



SIEMENS

Reindeer

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## Christmas workpiece 2023 "Reindeer"

The CNC4you Christmas workpiece for 2023 is a milled contour of a reindeer.



All the information required to machine the workpiece is subsequently listed – such as tool data, machining plans and NC programs.

[www.siemens.de/cnc4you](http://www.siemens.de/cnc4you)

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## 1 Safety note

Handling machines involves dealing with a wide range of risks. This means that it is crucial that the legal and usual operational safety regulations are carefully complied with when fabricating the 2023 Christmas workpiece.

## 2 Preliminary comment

The following description addresses technicians who are familiar with CNC machines, and who have experience or knowledge about SINUMERIK CNC controls. All the technology data listed here correspond to the machines, tools, materials, machining plans and drawings used to craft this festive workpiece. However, when it comes to the replication, this only serves as an example because of the wide diversity of resources generally available in workshops. Having said that, in most cases it should be possible to simply replicate this Christmas workpiece.

The program for the milled part was generated and tested on a 3-axis CNC milling machine. The machine was equipped with a SINUMERIK 828D with ShopMill user interface. SINUMERIK Operate V4.95 was installed on the machine.

The workpiece is machined with multiple clamping operations: Clamping for machining on the front side and clamping for machining on the rear side.

Generally, the program can be simply adapted to other SINUMERIK versions, for example, to other SINUMERIK Operate software releases. A simulation run and necessary changes, for example the zero points and the clamping depth, should always be performed.

All CAD drawings, programs and machining descriptions for the workpieces can be downloaded at no charge from [www.siemens.de/cnc4you](http://www.siemens.de/cnc4you). Here you can find the following files and formats for the reindeer:

- NC programs (ShopMill) for the workpiece and the required contour-clamping jaws
- DXF files for the workpiece contour and its mirroring

## 3 Workpiece blanks/bill of materials

- For the workpiece:

Aluminum, cuboid with dimensions 80 x 70 x 20 mm

- For the fixtures/soft clamping jaws

Aluminum, 2 cuboids, for example with dimensions 70 x 100 x 30 mm

- ➔ The dimensions of the clamping aid – and therefore the blanks – can and must be adapted to the currently available clamping tools and the situation in the machining area of the machine itself.

## 4 Machines and machining plans

CNC milling machine:

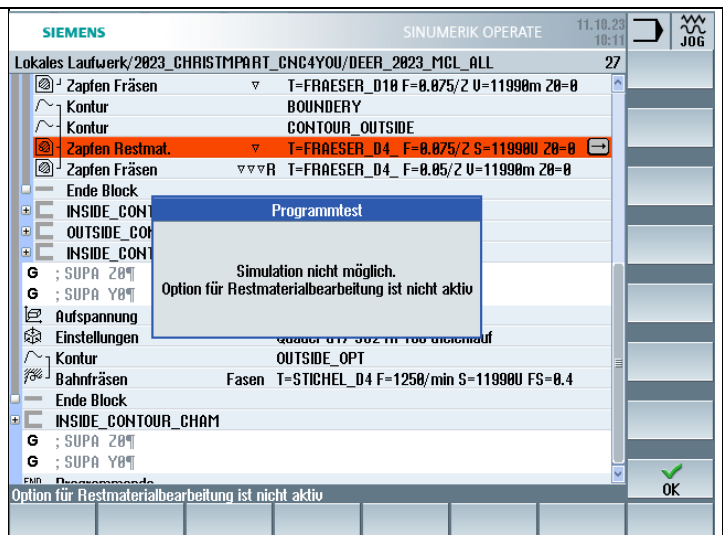
- Type: Mazak VTC-530-C 3-axis milling machine
- CNC: SINUMERIK 828D with ShopMill V 4.95

ShopMill machining plans:

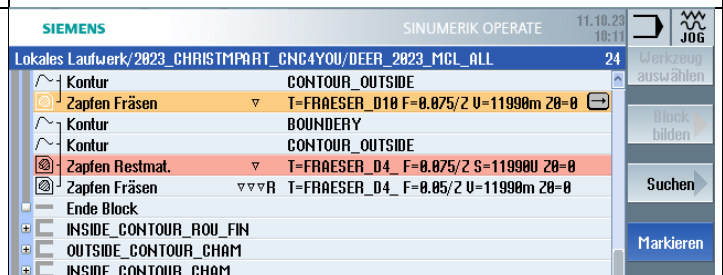
- DEER\_2023\_CHICK\_CLAMP.MPF (machining the clamping jaws for the 2nd clamping/machining the rear side)
- DEER\_2023\_MCL\_ALL.MPF (machining the workpiece in multiple clamping operations)
- DEER\_2023\_1\_CL.MPF (machining the front side with single clamping operation)
- DEER\_2023\_2\_CL.MPF (machining the rear side with single clamping operation)

### 4.1 Using NC programs with SinuTrain

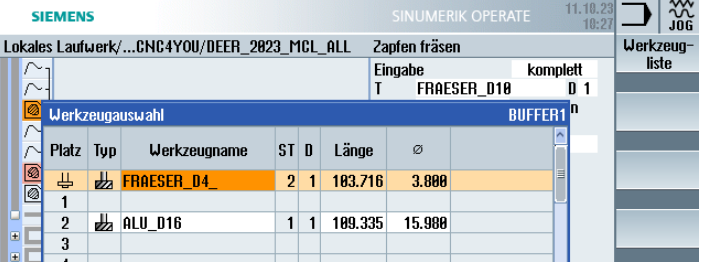
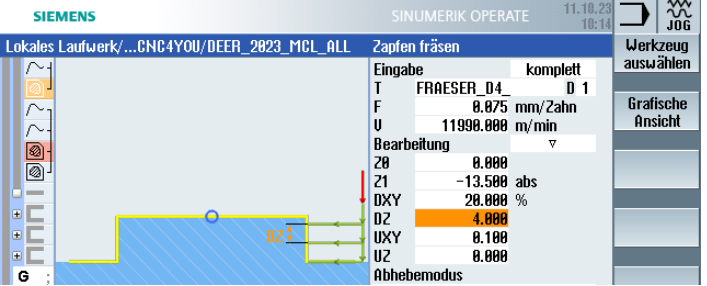
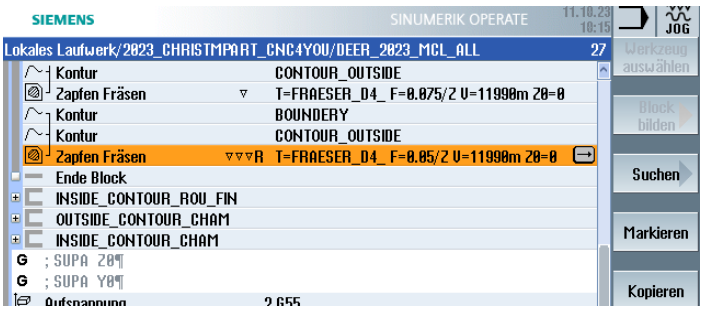
The NC programs for the workpiece use option "Residual material detection"; this is not set in the demonstration machines in the basic version of SinuTrain for SINUMERIK Operate. An error message is displayed when starting the simulation routine:



If you wish to simulate these NC programs with the demonstration milling machine of a SinuTrain basic version that does not require license, then you can proceed as shown here using the example of program DEER\_2023\_MCL\_ALL.MPF (the best approach is that you work with a copy of the program).



Select cycle "Mill spigot" (shown in orange in the diagram in front of the line marked red) and open for editing.

<p>Replace tool FRAESER_D10 used for roughing with tool FRAESER_D4</p>	
<p>Reduce values DXY=45 % and DZ=6.75 mm, e.g. to 20 % and 4 mm. Confirm the changes with "Accept" and "OK".</p>	
<p>Delete line "Pocket resid. mat." (this has already been done in the diagram to the right)</p>	

With these changes, the program can also be simulated on the demonstration milling machine supplied with the SinuTrain software. Program DEER\_2023\_1\_CL.MPF can also be modified in the same way.

## 5 Tools used

Tool/short name	Description
ALU_D16	End mill, 16 mm diameter
FRAESER_D10	End mill, 10 mm diameter
FRAESER_D4	End mill, 4 mm diameter
FRAESER_D2	End mill, 2 mm diameter
STICHEL_D4	4 mm stylus or milling tool with 90 degree cutting edge angle
ALU_MK_D40_ROMB	Facing milling tool, 40 mm diameter

## 6 Fabricating the "Reindeer 2023" workpiece

### 6.1 Machining steps at the milling machine

#### 6.1.1 Fabricating the fixture for the 2nd clamping

1. Approach the machine reference point.
2. Read-in the machining plan: DEER\_2023\_CHICK\_CLAMP.MPF
3. Read-in the tool list: DEER\_2023\_MCL\_ALL\_TMZ.INI
4. Measure the tools, enter in the tool list.
5. Insert tools in the magazine.
6. Clamp the workpieces (two aluminum blocks for the fixtures for the second clamping) adapt in the NC program and if required adapt the size of the blank
7. Set the workpiece zero, using a measuring probe or by probing using an appropriate device
8. Check the work offsets programmed in the part program and if necessary adapt to the machine configuration.
9. Perform the simulation.
10. Start machining, execute the machining plan.
11. Remove the workpieces, the two parts together constitute a clamping fixture for the second clamping of the workpiece when machining the rear side.

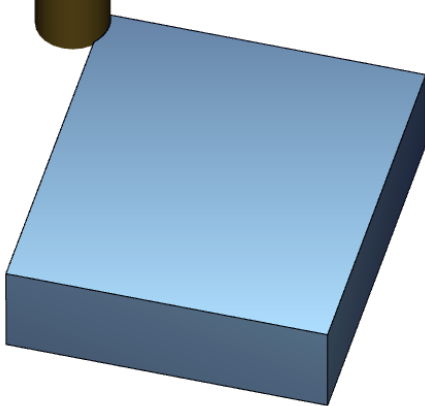
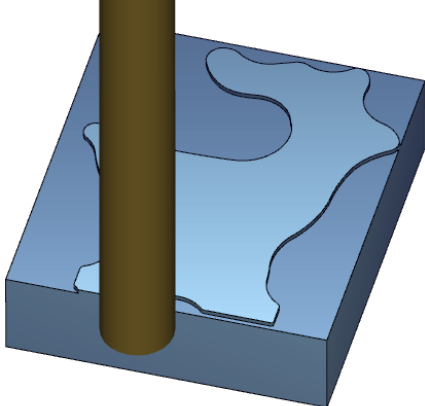
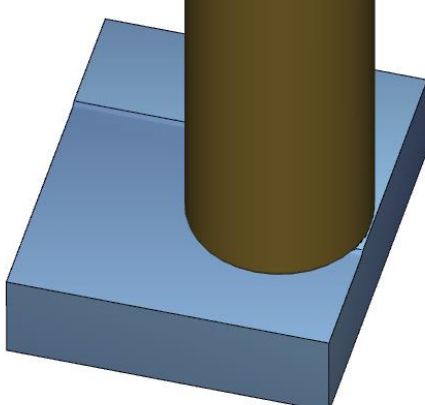
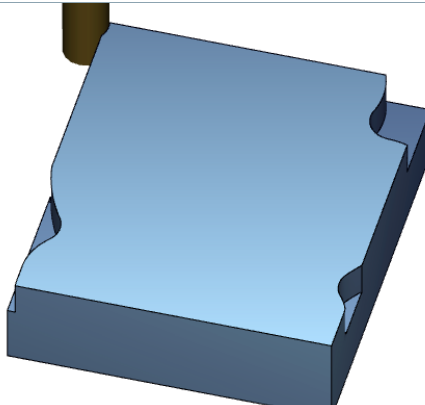


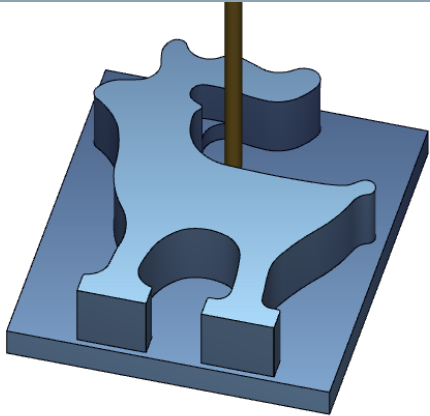
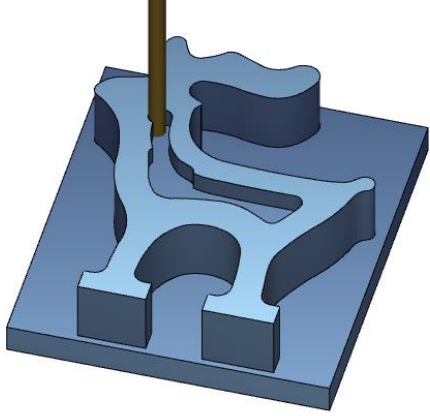
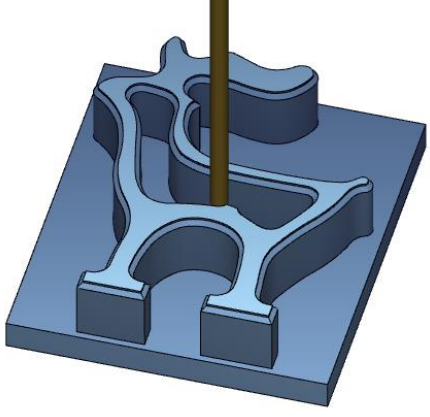
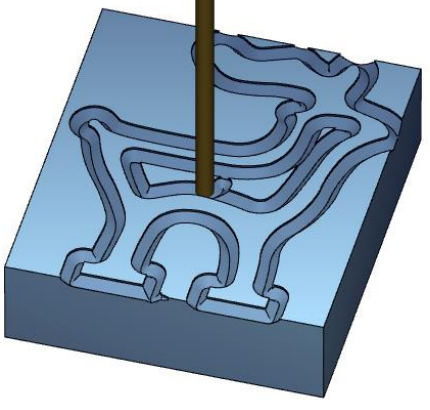
*Clamping jaws for machining the rear side/clamping 2*

### 6.1.2 Machining the "DEER 2023" workpiece

1. Approach the machine reference point.
2. Read-in the machining plan: DEER\_2023\_MCL\_ALL.MPF
3. If you have not already done so: Read-in the tool list DEER\_2023\_MCL\_ALL\_TMZ.INI
4. If you have not already done so: Measure the tools, enter in the tool list.
5. If you have not already done so: Insert the tools into the magazine.
6. Attach the clamping fixtures.
7. Using the clamping fixtures, clamp the workpiece for the first clamping.
8. Set the workpiece zero by scratching.
9. Check the work offsets programmed in the part program and if necessary adapt to the machine configuration.
10. Perform the simulation.
11. Start machining, execute the machining plan for the first run with air cuts over the 2nd clamping.
12. Insert the workpiece for machining the rear side in the 2nd clamping, clamp the new blank for the next workpiece in clamping 1.
13. Repeat steps 11 and 12 until the required number of workpieces have been machined; for the last blank, with air cuts over the first clamping.

## 7 Executing the ShopMill machining plan DEER\_2023\_MCL\_ALL.MPF – machining with multiple clamping operations

Machining step	Graphic
<p>Machining starts by machining the rear side in clamping 2. A workpiece is not clamped for the first run, in this case, the machine just performs air cuts.</p>	
<p>The mirrored contour of the workpiece is first approached from the rear side using the 16 mm milling tool.</p>	
<p>The rear side of the workpiece in clamping 2 is then finished on the face side; a changeover is then made to the first clamping and the face surface of the front side is then finished using the same tool.</p>	
<p>Using the 10 mm milling tool, the contour of the workpiece is roughly machined (spigot milling, contour-controlled) in <b>clamping 1</b></p>	

<p>The outer workpiece contour is machined using the residual material detection function.</p>	
<p>The inner workpiece contour is machined using cycle "Mill pocket"</p>	
<p>Initially the outer and then the internal contour of the front side of the workpiece is chamfered, and then a switch is made to clamping 2 ...</p>	
<p>... and <b>in clamping 2</b>, the contours of the rear side of the workpiece are chamfered.</p>	

Completed "Reindeer 2023" Christmas  
workpiece



## **8 Information in the Internet**

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### **Design of the parts, creation of the drawings, development of the machining plans**

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