

Manufacturing Lighthouse



Lighthouse, manufactured BNW Lüneburg

The lighthouse as a maritime navigation aid for marks important points of orientation or hazardous areas, thus pointing the right way. At the BNW Lüneburg, however, the lighthouse makes it easy to get started with CNC programming using Sinumerik controls. In the basic CNC-turning course, it serves as a sample workpiece to demonstrate efficient programming with Sinumerik Operate.

The lighthouse is made up of five individual parts. All the information, tool data, drawings and ShopTurn machining plans required for a reproduction are contained in the following.

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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 pyramid.

2. Preliminary remark

The following description is intended for persons acquainted with CNC machines and who have experience with or knowledge of SINUMERIK CNCs with ShopTurn. 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 V4.5.

You can download all the CAD drawings, programs and machining descriptions for the workpieces free of charge in the registered Internet area "My SINUMERIK" at www.siemens.com/cnc4you. The following files and formats are available there:

Jobshop files / Drawing as PDF, PRT

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3. Workpiece blanks

- AlCuMgPb; 3.1645, rod Ø 60 mm
- Acryl glass, rod, colourless Ø 50 mm

4. Turning machines and machining plans

- CNC-Turning machine NEF 400 with C-Axis, DMG / MORI SEIKI, SINUMERIK 840D sl with SINUMERIK Operate V4.4
- **ShopTurn machining plan base**
TOWERBASE.MPF
- **ShopTurn machining plan centerpiece**
TOWERCENTER.MPF
- **ShopTurn machining plan gallery**
TOWERGALLERY_SIDE1.MPF
TOWERGALLERY_SIDE2.MPF
- **ShopTurn machining plan dome acryl glass**
TOWERACRYL.MPF
- **ShopTurn machining plan roof**
TOWERROOF_SIDE1.MPF
TOWERROOF_SIDE2.MPF

5. Used Tools

Turning, boring and milling tools

Tool name in the machining plan	Designation
SCHLICHTER_AUSSEN	Turning tool for the exterior with finishing insert with cutting radius R0.2, 35°
SCHLICHTER_INNEN	Turning tool inside, with finishing insert cutting radius R0.2, 35°, 55°
ABSTECHER	Grooving tool with 4 mm tip width
ZENTRIERER_MANTEL	NC spotdrill with 90° tip angle
VOLLBOHRER	Ø 58 mm drill tool inserts
BOHRER_MANTEL	Spiral drill, Ø 6mm diameter, 118°
FRASER_STIRN	Boring-groove milling tool with Ø 12 mm diameter

You can use the LIGHTHOUSE_TMZ.INI, to import the tool data.

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6. Turning the lighthouse

The lighthouse is made up of five individual parts.

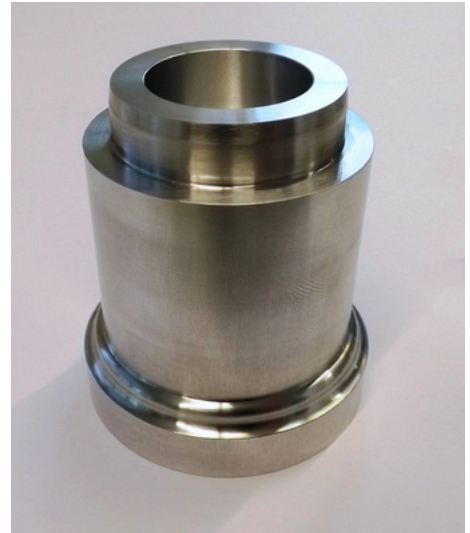
Base and center piece

The base and the attached hollow middle part made of aluminum provide the foundation. For both parts, the outside contour is created in the contour editor, and then scrubbed and smoothed with the area clearance cycles.

The blank is securely clamped.

Machining steps on the turning machine

1. Home the machine.
2. Load the machining planes (TOWERBASE.MPF, TOWERCENTER.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.



Gallery

The gallery serves as the middle part, which is preproduced with standard turning cycles first. To drill the balustrade, the cycle for full circle drilling positions is used. In the cycle, the user chooses the option to drill in the lateral surface. This makes it possible to program the drilling positions without time-consuming conversion. Additionally, a circular pocket contour is milled on the face. This is also accomplished by using a cycle.

The blank is securely clamped.



Machining steps on the turning machine

1. Home the machine.
2. Load the machining planes (TOWERGALLERY_SIDE1.MPF, TOWERGALLERY_SIDE2.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.



Dome acryl glass

The dome made from acrylic glass is the centerpiece of the lighthouse, requiring two clampings to be produced. Again, the outside contour is created first via contour editor. The cycle for plunge turning and plunge turning residual material is used for stock removal. Plunge turning is a very effective means for producing contours with steep slopes and deep grooves.

The blank is securely clamped.

Machining steps on the turning machine

1. Home the machine.
2. Load the machining planes (TOWERACRYL.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.



Tower roof

Finally, the aluminum tower roof is turned. In the first clamping, the circular pocket is milled on the inside, the dome is turned and cut off. In the second clamping, the roof is precision-turned once more.

The blank is securely clamped.

Machining steps on the turning machine

1. Home the machine.
2. Load the machining planes (TOWERROOF_SIDE1.MPF, TOWERROOF_SIDE2.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 and illumination

The individual parts of the lighthouse are easily put together. Base and middle part as well as gallery, dome and roof are press fits and can simply be assembled. The loose fit between gallery and middle part provides for easy separation of the parts. Inside, a small flashlight can be used to illuminate the dome.



7. Information at the Internet

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

BNW Niedersachsen Lüneburg

Internet: www.bnw.de

Details of the tool machine to be used

DMG MORI SEIKI AKTIENGESELLSCHAFT,
Gildemeisterstraße 60,
33689 Bielefeld,

Internet: www.dmgmoriseiki.com/de

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Manuals and information from the Siemens AG

Manuals and detailed information about our products can be found at www.siemens.de/sinumerik -> Index or search: DOConWEB -> SINUMERIK

- "Simple Turning with ShopTurn" Training Documents
-> Info/Training -> "Simple Turning with ShopTurn" Training Documents
- ShopTurn Product Brief
-> 840D/840Di/810D Users -> ShopTurn Product Brief 840D/810D
- ShopTurn Operation/Programming
840D/840Di/810D Users -> ShopTurn Operation and Programming
- "Simple milling with ShopMill" training document
-> Info/Training -> "Simple milling with ShopMill" training document
- ShopMill product brief
-> 840D/840Di/810D users -> ShopMill 840D/810D product brief
- ShopMill operating/programming
-> 840D/840Di/810D users -> ShopMill operating and programming

Tips when searching in DOConWEB

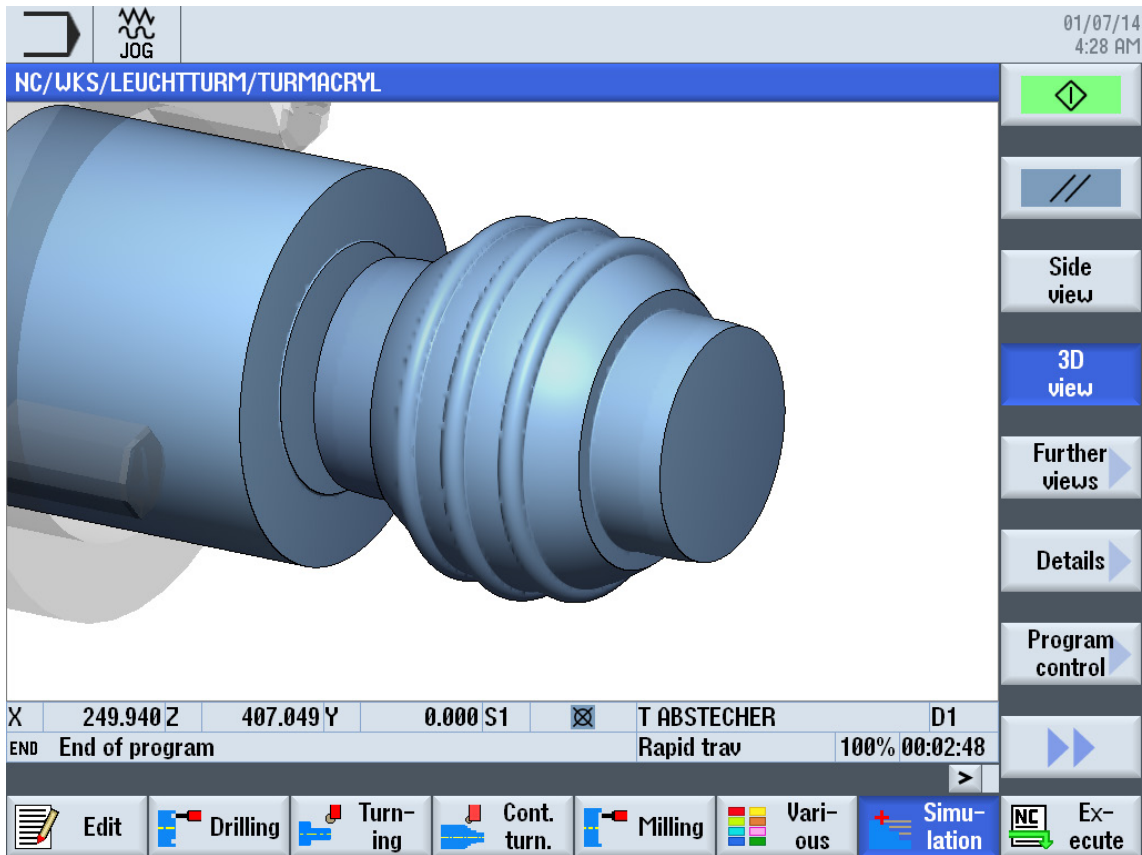
DOConWEB enables individual pages to be called up quickly from documents without having to load the entire file.

- You can restrict the search by clicking "A-Z"
(-> a search is now only performed below this point in the index)
- Or click the zoom
(-> a full text search is now performed below this point).



8. Figures

Simulation dome acryl glass



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Contour dome acryl glass

01/07/14
4:27 AM

NC/WKS/LEUCHTTURM/TURMACRYL

Straight line X

X	50.000 abs
$\alpha 1$	90.000 °
$\alpha 2$	270.000 °
Transition to next element	Cham
FS	0.000

Delete element

← →

↕

↗ ↘

↶ ↷

▶▶

Cancel

Accept

END

X

80

40

0

-40 -20 0 Z

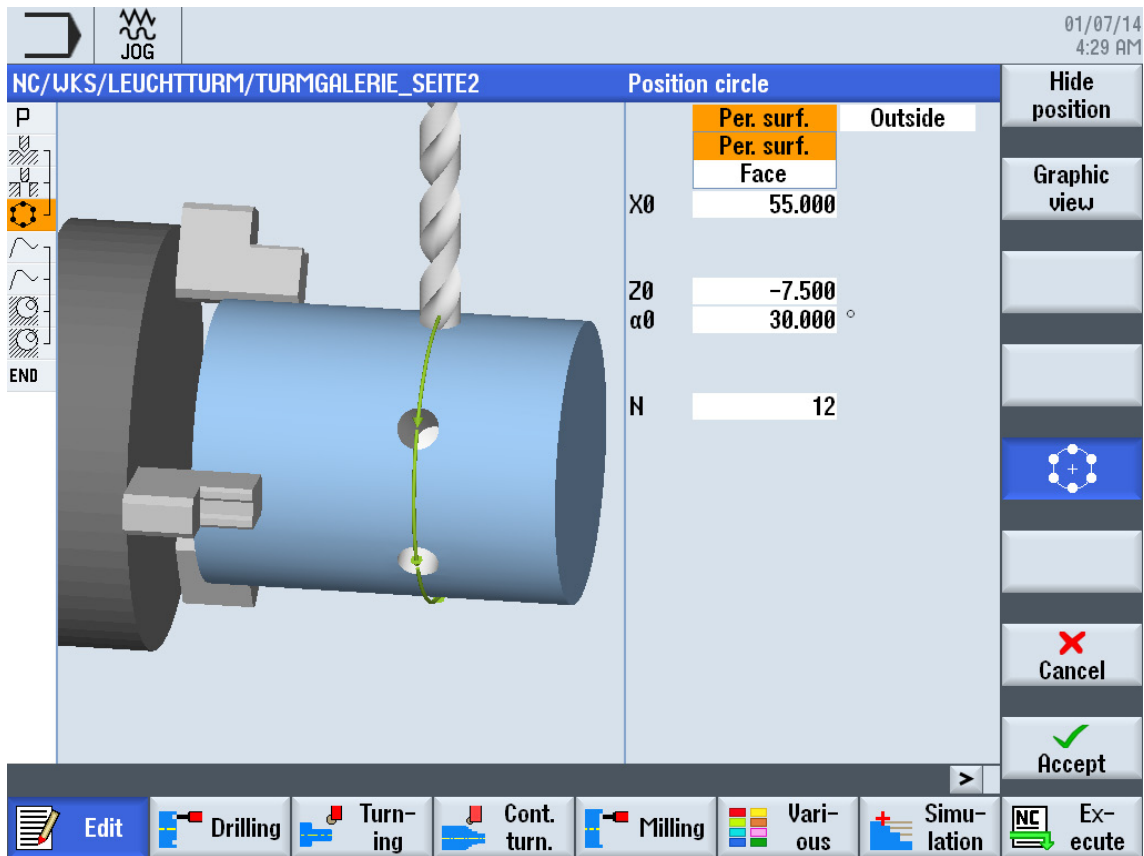
Edit Drilling Turning Cont. turn. Milling Various Simulation Execute

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Boring gallery with position circle










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Tool list in SinuTrain for SINUMERIK Operate

Werkzeugliste										MAGAZIN	
Platz	Typ	Werkzeugname	ST	D	Länge X	Länge Z	Radius		Plat.-breite	Pl.-läng	
1		SCHLICHTER_AUSSEN	1	1	88.600	46.500	0.200	←	93.0	35	11.0
2		VOLLBOHRER	1	1	0.000	160.300	29.000		180.0		
3		SCHLICHTER_INNEN	1	1	-10.000	120.000	0.200	←	93.0	55	11.0
4		ZENTRIERER_MANTEL	1	1	120.300	110.400	1.000		90.0		
5		ABSTECHER	1	1	89.300	47.100	0.100		4.000		11.0
6		BOHRER_MANTEL	1	1	122.000	110.000	6.000		118.0		
7		FRAESER_STIRN	1	1	0.000	80.200	6.000	4			

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