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Working with several cutting edges

SINUMERIK 828D/ 840D sl, SW 4.5 SP1

<https://support.industry.siemens.com/cs/ww/en/view/109477352>

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1 Working with several cutting edges

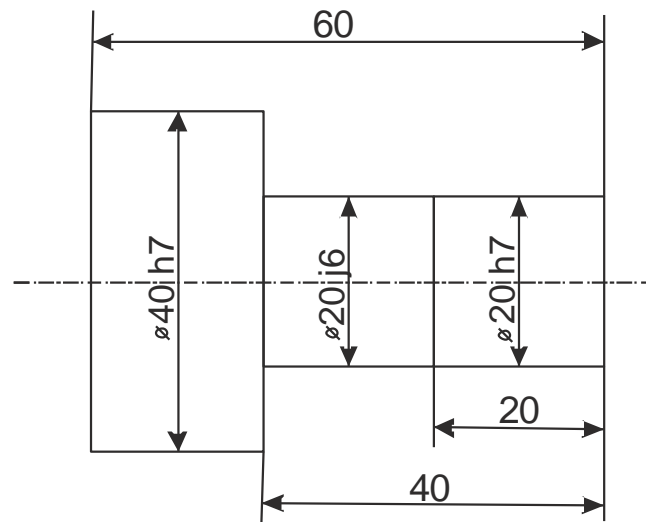
1.1 Two fits with the same shaft diameter

In the workshop environment, machine operators sometimes have to machine two different fits with the same diameter. The fit tolerances should be different.

This requirement can be implemented by calling different cutting edges of a tool. While working with several cutting edges, it is possible to assign fits with their own dedicated offset memory to a tool.

In the subsequent description, a shaft should have two different fits at the front shaft seat. A third fit has a diameter of 40mm. The workpiece dimensions can be taken from Fig 1-1.

Figure 1-1 Two different fits with the same shaft diameter



2 Selecting the tool

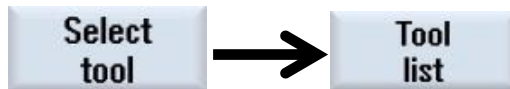
2.1 Selecting several cutting edges

Tools can be conveniently selected in the SINUMERIK Operate editor using a softkey and inserted in the G code or ShopTurn program.

Note The selected tool must be created and measured as specified in the "ShopTurn tools" instruction.

To navigate to the tool bar, the following softkeys must be actuated in the editor area before execution can start.

Figure 2-1 Navigation to the tool bar



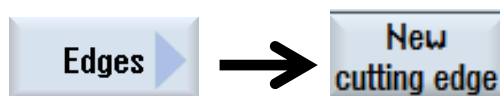
The tool to be used is selected there (Fig. 2-2).

Figure 2-2 List of tools

Tool list										MAGAZIN1
Loc.	Type	Tool name	ST	D	Length X	Length Z	Radius			Loc. leng
1		ROUGHING_T80 A	1	1	55.000	39.000	0.800	←	95.0 80	12.0
2		DRILL_32	1	1	0.000	185.000	32.000		180.0	
3		FINISHING_T35 A	1	1	124.000	57.000	0.400	←	93.0 35	12.0
4		ROUGHING_T80 I	1	1	-9.000	122.000	0.800	←	95.0 80	10.0
5		PLUNGE_CUTTER_3 A	1	1	85.000	44.000	0.200		3.000	8.0

An additional cutting-edge is selected once the required tool has been selected.

Figure 2-3 Selecting an additional cutting edge



A second cutting edge is created. The result can be immediately seen in the tool list. This operation must be repeated to select a third cutting edge.

2 Selecting the tool

Figure 2-4 Tool with two cutting edges

Tool list										MAGAZIN1
Loc.	Type	Tool name	ST	D	Length X	Length Z	Radius			Loc. leng
1		ROUGHING_T80 A	1	1	55.000	39.000	0.800	←	95.0 80	12.0
		ROUGHING_T80 A	1	2	55.000	39.000	0.800	←	95.0 80	12.0
2		DRILL_32	1	1	0.000	185.000	32.000		180.0	
3		FINISHING_T35 A	1	1	124.000	57.000	0.400	←	93.0 35	12.0
4		ROUGHING_T80 I	1	1	-9.000	122.000	0.800	←	95.0 80	10.0
5		PLUNGE_CUTTER_3 A	1	1	85.000	44.000	0.200		3.000	8.0

Three different offsets for the fits can be selected using the tool wear memory. When programming the contour, before each Z motion, another cutting edge is called for the fits.

This is realized using the "D" command; this is responsible for the particular cutting edge number. For the contour in the current example, between the two programmed straight lines in the Z direction (20h7 + 20j6), a straight line must be inserted in the X direction.

This traversing path is necessary in order that the modified cutting edge length in the X direction from the tool offset of the second cutting edge can be taken into account with the traversing path. An incremental length of 0.001mm is already sufficient for the straight line.

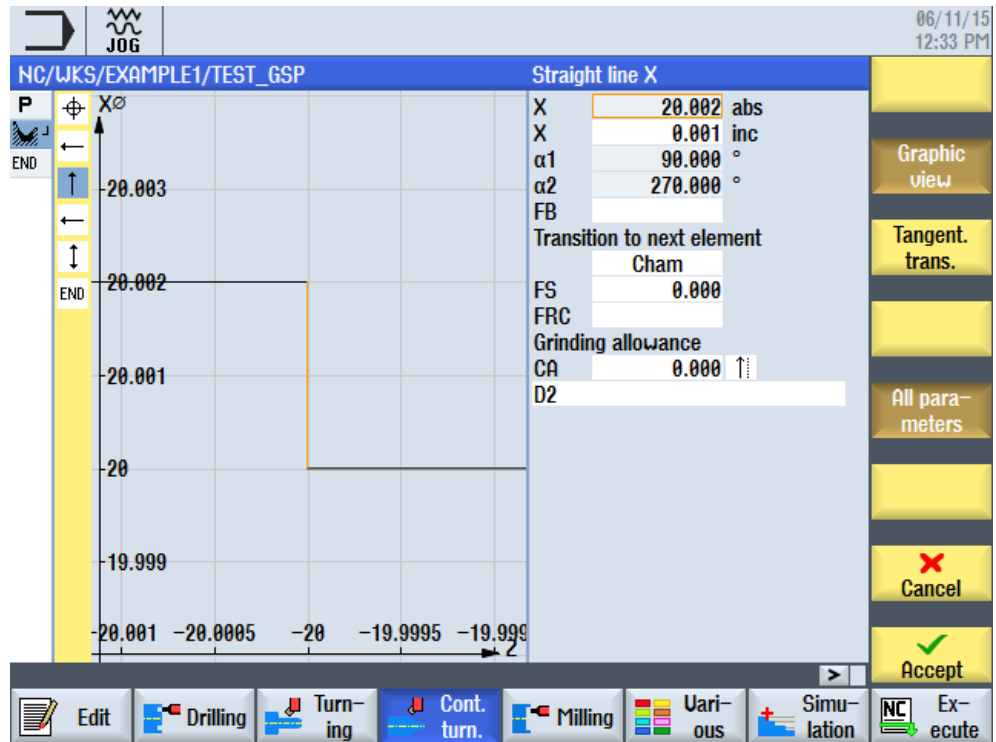
Figure 2-5 Selecting the first cutting edge when machining the contour

Another cutting edge can be selected using the "All parameters" softkey; this is in the entry field Supplementary commands

The "All parameters" softkey must be pressed to select another cutting edge. Entering "D2" under the supplementary commands calls the second cutting edge.

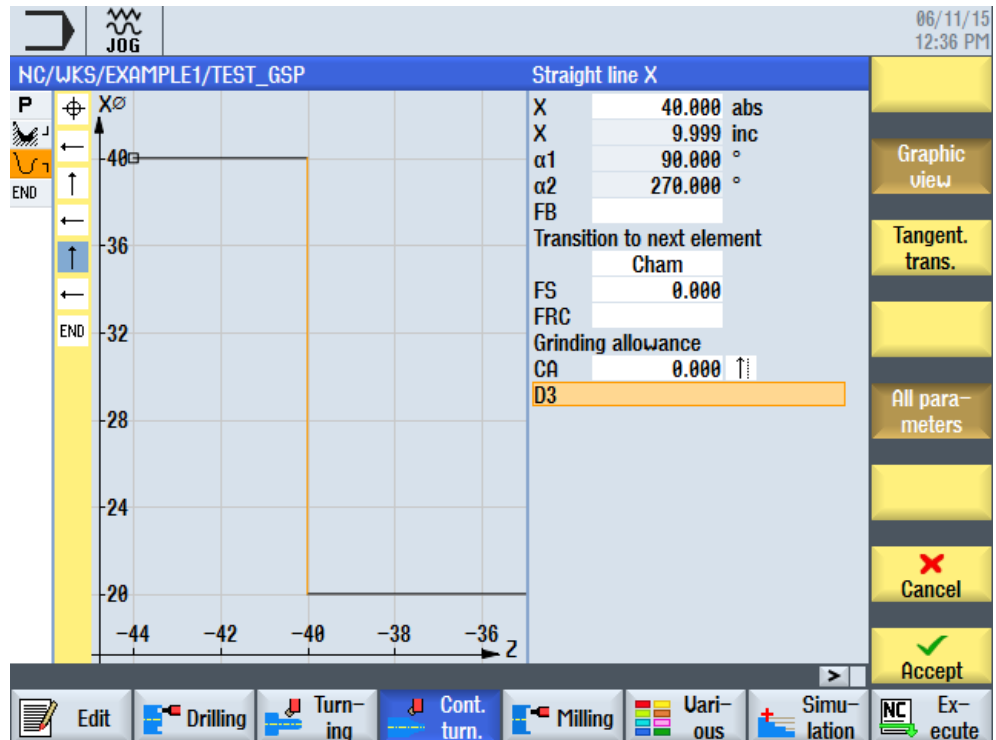
2 Selecting the tool

Figure 2-6 Selecting the second cutting edge when machining the contour



For the third fit of the current example, no element has to be inserted before the Z direction, as the third cutting-edge can be selected in the element in the X direction. The fits are machined with their own specific offset memory.

Figure 2-7 Selecting the third cutting edge when machining the contour



2.2 Additional notes

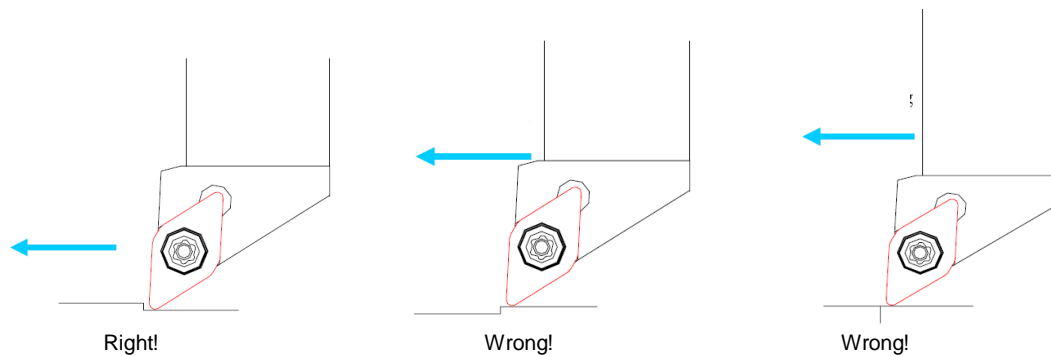
2.2.1 Traversing direction

The programmed straight line with a traversing path of 1/1000mm does not play a role when machining the fit tolerance. In the current example, the cutting edge is only taken into account for a straight line in the positive X direction, as the cutting edge geometry of the tool only permits this traversing direction.

Programming the cutting edge call in the negative X direction is ignored, as the tool cannot machine the contour as a result of the cutting-edge geometry.

Even if the contour comprises individual straight lines in which a cutting edge call is programmed, this is ignored as traversing cannot take place in the X direction. As a consequence, the corresponding cutting-edge length cannot be taken into account. Between the individual contour elements in which a cutting edge is selected it is possible that the tool briefly remains in this position.

Figure 2-8 Traversing direction of the tool used



2.2.2 Increasing the number of cutting edges

Machine data 18106 "**MM_MAX_CUTTING_EDGE_PERTOOL**" defines the maximum number of cutting edges (D offsets) per tool. The minimum value is one, and can be set to a maximum value of 12. A value of nine is entered as default value.

When changing the relationship from "less than or equal to" to "greater than" – or vice versa – the values between machine data 18105 and 18106, influence the amount of non-buffered memory required. Machine data 18100

"**MM_NUM_CUTTING_EDGES_IN_TOA**" has a relationship with the above mentioned MD 18106, as it defines the number of tool cutting edges in a T0 area.

3 Contact

Siemens AG
Industry Sector
DF MC MTS APC
Frauenauracher Strasse 80
91056 Erlangen
Germany
mailto: MC-MTS-APC-Tech-Team.i-dt@siemens.com

4 History

Table 4-1

Version	Date	Modifications
V1.0	07/2015	First version