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Tree slice

[siemens.com/cnc4you](https://www.siemens.com/cnc4you)

## "Tree slice" decoration

Aluminum or brass, raw or anodized: either way, the 2020 CNC4you Christmas workpiece is decorative.

It is a turned and milled workpiece. Its cutouts are produced using powered tools for end face machining.

If you want to engrave the workpiece after machining, this can be done in a separate clamping on a vertical milling machine. A suitable ShopMill program is available for downloading along with the ShopTurn program for machining the workpiece.



*The wooden prototype that inspired it*



*The completed workpiece "Tree slice", here made of anodized aluminum*

All the information required for production, the drawings, tool data, work plan and NC programs are provided below.

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

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## 1 Safety information

Using machinery always entails a wide variety of hazards. The statutory and customary safety regulations must therefore be observed at all times when manufacturing the "Tree slice" Christmas workpiece.

## 2 Preliminary remarks

The following description is intended for operators of CNC machines who have experience with or knowledge of the SINUMERIK CNC. All the technology data listed here correspond to the machines, tools, materials, machining plans, and drawings used in the manufacture of the sample. For reproduction of this workpiece, they serve only as an example, because conditions in other workshops can be very different. Nevertheless, it should be possible to reproduce the workpiece without any problem in most cases.

The program was written and tested on a CNC turning machine with a counterspindle. The machine was equipped with a SINUMERIK 828D with the ShopTurn user interface V 4.8. The program can normally be easily adapted to other SINUMERIK versions, e.g. other SINUMERIK Operate software versions. Simulations and any necessary modifications should always be carried out, for example, setting the zero point and the clamping depth in the clamping jaws of the counterspindle.

All CAD drawings, programs, and manufacturing descriptions for the workpieces can be downloaded free of charge at **[www.siemens.com/cnc4you](http://www.siemens.com/cnc4you)**.

You'll find the following files and formats:

- NC programs (ShopTurn, ShopMill),
- A DXF file for the contours

### 3 Workpiece blanks/parts list

- Aluminum or brass, round material 60 mm in diameter  
About 10 mm of material are required to manufacture a tree disk. The clamped section must also be considered when determining the material requirements. The sample workpiece was produced with a protruding length of 101 mm.

### 4 Machines and work plans

#### CNC turning machine:

- For manufacturing the workpiece
- Type: DOOSAN 2600SY
- CNC: SINUMERIK 828D with ShopTurn V 4.8
- ShopTurn work plan: BAUMSCHEIBE\_V4.MPF

#### CNC milling machine:

- For optional engraving of the workpiece on a vertical milling machine
- 3-axis milling machine
- All ShopMill versions
- ShopMill work plan:
  - MERRY\_CHRISTMASS\_G55 or MERRY\_CHRISTMASS\_G56, depending on clamping situation

## 5 Tools used

Note: When equipping the tool turret, ensure there is sufficient clearance a) for the powered tools and b) sufficient distance between the adjacent tools and the clamping jaws of the spindle and counterspindle!

### 5.1 Tools for turning machine

Tool/short name	Description
ROUGHING_T80 A	Roughing turning tool for outside with one roughing insert, roughing tool, main spindle
FINISHING_T35 A	Turning tool for outside with one finishing insert, finishing tool, main spindle
ENDMILL_D4_MS	Milling cutter 4 mm (powered tool), main spindle
FASER_D6_MS	Chamfer cutter, 6 mm, powered tool, main spindle
PLUNGE_CUTTER_3 A	Plunge cutter, 3 mm
FINISHING_C2 A	Turning tool for outside with one finishing insert, counterspindle
FASER_D6_CS	Chamfer cutter, 6 mm, powered tool, counterspindle

### 5.2 Tools for milling machine

Tool/short name	Description
BALLMILL_D1	Ball cutter or ball nose end mill

## **6 Producing the "tree slice"**

### **6.1 Machining steps on the turning machine**

1. Approach the reference point of the machine.
2. Read in the work plan: BAUMSCHEIBE\_V4.MPF.
3. Read in the tool list WKZ\_LISTE\_TMZ.INI
4. Measure the tools and enter them in the tool list.
5. Insert the tools in the magazine.
6. Clamp the workpiece, ensuring a protruding length of 101 mm or adapt this length in the part program.
7. Set tool zero point by scratching.
8. Check the work offsets programmed in the part program and adapt to the machine situation as well as the clamping depth in the counterspindle.
9. Perform simulation.
10. Start production, execute the work plan.
11. Remove the workpiece

### **6.2 Coloring (optional)**

Before engraving, which can be performed as an optional extra step, the workpiece can be suitably colored so that the engraving stands out more. The sample workpiece has been anodized.

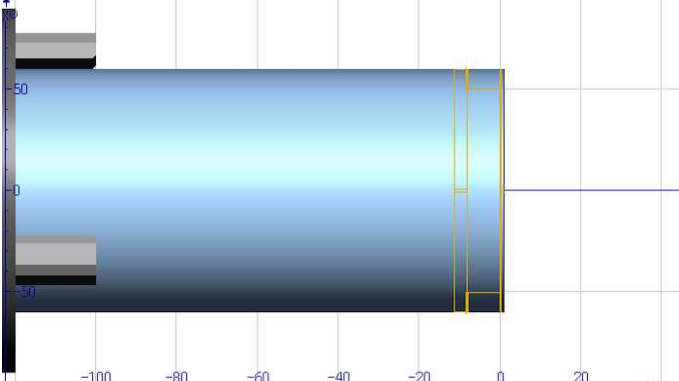
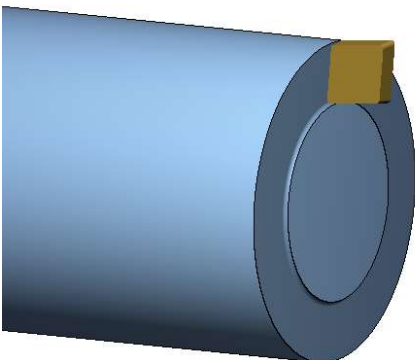
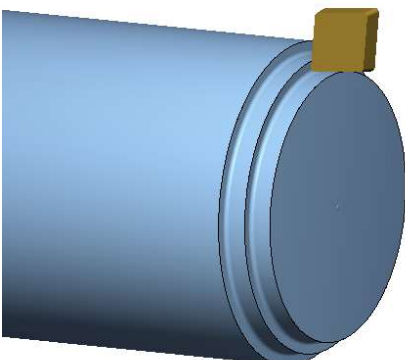
### **6.3 Machining steps at the milling machine (optional engraving)**

1. Approach the reference point of the machine.
2. Read in the work plan: MERRY\_CHRISTMASS\_G5\*.MPF (Select program depending on the clamping situation)
3. Read in the tool list WKZ\_LISTE\_TMZ.INI
4. Measure the tools and enter them in the tool list.
5. Insert the tools in the magazine.
6. Clamp the workpiece, checking the orientation so that the engraving is milled on the intended surface (check with simulation). It is best to use a stop point.
7. Set the workpiece zero point, using a probe or other probing equipment.
8. Check the work offsets programmed in the part program and adapt to the machine situation where necessary.
9. Perform simulation.
10. Start production, execute the work plan.
11. Remove the workpiece.



## 7 Executing the ShopTurn/ShopMill work plans

### 7.1 Executing the ShopTurn work plan "BAUMSCHEIBE\_V4.MPF"

Machining step	Screen
Clamp the blank, protruding length 101 mm	<div><div>SIEMENS</div><div>SINUMERIK OPERATE</div><div>12/15/20 8:58 AM</div><div>NC/UKS/BAUMSCHEIBE/BAUMSCHEIBE_U4</div><div>X0 1000.000 Z 60.000 Y 0.000 S1 T D1 P Program header G54 Z2 1000.000 F 0.200/rev 1% 00:00:00</div></div>
Face-turning end face (roughing)	<div><div>SIEMENS</div><div>SINUMERIK OPERATE</div><div>12/04/20 9:58 AM</div><div>NC/UKS/BAUMSCHEIBE/BAUMSCHEIBE_U4</div><div>X0 -0.500 Z 0.200 Y 0.000 S1 T ROUGHING_T80 R D1 Stock removal T=ROI Z2 1000.000 F 0.300/rev 5% 00:00:10</div></div>
Roughing to the external diameter	<div><div>SIEMENS</div><div>SINUMERIK OPERATE</div><div>04.12.20 10:00</div><div>NC/UKS/BAUMSCHEIBE/BAUMSCHEIBE_U4</div><div>X0 50.200 Z -7.900 Y 0.000 S1 T ROUGHING_T80 R D1 Abspannen T=ROI Z2 1000.000 F 0.300/U 5% 00:00:13</div></div>

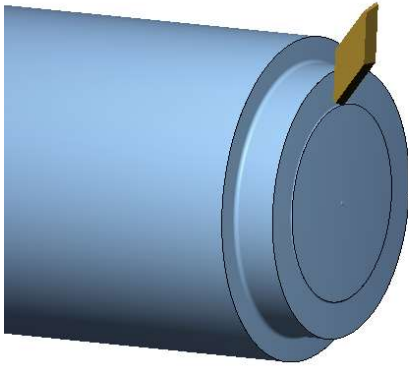
Finishing of end face

SIEMENS

SINUMERIK OPERATE

12/04/20  
10:07 AM

NC/LKS/BAUMSCHEIBE/BAUMSCHEIBE\_U4



X0

-0.500 Z

0.000 Y

0.000 S1

T FINISHING\_T35 A

D1

Stock removal

▽▽▽

T=FIN|Z2

1000.000 F 0.200/rev

5% 00:00:20

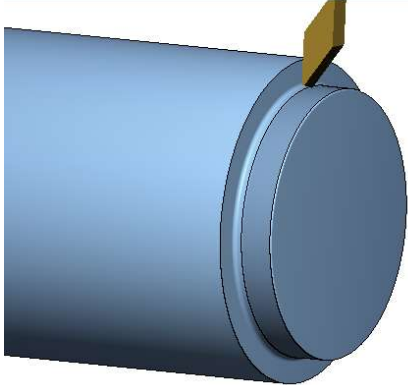
Finishing of peripheral surface

SIEMENS

SINUMERIK OPERATE

12/04/20  
10:09 AM

NC/LKS/BAUMSCHEIBE/BAUMSCHEIBE\_U4



X0

50.000 Z

-8.500 Y

0.000 S1

T FINISHING\_T35 A

D1

Stock removal

▽▽▽

T=FIN|Z2

1000.000 F 0.200/rev

5% 00:00:24

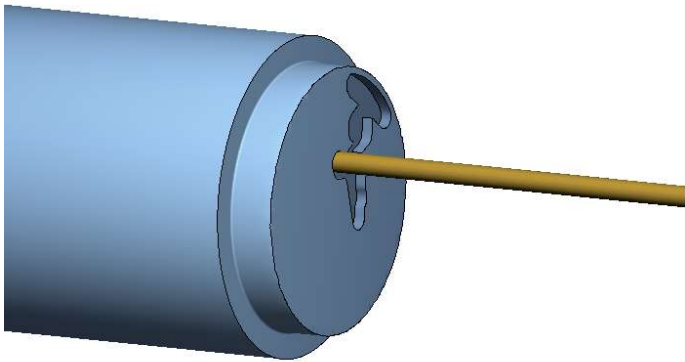
Milling of the contour from DXF file with pocket cycle, start...

SIEMENS

SINUMERIK OPERATE

12/04/20  
10:11 AM

NC/LKS/BAUMSCHEIBE/BAUMSCHEIBE\_U4



X0

8.154 Z

-2.125 Y

6.232 SP1

T ENDMILL\_D4\_M5

D1

Mill pocket

▽

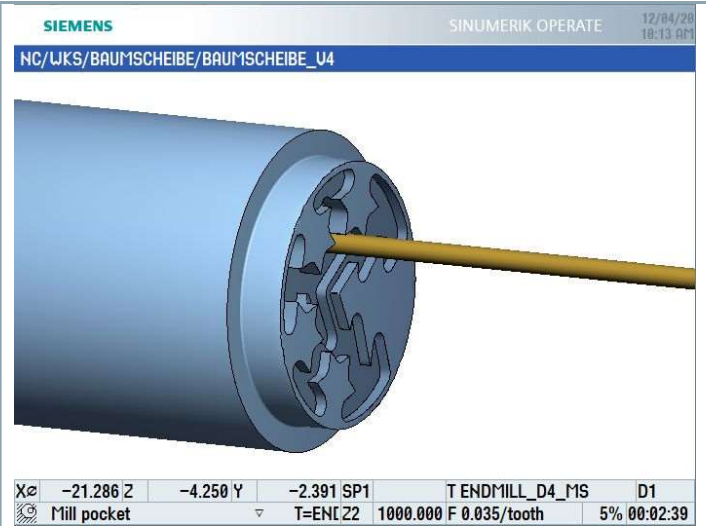
T=ENC|Z2

1000.000 F 0.035/tooth

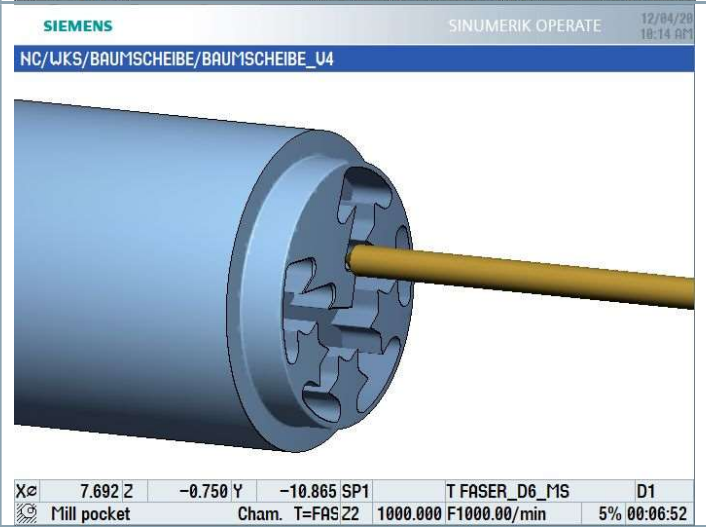
5% 00:01:03



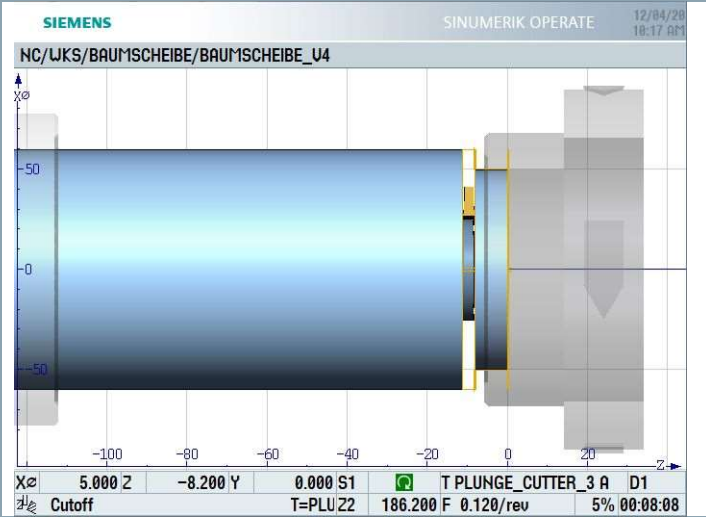
Milling the contour up to the full depth in several planes ...



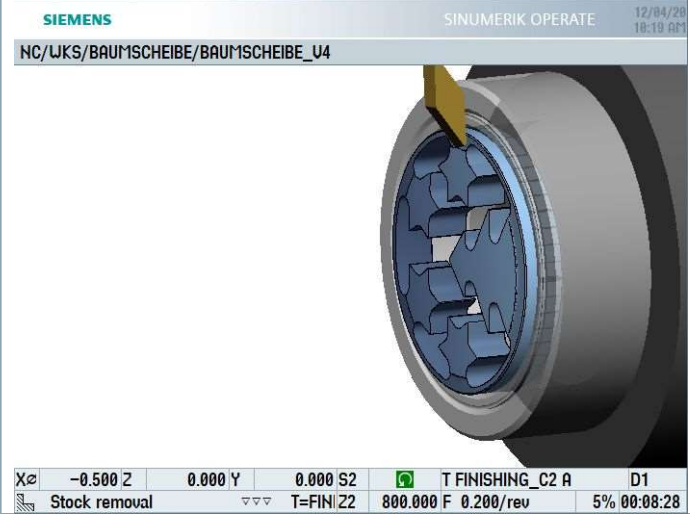
Contour chamfering



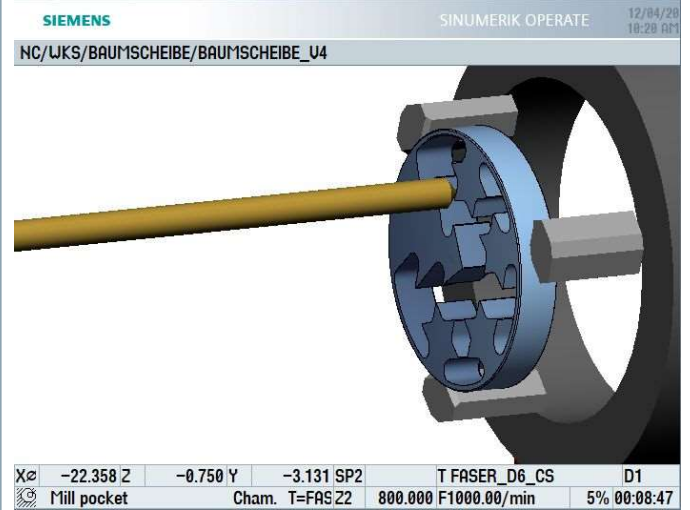
Cutoff and transfer to the counterspindle



Face-turning the reverse side (finishing)



Contour chamfering, reverse side



Completed workpiece (shown already anodized)

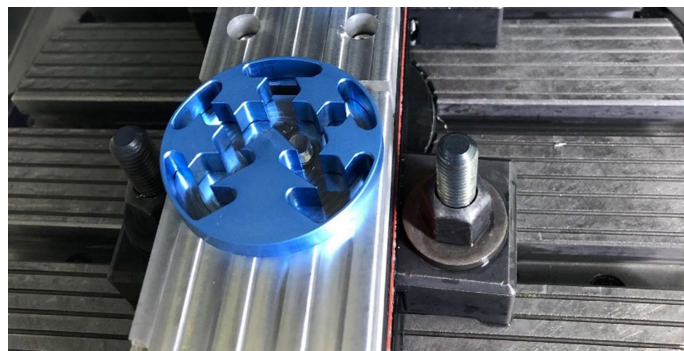


## 7.2 Executing ShopMill work plane "Merry CHRIST-MASS\_G55" (or ...\_G56), optional

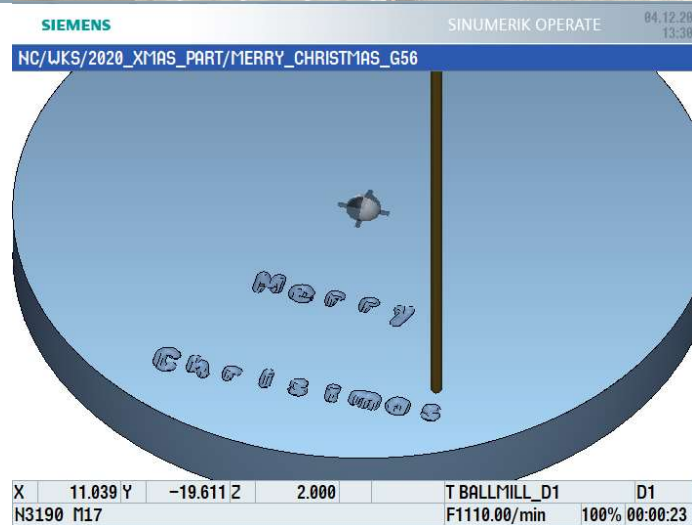
The engraving program is available in two versions with different clamping positions. These programs can be used to engrave several "tree slices" in one clamping, see figure



Depending on the clamping, load the ShopMill workplan, e.g. MERRY\_CHRISTMASS\_G55.MPF. Clamp the blank, set the zero point.



Start the program. The programmed text is milled



Engraved workpiece:



## 8 Information on the Internet

### **Published by**

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### **Design of parts, creation of drawings, development of work plans for machining:**

Digital Experience and Application Center (DEX)  
Frauenauracher Strasse 80  
91056 Erlangen, Germany

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