Turning your world

APPLICATIONS
PARTING OFF WITH Y AXIS

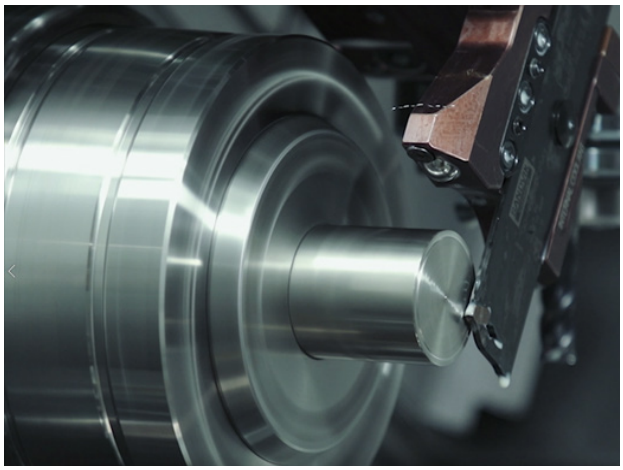
PARTING OFF WITH Y AXIS

CNC lathes usually work from **bar** and **part off** is a **key operation** to finish the component. It is a small percentage of the cycle time but its failure causes down time in resetting up and most likely a component with already added value is lost. This is the reason why **security in the process** is very **important** in part off.

Material is a considerable percentage in component cost. In order to avoid large material waste on the cut off, the **blades** are usually very **thin and long,** which often lead to **vibrations** and **bad surface finish.** The only solution is to reduce the tool overhang to minimise the effect; however, the shortening limits the capacity to part off larger diameters.

To overcome this challenge, Sandvik Coromant has developed a **new concept** where they use an element that traditionally has been used for milling, the machine **Y axis for part off.** Just by **changing the cutting direction,** they have managed to **increase resistance to flection,** which **allows longer overhangs** and **faster cutting** conditions as the force is directed towards the tool axis. Surface finish is also improved.

In **CMZ** we have identified this application and considered it quite interesting to be used in our machines; that is why we have **prepared the machines for this purpose.** This document will give you all the information you require to setup both tool and program in all our CNC lathe series, provided they are configured with Y axis.

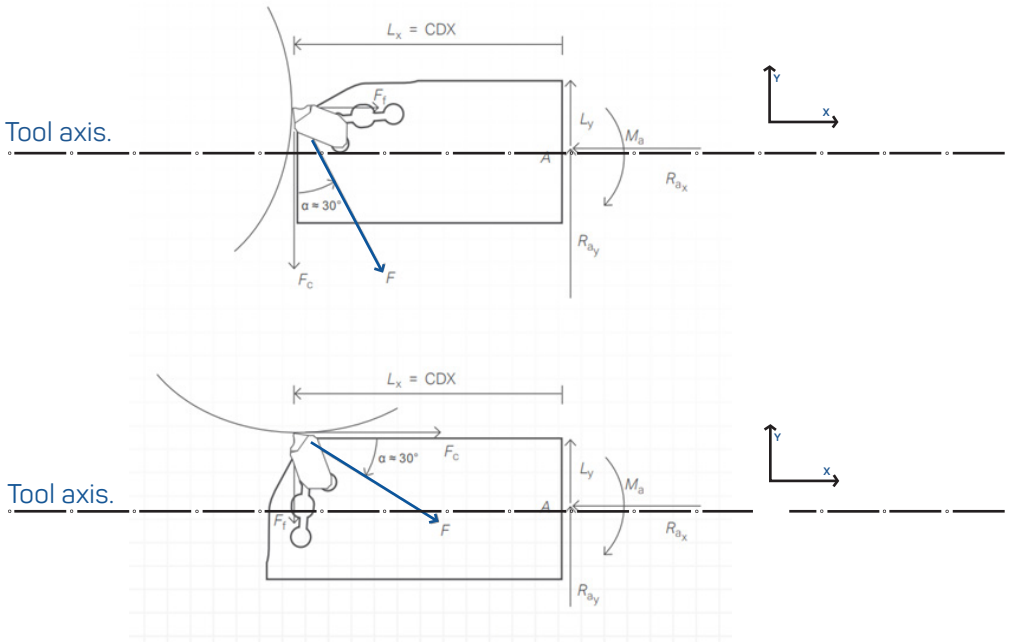


TOOL CONCEPT

As mentioned before, just a change in the cutting direction improves the capacity to part off.

In the **traditional approach,** the **feed is parallel to the tool axis.** Both feed and cutting forces create an equivalent that is directed diagonally. This is the **weakest spot** in the tool after the blade width. The only solution to limit its negative effect is to shorten tool overhang, which limits the maximum diameter you can cut.

If the **Y axis approach** is taken, the feed **movement is at 90 degrees** from the tool axis; in other words, it enters from the front. The **equivalent force** in this case is almost **parallel to the tool axis.** The direction of the equivalent cutting force is responsible for all the improvement in the Y axis part off as it **increases the flection resistance in 6 times** compared to the traditional approach. The better resistance means longer blades can be used and also faster cutting conditions. The fact that **vibrations** are **reduced** leads to a **better surface finish and reduced noise** in the cutting process.



Traditional part off (top) Y axis part off (bottom).
Image courtesy of Sandvik Coromant.

Bear in mind, that the lathe needs to be equipped with Y axis. In our series, the Y axis travelsoffered are the following.

CMZ SERIES	Y AXIS COURSE (MM)
TA	+60/-40
TD	+80/-60
TTL	+45/-45
TX	+40/-40

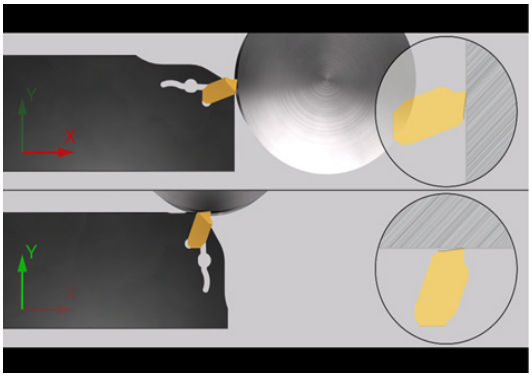
Table. Y axis travels in all CMZ models.

SETUP

As one can imagine, investment is required for this application. However, the good news is that both the insert and the toolholder are the same ones they would be used in a traditional part off process if already using Sandvik inserts. It is **only the blade that changes.**

Mounting:

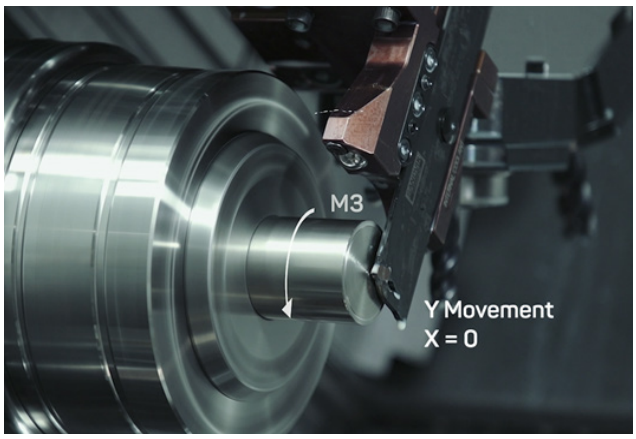
The insert is mounted in the blade with elastic clamping like in the traditional approach. It is important to mount the insert correctly like shown in the diagram below.



Insert mounting in traditional (top) vs Y axis approach (bottom).
Image courtesy of Sandvik Coromant.

The **blades** come with **internal coolant,** therefore, a toolholder with internal coolant is strongly recommended. **CMZ can guide** you through the selection of toolholders for your process.

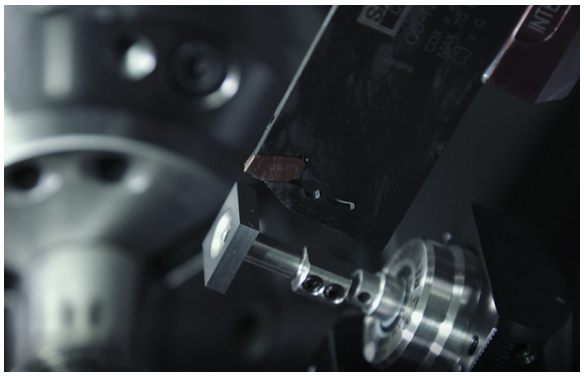
Spindle orientation is also important. Depending on how you mount the tool, CW or CCW will be used as in any other turning process, just be careful as the concept **changes from the traditional approach.** The diagram below shows an example using M3 and part off form Y negative to Y positive. This example will be programmed later in the document. If big diameters are going to be part off, it is recommended to machine in Y positive side as more machine course is available.



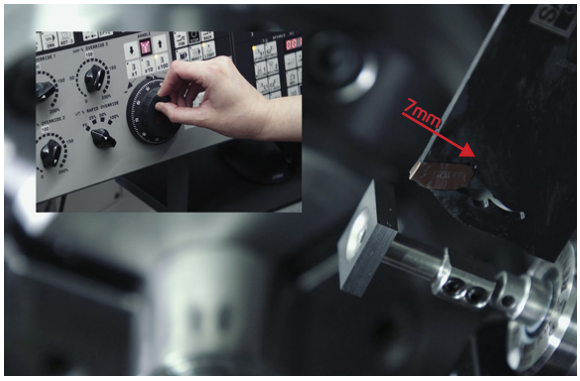
Spindle orientation in Y axis approach

Presetting:

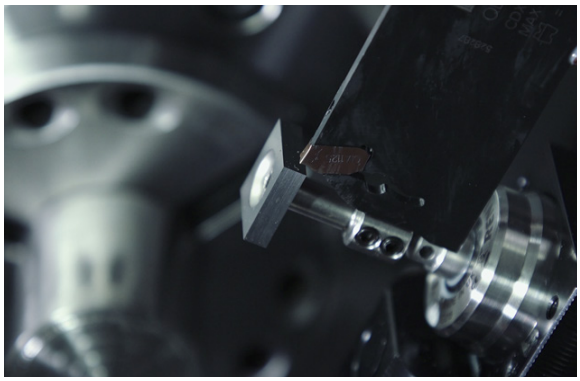
As it has been explained previously, the **tool tip is offset by 7mm from the tool axis.** This displacement makes the presetting process a bit different. The tool needs to be moved manually to Y +7 or -7 (depending on how it is mounted) and then, the X and Z axis can be touched. If this procedure is not followed the values taken will not be correct.



Tool in Y=0



Tool y Y=-7



X axis preset

NOTE:

It is recommended to touch the square in one side as seen in the picture above, otherwise the blade can touch the body of the probe and give a false measurement.

The blade comes with a diagram showing the important dimensions.

PROGRAMMING

Part off is generally programmed with **constant surface speed (G96),** this speed change is usually linked to the X axis position as it is used in turning. To allow constant surface speed in Y axis, in CMZ we have developed **two M codes** that will allow you to **switch from X to Y easily.**

M398: Activates G96 for Y axis.

M399: Activates G96 for X axis (setup by default when the machine is switched on).

NOTES:

- Program these codes before G96 in a separate block.
- Before cancelling off M398 a G97 needs to be programmed.
- In TA/TD machines M206/M207 can be used for the same purpose.

MACHINING EXAMPLE

In this example we are going to part off a stainless steel component (316L) in a Ø40mm bar in a TA machine with G codes A without part transfer.

N10 (CUTOFF Y AXIS)
T0606 (PART OFF TOOL)
G54
M81
G50S2200
G97M3S500
G0Z-46
G0X50Y0
Y-25
G0X0
M398 (G96 WITH Y AXIS)
G96G99S140M3
G1Y-15F0.2
G1Y0F0.08
G0Y-25
G0X45
G97S1500
M399 (G96 WITH X AXIS)
M5

In this example we are going to part off a stainless steel component (316L) in a Ø40mm bar in a TA machine with G codes A with part transfer.

N10 (CUTOFF Y AXIS)
T0606 (PART OFF TOOL)
G54
M81
G50S2200
G97M3S500
M211 (OPEN SUBSPINDLE)
M34 (SPINDLE SYNC)
G0B10
G98G1B-20F100
M210 (CLOSE SUBSPINDLE)
G0Z-46
G0X50Y0
Y-25
G0X0
M398 (G96 Y AXIS)
G96G99S140M3
G1Y-15F0.2
G1Y0F0.08
G0Y-25
G0X45
M40 (CUT OFF CONTROL)
G4X1
G53G0B0
M36 (CANCEL SPINDLE SYNC)
M97S1500
M399 (G96 X AXIS)
M5

SINGLE -TURRET LATHES

TA SERIES

Z400 MODEL

Z640 MODEL

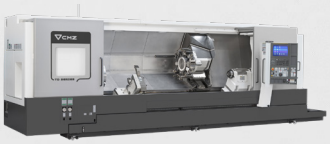
Z1100 MODEL

TD SERIES

Z800 MODEL

Z1350 MODEL

Z2200 MODEL



Z3200 MODEL

MULTI-TURRET LATHES

TX SERIES

TX66 MODEL

TX52 MODEL

TTL SERIES

TTL66 MODEL

TTL52 MODEL

VCMZ

CMZ Deutschland GmbH
Holderäckerstr. 31
70499 Stuttgart (Germany)
Tel. +49 (0) 711 469204 60
info-de@cmz.com
www.cmz.com

CMZ France SAS
Parc Technologique Nord
65, Rue Condorcet
38090 Vaulx Milieu (France)
Tel. +33 (0) 4 74 99 03 22
contact@cmz.fr
www.cmz.com

CMZ Italia S.r.l.
Via Arturo Toscanini 6
20020 Magnago (Mi) Italy
Tel. +39 (0) 331 30 87 00
info-it@cmz.com
www.cmz.com

CMZ Machinery Group S.A.
Azkorra s/n.
48250 Zaldibar (Spain)
Tel. +34 94 682 65 80
info@cmz.com
www.cmz.com

CMZ UK Ltd.
6 Davy Court
Central Park
Rugby
CV23 0UZ (United Kingdom)
Tel. +44 (0) 1788 56 21 11
info-uk@cmz.com
www.cmz.com

CMZ Machine Tool Manufacturer, S.L.
Azkorra, s/n.
48250 Zaldibar (Spain)
Tel. +34 946 826 580
info@cmz.com
www.cmz.com