

Production of chess pieces



chess pieces

Check and checkmate - also become a follower of the most popular board game in Europe. For the chess pieces manufactured in-house, two things are required: your technical know-how for the production and strategic thinking for the game.

The turning parts were programmed with ShopTurn and G-Code in SINUMERIK Operate and produced on a CNC lathing machine. For programming, the contour-editor and the turning, drilling and milling cycles of SINUMERIK Operate were used.

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

Corresponding to your CNC lathe, different NC programs are available for machining with or without counter spindle.

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Table of Contents

1.	Safety note.....	2
2.	Preliminary remark	2
3.	Workpiece blanks.....	3
4.	Turning machine and machining plans	3
5.	Tools used	4
6.	Turning the parts	6
7.	Informationen at the Internet	7
8.	Pictures	8
8.1	Simulation pawn	8
8.2	Simulation bishop	9
8.3	Simulation queen	10
8.4	Simulation king	11
8.5	Simulation rook.....	12
8.6	Simulation knight.....	13
8.7	Simulation knight without Y-Axis	14
8.8	Tool list.....	15
8.9	Chess pieces queen and king	16
8.10	Chesspieces rook and knight	17
8.11	Chesspieces pawn and bishop	18
8.12	Complete chess pieces	19

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 chess pieces.

2. Preliminary remark

The following description is oriented to technicians familiar with a CNC turning machine who have experience or knowledge of the SINUMERIK CNC with ShopTurn. All technology data listed here is appropriate for the machines, tools, materials and machining plans used to produce the chess pieces. 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.

Each of the chess pieces must be produced from two different materials. There are no limits placed on the fantasy of the material you use. For the white pieces, aluminum or steel, and for the black pieces, brass, are suitable as material, although any different colored material is conceivable.

The programs were created and tested using a CNC turning machine equipped with SINUMERIK Operate V4.5 SP2. It should be possible to easily adapt the program to other SINUMERIK versions (e.g. different

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SINUMERIK Operate SW versions). 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 ShopTurn, drawings PDF, 3d data

3. Workpiece blanks

- Material: AlCuMgPb, material-No: 1.4301 (white)
CuZn44Pb2, material-No: 2.0410 (black)
- Round stock Ø30 mm

4. Turning machine and machining plans

- CNC turning machine DOOSAN PUMA 2600SY
SINUMERIK 828D with SINUMERIK Operate V4.5 SP2

ShopTurn machining plan with counter spindle

- pawn_bauer_countersp.MPF, queen_dame_countersp.MPF, king_koenig_countersp.MPF, bishop_laeufer_countersp.MPF, rook_turm_countersp.MPF, knight_springer_countersp.MPF

The program "knight_springer_y_csp.MPF" is selected instead of the program "knight_springer_csp.MPF" for the processing of the jumper on a machine without a Y axis.

ShopTurn machining plan without counter spindle

- First step

pawn_bauer_msp.MPF, queen_dame_msp.MPF, king_koenig_msp.MPF, bishop_laeufer_msp.MPF, rook_turm_msp.MPF, knight_springer_msp.MPF

The program "knight_springer_y_msp.MPF" is selected instead of the program "knight_springer_msp.MPF" for the processing of the jumper on a machine without a Y axis.

- Second step

Finally, the turned figures are clamped on the foot diameter (29mm) and then the machining plan "foot_fuss_msp.MPF" is processed.



5. Tools used

Tools for turning machine

Tool name in the machining plan	Designation
SCHRUPP	Turning tool for the exterior with roughing insert
SCHL35	Turning tool for the exterior with finishing insert
SCHL-35-CBN	Turning tool for the exterior with finishing insert high surface quality
SCHL I 35	Turning tool inside, with finishing insert
CUTTER 3 UEK	Cutoff tool left (Turning overhead with counter spindle)
FRAESER-8-MA	End mill cutter Ø8 mm for processing at the cylinder surface Only for machine without Y-axis
FRAESER-4-M	End mill cutter Ø4 mm for processing at the cylinder surface
FRAESER_12	End mill cutter Ø12 mm for processing at the end face Only for machine without Y-axis
ZENTRIERER_6	Centering Ø6 mm for processing at the cylinder surface
ZENTRIERER_8_STIRN	Centering Ø8 mm for processing at the cylinder surface
KUGELFRAESER_ZYL_R1_M	Ball milling cutter Ø2 mm for processing at the cylinder surface Only for machine with Y-axis
KUGELFRAESER_ZYL_R3_M	Ball milling cutter Ø6 mm for processing at the cylinder surface Only for machine without Y-axis
SCHLICHT_GEKR	Turning tool for the exterior with finishing insert (counter spindle)



Description and article number of the tools by Hoffmann Group

Description	Designation Hoffmann Group	Article number
SCHRUPP	ISO-Code holder: PCLNL 2525M12 Insert: CNMG 120408 KW10	250019 25/12 250212 KW10
SCHL35	ISO-Code holder: MVJN 93° 25/16 Insert: VN.G 160404 HU7305	251706 25/16 251802 HU7305
SCHL-35-CBN	ISO-Code holder: MVJN 93° 25/16 Insert: CBN VNMA 160404 F	251706 25/16 255564 F
SCHL I 35	ISO-Code holder: AH04X SCLDR/LS4 Insert: CDCT S40102 AF	268706 45/S4 268530 AF
CUTTER 3 UEK	Holder for plunging tool 25/3 mm Insert HU7310	273758 25/3 273697 3
FRAESER-8-MA	Solid carbide slot drill DIN 6535 HB 8 mm	201200 8
FRAESER-4-M	Solid carbide slot drill DIN 6535 HB 4 mm	201200 4
FRAESER_12	Solid carbide slot drill 12 mm	202080 12
ZENTRIERER_6	NC spotdrill 90° N 6 mm	112020 6
ZENTRIERER_8_STIRN	NC spotdrill 90° N 8 mm	112020 8
KUGELFRAESER_ZYL_R1_M	Solid carbide ball nose slot drill 2X6 mm	207022 2X6
KUGELFRAESER_ZYL_R3_M	Ball nose end mill HSS-PM TiAlN	194302 6
SCHLICHT_GEKR	ISO-Code holder: SVHCR/L 2020K11 Insert: VC.T 110304 HB7310	261308 20/11 261454 HB7310

A tool file for the tools used at the turning machine is included when downloading. You only have to open and import chess_schach_tools.INI e.g. in SinuTrain for SINUMERIK Operate.



6. Turning the parts

The chess figures can be produced on a turning machine without Y-axis, except for the jumper. For the production of the jumpers, a work plan is provided, for a machine with and for a machine without Y-axis.

Machining steps on the turning machine:

1. Home the machine.
2. Load the program of the figure that is to be produced (e.g.: pawn_bauer_msp.MPF).
3. Enter the measured tools in the tool list.
4. Insert the tools in the magazine.
5. Clamp the round material. The clamping length is described in the program head.
6. Set the workpiece zero by scratching (check or adapt the other zero points in the program).
7. Perform the simulation.
8. Start production, execute the machining plan.



7. Informationen 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 and tools to be used

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

Hoffmann turning tools
Internet: <https://www.hoffmann-group.com>

Manuals and information from the Siemens AG

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

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

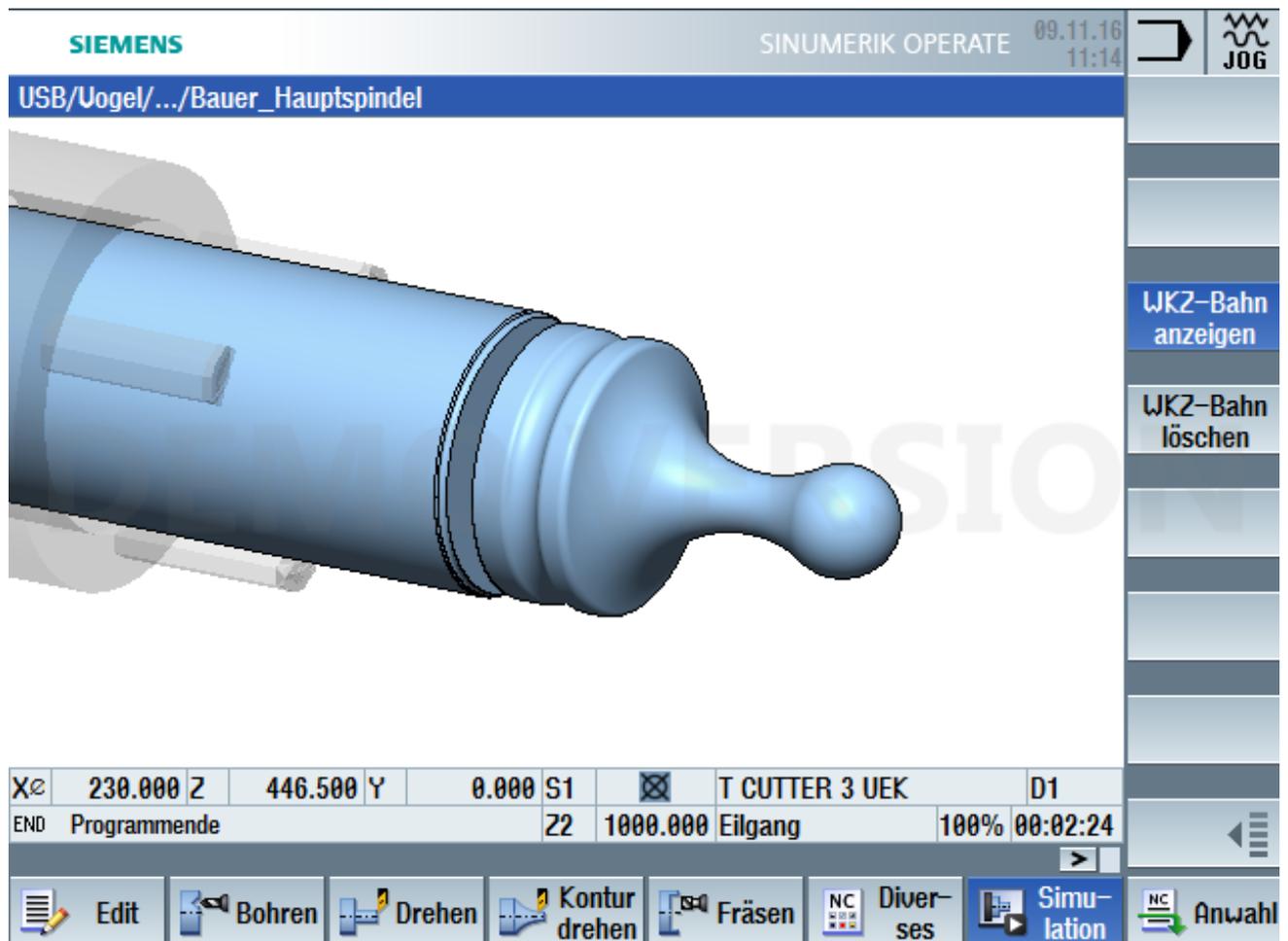
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8. Pictures

8.1 Simulation pawn



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8.2 Simulation bishop

X	230.000	Z	426.500	Y	0.000	S1	<input checked="" type="checkbox"/>	T CUTTER 3 UEK	D1
END	Programmende		22	1100.000	Eilgang	100%	00:02:49		

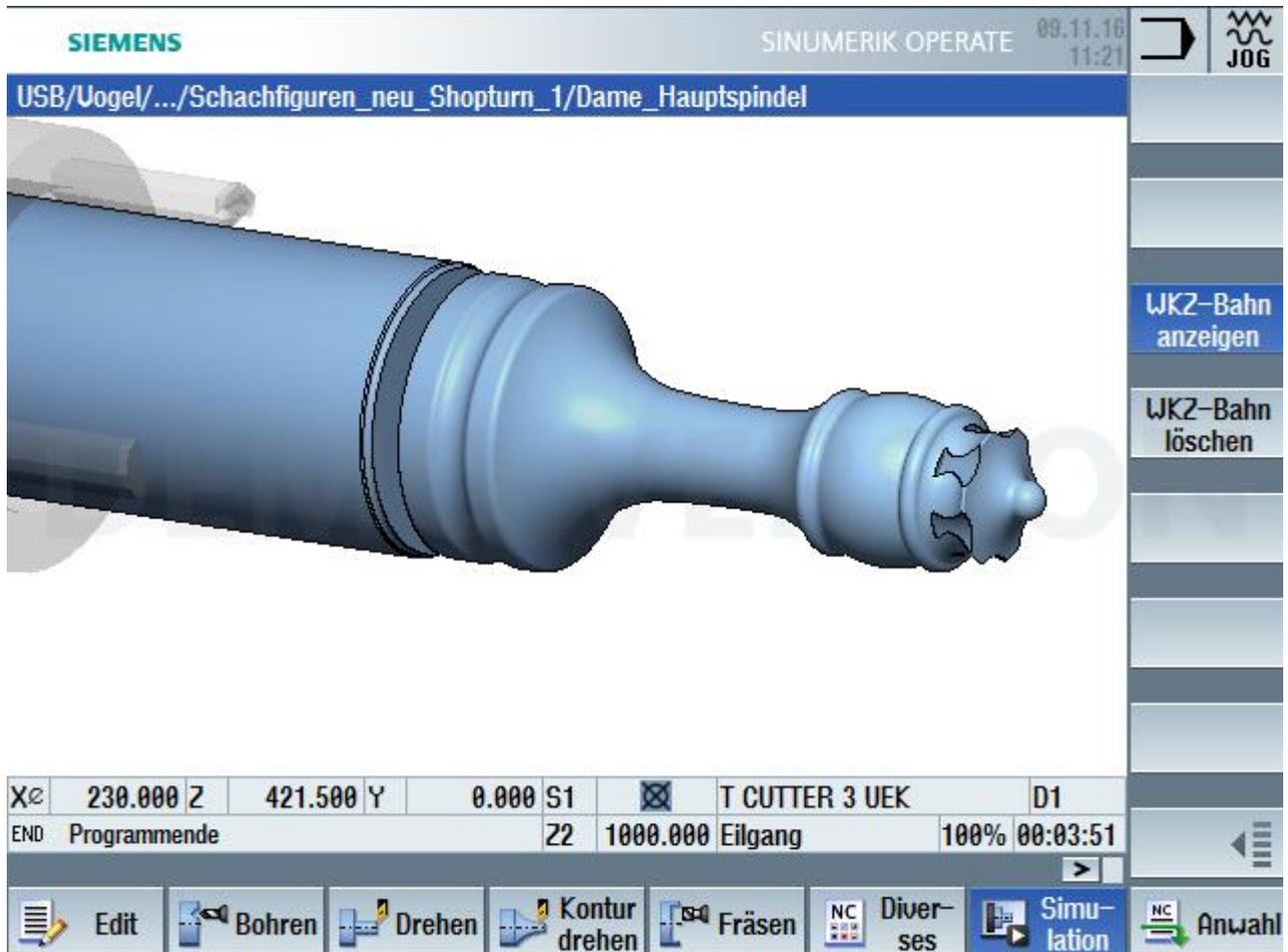
Edit | Bohren | Drehen | Kontur drehen | Fräsen | NC Diverses | **Simulation** | NC Anwahl

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8.3 Simulation queen



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8.4 Simulation king

X	230.000	Z	416.500	Y	0.000	S1	<input checked="" type="checkbox"/>	T CUTTER 3 UEK	D1
END	Programmende		22	1000.000	Eilgang	100%	00:05:51		

Edit Bohren Drehen Kontur drehen Fräsen NC Diver- ses **Simu- lation** NC Anwahl

chess pieces

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8.5 Simulation rook

X \varnothing	230.000	Z	321.500	Y	0.000	S1	<input checked="" type="checkbox"/>	T CUTTER 3 UEK	D1
END	Programmende		22	1000.000	Eilgang	100%	00:08:19		

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8.6 Simulation knight

X	230.000	Z	296.500	Y	0.000	S1	<input checked="" type="checkbox"/>	T CUTTER 3 UEK	D1
END	Programmende		22	1000.000	Eilgang	100%	00:09:51		

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8.7 Simulation knight without Y-Axis

SIEMENS
SINUMERIK OPERATE
23.11.16
16:00

JOG

USB/Uogel/.../Springer_v_Hauptspindel

X	230.000	Z	381.500	Y	0.000	S1	<input checked="" type="checkbox"/>	T CUTTER 3 UEK	D1
END	Programmende		22	1100.000	Eilgang	100%	00:16:51		

Edit

Bohren

Drehen

Kontur drehen

Fräsen

Diverses

Simulation

Anwahl

Zurück

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8.8 Tool list

SIEMENS		SINUMERIK OPERATE		23.11.16 16:07		JOG					
Werkzeugliste								MAGAZIN1			
Platz	Typ	Werkzeugname	ST	D	Länge X	Länge Z	Radius				
1		SCHRUPP	1	1	55.000	39.000	0.800	←	95.0	80	12.0
2		FRAESER-8-MA	1	1	23.000	0.000	8.000	2			
3		SCHL35	1	1	124.000	57.000	0.400	←	93.0	35	12.0
4		KUGELKOPF_ZYL_R3	2	1	0.000	50.000	6.000	2			
5		CUTTER 3 UEK	1	1	85.000	44.000	0.200		3.000		8.0
6		ZENTRIERER_6	1	1	23.000	0.000	6.000		90.0		
7		SCHL I 35	1	1	-12.000	122.000	0.400	↑	93.0	35	8.0
8		ZENTRIERER_8_STIRN	1	1	0.000	45.000	8.000		90.0		
9		FRAESER_8	1	1	0.000	74.000	8.000	3			
10		KUGELKOPF_ZYL_R3	1	1	45.000	0.000	6.000	2			
11		FRAESER-4-M	1	1	0.000	34.000	4.000	2			
12		KUGELFRAESER-R1-M	1	1	23.000	0.000	2.000	2			
13		SCHLICHT_GEKR	1	1	124.000	-39.000	0.400	→	107.5	35	12.0
14		SCHL-35-CBN	1	1	34.000	34.000	0.400	←	93.0	35	11.0
15		FRAESER_12	1	1	0.000	60.000	12.000	3			
16											
17											

Werkz.-
liste

Werkz.-
versch.

Maga-
zin

Nullp.-
versch.

Anwen.
variable

SD Setting-
daten

Neues
Werkzeug

Beladen

Magazin-
anwahl

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8.9 Chess pieces queen and king



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8.10 Chesspieces rook and knight



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8.11 Chesspieces pawn and bishop



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8.12 Complete chess pieces



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