

## Production of a workpiece stop



*workpiece stop*

Every workshop should have one, a workpiece stop. Always when several identical parts must be machined, and the same machining steps must be repeated. The workpiece stop helps do this. For example, when drilling, it always ensures the same clamping length; the same is true when cutting or other machining steps. Using the adjustable joint of the workpiece stop, the optimum position of the workpiece stop needle can be set and fixed. An M8 cylinder screw allows the stop to be mounted.

All of the individual parts of the workpiece are machined from commercially available materials.

All information, tool data and machining plans required for the reproduction are summarized in the following sections.

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### 1. Safety note

The handling of machines brings many dangers. Consequently, the legal and general company safety regulations must always be observed for the production of the hood ornament.

### 2. Preliminary remark

The following description is oriented to technicians familiar with a CNC milling machine who have experience or knowledge of the SINUMERIK CNC with ShopMill/ShopTurn. All technology data listed here is appropriate for the machines, tools, materials, machining plans and drawings used to produce the sample piece. Although the wide range of conditions prevailing in other workshops mean they are only exemplary for a reproduction, in most cases they should allow a problem-free reproduction.

ShopMill and ShopTurn allow all of the individual parts to be machined in basic machining steps. The individual part drawings clearly show which design elements are used when machining the workpieces using SINUMERIK ShopMill/ShopTurn. The complex pocket milling function is used as well as thread shapes and simple drilling. This example in no way fully utilizes the huge range of options provided by the milling and turning program.

Assembling the workpiece stop according to the machine part drawings should be easy and straightforward. The screws used are standard parts, and it goes without saying that you will not have to machine these yourself.

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To guarantee success, we recommend simulating the machining plans prior to the start. This detects and avoids collisions, caused, for example, by incorrect tool lengths. The "Perform simulation" work step before starting the manufacturing is not essential.

You can download without charge all CAD drawings and production descriptions for the workpieces in the registered "My SINUMERIK" Internet area at [www.siemens.com/cnc4you](http://www.siemens.com/cnc4you). We make the following files and formats available here:

IGS file / DXF file / Jobshop file

Here, we provide you with the following files and formats:

- **PDF file of the model with dimensions (drawings):**  
A 3D view of the model, and individual part view as well as the drawing list with the individual parts
- **IGS files**  
that can be viewed using CAD/CAM systems
- **Jobshop files (V5.3, V6.4) for three or four axes**  
The individual head/foot part can be machined using 3 axes or with 3 plus a fourth axis.
- **Machining plans and clamping arrangement**  
To compare with your programming

### 3. Drawing list

- Clamping jaws, on blank part drawings clamping jaws blank parts see Section 7.B of this document.
- Foot, individual part drawings, foot for workpiece stop, Page 3
- Side part, individual part drawing, side part for workpiece stop, Page 4
- Bolt, individual part drawing bolt with countersink for workpiece stop, Page 5
- Bolt, individual part drawing bolt with thread for workpiece stop, Page 6
- Stop needle, individual part drawing, stop needle for workpiece stop, Page 7
- Needle holder, individual part drawing needle holder 1 for workpiece stop, Page 8
- Needle holder, individual part drawing, needle holder 2 for workpiece stop, Page 9
- Workpiece stop, assembly drawings, workpiece stop complete, Page 10

### 4. –Workpiece blank

- 2x blanks for clamping jaws, material AlMg4,5Mn material No.: 3.3547, 45mm x 45mm x 130mm
- 2x blanks for head and foot, material AlMg4,5Mn material No.: 3.3547, 40mm x 35mm x 40mm
- 2x blanks for side parts, material AlMg4,5Mn material No.: 3.3547, 40mm x 30mm x 160mm

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- 1x round bar material for the workpiece stop needle material AlCuMgPb, material No.: 3.1645, diameter 6mm, length 205mm
- 2x round bar material for bolts with countersink and bolts with thread, material C45, material No.: 1.0503, diameter 20mm, length 35mm
- 2x round bar material for the needle holders 1 and 2, material AlMg4,5Mn material No.: 3.3547, diameter 30mm, length 15mm
- 2x cylinder head bolts DIN 912 – M5 x 25
- 2x cylinder head bolts DIN 912 – M8 x 55

## 5. Milling machine and machining plan JobShop

- Milling machine Deckel-Maho DMC 64V linear with SINUMERIK 810 D / ShopMill Version 6.4
- Milling machine Deckel-Maho DMC 63 with SINUMERIK 810 D / ShopMill Version 5.3
- Machining plan SIE\_WAHALT\_SP00A to mill the outer foot contour (3 + 1 axes)
- Machining plan head\_foot\_SP1 to head\_foot\_SP4 to mill the outer foot contour (3 axes)
- Machining plan SIE\_WASEITE\_SP002\_BACKEN to mill the clamping jaws
- Machining plan SIE\_WASEITE\_SP001 to mill the inside of the side part, part 2
- Machining plan SIE\_WASEITE\_SP002 to mill the outside of the side part, part 2
- Machining plan SIE\_WAAROLLE\_DLOCH to drill the bolt, part 3
- Machining plan SIE\_WAAROLLE\_M8 to drill the bolt, part 4
- Machining plan SIE\_WAANH\_OTAIL\_SP001 to mill the longitudinal groove of the needle holder 1, part 6
- Machining plan SIE\_WAANH\_OTAIL\_SP002 to drill the needle holder 1, part 6
- Machining plan SIE\_WAANH\_UTAIL\_SP001 to mill the longitudinal groove of the needle holder 2, part 7
- Machining plan SIE\_WAANH\_UTAIL\_SP002 to drill the needle holder 2, part 7

## 6. Tools

### A. Tools to mill the head and foot contours (3 + 1 axes)

Designation	tool name machining plan	tools Hoffmann-Gruppe
milling head 40	MESSERKOPF 40	215850 40/6
Cutter 16	FRAESER 16	202545 16
Chamfer End Mill 8	FASE 8-3	208111 8

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## B. Tools to mill the head and foot contours (3 axes)

Designation	tool name machining plan	tools Hoffmann-Gruppe
milling head 40	MESSERKOPF_D40	9185 400424
cutting insert		9685 09220
Screw-in milling cutters M16		6340 16036
Center drill	NC_ANBO_D8	
Drill	BOHRER_D8.4	
end mill cutter	FRAESER_D8_Z3	1856 008
end mill cutter	FRAESER_D16_Z4	1856 016
Chamfer End Mill 8	FASE_D8_Z4	1715 09008

## 7. Tools to mill the clamping jaws

Designation	tool name machining plan	tools Hoffmann-Gruppe
Cutter 8	FRAESER 8 ALU	202545 8

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## 8. Tools to mill the inside of the side parts

Designation	tool name machining plan	tools Hoffmann-Gruppe
Milling head 63	MESSERKOPF 63 ALU	215850 63/8
shoulder milling cutter 40	ECKMESSERKOPF 40	215850 40/6
Cutter 25	FRAESER 25 SC	215870 25/4
Cutter 10	FRAESER 10 ALU	202545 10
beveled cutter 90	FRAESER KEGEL 90	208111 8
NC – Drill 8	NC ANBO 8	112110 8
Drill 4,6	BOHRER 4.6	113020 4,6
Drill 5,2	BOHRER 5.2	113020 5,2
thread molder M5	GEFO M5 P0.8mm	139145 M5

## 9. Tools to mill the outside of the side parts

Designation	tool name machining plan	tools Hoffmann-Gruppe
Cutter 8	FRAESER 8 ALU	202545 8
Milling head 50	MESSERKOPF 50 AL	215850 50/6
Chamfer End Mill 8	FASE 8-2.5	208111 8

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## 10. Tools to mill the bolt with through hole

Designation	tool name machining plan	tools Hoffmann-Gruppe
Center drill 8	ZENTRIERER 8 142	112120 8
Drill 8,4	BOHRER 8.4	113020 8,4
Cutter 8	FRAESER 8 HM	202545 8
Chamfer End Mill 8	FASE 8-4	208111 8

## 11. Tools to mill the bolt with thread

Designation	tool name machining plan	tools Hoffmann-Gruppe
Center drill 8	ZENTRIERER 8 142	112120 8
Drill 7,5	BOHRER 7.5	113020 7,5
Cutter 8	FRAESER 8 HM	202545 8
Chamfer End Mill 8	FASE 8-4	208111 8
thread molder M8	GEFO M8	139145 M8

## 12. Tools to mill the longitudinal slot of needle holder 1

Designation	tool name machining plan	tools Hoffmann-Gruppe
Cutter 4	FRAESER 4 HM	202545 4
Chamfer End Mill 6	FASE 6-6	208111 6

## 13. Tools to drill the needle holder 1

Designation	tool name machining plan	tools Hoffmann-Gruppe
Cutter 8	FRAESER 8 ALU	202545 8
Chamfer End Mill 6	FASE 6-6	208111 6

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## 14. Tools to mill the longitudinal slot of the needle holder 2

Designation	tool name machining plan	tools Hoffmann-Gruppe
Cutter 4	FRAESER 4 HM	202545 4
Chamfer End Mill 6	FASE 6-6	208111 6

## 15. Tools to drill the needle holder 2

Designation	tool name machining plan	tools Hoffmann-Gruppe
Cutter 8	FRAESER 8 ALU	202545 8
Chamfer End Mill 6	FASE 6-6	208111 6

## 16. Machining step, milling the outer foot and head contours

In this machining step, the outer contours of the head and foot, part 1 are machined. Head and foot components are identical. This means that 2 workpieces are required. The parts are milled on milling machine DMC 63 V.

### Machining steps on the milling machine:

- 16.1** Approach the reference point of the machine
- 16.2** Read in the machining plan SIE\_WAHALT\_SPO0A
- 16.3** Enter the measured tools in the tool list
- 16.4** Insert the tools in the magazine
- 16.5** Clamp the blank in the milling machine
- 16.6** Set the workpiece zero
- 16.7** Run the simulation
- 16.8** Start machining, execute the machining plan

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## 17. Milling the outer foot and head contours

### A. 3 axes

In this machining step, the outer contour of the head and foot, Parts 1 are machined. Head and foot parts are identical. This means that 2 workpieces are required.

#### Machining steps at the milling machine:

- 17.1 Approach the reference point of the machine
- 17.2 Read in the machine plans, head\_foot\_SP1 to head\_foot\_SP4
- 17.3 Into the measured tools in the tool list
- 17.4 Insert the tools in the magazine
- 17.5 Clamp the blank in the milling machine
- 17.6 Set the workpiece zero  
The workpiece zero is at the left of the part in the X and Y axes. In the Z axis, the zero is located at the bottom of the part. The zero is shifted in the NC-program, if the component is clamped the same way for all four clamping operations, then the workpiece zero only has to be set once.
- 17.7 Carry out the simulation
- 17.8 Start machining, execute the machining plan

## 18. Machining the clamping jaws

Two clamping jaws are required. The vice used to clamp the blank side parts is equipped with clamping jaws, 130 mm long, 45 mm wide and 45 mm high. If the clamping jaws of the vice to be used, have different dimensions, then the size of the clamping jaws must be adapted. Machining blanks for clamping jaws is an everyday machining operation in the workshop, and will not be described here. The parts are milled on a DMC 63 V milling machine.

#### Machining steps at the milling machine:

- 18.1 Approach the reference point of the machine
- 18.2 Read in the machine plan SIE\_WASEITE\_SPO02\_BACKEN
- 18.3 Enter the measured tools in the tool list
- 18.4 Insert the tools in the magazine
- 18.5 Clamp the clamping jaw blank in the milling machine
- 18.6 Set the workpiece zero, zero centered
- 18.7 Carry out the simulation
- 18.8 Start machining, execute the machining plan

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## 19. Milling the inside of the side part

In this machining step, the complete contour of the side part, part 2 is machined. In addition, stock is removed from the pockets, all edges are chamfered and the holes drilled. The two side parts are identical. This means that 2 workpieces are required. The parts are milled on the DMC 64 V linear milling machine.

### Machining steps at the milling machine:

- 19.1 Approach the reference point of the machine
- 19.2 Read in the machining plan SIE\_WASEITE\_SP001
- 19.3 Enter measured tools in the tool list
- 19.4 Insert the tools in the magazine
- 19.5 Clamp the blank in the milling machine
- 19.6 Set the workpiece zero, zero centered
- 19.7 Carry out the simulation
- 19.8 Start machining, execute the machining plan

## 20. Milling the outside of the side part

In this machining step, the protruding material that was required for clamping for the previous machining step, is removed. The edges are also chamfered. For this machining step, the side part is clamped in the clamps machined for the purpose. For the two identical side parts, this machining step must be executed twice. The parts are milled on a DMC 63 V milling machine.

### Machining steps at the milling machine:

- 20.1 Approach the reference point of the machine
- 20.2 Read in the machining plan SIE\_WASEITE\_SP002
- 20.3 Enter the measured tools in the tool list
- 20.4 Set the tools in the magazine
- 20.5 Insert the clamping jaws and pre-milled side parts in the milling machine and clamp
- 20.6 Set the workpiece zero, zero centered
- 20.7 Carry out the simulation
- 20.8 Start machining, execute the machining plan

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## 21. Milling the bolt with through hole

The round bar material for the bolt is sawn and chamfered. Alternatively, the bolt can be taken from a bar material and cut to length on a lathe and chamfered. Only the hole is drilled using the milling machine. The hole is milled on the DMC 63 V milling machine.

### Machining steps at the milling machine

- 21.1 Approach the reference point of the machine
- 21.2 Read in the machining plan SIE\_WAAROLLE\_DLOCH
- 21.3 Enter the measured tools in the tool list
- 21.4 Insert the tools in the magazine
- 21.5 Clamp the bolts in the milling machine
- 21.6 Set the workpiece zero, centered zero
- 21.7 Carry out the simulation
- 21.8 Start machining, execute the machining plan

## 22. Milling the bolt with thread

The round bar material for the bolt is sawn and chamfered. Alternatively, the bolt can be taken from a bar material and cut to length on a lathe and chamfered. Only the hole is drilled using the milling machine. The hole is milled on the DMC 63 V milling machine.

### Machining steps at the milling machine

- 22.1 Approach the reference point of the machine
- 22.2 Read in the machining plant SIE\_WAAROLLE\_M8
- 22.3 Enter the measured tools in the tool list
- 22.4 Insert the tools in the magazine
- 22.5 Clamp the bolts in the milling machine
- 22.6 Set the workpiece zero, centered zero
- 22.7 Carry out simulation
- 22.8 Start machining, execute the machining plan

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## 23. Milling the longitudinal slot in the needle holder 1

The round material for the needle holder is cut from the bar of material on a lathe. The recess diameter 15mm, height 1.5mm is turned. In this machining step, in the milling machine, only the longitudinal slot is milled. The DMC 63 V milling machine is used for this purpose.

### Machining steps of the milling machine

- 23.1 Approach the reference point of the machine
- 23.2 Read in the machining plan SIE\_WAANH\_OTAIL\_SP001
- 23.3 Enter the measured tools in the tool list
- 23.4 Insert the tools in the magazine
- 23.5 Clamp the blank in the milling machine
- 23.6 Set the workpiece zero, centered zero
- 23.7 Carry out the simulation
- 23.8 Start machining, execute the machining plan

## 24. Drilling the needle holder 1

The through hole is milled in this machining step. The DMC 63 V lathe is used.

### Machining steps at the milling machine

- 24.1 Approach the reference point of the machine
- 24.2 Read in the machining plant SIE\_WAANH\_OTAIL\_SP002
- 24.3 Enter the measured tools in the tool list
- 24.4 Insert the tools in the magazine
- 24.5 Clamp the blank in the milling machine
- 24.6 Set the workpiece zero, centered zero
- 24.7 Carry out the simulation
- 24.8 Start machining, execute the machining plan

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## 25. Milling the longitudinal slot in the needle holder 2

The round material for the needle holder is cut from the bar of material on a lathe. The recess diameter 15mm, height 3mm is turned. In this machining step, in the milling machine, only the longitudinal slot is milled. The DMC 63 V milling machine is used for this purpose.

### Machining steps at the milling machine

- 25.1 Approach the reference point of the machine
- 25.2 Read in the machining plant SIE\_WAAUTEIL\_SP001
- 25.3 Enter measured tools in the tool list
- 25.4 Install the tools in the magazine
- 25.5 Clamp the blank in the milling machine
- 25.6 Set the workpiece zero, centered zero
- 25.7 Carry out the simulation
- 25.8 Start machining, execute the machining plan

## 26. Drilling the needle holder 2

The through hole is milled in this machining step. The DMC 63 V lathe is used.

### Machining steps at the milling machine

- 26.1 Approach the reference point of the machine
- 26.2 Read in the machining plant SIE\_WAANH\_UTEIL\_SP002
- 26.3 Enter the measured tools in the tool list
- 26.4 Install of the tools in the magazine
- 26.5 Clamp the blank in the milling machine
- 26.6 Set the workpiece zero, centered zero
- 26.7 Carry out simulation
- 26.8 Start machining, execute the machining plan

## 27. Machining the needle

The round bar material for the workpiece stop needle is sawn and chamfered. As an alternative, the needle can be cut from the bar material in a lathe and chamfered.



## 28. Informationen in the Internet

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

Firma W. Andreas Pfeiffer Maschinen- und Apparatebau,  
Buchackerstraße 4 in 90513 Zirndorf,  
im Internet: [www.wapfeiffer.de](http://www.wapfeiffer.de)

Dimensions and performance data for the tools to be used

Hoffmann – Gruppe,  
Werkzeughersteller Hoffmann GmbH Qualitätswerkzeuge,  
Haberlandstraße 55, 81241 München,  
im Internet: [www.hoffmann-group.com](http://www.hoffmann-group.com)

Details of the tool machine to be used

Gildemeister Aktiengesellschaft,  
Gildemeisterstraße 60,  
33689 Bielefeld,  
Im Internet: [www.gildemeister.com](http://www.gildemeister.com)

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