Table clock and pencil holder

table clock, milled

A classical table clock milled from a single block, with an integrated pencil holder for the CNC miller.

The workpiece is milled from an aluminum plate in two clamping operations. The border of the clock face is created in the contour editor, and is milled and chamfered with path milling cycles. The clock face itself is created with the position pattern cycle together with centering and drilling cycles, and the pocket milling cycle. The table is swiveled with CYCLE800, the inclined surface and the circular pockets are milled, and then engraved. The milled, aluminum clock case contains an analog quartz movement. This classic gem is ideal as a gift or for standing on one's own desk.

All of the information required for production, drawings, tool data and workplans are compiled in the following.

www.siemens.com/cnc4you

Contents

1. Safety Note 2
2. Preliminary remark 2
3. Workpiece blank and clock movement 3
4. Milling machine and machining plan 3
5. Tools used 4
6. Milling the table clock 5
7. Informationen on the Internet 7
8. Pictures 8

1. Safety Note

Working with machines is always associated with numerous hazards. It is therefore imperative that the legal and company safety regulations are also observed during the production of the table clock.

2. Preliminary remark

The following description is intended for persons acquainted with CNC machines and who have experience with or knowledge of SINUMERIK CNCs. All the technical data listed here corresponds to the machines, tools, materials, machining plans and drawings used to produce the prototype. Because of the widely varying conditions in other workshops, this data is only of exemplary character for a reproduction. Nevertheless, a problem-free reproduction should be possible in most cases.

The programs were created and tested using a CNC milling machine equipped with SINUMERIK Operate V4.5 SP2. It should be possible to easily adapt the program to other SINUMERIK versions (e.g. different SINUMERIK Operate SW versions). Usually these programs are not downward compatible as new cycles often require additional parameters not yet available in older versions. These must then be added manually. A simulation and necessary changes (e.g. zero points) should always be carried out.

You can download all the CAD drawings, programs and machining descriptions for the workpieces free of charge at **www.siemens.com/cnc4you**.

The following files and formats are available there:
NC programs ShopMill, drawings PDF

3. Workpiece blank and clock movement

- AlCu4PbMg, Plate ca. 100x100x45
- Standard quartz clock movement
  Example shop: Conrad Electronic Order-Nr. 463077 - 62, EAN 4016138012675

Copyright: Conrad Electronic

4. Milling machine and machining plan

- CNC milling machine DMG MORI DMU50, Siemens 840D sl - SINUMERIK Operate V4.5 SP2
- ShopMill machining plans UHR_CLOCK_1SPG.MPF
  UHR_CLOCK_2SPG.MPF
  Tool list UHR_CLOCK_TMZ.INII
  The machining plans are available as download for the software version V4.5 SINUMERIK Operate SP2.

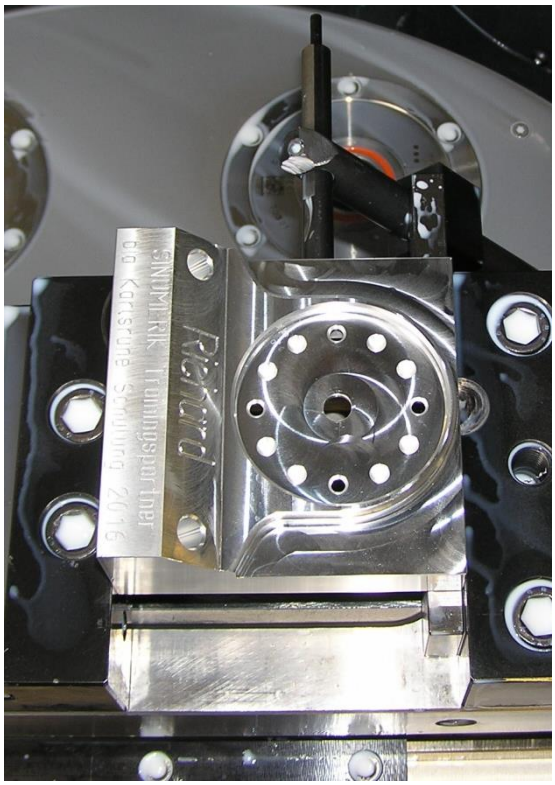
5. Tools used

Drilling and milling tools for machining both sides of the parts.

Tools for milling machine

Tool name in the machining plan	Designation
ECK-MK-D40	90° angular face milling head Ø40 mm
CUTTER 20	End mill Ø20 mm
FRAESER 12	End mill Ø12 mm
FRAESER 8	End mill Ø8 mm
CENTERDRILL 12	Center drill Ø12 mm
BOHRER D8.0	Solid carbide twist drill Ø8 mm
KUGELKOPF_ZYL 2	Ball cutter Ø2 mm
CUTTER 16	End mill Ø16 mm
CUTTER 6	End mill r Ø6 mm
BOHRER D5	Solid carbide twist drill Ø5 mm
MFR_D4_G90	Multi mill Ø4 x 90 deg


6. Milling the table clock



The clock has a one-piece case. The front and rear sides of the case are machined in two clamping operations. The zero point lies in the drill hole for the axes of the clock hands X0-50 Y0-64.

The raw part is clamped. First the workpiece is face milled. Then the external contour of the clock is milled with the contour milling cycles, this is followed by the rectangular pocket, which is the right size to hold the clock movement. The holes are then drilled, the external contour and the rectangular pocket are chamfered. The rear can be engraved as an option. This completes the machining in the first clamping operation.

The workpiece is reclamped, and the front is machined. The zero point lies in the center of the Ø8 hole for the clock hands, and should be redetermined. First the workpiece is face milled, the step and the incline are milled. The programmed contour of the clock border is roughed and then finished. The circular pocket for the clock face is then milled, the radius of the clock border and the two optional rectangular pockets are milled (the clock in the illustration does not have rectangular pockets on the left or right). In the swiveled position, the circular pockets for the pencil holders on the inclined surface are milled.

Now only the holes for the hands have to be drilled and the entire external contour of the clock chamfered. The front or inclined surface can be optionally engraved.

That finishes the processing on the machine. Finally only the quartz movement has to be fitted.

Work steps at the milling machine (back)

1. Approach the reference point of the machine
2. Read-in the workplan: UHR_CLOCK_1SPG.MPF
3. Read-in the tool list or zero offsets UHR_CLOCK_TMZ.INI
4. Measure tools and enter them in the tool list
5. Insert tools in magazine
6. Clamp the workpiece
7. Set tool zero point, by scraping (center of the borehole -50/-64)
8. Program of zero offsets
9. Perform simulation
10. Start production, process workplan

Work steps at the milling machine (front)

1. Approach the reference point of the machine
2. Read-in the workplan: UHR_CLOCK_2SPG.MPF
3. Read-in the tool list or zero offsets UHR_CLOCK_TMZ.INI
4. Measure tools and enter them in the tool list
5. Insert tools in magazine
6. Clamp the workpiece
7. Set tool zero point, by scraping (center of the borehole -50/-64)
8. Program of zero offsets
9. Perform simulation
10. Start production, process workplan


7. Informationen on the Internet

Design of the parts, creation of the drawings, development of the machining plans for machining

Moser CNC-Training
Internet: www.moser-cnc-training.de/

and

HANDWERKSKAMMER KARLSRUHE
Friedrichsplatz 4-5
76133 Karlsruhe
Internet: www.hwk-karlsruhe.de

Details of the tool machine and tools to be used

DMG MORI High Speed Cutting precision center
Internet: www.dmgmori.com

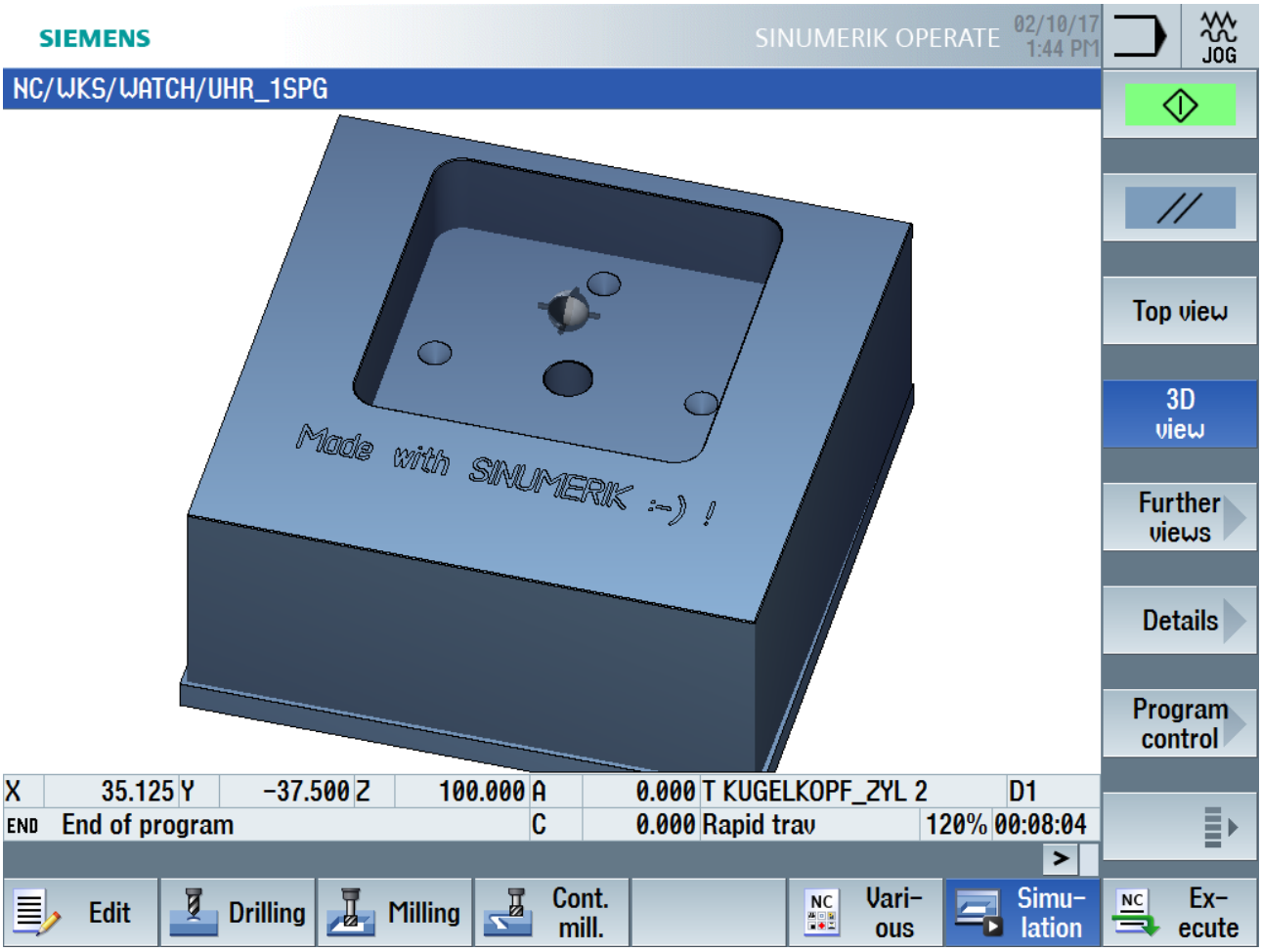
Manuals and information from the Siemens AG

Manuals and detailed information about our products, please visit the following websites:

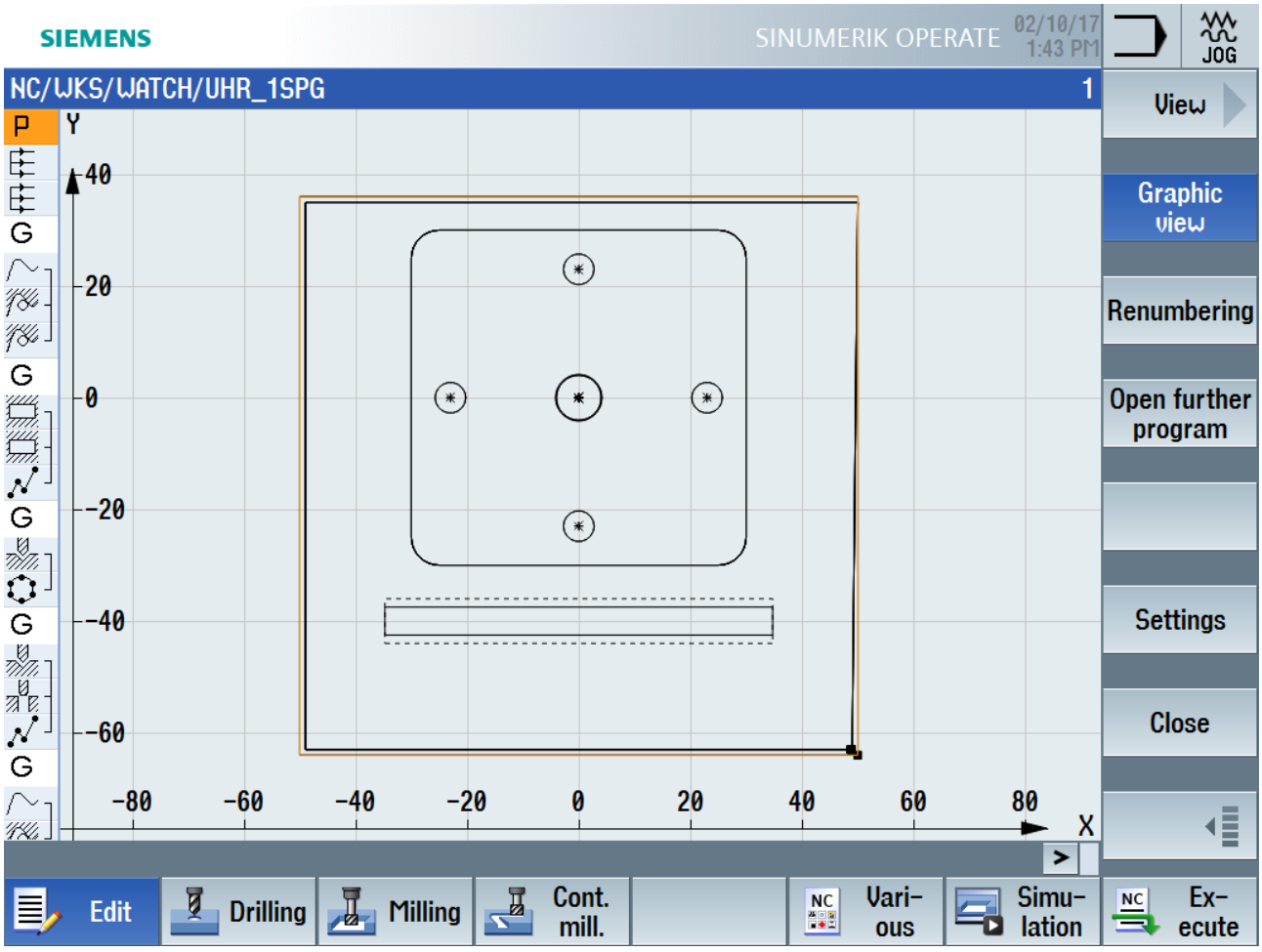
- Technical Documentation (https://support.industry.siemens.com/cs/ww/en/view/109476679)
- Service&Support Portal (https://support.industry.siemens.com)
- SINUMERIK Website (www.siemens.com/sinumerik)


8. Pictures

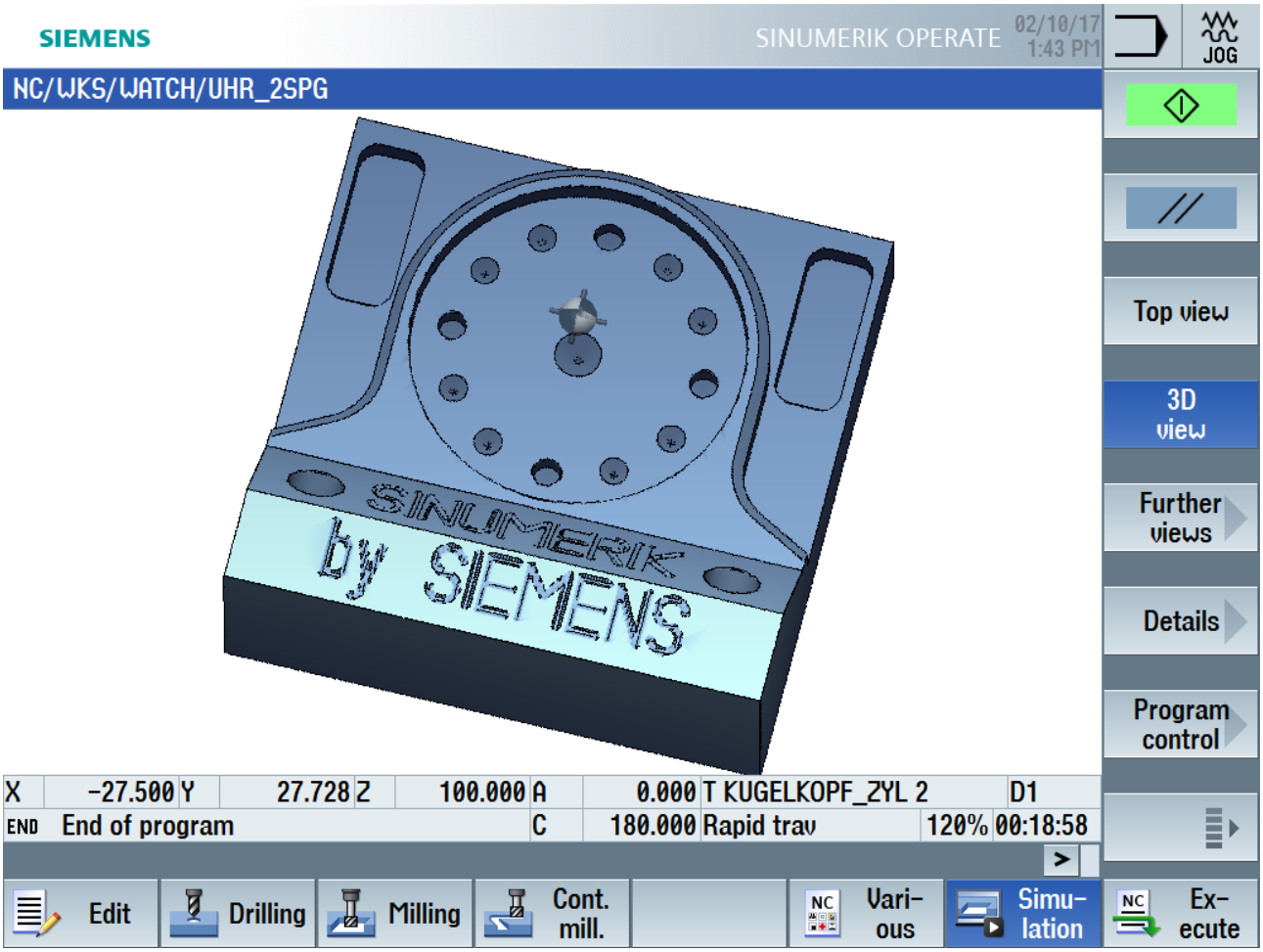
Simulation backside



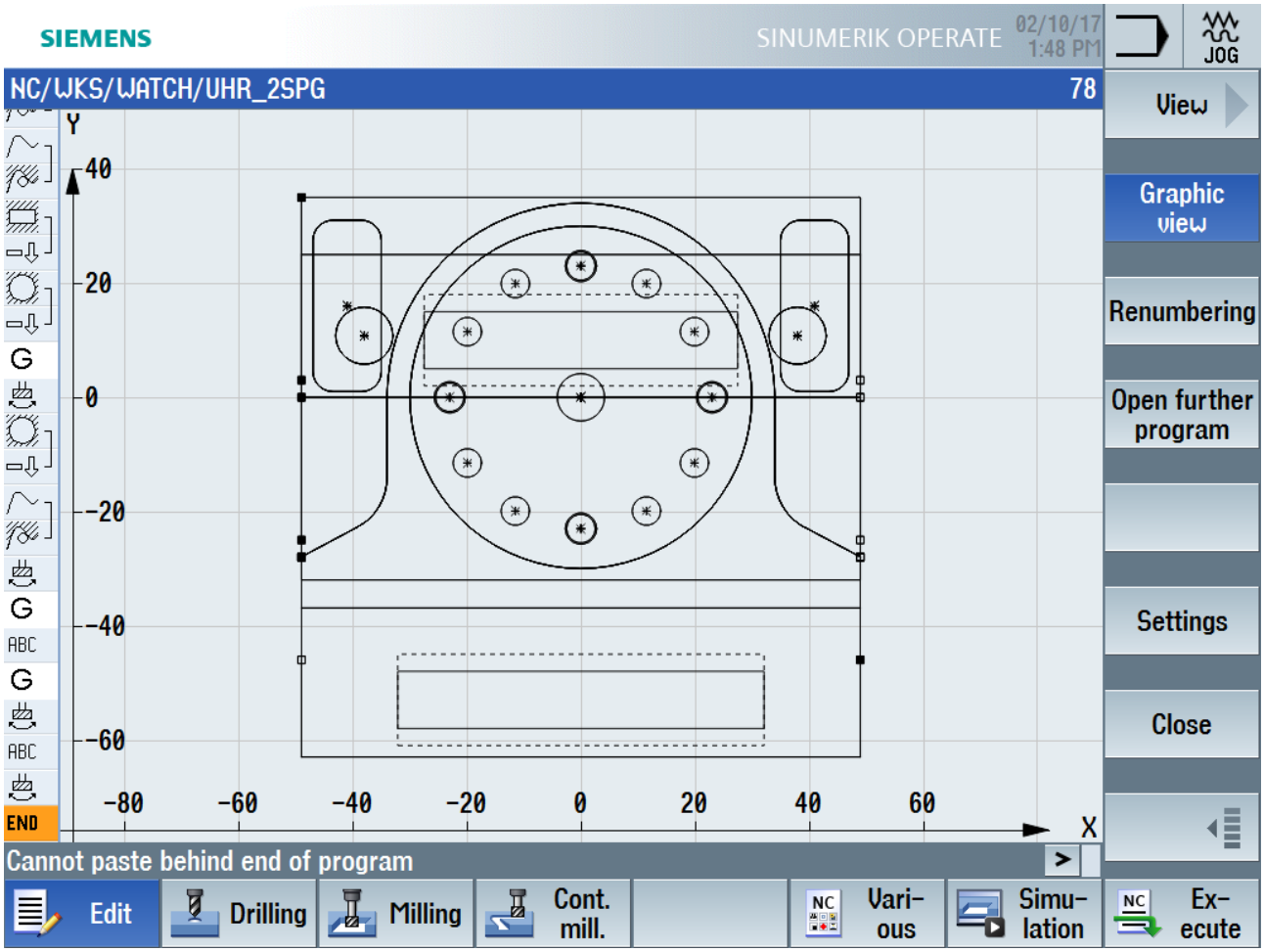
Graphical view backside



Simulation frontside



Graphical view frontside



Picture table clock