

Pen holder



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The CNC4you "Pen holder" workpiece is milled from aluminum and has a personal engraving on it. In spite of having a free-form surface, this workpiece can be machined on a 3-axis machine: This particular sample was machined on a Kaast VF-Mill HP760 equipped with a CNC Sinumerik 828D.

All information required for machining, including the set of drawings, tool data, workplan and NC programs, is compiled below.

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1. Safety note

The use of machinery always entails wide-ranging hazards. It is therefore essential that you also strictly observe the standard and statutory safety regulations when manufacturing the pen holder.

2. Preliminary remarks

The following description is intended for operators of CNC machines who have experience with or knowledge of the SINUMERIK CNC. All technology data listed here correspond to the machines, tools, materials, workplans, and drawings used in the manufacture of the sample. For remanufacturing purposes, they only serve as a model, on account of the diverse conditions prevailing in other workshops. Trouble-free machining should nevertheless be possible in most cases.

The program was generated and tested on a Kaast VF-Mill HP760 CNC milling machine with a 24-position tool turret. The machine is equipped with a SINUMERIK 828D with a SINUMERIK Operate V4.7, SP3 HF1 user interface.

Note:

As a rule, the program can be easily adapted to other SINUMERIK versions, such as other SINUMERIK Operate software versions. Simulations and necessary changes, such as zero point adjustments, should always be carried out.

All CAD drawings, programs, and manufacturing descriptions for the workpieces can be downloaded free of charge at www.siemens.com/cnc4you. Here, we can provide you with the following files and formats to address your requirements: NC programs, drawings as PDF and possibly, also 3D data.



3. Workpiece blanks/parts list

- For each pen holder, an aluminum blank (AlZnMgCu1,5 (3.4364) size 175 x 95 mm (saw dimension) x 65 mm is required.

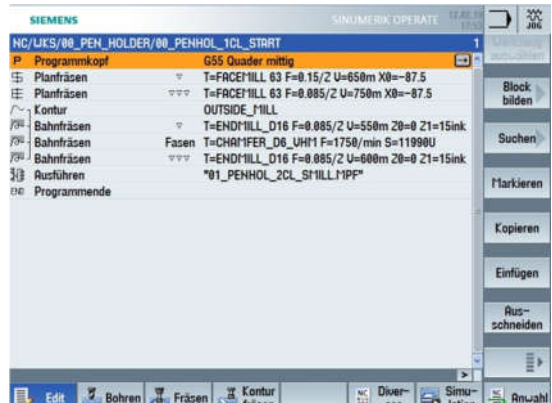


4. Milling machines and NC programs

- 3-axis Kaast VF-Mill HP760 CNC milling machine
SINUMERIK 828D with SINUMERIK Operate V4.7, SP3, HF1

Part programs:

- 00_PENHOL_1CL_START.MPF
Mill the foot section in clamping position 1 (rear, lower side machining of the blank) and jump into the next program:
- 01_PENHOL_2CL_SMILL.MPF
Mill the workpiece in clamping position 2 (front, workpiece with premachined foot section) - the following subroutines are called one after the other.
- 02_PENHOL_2CL_3DPL_ROU.MPF
- 03_PENHOL_2CL_3DPL_PREFI.MPF
- 04_PENHOL_2CL_3DPL_FIN.MPF
- 05_PENHOL_2CL_3DPL_CHAM.MPF



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5. Tools used

Milling and drilling tools for machining the workpiece:

Tool/short name	Description
BALLMILL_D2	Ball head cutter 2 mm Ø
BALLNOSE_MILL_D12_SL	Ball head cutter 12 mm Ø for finishing
BALLNOSE_MILL_D12_SR	Ball head cutter 12 mm Ø for roughing
ENDMILL_D10	End mill 10 mm Ø, protruding length 40 mm
ENDMILL_D16	End mill 16 mm Ø
ENDMILL_D6_R1	End mill 6 mm Ø with rounded cutting edge (radius 1 mm)
TORUSMILL_D12_R2	Torus/peripheral milling cutter 12 mm Ø with rounded cutting edge (radius 2 mm)
ENDMILL_D16_R3	End mill 16 mm Ø, 60 mm long with rounded cutting edge (radius 3 mm)
FACE_TORUS_63_R2.5	Face milling cutter 63 mm Ø with rounded cutting edge (radius 2.5 mm)
DRILL_D4.2	Drill 4.2 mm Ø
DRILL_D13	Drill 13 mm Ø
CHAMFER_D6_VHM	Chamfer mill 6 mm Ø

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6. Milling in two clamping operations

The part is milled with the part program specified below in two machining phases and/or two clamping operations.

Machining two or more pen holders

The part program is designed to produce several pen holders; a double vice is used to clamp the workpiece. The rear compartment of the double vice holds the new blank for machining the lower side; the front compartment, the premachined workpiece on the foot side. The workpieces are clamped up to the end stop. Each of the two workpieces is assigned its own work offset (G55 and G54); the part program switches between these two work offsets.

When program 00_PENHOL_1CL_START is started, the blank in the rear clamp is machined, and then program 01_PENHOL_2CL_SMILL.MPF is called to machine the workpiece in the front clamp.

At the end of the program, the machined pen holder is removed from the front clamp, the premachined blank with the premachined foot is inserted in the front clamp, and a new blank is inserted at the rear.

For the very first part of the series, the front location of the double vice remains empty - or a placeholder is inserted. When machining the very first part of the series, program execution should be stopped after machining the foot section.

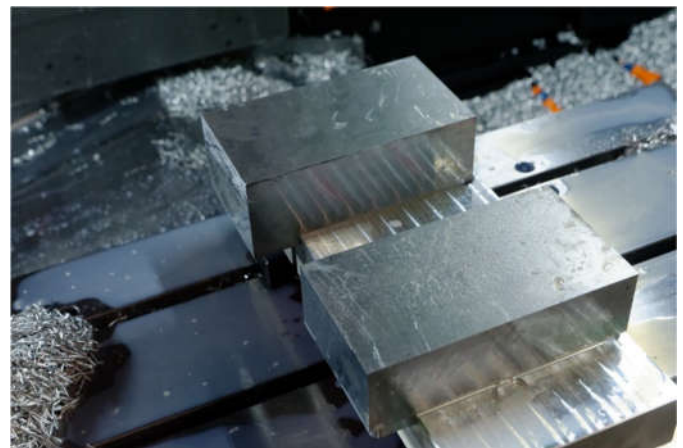
At the last part of the series, a new blank is not inserted; the program is then started using a block search from the machining of the top side.

Machining only one pen holder

Alternatively, if only one pen holder is to be machined, then a single vice is sufficient. The automatic call of 01_PENHOL_2CL_SMILL.MPF is removed from program 00_PENHOL_1CL_START and the two programs individually executed in the original sequence.



Clamping in the double vice: At the rear, the new blank (machining the lower side), at the front, the workpiece premachined at the lower side


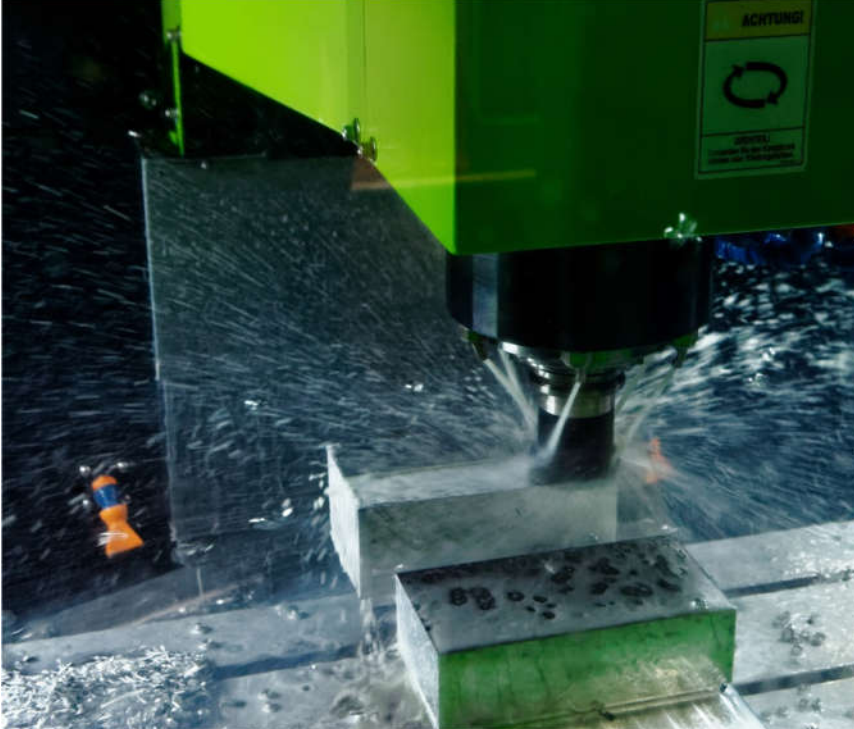


Machining steps at the milling machine

1. Approach the reference point of the machine.
2. Import the tool list and/or the work offsets PENHOL_2CL_SMILL_TMZ.INI.
3. Measure the tools and enter them in the tool list.
4. Insert the tools in the magazine.
5. Import part program 01_PENHOL_2CL_SMILL.MPF scroll down, enter the required engraving text in the three engraving cycles and then save.
6. Clamp the blank (if necessary, reclamp the premachined workpiece, see above).
7. Specify the work offset: G55 for the blank (rear clamp) and G54 for the premachined workpiece (front clamp)
8. Import part program 00_PENHOL_1CL_START.MPF
9. Start the part program; the switchover from machining the foot side of the blank to completing the machining (finishing) of the premachined workpiece in the second clamp is programmed and takes place automatically. See the notes relating to the first and last workpiece in Section "Milling in two clamping operations"
10. At the end of the program, remove and clean the workpiece, insert the blank with the premachined foot section in the front clamp and insert the new blank into the rear clamp.
11. Machine the next workpiece: if necessary, in the still active 01_PENHOL_2CL_SMILL.MPF part program, adapt the engraving texts (see above) and then continue with step 8 of this list.

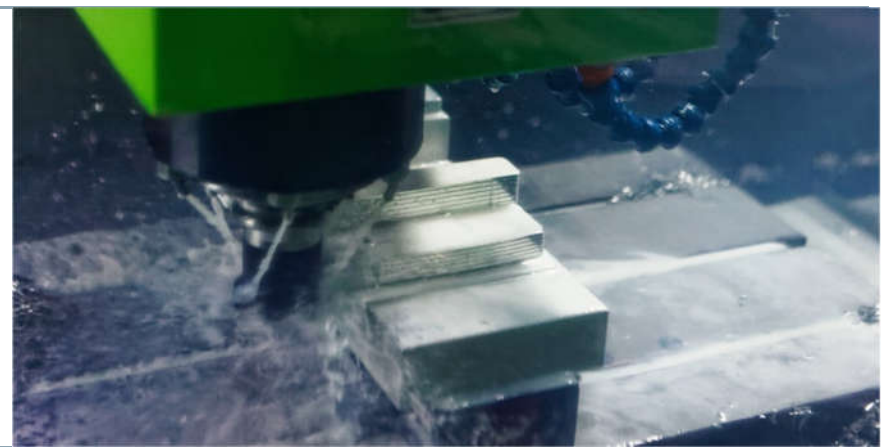




Machining sequence

Machining step	Diagram
<ul style="list-style-type: none"> • Clamp the blank/reclamp the premachined workpiece • Before the first program run: Define the work offsets for the blank (G55: rear clamp), and for the premachined workpiece (G54: front clamp) • Import part program 01_PENHOL_2CL_SMILL.MPF. • Define the engraving text and • import part program 00_PENHOL_1CL_START.MPF • Start the part program. 	
<p>The first program step, face milling the lower side of the workpiece is shown in the diagram.</p>	

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<p>After machining the contour of the foot section (roughing, finishing, chamfering), 01_PENHOL_2CL_SMILL.MPF is automatically called and program execution changes to the workpiece clamped at the front and machines the basic form of the pen holder.</p>	
<p>The bores for the pens and pencils are drilled,...</p>	
<p>... and then using a smaller diameter, additional recesses are drilled in the base of the bores to protect the tips of the pens and pencils and pencil leads.</p>	

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<p>Pockets are milled to store small materials (stock removal with tool change to remove the residual material at the corners of the pockets)</p>	
<p>The free form surface is machined, and all of the contours chamfered along with the holes in the free form surface for the pens and pencils. To do this, subroutines 02_PENHOL_2CL_3DPL_ROU to 05_PENHOL_2CL_3DPL_CHAM are called. The workpiece is then engraved.</p>	
<p>Release the blank and clean: The completed workpiece.</p>	

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7. Information on the Internet

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

Digital Experience and Application Center (DEX) Erlangen
Frauenauracher Strasse 80
91096 Erlangen

Published by:

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

Details on the Kaast VF-Mill HP760 machine tool used in the
Internet:

<http://www.kaast.de/catalog/53/1206>

Manuals and information issued by Siemens AG

Manuals and detailed information about our products can be
found on the following websites:

- DOConWEB
(<https://support.industry.siemens.com/cs/ww/en/view/109476679>)
- Service&Support Portal
(<https://support.industry.siemens.com>)
- SINUMERIK website (www.siemens.com/sinumerik)



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