3DGENCE DOUBLE P255

MAITENANCE ACTIVITIES

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1. HOTENDS CLEANING

Recommended frequency: each time printing is finished.

Each time after completed printing, clean the hotends by removing the remaining molten/burnt material that may be on the outside of the nozzle

For this purpose:

Procedure for hotend cleaning.

1. Wear protective gloves.
2. In the TUNE menu, set the heating temperature for the given hotend using +/- keys. Choose Tool 0 temp. option for T0 hotend and Tool 1 temp. option for T1 hotend.
3. Ensure good access to the hotend using the RISE HEATBED or LOWER HEATBED option in the MENU. Press and hold the keys to move the heatbed smoothly up or down. Press the key once to move the heatbed at a short distance.
4. Using a non-flammable material or tweezers, gently remove the remaining molten/burnt material.
5. After cleaning the hotend, switch the heating off (TUNE → Tool 0 temp. / Tool 1 temp. → RESET).

3DGence DOUBLE P255 printer can also clean the hotends automatically by extruding a section of material. This function is particularly useful when the user has to change the material or remove the remains of old filament or if the hotend has not been used for a long time and is slightly clogged. The automatic hotend cleaning assistant is available during printing and in the idle mode.

Hotend cleaning assistant:

1. Choose MATERIALS and then CLEAN NOZZLES in the main menu.
2. Specify the hotend to be cleaned – MODEL MATERIAL for T0, SUPPORT MATERIAL for T1 or BOTH TOOLS for both hotends. Confirm the choice with CONTINUE key.
3. The process will start automatically.
4. After completed process, remove the rest of the filament extruded from the hotend.

2. HEATBED CLEANING

Recommended frequency: each time printing is finished.

Dirty or greasy heatbed may seriously hinder or make printing impossible. It is recommended that the heatbed should be cleaned before each new printout.

Clean the printer's heatbed by following the instructions below:

1. Set the printer's heatbed in a position that makes it possible to clean the heatbed easily (MENU → RISE HEATBED / LOWER HEATBED).
2. Switch off all heating elements of the printer and wait until they are cooled down completely.
3. Switch the printer off using the main switch and disconnect the printer from the power source.
4. Put protective gloves on.
5. Remove any residual plastic from the heatbed surface using the spatula. Next, soak a cotton (non-synthetic) cloth with a solvent:

• 10% spirit vinegar,
• acetone,
• nitro cleaner,
• extraction naphtha or clean the heatbed using a sponge soaked in detergent. When degreasing, pay special attention not to expose the printer components made of plastic and painted components to action of a solvent as it may damage them.

6. Wait for the solvent to evaporate completely.

ATTENTION: There are OHS instructions on the packaging of the solvents. The instructions must be strictly observed – the solvent vapours may be harmful.

3. CALIBRATION OF HEATBED

Recommended frequency: when required, or once on a few hundred hours of printing.

The heatbed calibration procedure is always the same. There is no need to perform the calibration before each printout. It is enough to perform it once every few dozen hours of printing or if there are problems with the adhesion of the first layer of printout.

Calibrate the heatbed if any of the below symptoms occur:

• the printer is to be started for the first time,
• one or more corners or edges of the printout get unstuck or do not adhere to the heatbed,
• one or more corners or edges of the printout are pressed into the heatbed surface (the impression of transparency),
• too thinly applied layer, eventually, skipping, clicking of the extruder motor, accumulation of excess material between the hotend passages,
• the heatbed surface has been unintentionally lifted,
• large force has been applied, for example, when removing the printout, and there is a reasonable suspicion that it has been relocated,
• the first layer seems to be unevenly distributed - one edge is correct while the opposite one is crushed or does not adhere to the heatbed strongly enough.

3DGence DOUBLE P255 printer is equipped with an advanced, extremely sensitive system of automatic calibration of the heatbed. This system facilitates the printer operation. The correct calibration procedure of the printer's heatbed is described below. The printer has been calibrated prior to transport, but it may have become decalibrated during transport. Therefore, the following actions should be performed in order to avoid problems with the first printout.

Heatbed calibration procedure.

For this purpose:

1. Check the power leads and the printer's leads for abrasion wear and defects. Check the cogged belts for defects and abrasion wear. Confirm that the Z axis breaker (fig. 6) is not damaged, broken or bent and that it is aligned with the Z axis endstop notch. To do this, use the "Rise heatbed" option in the menu and move the heatbed slowly up.

2. If there is a filament in the hotend, unload it (chapter III, point 4.1), and then cool both hotends down to a temperature below 50oC (TUNE → Tool 0 temp. / Tool 1 temp. → RESET).

3. Gently remove all dirt and material residues from the nozzle of T0 hotend using tweezers and from the heatbed using a spatula (this does not apply to the first start-up).

4. From the printer's MENU, choose the HOME ALL option.

ATTENTION: observe carefully the movement of all axes. When the Z axis breaker (fig. 37, violet colour) reaches the level of the Z axis endstop (fig. 37, green colour) and stops, check the distance between T0 nozzle and the heatbed using a feeler gauge. The distance should be about 0.8 - 1.5 mm. If the distance is larger, the heatbed scanning may be aborted and the "Heatbed scan aborted" error message may be displayed.

If the distance between the heatbed and T0 nozzle tip is outside the range of 0.8 - 1.5 mm, adjust it manually:

a) Move the heatbed maximally backward along Y axis.

b) Loosen the clamp bolt (fig. 37, blue colour) locking the slide (fig. 37, yellow colour).

c) Adjust the distance by means of the thumbscrew (fig. 37, red colour). Tighten the thumbscrew to lower the slide and increase the distance between the nozzle and the heatbed. Unscrew the thumbscrew to rise the slide and bring the nozzle closer to the heatbed (fig. 37 red-yellow arrow).

d) Tighten the thumbscrew and check the position of the nozzle above the heatbed using a feeler gauge, after selecting the "HOME ALL" command.

ATTENTION: During manual calibration of the heatbed, exercise particular care to prevent the heatbed from hitting the hotend nozzle. Otherwise, the ceramic heatbed or hotend may get damaged. The guarantee provided by 3DGence does not cover such damage.

5. In the printer's menu, choose Menu → Advanced → Heatbed Scan. At this point, the process of heatbed scanning starts.

6. Wait until the scanning is completed – it will take about 20 minutes. After completed scanning, "HEATBED SCAN COMPLETED" message appears on the display. The printer's heatbed has been successfully calibrated and the printer is ready for further work.

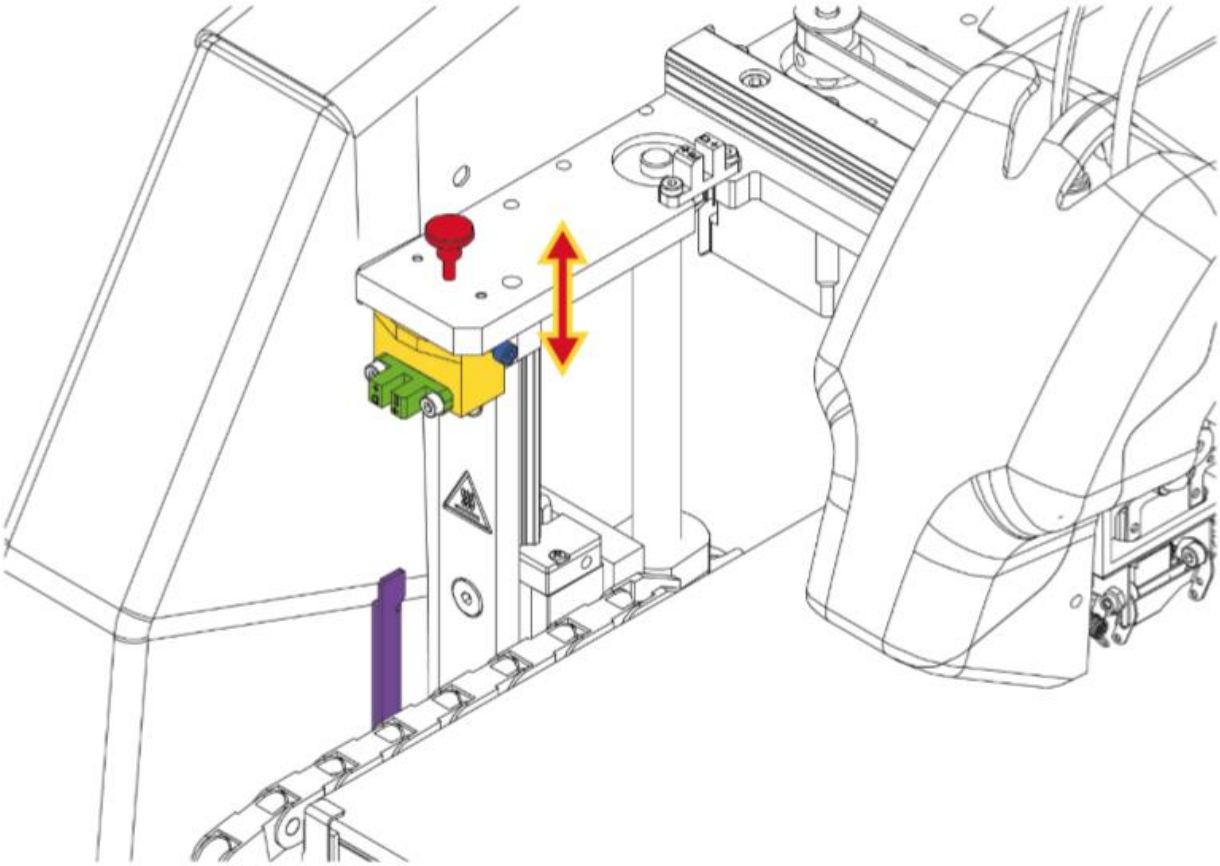


Fig. 37 Manual adjustment of the distance between the heatbed and T0 nozzle tip

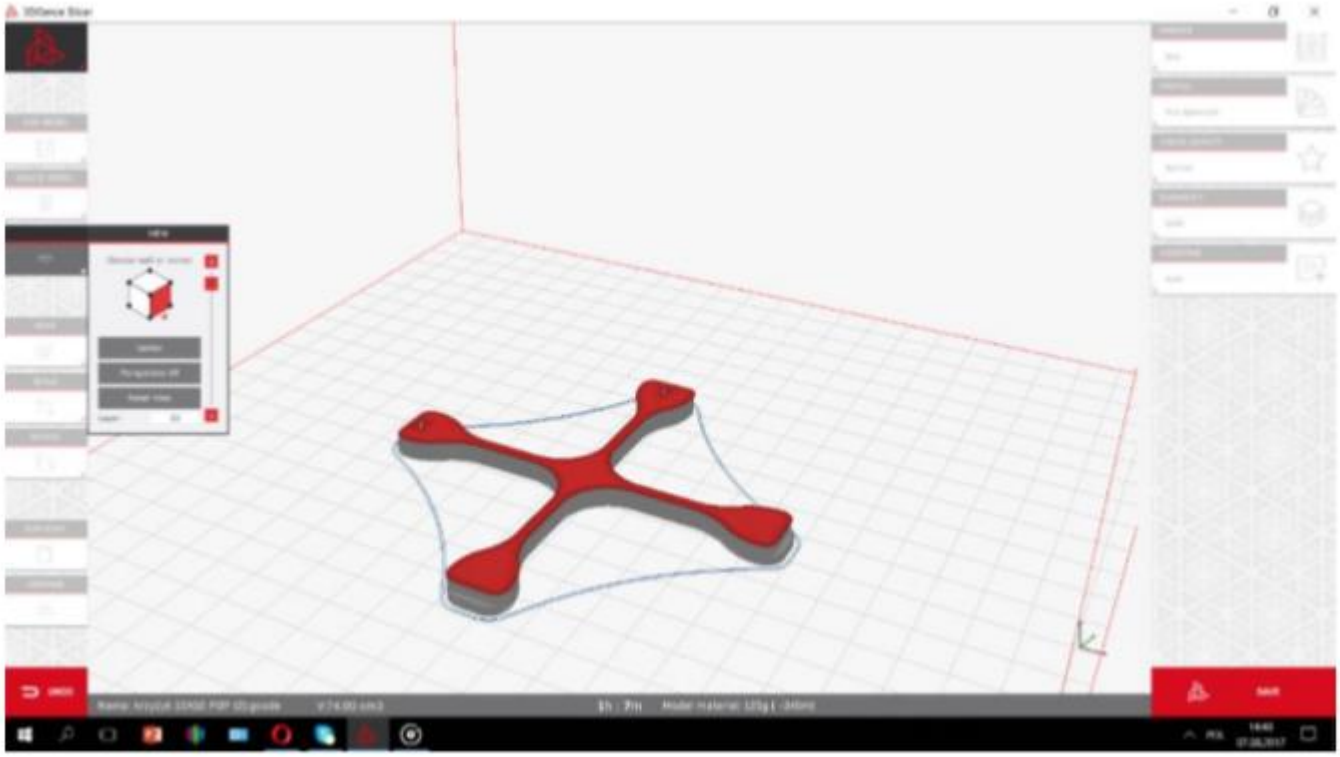
4. PRECISE AXES CALIBRATION

Recommended frequency: each time the material type is changed to a different one.

3DGence DOUBLE P255 printer, like all 3DGence printers, is equipped with a unique system for precise dimensional correction of the printed model. The printer is factory calibrated for Verbatim PLA material with the accuracy of 0.1 mm. During printing with the use of materials having various material shrinkage levels, the dimensional correction may be necessary. In the case of most printers, such a correction can be very troublesome or even impossible. Thanks to the innovative system, 3DGence DOUBLE P255 printer allows you to make a precise dimensional correction in a simple and quick way. With just one calibration printout and simple measurements, this system makes it possible to achieve the accuracy of 0.02 mm.

ATTENTION: each material from which the filament is made has its own unique thermal shrinkage. To ensure the maximum precision of results, this calibration should be performed for the material from which the printout is to be made.

To begin the precise calibration of the XY axes, the special printout has to be made (fig. 58). Dimmension_Calibration.stl model is available at www.3dgence/support in the Your file tab (the tab is available after creating an account and registering the device). The model should be prepared for printing in 3DGence Slicer software for selected materials. The printout will take about 45 minutes.



Prepared models .stl and .gcode are also available at www.3dgence/support in the tab Your files
(the tab is available after creating an account and registering the device).

After printing, cooling down and removing the calibration cross carefully from the heatbed, measure the cross along X and Y axes. They are marked on the model. Different tools can be used to make the measurement, but their accuracy must be at least 0.05 mm:

- slide caliper,
- micrometer,
- coordinate measuring machine,
- optical tools.

The printout should be measured along X and Y axes. To increase the measurement certainty, follow the below instructions:

- the measuring point should be in the middle of the model height above the step, both points at the height of the same layer (fig. 59),
- measurements for X and Y axes should be made 5 times for each axis. Reject the highest and the lowest measurement result from each group. Other measurements should be averaged for each axis (fig. 60).

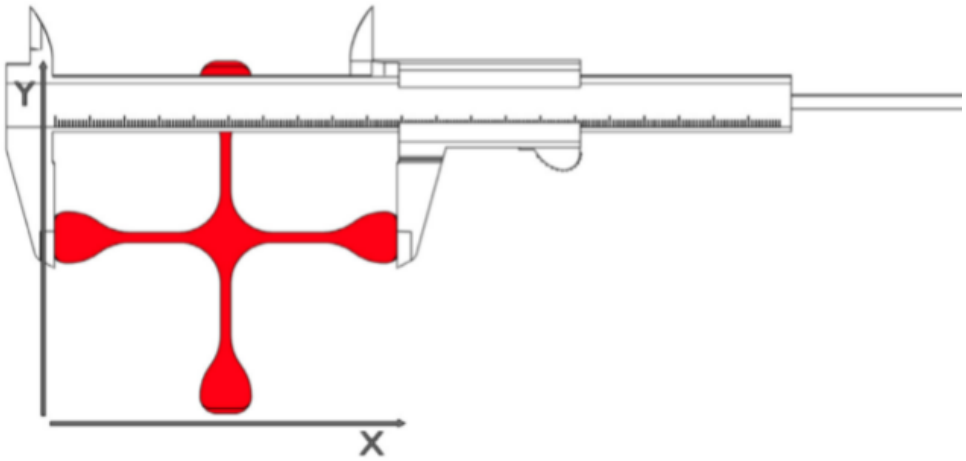


Fig. 59 Measurement visualization

MEASUREMENT:	X:	Y:
	100.08	100.07
	100.06	100.06
	100.05	100.08
	100.04	100.06
	100.05	100.05
AVERAGE:	100.05	100.06

Fig. 60 Table of measurements for X axis and Y axis

The result of such action will be the basis for further operations:

1. Go to MENU → ADVANCED → XY CALIB. (fig. 25).
2. Choose ORIGIN X and use –/+ keys to enter the value of the dimension given to the model in X axis. In the case of Dimmension_Calibration.stl file downloaded from the website, this value is 100,00 mm.
3. Choose PRINT X and use –/+ keys to enter the value measured on the cross in X axis.
4. Choose ORIGIN Y and use –/+ keys to enter the value of the dimension given to the model in Y axis. In the case of Dimmension_Calibration.stl file downloaded from the website, this value is 100,00 mm.
5. Choose PRINT Y and use –/+ keys to enter the value measured on the cross in Y axis.
6. Confirm the changes with the Save key. Additionally, in order to verify correct axis calibration, you can print the Dimmension_Calibration.stl model downloaded from the website once again and measure it. Thanks to this procedure, the next printout of the material for which calibration was performed will be printed with compensation of material shrinkage along X and Y axes.

5. CALIBRATION OF OFFSETS ALONG X, Y AND Z AXES

Due to design characteristics of the dual hotend 3D printer, there are differences in the position of the hotends along X, Y and Z axes. X/Y/Z Offset is the name of the parameter describing the position difference of T1 extruder nozzle with respect to T0 extruder nozzle along X/Y/Z axes. Fig. 61 shows the visualization of the offsets along X axis and Z axis. This difference can be compensated by the printer settings, using the touch panel.

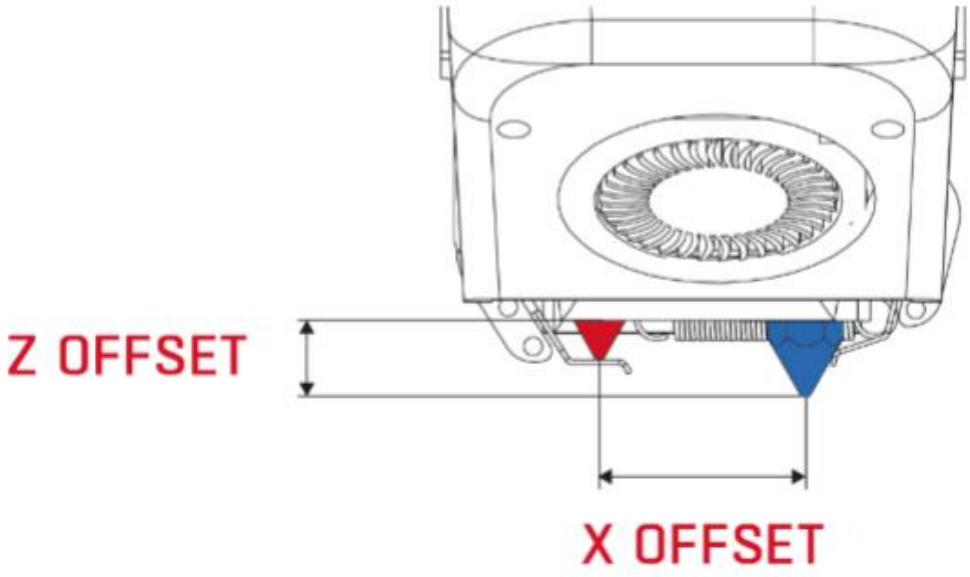


Fig. 61 Visualization of the nozzle position difference (offsets)

ATTENTION: After each change of the hotend, the Z offset should be calibrated, and then the offsets along the X and Y axis should be calibrated!

Calibration of Z axis offsets:

To calibrate the nozzle position difference along Z axis, use the Z MEASURE option available in MENU → ADVANCED → MODULE CALIB. The printer makes the tensometric measurement of the distance of both hotends (T0 and T1) from the heatbed and recalculates these distances to the position difference of the T1 extruder nozzle with respect to the T0 extruder nozzle.

The Z offset value can be also modified manually: MENU → ADVANCED → MODULE CALIB. → Z OFFSET and use the +/- keys to enter a value.

Calibration of XY offsets:

In order to verify the offset along the X, Y axes, the calibration model should be printed in the printer memory (procedure described below). The model is prepared for PLA and BVOH materials. The printout takes about 10 minutes. The model consists of two parts - part X (fig. 62) and part Y (fig. 63). Part X is used to set offset between hotends along the X axis. Part Y is used to set offset between hotends along the Y axis. Each part consists of two material layers - the bottom layer printed from support material (fig. 62, white) and the upper layer printed from model material (fig. 62, red). Each part of the model is built of 11 lines. The middle line is point 0.00. The lines to the right from point 0.00 increase with the plus sign every 0.05 mm in the range from 0.05 mm to 0.25 mm, and the lines to the left from 0.00 point decrease with the minus sign every 0.05 mm in the range from -0.05 mm to - 0.25 mm (fig. 62, 63). Printed symbols: "+" on the right side and "-" on the left side are helpful in determining the character with which the read value will have to be entered into the printer (fig. 62, 63). With correctly calibrated offsets on the middle line (point 0.00), the model material coincides with the support material both along the X axis and along the Y axis.

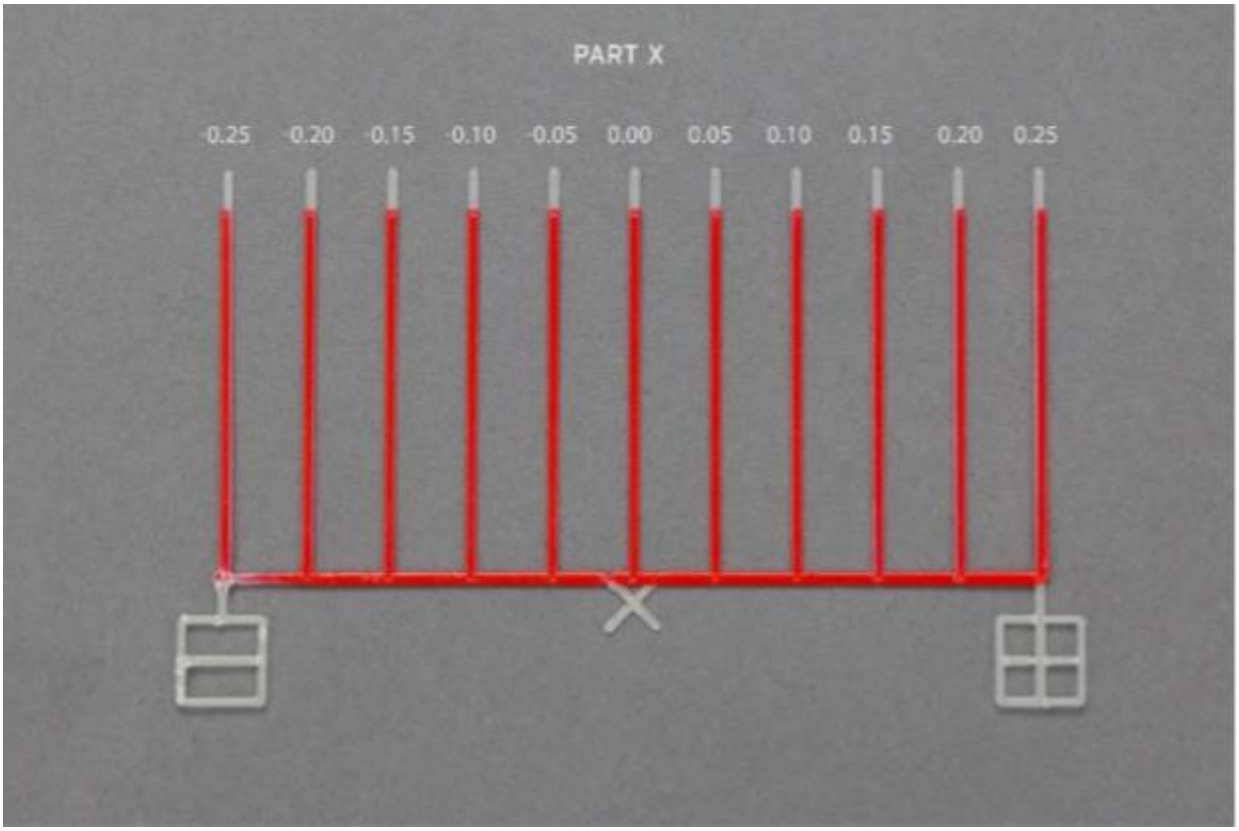


Fig. 62 Calibration model of offset along X axis

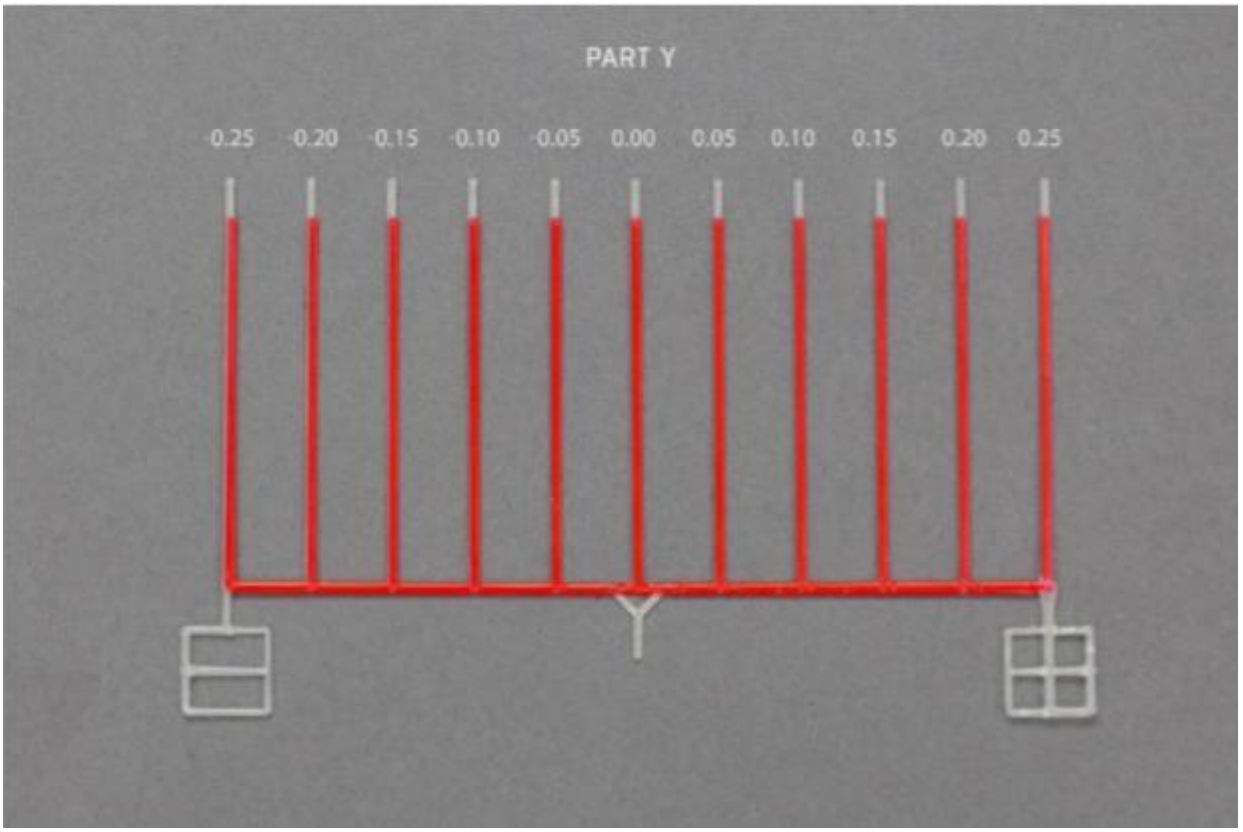


Fig. 63 Calibration model of offset along Y axis

Figure 64 presents two calibration models – part X. The first one (at the top) has incorrect offset values along the X axis, while the second one (at the bottom) has correctly calibrated offset values along the X axis (fig. 64). With correctly calibrated offsets on the middle line (point 0.00), the model material coincides with the support material both in the X axis and in the Y axis (Fig. 64, bottom model).

First of all, on the out of calibrated model find the line on which the model material (fig. 64, red) is best covered with support material (fig. 64, white). On the top model (fig. 64), the materials overlap best on the third line to the left of point 0.00. This line is distanced from point 0.00 at -0.15mm. This means that the X offset value is shifted by -0.15 mm and by this value the X offset value entered in the calibration menu must be corrected (the offset procedure in the X and Y axis is described below).

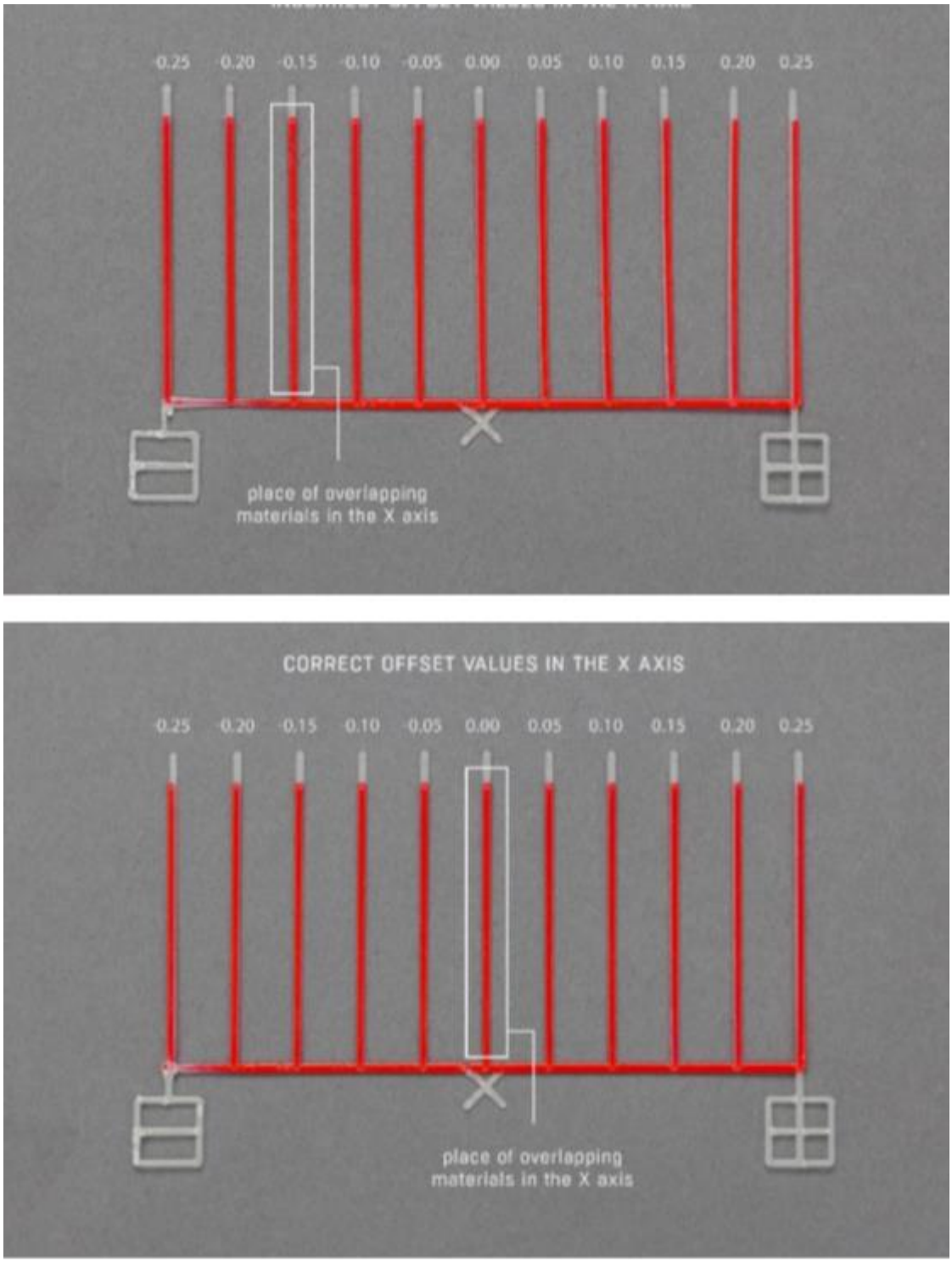


Fig. 64 Comparison of correctly calibrated offset values with incorrectly calibrated ones

Calibration of XY offsets:

1. Load the model filament (PLA) and support filament (BVOH) by selecting from the printer menu: MATERIALS → LOAD MODEL MATERIAL / LOAD SUPPORT MATERIAL and follow the instructions on the display.

2. Print the calibration model in the printer memory by selecting from the printer menu: MENU → ADVANCED → MODULE CALIB. → AUTO XY CALIB.

3. After printing the model, select the line on the display on which the model material with the support material in part X is best covered (fig. 65).

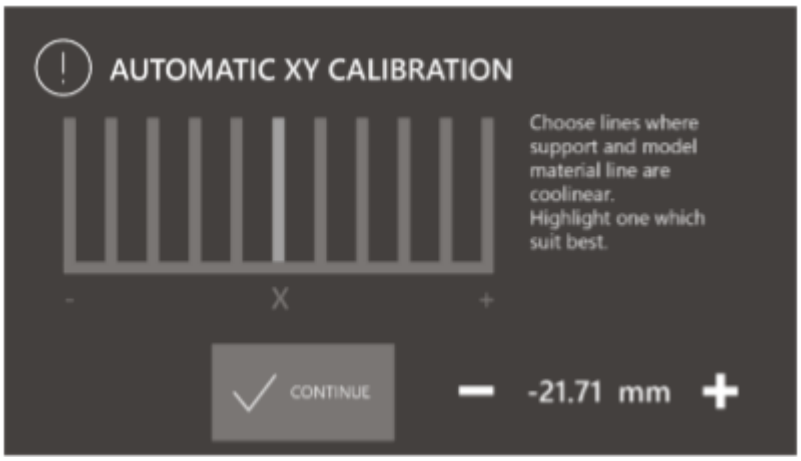


Fig. 65 Automatic offset calibration screen in the X axis

4. Select the CONTINUE button.
5. Select the line on the display on which the model material with the support material in part Y is best covered (fig. 66).

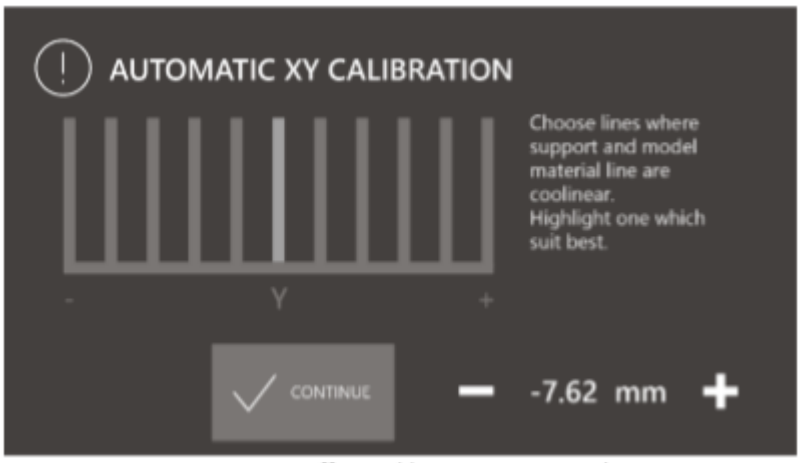


Fig. 66 Automatic offset calibration screen in the Y axis

6. Select the CONTINUE button.
7. Confirm with the SAVE key.
8. Print the calibration model in the printer memory again by selecting from the printer menu: MENU → ADVANCED → MODULE CALIB. → AUTO XY CALIB. and visually check the offset calibration level:

• if on the middle line the model material coincides with the support material both in the X axis and in the Y axis - the XY offsets of the dual hotend module are calibrated correctly,

• if the model material does not coincide with the support material both on the X axis and in the Y axis on the middle line - the XY offsets of the dual hotend module are not calibrated correctly. Calibrate the offsets again in accordance with points 2 - 7.

6. GEAR BELT TENSION MEASUREMENT

Recommended frequency: every six months or every 2000 h

Once every six months or every 2000 hours it is recommended to review the technical condition of toothed belts consisting in visual assessment of the degree of wear of the belts and checking their tension.

Before proceeding to check the tension of the toothed belts, you should obtain:

- Belt Tension Tester BTT Hz (Fig. 67).

Fig.67 Belt Tension Tester BTT HZ

Procedure of the measurement of the tension timing belts.

1. Run the belt tension tester (Fig.68).

Fig. 68 Start tester

2. Move the carriage of the module to the maximum left side.

   Measurement of the tension timing belts on the axis X

   - Start the tester.
   - Place the microphone facing the toothed belt side at the third black mounting hole of the linear guide counting from the right side of the printer.

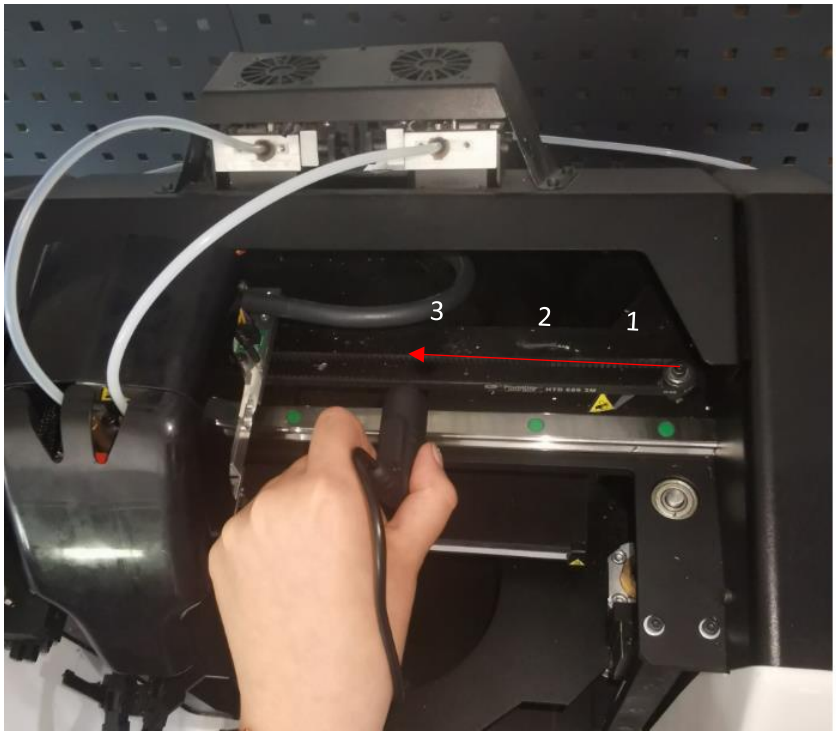


Fig.69 Measurement toothed belt on the X axis

- Make the timing belt vibrate by vigorously jerking it like a guitar string.
- Check the voltage value on the tester and read the frequency value.

For a correctly tensioned Timing Belt on the X2 axis, the measured value should be between 71-75 Hz.

If the measured tension value is not within the specified ranges, please contact the 3DGence Technical Support for assistance.

Measurement of the tension timing belts on the axis Y

3. Move the Y axis to the maximum back position.
4. Place the microphone facing the toothed belt side at the third black mounting hole of the linear guide counting from the right side of the printer (Fig. 70).

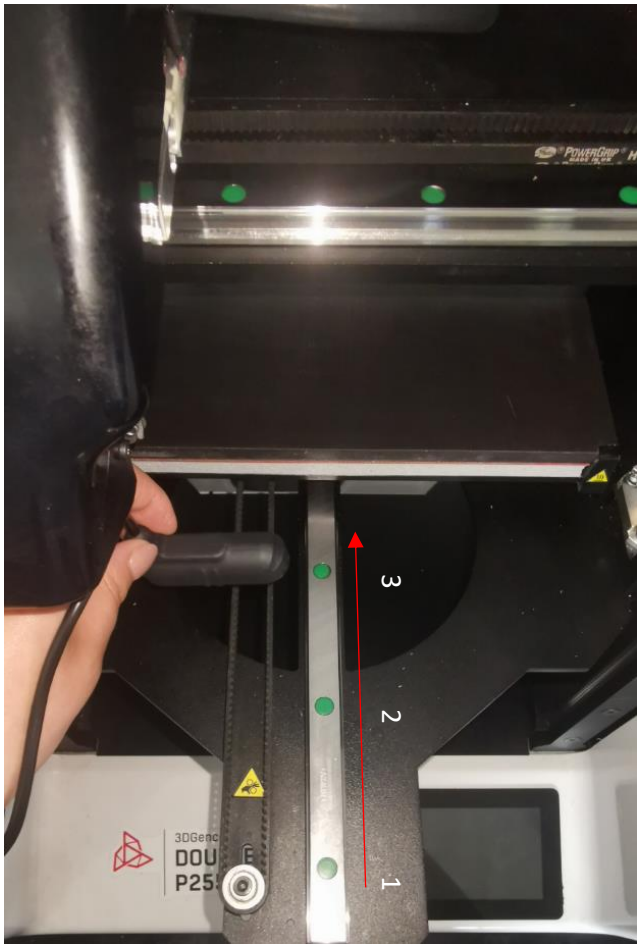


Fig.70 *Measurement toothed belt on the Y axis*

- Make the timing belt vibrate by vigorously jerking it like a guitar string.
- Check the voltage value on the tester and read the frequency value.

For a correctly tensioned Timing Belt on the Y axis, the measured value should be between 71-75 Hz.

If the measured tension value for tension belts is not within the specified ranges, please contact the 3DGence Technical Support for assistance.

7. LUBRICATION OF GUIDES AND TRAPEZOID BOLT

Recommended frequency: every four months.

1. Before you start to lubricate, please obtain:
   - Grease SKF LGEP 2 (grease according to norm DIN 51825 or class K2K),
   - a manual lubricator (Fig.71).

Fig.71 Manual lubricator

2. Choose the appropriate grease:
   -for trapezoid that aren't equipped with grease nipples and for linear guides:
   - Grease SKF LGEP 2 (Fig.72)

Fig. 72 Grease SKF LGEP 2

3. Fill the lubricator with the appropriate grease according to the manufacturer's instructions.

LUBRICATING THE TRAPEZOID BOLT

1. Set the heatbed to the lower position (Menu → Lower heatbed).
2. Move heatbed towards to you.
3. Lubricate trapezoid bolts and linear guides:

- Push grease into the grease nipple and around of the left linear carriage (Fig.73). It is located at the top of the liner carriage. Push grease out by pressing the lubricator nozzle firmly against the grease nipple and pressing smoothly the lubricator lever once.

Fig.73 Linear carriage grease nipple

4. Apply grease to the raceway of the trapezoid bolts (left and right) Fig.74
5. using a wooden stick (or other blunt tool).
   -Apply the grease every 5 cm.

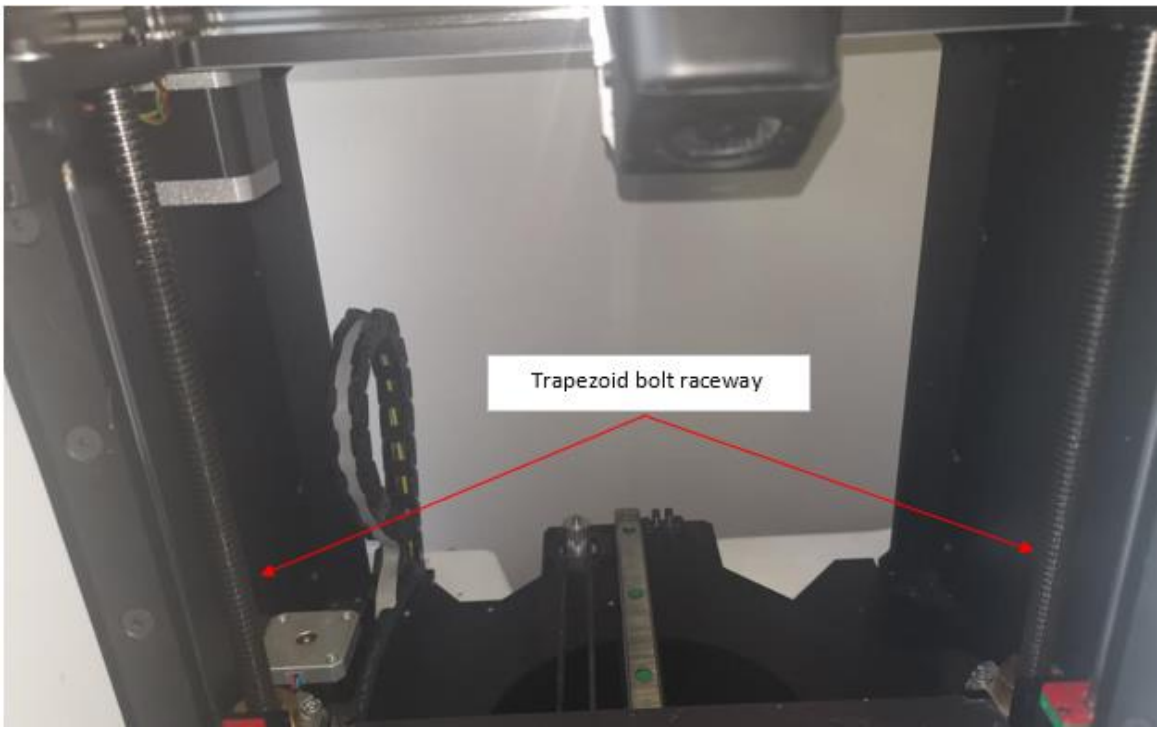


Fig.74 Trapezoid bolt raceway

6. Raise the heatbed (Menu-> Upper heatbed).
7. Lower the heatbed (Menu ->Lower heatbed).
8. Collect excess grease from linear carriages and trapezoid bolt nuts using a paper towel.
9. Apply grease to the raceway of the trapezoid bolts (left and right) using a wooden stick (or other blunt tool).

10. Raise the heatbed (Menu-> Upper heatbed).
11. Lower the heatbed (Menu ->Lower heatbed).
12. Collect excess grease from linear carriages and trapezoid bolt nuts using a paper towel.

LUBRICATING THE X AXIS

1. Move the module to the left until it stops to get access to the grease nipple on the X axis carriage.
2. Push grease into the grease nipple of the linear carriage of the X axis (Fig.75) by pressing the lubricator nozzle firmly against the grease nipple and pressing smoothly the lubricator lever once.

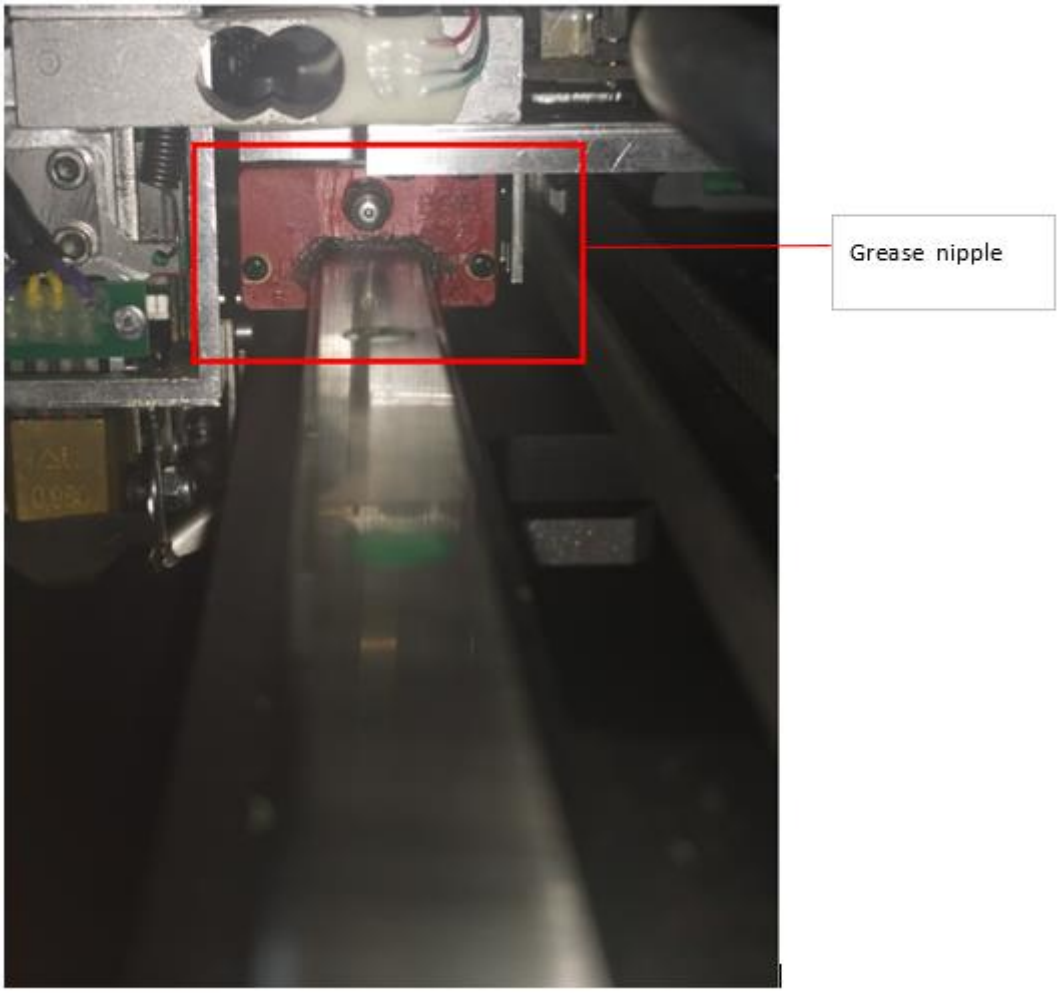


Fig.75 Linear carriage of the X axis

3. Move the module to the right and left twice.
4. Remove excess grease from the linear carriages using a paper towel.

LUBRICATING THE Y AXIS

1. Move the heatbed to the front of the printer until it stops, to get access the Y axis linear carriage grease nipple (Fig.76)
2. Push grease out by pressing the lubricator nozzle firmly against the grease nipple of the Y axis carriage and pressing smoothly the lubricator lever once.

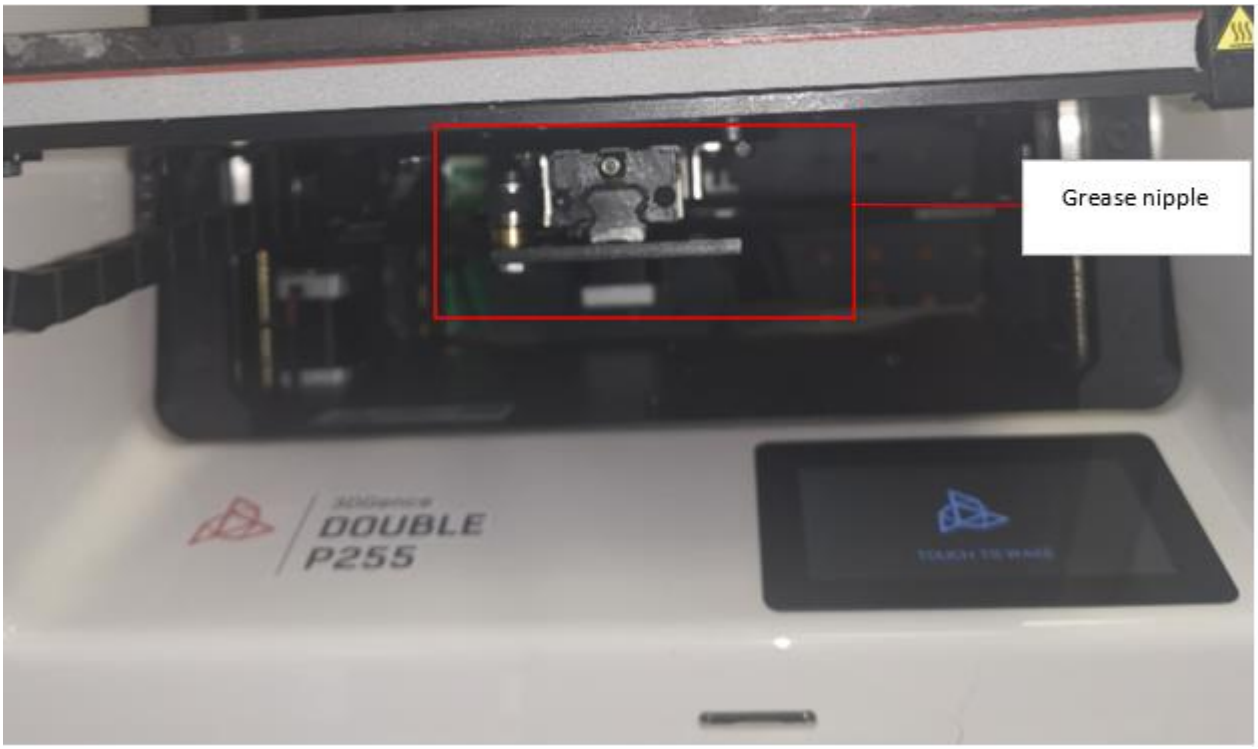


Fig.76 Linear carriage grease nipple Y axis

3. Move the heatbed back and forth twice.
4. Remove excess grease from the linear carriages using a paper towel.
5. Push grease out by pressing the lubricator nozzle firmly against the grease nipple of the Y axis carriage and pressing smoothly the lubricator lever once.
6. Move the module back and forth twice.
7. Remove excess grease from the linear carriages using a paper towel.