

Manufacturing camera housing



Camera housing with cable guide

Action camcorders enjoy great popularity and provide very good video recordings even under difficult conditions. Their compactness, wide-angle lenses and various mounting options mean these types of camcorders are also useful in the work area of CNC machines. Since the solutions available on the market did not meet all the necessary specifications, the CNC4you team developed a new camera-housing workpiece.

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Contents

1. Safety Note	2
2. Preliminary remark	2
3. Workpiece blanks	3
4. Turning/milling machines and machining plans	3
5. Used Tools	4
6. Milling and turning the housing parts	6
7. Information at the Internet	10
8. Figures	12

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 camera housing.

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 program has been programmed and tested on SINUMERIK Operate V4.4 ED2. Normally, the program can be easily adapted to other SINUMERIK user interfaces, such as SINUMERIK Operate other software version. A simulation should be performed in any case.

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

The following files and formats are available there:

NC-programs ShopMill/ShopTurn, Drawings PDF, 3D-data

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3. Workpiece blanks

- Raw material AlMg 4,5MN material-no. 3.3547
1 material: about 140x80x50 [mm]
1 material: about 140x80x60 [mm]
- AlCuMgPb; 3.1645, Round stock Ø 50mm
- Cable connection IP65 M20
- O-ring 114x2
- Allen head screw M3
- Allen head screw M6
- Protection cover for the lens from the standard GoPro plastic housing
- GoPro camera and cables

4. Turning/milling machines and machining plans

- CNC-Turning DOOSAN PUMA 2600SY
SINUMERIK 828D with SINUMERIK Operate V4.5
- CNC-Milling ROMI D800
SINUMERIK 828D with SINUMERIK Operate V4.5
- **Milling housing rear wall ShopMill**
COVER_1.MPF (out)
COVER_2.MPF (inside)
- **Milling housing case ShopMill**
HOUSING_1.MPF (out)
HOUSING_2.MPF (inside)
HOUSING_3_SCHRUPP.MPF (roughing)
HOUSING_3.MPF (inside)
POLIER.MPF (Polishing housing case)
- **Turning flange/ring ShopTurn**
RING.MPF



5. Used Tools

Tools milling machine

Tool name in the machining plan	Designation
3D_TASTER	Probe
SCHAFT_SCRUPP_D20	End mill cutter roughing Ø 20 mm
FRASER_14	End mill cutter Ø 14 mm
FRAESER_16	End mill cutter Ø 16 mm
ZENTRIERER_D16	NC spotdrill Ø 8 mm with 90° tip angle
SPIBO_D6	Spiral drill Ø 6 mm
GEWIDEF_M8	Thread milling cutter M8
SF_D_6_R	End mill cutter Ø 6 mm, Dreischneider
SF_D_6_F	End mill cutter Ø 6 mm, Vierschneider zum Schlichten
FASE	Chamfer milling cutter Ø 6 mm 90°
SPIBO_2_6	Spiral drill Ø 2,6 mm
GEWINDE_M3	Tap M3
GEWINDE_M20	Thread milling cutter P=1.5
KUG_D2	Ball milling cutter Ø 2 mm
SPIBO_5	Spiral drill Ø 5 mm
M6	Tap M6
SCHAFT_D8	End mill cutter Ø 8 mm, Dreischneider
FIN_D8	End mill cutter Ø 8 mm, Vierschneider zum Schlichten

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Tools turning machine

Tool name in the machining plan	Designation
SCHRUPPER-80	Turning tool for the exterior with roughing insert
FINISH123	Turning tool for the exterior with finishing insert
FRAESER_12	End mill cutter Ø 12 mm
BS_IN_20	Turning tool inside, with finishing insert cutting radius
BOHRER_4_2	Spiral drill Ø 4,2 mm
ABSTECHER_ISCAR	Grooving tool with 4 mm tip width

You can use the CAM_TMZ.INI or RING_TMZ.INI, to import the tool data.

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6. Milling and turning the housing parts

The rear wall and case of the housing are manufactured on the milling machine. The flange for the cover of the camera objective is manufactured on the lathe.

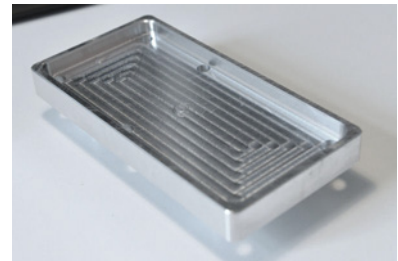
Housing rear wall

The rear wall provides options for mounting the camera housing in the working area of the CNC machine. First, the outside and then the inside of the housing wall are milled in two clamping settings.

The blank is securely clamped.

Machining steps on the milling machine

1. Home the machine.
2. Load the machining planes (COVER_1.MPF and COVER_2.MPF).
3. Enter the measured tools in the tool list.
4. Insert the tools in the magazine.
5. Set the workpiece zero-point by scratching or contacting.
6. Perform simulation.
7. Start production, execute machining plan.



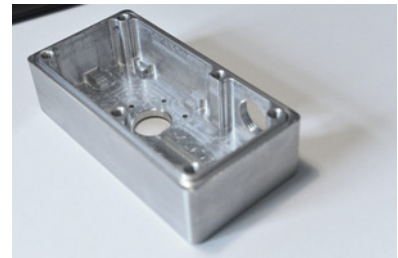
Housing case

The housing case must be manufactured in several clamping settings. First, the outside with the drill hole for the camera objective is milled. In the second step, the drill hole with the M20 threads is made in the side. Then the rear wall is roughed and the inner case is milled. The outside can be polished (optional).

The blank is securely clamped.

Machining steps on the milling machine

1. Home the machine.
2. Load the machining planes (HOUSING_1.MPF, HOUSING_2.MPF, HOUSING_3_SCHRUPP.MPF, HOUSING_3.MPF optional POLIER.MPF).
3. Enter the measured tools in the tool list.
4. Insert the tools in the magazine.
5. Set the workpiece zero-point by scratching or contacting.
6. Perform simulation.
7. Start production, execute machining plan.



Flange/ring

The flange is manufactured on a lathe in one clamping setting and precisely punched. The protective cover for the lens is mounted on the camera housing with the aid of the flange and M3 Allen-head screws.

The blank is securely clamped.



Machining steps on the turning machine

1. Home the machine.
2. Load the machining planes (RING.MPF).
3. Enter the measured tools in the tool list.
4. Insert the tools in the magazine.
5. Set the workpiece zero-point by scratching or contacting.
6. Perform simulation.
7. Start production, execute machining plan.



Assembly

The individual parts of the camera housing can be easily screwed together. First, the camera and the cable gland are inserted into the housing case. The cables needed for power supply and the signal cable are routed through the cable gland. The O-ring is inserted into the groove provided and the rear wall of the housing is screwed onto the housing case.



Then the protective cover for the lens is screwed onto the front wall with the aid of the flange.



The camera is positioned in the machine room using the mounting options on the rear wall of the housing.



7. Information at the Internet

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

TAC Technology and Application Center
Frauenauracher Str. 80
91056 Erlangen

Details of the tool machine to be used

DOOSAN turning center
Internet: <http://www.doosan.com/>

ROMI Machine Tools
Internet: <http://www.romi.com.br>

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Manuals and information from the Siemens AG

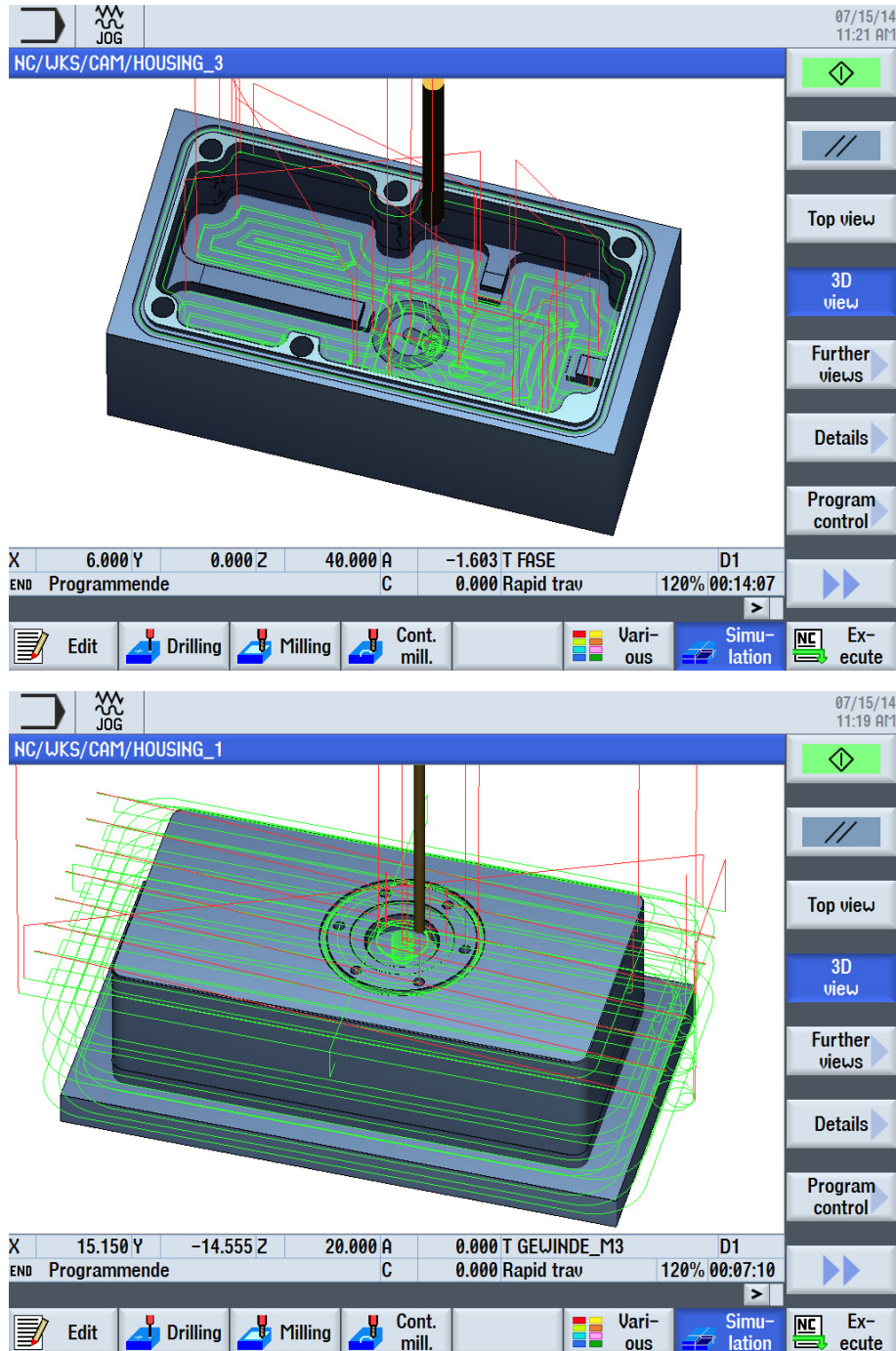
Manuals and detailed information about our products, please visit the following websites:

- DOConWEB (www.automation.siemens.com/doconweb)
- Service&Support Portal (www.support.automation.siemens.com)
- SINUMERIK Website (www.siemens.com/sinumerik)



8. Figures

Simulation housing case

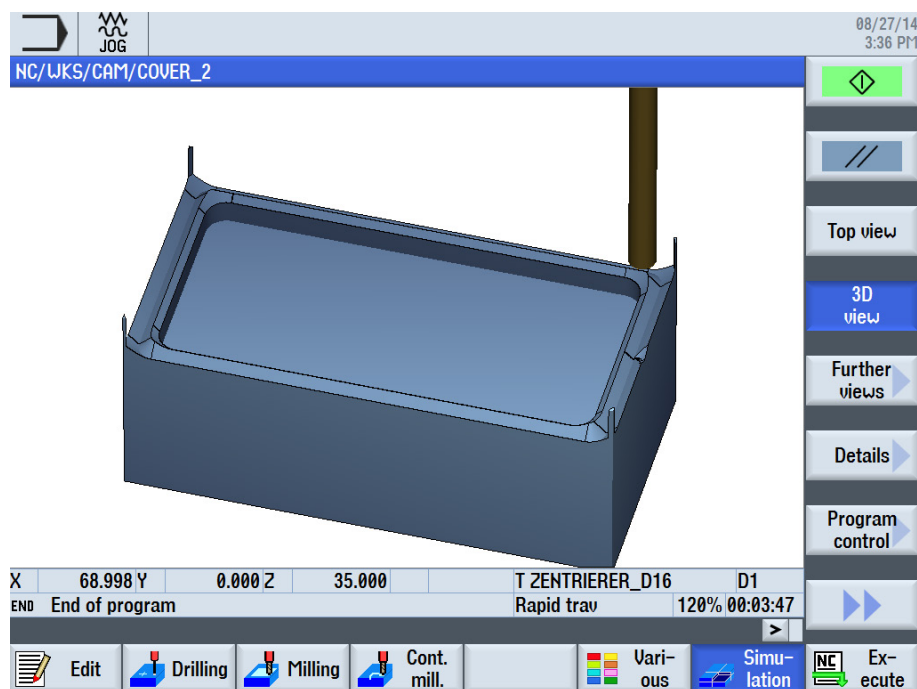
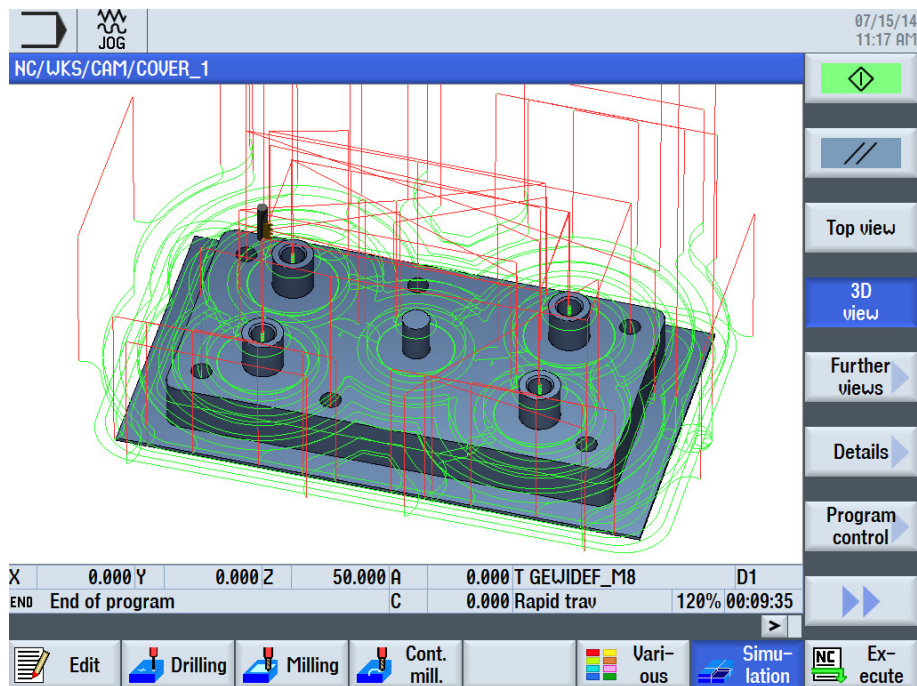


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Simulation housing rear wall



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Tool list milling

07/16/14
10:35 AM

Tool list										BUFFER1		
Loc.	Type	Tool name	ST	D	Length	Ø						
16		3D_TASTER	1	1	200.088	5.640						
17		SCHAFT_SCRUPP_D20	1	1	142.089	19.936		3				
18		FRASER_14	1	1	103.648	14.040		3				
19		ZENTRIERER_D16	1	1	92.387	8.000	90.0					
20		SPIBO_D6	1	1	117.841	6.000	118.0					
21		SF_D_6_R	1	1	90.984	5.980		3				
22		SF_D_6_F	1	1	94.272	5.994		4				
23		GEWIDEF_M8	1	1	98.850	6.288		5				
24		FRAESER_16	1	1	127.183	15.966		3				
25		FASE	1	1	80.705	6.000	90.0					
26		SPIBO_2_6	1	1	127.416	2.600	118.0					
27		GEWINDE_M3	1	1	116.916	3.000	0.500					
28		GEWINDE_M20	1	1	80.774	11.966		4				
29		KUG_D2	1	1	92.780	2.040		2				
30		SPIBO_5	1	1	110.940	5.000	118.0					
31		SCHAFT_D8	1	1	111.626	7.946		3				
32		FIN_D8	1	1	143.658	8.046		4				
		FIN_D8	1	2	143.658	7.886		4				
33		POLIER	1	1	156.243	70.000		3				
		POLIER	1	2	156.743	66.000		3				

Tool list
 Tool wear
 Magazine
 Work offset
 User variable
 SD Setting data

New tool

Load

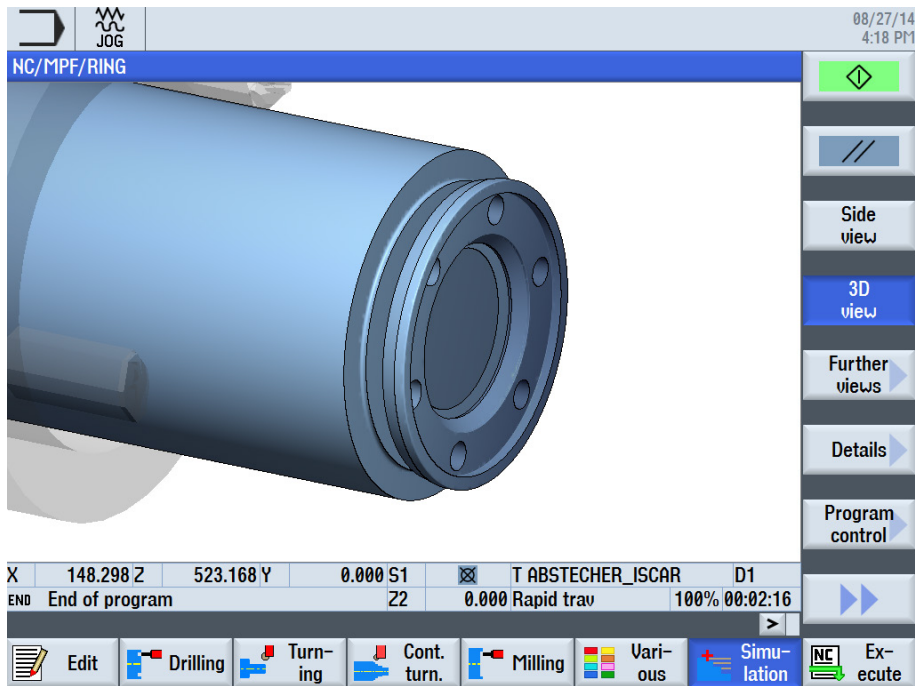
Magazine selection

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Simulation turning flange/ring



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Tool list turning

08/27/14
4:17 PM

Tool list										NC memory		Tool measure
Loc.	Type	Tool name	ST	D	Length X	Length Z	Ø	N				
9		CUTTER_8	1	1	0.000	74.000	8.000	3				
10		DRILL_5	1	1	0.000	185.000	5.000		118.0			
11		BUTTON_TOOL_8	1	1	88.000	38.000	2.000					
12		ROUGHING_C2 A	1	1	55.000	-39.000	0.800	→	95.0	80	12.0	
13		FINISHING_C2 A	1	1	124.000	-39.000	0.400	→	93.0	35	12.0	
14		DRILL_32_C2	1	1	0.000	185.000	32.000		180.0			
15		ROUGHING_C2 I	1	1	-9.000	-39.000	0.800	→	95.0	80	10.0	
16		FINISHING_C2 I	1	1	-12.000	-85.000	0.400	→	93.0	35	10.0	
17		PLUNGE CUTTER_2	1	1	85.000	44.000	0.100		2.000		8.0	
18		PLUNGE CUTTER_3_C2	1	1	50.000	20.000	0.200		3.000		10.0	
19		CUTTER_C2_12	1	1	0.000	-60.000	12.000	3				
20		THREADING_1.25	1	1	100.000	-23.000	0.050				0.0	
		FRAESER_12	1	1	0.000	0.000	12.000	3				
		BOHRER_4_2	1	1	0.000	0.000	4.200		118.0			
		SCHRUPPER-80	1	1	0.000	0.000	0.800	←	95.0	80	11.0	
		BS_IN_20	1	1	0.000	0.000	0.100	←	93.0	55	11.0	
		FINISH123	1	1	0.000	0.000	0.400	←	93.0	55	11.0	
		ABSTECHER_ISCAR	1	1	0.000	0.000	0.100		3.000		30.0	

Tool list Tool wear Magazine Work offset R User variable SD Setting data

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