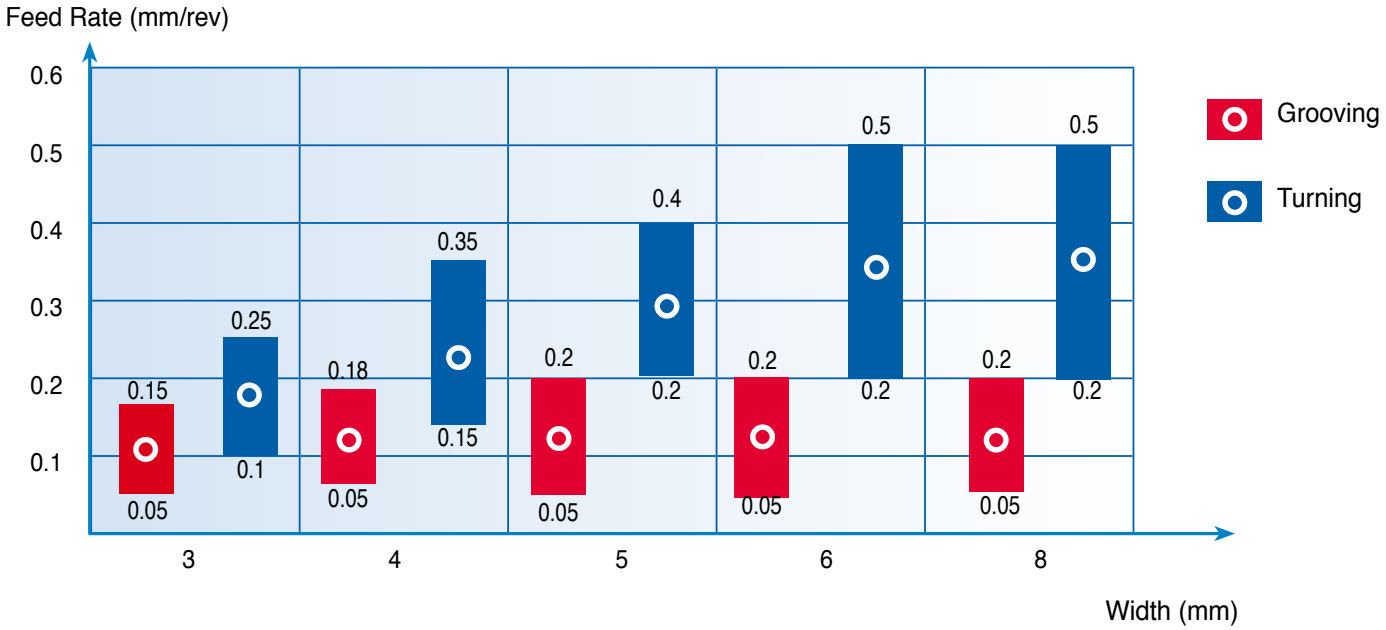
Grooving



Turning

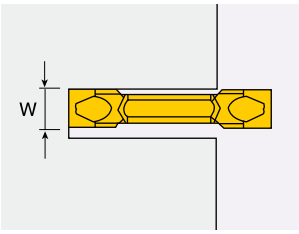


TDT/TDXT Cutting Condition Table

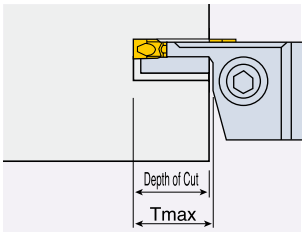


Tool Selection

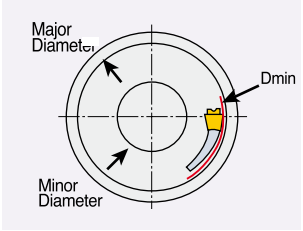
Follow these three recommendations for selecting the correct cutting tool:



Choose the widest possible insert and tool, according to the cutting width and geometry to be machined.



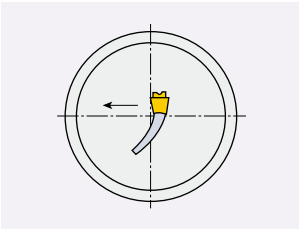
Choose the shortest tool holder overhang, according to the maximum depth required.



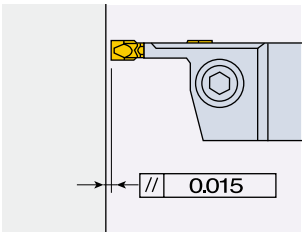
Choose the tool range with the largest diameter depending on the initial grooving diameter required in the application.

Tool Adjustment

Prior to machining, check and adjust the following tool positions



Check the cutting-edge height at center line, take a light cut toward the center, and check for a burr.

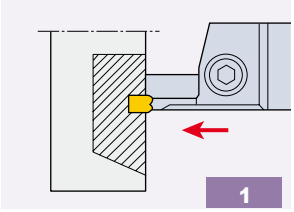


Check parallelism of cutting edge and the machined surface. Correct position can guarantee good surface quality when face turning in both directions.

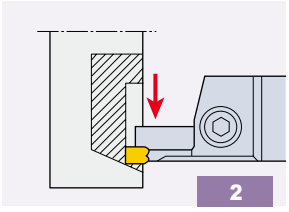
Optimizing the Machining Procedure

For Roughing

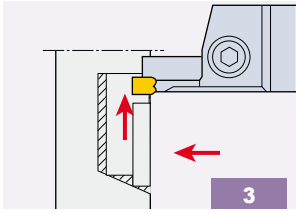
Basic steps for roughing operations when face turning with T-CLAMP ULTRA PLUS tools:



Grooving into initial diameter range



Turning away from center

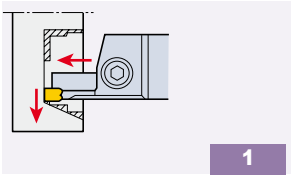


Rapid position back to initial groove and continue with face turning toward center

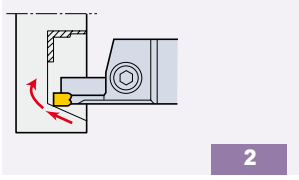
• When face grooving, reduce the speed by 40% in relation to that used in face turning.

For Finishing

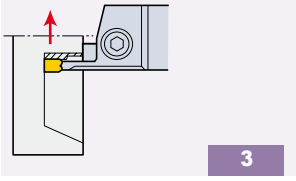
Basic steps for finishing operations when face turning with T-CLAMP ULTRA PLUS tools:



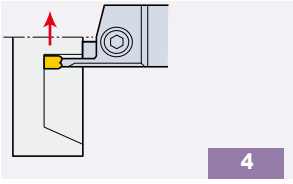
After initial groove move away from center



Finish major diameter and radius



Rapid position back to initial groove and continue with face turning toward center



Finish minor diameter

• When face grooving, reduce the speed by 40% in relation to that used in face turning.

Recommended Cutting Condition

ISO	Material		Condition	Tensile Strength Rm(N/mm²)	Hardness HB	Groove-Turn, Profiling, Undercutting (m/min)				Internal Grooving, Face Grooving (m/min)	
						CT3000	TT9100	TT9080 TT7220	TT8020	TT9080 TT7220	TT8020
P	Non-alloy steel, cast steel, free cutting steel	<0.25 %C	Annealed	420	125	100-210	100-230	100-200	100-180	100-150	80-110
		>=0.25 %C	Annealed	650	190	100-200	100-210	100-180	100-150	60-100	60-90
		<0.55 %C	Quenched and tempered	850	250	80-180	80-180	80-160	80-130		
		>=0.55%C	Annealed	750	220	80-180	80-180	80-160	80-130	60-110	50-90
			Quenched and tempered	1000	300	70-150	70-150	70-130	70-120		
	Low alloy steel and cast steel (less than 5% alloying elements)		Annealed	600	200	100-180	100-200	100-160	10-150	60-110	40-70
			Quenched and tempered	930	275	90-180	90-180	80-160	80-150	70-110	40-60
				1000	300	80-170	80-170	80-150	80-130		
				1200	350	80-150	80-150	80-130	80-120	60-90	30-50
	High alloy steel, cast steel and tool steel.		Annealed	680	200	90-130	90-140	90-130	90-110	60-90	30-50
			Quenched and tempered	1100	325	50-80	50-80	50-80	50-70	50-80	30-40

ISO	Material	Condition	Tensile Strength Rm(N/mm²)	Hardness HB	Groove-Turn, Profiling, Undercutting (m/min)			Internal Grooving, Face Grooving (m/min)	
					CT3000	TT9080	TT8020	TT9080	TT8020
M	Stainless steel and cast steel	Ferritic/martensitic	680	200	80-170	80-170	80-170	50-130	40-80
		Martensitic	820	240	80-150	80-150	80-150		
		Austenitic	600	180	80-170	80-170	80-170	40-130	30-80

ISO	Material	Condition	Tensile Strength Rm(N/mm²)	Hardness HB	Groove-Turn, Profiling, Undercutting (m/min)			Internal Grooving, Face Grooving (m/min)		
					TT6300	K10	T6080	TT6300	TT6080	K10
K	Gray cast iron (GG)	Ferritic		160	150-270	70-100	110-250	90-140	70-120	40-60
		Pearlitic		250	120-170	50-90	90-140	80-120	60-100	40-60
	Cast iron nodular (GGG)	Ferritic		130	150-250	70-100	120-230	90-130	70-110	40-60
		Pearlitic		230	120-200	60-90	90-180	80-110	60-90	30-50
	Malleable cast iron	Ferritic/pearlitic		180	120-200	60-120	90-180	80-130	60-110	20-40
		Pearlitic		260	100-180	50-80	80-150	60-100	50-90	20-40

ISO	Material		Condition	Tensile Strength Rm(N/mm²)	Hardness HB	Groove-Turn, Profiling, Undercutting (m/min)		Internal Grooving, Face Grooving (m/min)
						KP300	K10	K10
N	Aluminum-wrought alloy		Not curable		60	150-2500	300-800	100-300
			Cured		100	150-2500	230-310	100-300
	Aluminum-cast, alloyed	<=12% Si	Not cureable		75	150-2500	280-830	100-300
			Cured		90	150-2500	200-510	100-300
		>12% Si	High temp.		130	330-800	130-300	80-200
	Copper alloys	>1% Pb	Free cutting		110			
			Brass		90	330-800	120-200	80-150
			Electrolitic copper		100	190-400	90-150	60-100

ISO	Material		Condition	Tensile Strength Rm(N/mm²)	Hardness HB	Groove-Turn, Profiling, Undercutting (m/min)			Internal Grooving, Face Grooving (m/min)	
						TT9080	K10	TT8020	TT9080	TT8020
S	High temp. alloys	Fe based	Annealed		200	30-50	30-40	20-30	20-40	20-30
			Cured		280	20-40	20-40	15-20	15-30	15-20
		Ni or Co based	Annealed		250	20-30	20-30	15-20	15-20	15-20
			Cured		350	15-20	15-20	15-20	15-20	15-20
			Cast		320	15-20	15-20	15-20	15-20	15-20
	Titanium, Ti alloys			Rm 400		130-170	100-130	80-100	90-120	60-80
			Alpha+beta alloys cured	Rm 1050		40-70	20-50	15-30	20-50	15-30

ISO	Material	Condition	Tensile Strength Rm(N/mm²)	Hardness HB	Groove-Turn, Profiling, Undercutting (m/min)			Internal Grooving, Face Grooving (m/min)	
					TT6300	TB650	K10	TT6300	K10
H	Hardened steel	Hardened		55 HRc	30-50	90-110	20-40	15-25	15-20
		Hardened		60 HRc	30-50	80-100	20-30	15-25	15-20
	Chilled cast iron	Cast		400	30-50	180-200	20-50	15-25	15-25
	Cast iron nodular	Hardened	55 HRc	55 HRc	30-50	90-110	20-40	15-25	15-25

* For more information of material groups,
see the TaeguTec concise catalogue " Material Conversion Table" section.

Steel Stainless Steel Cast Iron Nonferrous High Temp. Alloys Hardened Steel

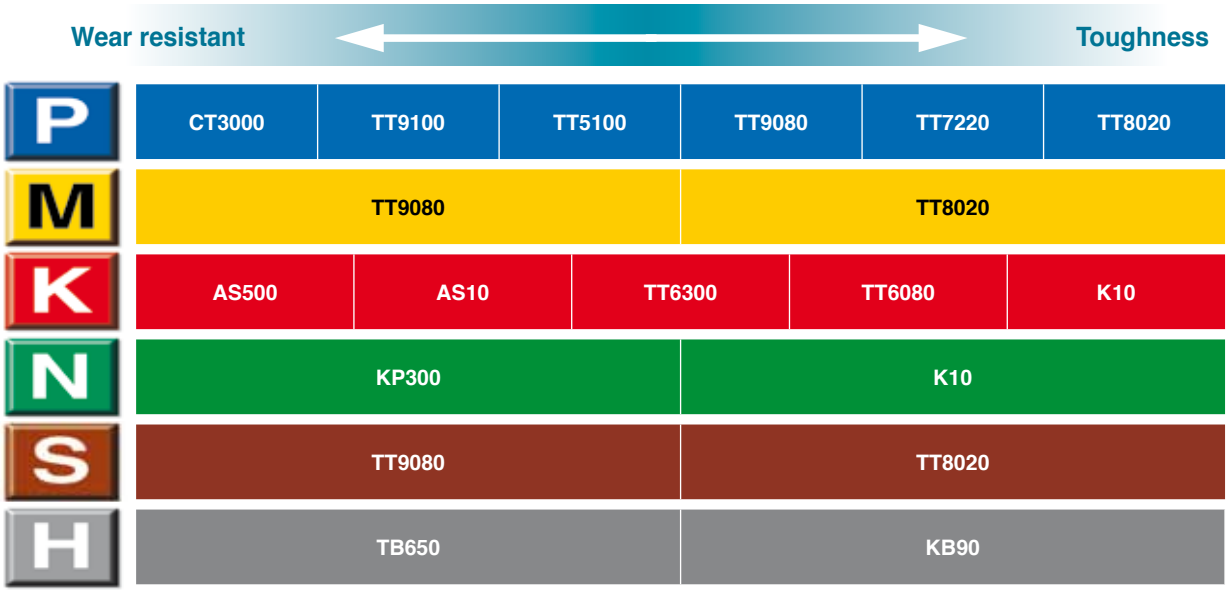
Recommended Machining Conditions for Ceramic T-CLAMP ULTRA PLUS Insert

Material		Grooving	Turning
Cast iron	Vc (m/min)	600 - 800	600 - 800
	F (mm/rev)	0.1 - 0.2	0.1 - 0.24
High hardened steel	Vc (m/min)	Not recommended	250 - 350
	F (mm/rev)		0.08 - 0.20

• Above condition is adapted to TDT 4E-0.4T CE AB30.

User Guide

Grades



TT6300(CVD)

This grade has an extra thick CVD coating that guarantees excellent tool life especially when machining gray cast iron. Its surface has been treated after the coating process.

TT6080(PVD)

The latest PVD coating technology has been applied to substrate that has multi nano layers such as Multi Nano AlTiN/TiAlCrN/TiN. This ensures outstanding performance when machining ductile cast iron, as well as interrupted machining on gray cast iron. The surface has been treated after the coating process.

TT9100(CVD)

A CVD coating layer has now been added to enhance toughness and wear resistance, this grade is suitable to high speed steel machining. In addition, the grade shows 200% and 130% improved tool life when compared to the existing competitors.

TT5100(CVD)

A CVD coated grade for machining carbon steels, alloy steels and stainless steels with outstanding tool life

TT9080(PVD)

For general Turning, Grooving Profiling and Parting applications on Carbon Steel, Alloy Steel and Stainless Steel.
TaeguTec has applied the latest coating technology to the existing sub micron substrate.

TT7220(PVD)

A PVD coated grade for machining carbon steel and alloy steel

TT8020(PVD)

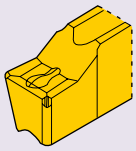
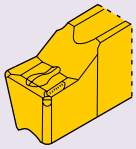
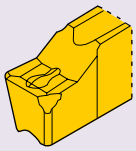
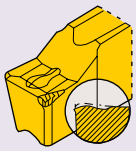
TaeguTec's toughest PVD grade for severely interrupted cutting, stainless steel and exotic alloy machining

CT3000(CERMET)

A tough new reinforced cermet grade with excellent wear resistance.
Recommended for grooving, parting & turning alloy steels and stainless steels with good surface quality and long tool life

Trouble Shooting

Insert failure and tool life

Problem	Possible Cause	Solution
1. Rapid flank wear **Short tool life** 	Excesively high cutting speed. Carbide with too low wear resistance	· Decrease cutting speed · Use a carbide with higher hardness or a coated carbide
2. Cratering **Short tool life** 	High cutting temperature on insert rake face at high feed and speed	· Decrease feed and speed · Use coated grade
3. Cutting edge/ **Insert fracture** 	High load on insert. Insert width too narrow. Grade too brittle.	· Use wider insert for maximum support · Decrease feed and speed · Choose a tougher grade
4. Plastic **deformation** 	High heat pressure decreasing carbide hardness.	· Use a bigger corner radius and decrease feed and speed · Choose carbide with higher hardness
5. Chip control **Spaghetti-like chips coil under holder and interfere with operation**	Small depth of cut. Feed too slow. Insert width too large. Insert radius too large.	· Check chipbreaking range · Increase depth of cut · Increase feed rate · Use narrower insert with a smaller radius
6. Poor surface finish	Small depth of cut, i.e. less than corner radius.	· Increase depth of cut to minimum radius size
7. Vibration and poor surface quality	Small front clearance angle between insert and workpiece leads to rubbing action.	· Increase feed to get suitable clearance · Before starting, check that the front cutting edge is parallel to workpiece

Sleeves for TOPMICRO, H-DRILL

Our new sleeves have been designed to accommodate the TOPMICRO and H-DRILL.
The sleeves have a stopper inside the hole, so customers can machine without the resetting process after indexing.
It also allows users to replace tools without taking the sleeve from the tool post.

Sleeve

for TOPMICRO (Ø4mm & Ø7mm)

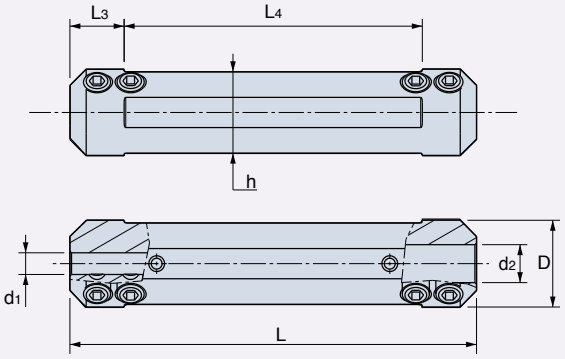
for H-DRILL

TOPMICRO

The latest tools are designed for boring, grooving, back turning, profiling and face machining as internal operations. Including an internal coolant hole, a direct supply of cooling oil controls build-up and enables smooth chip evacuation.

• See page C77 - C83

Sleeves for TOPMICRO

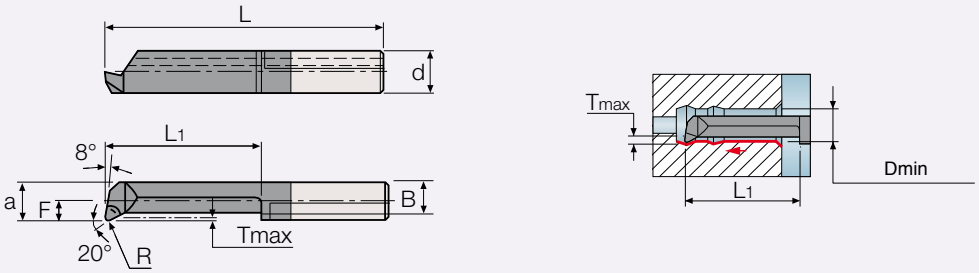


Designation	D	d1	d2	L	L3	L4	h	Set Screw	Wrench
MINSL 12-4-4	12.00	4.00	4.00	75.00	10.00	55.00	10.30	SS M5X0.8X4-MG	L-W 2.5
MINSL 14-4-4	14.00	4.00	4.00	75.00	10.00	55.00	12.00	SS M5X0.8X6-MG	
MINSL 16-4-7	16.00	4.00	7.00	75.00	10.00	55.00	15.00	SS M5X0.8X6-MG	
MINSL 20-4-7	20.00	4.00	7.00	90.00	10.00	70.00	18.00	SS M5X0.8X6-MG	
MINSL 22-4-7	22.00	4.00	7.00	90.00	10.00	70.00	20.00	SS M5X0.8X6-MG	
MINSL 25-4-7	25.00	4.00	7.00	100.00	10.00	80.00	23.00	SS M5X0.8X6-MG	

Recommended Cutting Conditions

Cutting Speed (m/min)		Feed Rate (mm/rev)		
		Turning / Back Turning	Grooving	Face Grooving
P	30~150	0.01 ~ 0.08	0.01 ~ 0.05	0.01 ~ 0.04
M	30~130			
K	30~150			
N	50~200			
S	10~50			

MINT Type Mini Carbide Bars for Internal Turning and Chamfering



Right hand shown

Designation	d	F	a	B	L	L1	R±0.05	Tmax	Dmin	R/L	Grade TT9030
MINTR04-020004D006*		-	0.50	0.35	18.50	3.50	0.04	0.08	0.60	R	●
MINTR04-030004D006*		-	0.50	0.35	19.50	4.50	0.04	0.08	0.60	R	●
MINTR04-045005D010		-	0.90	0.70	21.00	6.00	0.05	0.10	1.00	R	●
MINTR04-065005D010		-	0.90	0.70	23.00	8.00	0.05	0.10	1.00	R	●
MINTR04-040005D020		-	1.70	1.45	20.50	5.50	0.05	0.10	2.00	R	●
MINTR04-090005D020		-	1.70	1.45	25.50	10.50	0.05	0.10	2.00	R	●
MINTR04-140005D020		-	1.70	1.45	30.50	15.50	0.05	0.10	2.00	R	●
MINTL04-090010D028		0.60	2.60	2.20	25.50	10.50	0.10	0.20	2.80	L	●
MINTR04-090010D028		0.60	2.60	2.20	25.50	10.50	0.10	0.20	2.80	R	●
MINTL04-150010D028		0.60	2.60	2.20	31.50	16.50	0.10	0.20	2.80	L	●
MINTR04-150010D028	4.00	0.60	2.60	2.20	31.50	16.50	0.10	0.20	2.80	R	●
MINTL04-190010D028		0.60	2.60	2.20	35.50	20.50	0.10	0.20	2.80	L	●
MINTR04-190010D028		0.60	2.60	2.20	35.50	20.50	0.10	0.20	2.80	R	●
MINTL04-090010D040		1.50	3.50	2.90	25.50	10.50	0.10	0.30	4.00	L	●
MINTR04-090010D040		1.50	3.50	2.90	25.50	10.50	0.10	0.30	4.00	R	●
MINTL04-150010D040		1.50	3.50	2.90	31.50	16.50	0.10	0.30	4.00	L	●
MINTR04-150010D040		1.50	3.50	2.90	31.50	16.50	0.10	0.30	4.00	R	●
MINTL04-190010D040		1.50	3.50	2.90	35.50	20.50	0.10	0.30	4.00	L	●
MINTR04-190010D040		1.50	3.50	2.90	35.50	20.50	0.10	0.30	4.00	R	●
MINTR04-230010D040		1.50	3.50	2.90	35.50	24.50	0.10	0.30	4.00	R	●
MINTR04-270010D040		1.50	3.50	2.90	43.50	28.50	0.10	0.30	4.00	R	●

- Cutting condition: Page C76
- Holder: Page C76
- * Max D.O.C: 0.01 - 0.03, Max feed 0.01mm/rev

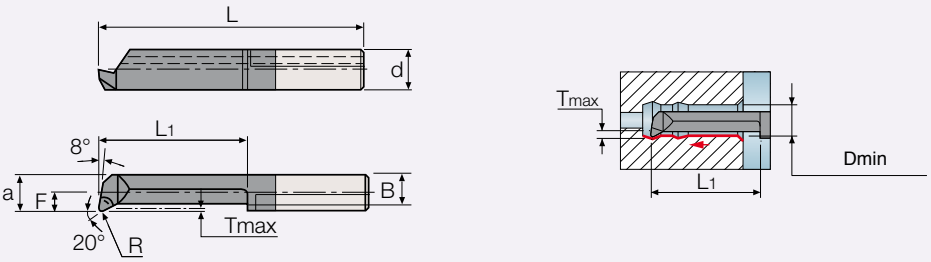
●: Standard Item

TOPMICRO Designation System

MIN R 04 - 040 005 D010

- MIN: TOPMICRO series
- For use:
  - T Turning and chamfering
  - B Back turning
  - P Turning and profiling
  - U Undercutting and chamfering
  - C Turning & 45°chamfering
  - G Grooving and turning
  - A Grooving along shaft
  - F Face grooving
  - R Full radius for internal boring and profiling
  - N ISO full profile internal threading
  - SLSleeve for MINS
- R: Hand of tool — R Right hand, L Left hand
- 04: Shank dia. — 04 4.0mm, 05 5.0mm
- 040: Max. Depth — 050 5.0mm, 140 14.0mm
- 005: Corner Radius — 010 0.10mm, 020 0.20mm
- D010: Min.bore.dia. — D010 1.0mm

MINT Type Mini Carbide Bars for Internal Turning and Chamfering



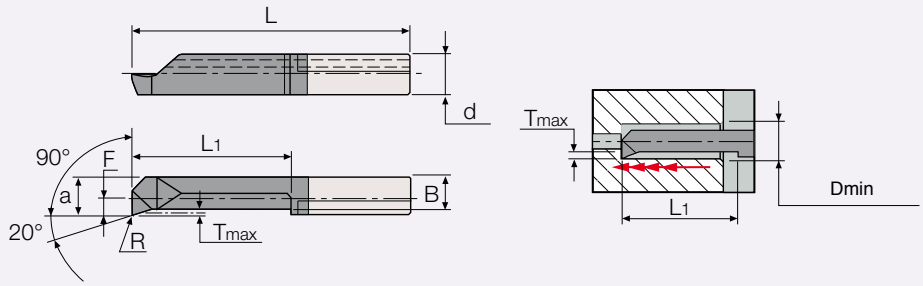
Right hand shown

Designation	d	F	a	B	L	L1	R±0.05	Tmax	Dmin	R/L	Grade TT9030
MINTL07-090015D050		0.90	4.40	3.65	25.00	10.00	0.15	0.50	5.00	L	●
MINTR07-090015D050		0.90	4.40	3.65	25.00	10.00	0.15	0.50	5.00	R	●
MINTL07-140015D050		0.90	4.40	3.65	30.00	15.00	0.15	0.50	5.00	L	●
MINTR07-140015D050		0.90	4.40	3.65	30.00	15.00	0.15	0.50	5.00	R	●
MINTL07-190015D050		0.90	4.40	3.65	35.00	20.00	0.15	0.50	5.00	L	●
MINTR07-190015D050		0.90	4.40	3.65	35.00	20.00	0.15	0.50	5.00	R	●
MINTL07-240015D050		0.90	4.40	3.65	40.00	25.00	0.15	0.50	5.00	L	●
MINTR07-240015D050		0.90	4.40	3.65	40.00	25.00	0.15	0.50	5.00	R	●
MINTL07-290015D050		0.90	4.40	3.65	45.00	30.00	0.15	0.50	5.00	L	●
MINTR07-290015D050		0.90	4.40	3.65	45.00	30.00	0.15	0.50	5.00	R	●
MINTR07-340015D050		0.90	4.40	3.65	50.00	35.00	0.15	0.50	5.00	R	●
MINTL07-140015D060		1.80	5.30	4.40	30.00	15.00	0.15	0.50	6.00	L	●
MINTR07-140015D060		1.80	5.30	4.40	30.00	15.00	0.15	0.50	6.00	R	●
MINTL07-210015D060		1.80	5.30	4.40	37.00	22.00	0.15	0.50	6.00	L	●
MINTR07-210015D060		1.80	5.30	4.40	37.00	22.00	0.15	0.50	6.00	R	●
MINTL07-240015D060	7.00	1.80	5.30	4.40	40.00	25.00	0.15	0.50	6.00	L	●
MINTR07-240015D060		1.80	5.30	4.40	40.00	25.00	0.15	0.50	6.00	R	●
MINTL07-290015D060		1.80	5.30	4.40	45.00	30.00	0.15	0.50	6.00	L	●
MINTR07-290015D060		1.80	5.30	4.40	45.00	30.00	0.15	0.50	6.00	R	●
MINTR07-340015D060		1.80	5.30	4.40	50.00	35.00	0.15	0.50	6.00	R	●
MINTR07-410015D060		1.80	5.30	4.40	57.00	42.00	0.15	0.50	6.00	R	●
MINTL07-190015D068		2.80	6.30	5.40	35.00	20.00	0.15	0.60	6.80	L	●
MINTR07-190015D068		2.80	6.30	5.40	35.00	20.00	0.15	0.60	6.80	R	●
MINTR07-240015D068		2.80	6.30	5.40	40.00	25.00	0.15	0.60	6.80	R	●
MINTL07-290015D068		2.80	6.30	5.40	45.00	30.00	0.15	0.60	6.80	L	●
MINTR07-290015D068		2.80	6.30	5.40	45.00	30.00	0.15	0.60	6.80	R	●
MINTL07-340015D070		2.80	6.30	5.40	50.00	35.00	0.15	0.60	7.00	L	●
MINTR07-340015D070		2.80	6.30	5.40	50.00	35.00	0.15	0.60	7.00	R	●
MINTR07-390015D070		2.80	6.30	5.40	55.00	40.00	0.15	0.60	7.00	R	●
MINTR07-440015D070		2.80	6.30	5.40	60.00	45.00	0.15	0.60	7.00	R	●
MINTR07-490015D070		2.80	6.30	5.40	65.00	50.00	0.15	0.60	7.00	R	●

• Cutting condition: Page C76
• Holder: Page C76

●: Standard Item

MINP Type Mini Carbide Bars for Internal Turning and Profiling



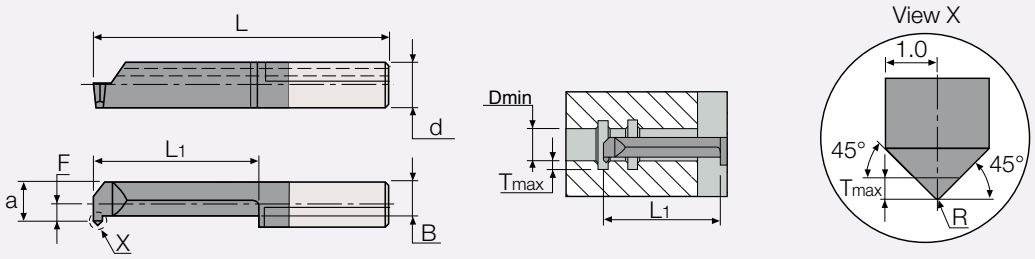
Right hand shown

Designation	d	F	a	B	L	L1	R±0.05	Tmax	Dmin	R/L	Grade TT9030
MINPR04-090010D028	4.00	0.60	2.60	2.20	25.50	10.50	0.10	0.20	2.80	R	●
MINPR04-150010D028		0.60	2.60	2.20	31.50	16.50	0.10	0.20	2.80	R	●
MINPR04-090010D040		1.50	3.50	2.90	25.50	10.50	0.10	0.30	4.00	R	●
MINPR04-150010D040		1.50	3.50	2.90	31.50	16.50	0.10	0.30	4.00	R	●
MINPR07-140015D050	7.00	0.90	4.40	3.65	30.00	15.00	0.15	0.50	5.00	R	●
MINPR07-190015D050		0.90	4.40	3.65	35.00	20.00	0.15	0.50	5.00	R	●

• Cutting condition: Page C76
• Holder: Page C76

●: Standard Item

MINC Type Mini Carbide Bars for Internal Turning and 45° Chamfering



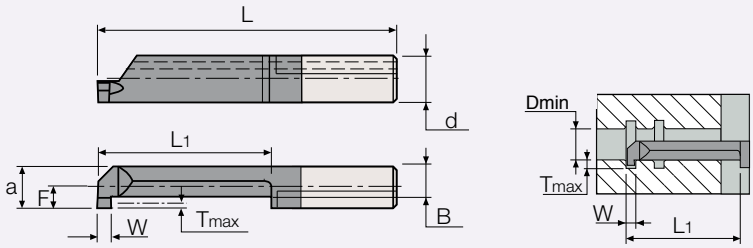
Right hand shown

Designation	d	F	a	B	L	L1	R±0.04	Tmax	Dmin	R/L	Grade TT9030
MINCR07-140020D050	7.00	0.90	4.40	3.20	30.00	15.00	0.20	0.70	5.00	R	●
MINCR07-190020D050		0.90	4.40	3.20	35.00	20.00	0.20	0.70	5.00	R	●
MINCR07-190020D068		2.80	6.30	3.80	35.00	20.00	0.20	0.70	6.80	R	●

• Cutting condition: Page C76
• Holder: Page C76

●: Standard Item

MING Type Mini Carbide Bars for Grooving and Turning



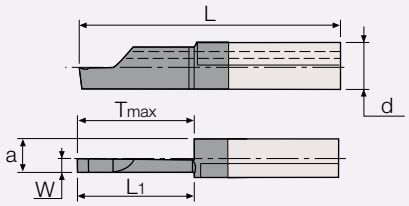
Right hand shown

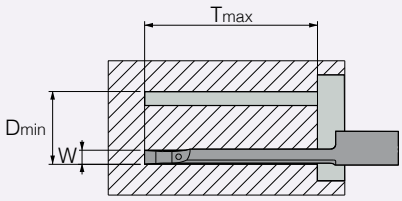
Designation	d	W±0.05	F	a	B	L	L1	Tmax	Dmin	R/L	Grade TT9030
MINGR04-050050D020	4.00	0.50	0.20	1.80	1.15	21.00	6.00	0.40	2.00	R	●
MINGR04-100050D020		0.50	0.20	1.80	1.15	26.00	11.00	0.40	2.00	R	●
MINGR04-050070D030		0.70	0.70	2.70	1.85	21.00	6.00	0.60	3.00	R	●
MINGR04-100070D030		0.70	0.70	2.70	1.85	26.00	11.00	0.60	3.00	R	●
MINGR04-090100D040		1.00	1.50	3.50	2.30	25.50	10.50	0.80	4.00	R	●
MINGR04-150100D040		1.00	1.50	3.50	2.30	31.50	16.50	0.80	4.00	R	●
MINGR07-090100D050	7.00	1.00	0.90	4.40	3.00	25.00	10.00	1.00	5.00	R	●
MINGR07-140100D050		1.00	0.90	4.40	3.00	30.00	15.00	1.00	5.00	R	●
MINGR07-090150D050		1.50	0.90	4.40	3.00	25.00	10.00	1.00	5.00	R	●
MINGR07-140150D050		1.50	0.90	4.40	3.00	30.00	15.00	1.00	5.00	R	●
MINGR07-090200D050		2.00	0.90	4.40	3.00	25.00	10.00	1.00	5.00	R	●
MINGR07-190200D050		2.00	0.90	4.40	3.00	35.00	20.00	1.00	5.00	R	●
MINGR07-090100D060		1.00	1.80	5.30	3.10	25.00	10.00	1.80	6.00	R	●
MINGL07-090100D060		1.00	1.80	5.30	3.10	25.00	10.00	1.80	6.00	L	●
MINGR07-140100D060		1.00	1.80	5.30	3.10	30.00	15.00	1.80	6.00	R	●
MINGR07-210100D060		1.00	1.80	5.30	3.10	37.00	22.00	1.80	6.00	R	●
MINGR07-290100D060		1.00	1.80	5.30	3.10	45.00	30.00	1.80	6.00	R	●
MINGR07-090150D060		1.50	1.80	5.30	3.10	25.00	10.00	1.80	6.00	R	●
MINGL07-090150D060		1.50	1.80	5.30	3.10	25.00	10.00	1.80	6.00	L	●
MINGR07-140150D060		1.50	1.80	5.30	3.10	30.00	15.00	1.80	6.00	R	●
MINGR07-210150D060		1.50	1.80	5.30	3.10	37.00	22.00	1.80	6.00	R	●
MINGR07-240150D060		1.50	1.80	5.30	3.10	40.00	25.00	1.80	6.00	R	●
MINGR07-290150D060		1.50	1.80	5.30	3.10	45.00	30.00	1.80	6.00	R	●
MINGR07-090200D060		2.00	1.80	5.30	3.10	25.00	10.00	1.80	6.00	R	●
MINGR07-140200D060		2.00	1.80	5.30	3.10	30.00	15.00	1.80	6.00	R	●
MINGR07-210200D060		2.00	1.80	5.30	3.10	37.00	22.00	1.80	6.00	R	●
MINGR07-240200D060		2.00	1.80	5.30	3.10	40.00	25.00	1.80	6.00	R	●
MINGR07-290200D060		2.00	1.80	5.30	3.10	45.00	30.00	1.80	6.00	R	●
MINGR07-090100D068		1.00	2.70	6.20	3.30	25.00	10.00	2.50	6.80	R	●
MINGR07-140100D068		1.00	2.70	6.20	3.30	30.00	15.00	2.50	6.80	R	●
MINGR07-210100D068		1.00	2.70	6.20	3.30	37.00	22.00	2.50	6.80	R	●
MINGR07-090150D068		1.50	2.70	6.20	3.30	25.00	10.00	2.50	6.80	R	●
MINGR07-140150D068		1.50	2.70	6.20	3.30	30.00	15.00	2.50	6.80	R	●
MINGR07-210150D068		1.50	2.70	6.20	3.30	37.00	22.00	2.50	6.80	R	●
MINGR07-290150D068		1.50	2.70	6.20	3.30	45.00	30.00	2.50	6.80	R	●
MINGR07-090200D068		2.00	2.70	6.20	3.30	25.00	10.00	2.50	6.80	R	●
MINGR07-140200D068		2.00	2.70	6.20	3.30	30.00	15.00	2.50	6.80	R	●
MINGL07-140200D068		2.00	2.70	6.20	3.30	30.00	15.00	2.50	6.80	L	●
MINGR07-210200D068		2.00	2.70	6.20	3.30	37.00	22.00	2.50	6.80	R	●
MINGR07-290200D068		2.00	2.70	6.20	3.30	45.00	29.00	2.50	6.80	R	●

• Cutting condition: Page C76
• Holder: Page C76

●: Standard Item

MINF Type Mini Carbide Bars for Deep Face Grooving





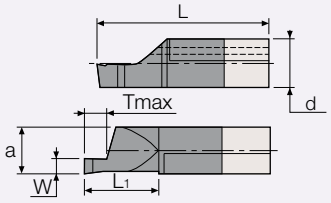
Right hand shown

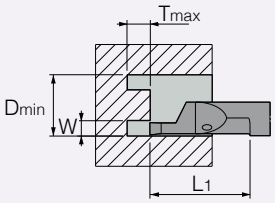
Designation	d	W	a	L	L1	Tmax	Dmin	R/L	Grade TT9030
MINFR07 200250D150	7.00	2.50	5.90	36.00	21.00	20.00	15.00	R	●
MINFR07 200300D150		3.00	5.90	36.00	21.00	20.00	15.00	R	●
MINFR07 300300D150		3.00	5.90	46.00	31.00	30.00	15.00	R	●

• Cutting condition: Page C76
• Holder: Page C76

●: Standard Item

MINF Type Mini Carbide Bars for Deep Face Grooving





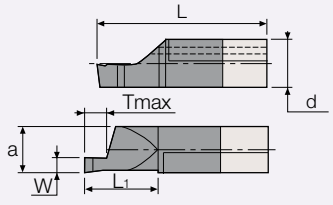
Right hand shown

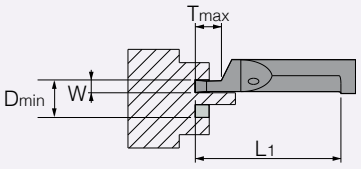
Designation	d	W	a	L	L1	Tmax	Dmin	R/L	Grade TT9030
MINFR07-110100D060	7.00	1.00	5.20	26.00	11.00	1.50	6.00	R	●
MINFR07-110100D080		1.00	5.90	27.00	12.00	1.50	8.00	R	●
MINFR07-110150D060		1.50	5.20	26.00	11.00	2.00	6.00	R	●
MINFR07-110150D080		1.50	5.90	27.00	12.00	2.50	8.00	R	●
MINFR07-110200D060		2.00	5.20	26.00	11.00	3.00	6.00	R	●
MINFR07-200200D080		2.00	5.90	36.00	21.00	3.00	8.00	R	●
MINFL07-210150D080		1.50	5.90	36.00	22.00	2.50	8.00	L	●
MINFR07-210150D080		1.50	5.90	36.00	22.00	2.50	8.00	R	●
MINFL07-300200D080		2.00	5.90	46.00	31.00	3.00	8.00	L	●
MINFR07-110200D080		2.00	5.90	27.00	12.00	3.00	8.00	R	●
MINFR07-210200D080		2.00	5.90	36.00	22.00	3.00	8.00	R	●
MINFR07-110250D080		2.50	5.90	27.00	12.00	3.50	8.00	R	●
MINFR07-210250D080		2.50	5.90	36.00	22.00	3.50	8.00	R	●
MINFR07-110300D080		3.00	5.90	27.00	12.00	3.50	8.00	R	●
MINFR07-210300D080		3.00	5.90	36.00	22.00	3.50	8.00	R	●
MINFR07-300300D080		3.00	5.90	46.00	31.00	3.50	8.00	R	●

• Cutting condition: Page C76
• Holder: Page C76

●: Standard Item

MINA Type Mini Carbide Bars for Grooving along Shaft





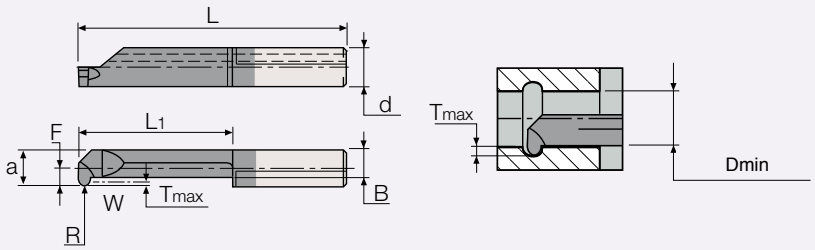
Right hand shown

Designation	d	W	a	L	L1	Tmax	Dmin	R/L	Grade TT9030
MINAR07-200200D060	7.00	2.00	5.20	36.00	21.00	4.00	6.00	R	●

• Cutting condition: Page C76
• Holder: Page C76

●: Standard Item

MINR Type Mini Carbide Bars, Full Radius for Internal Boring and Profiling



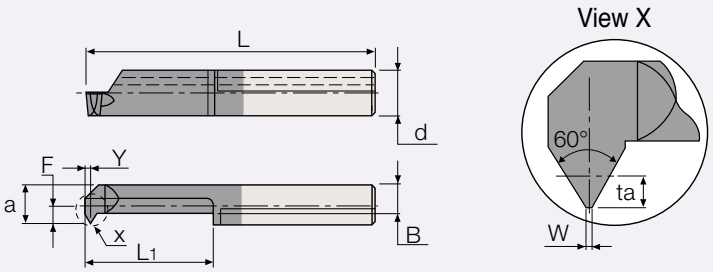
Right hand shown

Designation	d	W±0.05	F	a	B	R	L	L1	Tmax	Dmin	R/L	Grade TT9030
MINRR07-190050D050	7.00	1.00	0.90	4.40	3.10	0.50	35.00	20.00	1.00	5.00	R	●
MINRR07-240050D060		1.00	1.80	5.30	3.20	0.50	40.00	25.00	1.80	6.00	R	●
MINRR07-290050D068		1.00	2.80	6.30	3.55	0.50	45.00	30.00	2.50	6.80	R	●

• Cutting condition: Page C76
• Holder: Page C76

●: Standard Item

MINN Type Mini Carbide Bars for ISO Internal Thread Turning



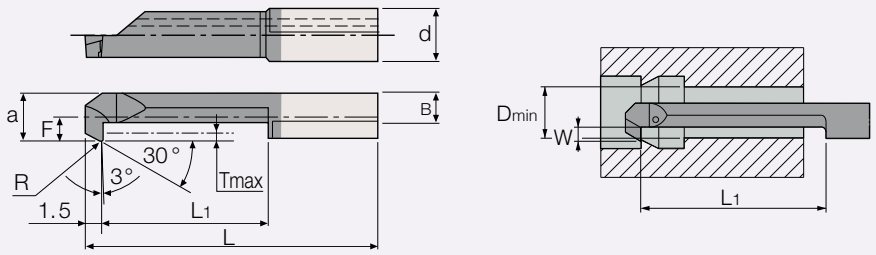
Right hand shown

Designation	d	Pitch	ta	W	Y	F	a	B	L	L1	Dmin	Grade TT9030
MINNR04-140050D040	4.00	0.50	0.30	0.06	0.35	1.50	3.50	2.40	30.00	15.00	4.00	●
MINNR07-140050D050	7.00	0.50	0.30	0.06	0.35	0.90	4.40	3.30	30.00	15.00	5.00	●
MINNR07-140075D050		0.75	0.40	0.90	0.45	0.90	4.40	3.30	30.00	15.00	5.00	●
MINNR07-140100D048		1.00	0.60	0.12	0.55	0.90	4.40	3.30	30.00	15.00	4.80	●
MINNR07-140100D060		1.00	0.60	0.12	0.55	1.80	5.30	3.40	30.00	15.00	6.00	●
MINNR07-140125D060		1.25	0.70	0.15	0.65	1.80	5.30	3.40	30.00	15.00	6.00	●
MINNR07-140150D060		1.50	0.80	0.18	0.75	1.80	5.30	3.40	30.00	15.00	6.00	●
MINNR07-140150D070		1.50	0.80	0.18	0.75	2.80	6.30	3.80	30.00	15.00	7.00	●

• Cutting condition: Page C76
• Holder: Page C76

●: Standard Item

MINB Type Mini Carbide Bars for Internal Back Turning



Right hand shown

Designation	d	F	a	B	L	L1	R±0.05	Tmax	Dmin	R/L	Grade TT9030
MINBR04-140020D030	4.00	0.60	2.60	1.80	30.00	15.00	0.20	0.50	3.00	R	●
MINBR04-190020D030		0.60	2.60	1.80	35.00	20.00	0.20	0.50	3.00	R	●
MINBR04-140015D040		1.50	3.50	2.40	30.00	15.00	0.15	0.80	4.00	R	●
MINBR04-240015D040		1.50	3.50	2.40	40.00	25.00	0.15	0.80	4.00	R	●
MINBR07-190020D050	7.00	0.90	4.40	3.10	35.00	20.00	0.20	1.00	5.00	R	●
MINBR07-290020D050		0.90	4.40	3.10	45.00	30.00	0.20	1.00	5.00	R	●
MINBR07-190020D060		1.80	5.30	3.20	35.00	20.00	0.20	1.80	6.00	R	●
MINBR07-290020D060		1.80	5.30	3.20	45.00	30.00	0.20	1.80	6.00	R	●
MINBR07-190020D070		2.80	6.30	3.50	35.00	20.00	0.20	2.50	7.00	R	●
MINBR07-290020D070		2.80	6.30	3.50	45.00	30.00	0.20	2.50	7.00	R	●

• Cutting condition: Page C76
●: Standard Item
• Holder: Page C76

For Swiss Type and Small Automatic Lather

Insert Features

- Excellent surface finish and repeatability credit to high precision ground inserts
- Ultra fine, ground cutting edge prevents micro-chipping and promotes longer tool life
- Chipbreaker designed for low cutting force and smooth chip evacuation
- Wiper cutting edge on external turning insert promotes excellent surface finish

Main Grade: TT9010 Features

- For roughing to finishing applications in small parts machining
- High mechanical shock resistance
- Ultra fine grain size substrate with TiN PVD coating
- TiN PVD coating improves wear resistance and reduces the friction coefficient

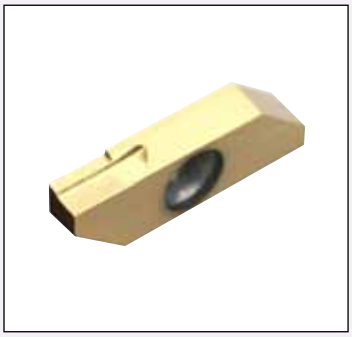
Tool Holder Features

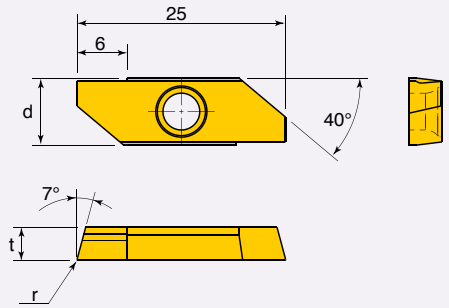
- Designed for setting on small automatic lathe machines
- Precision ground tool holders ensure accurate mounting to the lathe promoting stable machining
- Insert indexing from both sides of holder
- Dovetail shape of insert & pocket means a stable clamping system
- High clearance angle on both insert and holder ensures no interference with other holders when mounted on radial tool post

Recommended Cutting Conditions

	Application	Depth Of Cut (mm)	Feed (mm/rev)	Cutting Speed (m/min)
P	Turning	1.5 (0.1~5.5)	0.05 (0.01-0.1)	60(10-120)
M				60(10-100)
S				30(10-50)
P	Grooving / Parting		0.05 (0.01-0.1)	50(10-100)
M				
S				30(10-50)

TVER/L General Turning



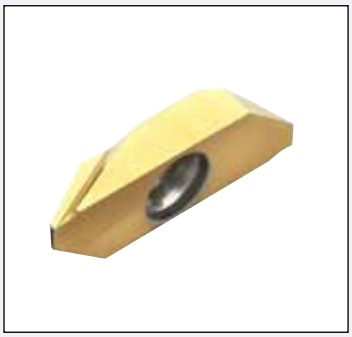


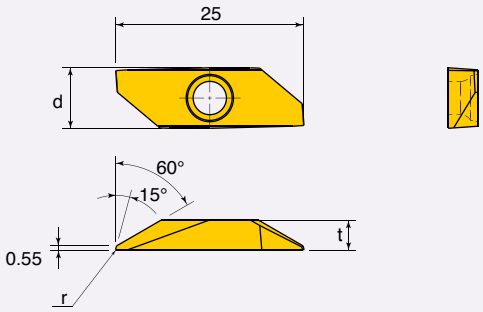
Right hand shown

Designation	Dimension (mm)				TT9010	
	d	t	r	Max. Depth Of Cut	R	L
TVER/L 40003	8	3.97	0.03	5.5	●	
TVER/L 40010	8	3.97	0.1	5.5	●	

●: Standard Item

TVRR/L Reverse Turning



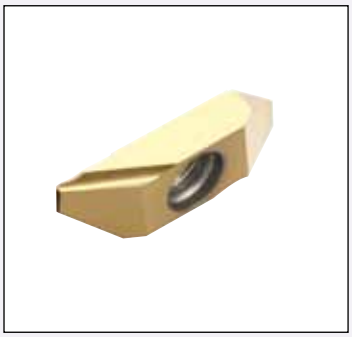


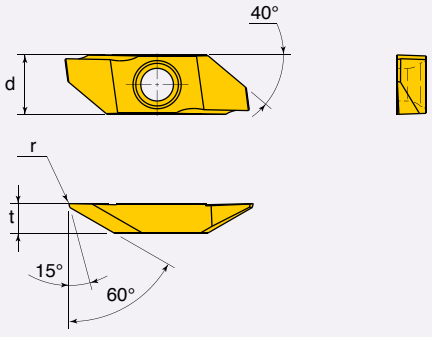
Right hand shown

Designation	Dimension (mm)				TT9010	
	d	t	r	Max. Depth Of Cut	R	L
TVRR/L 40003-60	8	3.97	0.03	5.5	●	
TVRR/L 40010-60	8	3.97	0.1	5.5	●	

●: Standard Item

TVBR/L Back Turning





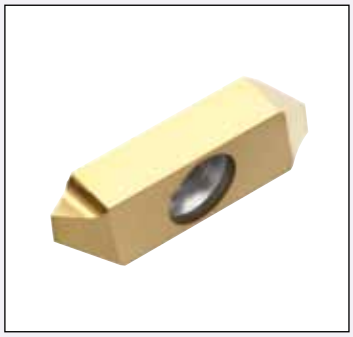
Right hand shown

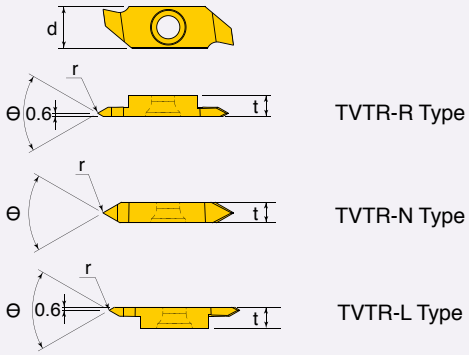
Designation	Dimension (mm)				TT9010	
	d	t	r	Max. Depth Of Cut	R	L
TVBR/L 40003	8	3.97	0.03	5.5	●	●
TVBR/L 40005	8	3.97	0.05	5.5	●	●
TVBR/L 40010	8	3.97	0.1	5.5	●	●
TVBR/L 40015	8	3.97	0.15	5.5	●	●
TVBR/L 40005-H[1)]	8	3.97	0.05	5.5	●	●
TVBR/L 40010-H[1)]	8	3.97	0.1	5.5	●	●
TVBR/L 40015-H[1)]	8	3.97	0.15	5.5	●	●

• [1)] with honed egdes

●: Standard Item

TVTR/L Threading





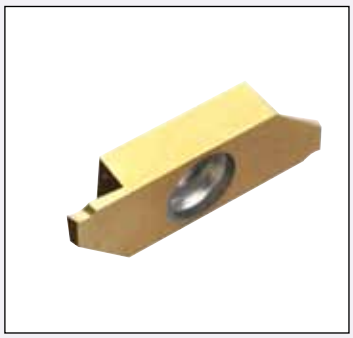
Right hand shown

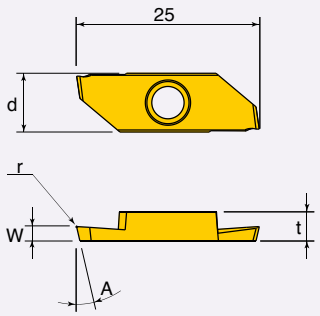
Designation	Dimension (mm)				TT9010	
	d	t	r	Θ	R	L
TVTR/L 41203-R	8	3.97	0.03	60°	●	
TVTR/L 40003-N	8	3.97	0.03	60°	●	
TVTR/L 41203-L	8	3.97	0.03	60°		

- TVTR 41203-R/L ➔ pitch range: 0.5 - 1.0mm
- TVTR 40003-N ➔ pitch range: 0.5 - 2.0mm

●: Standard Item

TVPR/L Grooving/Parting



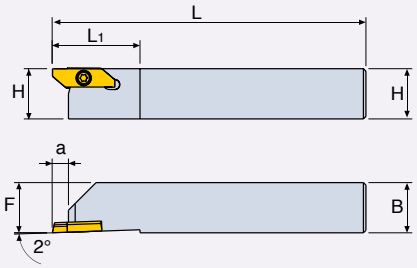


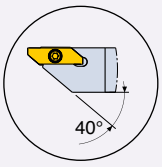
Right hand shown

Designation	Dimension (mm)						TT9010	
	d	t	r	W $^{0}_{+0.05}$	A	Max. Depth Of Cut	R	L
TVPR/L 40700-45	8	3.97	0	0.7	15°	4.5	●	●
TVPR/L 40705-45	8	3.97	0.05	0.7	15°	4.5	●	
TVPR/L 41000-60	8	3.97	0	1.0	15°	6	●	●
TVPR/L 41005-60	8	3.97	0.05	1.0	15°	6	●	
TVPR/L 41000-45	8	3.97	0	1.0	15°	4.5	●	
TVPR/L 41005-45	8	3.97	0.05	1.0	15°	4.5	●	
TVPR/L 41200-60	8	3.97	0	1.2	15°	6		
TVPR/L 41500-60	8	3.97	0	1.5	15°	6	●	●
TVPR/L 41505-60	8	3.97	0.05	1.5	15°	6	●	
TVPR/L 41500-50	8	3.97	0	1.5	15°	5	●	
TVPR/L 41505-50	8	3.97	0.05	1.5	15°	5	●	
TVPR/L 41800-60	8	3.97	0	1.8	15°	6	●	
TVPR/L 41805-60	8	3.97	0.05	1.8	15°	6	●	
TVPR/L 42000-60	8	3.97	0	2.0	15°	6	●	●
TVPR/L 42005-60	8	3.97	0.05	2.0	15°	6	●	
TVPR/L 42000N-60	8	3.97	0	2.0	0°	6	●	●
TVPR/L 42005N-60	8	3.97	0.05	2.0	0°	6	●	

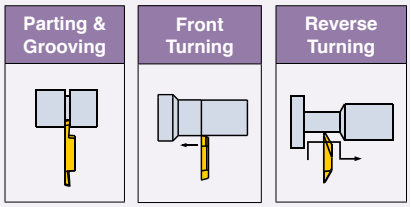
●: Standard Item

TTVER/L





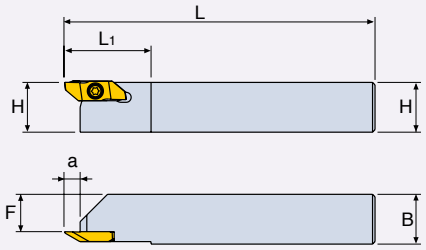
A-Type

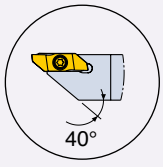


Right Hand Shown

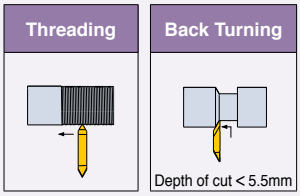
Designation	Insert	Dimension (mm)						Screw	Wrench
		H	B	L	L1	a	F		
TTVER/L 1010-4-A	TVER/L TVRR/L TVPR/L	10	10	125	29	6.7	9.9	CSTB-4SD	T 8
TTVER/L 1212-4-A		12	12	125	29	6.7	11.9		
TTVER/L 1616-4		16	16	125	29	6.5	15.9		
TTVER/L 2020-4		20	20	125	29	6.5	19.9		
TTVER/L 2525-4		25	25	125	29	6.5	24.9		

TTVBR/L

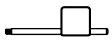




A-Type



Right Hand Shown

Designation	Insert	Dimension (mm)						Screw	Wrench
		H	B	L	L1	a	F		
TTVBR/L 1010-4-A	TVBR/L TVTR/L	10	10	125	29	6.7	5.7	CSTB-4SD	T 8
TTVBR/L 1212-4-A		12	12	125	29	6.7	7.7		
TTVBR/L 1616-4		16	16	125	29	6.4	11.7		
TTVBR/L 2020-4		20	20	125	29	6.4	15.7		
TTVBR/L 2525-4		25	25	125	29	6.4	20.7		

Features

- 4 cutting edges for better economy
- Positive J type chipformer for excellent chip control and high quality surface finish grooving Fig.1
- 3 contact points away from the cutting edges Fig.2
  - Accurate positioning of insert when indexing
  - Even if edges are broken any remaining edge can be used Fig.3
- Pocket protects unused edges from chips during the machining process. Fig.4

Fig.1

Fig.2

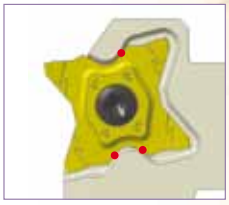
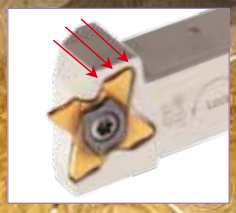
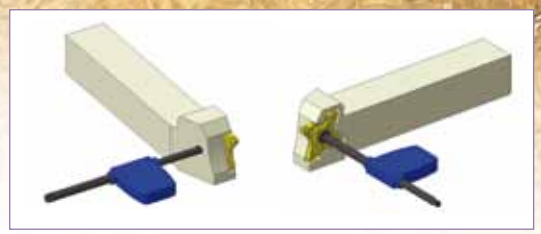


Fig.3

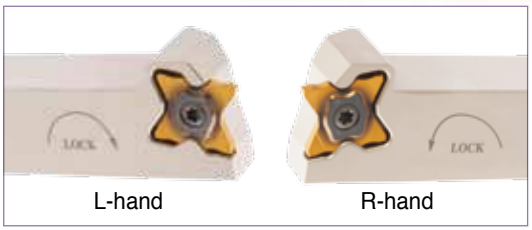
Fig.4



- Unique torx key & screw for insert clamping
  - Insert indexing from both sides of the holder
  - A major advantage over swiss type lathes



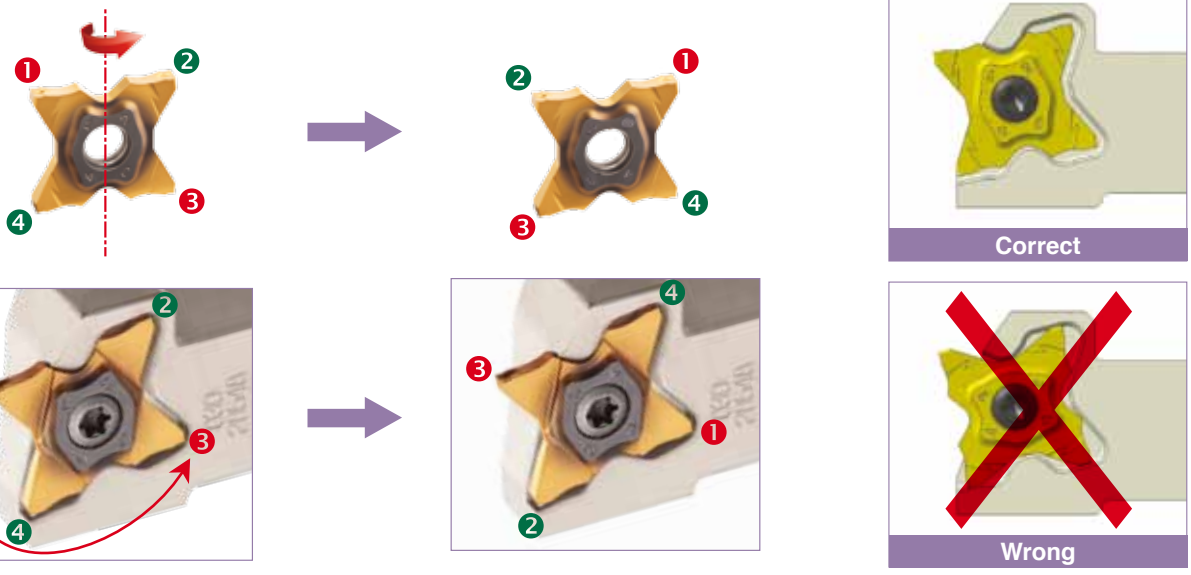
- Side lock torx screws
  - Ensures rigid clamping in holder



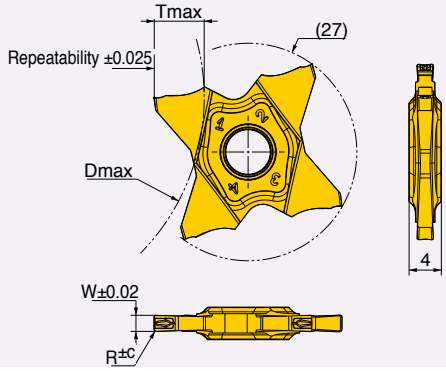
- 2 different setting screws are applied.
  - L-hand holder : R-hand screw
  - R-hand holder : L-hand screw

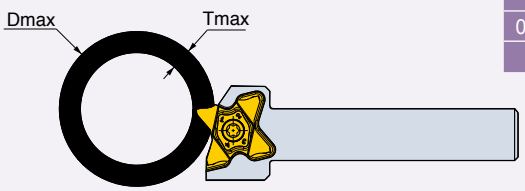
- Gold Rush grade TT9080 is the latest coating technology with multi-nano-layer for improved surface quality and tool life.

Guideline for Insert Positioning



TQJ 27 Precision Grooving, Parting and Recessing Insert





Tolerance

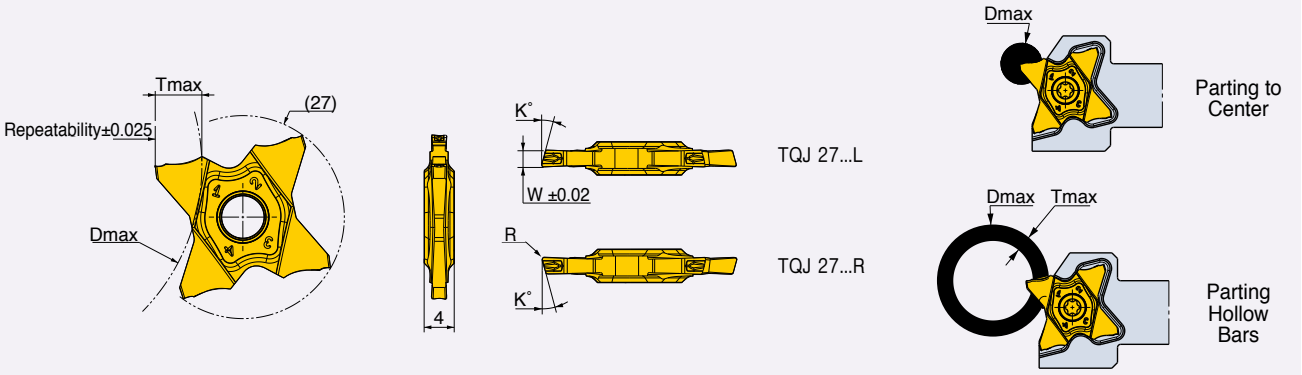
R	C
R≤0.1	0.02
0.1<R≤0.4	0.03
R>0.4	0.05

Designation	W±0.02	R	Tmax	Dmax										Grade
				T ≤ 3.0	T ≤ 3.5	T ≤ 4.0	T ≤ 4.5	T ≤ 5.0	T ≤ 5.5	T ≤ 5.7	T ≤ 6.0	T ≤ 6.2	T ≤ 6.4	TT9080
TQJ 27-0.50-0.00	0.50	0.00	1.0	-	-	-	-	-	-	-	-	-	-	
TQJ 27-0.50-0.04	0.50	0.04	2.5	-	-	-	-	-	-	-	-	-	-	●
TQJ 27-0.75-0.10	0.75	0.10	2.5	-	-	-	-	-	-	-	-	-	-	●
TQJ 27-0.80-0.00	0.80	0.00	1.6	-	-	-	-	-	-	-	-	-	-	
TQJ 27-1.00-0.06	1.00	0.06	3.5	N.L.	600	-	-	-	-	-	-	-	-	
TQJ 27-1.00-0.10	1.00	0.10	3.5	N.L.	600	-	-	-	-	-	-	-	-	●
TQJ 27-1.04-0.00	1.04	0.00	2.0	-	-	-	-	-	-	-	-	-	-	
TQJ 27-1.20-0.00	1.20	0.00	2.0	-	-	-	-	-	-	-	-	-	-	
TQJ 27-1.25-0.10	1.25	0.10	3.5	N.L.	600	-	-	-	-	-	-	-	-	●
TQJ 27-1.25-0.20	1.25	0.20	3.5	N.L.	600	-	-	-	-	-	-	-	-	●
TQJ 27-1.40-0.00	1.40	0.00	2.0	-	-	-	-	-	-	-	-	-	-	
TQJ 27-1.47-0.00	1.47	0.00	2.5	-	-	-	-	-	-	-	-	-	-	
TQJ 27-1.50-0.10	1.50	0.10	5.7	N.L.	600	280	180	130	50	35	-	-	-	●
TQJ 27-1.50-0.20	1.50	0.20	5.7	N.L.	600	280	180	130	50	35	-	-	-	●
TQJ 27-1.57-0.15	1.57	0.15	3.0	N.L.	-	-	-	-	-	-	-	-	-	
TQJ 27-1.57-0.79	1.57	0.79	3.0	N.L.	-	-	-	-	-	-	-	-	-	
TQJ 27-1.70-0.10	1.70	0.10	3.0	N.L.	-	-	-	-	-	-	-	-	-	
TQJ 27-1.75-0.10	1.75	0.10	3.0	N.L.	-	-	-	-	-	-	-	-	-	●
TQJ 27-1.75-0.20	1.75	0.20	3.0	N.L.	-	-	-	-	-	-	-	-	-	●
TQJ 27-1.78-0.18	1.78	0.18	3.0	N.L.	-	-	-	-	-	-	-	-	-	
TQJ 27-1.85-0.20	1.85	0.20	3.0	N.L.	-	-	-	-	-	-	-	-	-	●
TQJ 27-1.96-0.15	1.96	0.15	3.0	N.L.	-	-	-	-	-	-	-	-	-	
TQJ 27-2.00-0.10	2.00	0.10	6.4	N.L.	600	280	180	130	105	85	60	50	30	●
TQJ 27-2.00-0.20	2.00	0.20	6.4	N.L.	600	280	180	130	105	85	60	50	30	●
TQJ 27-2.00-1.00	2.00	1.00	3.5	N.L.	600	-	-	-	-	-	-	-	-	
TQJ 27-2.22-0.15	2.22	0.15	3.5	N.L.	600	-	-	-	-	-	-	-	-	
TQJ 27-2.30-0.20	2.30	0.20	3.5	N.L.	600	-	-	-	-	-	-	-	-	
TQJ 27-2.39-0.15	2.39	0.15	5.7	N.L.	600	280	180	130	50	35	-	-	-	
TQJ 27-2.39-1.20	2.39	1.20	5.7	N.L.	600	280	180	130	50	35	-	-	-	
TQJ 27-2.47-0.20	2.47	0.20	5.7	N.L.	600	280	180	130	50	35	-	-	-	
TQJ 27-2.50-0.10	2.50	0.10	5.7	N.L.	600	280	180	130	50	35	-	-	-	●
TQJ 27-2.50-0.30	2.50	0.30	5.7	N.L.	600	280	180	130	50	35	-	-	-	●
TQJ 27-2.70-0.10	2.70	0.10	6.2	N.L.	600	280	180	135	105	95	85	78	-	
TQJ 27-2.87-0.20	2.87	0.20	6.2	N.L.	600	280	180	135	105	95	85	78	-	
TQJ 27-3.00-0.00	3.00	0.00	6.4	N.L.	600	280	180	135	105	95	85	78	55	
TQJ 27-3.00-0.20	3.00	0.20	6.4	N.L.	600	280	180	135	105	95	85	78	55	
TQJ 27-3.00-0.30	3.00	0.30	6.4	N.L.	600	280	180	135	105	95	85	78	55	●
TQJ 27-3.00-0.40	3.00	0.40	6.4	N.L.	600	280	180	135	105	95	85	78	55	
TQJ 27-3.00-1.50	3.00	1.50	6.4	N.L.	600	280	180	135	105	95	85	78	55	
TQJ 27-3.15-0.15	3.15	0.15	6.4	N.L.	600	280	180	135	105	95	85	78	68	
TQJ 27-3.18-0.20	3.18	0.20	6.4	N.L.	600	280	180	135	105	95	85	78	68	●

- N.L. = No Limit
- Turning is possible only with 2.39mm and wider inserts.
- Non-standard grades are special order items.

●: Standard Item

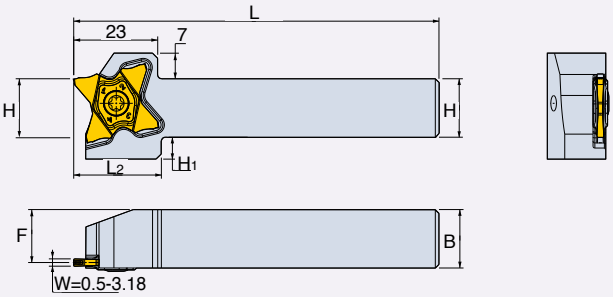
TQJ 27 Parting Insert



Designation	W±0.02	R	K°	Parting to Center	Parting Hollow Bars		Grade
				Dmax	Tmax	Dmax	TT9080
TQJ 27-1.00-15R/L	1.00	0.06	15	7.0	3.5	600	
TQJ 27-1.50-6R/L	1.50	0.06	6	12.0	5.7	35	
TQJ 27-1.50-15R/L	1.50	0.06	15	12.0	5.7	35	
TQJ 27-2.00-6R/L	2.00	0.10	6	13.0	6.4	30	
TQJ 27-2.00-15R/L	2.00	0.10	15	13.0	6.4	30	

●: Standard Item

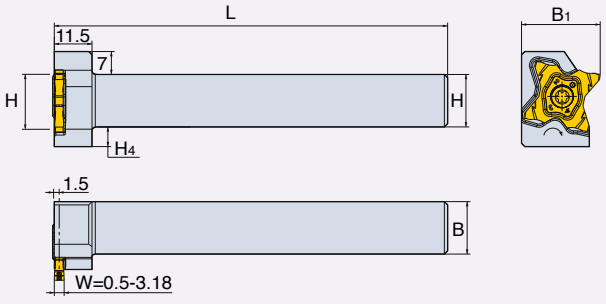
TQHR/L for Integral Shank Toolholders



Designation	H	B	F	L	L2	H1	Screw	Torx Key	Insert
TQHR/L 10-27	10	10	8.5	120	24	9	TS 50125I (1) TS 50125IL(2)	T 10/20	TQJ 27…
TQHR/L 12-27	12	12	10.5	120	24	8			
TQHR/L 16-27	16	16	14.5	120	24	6			
TQHR/L 20-27	20	20	18.5	120	24	2			
TQHR/L 25-27	25	25	23.5	135	-	-			

• (1) For left holder • (2) For right holder

TQHPR/L



Designation	H	B	B1	L	H4	Screw	Torx Key	Insert
TQHPR/L 16-27	16	16	24	120	6	TS 50125I (1) TS 50125IL(2)	T 20	TQJ 27…
TQHPR/L 20-27	20	20	28	120	2			
TQHPR/L 25-27	25	25	33	135	-			

• (1) For right holder • (2) For left holder

Recommended Cutting Conditions

ISO	Material		Condition	Tensile Strength Rm(N/mm²)	Hardness HB	Coated TT9080
P	Non-alloy steel, cast steel, free cutting steel	<0.25 %C	Annealed	420	125	140-250
		>=0.25 %C	Annealed	650	190	130-220
		<0.55 %C	Quenched and tempered	850	250	90-200
		>=0.55%C	Annealed	750	220	100-220
			Quenched and tempered	1000	300	70-170
	Low alloy steel and cast steel (less than 5% alloying elements)		Annealed	600	200	90-120
			Quenched and tempered	930	275	80-170
				1000	300	70-130
				1200	350	50-120
	High alloy steel, cast steel and tool steel.		Annealed	680	200	60-140
			Quenched and tempered	1100	325	50-70
M	Stainless steel and cast steel		Ferritic/martensitic	680	200	70-170
			Martensitic	820	240	60-150
			Austenitic	600	180	90-180
K	Gray cast iron (GG)		Ferritic		160	100-230
			Pearlitic		250	90-180
	Cast iron nodular (GGG)		Ferritic		130	190-300
			Pearlitic		230	120-220
	Malleable cast iron		Ferritic		180	120-250
			Pearlitic		260	100-210
S	High temp. alloys	Fe based	Annealed		200	40-70
			Cured		280	30-50
		Ni or Co based	Annealed		250	30-40
			Cured		350	15-25
			Cast		320	15-30
	Titanium, Ti alloys			Rm 400		90-190
			Alpha+beta alloys cured	Rm 1050		30-60

* For more information of material groups,
see the TaeguTec concise catalogue " Material Conversion Table" section.

Steel Stainless Steel Cast Iron Nonferrous High Temp. Alloys Hardened Steel

Feed Rate

Neutral: 0.05 - 0.18 mm/rev
Handed: Reduce 20% feed rate