

X-axis rods tuning parallel by clamps

ufodoctor3, June 17th, 2019

1. Introduction

Many 3D-printer users complain the x-offset of printed objects if the x-axis rods are not perfectly cleaned and lubricated!

But lubrication means symptom suppression but not healing!

Finally, after many hours of frustrating experiments I asked my wife to look at the x-system.

In power off condition she moved the slider manually and observed a friction, mainly at the left side near the x-stepper motor. But when I pressed on the left side the two x-rods together with two fingers with an estimated force of 3 N, the friction becomes reduced!

Here diagnostic finding: the two x-rods are not parallel!

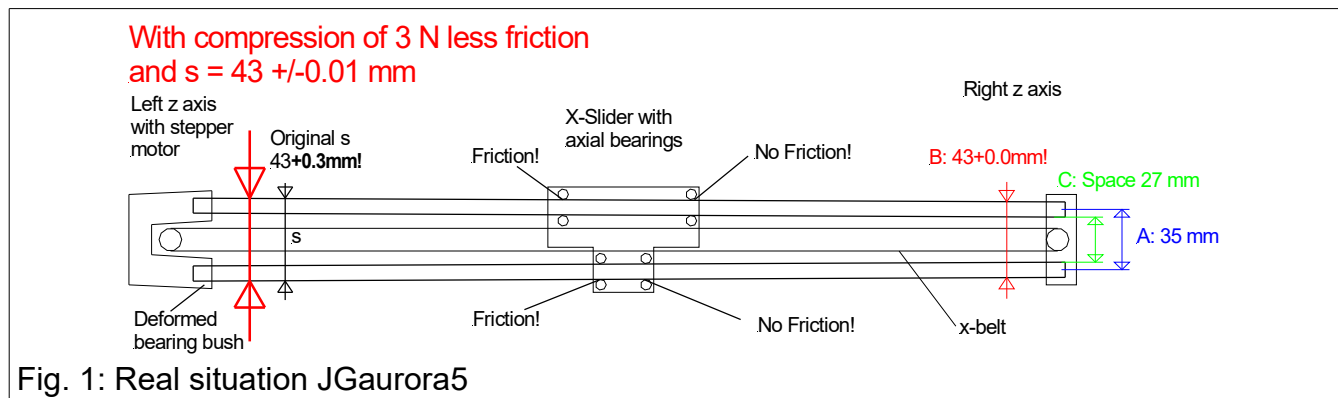
No miracle that the very stiff x-slider with axial ball bearing gets blocked!

In the original situation the vertical forces at the ball bearings are in the order of 1 to 3 N

Following the advice of my wife, I measures the axial distance of the two rods to discover that the rods at the left side shows a value of 43.3 up to 43.4 mm, but at the right side 43.00!

As a first countermeasure I pulled on the left side the two rods together by a strong cable strap. Now we got good value 43 +/-0.05 mm, and no more x-offset during printing.

But this is not professional, varying ambient temperature will show a negative effect.



2. Solution

We need to mount stable clamps, left and right, providing parallel rods with an axial distance of 35 ± 0.01 mm precision.

The axial distance A cannot be measured, sorry!

The outer distance B could be measured by a vernier caliper, but difficult to execute with an acceptable precision of ± 0.01 mm.

The inner space C can be measured fine by a 27 mm gauge: blocked if too narrow, wobble if too wide!

3: Clamp Design

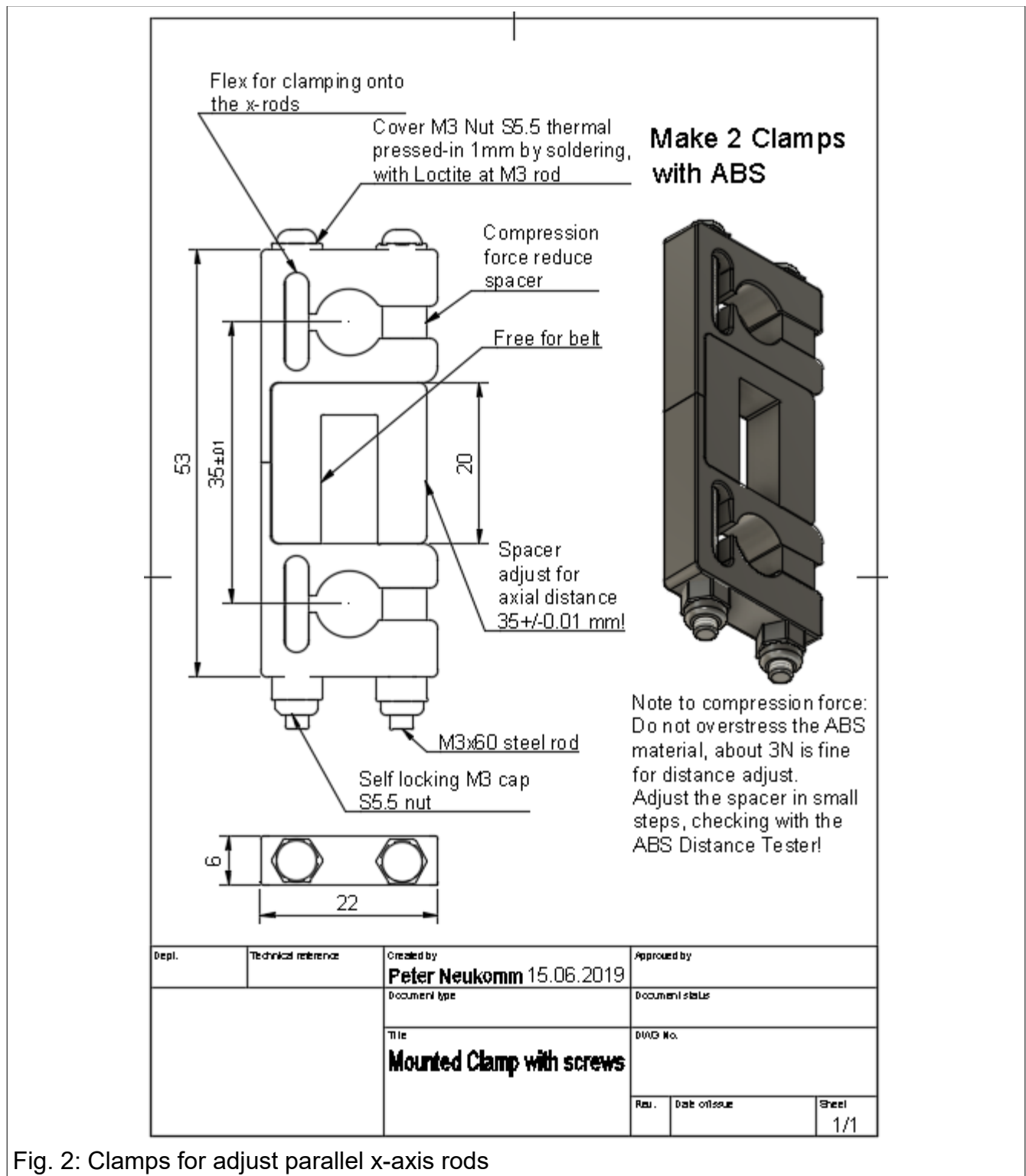


Fig. 2: Clamps for adjust parallel x-axis rods

If the U-shape spacer does not fit, adjust it small steps for correct height, but do not apply extreme forces by the nuts on the M3 rods!
ABS is not suited for long-term mechanical stress.

4. ABS Clamps mounting and clamp manufacturing

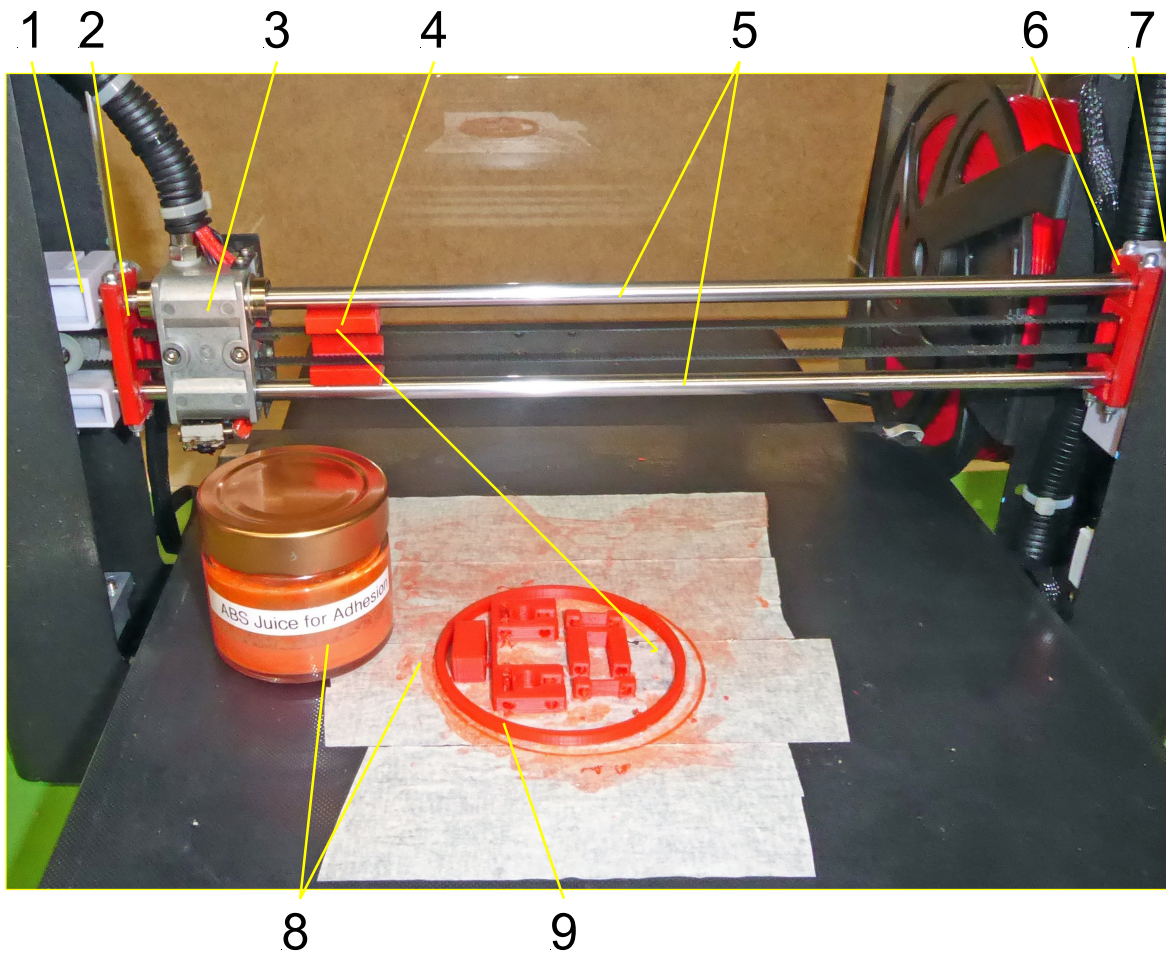


Fig. 3: Mounted clamps and manufacturing notes

- 1: Left z-axis
- 2: Left new clamp
- 3: x-slider
- 4: Distance calibrator tool 27 +/-0.01 mm
- 5: D8 mm rods to be parallel adjusted, axial distance 35 +/-0.0 1mm
- 6: Right new clamp
- 7: Right z-axis
- 8: ABS juice, thin coated to painter tape
- 9: Anti-Warp Ring (very effective!)

For more info about ABS juice, glue and slurry see:
<https://www.youtube.com/watch?v=8bYLRFMKDSY>
Very good practical information!

5. ABS Clamp Printing

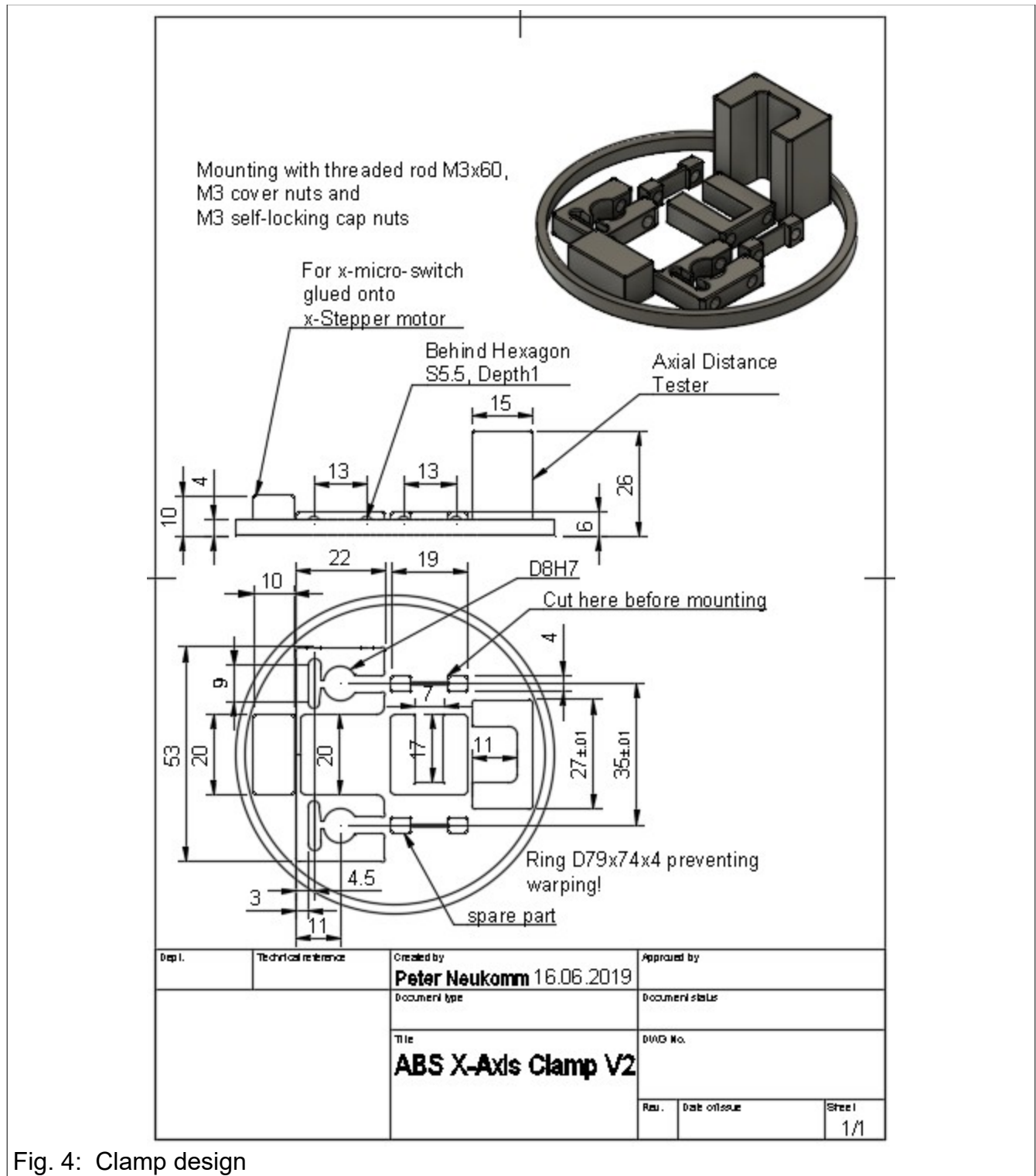


Fig. 4: Clamp design

See the attached STL-File, if you want to use this design.

6. 3D-Printer setting

The screenshot displays the 3D printer settings interface. At the top, the printer model 'A-5' is shown. Below it, the material is set to 'ABS' and the profile to 'PLA 普通质量(PLA Normal Quality)'. The 'Print Setup' section is active, with 'Custom' selected. A search bar is present above the settings list. The settings are organized into several categories:

- Quality:** Layer Height is set to 0.1 mm.
- Shell:** Wall Thickness and Top/Bottom Thickness are both set to 1.2 mm.
- Infill:** Infill Density is set to 70%.
- Material:** Printing Temperature is 230 °C, Build Plate Temperature is 80 °C, Diameter is 1.75 mm, Flow is 100%, and Enable Retraction is checked.
- Speed:** Print Speed is 40 mm/s and Travel Speed is 80 mm/s.
- Cooling:** Enable Print Cooling is unchecked.
- Support:** Generate Support is checked, and Support Placement is set to 'Everywhere'.
- Build Plate Adhesion:** Build Plate Adhesion Type is set to 'Skirt'.

Fig. 6: Printer Settings