

SIEMENS



Keychain

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Keychain

The CNC4you "keychain" was developed and designed by freelance trainer Hans-Peter Moser. This keychain is a turned part, which in addition to turning tools, was also machined using driven tools on the face and peripheral surfaces.



The completed keychain with ring (ring was purchased)

All the information required for the machining – such as tool data, machining plans and NC programs – are subsequently listed.

www.siemens.de/cnc4you

Table of contents

1	Safety note	3
2	Preliminary comment	3
3	Workpiece, blanks/bill of materials	4
4	Machines and machining plans	4
5	Tools used	4
6	Fabricating the "keychain" workpiece	5
7	Executing the ShopTurn machining plan	6
8	Mounting	9
9	Information in the Internet	9

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 observed when fabricating the CNC4you keychain.

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 workpiece. When it comes to replication however, this only serves as an example because of the wide diversity of resources available in other workshops. Having said that, it should be possible in most cases to simply replicate this nifty and practical workpiece.

The program for the turned part was generated and tested on a CNC turning machine with C / Y axes and counterspindle. The machine was equipped with a SINUMERIK 828D with the ShopTurn user interface. There is a special NC program for turning without a Y axis.

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

All programs and machining descriptions for the workpieces can be downloaded at no charge from www.siemens.de/cnc4you.

Here you can find the following files and formats for your keychain:

- ShopTurn machining plans

3 Workpiece, blanks/bill of materials

- Round aluminum bar Ø 20 mm

Approximately 150 mm of material is required to fabricate the keychain. When estimating the material, the area required to clamp the workpiece must also be taken into consideration.

The sample workpiece was machined with an unclamped length of 86 mm.

4 Machines and machining plans

CNC turning machine:

- Type: DOOSAN 2600SY
- CNC: SINUMERIK 828D with ShopTurn V 4.95
- ShopTurn machining plans:
 - SCHLUESSELANH_GS_01.MPF – for machines with counterspindle
 - SCHLUESSELANH_HS_01.MPF – for machines without counterspindle
 - SCHLUESSELANH_OPERATE_ST – engraved instead of spiral grooves

5 Tools used

Notice: When inserting tools in the tool revolver, ensure that a) there is adequate clearance for the driven tools and b) there is sufficient clearance between adjacent tools and the clamping jaws of the spindle and counterspindle!

5.1 Tools for the lathe

Tool/short name	Description
ANSCHLAG D20	Suitable tool as end stop for setting the unclamped length
FINISHING_T35 A	Outer turning tool with a finishing plate, finishing tool, main spindle
CUTTER_8	Driven tool for face machining, 8 mm milling tool, 3 cutting edges
FRAESER D6 MA	Driven tool for peripheral machining, 6 mm milling tool, 3 cutting edges
NC-FASER D8 G90	Driven tool for peripheral machining Chamfering-milling tool with 90 degree cutting edge angle, 8 mm diameter (also used as engraving cutter)
BOHRER D4 MA	Driven tool for peripheral machining, 4 mm drill
PLUNGE_CUTTER_3 A	3 mm parting tool
SCHLICHT_GS	Outer turning tool with a finishing plate, counterspindle

6 Fabricating the "keychain" workpiece

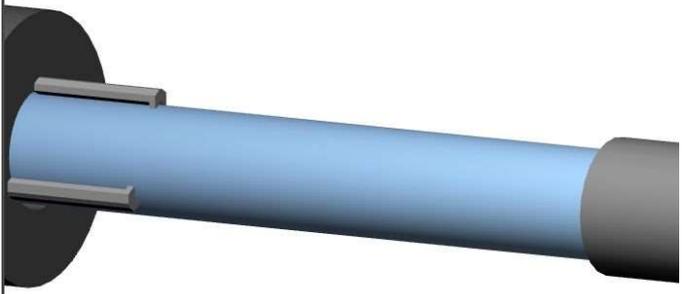
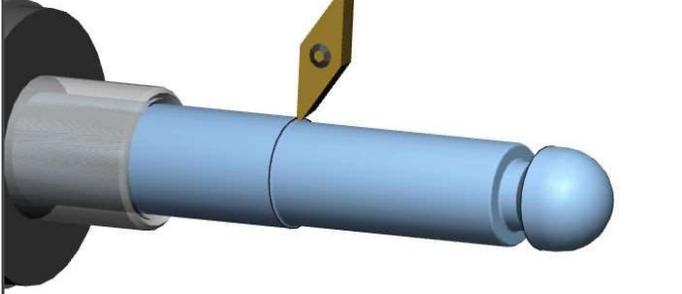
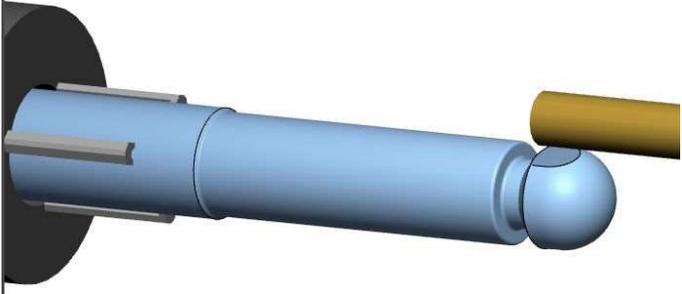
6.1 Machining steps at the turning machine

1. Approach the machine reference point.
2. Read-in the machining plan: SCHLUESSELANH_HS_01.MPF (or SCHLUESSELANH_GS_01.MPF, if a counterspindle can/should be used).
3. For turning machines without Y axis, the engraving steps on the surfaces of the hexagon head of the keychain should be commented-out; they can only be implemented on machines equipped with Y axis. The corresponding program section is marked in the part program in the form of a comment.
4. Read-in the tool list SCHLUESSELANH__TMZ.INI (only possible if OPTION is available)
5. Measure the tool internally and externally, depending on the functionality available
6. Insert tools in the magazine.
7. Start the part program, the tool functioning as end stop is positioned, machine is stopped.
8. Pull the workpiece to the end stop (unclamped length, approx. 86 mm)
NOTE: *Here there is a risk of injury!*
9. Check the work offsets programmed in the part program and if required adapt to the machine configuration – the same is true for the clamping depth in the counterspindle.
10. Perform the simulation.
11. Start fabrication, work through the machining plan.
12. Remove the workpiece

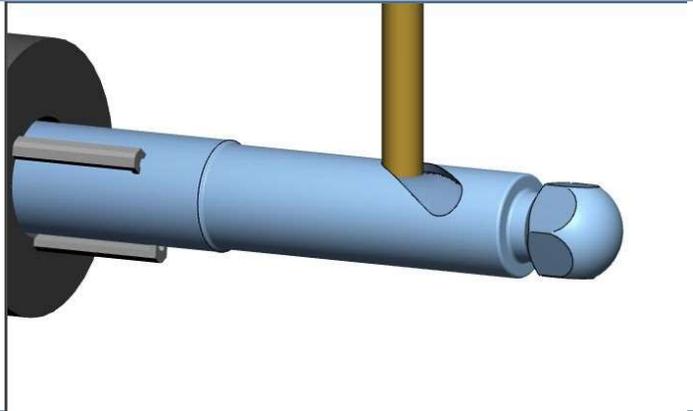
7 Executing the ShopTurn machining plan

7.1 Executing the ShopTurn machining plan "SCHLUESSELANH_HS_01.MPF"

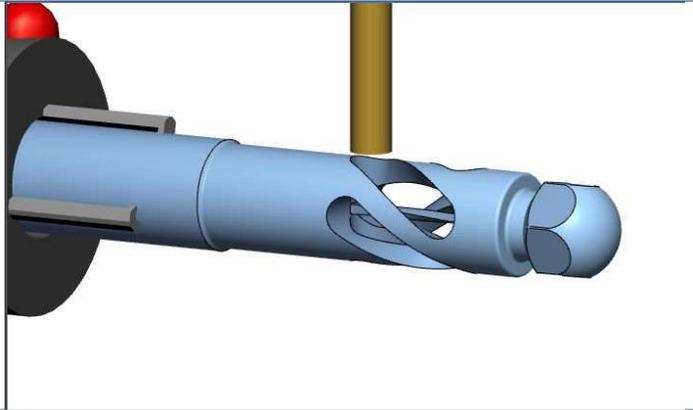
When machining on machines equipped with counterspindle and with ShopTurn machining plan "SCHLUESSELANH_GS_01.MPF", the procedure is essentially the same. The only difference is that when parting, the workpiece is transferred to the counterspindle and the back of the workpiece is subsequently finished.

Machining step	Illustration
<p>Start the NC program, end stop is positioned, machine is stopped, pull the blank to the end stop (unclamped length, approx. 86 mm). Continue to execute the part program that was interrupted with NC start</p>	 A 3D illustration showing a blue cylindrical workpiece being pulled into a lathe chuck. The workpiece is positioned against the chuck's jaws, and the unclamped length is approximately 86 mm.
<p>Turn the first contour and finish the peripheral surface</p>	 A 3D illustration showing a lathe tool (yellow) finishing the peripheral surface of a blue workpiece. The tool is positioned against the workpiece, and the peripheral surface is being turned.
<p>Multi-edge milling at the head part</p>	 A 3D illustration showing a multi-edge mill (yellow) finishing the head part of a blue workpiece. The mill is positioned against the workpiece, and the head part is being milled.

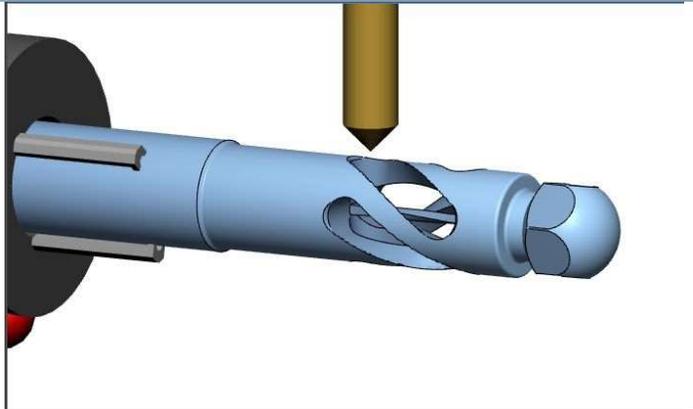
Mill the spiral grooves



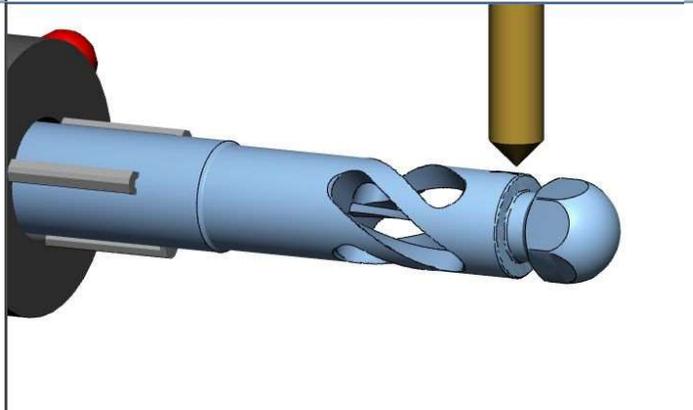
After the third spiral groove, a filament remains in the core of the keychain, this is an intentional feature of the keychain.



Chamfer the spiral grooves

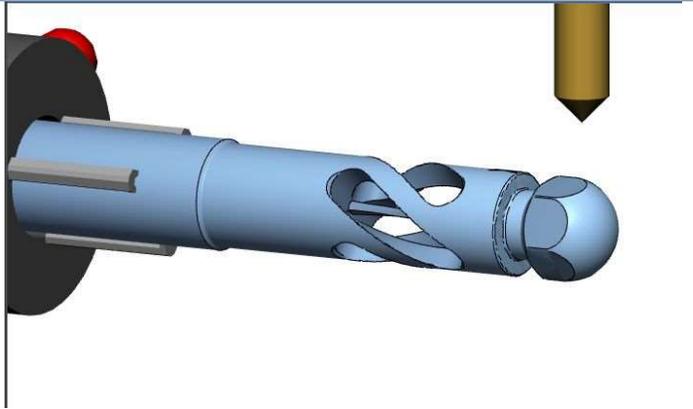


Engrave the workpiece

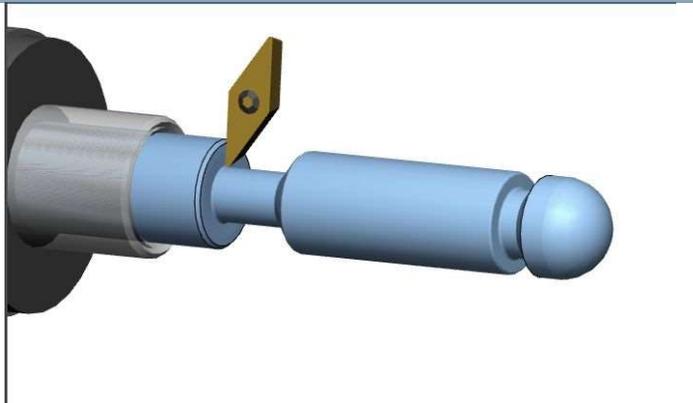


Engrave on three surfaces of the hexagon

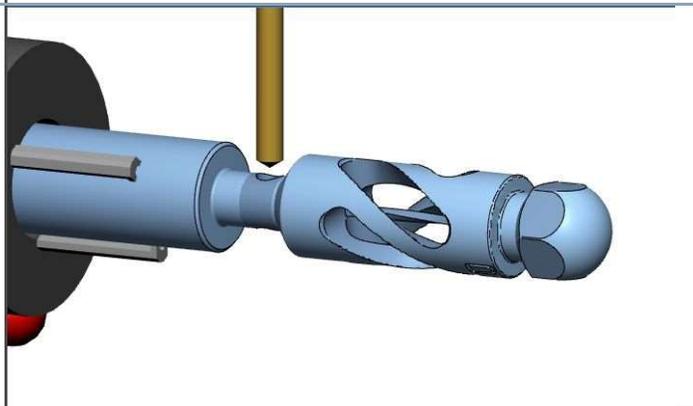
Caution: only possible for turning machines equipped with Y axis, see Section 6.1!



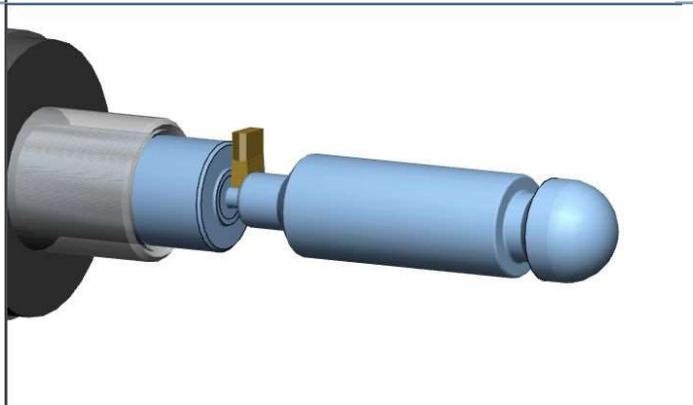
Turn the second contour at the foot section of the keychain



Bore for the ring



Part to the residual material to break off



Break off the workpiece and remove, deburr the broken edge or file to the required shape.

Hope your machining was a success!

8 Mounting

Add an existing/purchased ring to the keychain.

9 Information in the Internet

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Manuals and information of Siemens AG

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- Siemens Industry Online Support:
(<https://support.industry.siemens.com/cs/document/108464614>)
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