Application information – Parting off

As a general rule:

The most rigid and stable tool possible for parting off should always be selected. This prevents vibration and increases tool life.

Insert width

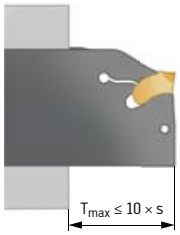
The insert width selected should be as narrow as possible, but as wide as necessary.

Reducing the insert width reduces the cutting force and saves material.

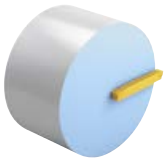


Cutting depth/overhang length

1. The max. cutting depth [T_{max}] of the tool or the max. overhang length of the insert holder should not exceed 10 × cutting edge width [s]. The smallest possible cutting depth/ overhang length should always be selected.



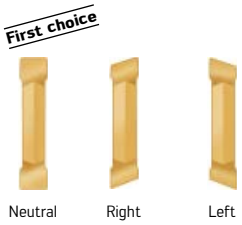
2. If the maximum cutting depth does not exceed the second cutting edge, double-edged Walter Cut GX or DX indexable inserts are the most efficient option. If the cutting depth is greater, single-edged Walter Cut SX cutting inserts are the first choice.



Use a neutral cutting edge for:

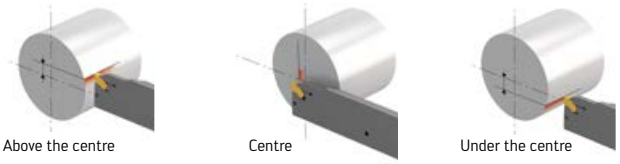
– Improved chip formation
– Lower cutting forces leading to reduced deflection
– Longer tool life

The design of the cutting inserts (right/ left) can be determined by viewing the cutting edge from above where the parting-off pip remains, unlike the tools, which are instead viewed from the front.



Tip: In general, the following rules apply …

Direction of rotation of the machine spindle:
Clockwise → right cutting insert
Anticlockwise → left cutting insert



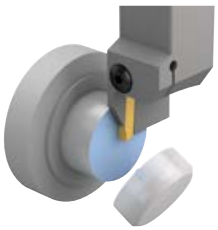
Checking the centre height [f]

– Longer/more consistent tool life
– Reduced pip/burr formation

If the tool is positioned over or under centre, the effective cutting angles change during machining.

Reducing the feed

From a diameter of 4 mm, reduce the feed [f] by approx. 50–75 %.
Do not groove past the centre, as this creates a risk of fracture.
It is possible to groove past the centre to a maximum of corner radius +0.1 mm.*
For any further, a constant cutting speed and speed limitation should be used.
This is based on the clamping unit and/or bar loader.



* Programming note:
With a corner radius of 0.3 mm, the x measurement should be adjusted in the direction of -0.4 mm.



Small corner radius

– Small pips
– Better chip control
– Lower feed

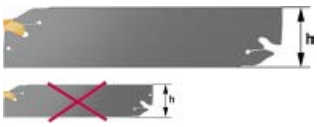


Large corner radius

– Higher feed
– Longer tool life

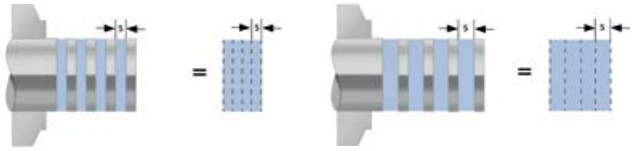
Use the largest tool possible – in relation to the height of the support [h]

– Higher tool rigidity
– Less vibration
– Longer tool life



Use the smallest insert width possible

– Lower cutting force
– Reduced material consumption

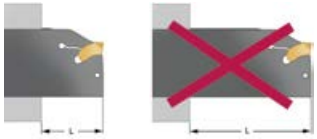


Clamp the workpiece at the shortest length possible and part off as close to the spindle as possible



Mount the tool in the machine with the shortest possible overhang

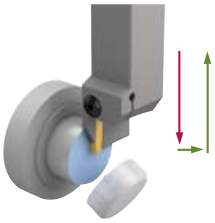
– Better face flatness
– Reduced vibration tendency
– Longer tool life



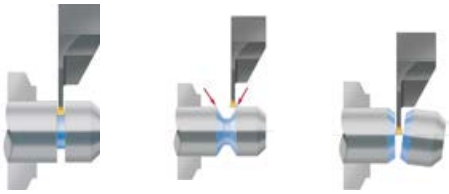
Application information – Parting off (continued)

Retracting the tool

After parting off, do not retract the tool immediately. First, step off axially and then retract.



Chamfering and parting off



1. Pre-grooving 2. Chamfering 3. Parting off

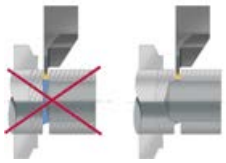
Internal chamfering before parting off

The peripheral cutting edges of the chamfering tool and parting-off tool must be precisely aligned to achieve the result with the fewest burrs possible.



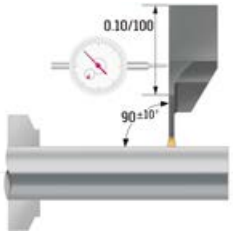
Parting off to a hole

The hole must be pre-bored to be deep enough for the entire cutting edge width of the parting-off tool to exit in the cylindrical section of the hole.



The tool must be aligned 90° to the axis of rotation

– Better face flatness
– Reduced vibration tendency



Precision cooling when parting off

Integrated precision cooling cools both the rake and flank faces exactly where it is needed.
Combined with **Tiger·tec® Silver** indexable inserts, the tool demonstrates a two- to four-fold increase in tool life for parting-off operations.

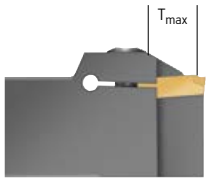
Vibration, chip jams and tool breakage, which would normally be a common occurrence given less than optimal conditions, are now a thing of the past.
A higher quality surface finish is another of the benefits of this new design.

A reliable supply of coolant to the cutting edge is always guaranteed. Ensure sufficient filtration of the coolant ≥ 50 µ.



Tool use

– Use the tool holder with the smallest possible cutting depth (T_{max}) for the application.



Cutting insert change

– When changing the cutting inserts, ensure that the new cutting insert lies securely against the tool holder stop.

– Before engaging the cutting insert, it is important to check to ensure that the insert seat is free from dirt and damage.

– Insert the cutting insert along the prismatic surfaces and into the insert seat, and watch out for resistance.

– Never tighten the clamping screw if there is no cutting insert in the insert seat.

– Tighten the clamping screw to the recommended torque.



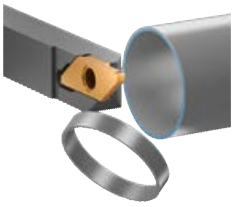




Tool	Tightening torque
G15…/G45…	5.0 Nm
G1011…/G4011…	5.0 Nm
G1111	4.0 Nm
G1221/G3221/G4221	5.0 Nm
G1041/G4041	3.5 Nm
G30..	5.0 Nm
G4014	≤ 12 mm 2.0 Nm
G4014	≥ 12 mm 3.0 Nm
XLDE	3.5 Nm

Parting off thin-walled pipes

When parting off thin-walled pipes, the cutting forces must be kept to a minimum. The use of the CD8 or GD8 geometry with high sharpness is therefore recommended.
The precision-ground WT26 indexable inserts in combination with a width of 0.7 mm generate the lowest possible cutting forces.



Application information – Parting off with inclined cutting edges

When parting off solid material, the use of cutting inserts with lead angles reduces the formation of residual pips on the component that has been parted off.



Left-hand cutting insert:
Pips on the bar



Neutral cutting insert:
Pips on the workpiece



Right-hand cutting insert:
Pips on the workpiece

When parting off tubular material, the use of inclined cutting inserts prevents rings from forming. These rings could otherwise remain on the parted-off component and interfere with the rest of the manufacturing process. It also leads to reduced burr formation.



Left-hand cutting insert:
Burr on the left of the pipe



Neutral cutting insert:
Burr on the right of the pipe

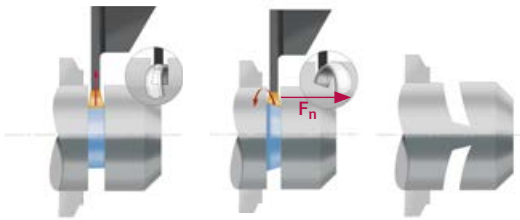
When inclined cutting inserts are used for parting off, the lead angle is likely to be detrimental to chip formation. The chip rolls at 90° to the main cutting edge, preventing it from forming a watch spring shape (as with a neutral cutting insert), and instead causing it to form a helical shape.



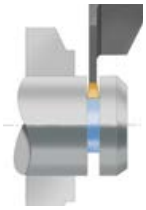


TIP:
One option for breaking the chamfer-chip is to interrupt cutting briefly once a cutting depth of 1–2 × s is reached. Once cutting resumes, the chip flows in the existing groove and breaks.

TIP:
The feed rates must be reduced by approximately 30% because the tool tends to run off-centre as a result of the axial force generated [F_n]. This can lead to vibration and convex parted-off surfaces.



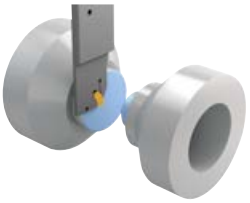
Effects on machining

	Neutral cutting insert	Inclined cutting insert
		
Stability and tool life	✓ good	× poor
Radial cutting forces (positive)	× high	✓ low
Axial cutting forces (negative)	✓ low	× high
Residual pip/burr formation	× large	✓ small
Risk of vibration	✓ low	× high
Surface quality and flatness	✓ good	× poor
Chip flow	✓ good	× poor

The use of inclined cutting inserts always has a negative effect on the cutting insert tool life (see table).
If possible, neutral cutting inserts should be used.
This statement applies particularly for machines with counter-spindles.

Application conditions – Reinforced blades

"Overhead" installation position
Contra blade



Main spindle Counter-spindle

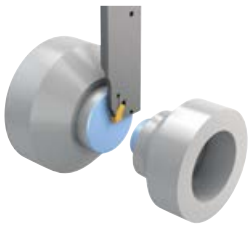


M3 clockwise rotation



G2042.32R-..T.. SX-C
G1041.32R-..T.. GX..-C

"Normal" installation position



Main spindle Counter-spindle



M4 anticlock-wise rotation



G2042.32R-..T.. SX
G1041.32R-..T.. GX..

"Normal" installation position
Contra blade



Main spindle Counter-spindle



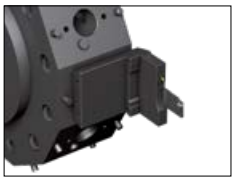
M4 anticlock-wise rotation



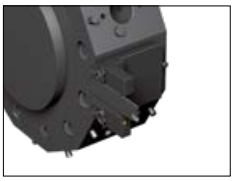
G2042.32L-..T.. SX-C
G1041.32L-..T.. GX..-C

Range of applications with VDI double serrations

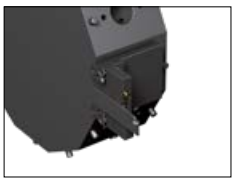
A2110-P blade adaptors – star turrets



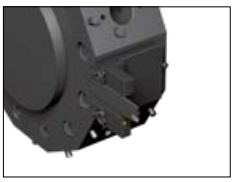
A2110…32R…P



A2110…32R…P
Overhead installation position

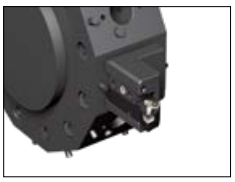


A2110…32L…P

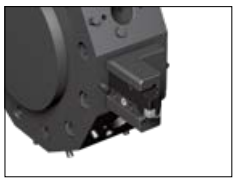


A2110…32L…P
Overhead installation position

A2110-P square shank adaptors – star turrets



A2120…25N…P



A2120…25N…P
Overhead installation position

A2121-P square shank adaptors – disc turrets



A2121…25R…P



A2121…25L…P
Overhead installation position

Fault analysis – Parting off

Large residual pips/burr
– Reduce the feed rate by 50–75% at a diameter of 4 mm or above
– Use a cutting insert with a lead angle
– Use a narrower insert (reduction of the cutting forces)
– Choose a smaller corner radius
– Choose a more positive geometry
– Check the centre height



Poor chip formation
– Reduce the cutting speed
– Improve the cooling (use of precision cooling tools)
– Check the chip former
– Increase the feed



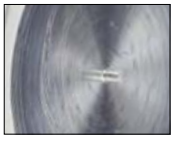
Poor surface/vibration
– Use a more rigid and stable tool
– Reduce the tool overhang
– Check whether the insert seat is damaged
– Choose a more positive geometry
– Increase the feed



Poor face flatness
– Use a cutting insert with as small a lead angle as possible or no lead angle at all
– Use a tool with the smallest possible cutting depth
– Reduce the feed for cutting inserts with a lead angle
– Choose a smaller corner radius
– Choose a more positive geometry
– Align the tool correctly



Damage caused by chips
– Use a chip former with greater chip constriction
– Reduce the cutting speed
– Use a straight cutting insert
– Optimise the cooling (use of precision cooling tools)
– Increase the feed



Chip formation when parting off
– Chip constriction inhibits friction on the side walls of the tool and reduces chip accumulation
– Enables higher feed rates
– No damage to parted-off surfaces
– Chips are rolled up helically and broken short, so that they can exit the groove with ease – “watch spring chip”
– Chip width measured at approx. 0.05–0.10 mm smaller than the insert width [s]

