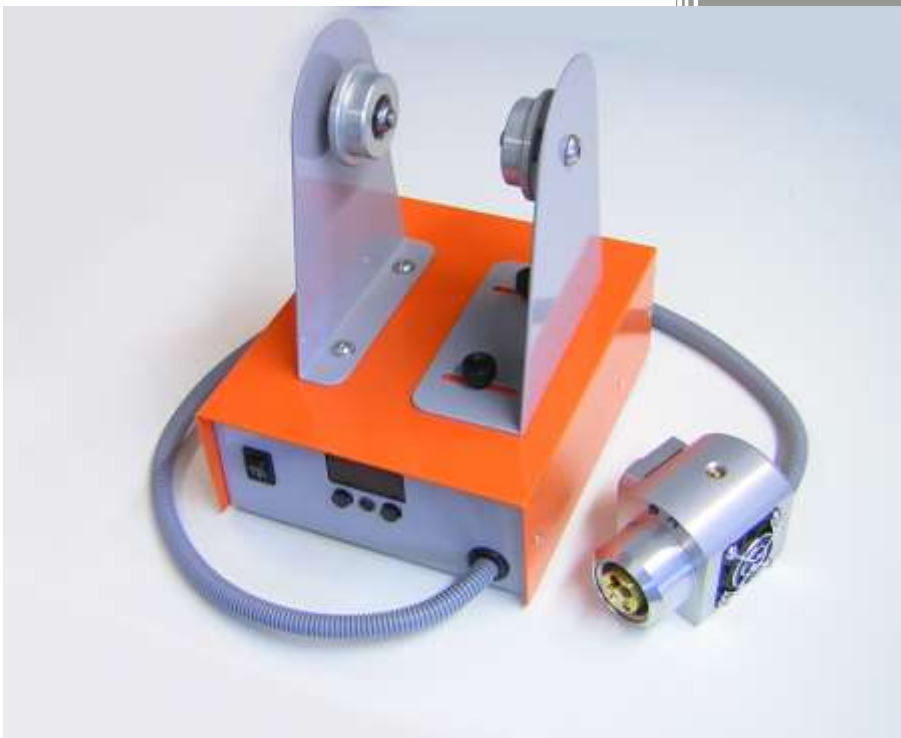


# Getting started

## 3D Printing Head FDM 1.75



Original Instructions

Date: 15/01/2014

Manufacturer:

STEEPCRAFT GmbH & Co. KG

Kalkofen 6

58638 Iserlohn

Germany

Tel: +49 (0) 2371 – 974 85 74

Fax: +49 (0) 2371 – 953 75 00

E-mail: [info@stepcraft-systems.com](mailto:info@stepcraft-systems.com)

Website: [www.stepcraft-systems.com](http://www.stepcraft-systems.com)



Please read these instructions completely before the initial start-up of your printing head and only operate it when you are sure that you have understood everything.



Before starting, the device should be checked for proper functioning and its technical condition.

## TABLE OF CONTENTS

1	GENERAL INSTRUCTIONS .....	4
2	Procedure of FDM 3D printing .....	4
3	Printing software Repetier host.....	4
3.1	Installation of the Stepcraft Repetier host .....	4
3.2	Load 3D file in Stepcraft Repetier host .....	5
3.3	Convert 3D file into G-codes .....	6
4	Preparing the printing head / printing table .....	7
4.1	Mount printing head.....	7
4.2	Insert filament.....	7
4.3	Mount printing table.....	8
5	Setting control software WinPc-NC .....	8
5.1	General settings .....	8
5.2	Reference run .....	9
5.3	Upload working file.....	10
5.4	Zero point determination .....	10
6	Print workpiece.....	11
6.1	Starting difficulties .....	11
6.2	Pause function .....	12
6.3	Ready workpiece.....	12
7	Care and maintenance .....	12

# 1 GENERAL INSTRUCTIONS

This manual is intended to familiarise you with your 3D printing head and to give you all the necessary information that you need to achieve your desired results quickly. At the end of this manual, you would have made your first 3D printed work-piece.

These instructions apply to the 3D printing head in conjunction with our desktop CNC-/3D-Systems STEPCRAFT 300, STEPCRAFT 420 and STEPCRAFT 600 alike, in short hereinafter referred to as STEPCRAFT.

Please read this manual completely before the initial start-up of your device.

To minimise the risk of injury and / or to prevent property damage, please only operate the machine and the associated control unit when you are sure that you have understood these instructions completely!

Should questions arise, please contact us. Our contact details can be found on the second page of this manual.

## 2 PROCEDURE OF FDM 3D PRINTING

The production process of 3D printed parts with our FDM (Fused Deposition Modelling) 3D printing head can be divided into four sections:

1. The model must first be in digital form. You can download different sample files from various online platforms such as "Thingiverse", "Archive3D", "Trimble3DGalerie", etc. In the enclosed CD you will find a 3D file (Muster.STL) in the folder "Musterdateien" (##) that we want to print parallel to these instructions.

To implement your own ideas, there are also many free programs such as "FreeCAD", "ViaCAD", "123D", "Art of Illusion", "Sketchup", "Blender" or "Openscad". At the end there is always your model as an STL file. This file can then be further processed.

2. We use our printing software "Stepcraft Repetier-Host". This program is included with our printing head and combines all the necessary individual programs in an attractive and easy to use interface. The program converts the STL file under consideration of the pre-installed machines and printing head parameters in G codes suitable for WinPC-NC. At the end you get a NC file.
3. The printing head is mounted on the machine and the printing table is clamped by means of the blank holder loosely onto the worktable. Now after the reference run, the working file is loaded and the work-piece zero point is searched for and stored.
4. Before every print, the nozzle must be completely filled with filament. This is done by manual feed of the 4th axis (filament feed). The axis is moved until the filament thread exits the nozzle and slides down. Now the manual drive control unit is closed, the protruding thread is removed and the printing process is started.

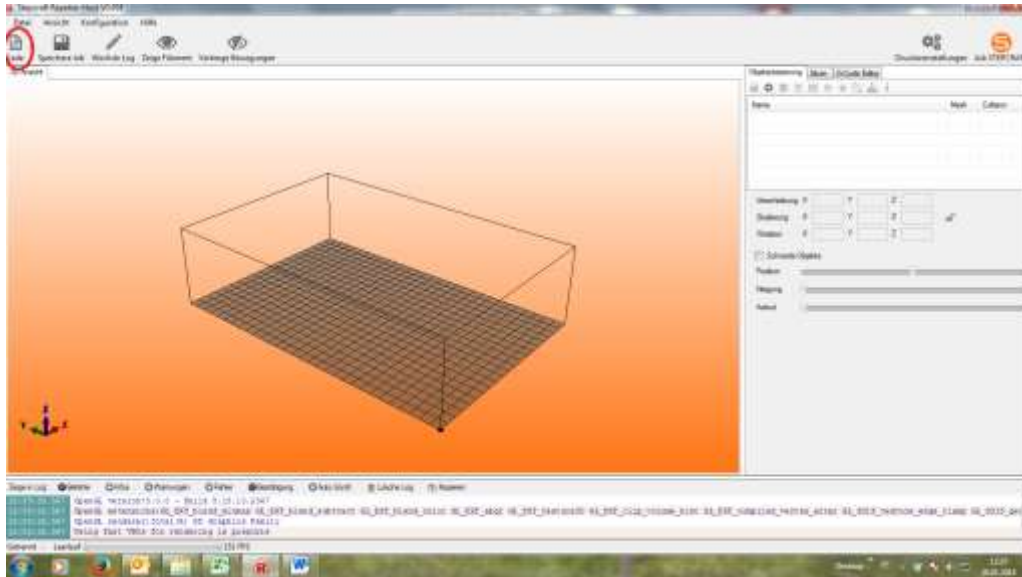
## 3 PRINTING SOFTWARE REPETIER HOST

### 3.1 INSTALLATION OF THE STEPCRAFT REPETIER HOST

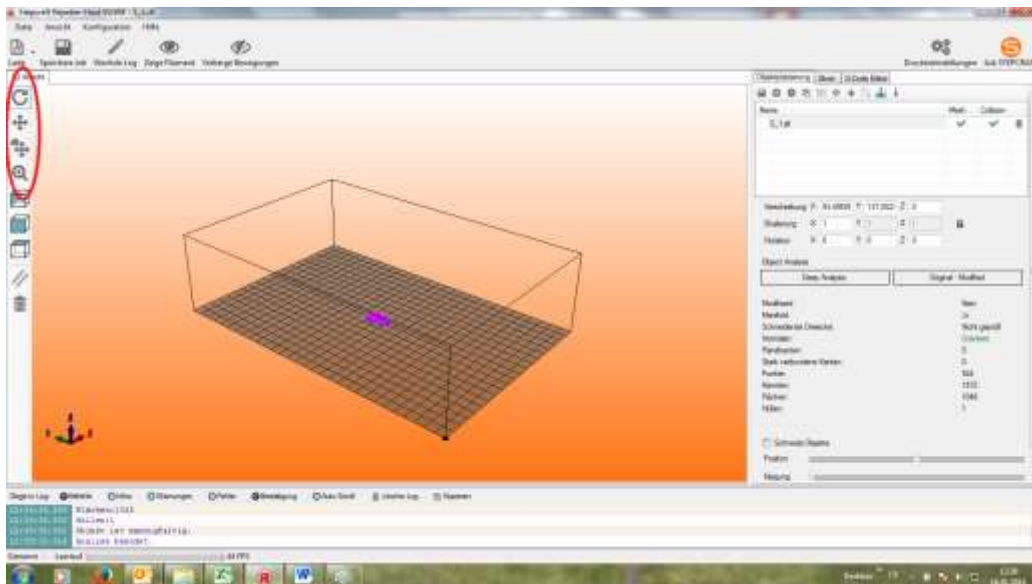
In the enclosed CD, you will find the installation file "setupStepcraftRepetierHost\_0\_xxx.exe". Please start this installation, and then follow the instructions.

## 3.2 LOAD 3D FILE IN STEPCRAFT REPETIER HOST

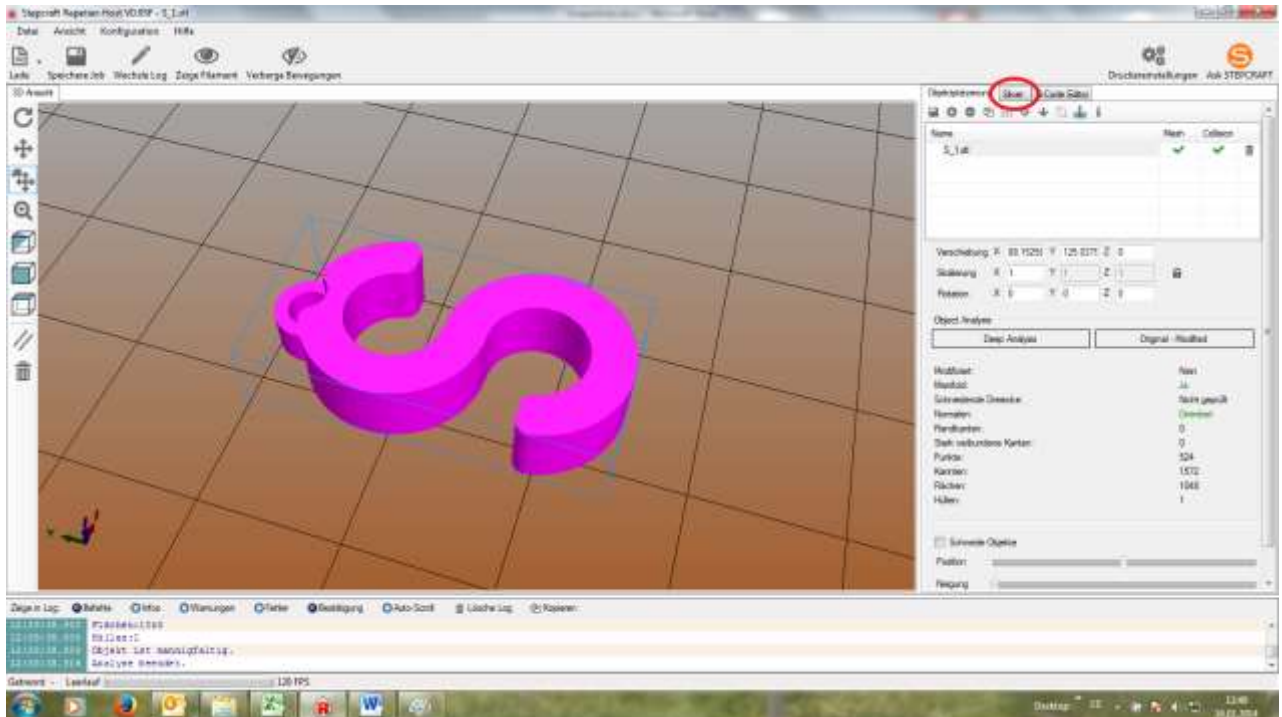
In the selection bar at the top left of the screen you will find the load button. By clicking you can open the 3D work-piece file. Our sample file can be found in the CD in the folder "Musterdateien" (##). Please download the file "S\_1".



The sample will automatically be placed on the printing table.

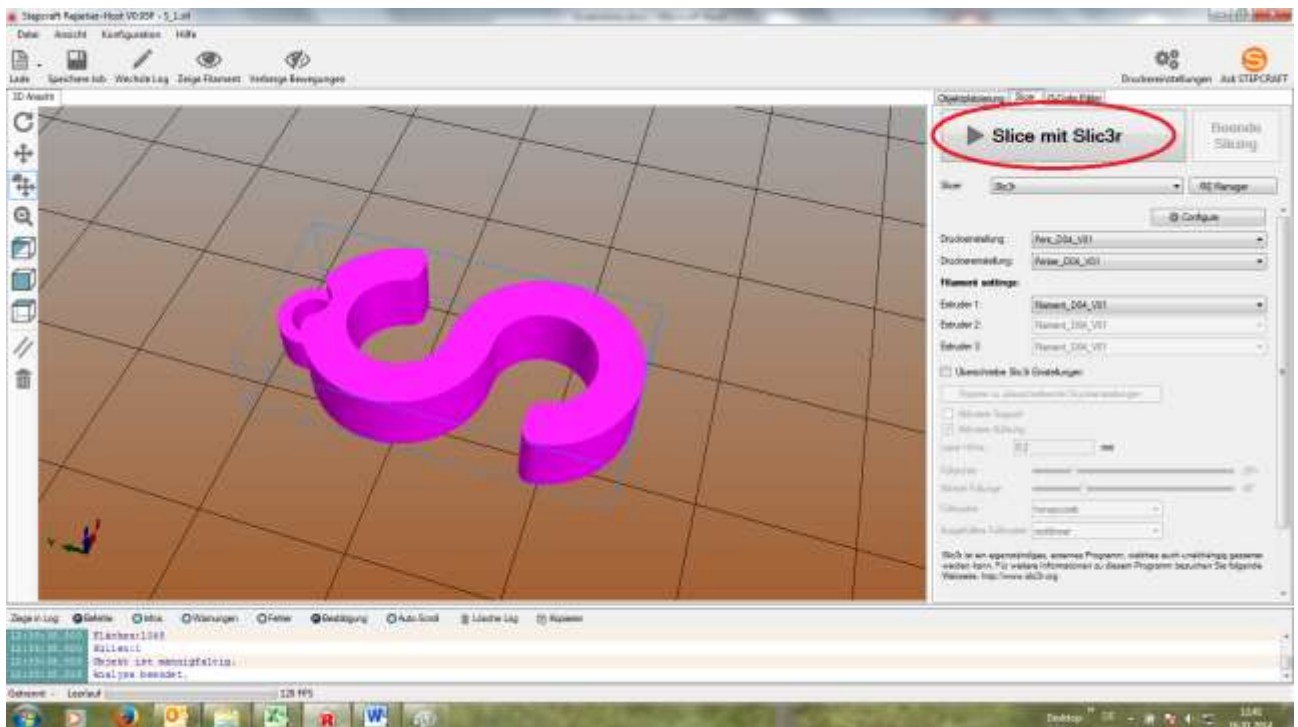


Using the side function keys, you can rotate the view and zoom.

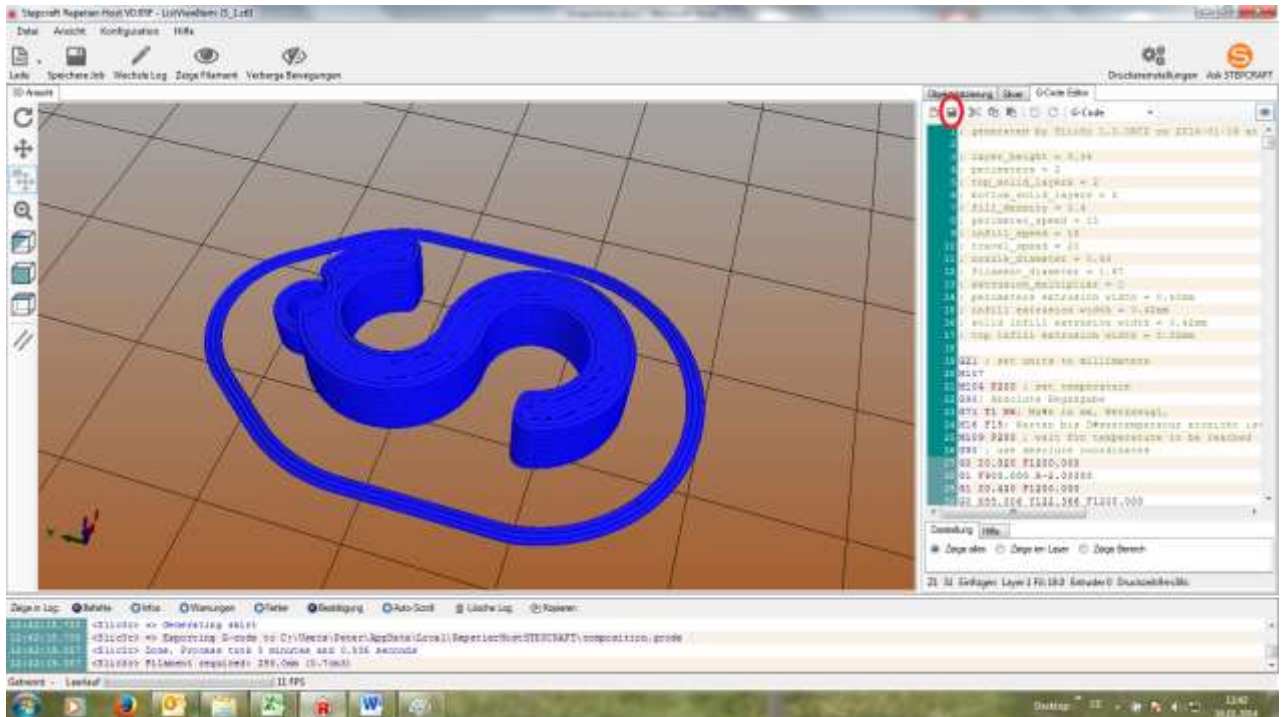


### 3.3 CONVERT 3D FILE INTO G-CODES

Now select the tab "slicer" and start the calculation of the G codes by pressing "Slice mit Slic3r". The program now calculates the G-codes for the printing work file.



After a few seconds the display should automatically be switched onto the tab "G-Code Editor". Now the individual filament paths are displayed. Now save the G-Code file with the name "S\_1" in any directory on your hard drive.



The processing of the print data is now complete.

## 4 PREPARING THE PRINTING HEAD / PRINTING TABLE

### 4.1 MOUNT PRINTING HEAD

The printing head is fully inserted with the two LEDs forward into the 43 mm clamping neck of the STEPCRAFT 3D-machine system and slightly stretched. The control device can be positioned adjacent to the machine or behind the machine. Depending on the position, the filament roll holder must be mounted on the control unit rotated by 90 °.



Mounted printing head with pressure nozzle. The filament roll holder is designed for the rear position here.

### 4.2 INSERT FILAMENT

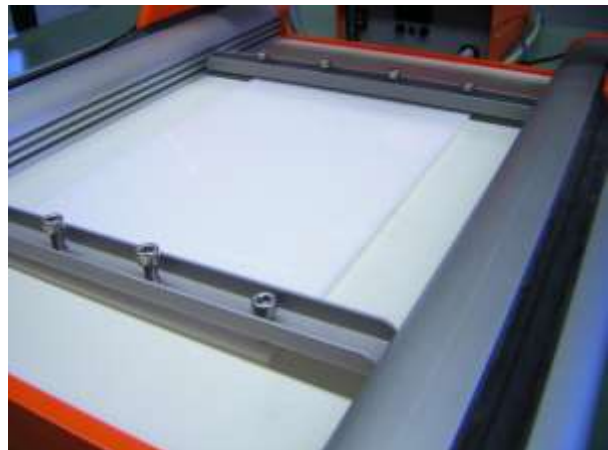
Drag the filament feed hose together with the filament feed line up out of the printing head. Now guide the filament through the hose so that it comes out of the other side of the filament feed line. Now insert

the filament between filament pinch roller and motor drive sprocket and turn the filament down into the nozzle line at the motor hand wheel. If the filament cannot be inserted in between, loosen the preload of the filament pinch roller. Now set (according to 5.3 of the manual) the correct preload of the pinch roller. Finally insert the filament feed line back into the printing head.



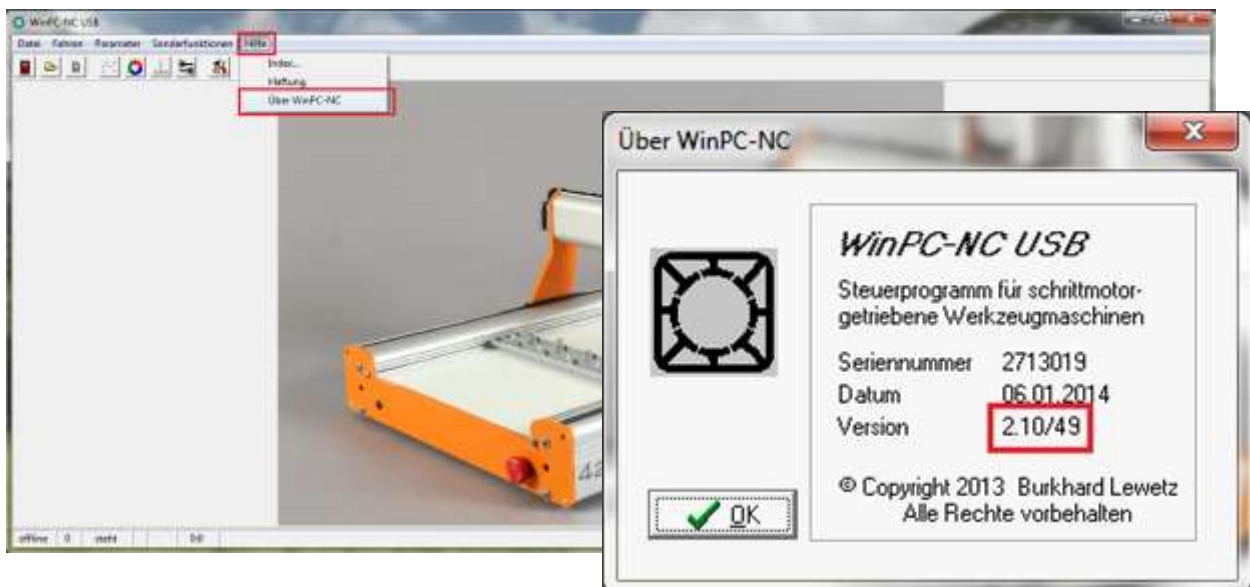
## 4.3 MOUNT PRINTING TABLE

Remove the protective film from both sides of the printing table. Place the printing table at the centre on your machine table and fix it either with a thin double-sided tape or, as shown, with the work-piece blank holders.



## 5 SETTING CONTROL SOFTWARE WINPC-NC

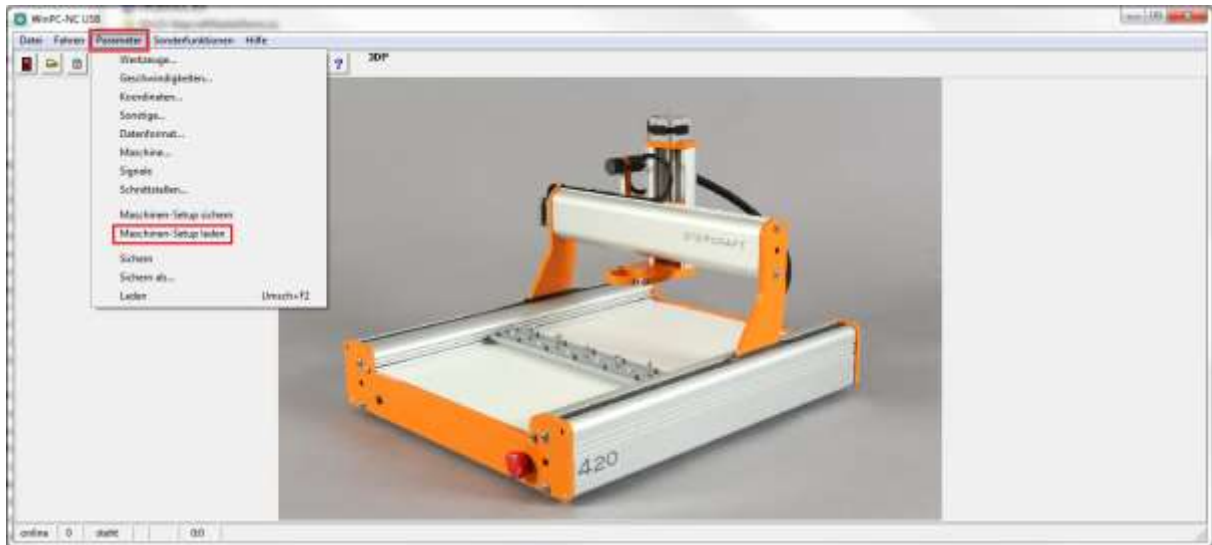
With versions above 2:10:49, the WinPc-NC USB (Stepcraft Version) is suitable for 3D printing. If you have an older version, you can get a free update directly from the manufacturer of the software ([www.Lewetz.de](http://www.Lewetz.de)). You can find this number under "Hilfe-Über WinPC-NC".



### 5.1 GENERAL SETTINGS



For the 3D printing, several settings must be made. Please turn on the machine for this and then start the software. After successful connection to the USB module, you can load machine setup in the tab "Parameter".



You can find this setup file on the enclosed CD in the folder WinPc-NC parameter ("WinPc-NC\_Parameter\_3D Druck\_300-600"). Please use the appropriate file for your machines size: 300, 420, 600SF, 600MFoder 600.

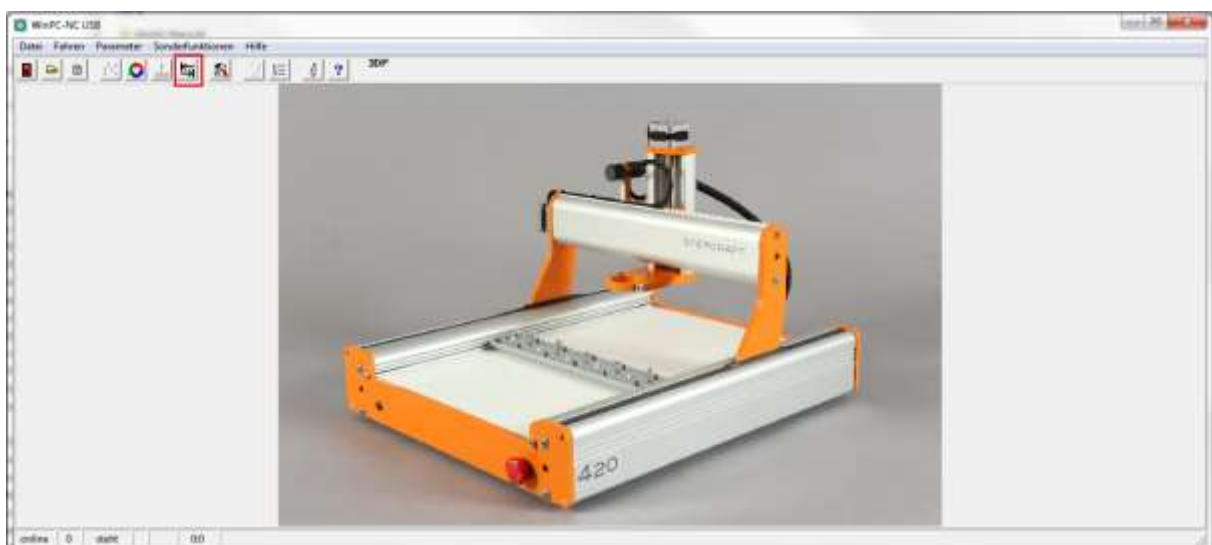
**Please backup the current machine setup settings of your machine on your hard drive so that you can use the old settings later if needed.**

There will soon be an update of the WinPc-NC, in which a convenient profile management system would be integrated.

For an activation or transfer of functions, the WinPc-NC must be restarted.

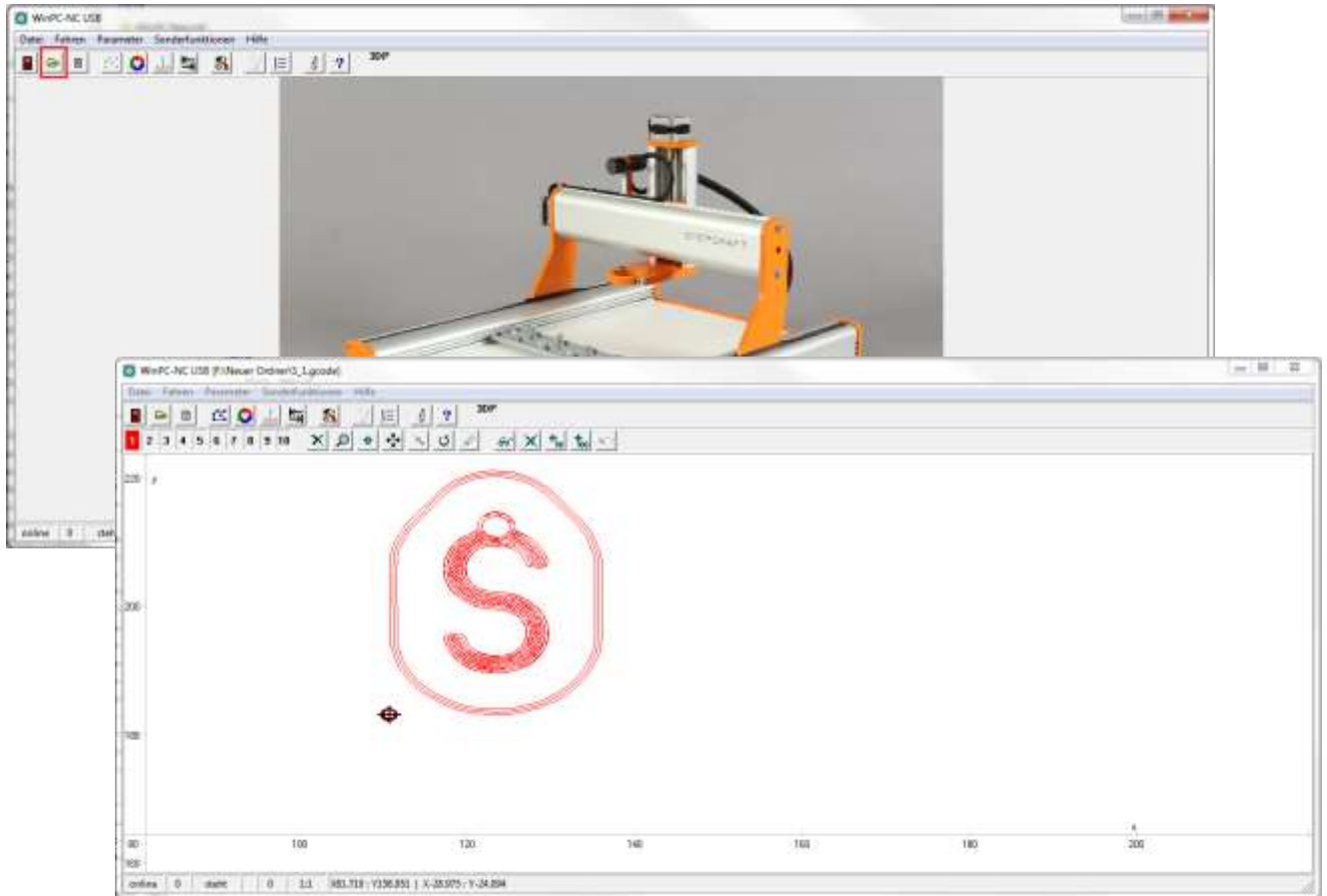
## 5.2 REFERENCE RUN

Now start a reference run so that the control computer or the WinPc-NC finds the machine zero point.



## 5.3 UPLOAD WORKING FILE

Download your working file now with the menu item "Datei- Öffnen". For our printing sample, please open your G-code file "S\_1".



## 5.4 ZERO POINT DETERMINATION

The work-piece zero point is programmatically in the centre of the work-piece. You can use these defaults settings in "Parameter-Menü-Sonstige" (zero point in file).

Move the pressure nozzle manually, approximately centred over the printing table. Move the Z-axis slowly downwards now far enough that the pressure nozzle comes to a halt approximately 1 mm above the printing table

Now place a strip of plain paper (80 g) on the printing table under the nozzle.

Now move, step by step, the Z-axis downwards, move it to the paper strip as long back and forth until the pressure nozzle touches the paper.

Now move the Z axis upwards by 0.3 mm. Save this position as "zero point XYZ".

The Z axis now automatically moves 75 mm upwards to the safety distance.

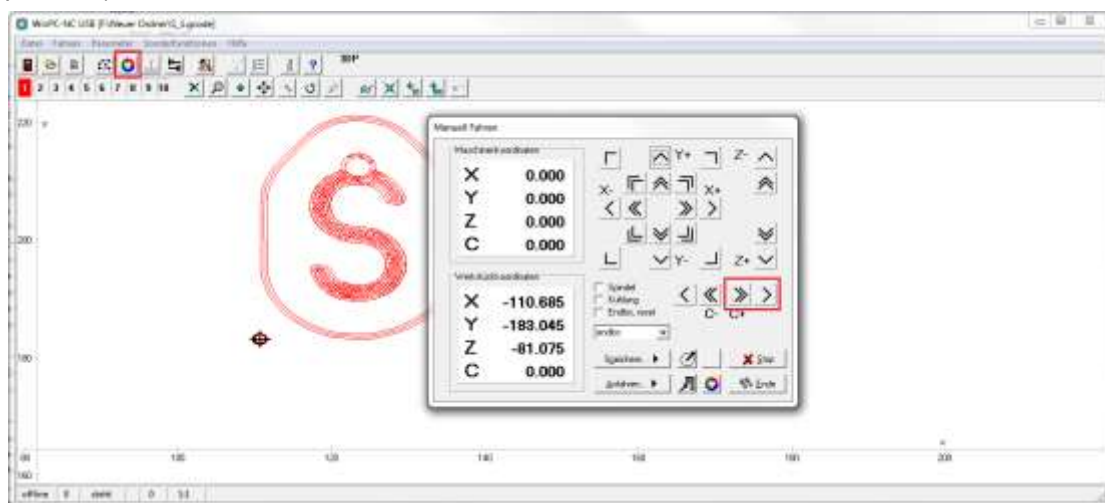
The work-piece zero point determination is now complete. You can save these work-piece parameters in the tab "Parameters". A parameter file is set up that stores the work-piece zero point to match the uploaded work file.



## 6 PRINT WORKPIECE

Make sure that all cables are properly connected. Turn on the 3D pressure control unit and wait until the blue LED turns off and the red LED signals readiness for operation. The control unit is set to 180 ° C. This temperature is suitable for the use of PLA filament (pressure temperature of PLA is between 170 ° C and 190 ° C).

Before every print, the pressure nozzle must be completely filled with filament (vented). For this, open the function "Manuell-Fahren" and move the filament feed line (4th Axis, key C+) until the filament is pushed out of the pressure nozzle. (Move the filament feed line only on reaching the nozzle temperature).



Exit the function "Manuell Fahren." Now remove the pressed-out filament thread and press Start. The machine will begin with the printing process.



### 6.1 STARTING DIFFICULTIES

Initially, prior to each print, a border "Loop" is printed around the work-piece. These "loops" are also used to "vent" the nozzle. With our settings, 3 "Loops" are printed. Sometimes it may happen, for example, that the filament thread does not attach immediately to the printing table if the distance to the printing table is not completely correct or the pressure nozzle is dirty. Here you can do something

manually. Make sure that no filament thread lies inside the border or is stretched. After printing of the "Loops", the printing of the work-piece takes place automatically

## 6.2 PAUSE FUNCTION

For our test print, this function is not required, but it is possible to interrupt the printing operation. In this pause, the printing head / the machine moves to the park position. This may be necessary for the following for example:

1. Filament change (colour change)
2. Insertion of inlays (e.g. carbon reinforcements, square nuts, ...)
3. Component Inspection / dimensional verification

To print after the pause, the pressure nozzle must be vented first. For this, the control keys for the filament feed are installed in the "Pause window". These are also required for a filament change. After ventilation, remove the filament thread and press "next". If the printing process is to be ended, press the "cancel" button.



## 6.3 READY WORKPIECE

When printing is finished, the machine moves to the park position. Please let the work-piece cool for about 2 minutes. You can release the work-piece from the printing table with a cutter knife by levering below the work-piece.

Ready work-piece



## 7 CARE AND MAINTENANCE

Occasionally wipe over the hot nozzle with a cloth and remove any filament residues.

**Be very careful here: Risk of burns!**

Occasionally check the ball-bearing filament roll holder. The two rollers must be able to turn easily.

Check regularly under the filament feed cover and clean this area.

Keep the whole printing head and the machine surroundings clean.

Foreign objects that enter into the nozzle area can block it. In such a case only the exchange of the pressure nozzle helps.