HEIDENHAIN

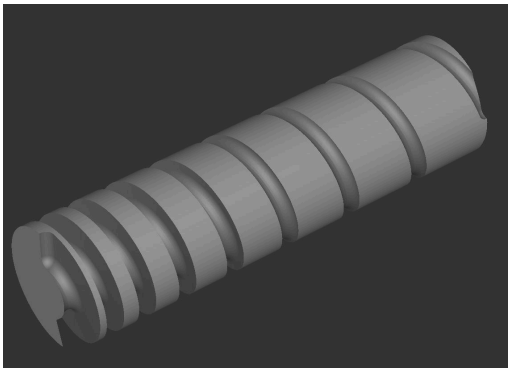
NC Solutions

Description of NC Program 4215

English (en)
5/2020

1 Description of NC program 4215_en.h

NC program for machining an extruder screw.



Requirement

Manufacture several different extruder screws.

When defining the screws, please note the following:

- The pitch of the screw per rotation increases by a constant value, but this value is different for each screw
- The core diameter of the screw is tapered up to a certain length. The core diameter of the rest of the screw is cylindrical
- The length of the taper as well as the overall length are different for each screw

Solution

An NC program was created for this application in which you define the variables in Q parameters. That way you can machine the different screws with just one NC program.

The NC program was defined for a milling machine with an A axis. The range of traverse and the display of the A axis must not be limited to 360°.

The tool has to be clamped in the center of the A axis. The preset must be defined in the center of the shaft. The machining process starts at X0. The machining process is performed in the positive X direction.

NC program 4215_en.h

In the NC program, first define the blank form and the tool. Then define all parameters required for machining. The control then calls the **LBL 10** subprogram. The actual machining process is programmed in this subprogram. When the subprogram has been executed, the control retracts the tool and ends the NC program.

After the program end, the **LBL 10** subprogram is defined.

The control calculates the following values at the start of the subprogram:

- The change of the core radius between the beginning of the taper and end of the taper
- The taper angle
- The Z coordinate at the beginning of the taper
- The Z coordinate at the end of the taper
- The stepping angle of the A axis
- The starting position in the X axis
- The angle of the A axis at the beginning of the taper

Then the control positions the tool to the clearance height. Subsequently, it positions the tool to the starting position in the X/Y plane. Then it positions the A axis to the starting angle. In the next step, it moves the tool in the Z axis to the starting radius of the taper.

Subsequently, a jump label is defined for a program section repeat for machining the taper. In this repetition, the control first calculates the new angle of the A axis and then the X and Z coordinates for the next positioning block. Then it moves the tool to the new position.

Then the control checks whether the end point of the taper in the Z axis has been reached

- If the end point has not been reached, the control performs a jump to the beginning of the repetition
- If the end point has been reached, the NC program continues

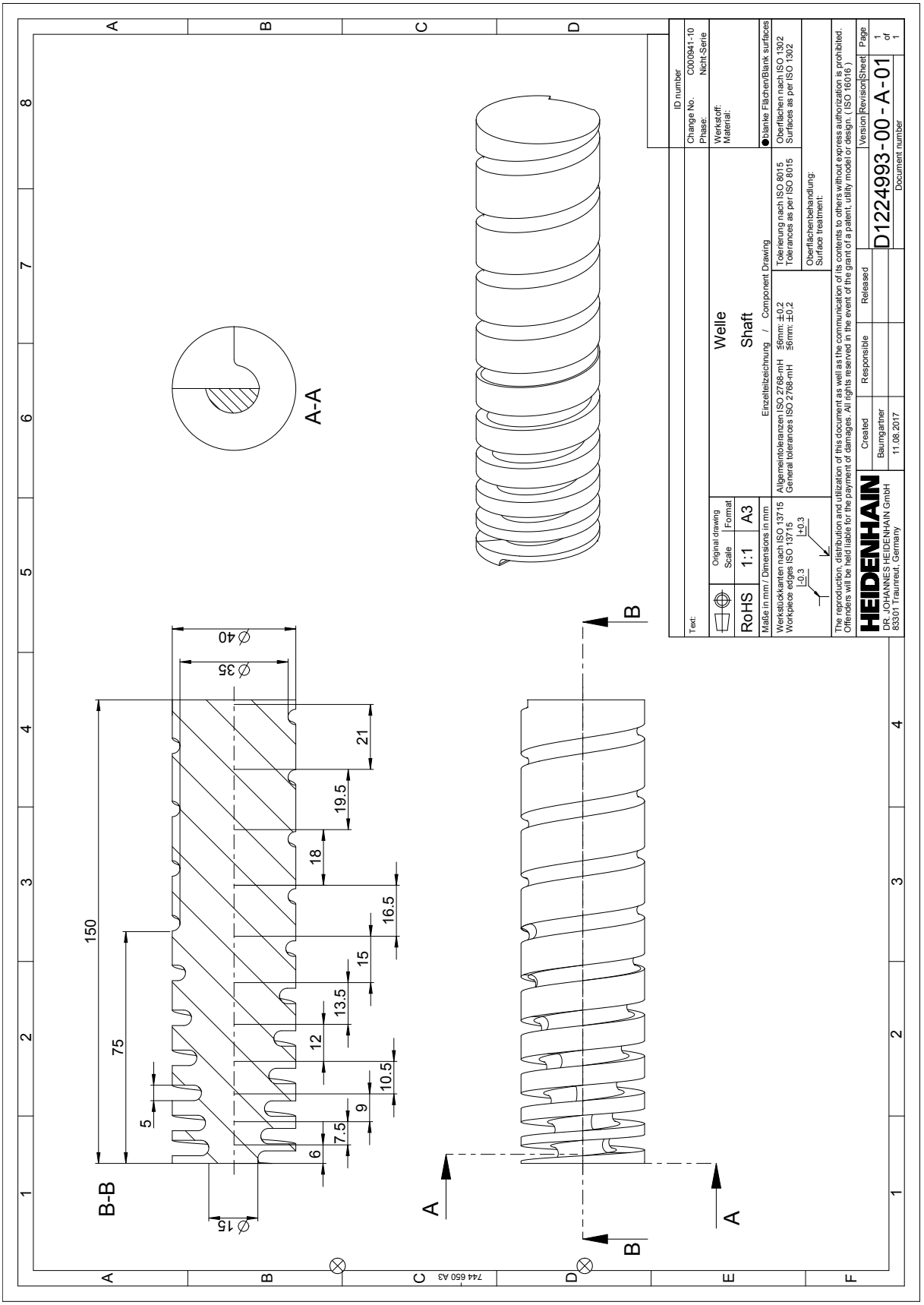
After the repetition for the taper, a jump label is defined again. The control uses this jump label for the program section repeat in which it machines the cylindrical part of the screw. In this repetition, the control first calculates the new angle of the A axis and then the X coordinate for the next positioning block. Then it moves to the calculated position.

Subsequently, the control checks whether the end point of the machining process in the X axis has been reached

- If the end point has been reached, the control jumps to the beginning of the repetition for the cylindrical part of the screw
- If the end point has been reached, the NC program continues

Then the machining process is completed and the control ends the program.

Parameter	Name	Meaning
Q1	DIAMETER ON SLOT FLOOR AT X0	Core diameter of the screw at the starting point
Q2	DIAMETER ON SLOT FLOOR AT END OF TAPER	Core diameter of the screw at the end of the taper
Q3	TAPER LENGTH	Length of the taper, incremental from the starting point in positive X direction
Q4	TOTAL LENGTH OF MACHINING	Length of the screw, incremental from the starting point in positive X direction
Q5	PITCH AT BEGINNING	Pitch of the screw for the first rotation
Q6	PITCH INCREASE PER REVOLUTION	Incremental change of the pitch per revolution
Q7	SUBDIVISION	Number of linear paths into which the control divides each rotation of the A axis
Q8	CLEARANCE HEIGHT	The Z coordinate for safe positioning
Q9	STARTING ANGLE	Angle of the A axis at the starting point of the screw
Q40	FEED RATE FOR PLUNGING	Traversing speed of the tool in the tool axis
Q41	FEED RATE FOR MILLING	Traverse speed of the tool during milling


A-A
B-B
∅40
∅35
∅15
150
75
5
6
7.5
9
10.5
12
13.5
15
16.5
18
19.5
21
A
B
Welle
Shaft
Einzelteilzeichnung / Component Drawing
ID number
Change No. C000941-10
Phase: Nicht-Serie
Werkstoff:
Material:
blanke Flächen/Blank surfaces
Oberflächen nach ISO 1302
Surfaces as per ISO 1302
Tolerierung nach ISO 8015
Tolerances as per ISO 8015
Oberflächenbehandlung:
Surface treatment:
Original drawing
Scale 1:1
Format A3
RoHS
Maße in mm / Dimensions in mm
Allgemeintoleranzen ISO 2768-mH ≤6mm: ±0.2
General tolerances ISO 2768-mH ≤6mm: ±0.2
Werkstückkanten nach ISO 13715
Workpiece edges ISO 13715
+0.3
-0.3
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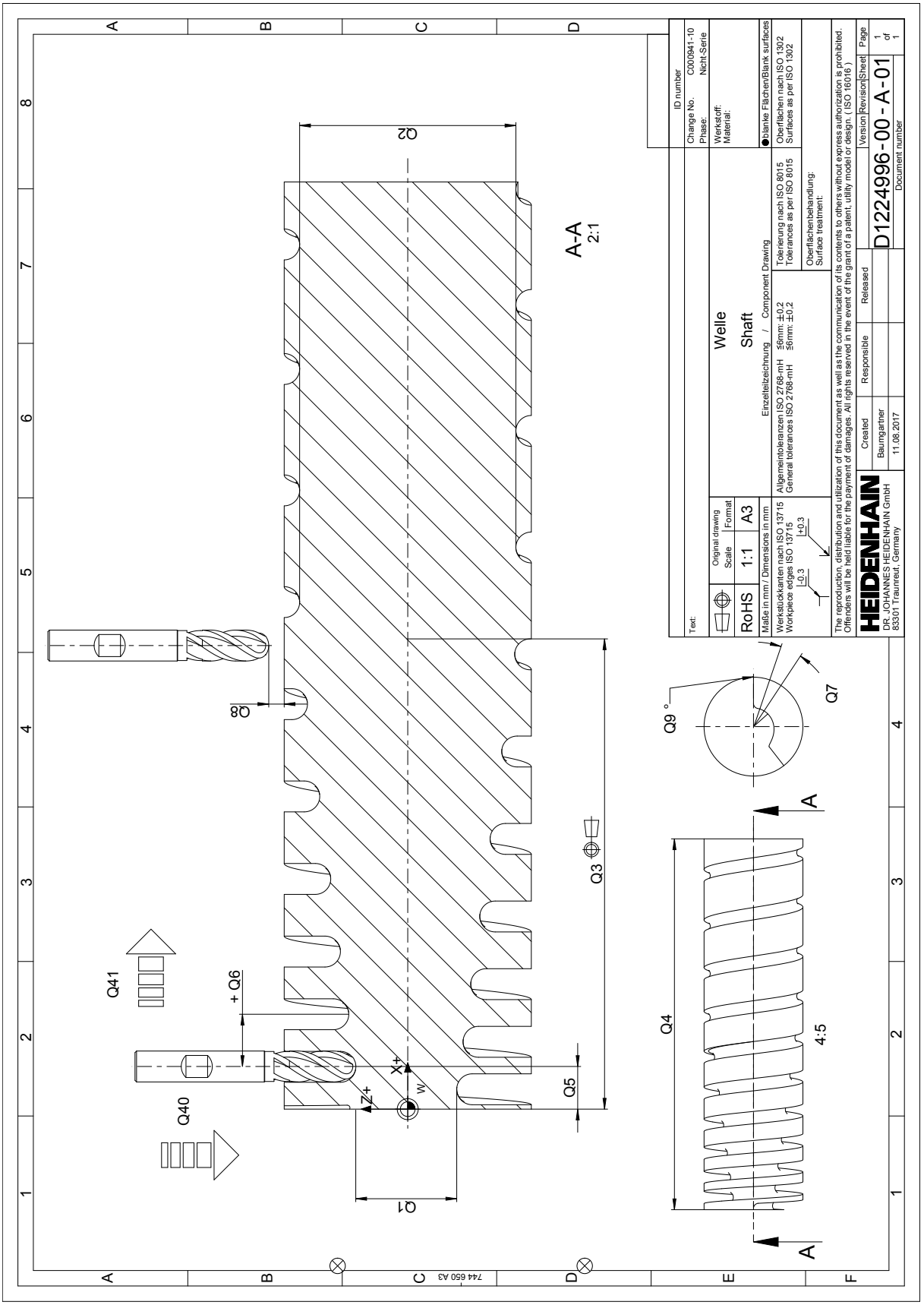
A-A
2:1
Q2
Q8
Q41
+ Q6
Q40
Q1
Q5
Q3
Q4
4:5
Q9 °
Q7
X+
Z+
W
Welle
Shaft
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Werkstoff:
Material:
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