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# Simultaneous drilling ISO machines

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## Content

1	Introduction .....	3
2	First example.....	3
2.1	Create a free tool in TISIS.....	3
2.2	Create a free tool on the machine .....	3
2.3	Set the free tool Z-geometry .....	4
2.4	Programming.....	4
3	Second example.....	5
3.1	Create the tools in TISIS.....	5
3.2	Tool geometry .....	5
3.3	Programming.....	6

# 1 Introduction

A large number of Tornos machines can benefit from a bidirectional end base. To win in cycle time it is interesting to do a drilling operation and counter operation simultaneously.

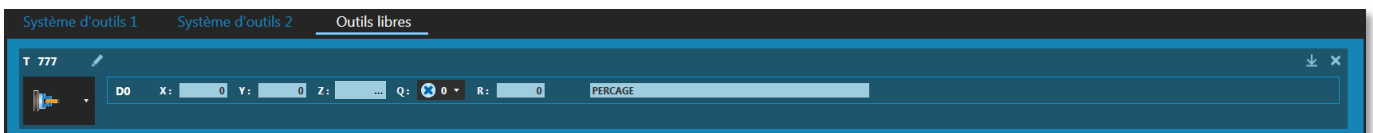
In the following 2 examples, we will explain how to perform this machining, using 2 drilling tools that are on the horn.

## 2 First example

The first example will be done by creating a free tool on the horn in counter-operation. Either from the TISIS tool catalogue or from the T-MI pages of the machine. The advantage of this method is that the channel 1 tool will be perfectly centred in the spindle.

### 2.1 Create a free tool in TISIS

The first step is to create a free tool in TISIS for drilling in counter-operation. We will call it T777 D0, giving it the Z geometry from the original machine to the tip of the tool.

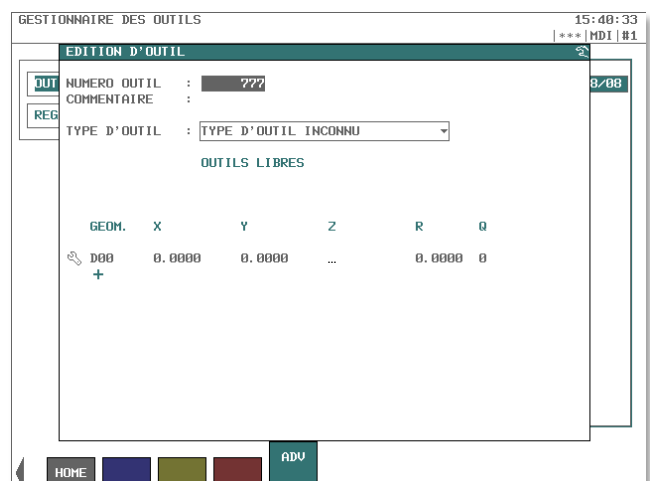


We will use a standard tool, T350 D0, with standard geometry on the horn, for drilling in the mainwork.



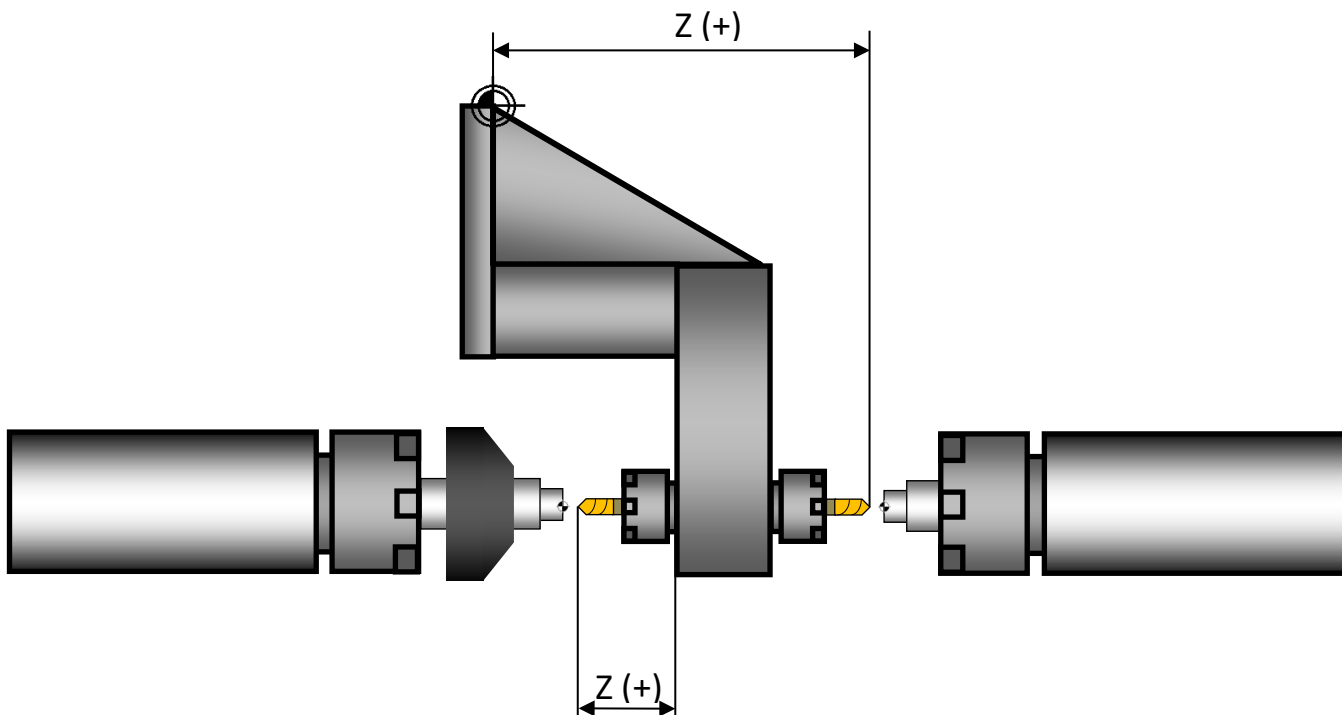
### 2.2 Create a free tool on the machine

It is possible to create a free tool on the machine through the T-MI pages



### 2.3 Set the free tool Z-geometry

To determine the tool's Z-geometry, refer to the kinematics of the machine. The X and Y geometries are 0 (zero), centre of the wick.



### 2.4 Programming

Programming example 1	
Channel 1	Channel 2
M9001	M9001
G54 G0 G95 <b>Y0 Z1 T350 D0</b> G97 M103 S4000 P1 G0 <b>X0</b>	G55 G0 G95 <b>Z1 T777 D0</b> G97 M403 S4000 P4
M9002	M9002
G1 Z-12 F0.08 (Machining) G0 Z2 (Tool retraction)	G1 Z-12 F0.08 (Machining) G0 Z2 (Tool retraction)
M9003	M9003
...	...

### 3 Second example

The second example will be done using the standard tools on the horn, propose in the TISIS catalogue of tools.

The advantage of this method is that the counter-operation tool will be perfectly in the centre of the counter spindle.

#### 3.1 Create the tools in TISIS

The geometry of the tool in main operation is standard.

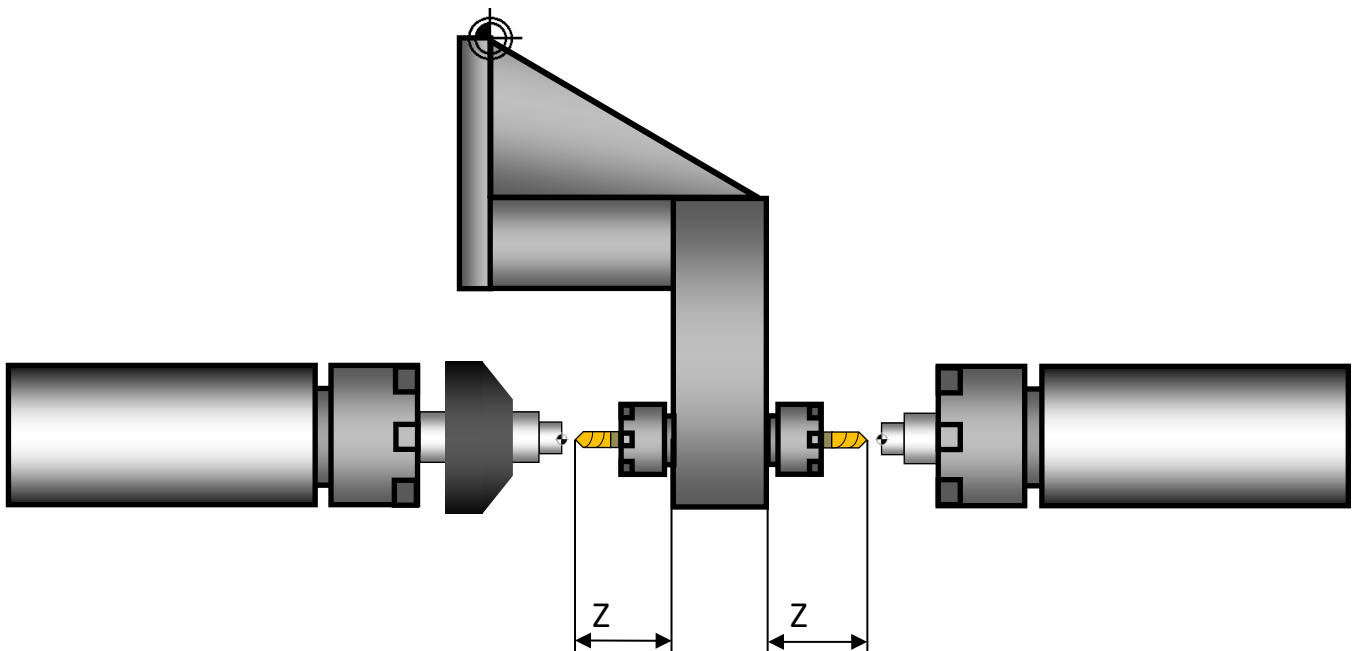


The geometry of the tool in counter operation is standard.



#### 3.2 Tool geometry

The standard geometry of the tools in operation and counter-operation applies for this example.



### 3.3 Programming

Programming example 2	
Channel 1	Channel 2
M9001	M9001
G0 <b>X0 Y0 T450 D0</b> (Tool indexing)	
M9002	M9002
	G97 M403 S4000 P4 G904 A1 <b>T450 D0</b>
M9003	M9003
G0 G95 <b>Z1 T350 D0</b> G97 M103 S4000 P1	G0 G95 Z1
M9004	M9004
G1 Z-12 F0.08 (Machining) G0 Z2 (Tool retraction)	G1 Z-12 F0.08 (Machining) G0 Z2 (Tool retraction) G904 A0
M9005	M9005
...	...