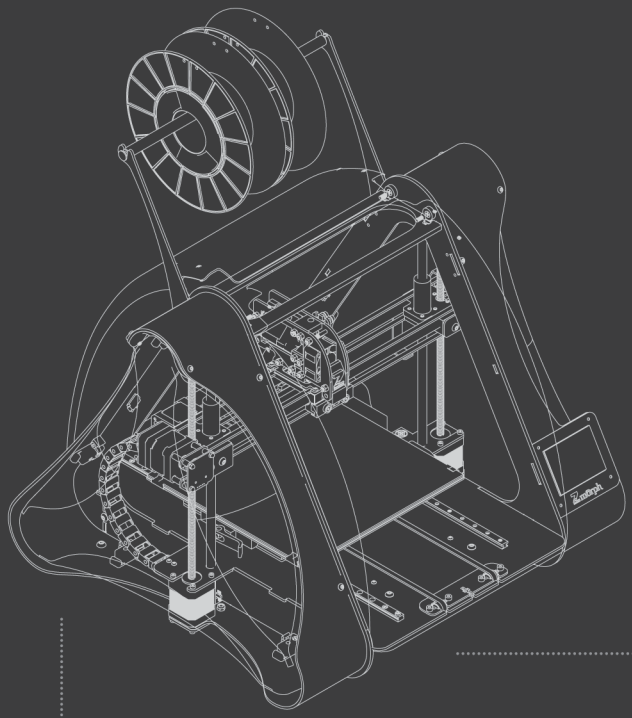
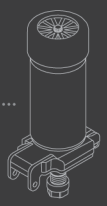
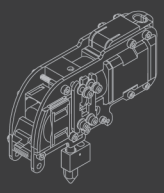
Product Manual

ZMorph VX Mooltitool 3D Printer

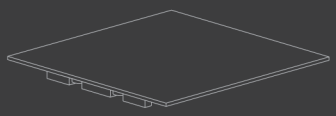




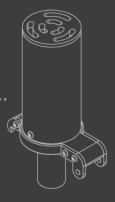
CNC PRO
Milling Toolhead



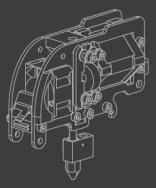
Plastic Extruder
3.00 mm



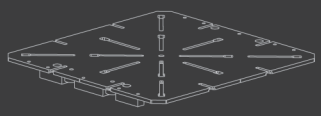
3D printing worktable



Laser PRO
Toolhead

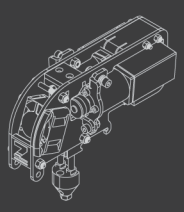


Plastic Extruder
1.75 mm



CNC worktable

Thick Paste
Extruder



Dual PRO
Toolhead

support.zmorph3d.com

Contents

1. Manual guide

1.1 Introduction

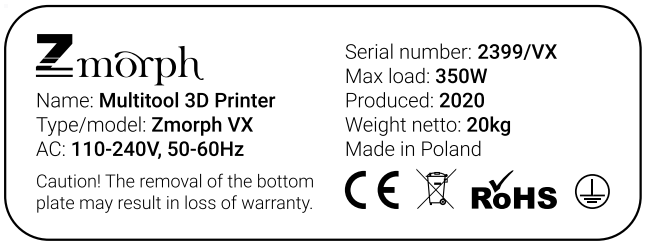
This manual describes the basic information about ZMorph VX, safety precautions, preparation for operations and basic maintenance. Read this manual guide carefully and understandably before operating the device for the first time. Ignorance of the instructions may result in damage to the device, personal injury or reduced quality of the printed parts. Make sure that everyone who uses the device has read and followed these instructions. The manufacturer of the equipment makes every effort to ensure that the safety of use, transport, storage and disposal is at the highest level. However, the manufacturer has no direct control over the user and the use of the device, therefore he is not liable for injury, damage and costs resulting from non-compliance with these instructions.

1.2 Markings contained in the instructions guide and on the device

Moving parts hazard - to avoid injury or damage to parts of the body, do not reach inside the unit or insert any foreign objects while the unit is in operation, during operation or at rest.

High voltage - this symbol indicates the area where the user may be electrocuted.

Hot surface - this symbol warns of high temperatures to avoid burns.



ZMorph VX Nameplate

2. Health and safety at work

2.1 General safety information

This manual contains warnings and safety information for your ZMorph product. The manual also indicates situations to which special attention should be paid, and warnings about misuse or neglect of the device. It is also important to read the material safety data sheets available at the address: https://zmorph3d.com. Regular updating of the firmware is also important to prevent defects and damage. To keep track of the latest instructions and software updates, it is recommended that you visit the site https://support.zmorph3d.com regularly. Place the unit on a level and clean surface. The device must be secured against overturning, falling from a height or being knocked down by people moving in the vicinity.

- ZMorph VX Multitool 3D Printer generates very high temperatures during operation, and has easily accessible moving parts. Caution is advised.
- When operating the printer, avoid situations that could cause burns or interfere with the proper functioning of the device.
- Due to their size and specificity, ZMorph devices are not intended for use by children under 14 years of age and persons with reduced manual, motor and psychomotor skills. If the device is operated by handicapped or elderly people, the Manufacturer recommends using assistance or supervision of appropriately trained persons.
- Do not leave the device unattended during operation, especially when working with the Laser PRO toolhead.
- Periodically check the condition and functionality of the 3D printer to avoid potential malfunctions.
- Switch off the device after finishing work.
- Regularly check the wear and tear of parts in the machine. The list of spare parts can be found in the spare parts section.
- For assistance with technical problems and any maintenance work, please contact the Technical support at the following address: https://support.zmorph3d.com
- Keep the unit away from heat sources, flammable materials, equipment emitting radiation, moisture, water and other liquids.
- Before starting work, ensure that the device is out of reach for children and animals.
- Be careful not to drop, hit or shake the device.
- This device is not intended to operate in a potentially explosive atmosphere.

For detailed information on the safety of devices with different toolheads, please refer to the separate chapters.

2.2 Occupational hygiene

- Special care must be taken when carrying out a repair, maintenance or servicing operations. The user is exposed to high temperatures. Protective gloves are recommended.
- It is recommended that a dedicated space with adequate ventilation is provided for the device. It is not recommended that you stay in the same room where the device is working continuously.
- Fumes emitted during 3D printing or laser engraving can be hazardous, depending on the material used. Some substances, in combination with accumulated dust, can have a negative effect on people in the long-term exposure.
- The noise emitted when working with 3D printing toolheads is 45 dB and when milling is less than 70 dB, but continuous presence in one room can cause discomfort to the user.
- Place the device on a stable and flat surface.
- The device is equipped with a vibration-damping base.
- Follow the toolhead cable descriptions while connecting them to the machine and do not connect devices that are not authorized by the manufacturer.
- Do not use materials that may damage the device or that are not authorized for use with the toolheads.
- When using ZMorph VX, ensure all necessary health and safety measures as described in this manual and separate regulations.
- Handle the sharp accessories and tools included with the kit with special caution.

2.3 Electrical safety and risk

ZMorph VX devices have been tested to comply with the Low Voltage Directive. In order to ensure maximum safety of use, including protection against short circuits, overloads, overvoltages and overheating of the product, the following provisions must be observed:

- Do not modify the machine, toolheads and its electronic components.
- Do not use electronic substitutes other than those recommended by the manufacturer.
- Replacement of electronic components should be done in accordance with the recommendations and instructions provided by the manufacturer.
- Before connecting the 3D printer to the power outlet, make sure that the voltage required by the device corresponds to the voltage available from the power source. For power supply information, refer to the nameplate on the rear of the device.
- Avoid overloading the power outlet to which the 3D printer is connected.
- The device must be properly grounded. Always make sure that the grounding is in accordance with local and national regulations.

- Use only the original power cord or one authorized by the manufacturer. It must not be destroyed, cut or repaired. Replace a damaged cable immediately with a new one.
- Perform repair and maintenance work on the device when it is disconnected from the power supply.
- Do not expose the device to moisture or modify electronic components (e.g. soldering).

2.4 Safety and mechanical risks

The device includes moving parts such as toothed belts, gears, motors, toolheads and a worktable. In order to ensure maximum safety for the operator and the device follow these precautions:

- Do not reach inside the unit or insert any foreign objects while the unit is during operation.
- Use the accessories supplied with the unit for their intended purpose and take special care when handling them. Their improper use may cause personal injury.
- Special care must be taken when removing the printout from the worktable and protective glasses should be worn, as there is a risk of fragments of the material scattering towards the eyes.

2.5 Risk of burns

There is a high risk of burns, as the temperature of the extruder can be as high as 250°C. Do not touch the toolhead with bare hands and use caution when operating hot components. If it is necessary to hold a hot item, use specially adapted pliers and/or tweezers. The hot components should not take more than 30 minutes to cool down. The temperature of the worktable can reach even 125°C, therefore, special care should be taken during use, in particular when performing operations or removing the finished printout. Do not underestimate the risk of burns on the device. In addition, design modifications to the device with respect to changes in operating temperature are not permitted, as they may result in serious injury or permanent damage to the printer.

2.6 Instructions for safe storage and transport

- Store ZMorph VX devices at -10 to 40°C.
- The storage place should be free from moisture and extreme weather conditions.
- During storage, the devices should be oriented in a vertical position with the top facing the direction marked on the box:

- When stored in original packaging, a maximum of 30 kg of weight can be placed on a single package.

Recommendations for packing:

- To transport the device, it is best to protect it with original protective foams; in case of lack of original foams, the device should be protected in such a way that free movement of the device in the transport packaging is not possible.
- Secure all moving components (toolhead with X-carriage and worktable with Y-axis) in such a way that they cannot be moved during transport.
- In particular, the glass plate of the worktable should be kept in mind, as it can slide out of the mounting clips during transport. Make sure that it is secured against ejection.

Recommendations for transportation:

- When placing several devices on a pallet, observe the markings on the packaging:


Protect against moisture.


Careful, fragile - a load that can easily be broken.


Do not roll.

Stack up to two packages one on top of the other.

- The weight of one device with toolheads is approximately 30 kg.
- It is recommended to safely store the devices on a pallet, but not more than 1.0 m high.
- One pallet (standard size 1200 x 800mm) can hold up to 4 devices.
- Remember that the edges of the packaging should not protrude beyond the outline of the pallet. Devices placed in this way on a pallet should be properly packed, bound and then wrapped with foil.
- At least two people must be involved in loading and unloading one machine. The packaging should be lifted by the designated handles on its sides

2.7 Electromagnetic compatibility (EMC)

Every ZMorph device is electromagnetically compatible in accordance with the EMC directive. It was tested in laboratory conditions meeting the standards of the European certificate of conformity. Its operation meets the following conditions in accordance with the EMC Directive:

- this device (system) does not cause harmful interference to other devices (systems),
- this device (system) is not sensitive to interference from other devices (systems),

2.8 Laser radiation

The Laser PRO Toolhead supplied with ZMorph VX is a Class 4 laser with a power of 2.8 Watts and an emitted wavelength of 450 nm. Such lasers are extremely dangerous and emit visible and invisible radiation. Diffuse radiation is dangerous for the eyes and skin. Materials evaporated from the surface of illuminated objects are a potential hazard. Depending on the material used, toxic fumes may occur affecting the respiratory tract and eyes of the user. In order to use the Laser PRO Toolhead, the user should be familiar with the principles of safe use (chapter 14.6).

3. Manufacturer's warranty and liability

ZMorph VX Multitool 3D Printer is designed to be modular and easy to service. In case of technical difficulty with any of the parts, it can be easily removed and shipped to manufacturer for maintenance.

3.1 Scope of the warranty

3.1.1 Guarantor is only liable for the physical defects resulting from the inherent causes in the sold product.

3.1.2 Duration of the warranty starts at the date of purchase of the product by the initial Buyer. The Date of Purchase is the date specified in the sales invoice. The warranty period of the repaired product is extended by the time which was required to repair the product (which includes the time from the delivery of the defective product with the complete warranty claim until the date of returning the repaired product to the Costumer).

3.1.3 Warranty does not cover defects resulting from other causes than indicated in clause 3.1.2, especially any defects resulting from:

a) improper use or application of the product;
b) improper product selection for the existing installation site conditions;
c) improper or inconsistent with User Guide installation (including improper connection to the main power supply), maintenance, storage or transport;
d) mechanical, chemical or thermal damages;
e) deliberate product damages;
f) damages ensuing as a result of non-original or inconsistent with Zmorph's recommendations or with the User Guide product use;
g) random events;
h) factors being result of major force, random events or any other external factors;
i) use of non-original parts or consumables;
j) modifications, repair attempts, interference in the product carried out by any other person than ZMorph representative or other representative authorized by ZMorph to carry out any of the above mentioned actions;
k) continued usage of the product despite occurrences indicating an obvious defect;
l) improper transport methods provided by the Costumer;

3.1.4 The warranty does not apply to the consumable parts (such as nozzle, PTFE tube, jagger, toothed belts, glass part of the table, bearing) unless failure has occurred due to a defect in materials or manufacture.

3.1.5 The warranty shall cease to apply in the event of:

a) any product modification by any person not authorized by Zmorph;
b) any repair attempts of product by any person not authorized by Zmorph;
c) other interference in the product carried out by any person not authorized by Zmorph.

3.1.6 The warranty service does not apply to the actions stipulated in the User Guide which the user is obligated to perform on their own and at their own expense.

3.1.7 The warranty applies without territorial restrictions.

3.2 Acceptance of warranty claim

3.2.1 The warranty claims may be accepted either at the shop where the product was purchased or at the authorized service or at ZMorph's registered office.

3.2.2 Acceptance of warranty claim requires:

a) returning a completed warranty claim during a warranty period to the Service Center;
b) including the name of the product, the date of purchase, a detailed description of the damage, as well as the description of the defect in the warranty claim;
c) attaching the original proof of purchase to the warranty claim;
d) delivering the defective product to ZMorph's registered office at the Costumer's expense.

3.3 Claim processing period

3.3.1 The Service Team shall repair the defective product within 14 working days from the date of delivery of the defective product with the complete warranty claim to the correct Service Center.

3.3.2 The claim processing period may be extended by the time necessary to import the required replacement parts of the product. In all cases the Costumer shall be informed on the extended claim processing period.

3.4 ZMorph's liability

3.4.1 ZMorph is not required to modernize or modify the existing products after launching their new versions.

3.4.2 ZMorph shall not be liable for any damages incurred by the Buyer due to the defect of the product, especially damages related to damage of other devices, loss of potential benefits or cost of replacement of the product. The clause shall not apply to the Buyer who is a Consumer.

3.4.2 The warranty does not waive, restrict or suspend any rights of the Buyer who is a Consumer due to the product being non-compliant with the contract.

4. Certificates

ZMorph S.A,
ul. Tęczowa 57, 53-601 Wrocław
NIP: 899-274-32-04
KRS: 0000724021
+48 71 33 68 923, contact@zmorph3d.com
www.zmorph3d.com

UE/EC DECLARATION OF CONFORMITY

Manufacturer/address:

ZMorph S.A.
ul. Teczowa 57, 53-601 Wrocław, Poland

Object of the declaration:

Personal fabricator
Type/model: ZMORPH VX

Object of the declaration described above is in conformity with the directives:

EMC 2014/30/UE; RoHS 2011/65/WE; LVD 2014/35/UE; MAD 2006/42/WE

The object also is in conformity with the relevant community harmonisation legislation:

PN-EN 55011:2016-05; PN-EN 61000-3-3:2013:10; PN-EN 61000-4-2:2011; PN-EN 61000-4-3:2007+A1:2008+A2:2011; PN-EN 61000-4-4:2013:05; PN-EN 61000-4-5:2014-10; PN-EN 61000-4-6:2014-04; PN-EN 61000-4-11:2007; PN-EN 61000-4-11:2007; PN-EN 61000-3-2:2014-10; PN-EN 55011-1:2012 group 1; PN-EN 55011-:2012 class B; PN-EN 61000-3-3:2013; PN-EN 61000-3-2:2014-10; PN-EN 61000-4-4:2013; PN-EN 61000-4-3:2007; PN-EN 61000-4-6:2009; PN-EN 61000-4-5:2014; PN-EN 61000-4-11:2007.

The declaration was issued as a result of the conformity assessment procedure conducted with the directives.

Confirmed by the sign:

CE

Independent laboratory tests were conducted.

Any change made to this device will void this declaration.

It is forbidden to use the device against its intended use.

This declaration of conformity is issued under the sole responsibility of the Manufacturer.

The technical documentation is kept at the Manufacturer address.

Wrocław 01.10.2018r.

Maciej Nowak

ZMorph S.A. z siedzibą we Wrocławiu, zarejestrowana w Sądzie Rejonowym dla Wrocławia-Fabrycznej we Wrocławiu,
IV Wydział Gospodarczy Krajowego Rejestru Sądowego pod nr KRS 0000724021, NIP 899-274-32-04, REGON 022111640.
Kapitał zakładowy: 160 526,40 zł opłacony w całości.

5. What is ZMorph VX

The ZMorph VX product is a multitool 3D printer. It has a system of interchangeable toolheads, designed to perform 3D model prints in Fused Filament Fabrication (FFF) technology, CNC milling, and laser engraving and cutting. ZMorph VX together with Voxelizer software provides a complete environment for moving 2D and 3D projects from monitor screen to reality. The device can operate independently or with an external computer on which the control software is installed. In this case, a USB connection or LAN connection is required. The control software is available on the manufacturer's website https://voxelizer.com The device is equipped with a built-in touch screen LCD panel which serves as a graphical interface for operation in standalone mode. The LCD panel has a port for SD cards on which it is possible to deliver ready-made executive files (G-code files). Files can also be sent to the device's internal memory via a computer.

ZMorph VX can be used with many different materials, such as: plastics (PLA, ABS, TPE, PET, HIPS, PVA, Nylon), wooden and wood-like materials (plywood, fiberboard), PCB, acrylic, aluminum, thick masses (chocolate, cream).

Due to the closed working area, the machine can be used for more demanding materials, e.g: ABS and Nylon. Closed covers ensure a constant temperature of the working space, thus creating a working atmosphere that prevents the occurrence of adverse phenomena such as: shrinkage of material, delamination, surface deformations. If you use materials that require faster cooling, the special magnetic design of the lid hinges allows for quick and easy disassembly.

6. How to use your ZMorph VX 3D printer

Working with ZMorph VX starts by preparing a 3D model in a modeling software that supports files in one of the standard formats .stl, .obj, .step, .dxf or delivering a finished model acquired from external sources.

Then, the model has to be opened in a software dedicated by the manufacturer called Voxelizer. It allows you to manage 3D printing, CNC milling and laser engraving. It is a unique original application for slicing 3D models into layers, creating a whole chain of processing 3D files into G-code files and sending them to the device. The program allows you to perform simple editing operations and optimize models using 3D filters and intelligent system of support structures. Voxelizer also has advanced algorithms such as projecting an image onto a 3D object, allowing multi-material printing of images from .png and .bmp files.

After selecting the parameters and generating the G-code file, it should be saved. This file can be delivered to the device using an SD card or imported to an internal memory using a USB connection. You can also transfer a file via Ethernet, but the transfer process will be slower. To avoid the risk of data transfer interruption, it is recommended to use an SD card.

Alternatively, other software can be used to generate G-code files, but they do not fully take advantage of the capabilities of the ZMorph VX device and do not provide the support for CNC and Laser toolheads.

After the finished file in G-code format has been delivered to the device, it can be started by using the touch panel on the device, or by connecting to the device via Ethernet cable. It can be started directly from the Internet browser on the computer.

The product is intended for indoor use only. The device is not protected against moisture and has no air filters. The spaces in which the device operates must be dust-free, dry and well ventilated. When working with plastics (e.g. ABS, Nylon), harmful fumes can be released.

Unauthorised uses

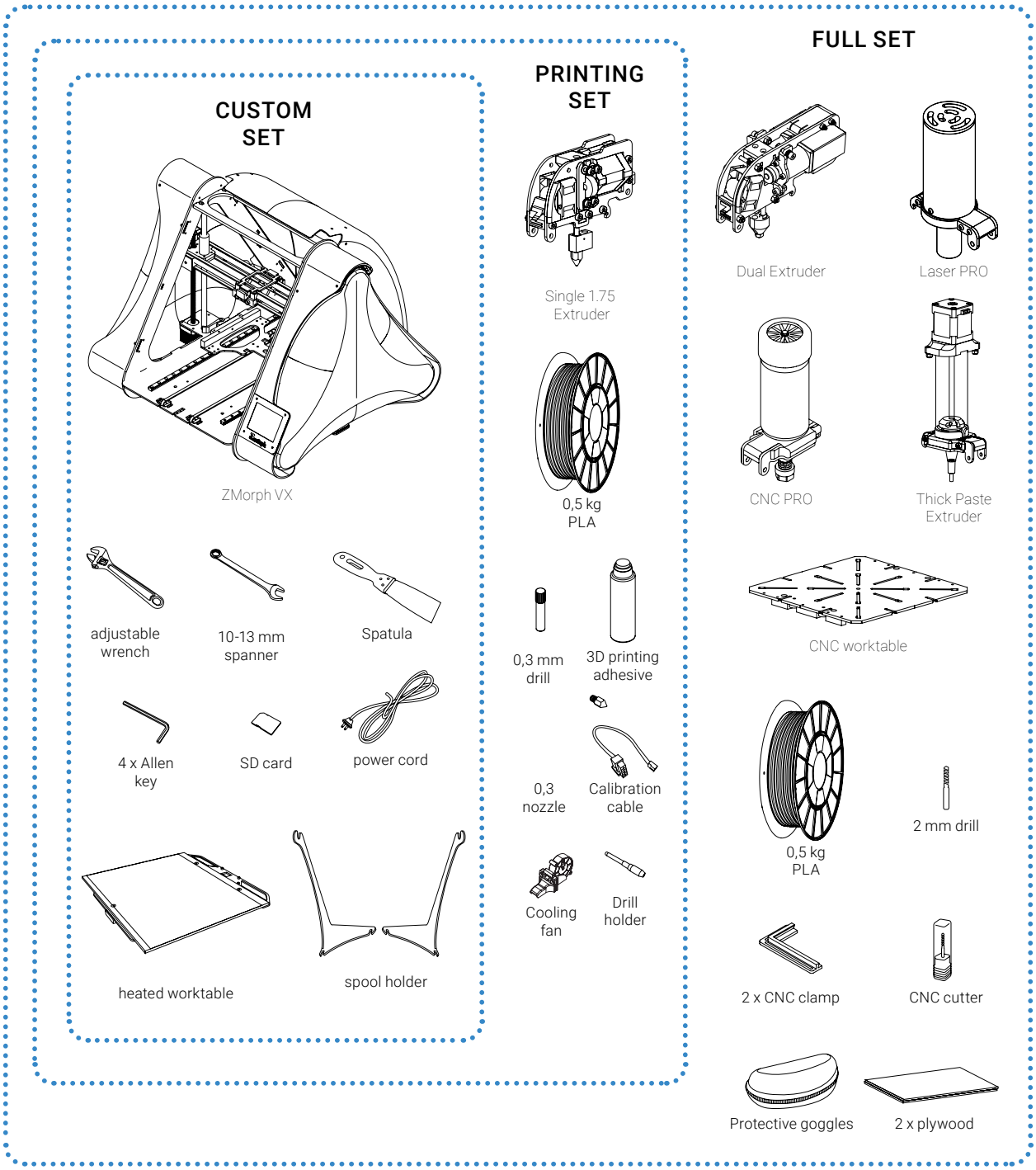
- It is forbidden to operate the device near flammable substances.
- It is forbidden to install the device outside areas which are dry and free from humidity or dust.

- It is forbidden to cover the device with any material during operation.
- It is forbidden to leave the device running unattended when working with the Laser PRO Toolhead.
- It is forbidden to install or service the device by unqualified persons.
- It is forbidden to interfere with the constructional solutions of the product.
- It is forbidden to connect the machine to a faulty power supply system.
- It is forbidden to connect the device to the a power outlet without grounding.
- It is forbidden to insert hands or any body parts between moving parts.
- It is forbidden to touch heated elements during operation.
- It is forbidden to use the device without the required protective equipment.
- It is forbidden for untrained personnel to operate the device.
- It is forbidden to use a damaged device.

7. Sets

7.1 Types of sets and their content

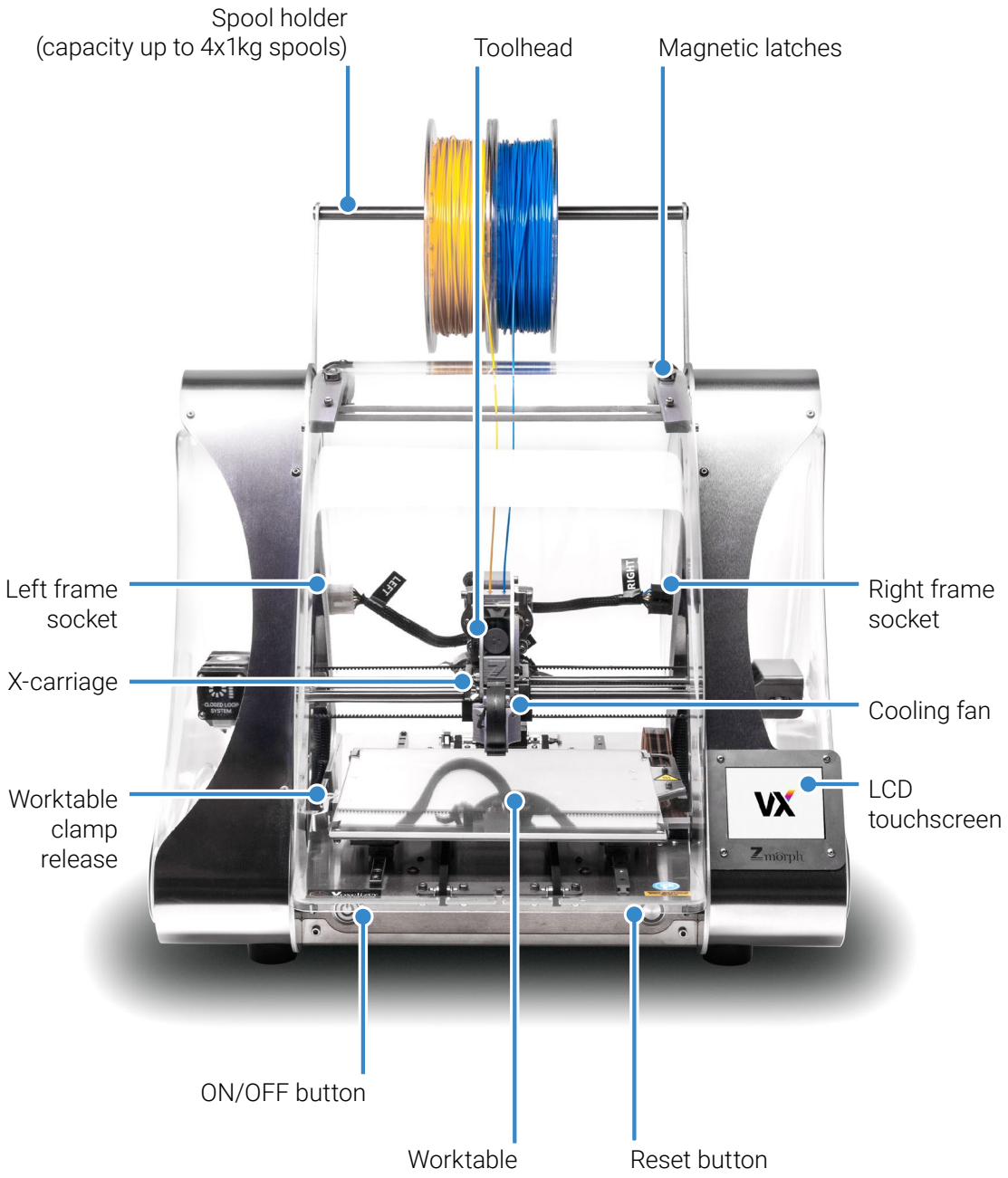
What's in the box:



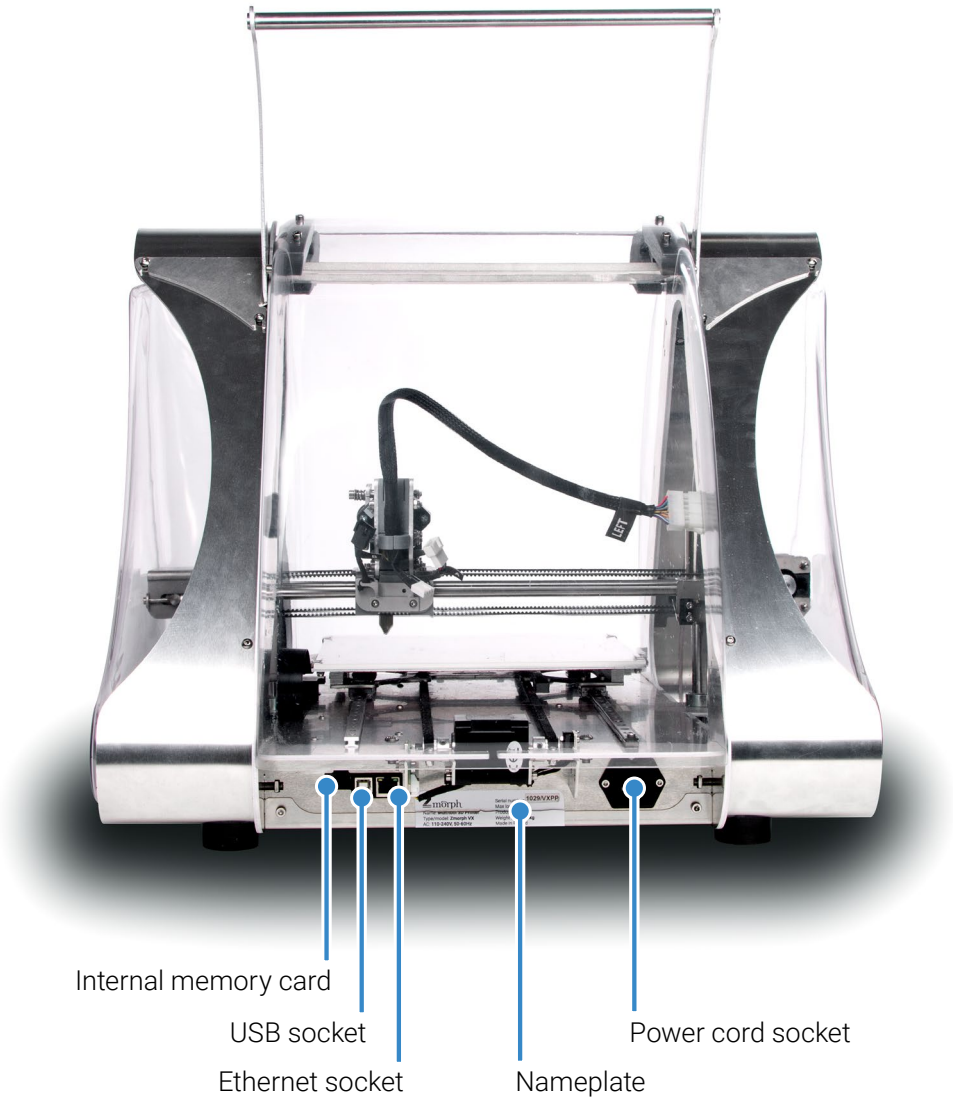
8. Machine specification

8.1 Overview

Front overview

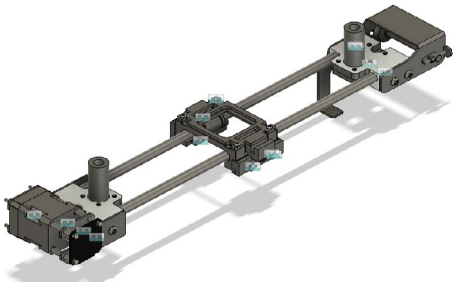


Back overview

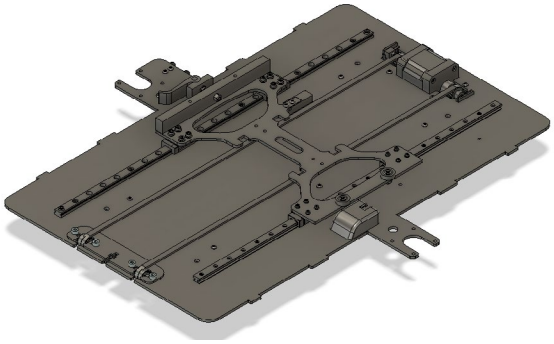


8.2 Components

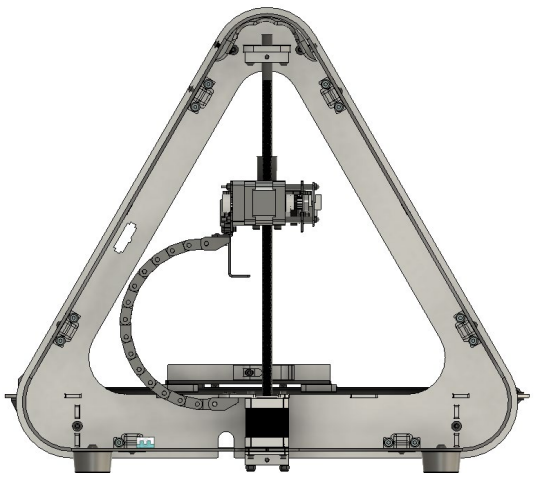
- X-axis - double-toothed belt system driven by a stepper motor and stainless steel rods as guiding elements. Used for movement of the ZMorph VX toolhead. Must be periodically lubricated to ensure a long life of the machine.



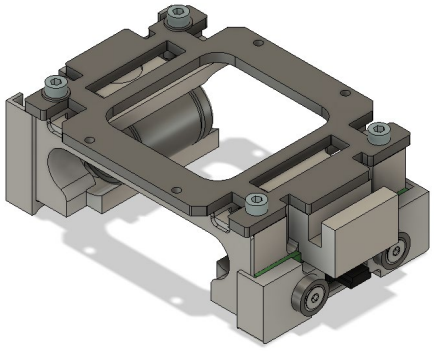
- Y-axis - double-toothed belt system driven by a stepper motor and hybrid (linear/sliding) rails as guiding elements. Used for movement of ZMorph VX worktable. Must be periodically lubricated to ensure a long life of the machine.



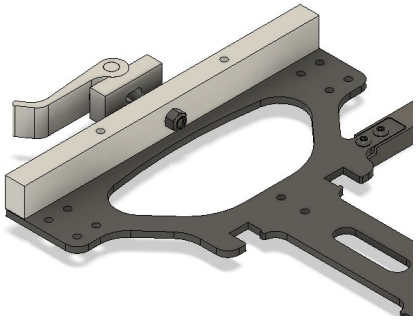
- Z-axis - axis driven by double stepper motors with integrated trapezoidal screws and high-quality POM trapezoidal nuts. Guiding elements are stainless steel rods and linear bearings. Used for movement of X-axis of ZMorph VX machine. Must be periodically lubricated to ensure a long life of the machine.



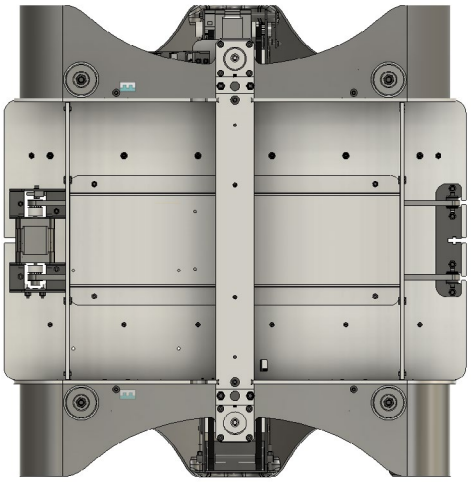
- X-carriage/Toolhead mount - element responsible for holding down toolhead, as well as automatic calibration. X-carriage has linear bearings mounted that slide on stainless steel rods and is also a housing for a calibration element - strain gauge. Toolhead mounting is described in 10.1 part of this manual.



- Y-carriage/Worktable fixation system - specially designed lever and magnets system for quick and effortless changing between additive and subtractive work surfaces. worktable changing is described in 10.2 part of this manual.



- The bottom cover of the machine - responsible for the protection of the motherboard and power supply from external damage and dirt. Allows air exchange for cooling internal electronics.



8.3 Functionalities

- Magnetic detachable covers - fully transparent covers allow for a clear, not obstructed view of fabrication processes. For easy cleaning and maintenance of the machine, covers can be removed thanks to the magnetic mounting system. Covers removal is described in 10.3 part of this manual
- External spool holder - designed for reliable filament unwinding during the 3D printing process. Mounted on the back of the machine doesn't obstruct filament path and doesn't take any additional space on your desk. Spool holder mounting is described in 9.3 part of this manual.
- Closed-Loop System - controls the current position of the toolhead in X and Y axes. Whenever detects the difference between the real and theoretical position of the toolhead, applies a correction algorithm to ensure the best quality of fabrication. It is also used as a protection system in case of severe positioning problems (like blocked toolhead).
- Toolhead changing system - quick and repeatable method for mounting different ZMorph toolheads. Properly mounted toolhead will ensure high-quality fabrication whether it is additive or subtractive manufacturing. Toolhead change is described in 10.1 part of this manual.
- Platform leveling - to ensure proper first layer adhesion your printing bed must be leveled. ZMorph has developed special software and mechanical solution to make the leveling process easy and reliable. There are both automatic and manual calibration methods available. Calibration methods are described in 12.7, 12.8, 13.6, 15.4 parts of this manual. Please remember that automatic calibration is available only for 3D printing toolheads.
- Filament change - an additional feature that can be performed during printing with both single and dual extruder. Allows for easy change of material to achieve either multi-colored or even multi-material models.
- Hibernation - a special software feature that allows to turn off the machine. During hibernation toolhead position is saved and later restored upon booting machine again.

8.4 Technical specification

Dimensions

Machine dimensions without the spool holder	520 x 500 x 450 [mm]
Machine dimensions with the spool holder	520 x 500 x 570 [mm]
Package dimensions	600 x 600 x 570 [mm]
Full Set weight	28.50 [kg]
Machine weight	14.25 [kg]
Single Plastic Extruder 1.75 weight	0.64 [kg]
Single Plastic Extruder 3.00 weight	0.71 [kg]
Dual Pro Toolhead weight	1.00 [kg]
CNC Pro Toolhead weight	0.90 [kg]
Laser Pro Toolhead weight	0.32 [kg]
Thick Paste Extruder Toolhead weight	0.60 [kg]

3D printing specifications

Print technology	FFF - (Fused Filament Fabrication)
Printing head	Single material 1.75 [mm], Dual PRO - single nozzle 1.75 [mm], Single material 3.00 [mm] *
Layer resolution	0.05 - 0.4 [mm] **
Minimum wall thickness	0.4 [mm] **
Dimensional accuracy of the fabricated model	+/- 0.2 [mm]
Platform calibration	Automatic, Manual
Printing volume	235 x 250 x 165 [mm]
Filament diameter	1.75, 3.00 [mm]
Nozzle diameter	0.2, 0.3, 0.4, 0.5 [mm]
Support structures	Mechanically and chemically removable - depends on used material
Connectivity	USB, Ethernet, SD card
Printable materials	PLA, ABS, PET, nylon, PVA, HIPS, ASA, TPE, PP, PC
Third party filaments	YES
Printing speed	40 [mm/s]
Travel speed	120 [mm/s]

Machine specification

Laser cutting and engraving specifications

Toolhead	Laser PRO
Laser spot size for 50mm	0.1 x 0.1 [mm]
Laser spot size for 80 mm	0.1 x 0.18 [mm]
Wavelength	450 [nm]
Laser class	4
Laser power	2.8 [W]
Operating sound	40 [dB]
Platform calibration	Manual
Cutting/engraving volume	235 x 250 x 85 [mm]
Cutting/engraving speed	1 - 15 [mm/s]
Travel speed	120 [mm/s]
Cutting/engraving materials	Wood, wood-like, leather, paper, cardboard, felt, foil, laminate, EPP, EVA Foam, CCL FR4

Milling specifications

Toolhead	CNC PRO
Spindle power	300 [W]
Operating sound	<70 [dB]
Platform calibration	Manual
Cutting volume	235 x 250 x 85 [mm] ***
Cutting speed	0.1 ~ 20 [mm/s]
Travel speed	120 [mm/s]
Milling materials	ABS, nylon, HDPE, PTFE, PC, PP, POM, PMMA, PVC, HIPS, LDPE, PET, carbon fiber, ccl fr4, dibond, tcf, wood, plywood, wood fiber boards, aluminum, brass, copper, cardboard, machining wax, modeling board, styrodur
Tool holding	ER-11 collet

Machine specification

Temperature specifications

Nozzle temperature	max. 250 [°C]
Build plate temperature	max. 125 [°C]
Operating ambient temperature	15 ~ 30 [°C]
Storage temperature	-10 ~ 40 [°C]

Electrical specifications

Power supply	100 VAC ~ 4 A 50/60 Hz 240 VAC ~ 2 A 50/60 Hz
Power consumption	max. 350 [W]
Single extruder power consumption	max. 220 [W]
Dual extruder power consumption	max. 230 [W]
CNC Pro milling toolhead power consumption	max. 330 [W]
Laser Pro toolhead power consumption	max. 80 [W]

Software specifications

Supplied software	Voxelizer
Supported file types	.stl, .obj, .step, .dxf, .png, .bmp
Minimum system requirements	Windows 7 64-bit or macOS 10.13

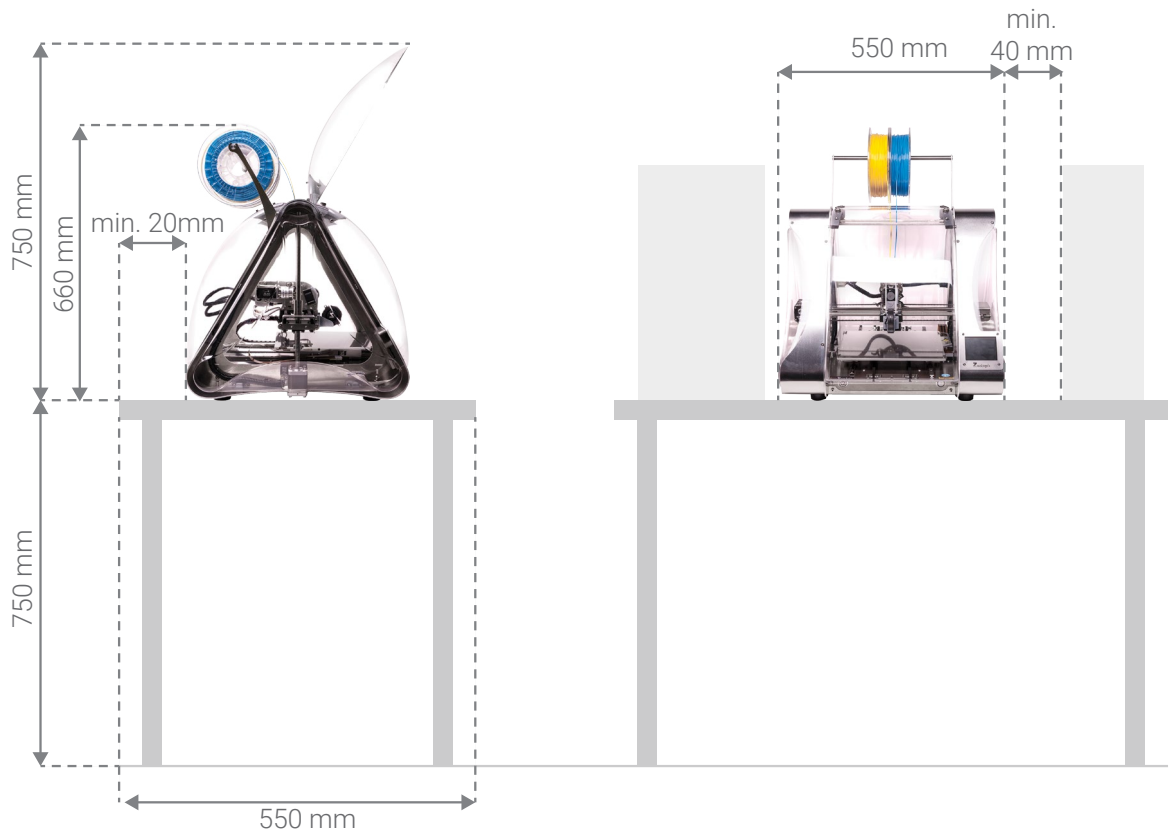
* Available on demand,
** Depends on nozzle diameter,
*** Depends on mounted milling cutter dimensions.

9. Setting up ZMorph VX

9.1 Location requirements

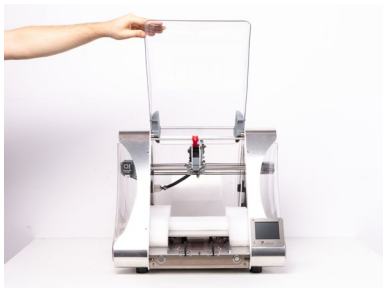
After unpacking, place the machine in a suitable location.

- The machine should be placed on a stable, flat surface with sufficient space above the machine.
- Do not cover the machine with any materials during operation.
- The machine should not be exposed to moisture.
- The electrical installation of ZMorph VX requires it to be connected to a grounded wall outlet.
- Do not use extension cords.
- Leave a 20 mm (minimum) space from the wall, for proper ventilation.
- Leave a 40 mm (minimum) space from the right side for better access to the SD card slot.
- It is recommended that the room in which the machine is located should be well ventilated, as hazardous vapors may escape from the machine during operation.

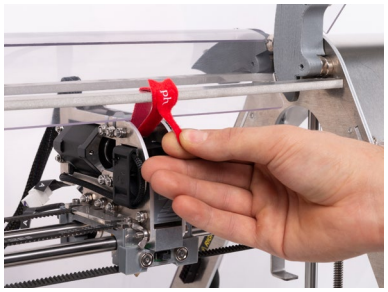


9.2 Safety features removal

After the machine has been set up at the target workplace, before it is put into operation for the first time, remove the safety band from the toolhead and the protective foam from the worktable.



Open the front cover of the machine to the point where it touches with the back cover. Magnetic latches will keep the cover open.

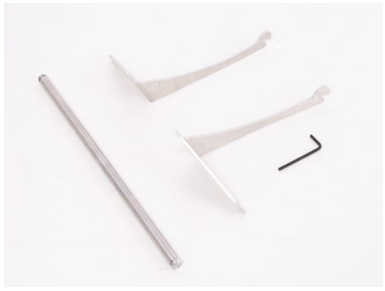


Remove the protective tool band.

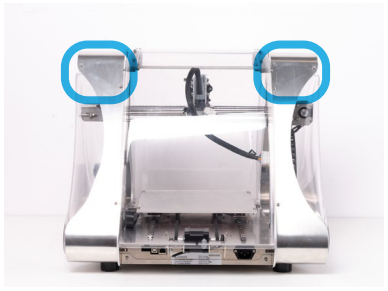
Gently remove the worktable protection foams.

9.3 Assembling the spool holder

For a better experience with the ZMorph VX machine, it is recommended to assemble the dedicated spool holder.



Prepare the spool holder components and a 2.5 mm Allen key.



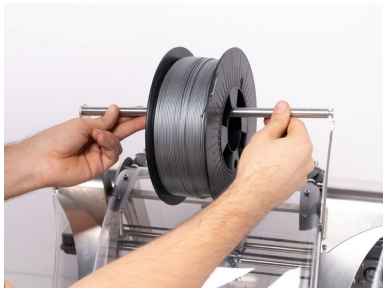
Look at the back of ZMorph VX. Spool holder attachment screws are placed at the top of the frame and highlighted on the picture.

Loosen the frame screws with a 2.5 mm Allen key.

Loosen the screws to the point where you can slide the spool holder.

Slide the spool holder in place.

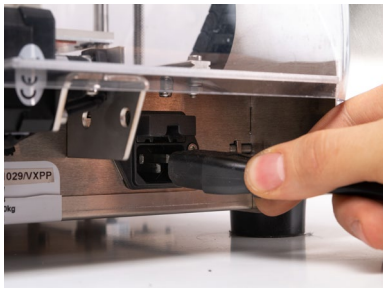
Tighten the screws.



Take out the filament roll from the plastic bag and slide it on the bar. Put the bar with filament on the holders.

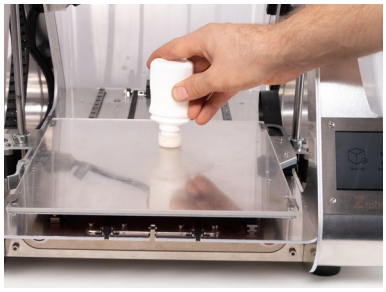
9.4 First use

When the machine is commissioned for the first time after transport, it is necessary to perform an initial calibration process (for more information, see the chapter on autocalibration). During this process, the machine will heat up and it will be necessary to insert material into the toolhead. After the calibration process, the machine is ready to perform its first print.



Connect the power cable to the socket.

Turn on the machine.

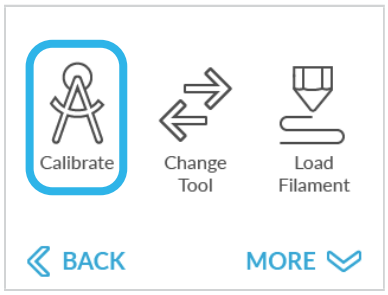


Apply 3D printing adhesive to the center of the worktable. Two layers should be enough.

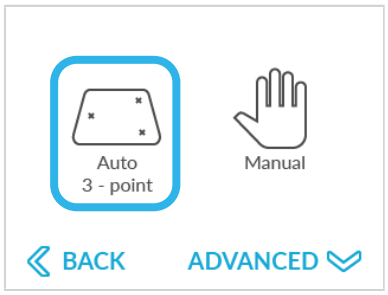
Take the calibration cable and connect the wider end to the RIGHT frame socket.

Connect the narrow end of the calibration cable to X-carriage B socket.

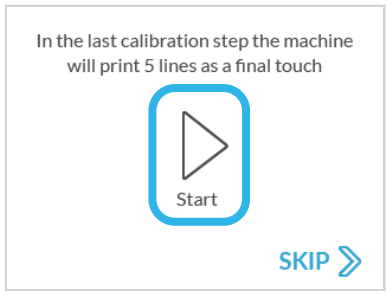
Choose "Maintenance".



Choose "Calibrate".



Choose "Auto 3-point". Wait for the machine to heat up and finish the probing.



To ensure best calibration result print calibration pattern. Choose "Start".

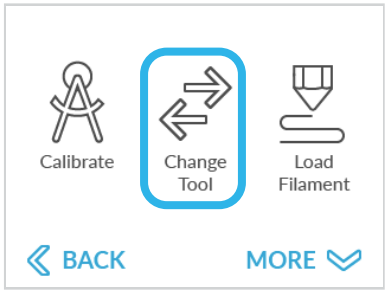
10. Maintenance

10.1 Toolheads maintenance

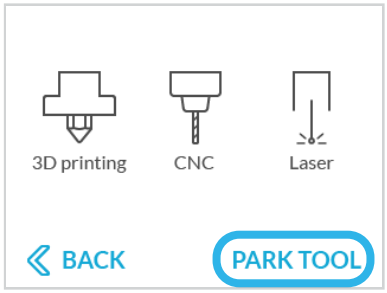
Changing and mounting toolheads require 3 mm Allen key usage. It is included in the foam insert with accessories.

Toolhead disassembly

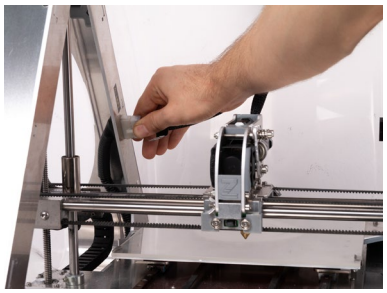
Select "Maintenance".



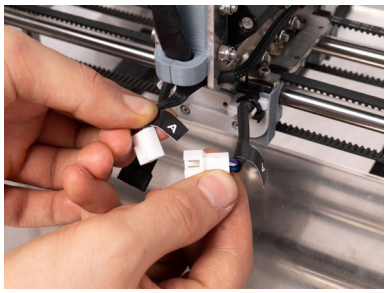
Select "Change tool".



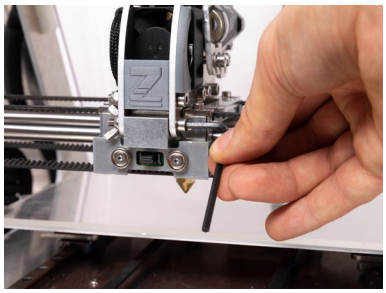
Select "PARK TOOL", wait for positioning process to be finished.



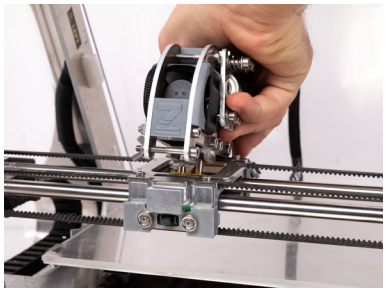
Disconnect the toolhead cable from the machine frame socket.



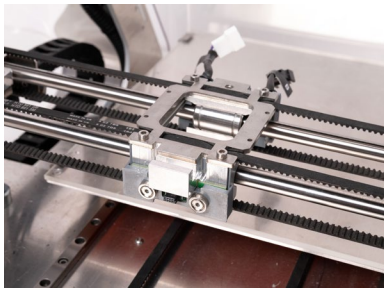
Disconnect the toolhead from the X carriage.



Use 3 mm Allen key to loose the screw mounting the toolhead.



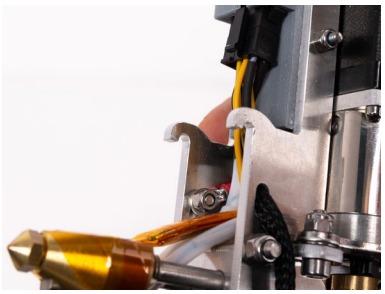
Lift the toolhead from the front to back from the x-carriage.



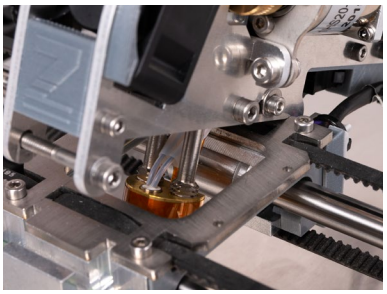
Printer is ready for mounting another toolhead.

Mounting toolheads

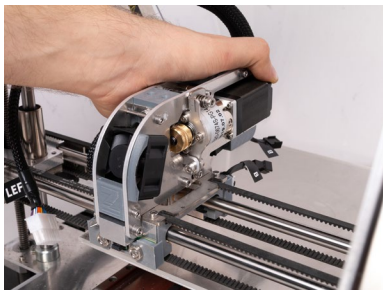
Each toolhead has similar mounting method.



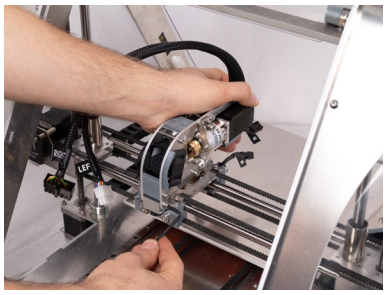
Find the bottom hooks placed on the back of the toolhead.



While placing the toolhead be sure the hooks are in the right place.



Gently mount new toolhead placing it from the back to the front in the X-carriage.



Tighten the mounting screw while gently pushing the toolhead forward

NOTE: Tightening the mounting screw without pushing the toolhead to the front might cause the connection between the toolhead and X carriage to be loose. This might cause further errors in calibrations and printing processes.

NOTE: Each time after changing the toolhead it is better to check if the connection is correct. Lift the back of the toolhead and check if the rear hooks are not moving up and down. If yes loose the front mounting screw and once again push and hold the toolhead forward and tighten the mounting screw.

Next steps depend on which toolhead will be used:

Single Plastic Extruder 1.75

- Connect the LEFT cable to the LEFT frame socket.
- Connect the extruder '"A" cable to X carriage "A" plug.
- Choose "Maintenance".
- Choose "Change tool".
- Choose "3D printing".
- Choose "Single printing".
- Choose "Single 1.75".

Dual PRO

- Connect the LEFT cable to the LEFT frame socket and RIGHT cable to the RIGHT frame socket.
- Connect the extruder "A" cable to the "A" plug and the "B" cable to the "B" plug on the X carriage.
- Choose "Maintenance".
- Choose "Change tool".
- Choose "3D printing".
- Choose "Dual printing".
- Choose "Dual PRO".

Laser PRO

- Connect the LEFT cable to the LEFT frame socket and RIGHT cable to the RIGHT frame socket.
- Choose "Maintenance".
- Choose "Change tool".
- Choose "Laser".

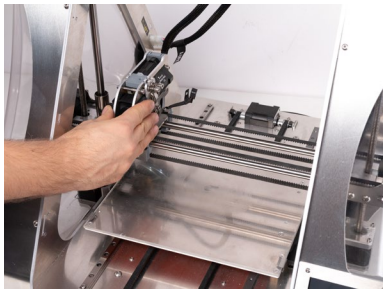
Thick Paste Extruder

- Connect the LEFT cable to the LEFT frame socket.
- Connect the extruder "A" cable to X carriage "A" plug.
- Choose "Maintenance".
- Choose "Change tool".
- Choose "3D printing".
- Choose "Thickpaste printing".

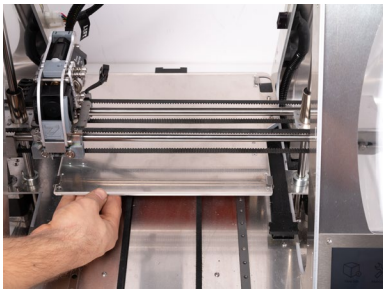
CNC PRO Milling Toolhead

- Connect the LEFT cable to the LEFT frame socket.
- Connect the extruder "A" cable to X carriage "A" plug.
- Choose "Maintenance".
- Choose "Change tool".
- Choose "CNC".

10.2 Changing worktable



Place toolhead in convenient position for removing worktable.

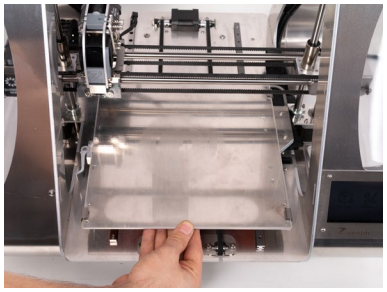


Slide the table backwards.

Disconnect the table plug.

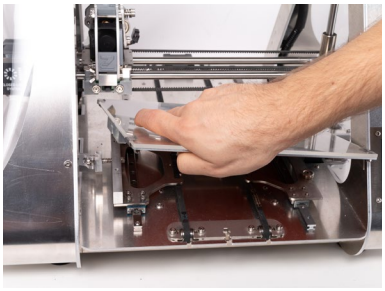
NOTE: The user can move the toolhead manually by disabling the motors by:

- pressing the reset button,
- powering down the machine,
- parking the toolhead in the "Change toolhead" section,
- waiting 1 minute for the standby mode.

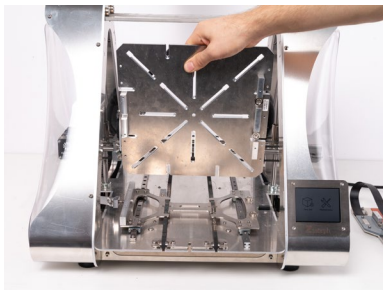


Pull the worktable forward.

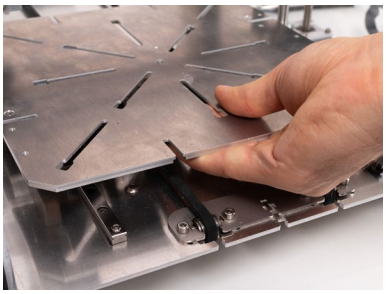
Pull the lever placed on the left to unlock the heated table.



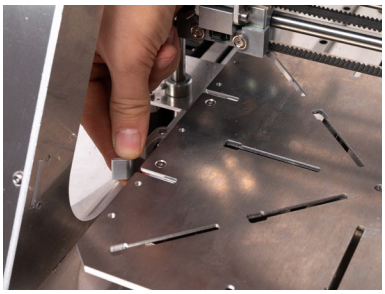
Lift the table with a little bit of strength up to disconnect it from the carriage magnets.



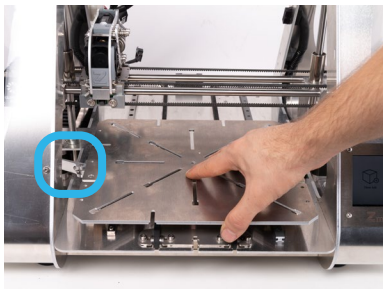
Take the CNC table. Notice the magnets under the table are on the proper side.



Place the worktable on the carriage, magnets will clip it on.



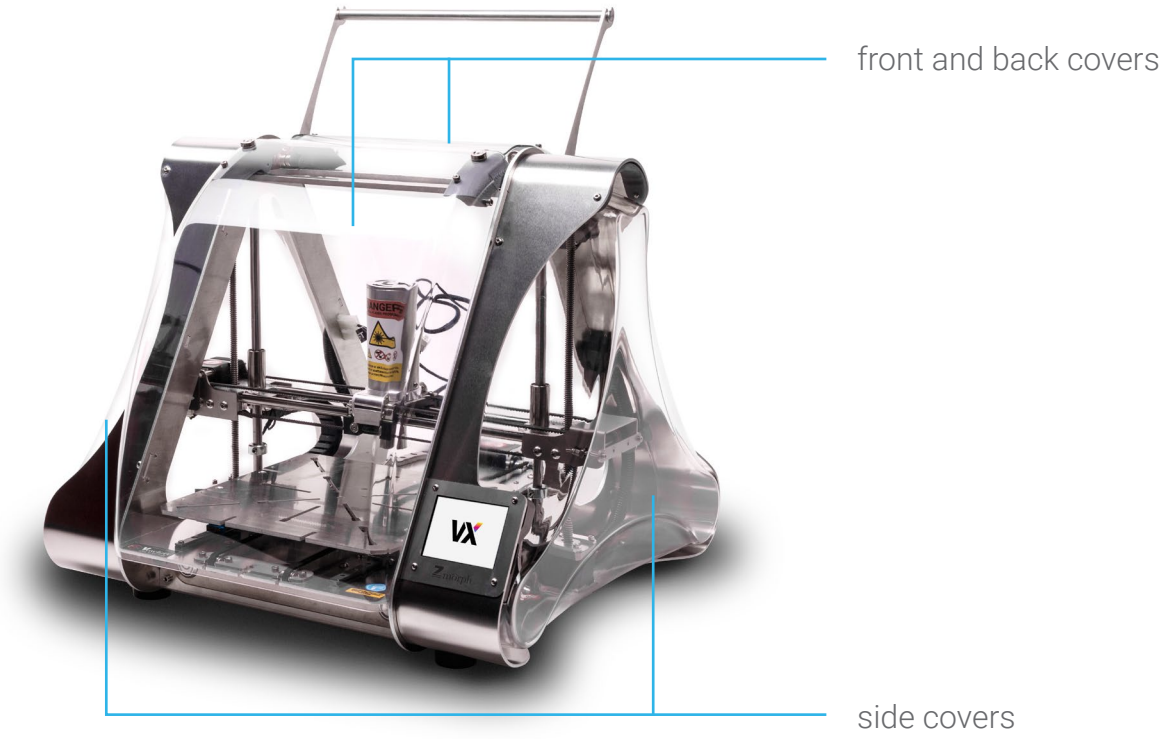
Pull the lever back to block the table



Make sure that lever doesn't block the table movement by pulling forward

10.3 Removing covers

There are two types of covers:



Front and back covers

To remove front and back covers:

Lift them up.

Grab on both sides.

Pull toward yourself.

They are snapped via magnets so removing and attaching comes easily.
The differences between front and back cover are shown in the picture below. Front cover has additional magnets that allow snapping in elevated position attached.

Front and back cover

Front cover closed.

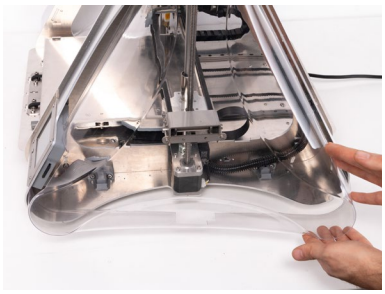
Front cover opened.

Side covers

To remove side covers:

Find the two hooks blocking the covers.

Release the cover rear corner from the hooks by gently squeezing the cover.



Pull out the cover rear corner from the machine frame.

Pull out the cover upper corner from the machine frame.

NOTE: To mount a cover, firstly slide in the upper side. Then adjust the lower side and place it in the hooks.

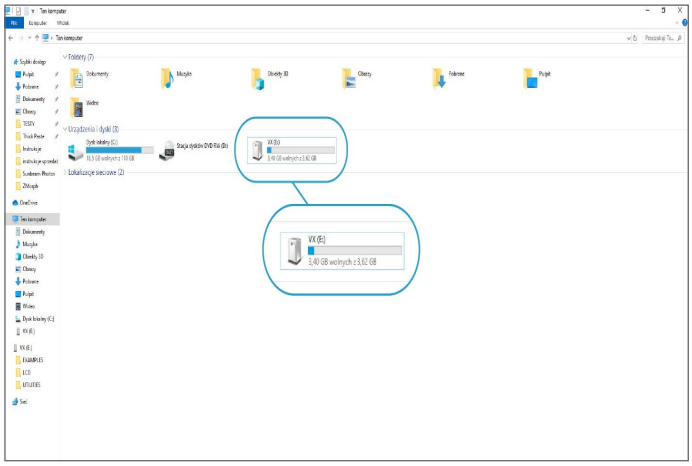
Side covers are NOT identical. The right cover contains a place for the screen.

Left and right cover.

10.4 Communication and File Delivery

Delivery of files on SD card

- Save a file you want to print to on SD card.

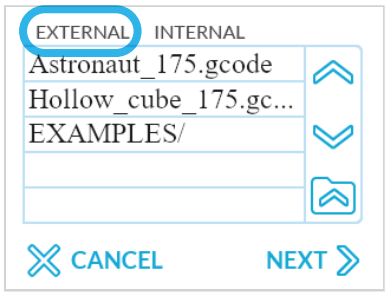


- Insert a card on the right hand side of the display.

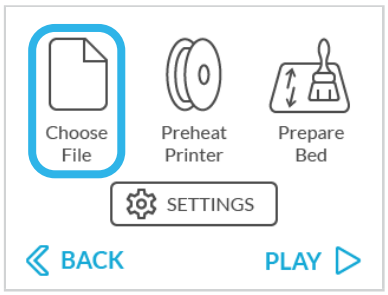
NOTE: If the user inserted the external SD card the screen should jump forward to the 'Choose File' menu screen on the 'EXTERNAL' directory.
NOTE: If there was no previously chosen file, after pressing on the 'New job' menu the screen will go directly to the 'Choose File' menu.

- Choose a folder with files from the external SD card:

New project



Choose file in external tab



Choose file

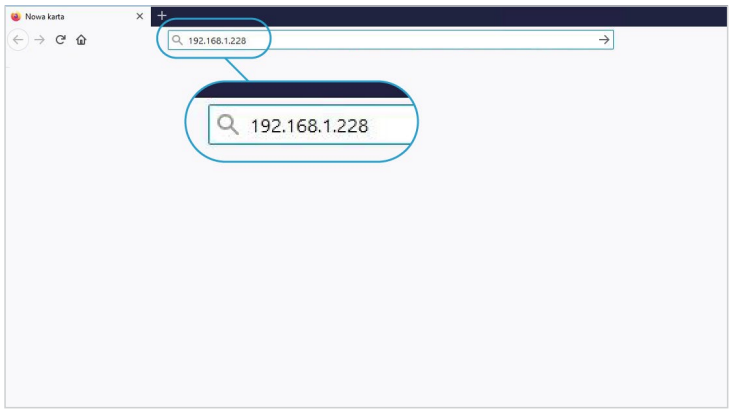
Connecting the machine via Ethernet

- Connect Ethernet cable to the back of the machine and a computer.

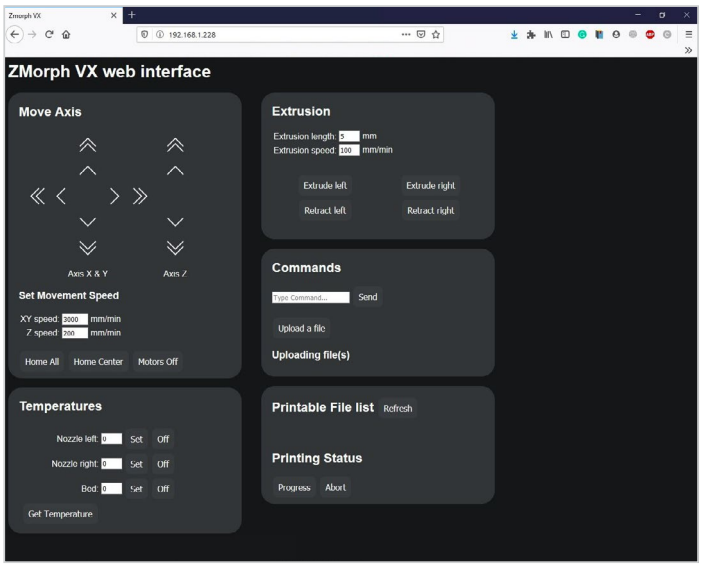
- The information about the IP address of the machine can be found in the INFO screen in the MAINTENANCE menu.

Info screen

- Provide the IP address in the web browser window.



- A full interface for controlling the machine and files sharing will appear in the web browser.



Connecting the machine via USB.

- Connect the USB cable to the back of the machine and a computer.

- Wait until the computer discovers the machine and installs the drivers.
- If the computer doesn't discover a USB device, click the reset button on the machine.
- The machine should be discovered as a Flash memory and you can access it from the "My Computer" folder.

11. Voxelizer

11.1 Installation and system requirements

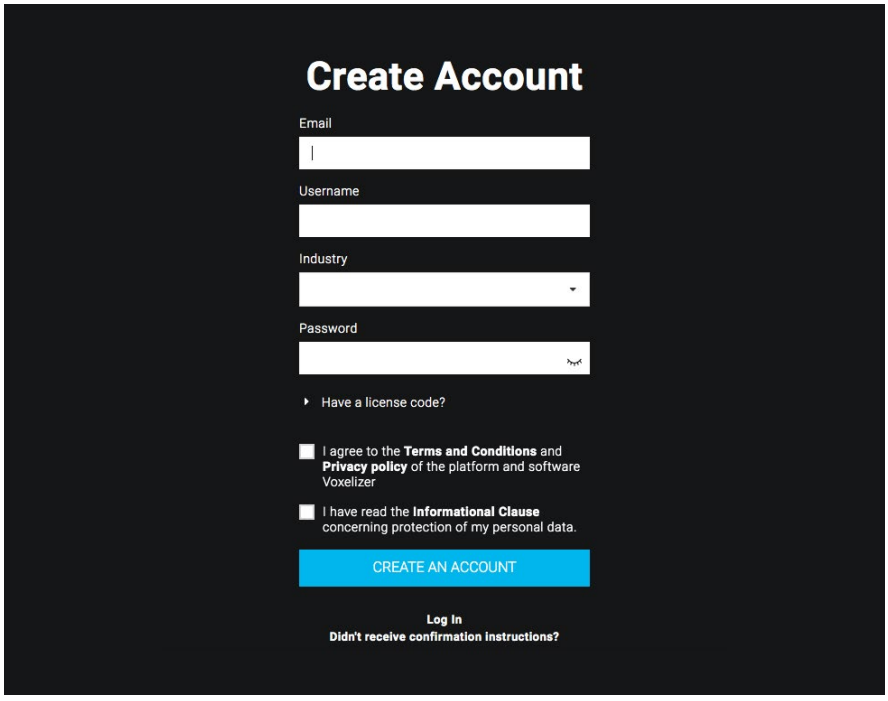
Voxelizer can be downloaded from the website https://voxelizer.com/download. Once the download is finished, run the installation wizard and follow the instructions provided on the screen.

Minimum system requirements:

- Operating system: Windows 7 or higher, 64-bit or MacOS 10.13 or higher (Mac Mini 6.0 Late 2012 or later, other Apple devices 2014 or later)
- 4GB RAM,
- GPU with OpenGL 3.3 support,
- Internet connection.
- Resolution 1280 x 720 pixels.

11.2 Creating Voxelizer account

To use Voxelizer, it's required to create an account. Go to Sign Up at https://voxelizer.com/auth/register/sign_up and create the account.



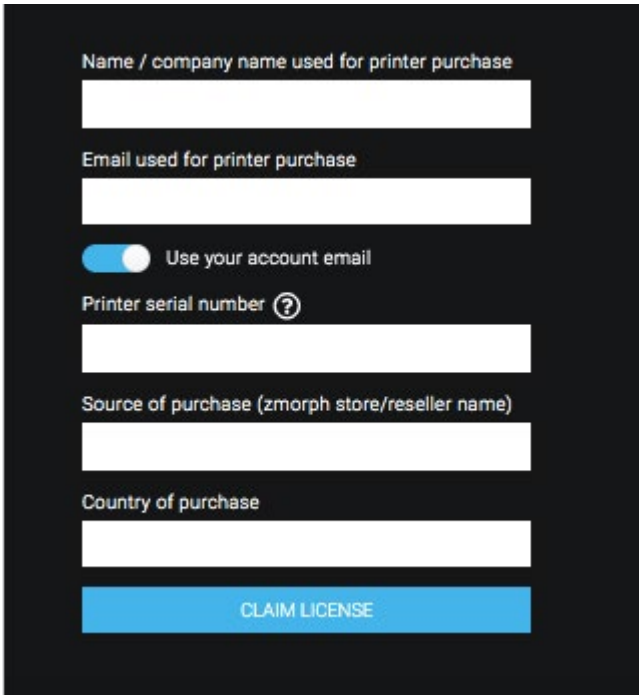
Fill the form. In case you got a Voxelizer License Code (it may be attached in the box with the printer), enter it in the "Have a license code?" section. To read more about licensing

go to chapter 12.3.
After filling the form, accept the Terms and Conditions, then click the button "Create an account". Go to the email provided during registration. You should get a message with a confirmation link from us. Click the link to activate the account.

11.3 License

The license for Voxelizer comes free for all ZMorph Owners. It is account-based: one printer provides one license which can be linked with the Voxelizer account.
There are two ways to link the license:

- By entering the License code (composed of 9 characters in the form of XXXX-XXXX). There are two ways of entering the code: filling the registration form ("Have a license code?") or directly in the Account info in License section ("Enter license code").
- By filling the form: https://voxelizer.com/claim_license. To get verified, we will need a serial number of your ZMorph printer and a few additional information. Once we get your request, we will grant the ZMorph license to your account.



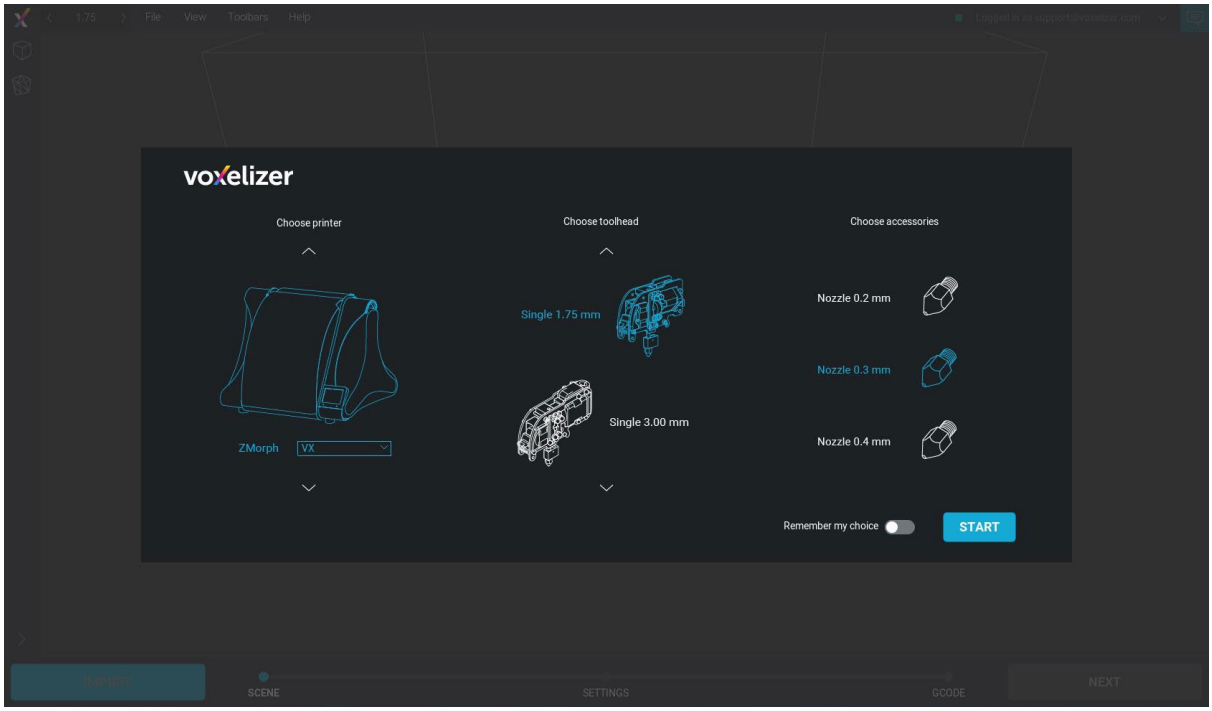
11.4 Files maintenance and preparation

Voxelizer handles all the ZMorph toolheads in separate workflows: 3D printing, CNC milling, laser cutting, and thick paste extrusion.

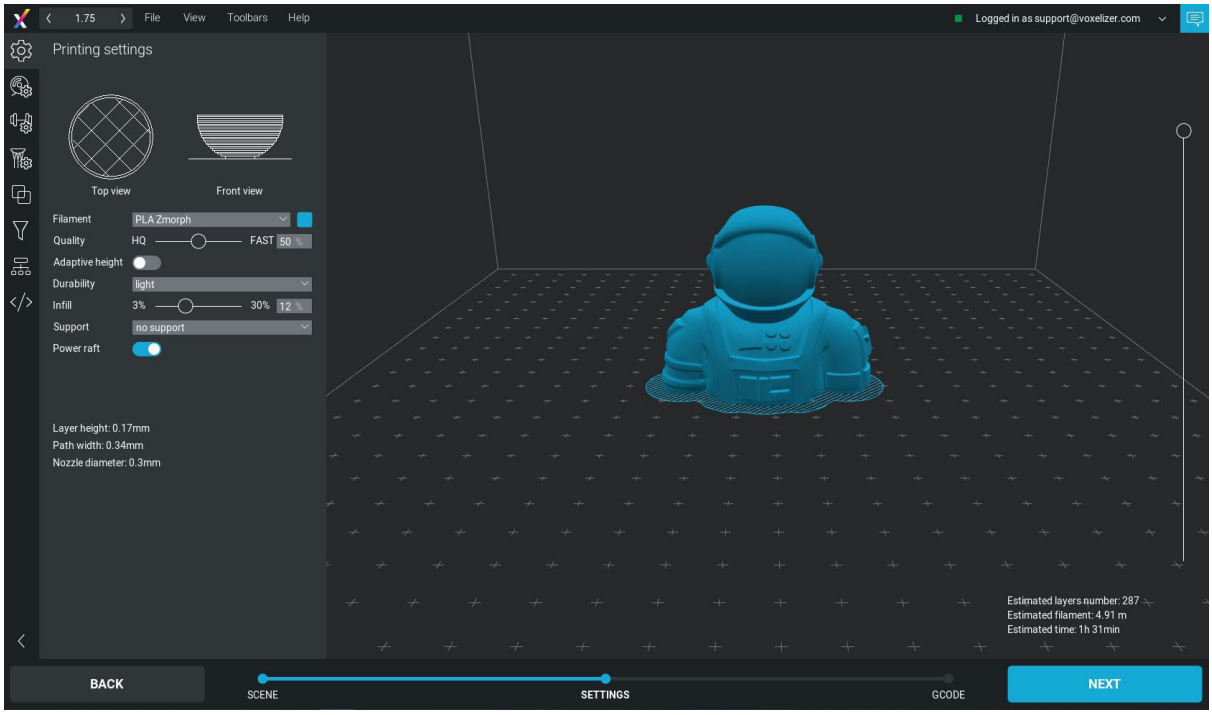
Each workflow is composed of three steps: during the first one the files are imported, scaled, oriented and positioned on the table; the second step is dedicated to configuring

the fabrication process by specifying the used materials and other settings; during the third step instructions for the machine (G-code) are generated, previewed and exported.

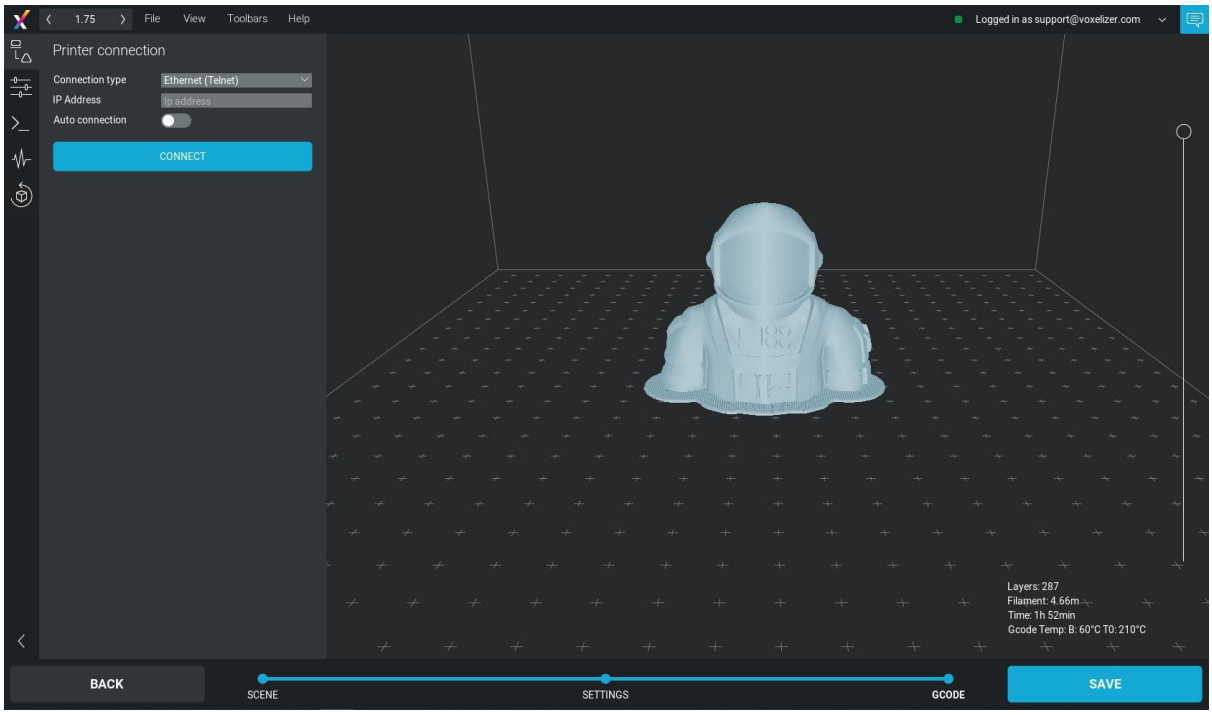
Taking the 3D printing workflow as an example, after selecting the tool in the welcome wizard, import a model in one of the different formats supported, for instance, an .STL. In the Scene view, it's possible to set its dimensions and orientation. When finished, click Next.



In the settings view, apply the main presets, based on the type of filament that is going to be used. It's possible to dig deeper into the different, more advanced settings and apply further transformations to the model via filters and voxel selection. When everything is set up, click Next to generate the G-code.



The G-code view provides a preview of the operations that a machine will perform. It's also possible to inspect the G-code instructions and look for possible errors by using the Diagnostic tab. Clicking on the Save button results in saving the G-code: on a computer, SD card or directly on ZMorph VX Multitool 3D Printer.

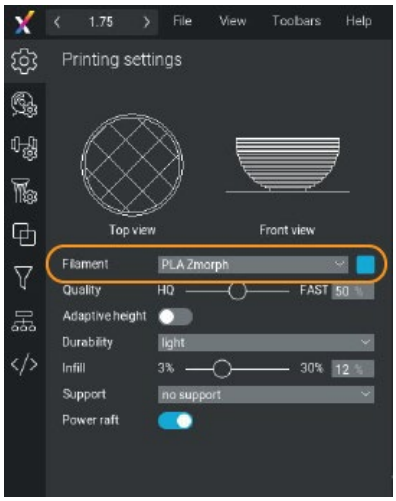


11.5 Presets

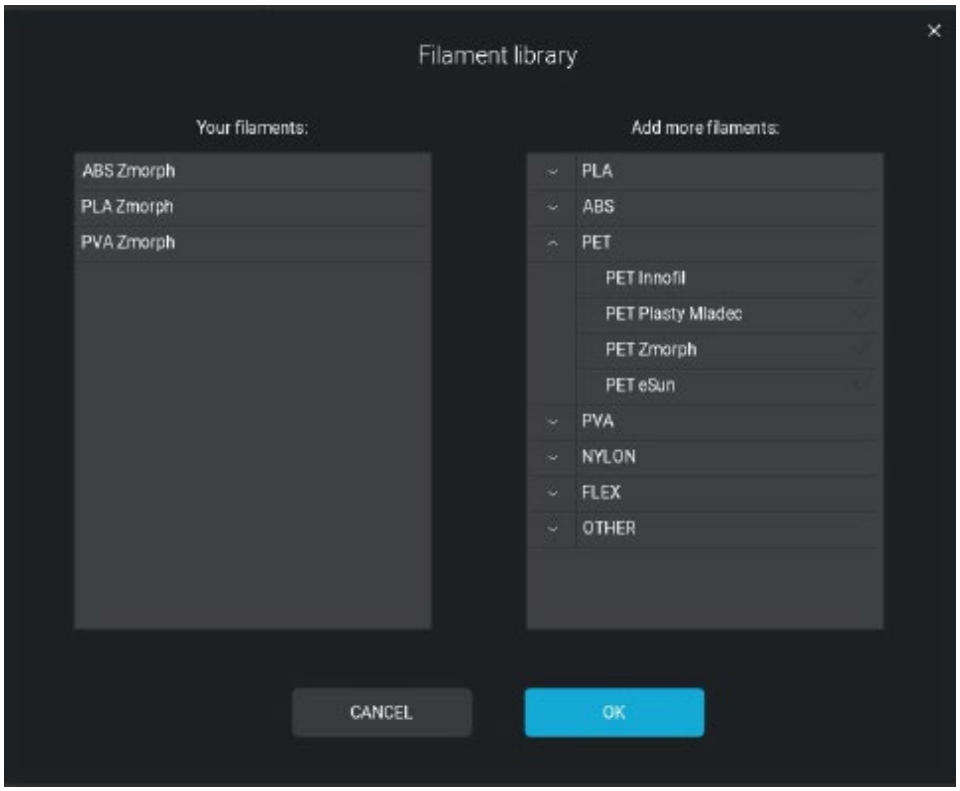
Voxelizer includes a set of tested presets for standard fabrication scenarios in all workflows. The user can define his own presets to adapt the software to new materials and specific project requirements.

Workflow	Preset types
3d printing	Filament, Durability, Support
Laser cutting	Material
CNC milling	Material, Operation tool

Taking the 3D printing workflow as an example, presets can be edited and selected in the SETTINGS view. In the Printing settings tab, they can be chosen from the available default materials and the ones prepared by the user.

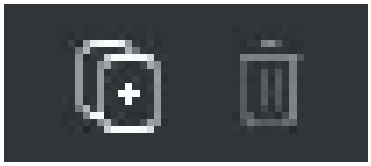


By clicking on the filament library icon, it's possible to access the online preset repository from which it's possible to add more materials to the list.



The customized user presets can be added and modified in tabs dedicated to presets, e.g "Filament preset list". There are also other tabs signed by tooth gear icon responsible for durability and support structures settings.

To add a new preset, choose one of the existing presets and click the copy icon. The preset has been duplicated and can be modified depending on the needs. After editing preset parameters, the changes will save automatically. The preset will remain until its deleted.
To use the new preset in a project, It's important to remember about selecting it in "Printing settings".

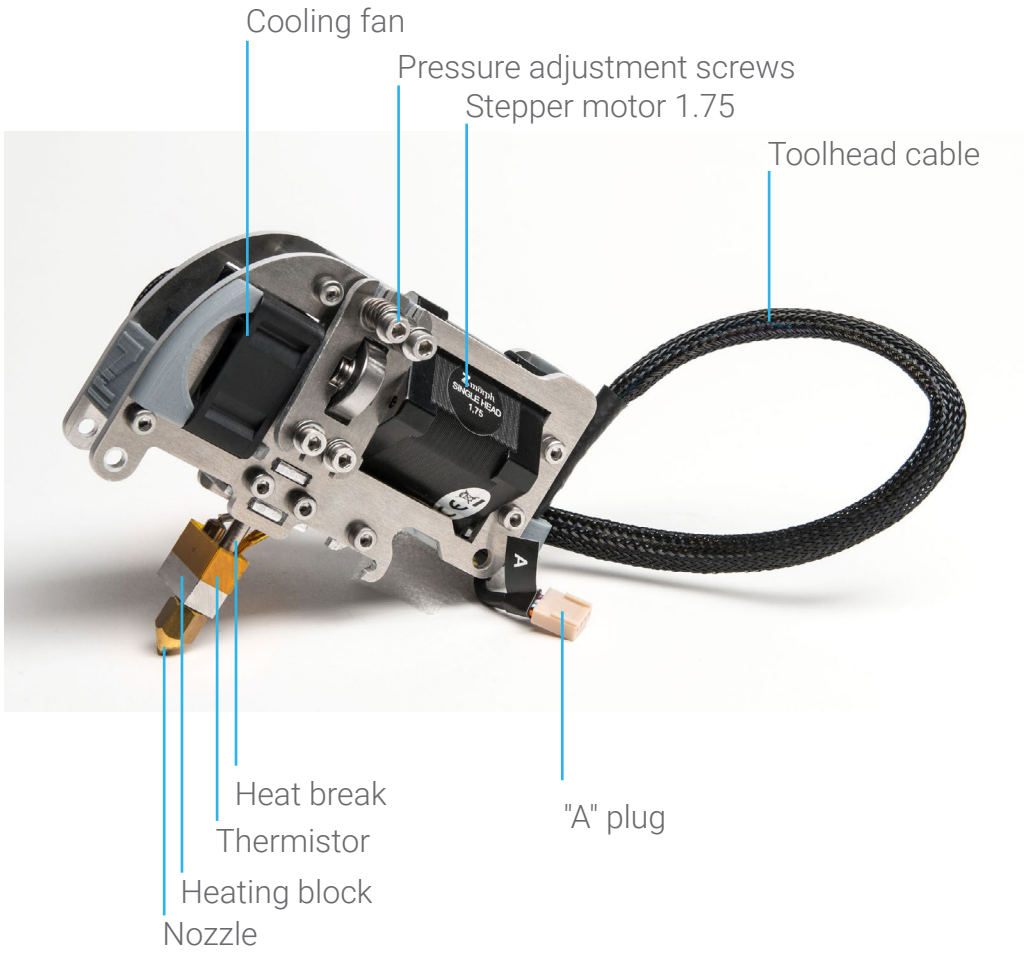


12. 3D printing workflow

12.1 Toolheads

Single Plastic Extruder 1.75 mm

Basic toolhead giving access to all 3D printing functionalities using 1.75 mm filaments. It's perfect for manufacturing single-material prototypes, jigs and fixtures, and other high-quality models from almost all materials available on the market such as: ABS, M-ABS, PLA, HIPS, Flex, PVA, PET, ASA and similar. Single Plastic Extruder 1.75 mm is included in all machine sets. Default nozzle is 0.3 mm.



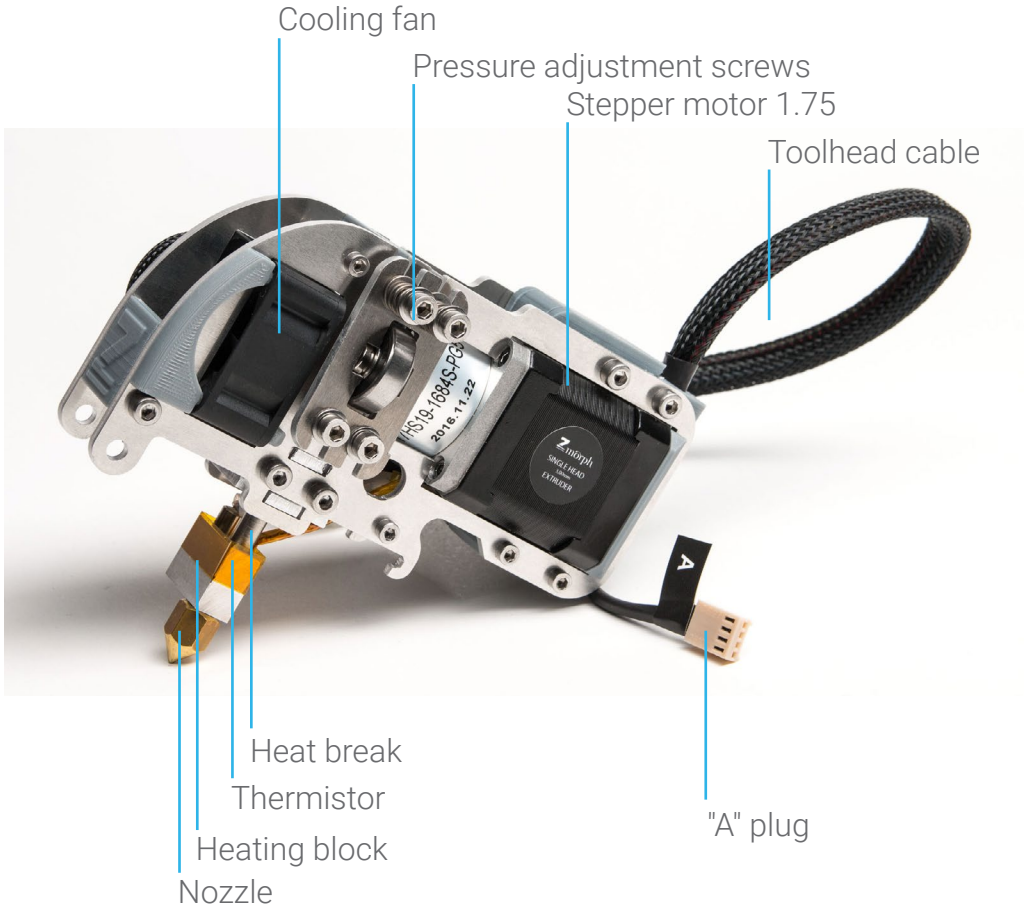
Toolhead Specification:

- Construction: High-quality 3 mm aluminium frame
- Hot End: ZMorph interchangeable nozzle 1.75 mm
- Temperature control: 1 thermistor
- Temperature range: 0 - 250 ˚C degrees

- Nozzles: 0.2, 0.3, 0.4 mm
- Motor: Nema 17 stepper motor
- Extrusion: Direct drive
- Work area: up to 235 x 250 x 165 mm
- Recommended printing resolution: 0.2 mm (200 microns)
- Supported printing resolution: 0.05 - 0.4 mm
- Extruder dimensions: 135 x 115 x 55 mm

Single Plastic Extruder 3.0 mm

Toolhead being sold separately on special request. It operates on 3 mm filaments. Default nozzle is 0.4 mm.



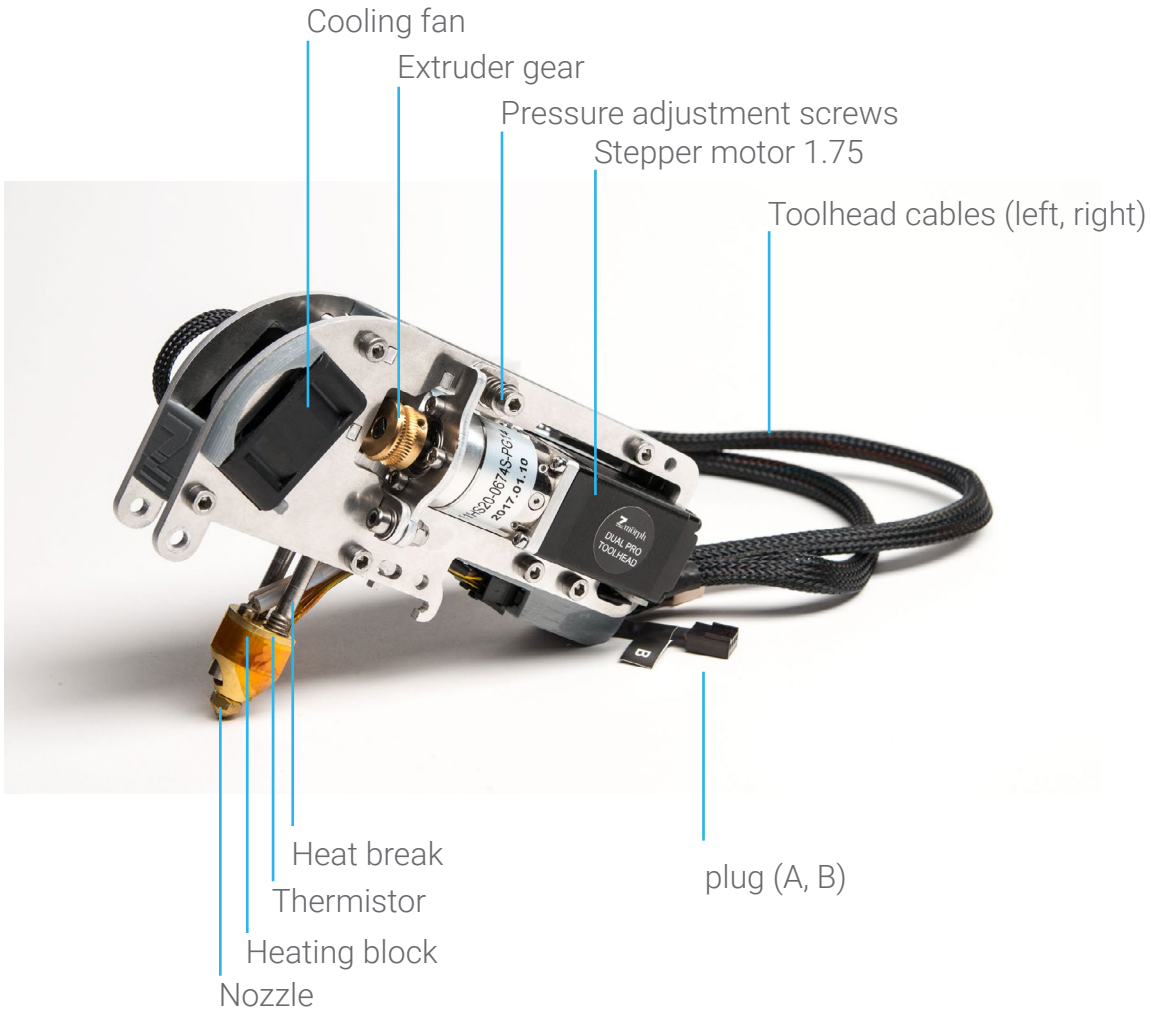
Specification:

- Construction: High-quality 3 mm aluminium frame
- Hot End: ZMorph interchangeable nozzle 3.0 mm
- Temperature control: 1 thermistor
- Temperature range: 0 - 250 ˚C degrees
- Nozzle 0.3, 0.4 mm
- Motor: Nema 17 stepper motor with planetary gear

- Extrusion: Direct Drive
- Work area: 235 x 250 x 165 mm
- Recommended printing resolution: 0.2 mm (200 microns)
- Supported printing resolution: 0.05-0.4 mm
- Extruder dimensions: 150 x 115 x 55 mm

Dual PRO Extruder

Basic toolhead giving access to all 3D printing functionalities, using 1.75 mm filaments. It's perfect for manufacturing double-material prototypes, jigs and fixtures and other high-quality models from almost all materials available on the market as: ABS, M-ABS, PLA, HIPS, Flex, PVA, PET, ASA and others. Dual PRO 1.75 mm is included in VX Full Set machine sets. Default nozzle is 0.4 mm.



Specification:

- Construction: High-quality 3 mm aluminum frame
- Hot End: ZMorph interchangeable Mixer Hotend

- Temperature control: 2 thermistors
- Temperature range: 0 – 250 ˚C
- Nozzle: 0.4 mm
- Motor: Nema 11 stepper motor with planetary gear x2
- Extrusion: Direct Drive
- Work area: up to 235 x 250 x 165 mm
- Recommended printing resolution: 0.2 mm
- Supported printing resolution: 0.025 – 0.4 mm
- Extruder dimensions: 170 x 115 x 70 mm

12.2. 3D printing materials

Single Plastic Extruder 1.75


PLA


ABS


Nylon


PET-G


ASA

PMMA


TPE


PC


PC/ABS


PP


PVA


HIPS

Dual PRO


PLA-PLA


ABS-HIPS


PLA-PVA


ABS/ABS

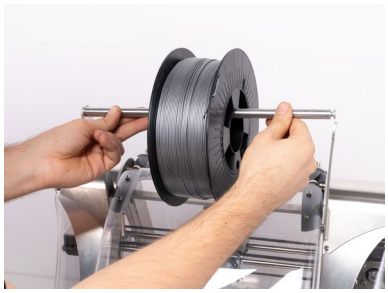
NOTE: check the material library for more information about our materials: http://bit.ly/ZMorphMaterialsLibrary

12.3 Loading the filament

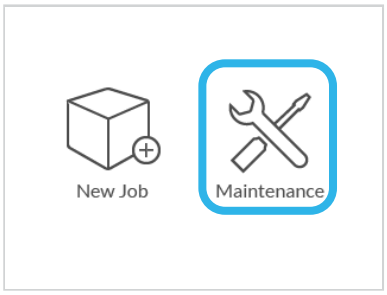
Single Plastic Extruder


Prepare the material. The 0.5 kg spool is included to the package. Take out the filament roll from the plastic foil, remove moisture absorber.

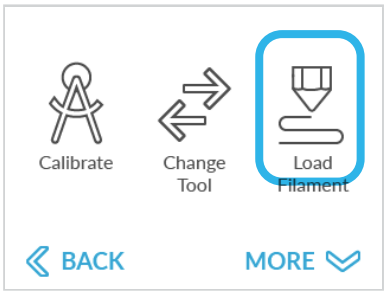
You can find out what kind of filament you own by looking at the sticker on the filament roll. ZMorph VX package comes with PLA.


Slide spool on the bar and place it on the machine.

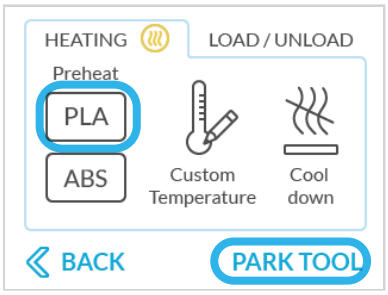
To preheat the extruder, follow these steps.



Choose the "Maintenance" from the LCD touchscreen menu.



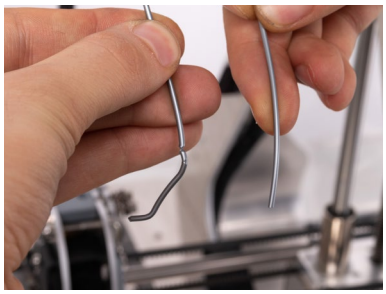
Choose "Load Filament".



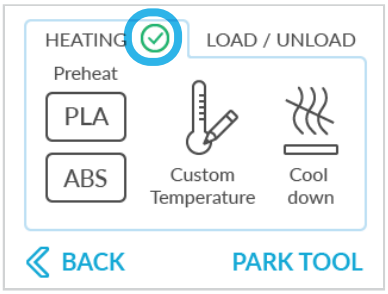
Choose PARK TOOL, wait for the machine to position the toolhead. When done, choose "PLA" to preheat the material.

NOTE: The "PREHEAT PLA" button will heat the nozzle to 200°C and the "PREHEAT ABS" to 235°C.

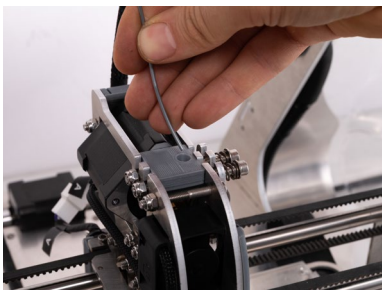
Take off the front cover.



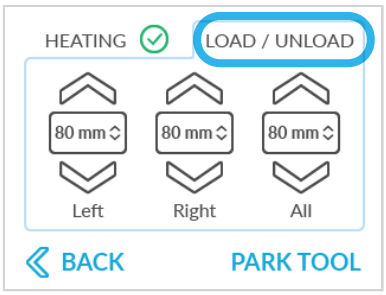
Straighten the tip of filament up or cut its end.



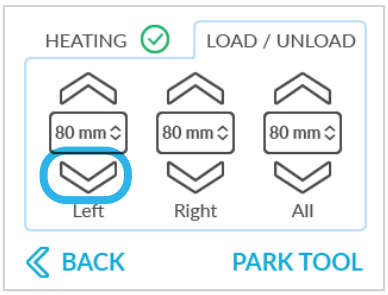
Wait till extruder reaches the proper temperature. The yellow HEATING sign will change colour from yellow to green.



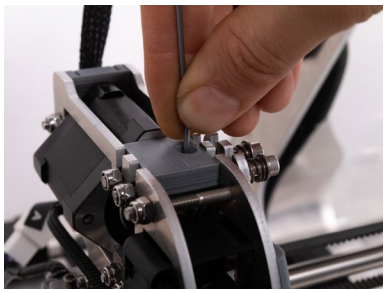
Insert filament into the guide hole on top of the extruder.



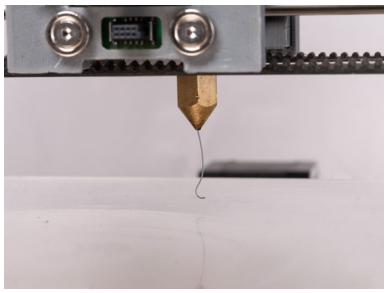
Tap the LOAD/UNLOAD menu.



Tap the bottom arrow on the screen to feed 80 mm of the filament. Choose down arrow with LEFT description to do that.



Push the filament down until you feel it has been grabbed by extruder drive gear.



Wait until the material flows out of the nozzle. Tap the feed button again if necessary.

NOTE: By tapping the button showing "80 mm" you can change the amount of extruded filament to 15 or 5 mm.

Dual PRO Extruder

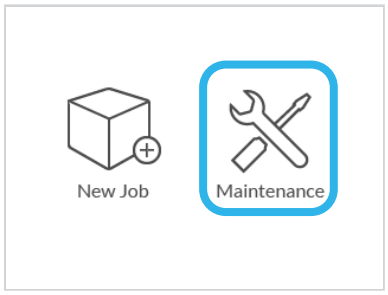
Mount the toolhead following the steps from "Mounting toolhead" chapter.

Prepare the material. The 2 spools (2x 0.5 kg) of filament are included in the package (full set). Take out the filament rolls from the plastic foil, remove moisture absorber.

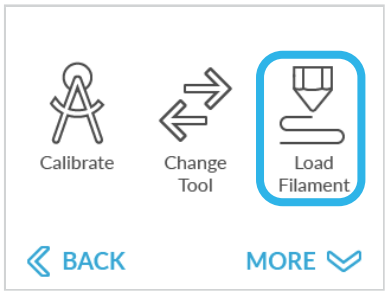
You can find out what kind of filament you own by looking at the sticker on the filament roll. ZMorph VX package comes with 0.5 kg white and 0.5 kg silver PLA materials.

Slide spools on the bar and place it on the machine.

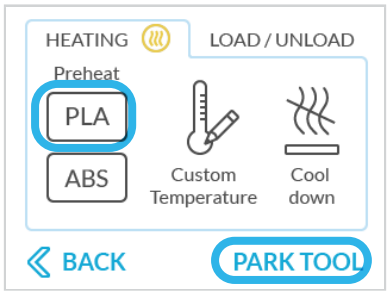
To preheat the extruder, follow these steps.



Choose the "Maintenance" from the LCD touchscreen menu.

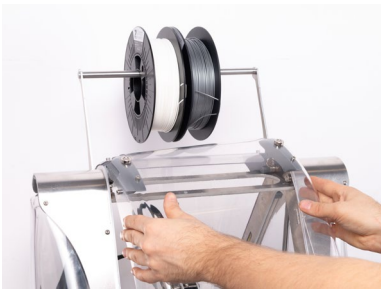


Choose "Load Filament".

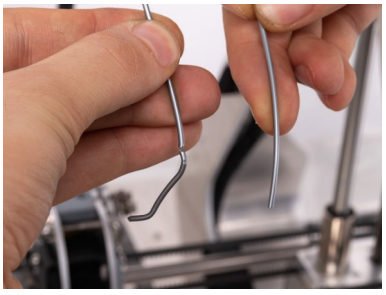


Choose PARK TOOL, wait for the machine to position the toolhead. When done, choose "PLA" to preheat the material.

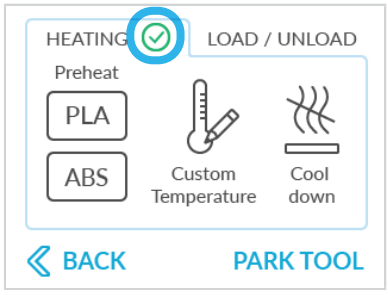
NOTE: The "PREHEAT PLA" button will heat the nozzle to 200°C and the "PREHEAT ABS" to 235°C.



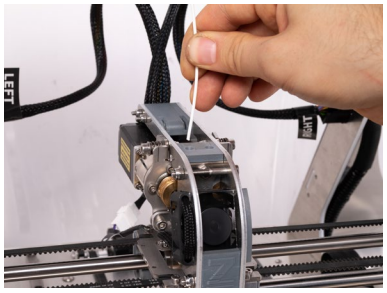
Take off the front cover.



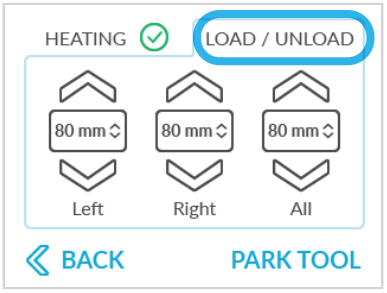
Straighten the tip of filament up or cut its end.



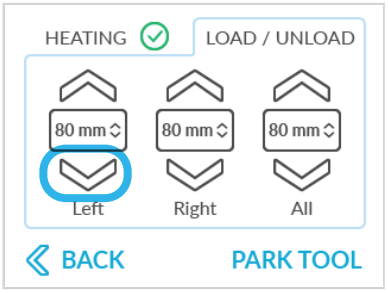
Wait till extruder reaches the proper temperature. The yellow HEATING sign will change colour from yellow to green.



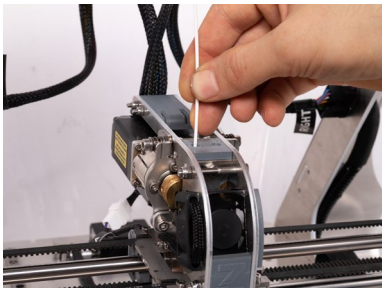
Insert the filament into the left side guide hole on top of the extruder.



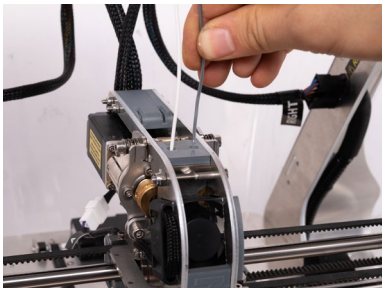
Tap the LOAD/UNLOAD menu.



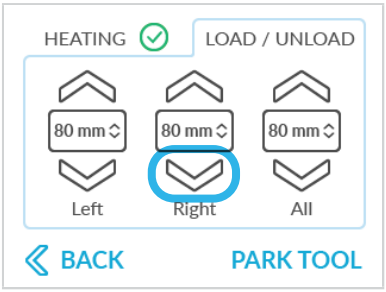
Tap the bottom arrow on the screen to feed 80 mm of the filament. Choose down arrow with LEFT description to do that.



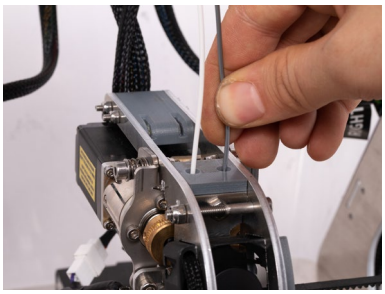
Push the filament down until you feel it has been grabbed by the extruder drive gear.



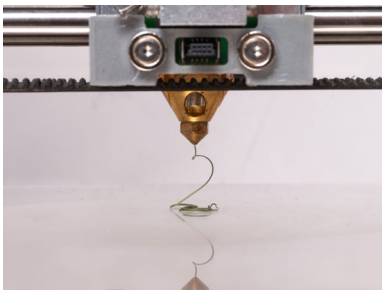
Insert the second filament into the right side guide hole on top of the extruder.



Tap the bottom arrow on the screen to feed 80 mm of the filament. Choose down arrow with RIGHT description to do that.



Push the filament down until you feel it has been grabbed by the extruder drive gear.



Wait until the material flows out of the nozzle. Tap the feed button again if necessary.

NOTE: Third menu named ALL maintain both filaments at the same time. Tap down arrow with ALL description to feed both filaments.

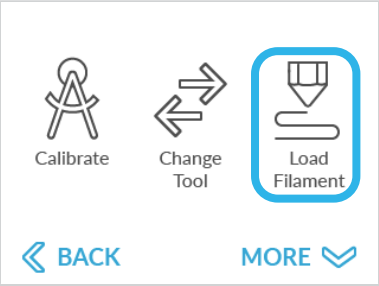
NOTE: By tapping the button showing "80 mm" you can change the amount of extruded filament to 15 mm or 5 mm.

12.3 Removing the filament

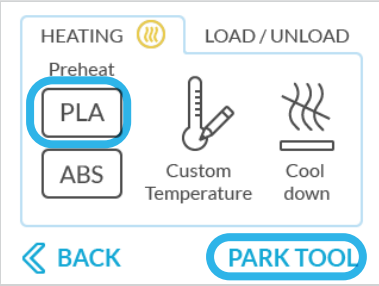
Single Plastic Extruder

To preheat the extruder, follow these steps.

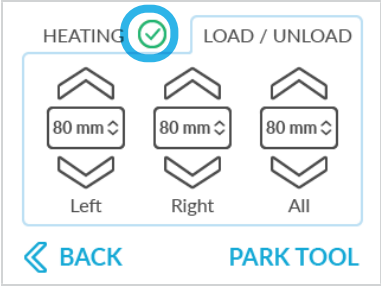
Choose the "Maintenance" from the LCD touchscreen menu.



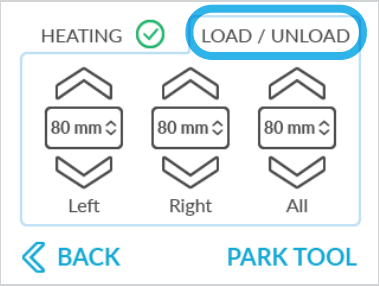
Choose "Load Filament".



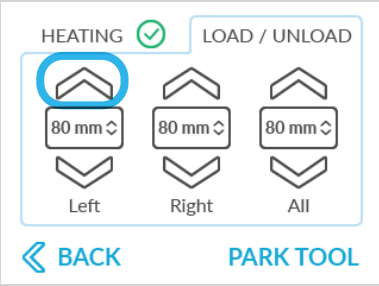
Choose PARK TOOL, wait for the machine to position the toolhead. When done, choose "PLA" to preheat the material.



Wait till extruder reaches the proper temperature. The yellow HEATING sign will change colour from yellow to green.



Tap the LOAD/UNLOAD menu.

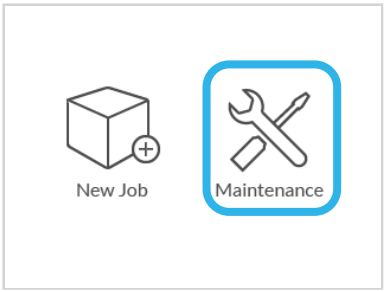


Tap the upper arrow on the screen to remove 80 mm of the filament. At first, extruder will load 40 mm to prevent clogging. Repeat if needed.

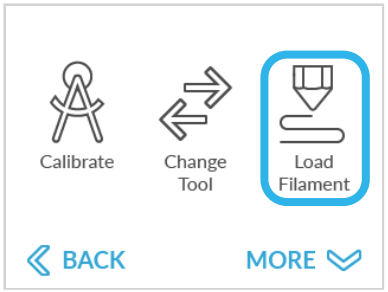
NOTE: By triggering the button showing '80 mm' you can change the amount of extruded filament to 15 mm or 5 mm.

Dual PRO Extruder

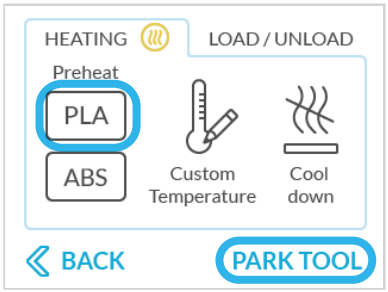
To preheat the extruder, follow these steps.



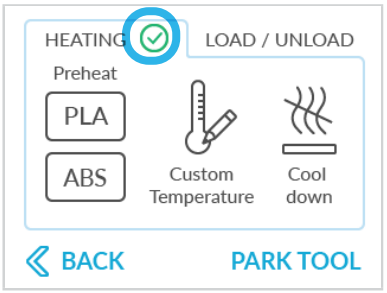
Choose the "Maintenance" from the LCD touchscreen menu.



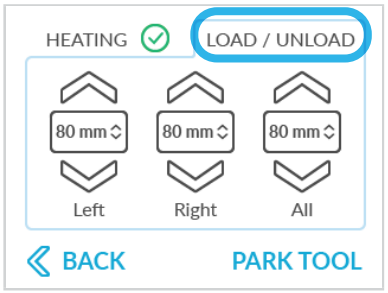
Choose "Load Filament".



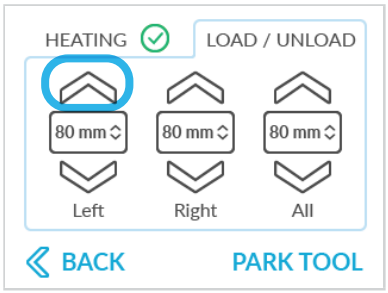
Choose PARK TOOL, wait for the machine to position the toolhead. When done, choose "PLA" to preheat the material.



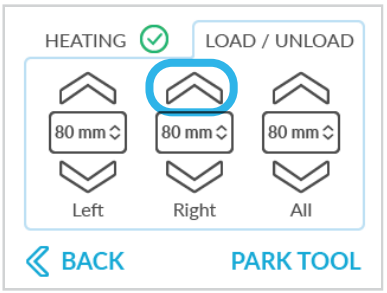
Wait till extruder reaches the proper temperature. The yellow HEATING sign will change colour from yellow to green.



Tap the LOAD/UNLOAD menu.



Tap the upper LEFT arrow on the screen to remove 80 mm of the filament. At first, extruder will load 40 mm to prevent clogging.



Tap the upper RIGHT arrow on the screen to remove 80 mm of the filament. At first, extruder will load 40 mm to prevent clogging. Repeat if needed

NOTE: Third menu named ALL maintain both filaments at the same time. Tap down arrow with ALL description to feed both filaments.

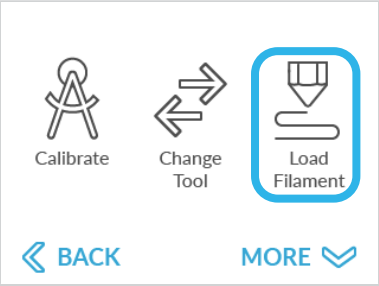
NOTE: By tapping the button showing "80 mm" you can change the amount of extruded filament to 15 or 5 mm.

12.4 Material exchanging

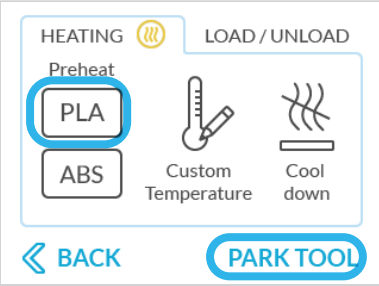
Single Plastic Extruder

To preheat the extruder, follow these steps.

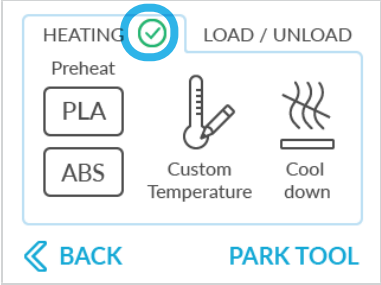
Choose the "Maintenance" from the LCD touchscreen menu.



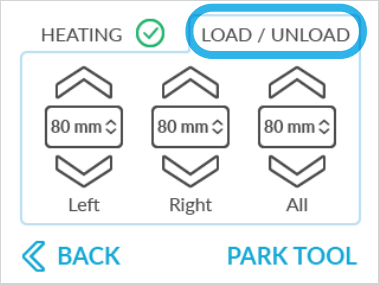
Choose "Load Filament".



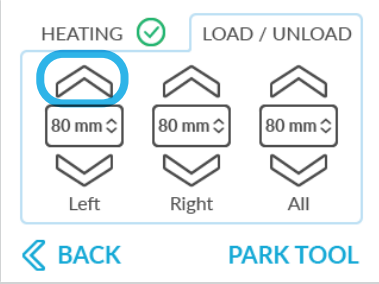
Choose PARK TOOL, wait for the machine to position the toolhead. When done, choose "PLA" to preheat the material.



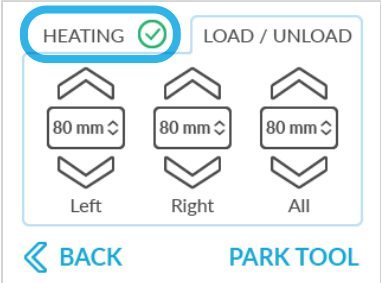
Wait till extruder reaches the proper temperature. The yellow HEATING sign will change colour from yellow to green.



Tap the LOAD/UNLOAD menu.

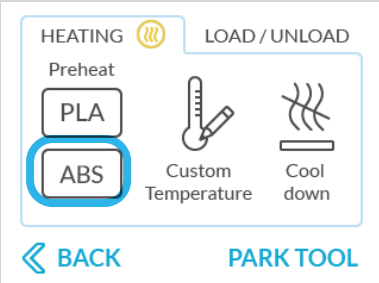


Tap the upper arrow on the screen to remove 80 mm of the filament. At first, extruder will load 40 mm to prevent clogging. Repeat if needed.

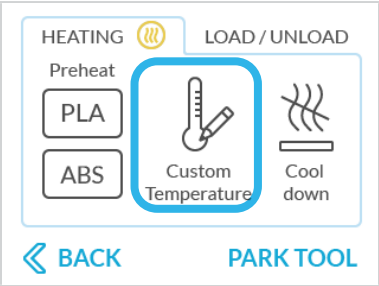


Adjust the temperature for the type of filament which will be used. To do that, tap the HEATING menu first.

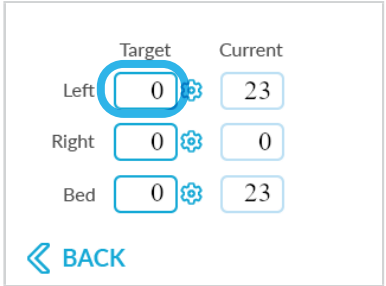
There are two ways to arrange the temperature for other materials than PLA.



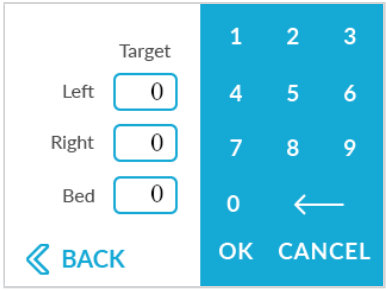
First option is by quick set up button "ABS", which automatically arrange the temperatures for maintaining this filament.



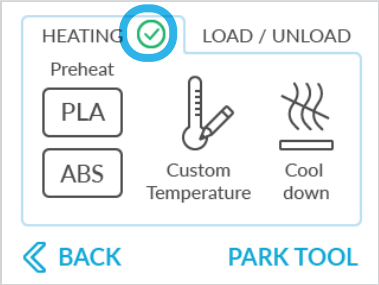
For any other materials than PLA and ABS, temperatures needed to be set up manually.
Tap the Custom Temperature button.



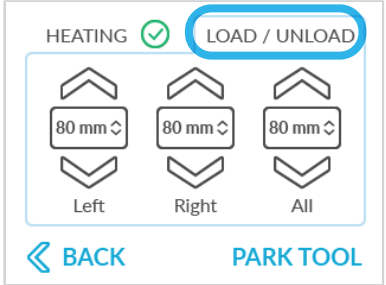
Tap the "Left" gap in the "Target: column.



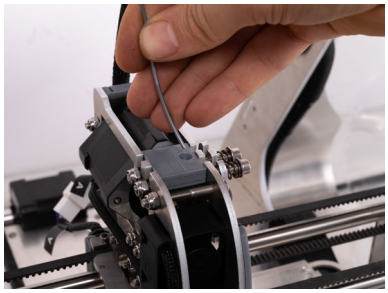
Tap the needed temperature on the keyboard, then OK.



Wait the extruder to heat up.



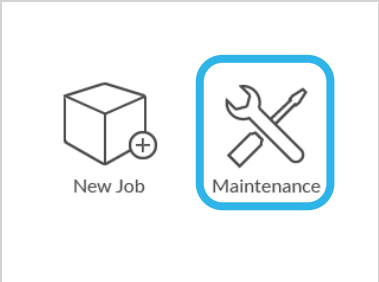
Go to the LOAD/UNLOAD menu.



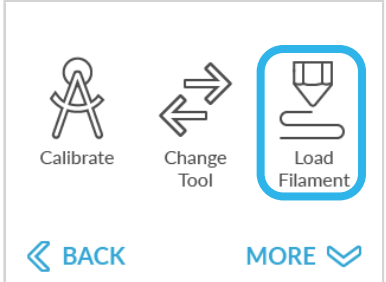
Feed the extruder by following steps from "loading the filament" chapter.

Dual PRO Extruder

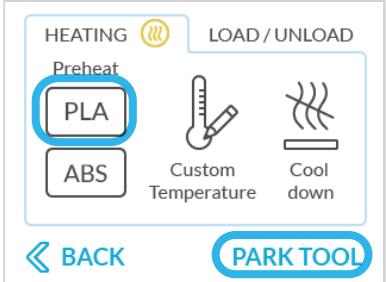
To preheat the extruder, follow these steps.



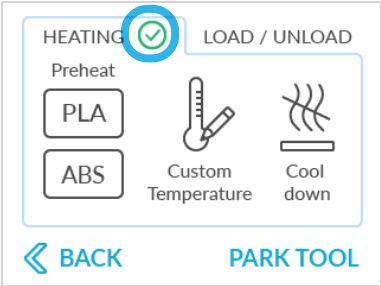
Choose the "Maintenance" from the LCD touchscreen menu.



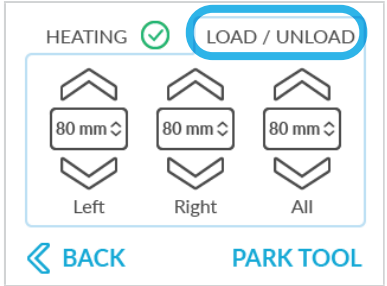
Choose "Load Filament".



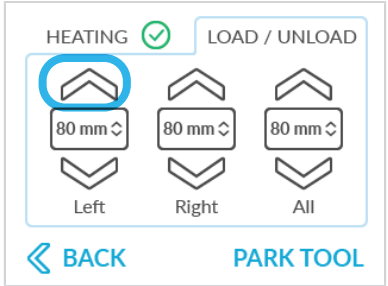
Choose PARK TOOL, wait for the machine to position the toolhead. When done, choose "PLA" to preheat the material.



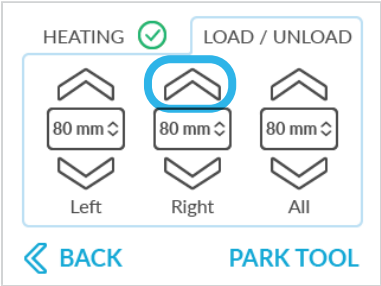
Wait till extruder reaches the proper temperature. The yellow HEATING sign will change colour from yellow to green.



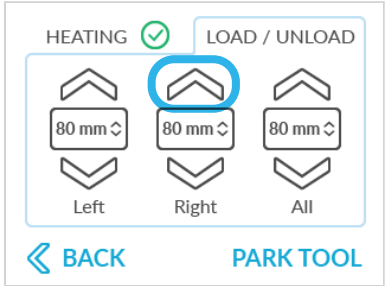
Tap the LOAD/UNLOAD menu.



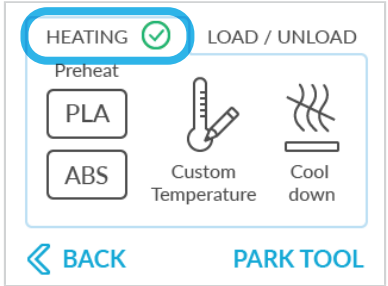
Tap the upper LEFT arrow on the screen to remove 80 mm of the filament. At first, extruder will load 40 mm to prevent clogging.



Tap the upper RIGHT arrow on the screen to remove 80 mm of the filament. At first, extruder will load 40 mm to prevent clogging.

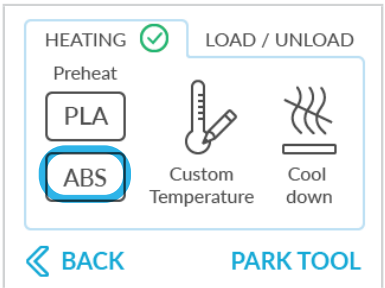


Repeat if needed. Third menu named ALL maintain both filaments at the same time. Tap upper arrow with ALL description to remove both filaments at the same time.

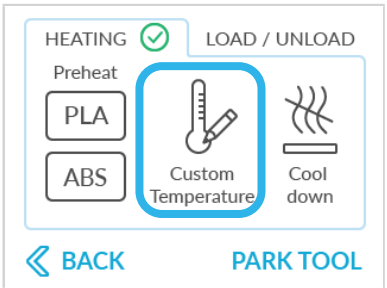


Adjust the temperature for the type of filament which will be used. To do that, tap the HEATING menu first.

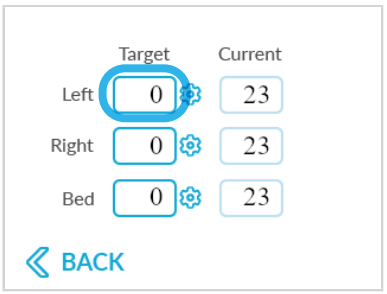
There are two ways to arrange the temperature for other materials than PLA.



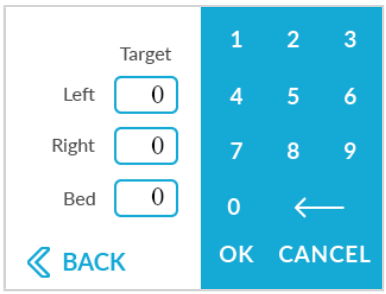
First option is by quick set up button "ABS", which automatically arrange the temperatures for maintaining this filament.



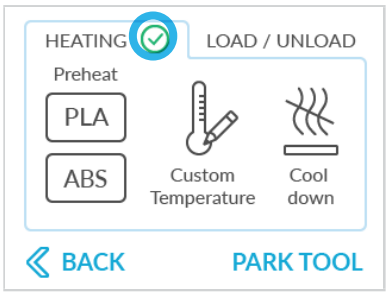
For any other materials than PLA and ABS, temperatures needed to be set up manually.
Tap the Custom Temperature button.



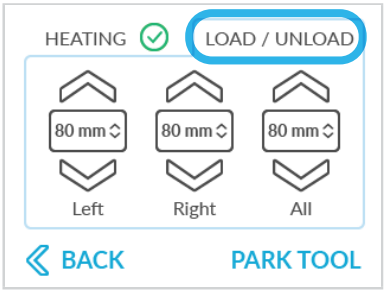
Tap the "Left" gap in the "Target: column.



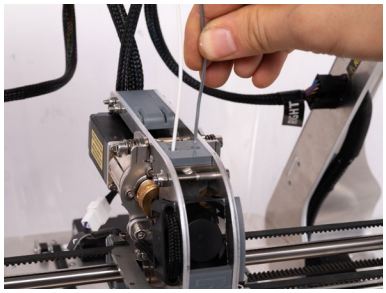
Tap the needed temperature on the keyboard, then OK.



Since the Dual PRO toolhead has one nozzle, the set up temperature adjusts for left and right filament. Wait the extruder to heat up.



Go to the LOAD/UNLOAD menu.

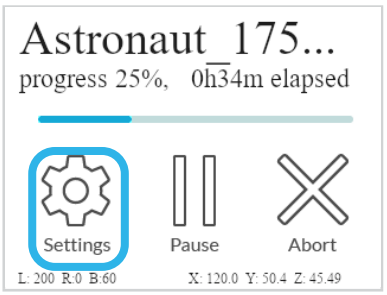


Feed the extruder by following steps from "loading the filament" chapter.

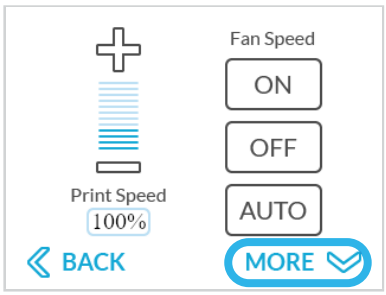
12.5 Filament replacement during printing

Single Plastic Extruder

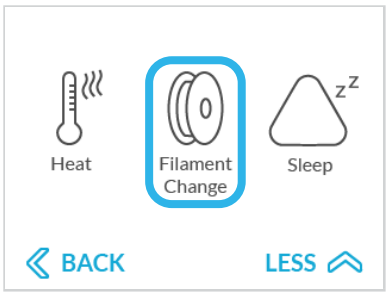
This function allows you to change the filament during the printing process. The new filament must be of the same material as the new one (PLA/PLA) because the temperature of the extruder will be the same as for the filament that was there before.



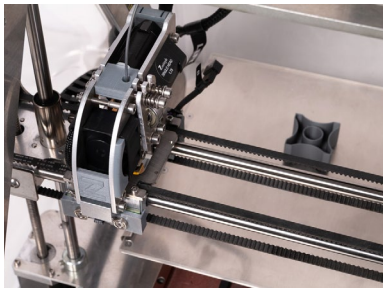
Tap the "Settings" menu.



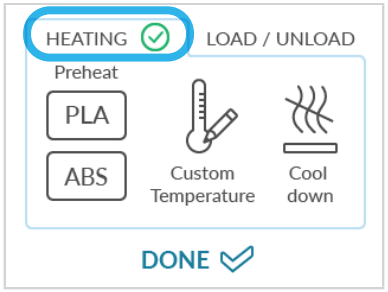
Choose "MORE".



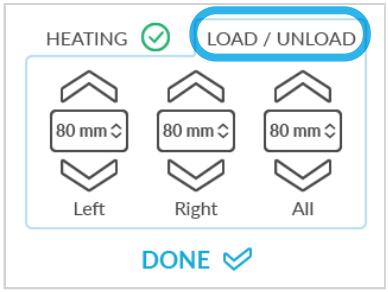
Choose "Filament Change".



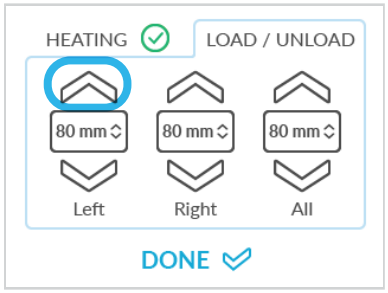
Wait until the extruder stops printing and lifts itself up.



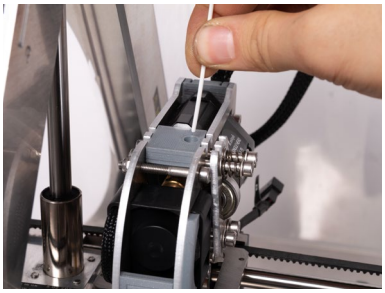
Tap the "HEATING" menu and check if the extruder has the right temperature.



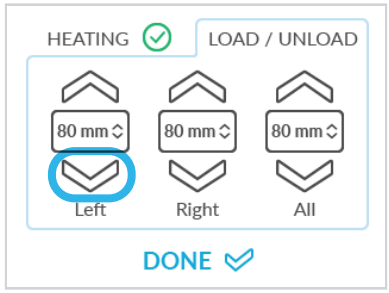
Tap the "LOAD/UNLOAD" menu.



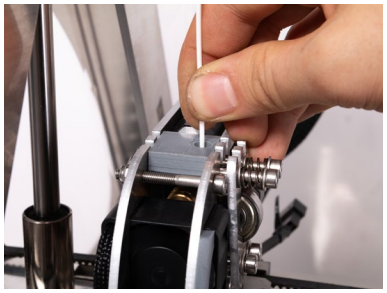
Tap the upper arrow on the screen to remove 80 mm of the filament. At first, extruder will load 40 mm to prevent clogging. Repeat if needed.



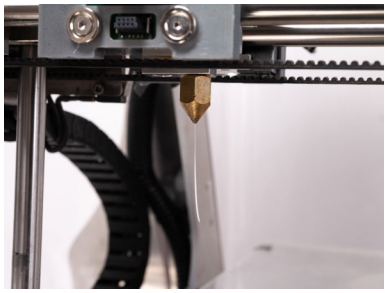
Insert new filament gently into the guide.



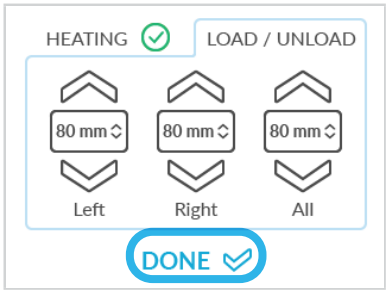
Tap the bottom arrow on the screen to feed 80 mm of the filament. Choose down arrow with LEFT description to do that.



Push the filament down until you feel it has been grabbed by the extruder drive gear.



Wait until the material flows out of the nozzle. Tap the feed button again if necessary.

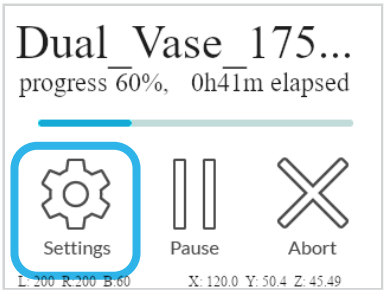


Remove the extruded material. Click "DONE", the extruder will continue work from where it stopped.

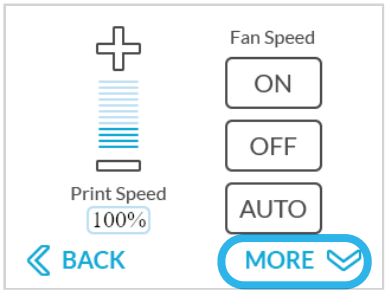
NOTE: Sometimes after clicking "DONE" the machine won't resume the work, in those cases repeat the feeding by pressing one more time the "LEFT" down button and after the extruder stops the feeding process press the "DONE" button.

Dual PRO Extruder

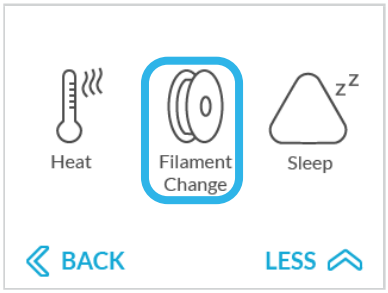
This function allows you to change the filament during the printing process. The new filament must be of the same material as the new one (PLA/PLA) because the temperature of the extruder will be the same as for the filament that was there before.



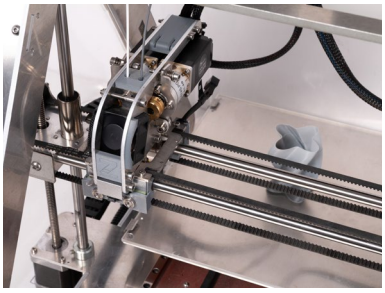
Tap the "Settings" menu.



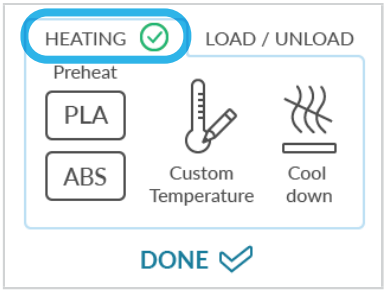
Choose "MORE".



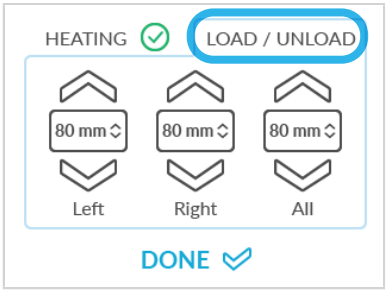
Choose "Filament Change".



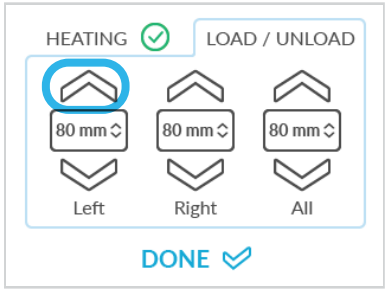
Wait until the extruder stops printing and lifts itself up.



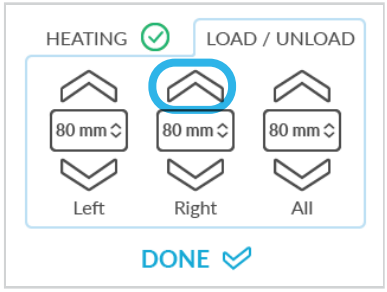
Tap the "HEATING" menu and check if the extruder has the right temperature.



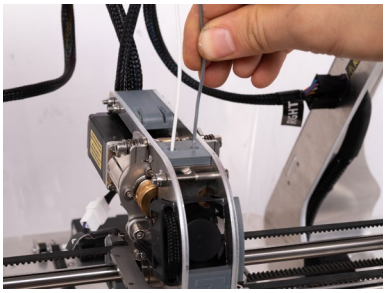
Tap the "LOAD/UNLOAD" menu.



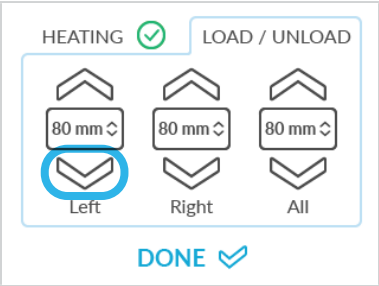
Tap the upper arrow with LEFT description on the screen to remove 80 mm of the filament. At first, extruder will load 40 mm to prevent clogging. Repeat if needed.



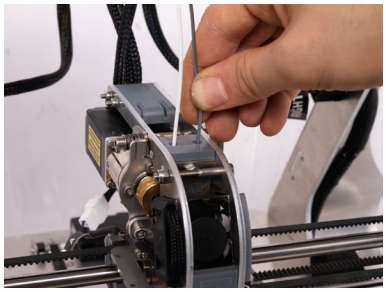
Tap the upper arrow with RIGHT description on the screen to remove 80 mm of the filament. At first, extruder will load 40 mm to prevent clogging. Repeat if needed.



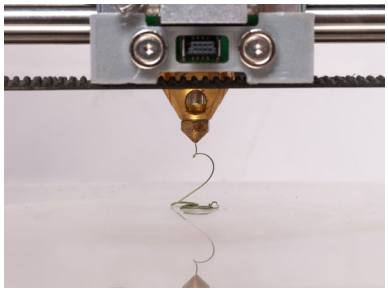
Insert new filament gently into the guide.



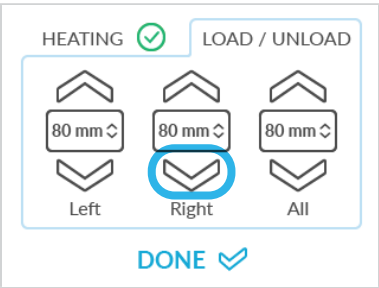
Tap the bottom arrow on the screen to feed 80 mm of the filament. Choose down arrow with LEFT description to do that.



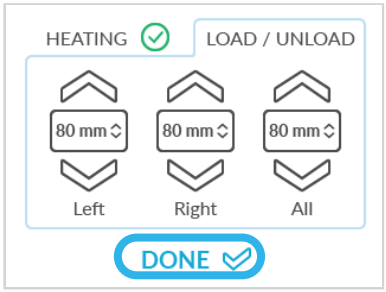
Push the filament down until you feel it has been grabbed by the extruder.



Wait until the material flows out of the nozzle. Tap the feed button again if necessary.



Repeat last 4 steps for down arrow with RIGHT description.



Remove the extruded material. Choose "Done" and wait until the extruder starts printing again.

NOTE: Sometimes after clicking "DONE" the machine won't resume the work, in those cases repeat the feeding by pressing one more time the "LEFT" down button and after the extruder stops the feeding process press the "DONE" button.

12.6 Autocalibration

Single Plastic Extruder

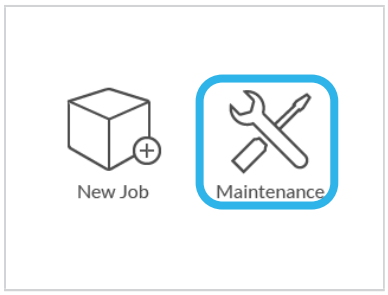
NOTE: Before performing the automatic calibration make sure the worktable is clean and prepared.

NOTE: During the automatic calibration process the printer is heating up.

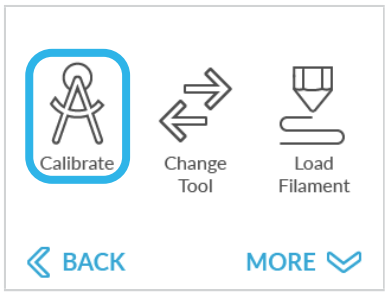
Take the calibration cable. The cable is included in the box.

Connect the wider end to the RIGHT frame socket.

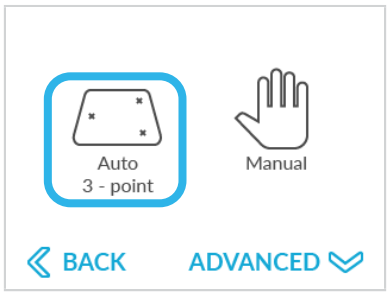
Connect the narrow end of the calibration cable to X-carriage B socket.



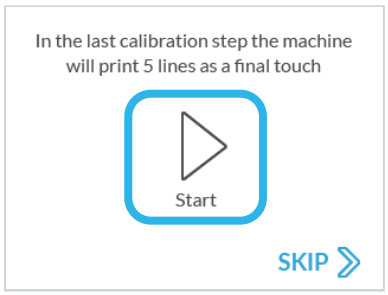
Choose "Maintenance".



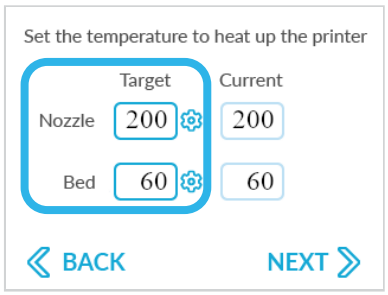
Choose "Calibrate".



Choose "Auto 3-point". Wait for the machine to heat up and finish the probing.

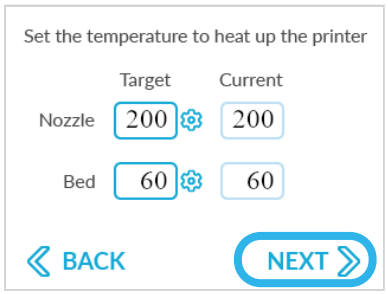


To ensure best calibration result print calibration pattern. Choose "Start".

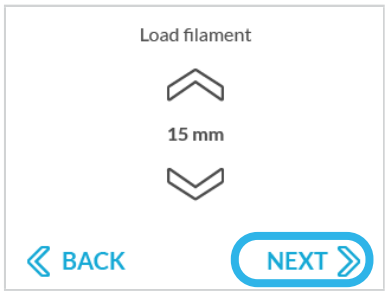


Set the printing temperature to the PLA material., Nozzle 200 ˚C, bed 60 ˚C.

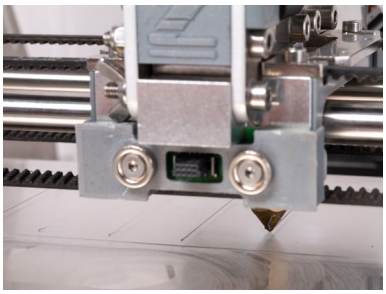
To do that tap the gaps and type the temperature on the keyboard.



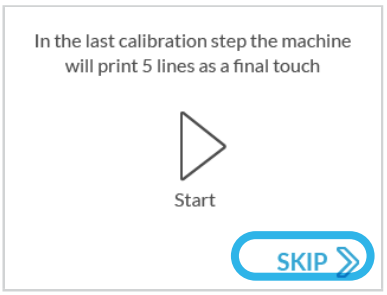
Wait for extruder to heat up. When done tap NEXT.



If your filament is not loaded, feed it using arrows on the screen. If your filament is already loaded choose "Next".

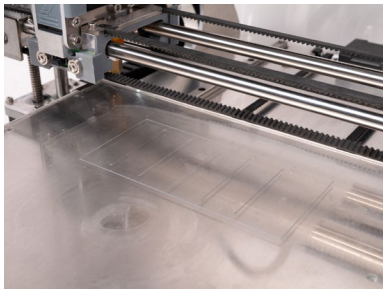


Wait for the machine to finish printing pattern.

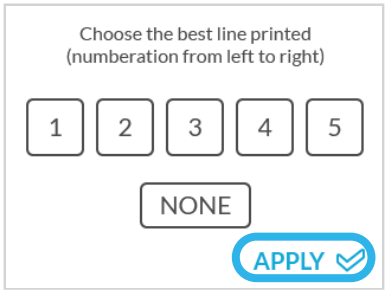


NOTE: by pressing the 'SKIP' button the user is approving the automatic calibration without visual validation. After that the calibration process ends.

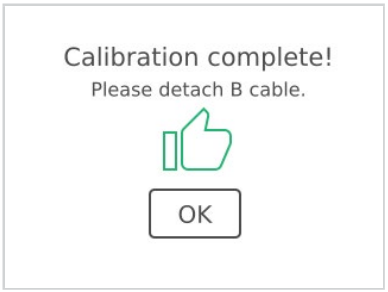
NOTE: Each one of those lines is printed on a slightly different height (+/- 0.05 mm) with the middle line being the result of the automatic calibration process.



Look at printed lines and select the best one on the screen. A correct line is the one that sticks to the table after gently touching it with the finger, but can be easily ripped off with a fingernail.



Apply your choice.

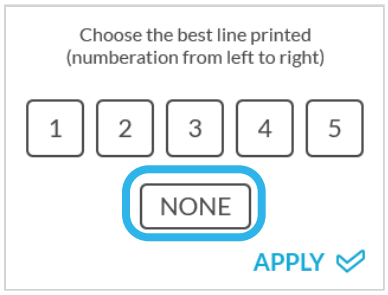


ZMorph VX calibration is complete.

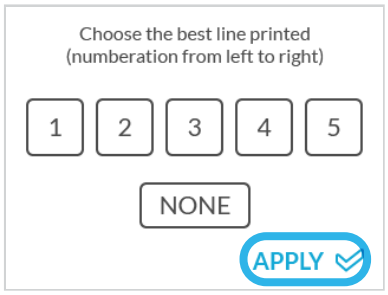
Detach the autocalibration cable

Clean the bed. Your machine is ready for your first print!

NOTE: If none of the printed lines is proper, please follow these steps:

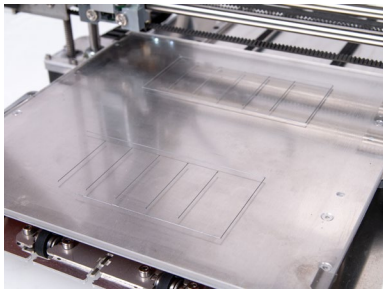


Choose NONE option.

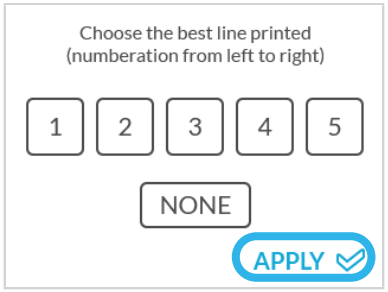


Choose APPLY.

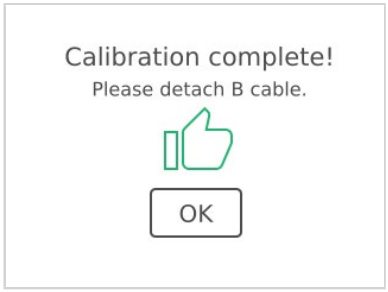
Printer will ask which of the line is closest to the best result 1 or 5. Pick one and tap NEXT.



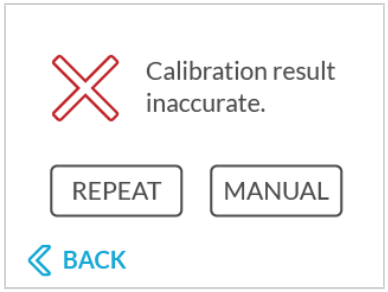
The machine will prepare another 5 lines, depending on the choice - lower (1) or higher (5).



Select the best one by pressing their corresponding numbers visible on the screen and clicking "APPLY".



Calibration completed. Detach B the cable.



If after the second round of calibration the user still decides that none of the lines are accurate, the machine will show a warning screen and advise to repeat the automatic calibration process or to perform the manual calibration.

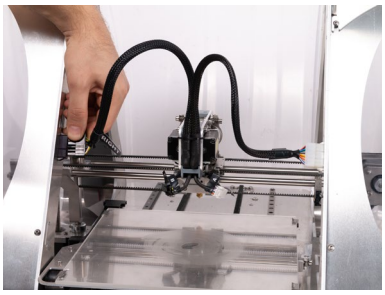
NOTE: If meeting calibration issues or autocalibration doesn't work, please contact Technical Support.

DUAL PRO Extruder

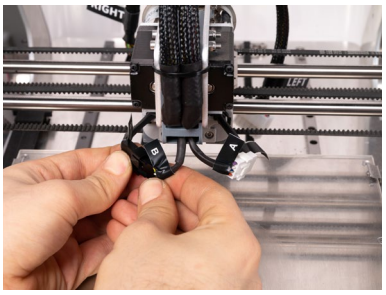
NOTE: Before performing the automatic calibration make sure the worktable is clean and prepared.

NOTE: See the toolhead changing process before mounting the Dual PRO extruder on the machine.

NOTE: During the automatic calibration process the printer is heating up!

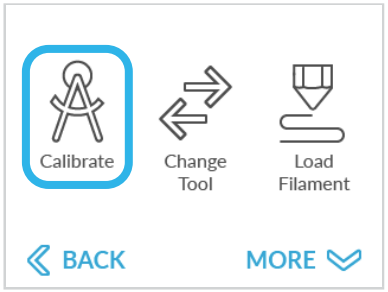


Connect the LEFT cable to the LEFT frame socket and RIGHT cable to the RIGHT frame socket

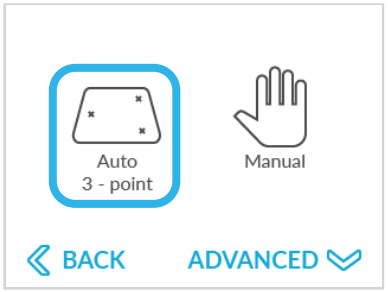


Connect the extruder "A" cable to the "A" plug and the 'B' cable to the "B" plug on the X carriage.

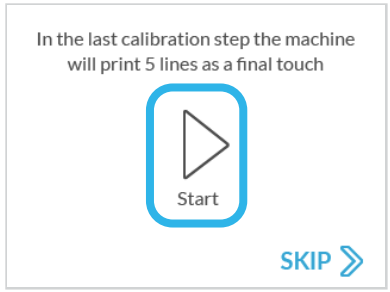
Choose "Maintenance".



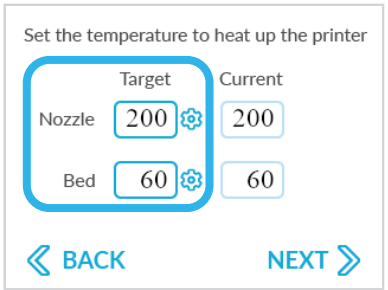
Choose "Calibrate".



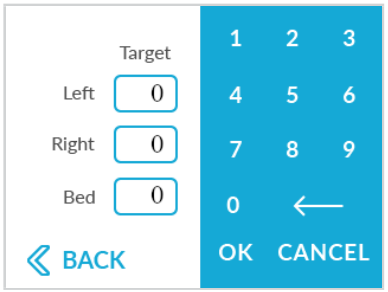
Choose "Auto 3-point". Wait for the machine to heat up and finish the probing.



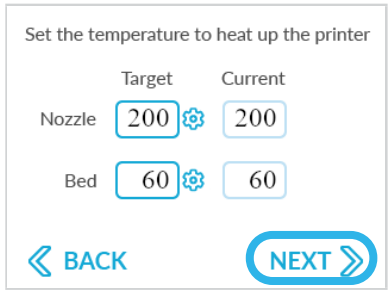
To ensure best calibration result print calibration pattern. Choose "Start".



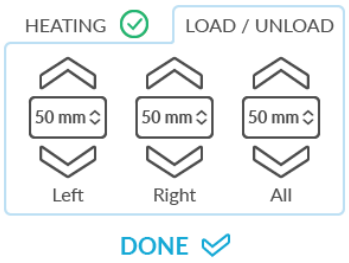
Set the printing temperature to the PLA material., Nozzle 200 °C, bed 60 °C.



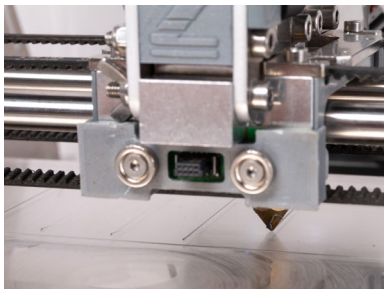
To to that tap the gaps and type the temperature on the keyboard.



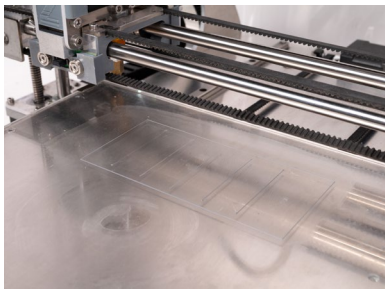
Wait for extruder to heat up. When done tap "NEXT".



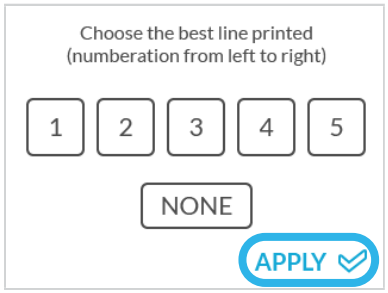
Use the arrow buttons on the screen to feed the material on both sides of the extruder until it start to pour out from the nozzle. (it might take a couple times), after that press the "NEXT" button.



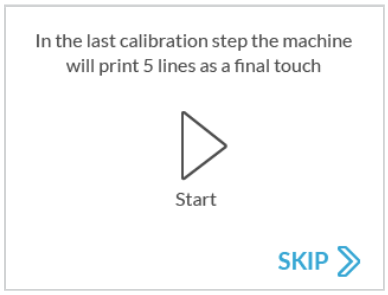
Wait for the machine to finish printing pattern.



Look at printed lines and select the best one on the screen. A correct line is the one that sticks to the table after gently touching it with the finger, but can be easily ripped off with a fingernail.

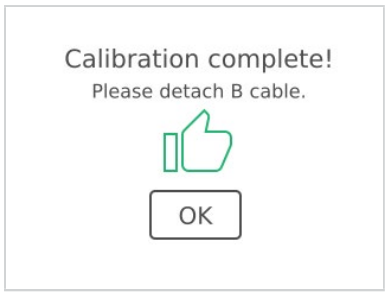


Apply your choice.

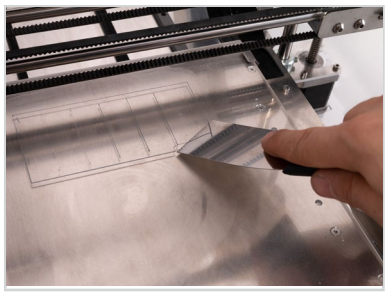


NOTE: by pressing the 'SKIP' button the user is approving the automatic calibration without visual validation. After that the calibration process ends.

NOTE: Each one of those lines is printed on a slightly different height (+/-0.05 mm) with the middle line being the result of the automatic calibration process.

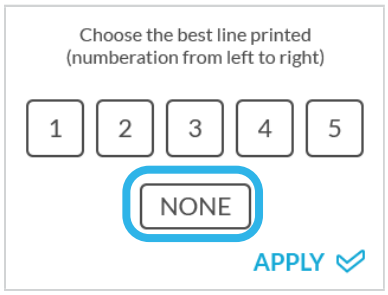


ZMorph VX calibration is complete.

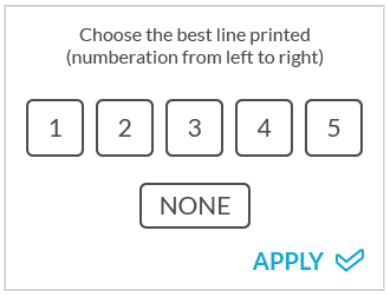


Clean the bed. Your machine is ready for your first print!

NOTE: If none of the printed lines is proper, please follow these steps:

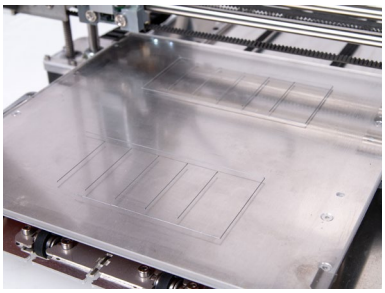


Choose NONE option.

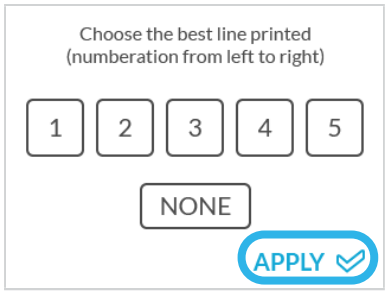


Choose APPLY.

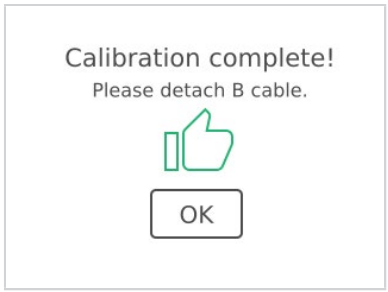
Printer will ask which of the line is closest to the best result 1 or 5. Pick one and tap NEXT.



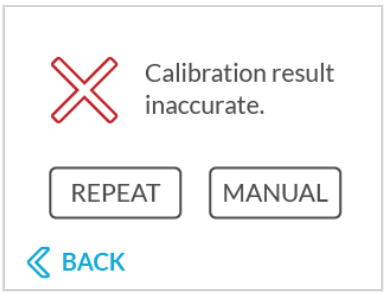
Printer will prepare another 5 lines lower or upper according to your choice. Each line is printed 0.05 mm lower/upper according to user choice.



Pick the best line and APPLY.



Calibration completed. Detach B cable.



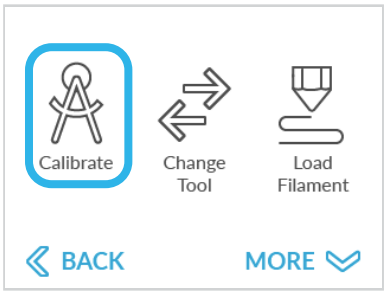
If after the second round of calibration the user still decides that none of the lines are accurate, the machine will show a warning screen and advise to repeat the automatic calibration process or to perform the manual calibration.

NOTE: If meeting calibration issues or autocalibration doesn't work, please contact Technical Support.

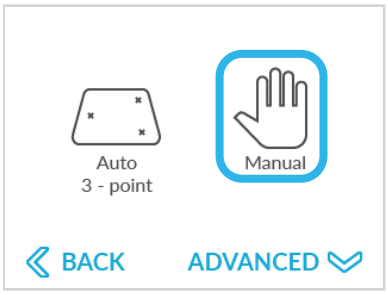
12.7 Manual calibration process

The manual calibration doesn't require loading a filament (can be performed with an empty extruder).

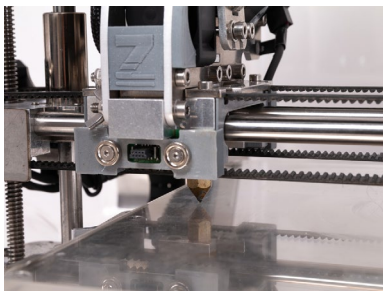
Choose "Maintenance".



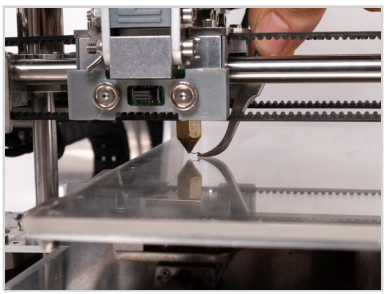
Choose "Calibrate".



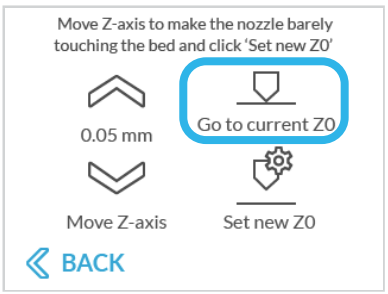
Choose "Manual".



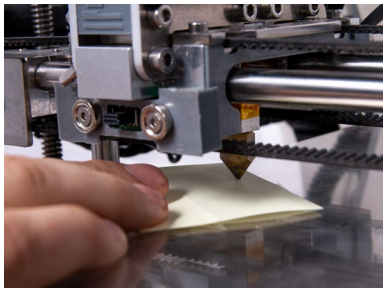
Wait until the extruder is placed in the right place.



Clear the nozzle and the table from the unnecessary material.



Take a small sheet of paper and place it between the nozzle and the worktable. Press the 'Go to current Z0' button.



Wait until the extruder stabilizes itself on the right height.

Use arrows on the touch-screen to lower or raise the extruder by 0.05 mm.

When the nozzle is at the correct height, choose 'Set new Z0' (Visual or paper verification).

NOTE: Move the paper between the nozzle and the worktable surface, if the nozzle is too low the paper won't move. If the nozzle is too high above the surface the paper sheet will be loose. The best configuration is when the piece of paper rubs against the nozzle but it's not too loose.

NOTE: Be very careful using the "Move Z-axis" feature, the movement of the Z-axis is slow and silent, don't press the arrow to many times because it might damage the work table glass surface.

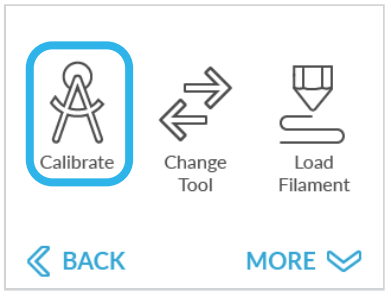
12.8 Calibration - additional functions

In the Maintenance Menu in Calibration Function there is an additional menu with advanced settings:

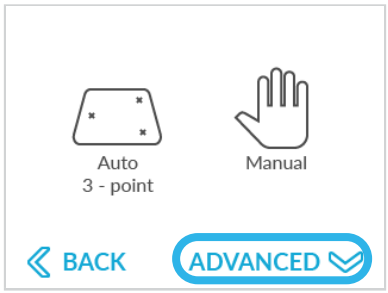
- Restore factory default - restores the factory default position and removes the history of calibration Z-axis changes.
- Manual 3-point calibration - an option for manual calibration the same 3 points that are used for autocalibration.

Manual 3-point calibration

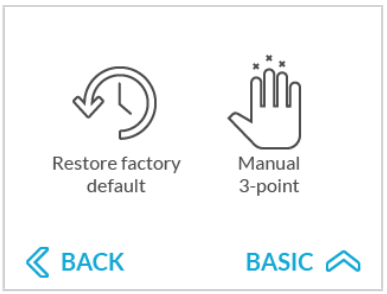
Choose "Maintenance".



Choose "Calibrate".

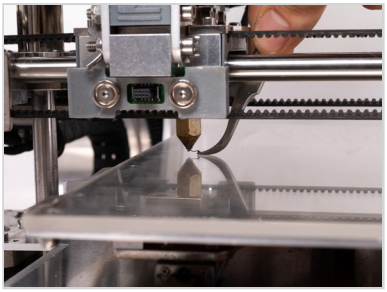


Choose "Advanced"

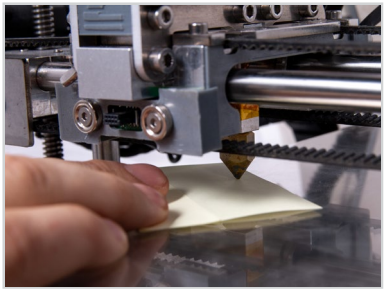


Choose "Manual 3-point calibration".

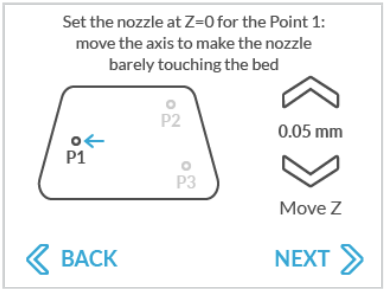
Wait until the extruder reaches the calibration position, on the left central part of the worktable.



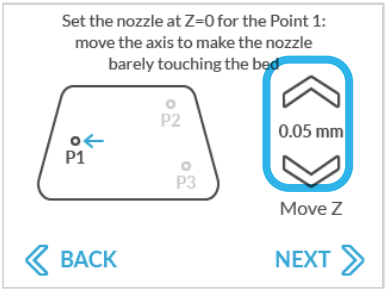
Clean the nozzle and table from unnecessary material.



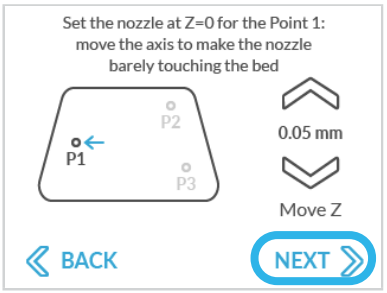
Take a small sheet of paper and place it between the nozzle and the worktable. Set the nozzle at Z=0 for the Point1.



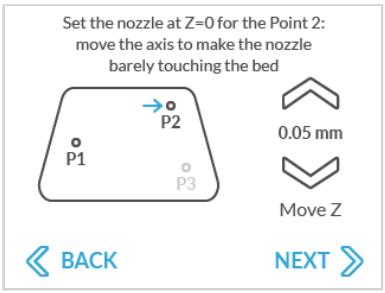
Set the nozzle at Z=0 for the Point1: move the axis to make the nozzle barely touching the bed.



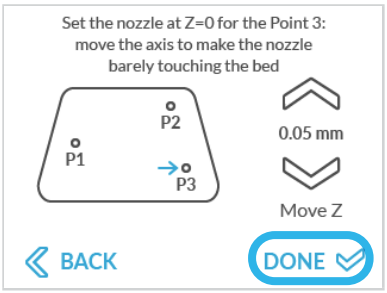
Use the arrows to set position. To verify the distance, you should be able to place a sheet of paper underneath.



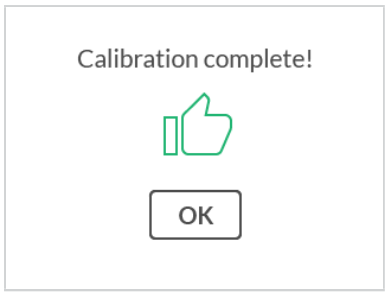
When done, tap "NEXT".



Repeat for point number 2 and 3.



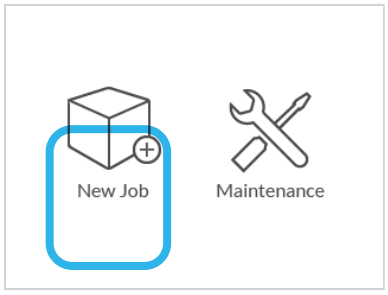
When finished tap "DONE".



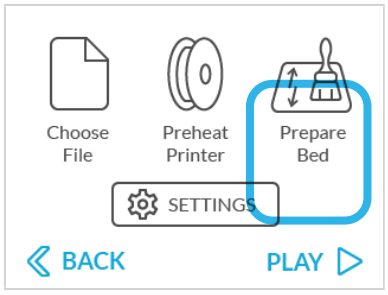
Manual 3-point calibration process is finished!

NOTE: Move the paper between the nozzle and the worktable surface, if the nozzle is too low, the paper won't move. If the nozzle is too high above the surface the paper sheet will be loose. The best configuration is when the piece of paper rubs against the nozzle but it's not loose.

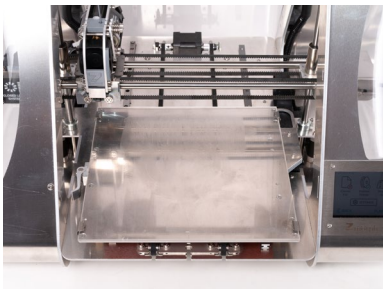
12.9 Preparing the worktable



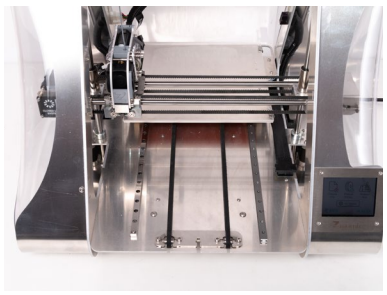
Choose "New Job".



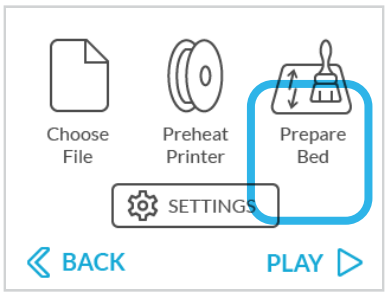
Choose "Prepare Bed".



Wait until the worktable stops.



Positioning the worktable works in two variants: to the front and to the back of the machine.



The variants are changing with every click on "Prepare Bed" option.

Clean the surface of the table and remove all greasy spots. We recommend paper towel and a window cleaner.

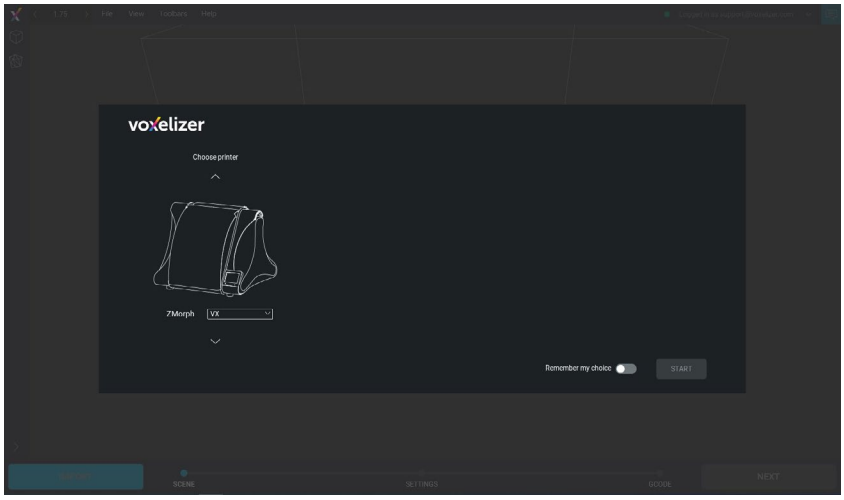
Apply a thin layer of an adhesive agent to the worktable.

The table is ready for 3D printing.

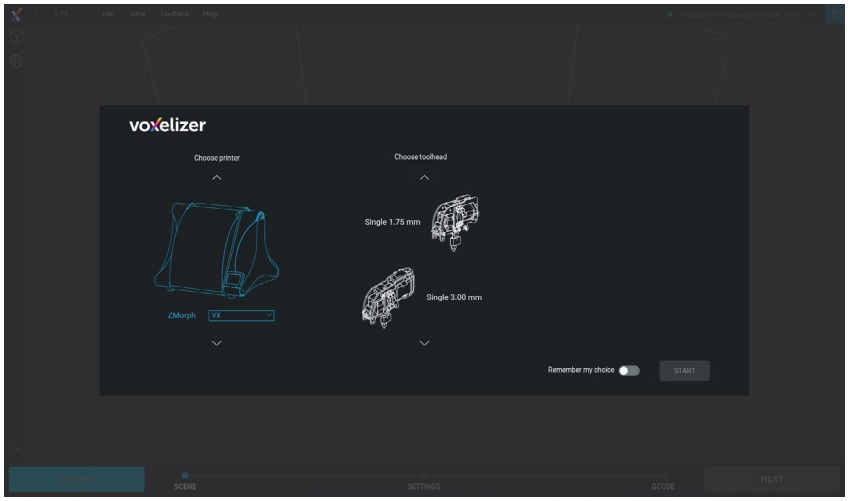
12.10 Files preparation

Single Plastic Extruder

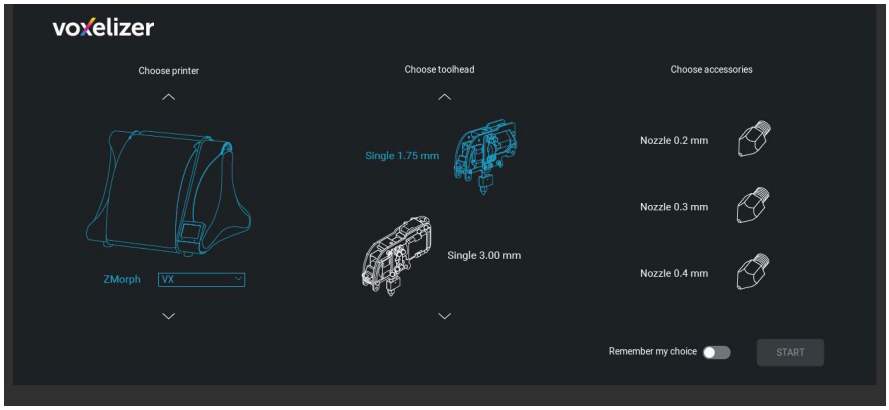
Launch Voxelizer



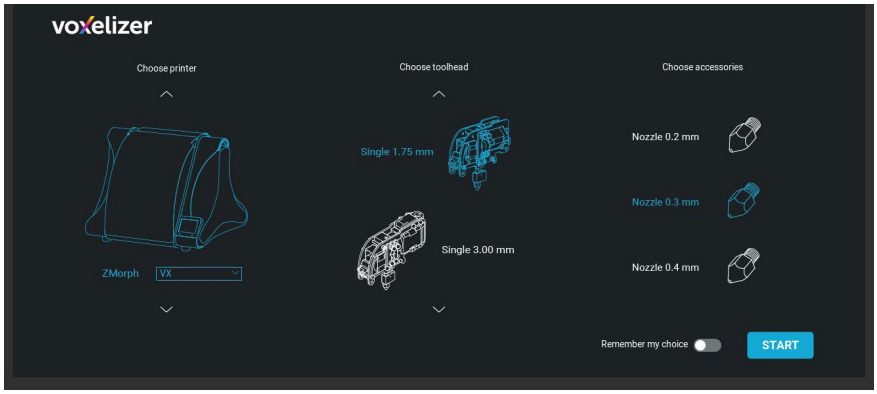
Select the model of your printer, when done click the graphic representing machine. Colour of graphic will change to blue and new settings column will appear.



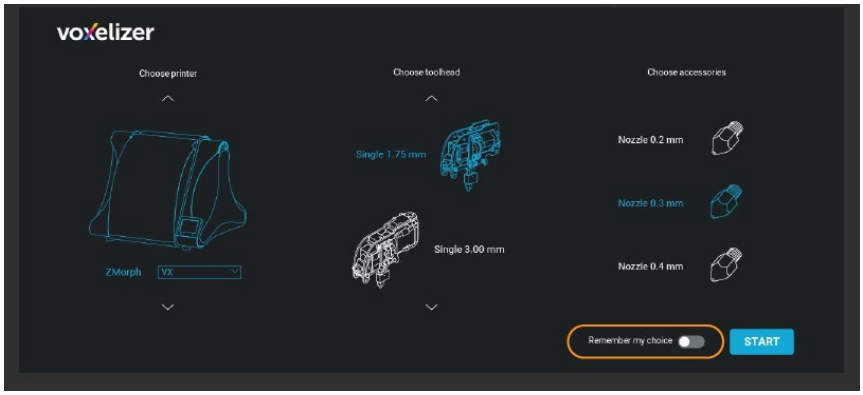
Choose Single 1.75 mm extruder



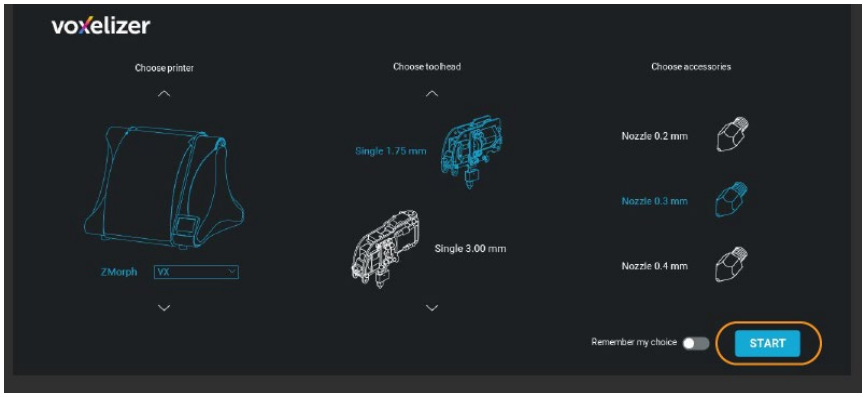
Choose nozzle 0.3 mm. This nozzle is mounted in extruder as a default.



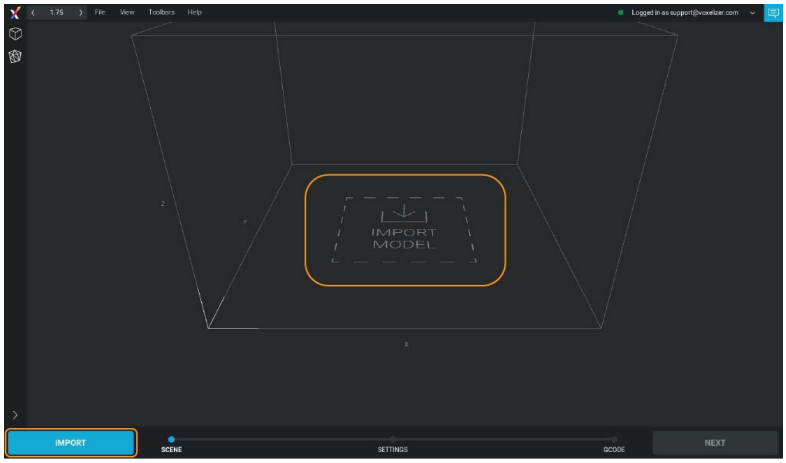
Use an option "Remember my choice" to save chosen settings.



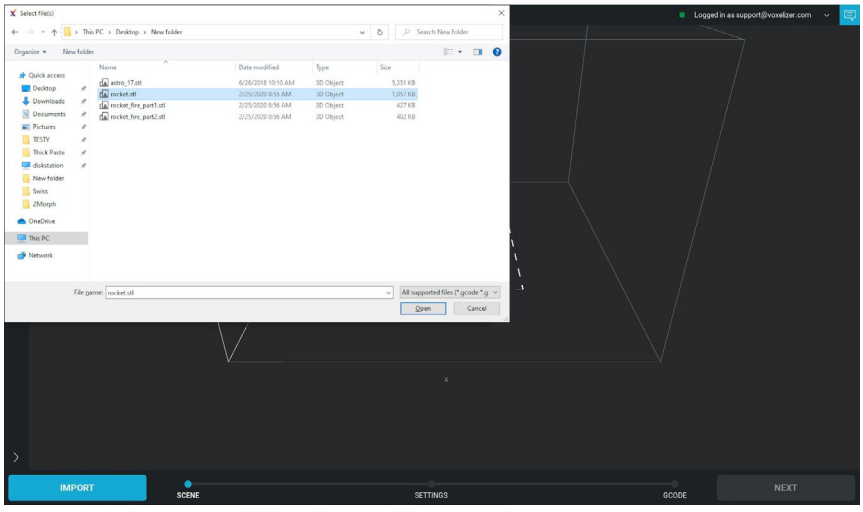
Choose START.



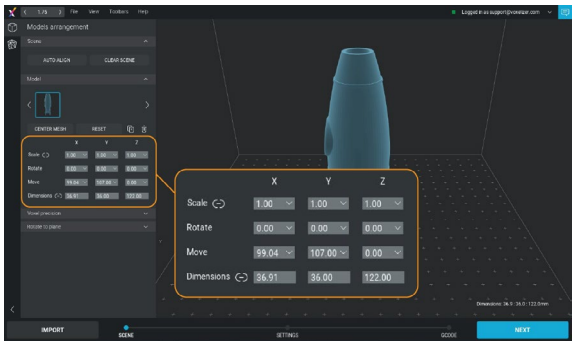
Import file by using one of marked buttons.



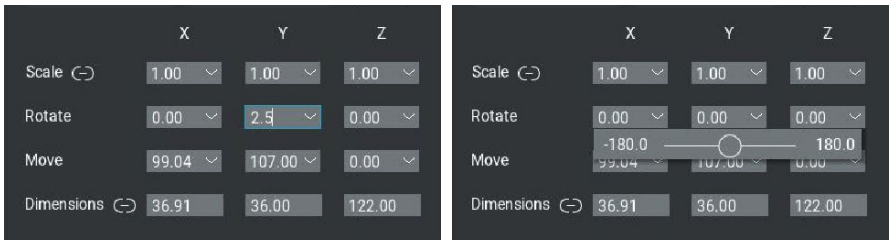
Select an STL file.



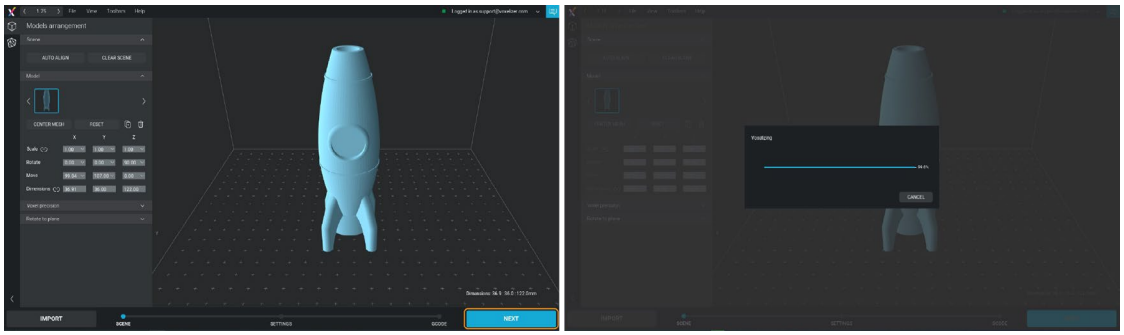
After importing the file, a toolbar will appear on the left that allows basic operations on the mesh model, such as: scaling (SCALE), scaling to specific dimensions (DIMENSION), rotating (ROTATE), and moving the model to specific position (MOVE).



You can set values manually or use sliders.

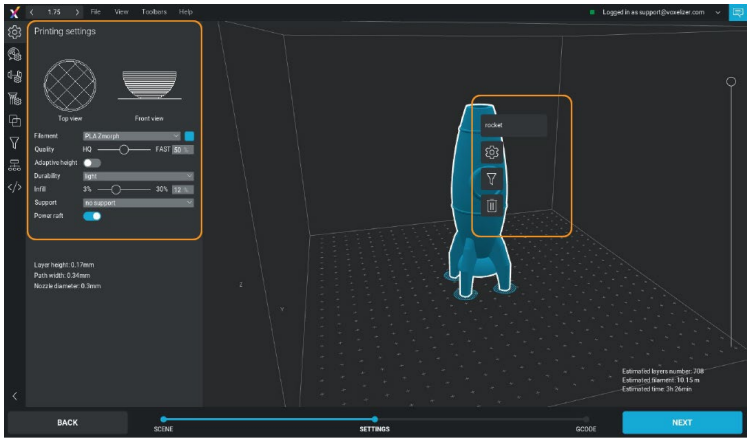


Set the model according to your preferences and click NEXT to voxelize the model.



The second step of the file preparation is to set the printing parameters.

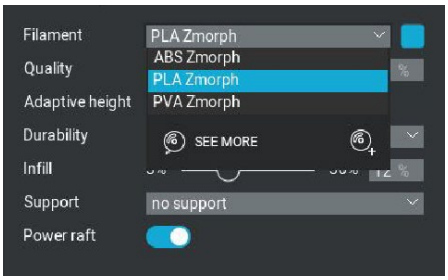
There are 2 types of menus - global (placed to the left of the screen) and local (opened by clicking the right mouse button on the model).



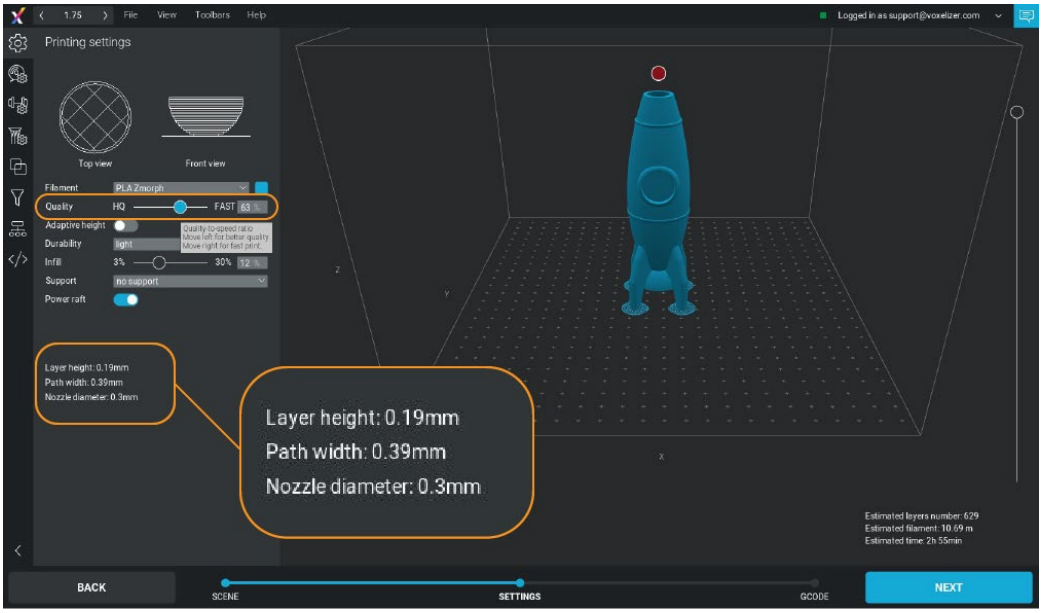
NOTE: there can be many different unbound models on the workspace, by clicking the right mouse button on them different printing parameters can be selected for each of them.

In the global menu you can set:

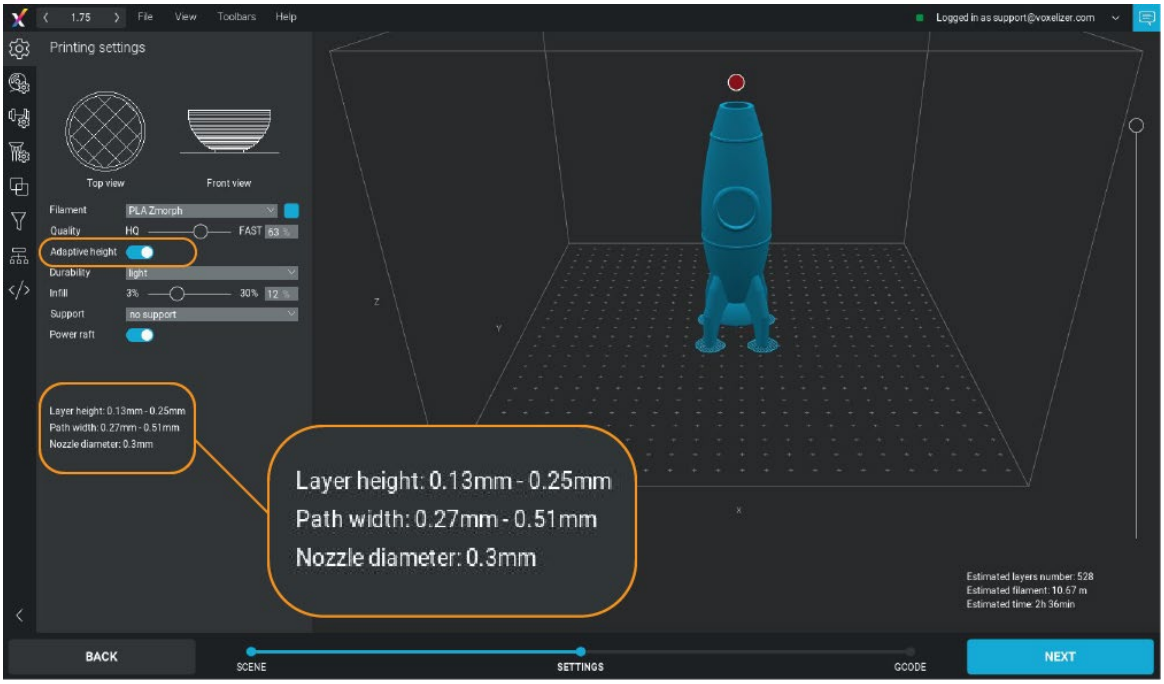
a) Filament - defines a filament type that will be used in the project, e.g: PLA ZMorph, ABS ZMorph, PET ZMorph. Basing on the filament choose, Voxelizer will adapt printing settings. To see the details of the print settings, click the button SEE MORE or go to Filament preset list. If you can't find filament your filament type, go to the filament icon that opens a filament library.



b) Quality - is a simplified option to select model quality settings, allowing you to select layer height and path width with a single slider. HQ guarantees the highest quality, at the expense of print speed (lasts longer), while FAST guarantees faster printout, at the expense of a larger layer, and thus lower quality. Recommended settings of 50% guarantee the best ratio of quality to print speed. The current path values and layer height are shown under the basic menu. Quality can also be defined separately for different models, editing takes place in the local menu.

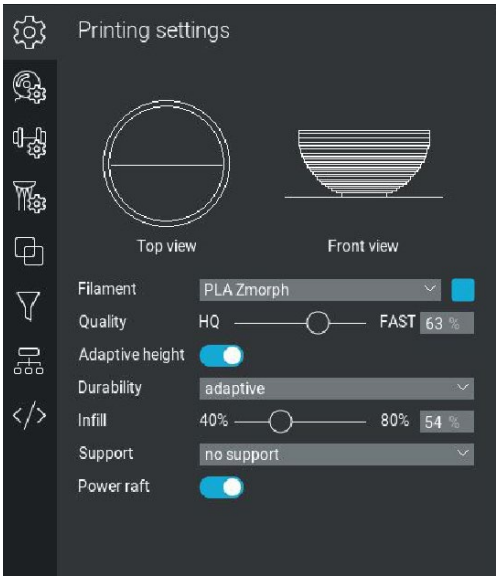


c) Adaptive height - option to enable or disable the height of the Adaptive Layer. This function allows the program to adjust the height of the print layer depending on the geometry of the model. The path width and default layer height values change to ranges that can be modified again using the Quality slider.

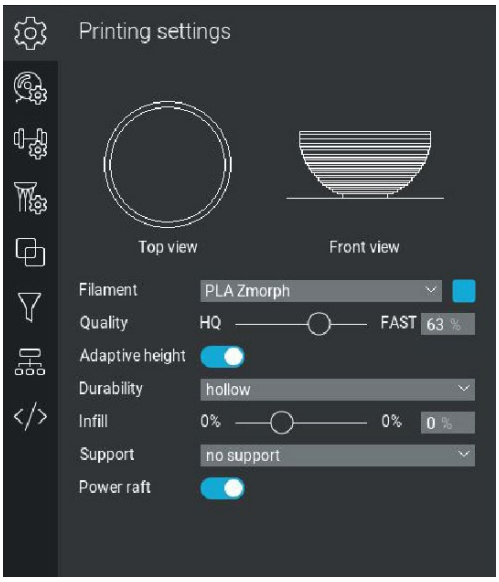


d) Durability - settings for the durability of the model. This function takes into account the number of model outlines as well as the scope and type of the infill. There are 5 types:

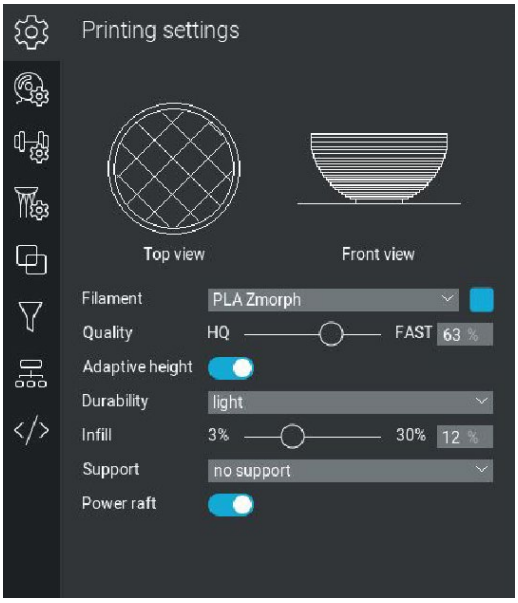
- Adaptive - allows for infill optimization and faster print. Imposes 2 outlines and 40-80% infill.



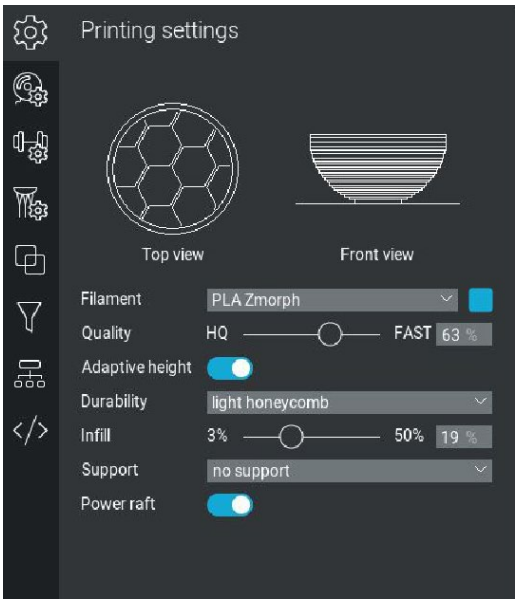
- Hollow - Imposes 2 outlines and 0% infill. Option for hollow models.



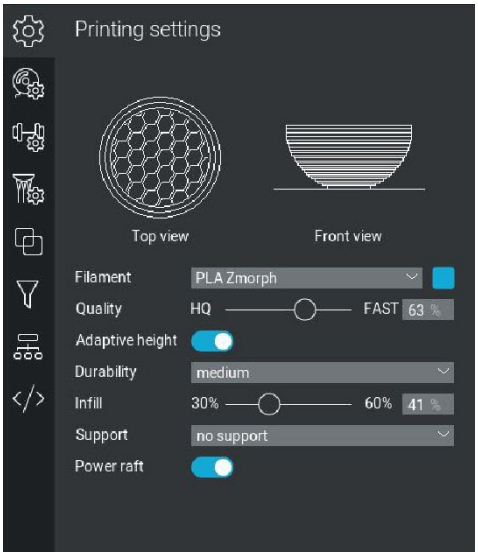
- Light - imposes 2 outlines and 3-30% grid-type infill.



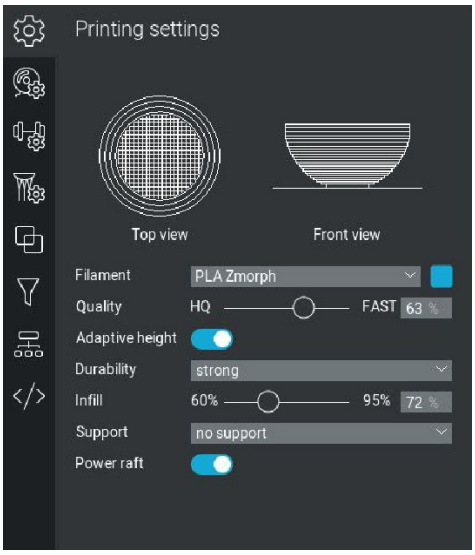
- Light honeycomb - imposes 2 outlines and 3-50% honeycomb-type infill.



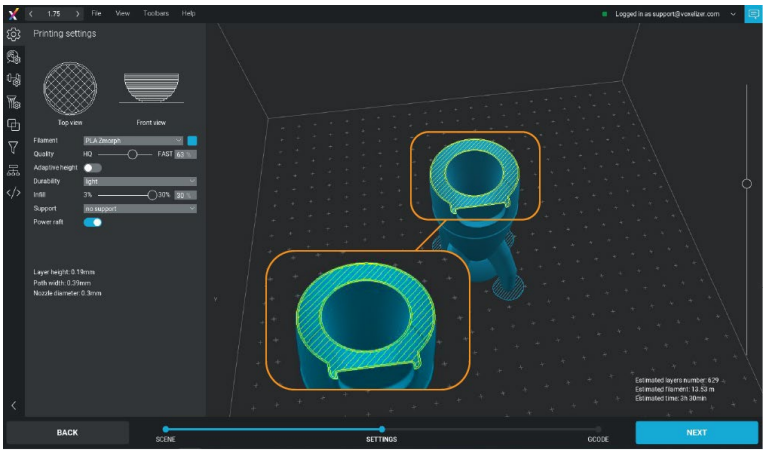
- Medium - imposes 3 outlines and 30-60% honeycomb-type infill.



- Strong - imposes 4 outlines and 60-95% grid-type infill.

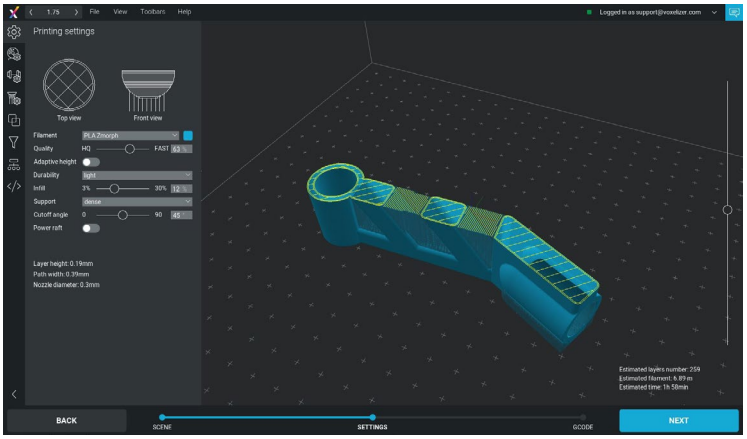


e) Infill - selection of model infill value within the range defined by Durability. The setting can be edited using the slider or entered manually. Generating a preview of the infill is performed on an ongoing basis, which allows for a quick assessment of the selected type and size of infill.

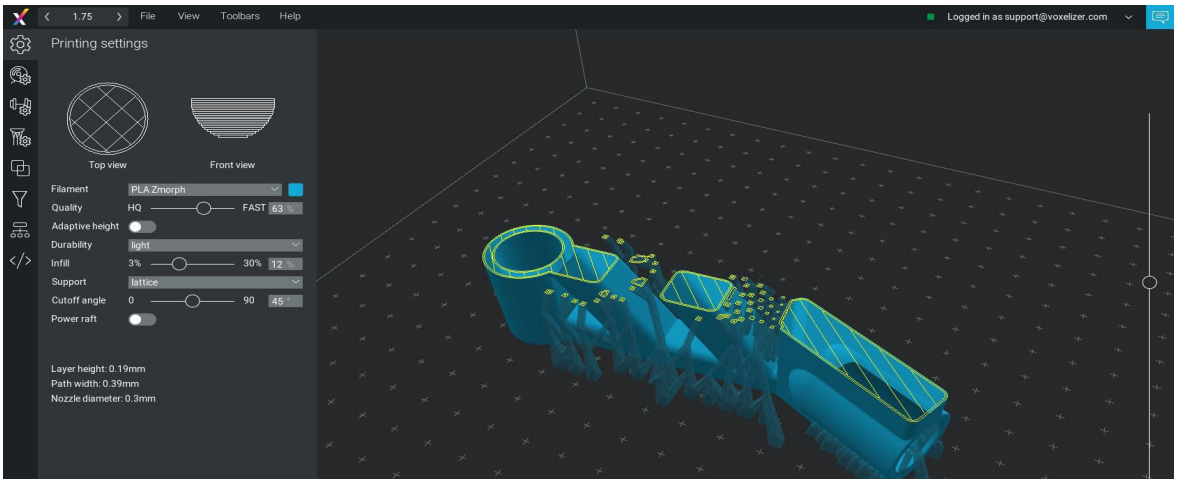


f) Support - enable/disable the support structure. There are 6 types of support:

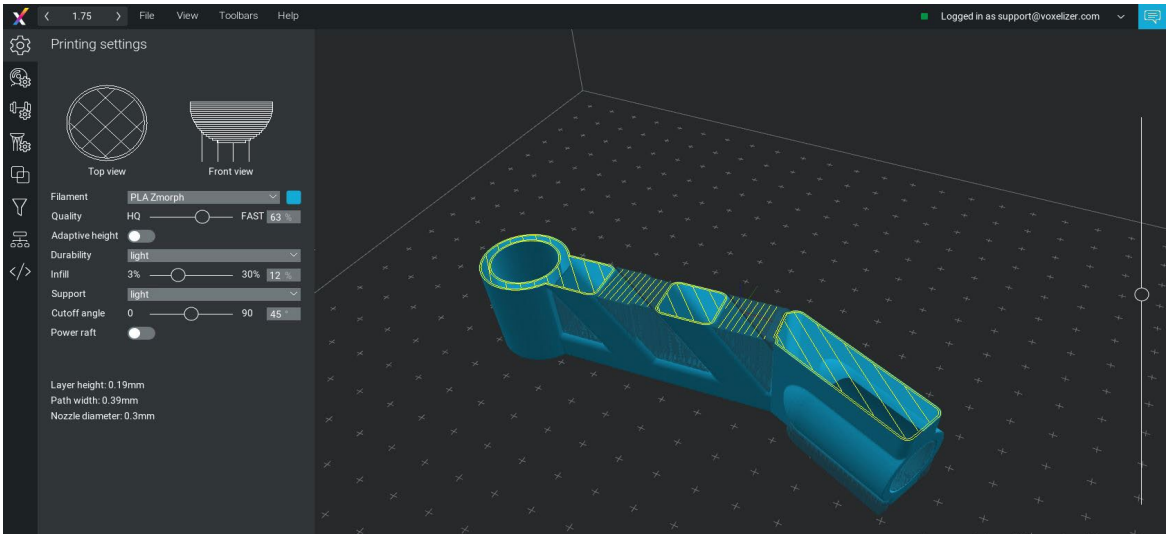
- Dense



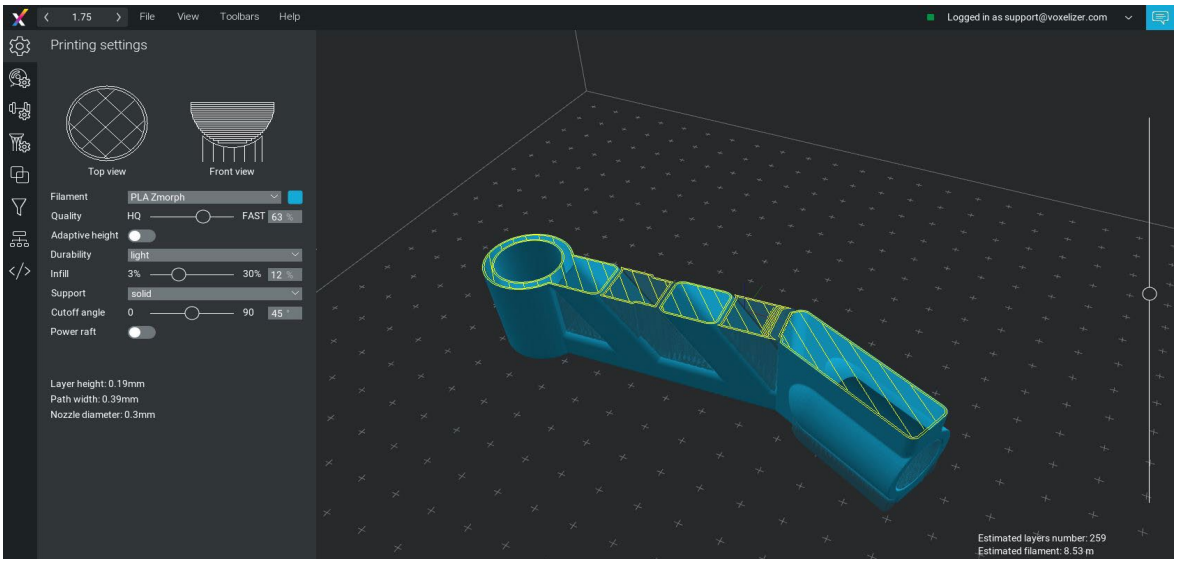
- Lattice



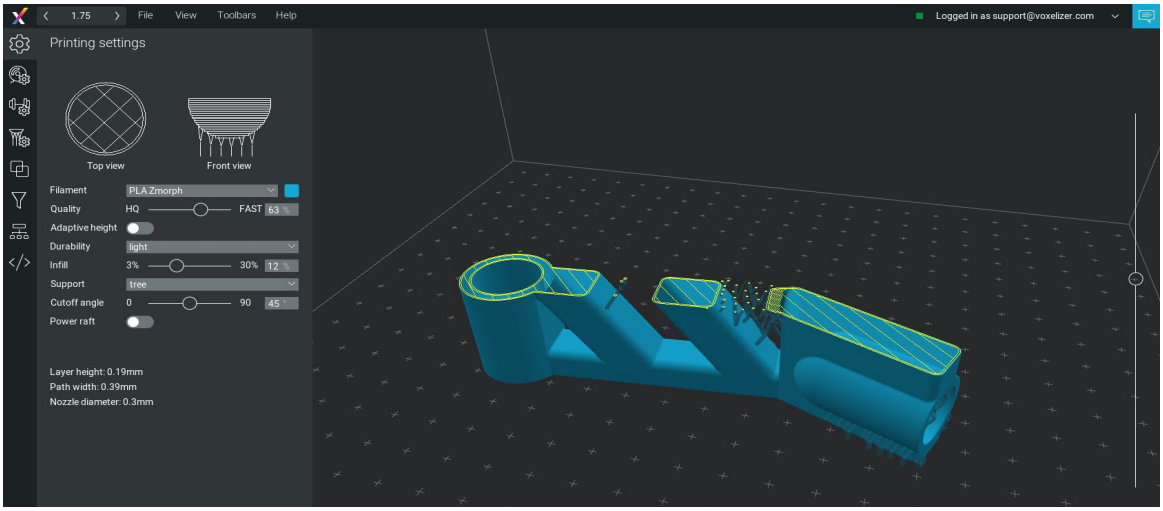
- Light



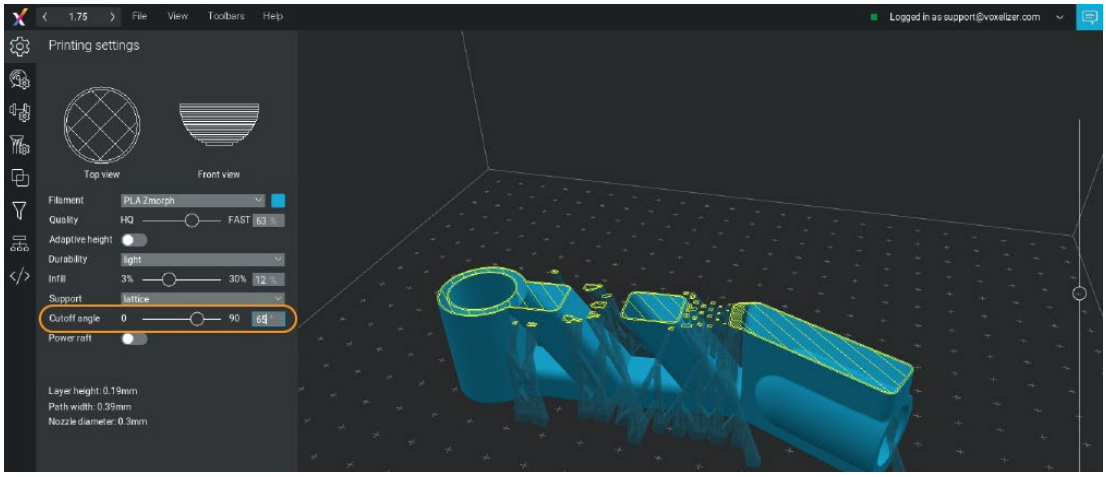
- Solid



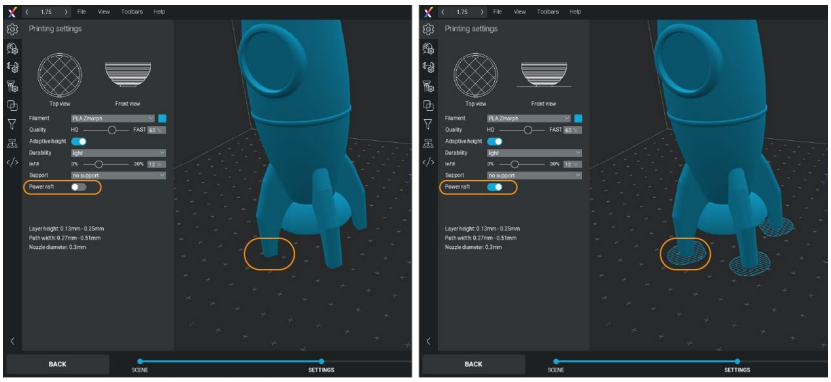
- Solid PVA - support dedicated for Dual PRO Extruder
- Tree



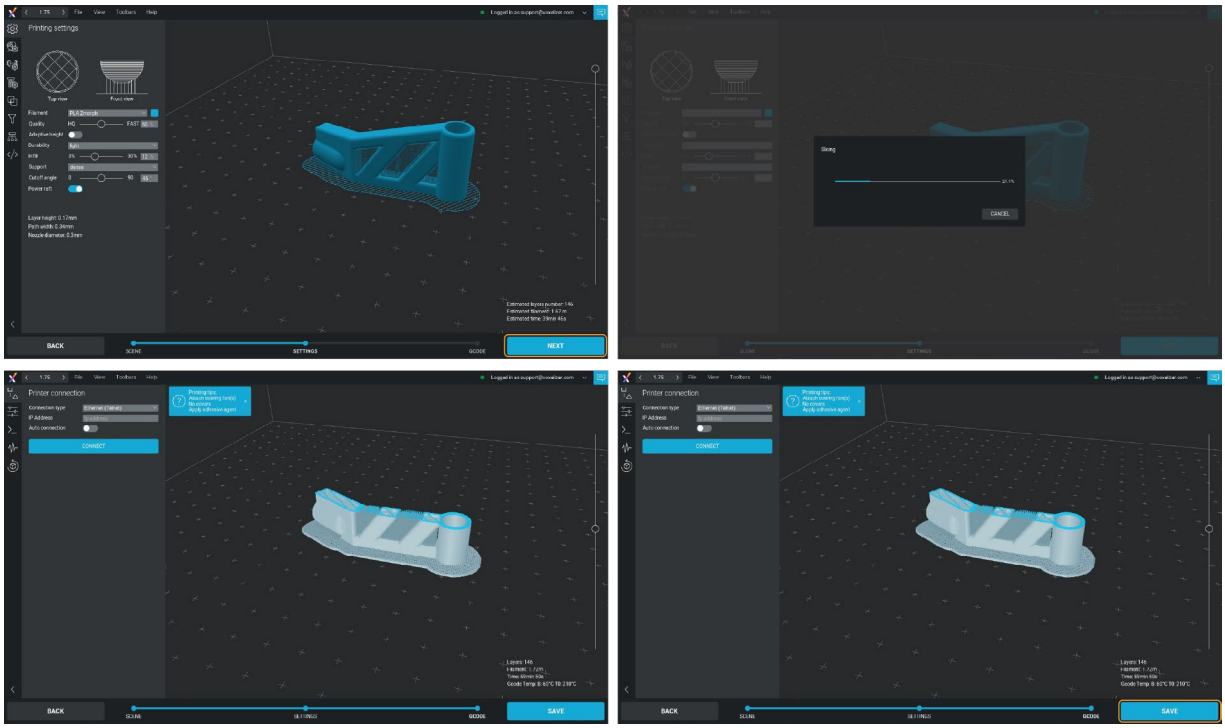
After selecting any of the support, a window appears to define the angle of inclination of the wall under which the support should be generated. This is the minimum angle value for the creation of support structures. Slide left for more support, right for less support.



g) Power raft - an option used to enable/disable power raft, i.e. a platform that increases the adhesion of the printout to the work table.

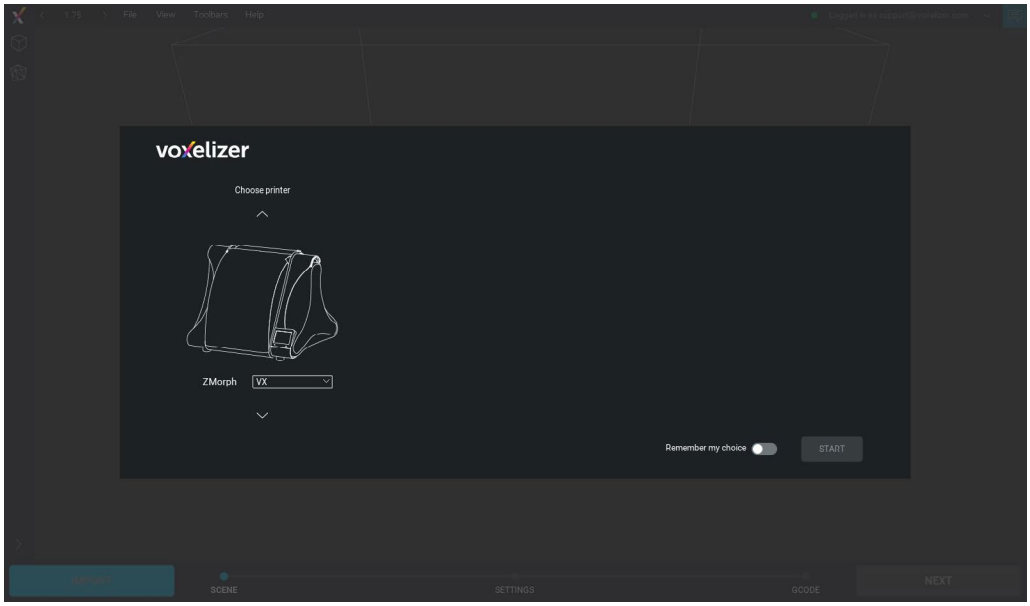


After all parameters have been set, click NEXT. The model is subjected to slicing and as a result .gcode file is generated. To save it, use the SAVE button.

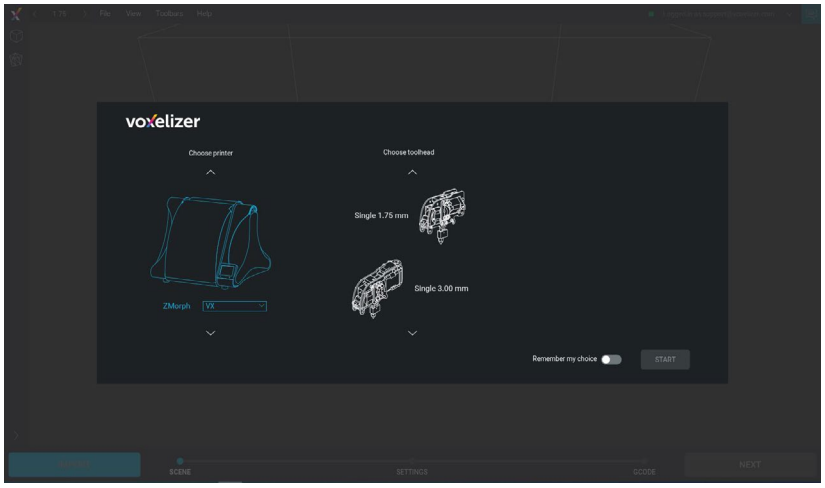


Dual PRO Extruder

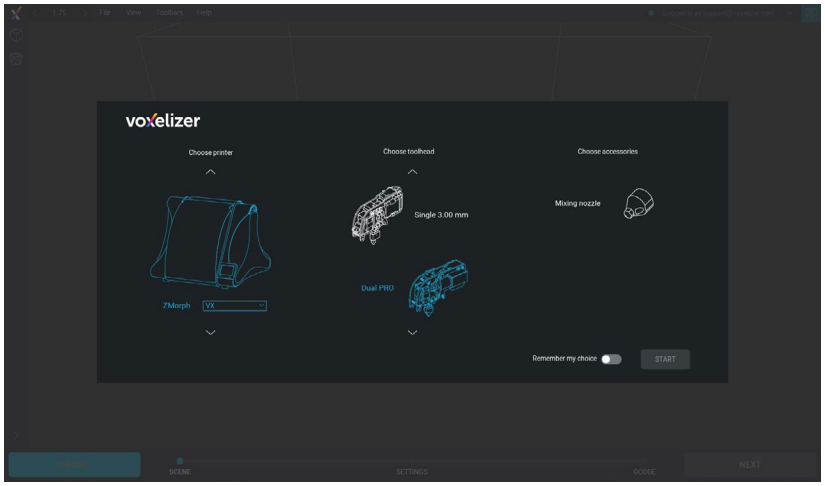
Launch Voxelizer



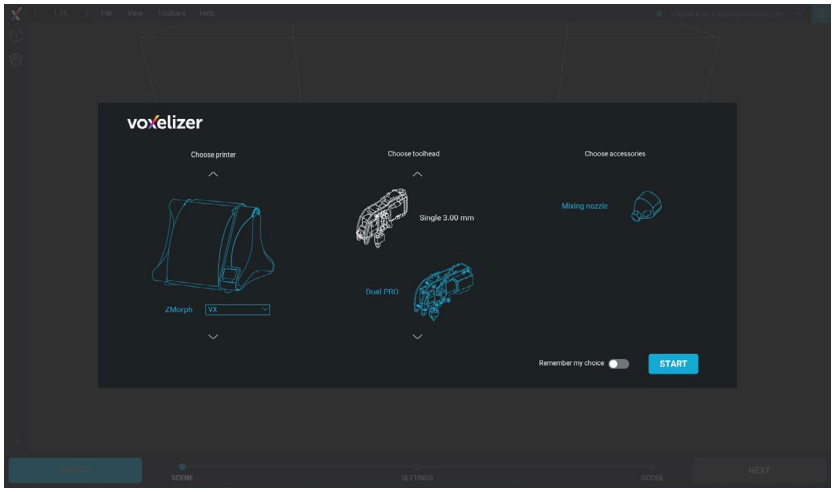
Select the model of your printer, when done click the graphic representing machine. Colour of graphic will change to blue and new settings column will appear.



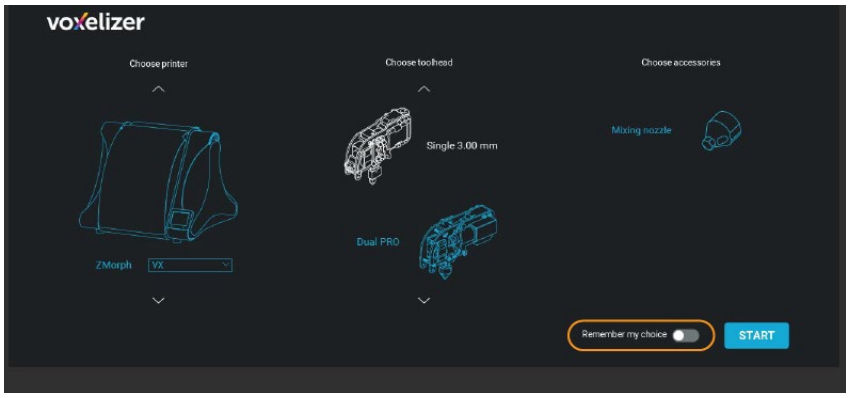
Choose Dual PRO extruder, use arrows to show more toolheads.



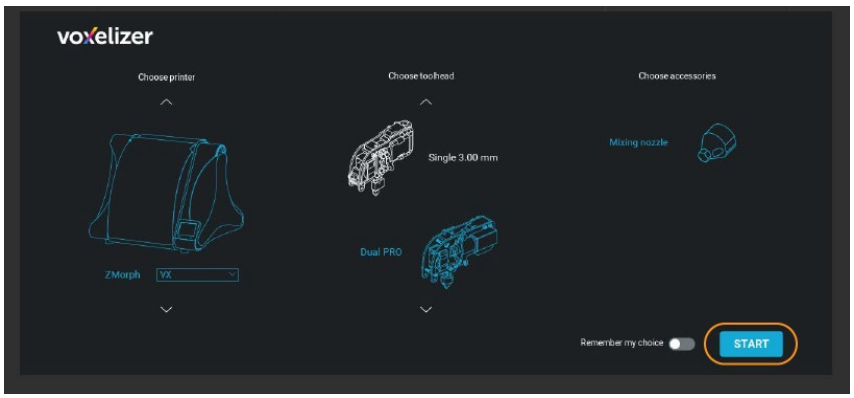
Choose mixing nozzle. The default type of the nozzle is 0.4 mm.



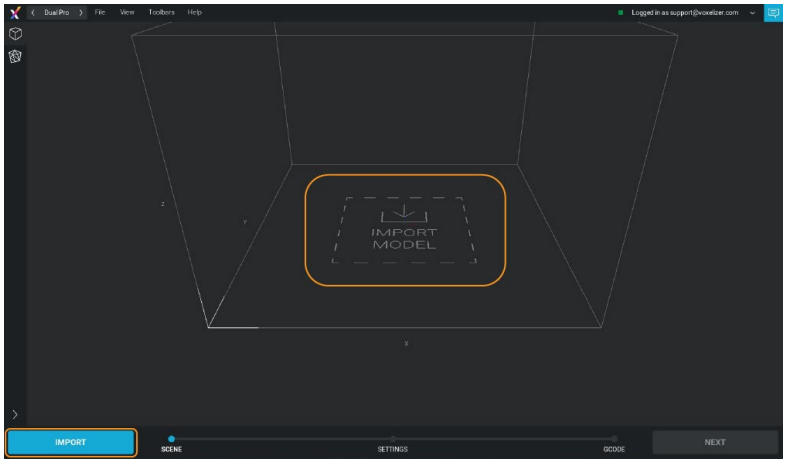
Use the option "Remember my choice" to save chosen settings.



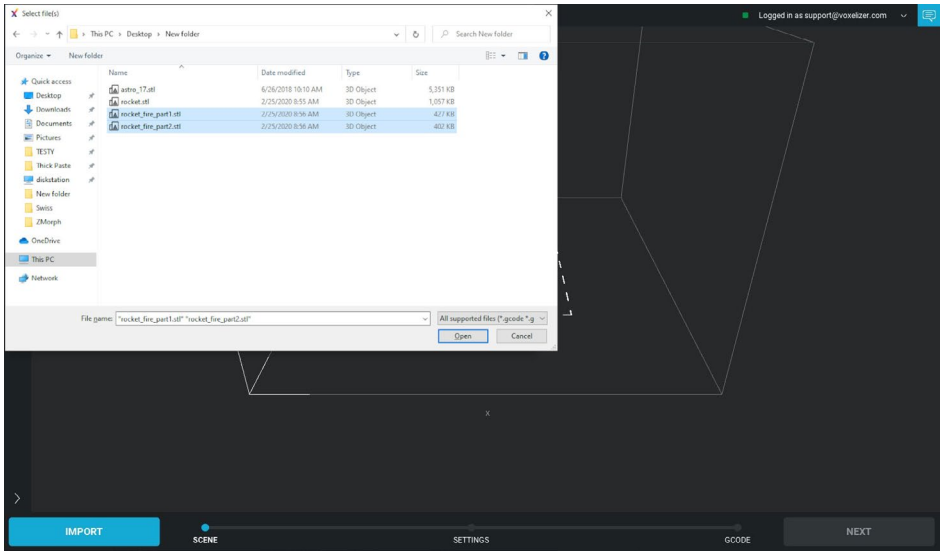
Choose START.



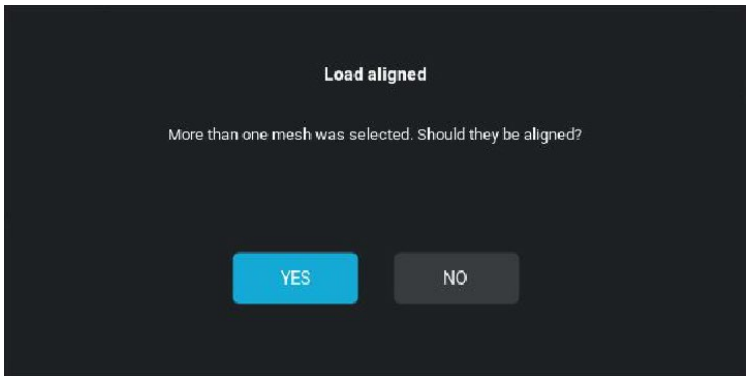
Import file by using one of marked buttons.



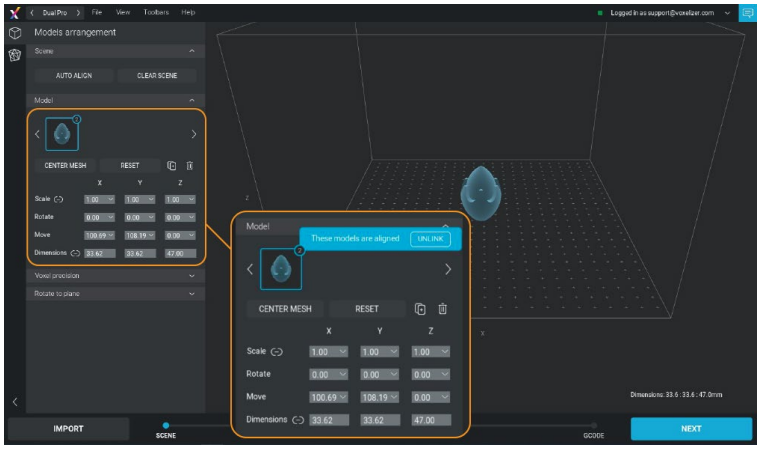
Select two STL models.



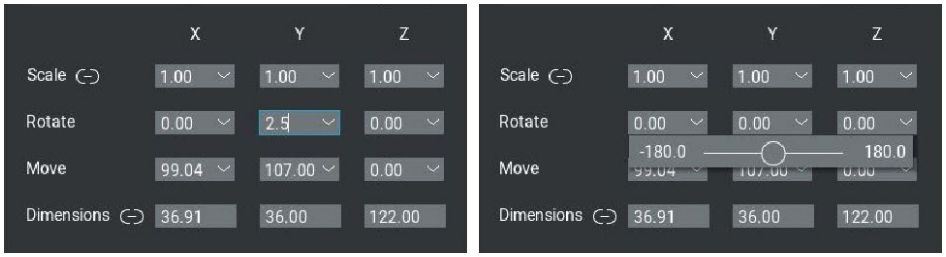
The software will ask if the models should be aligned. If the models were prepared in correct - aligned - relations between themselves, click YES. If you wish to set up the models manually, click NO.



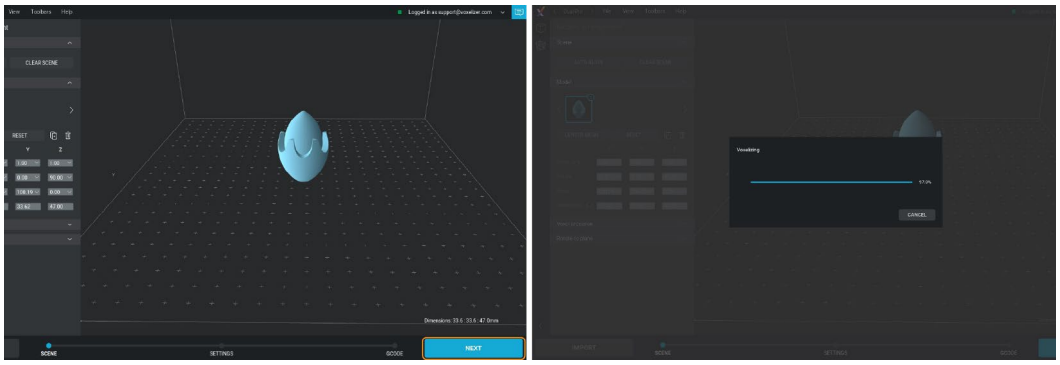
To the left you will find a toolbar that allows various operations on the models. The options allow for scaling (SCALE), scaling to specific dimensions (DIMENSION), rotating (ROTATE), and moving the model to specific position (MOVE). Remember that if the models are aligned, you should edit them together.



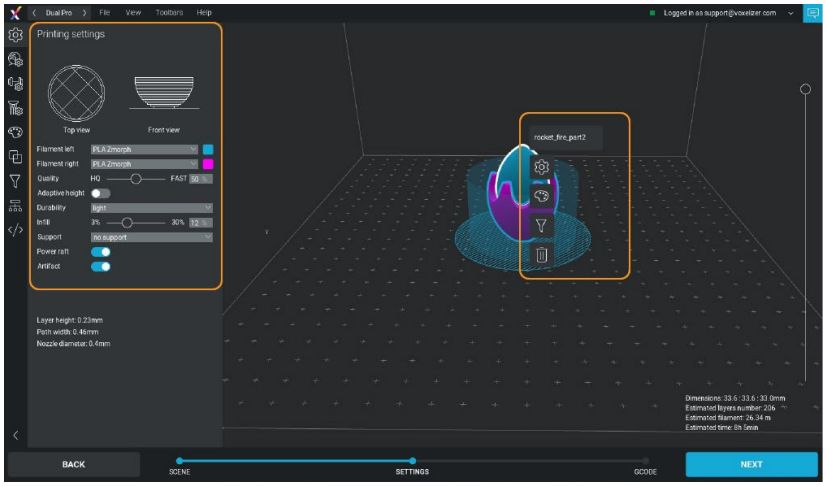
You can set values manually or use sliders.



Set the model according to your preferences and click NEXT to voxelize the model.



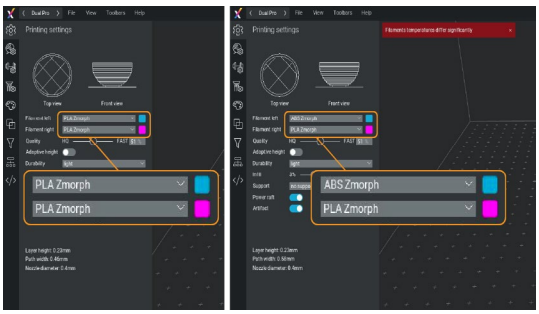
The second step of the file preparation is to set the printing parameters.
There are 2 types of menus - global (placed to the left of the screen) and local (opened by clicking the right mouse button on the model).



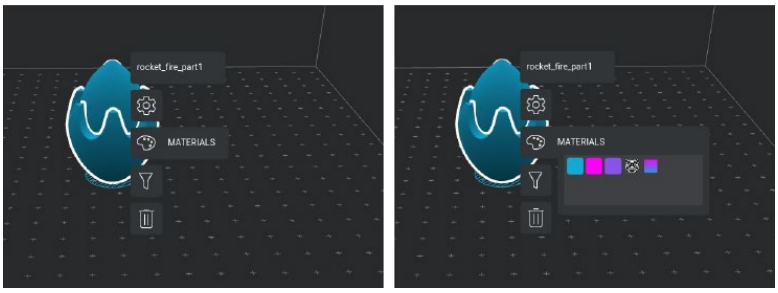
NOTE: there can be many different unbound models on the workspace, by clicking the right mouse button on them different printing parameters can be selected for each of them.

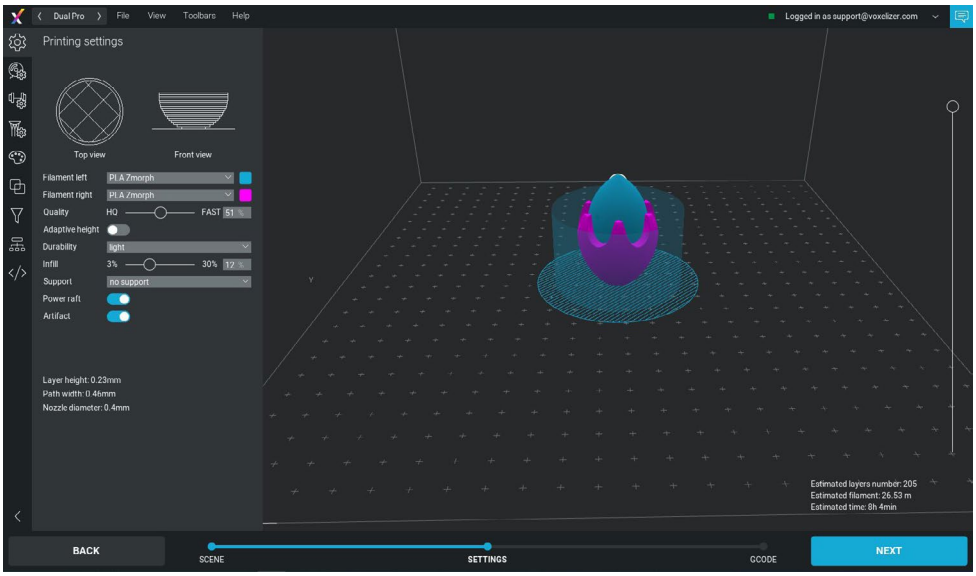
In the global menu you can set:

a) Filament Left and Right - choose your filament, e.g.: PLA ZMorph, ABS ZMorph, PET ZMorph. The filament icon opens the preset library. If you choose a pair of filaments that have different printing temperatures, a warning message will appear.

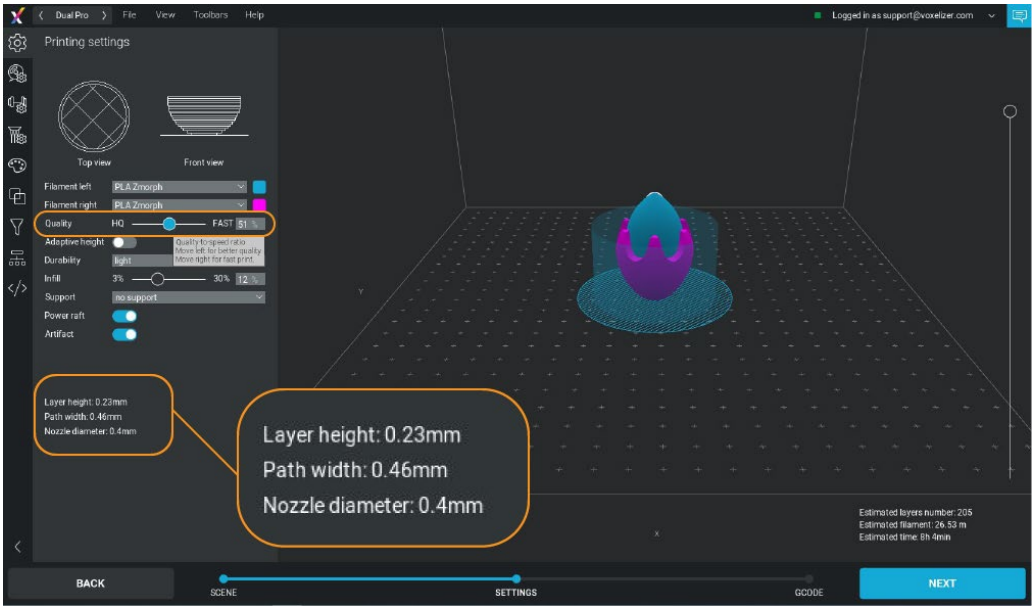


The software will separate the imported models allowing to set individual parameters for both of them. To assign filaments (left/right) to the models, right mouse click on a chosen model, go to Materials menu, and choose pink or blue color. The colors have their counterparts in main menu toolbar. After defining two different materials, the software will create an artifact that clears the nozzle from the filament.

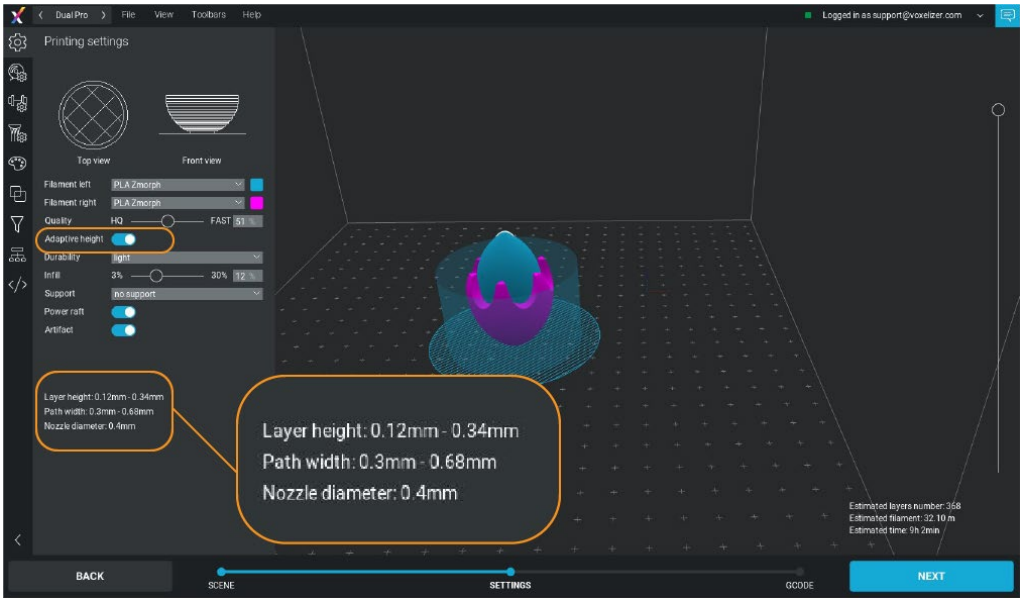




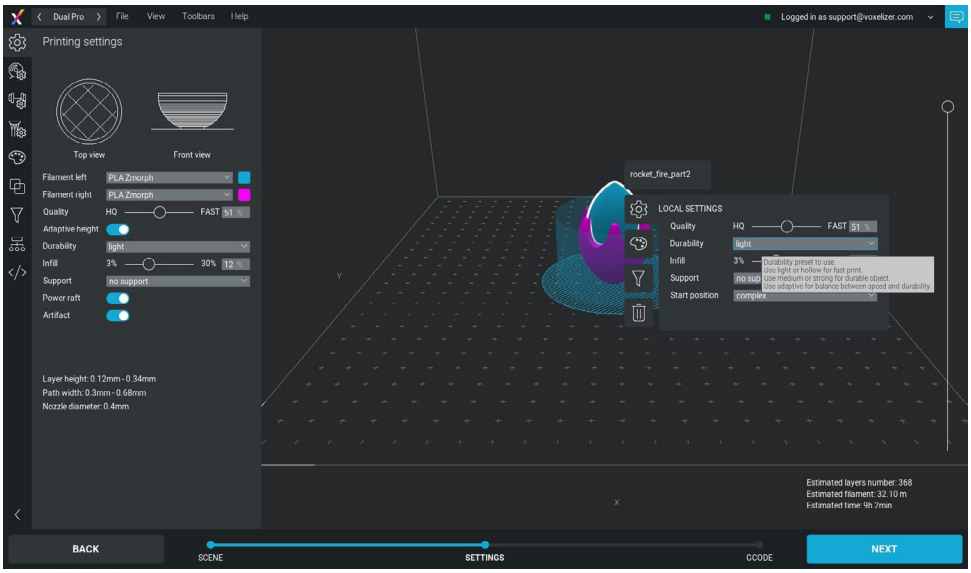
b) Quality - is a simplified option to select model quality settings, allowing you to select layer height and path width with a single slider. HQ guarantees the highest quality, at the expense of print speed (lasts longer), while FAST guarantees faster printout, at the expense of a larger layer, and thus lower quality. Recommended settings of 50% guarantee the best ratio of quality to print speed. The current path values and layer height are shown under the basic menu. Quality can also be defined separately for different models, editing takes place in the local menu.



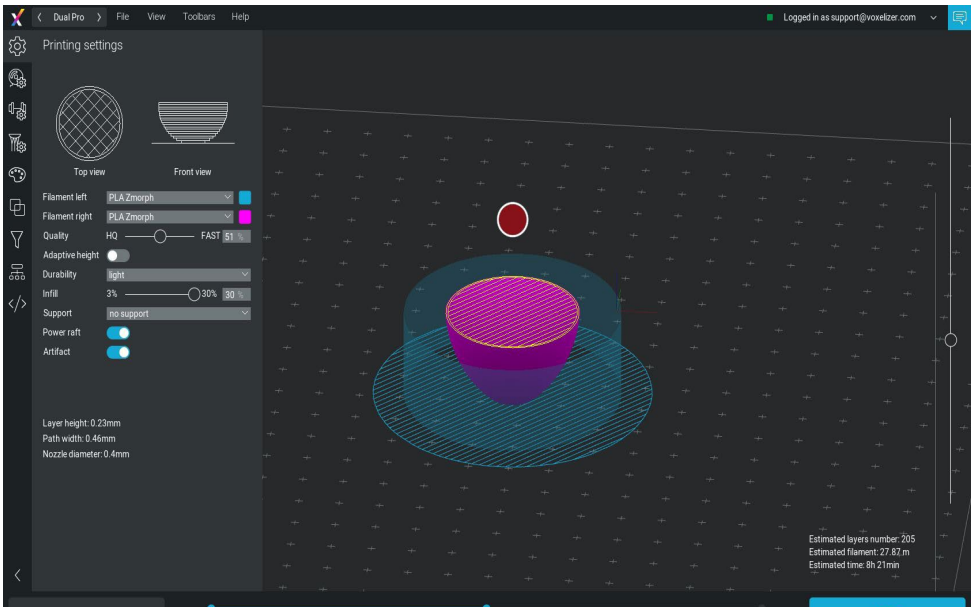
c) Adaptive height - option to enable or disable the height of the Adaptive Layer. This function allows the program to adjust the height of the print layer depending on the geometry of the model. The path width and default layer height values change to ranges that can be modified again using the Quality slider.



d) Durability - model durability settings. The function takes into account the number of model walls and the range and type of infill. There are 5 types distinguished, which are described in the part concerning Singles 1.75 above. Durability in the main menu imposes settings for both models. If you want to have different models in both models, use the local menu, right-click on the model you want to edit and change its settings in Local Settings..

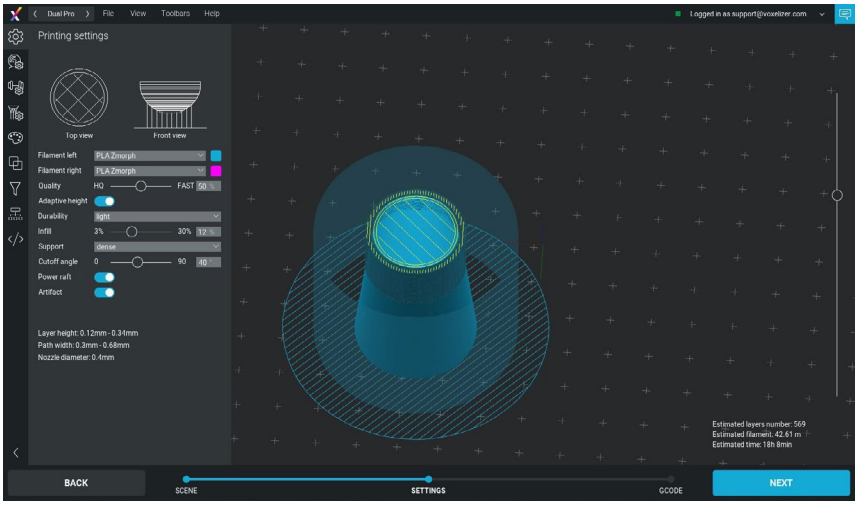


e) Infill - selection of model infill value within the range defined by Durability. The setting can be edited using the slider or entered manually. Generating a preview of the infill is performed on an ongoing basis, which allows for a quick assessment of the selected type and size of infill.

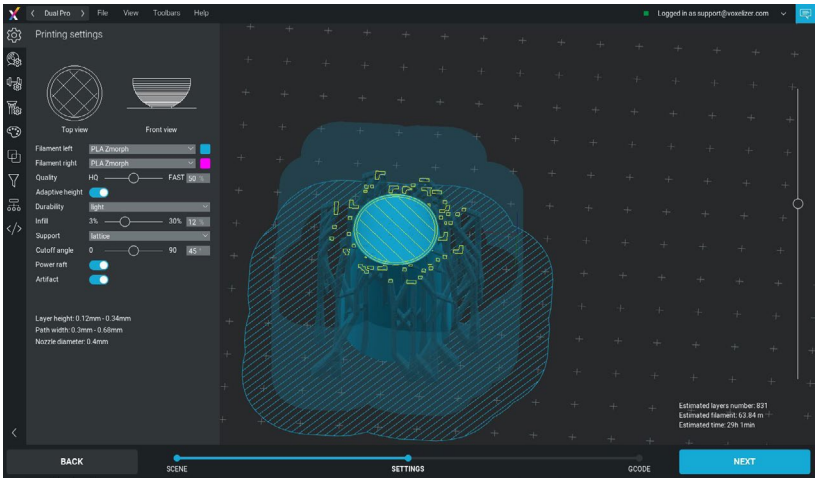


f) Support - enable/disable the support structure. There are 6 types of support:

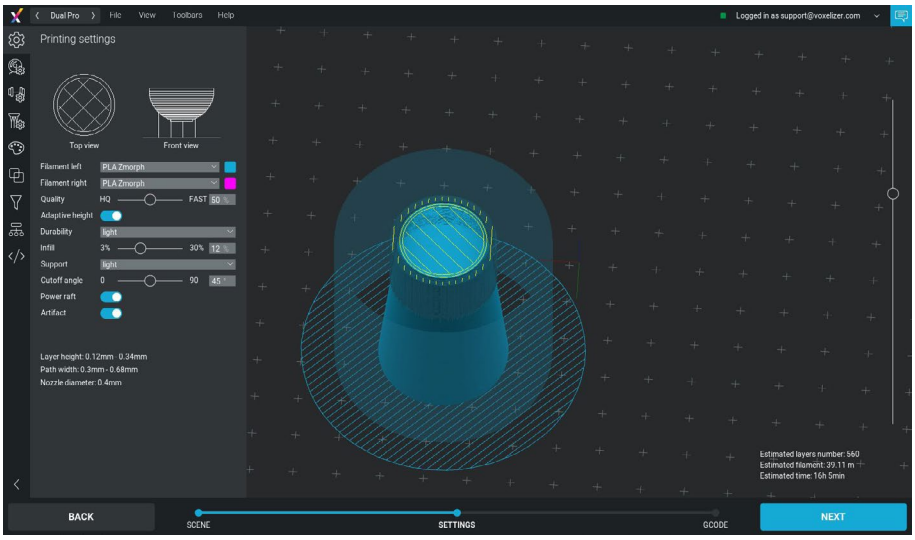
- dense



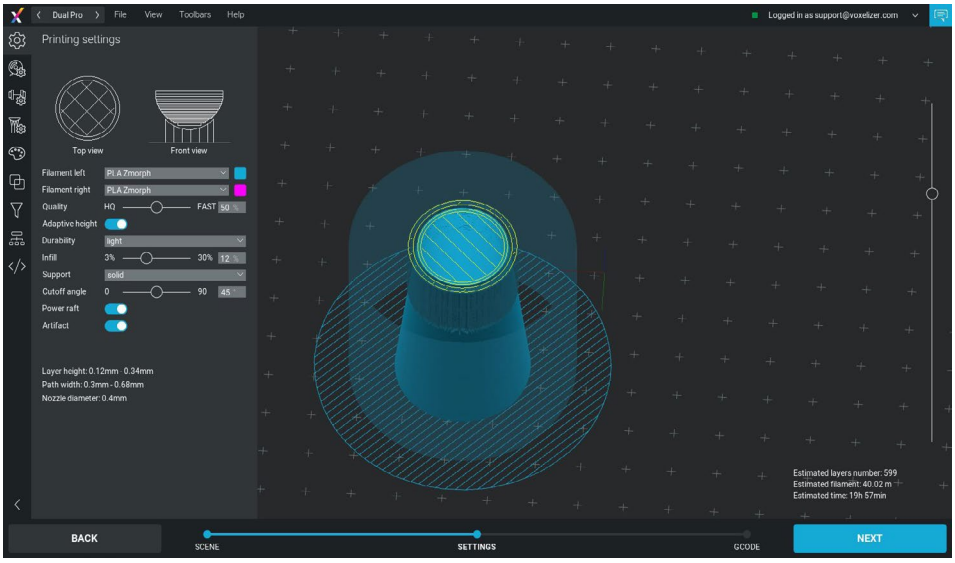
- lattice



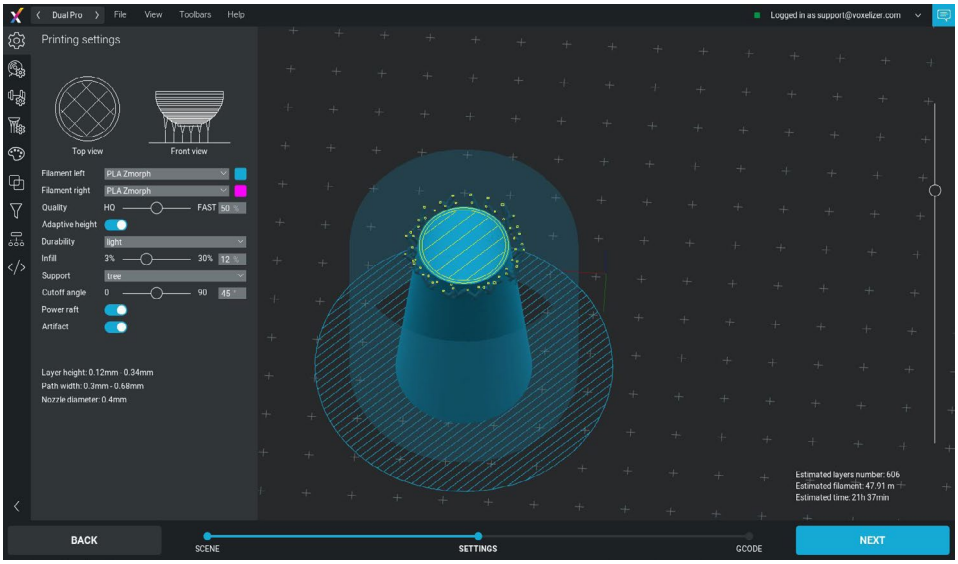
- light



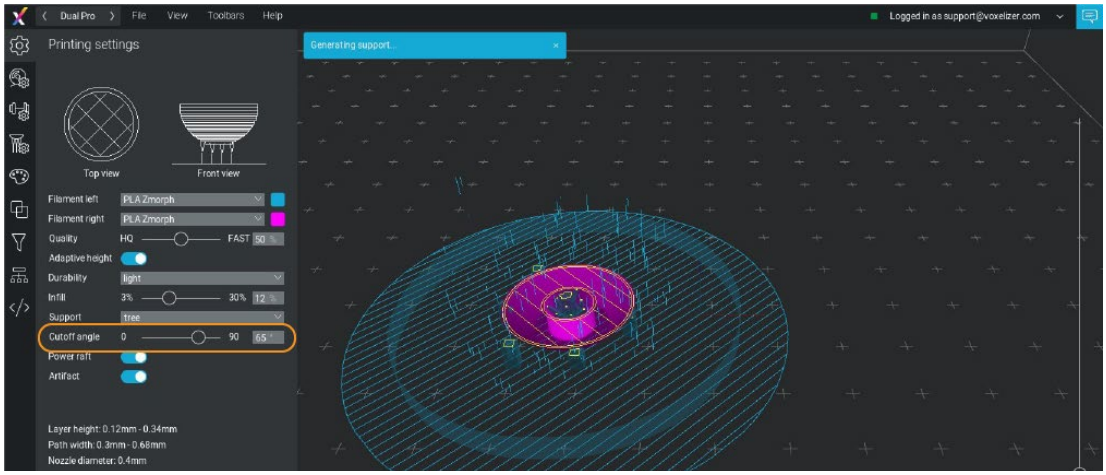
- solid



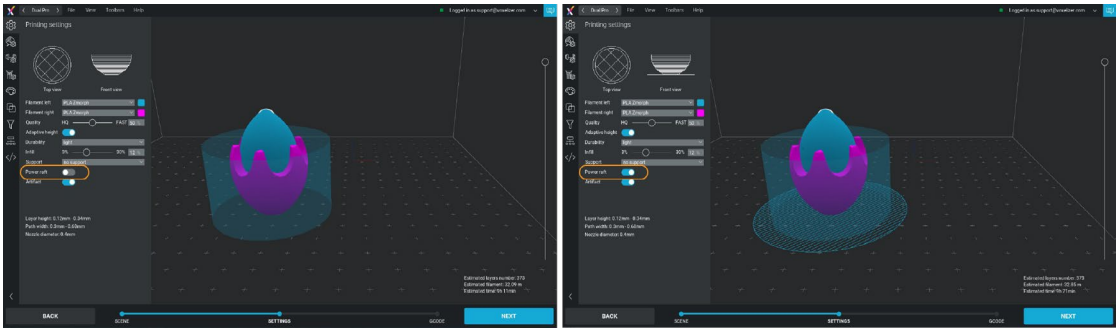
- solid PVA - support dedicated for Dual PRO Extruder
- tree



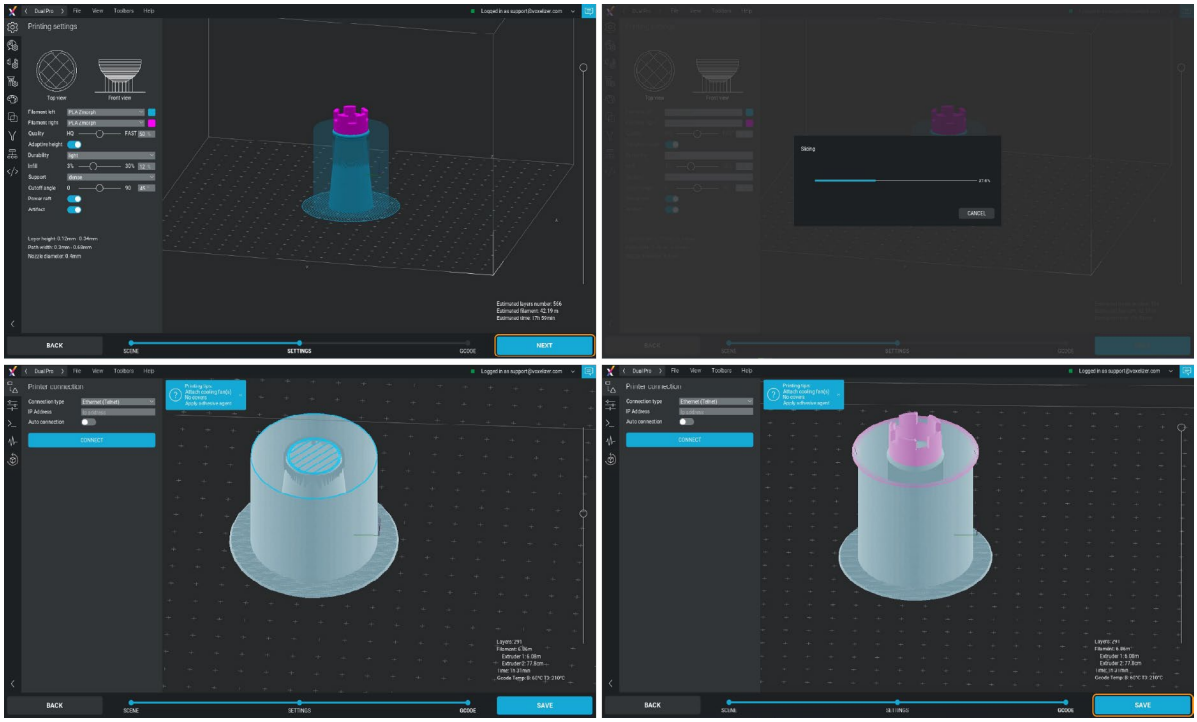
After selecting any of the support, a window appears to define the angle of inclination of the wall under which the support should be generated. This is the minimum angle value for the creation of support structures. Slide left for more support, right for less support.



g) Power raft - an option used to enable/disable power raft, i.e. a platform that increases the adhesion of the printout to the work table.

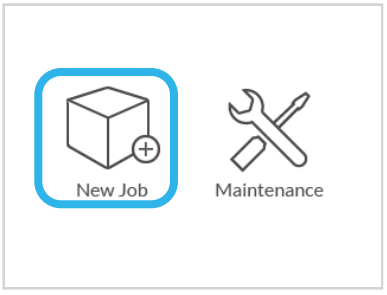


After all parameters have been set, click NEXT. The model is subjected to slicing and as a result .gcode file is generated. To save it, use the SAVE button.

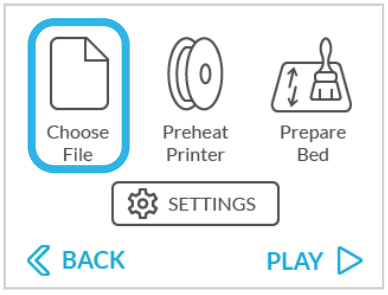


12.11 Starting the print

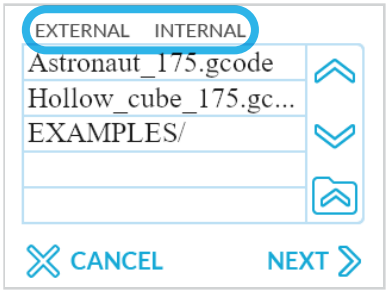
After uploading the file to an internal card or inserting an SD card with the file:
Choose "New Job"



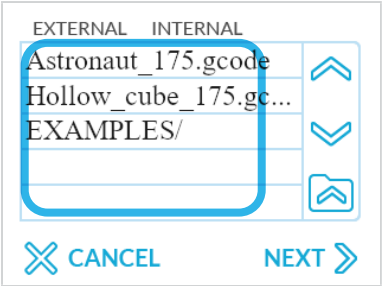
Choose "New Job".



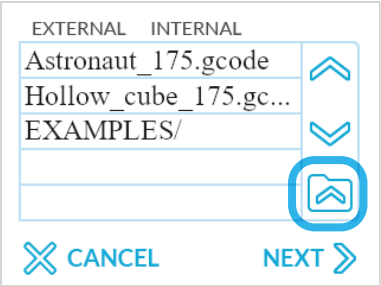
Choose "Choose file".



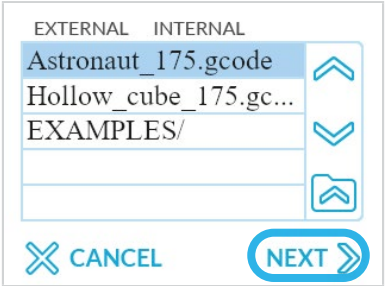
Files uploaded to the internal card are located in the "INTERNAL" tab, files uploaded to the SD card are located in the "EXTERNAL" tab.



Select the previously prepared G-code file. To open a folder, select its name.

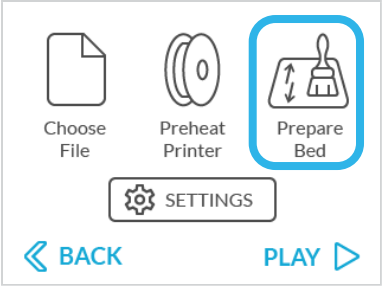


Exiting the folder is done by selecting the folder icon with the upward-facing arrow.

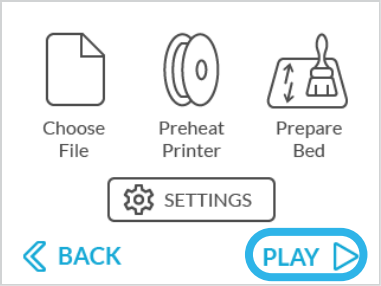


After selecting the file choose "NEXT".

NOTE: If the selected G-code file has temperature presets after pressing the "NEXT" button the machine will automatically start preheating.



The table can be prepared by selecting "Prepare Bed" and is described in the chapter "Preparing the worktable".



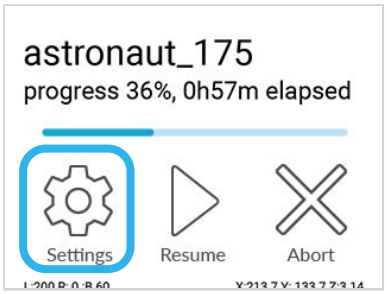
Choose "PLAY".

Printing will start automatically when the extruder and the table have reached the right temperature.

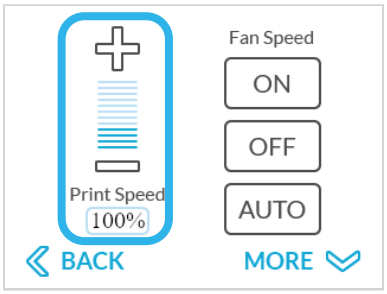
12.12 Editing parameters during printing

Single Plastic Extruder

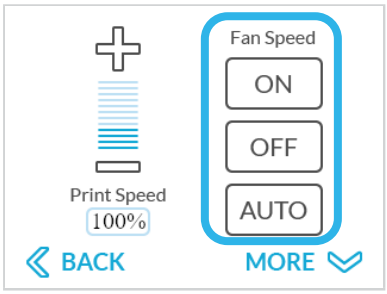
Functions allowing to change parameters during the printing process:



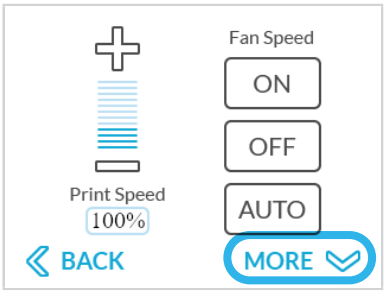
Choose "Settings".



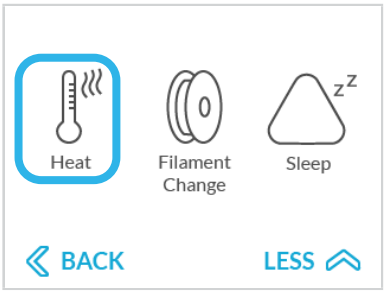
The Print Speed part allows you to change the print speed. Select plus to increase or decrease the speed from 5% to 300% of the initial speed.



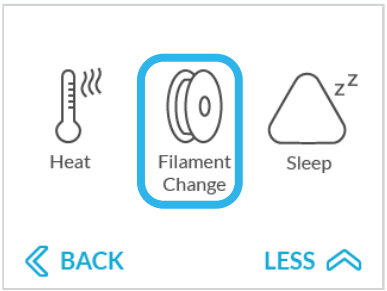
The "Fan Speed" section allows you to change the settings of the fan, the "on" option turns on the fan at 100% and the "off" function turns off the fan. After selecting the "auto" option, the speed of the fan is set according to the G-code.



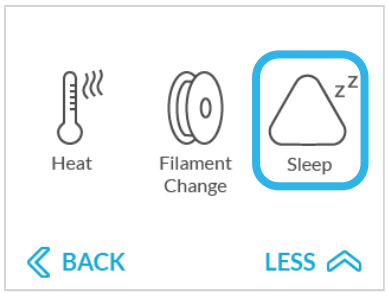
Choose "More"



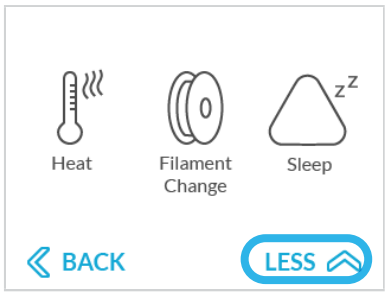
The Heat function allows you to change the temperature of the extruder and the table. Choose "Heat" and tap the needed temperature on keyboard, then OK



The "Filament Change" function allows you to change the filament during the printout and is described in the chapter "Filament replacement during printing".



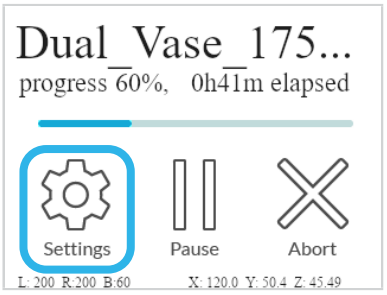
The "Sleep" function allows you to put the printer into sleep/store mode and is described in the 12.18 chapter.



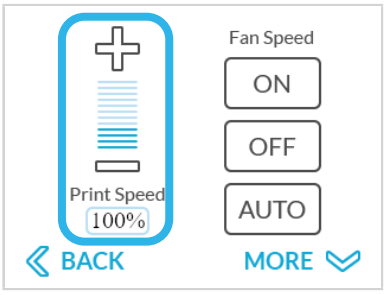
To return to the previous screen, select "LESS" or return to the main printing screen by pressing the "BACK" button.

Dual PRO Extruder

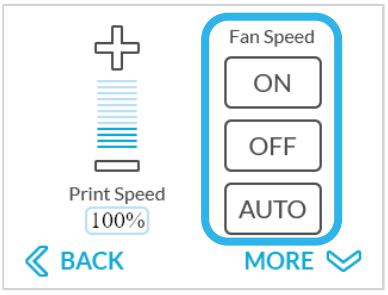
Functions allowing to change parameters during the printing process:



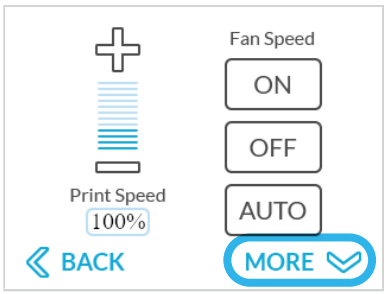
Choose "Settings"



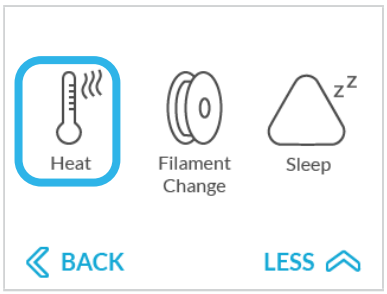
The Print Speed part allows you to change the print speed. Select plus to increase or decrease the speed from 5% to 300% of the initial speed.



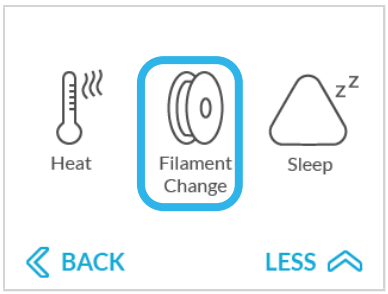
The "Fan Speed" section allows you to change the settings of the fan, the "on" option turns on the fan at 100% and the "off" function turns off the fan. After selecting the "auto" option, the speed of the fan is set according to the G-code.



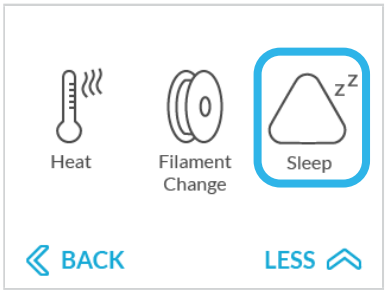
Choose "More".



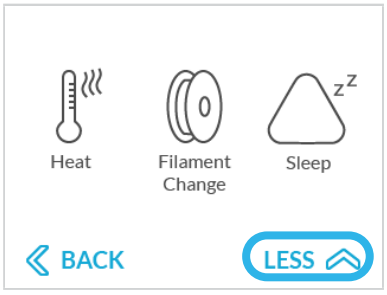
The Heat function allows you to change the temperature of the extruder and the table. Choose "Heat" and tap the needed temperature on keyboard, then "OK".



The "Filament Change" function allows you to change the filament during the printout and is described in the chapter "Filament replacement during printing".

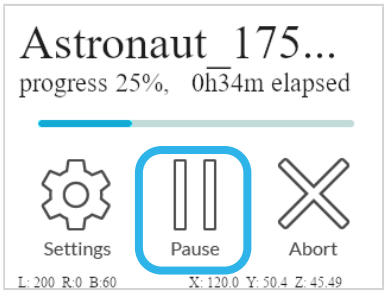


The "Sleep" function allows you to put the printer into sleep/store mode and is described in the 12.18 chapter.



To return to the previous screen, select "LESS" or return to the main printing screen by pressing the "BACK" button.

12.13 Pause and resume printing



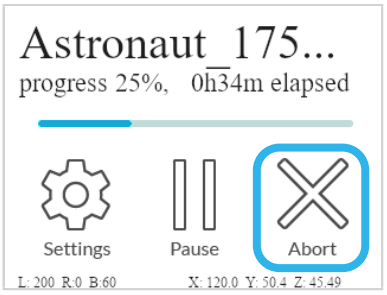
While the machine is running, press the 'Pause' button on the screen to stop printing.

Choose "Play" to continue printing. The printer will resume the printout exactly where it was stopped.

NOTE: If the Pause was long the heat from the nozzle might have melted a small portion of the printed model or the spilling material from the nozzle may have settled at the nozzle stopping place.

NOTE: Pause mode has no time limit. During its duration, the extruder maintains the same temperature all the time, which causes the additional material to flow out of the nozzle.

12.14 Printing stopping

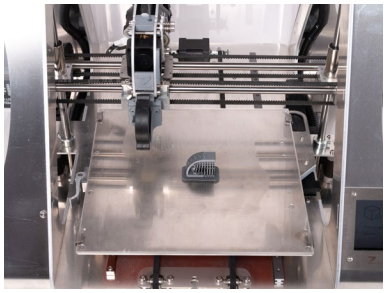


To stop the print choose "Abort".

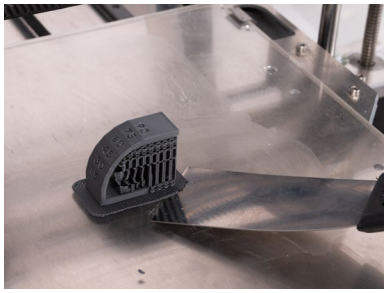
The printer will ask you to confirm that you want to abort the printing process. To do so, choose "OK".

If you do not want to abort the printing choose "Back".

12.15 Removing a printout from the platform



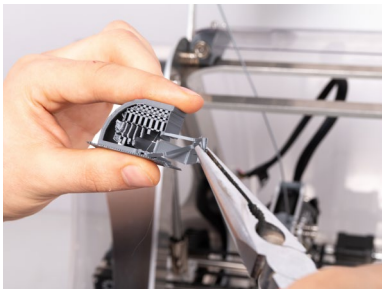
Wait until the temperature of the table drops before removing the printout from the table - this will allow you to remove the printouts without damaging them.



If the printout could not be removed despite the low temperature of the table, gently lift the printout with a spatula.

NOTE: The spatula has sharp edges that may cause the table to be drawn. When taking off the printout, lay it as parallel as possible to the table and be careful.

12.16 Support removal

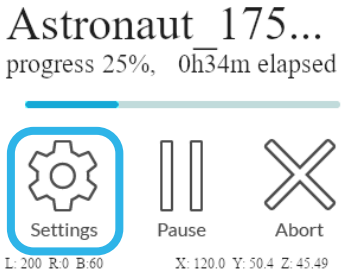


To be able to print models with more complex geometry, additional support is printed, which is not part of the model. When the printout is complete, remove them carefully. Pliers are best suited for this purpose.

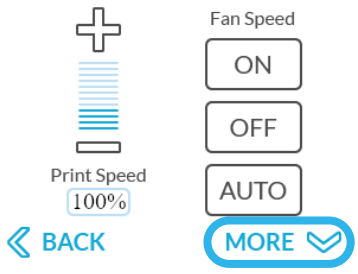
In case of problems with removing the support, you can use a knife to help you.

12.17 Hibernation

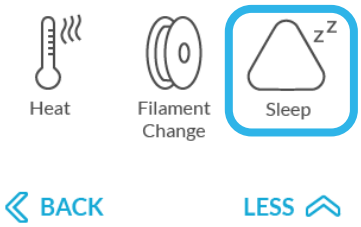
This option allows you to safely pause printing, with the option of resuming it if you need to disconnect the printer from the power supply. Hibernation should not be used to pause printer operation for a long time due to the cooling of the table and extruder.



Choose "Settings".

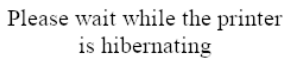


Choose "More".

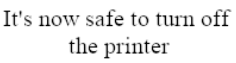


Choose "Sleep".

The printer will ask you to confirm your decision. To do this, choose "YES". If you do not want the printer to go into hibernate mode choose "NO".



Wait for the extruder to finish printing and stop at the right place.



The printer is ready to disconnect the power supply safely when prompted.

Switch the printer on to resume operation.

The printer will ask you to confirm that you want to continue the stopped printout. To do so, choose "YES". If you do not want to continue printing choose "NO.

Once the extruder and the table have reached the correct temperature, the printout will start automatically from where it was stopped.

13. CNC milling

13.1 CNC PRO Milling Toolhead

CNC PRO is a toolhead used in milling and engraving operations. It consists of 300W spindle, in a steel casing, and aluminum mounting that allows for attachment of the toolhead to X-carriage of ZMorph VX machine.
By default provided with ER11 ⅛" collet, after exchanging collet chuck, can be expanded to use up to 7 mm diameter shank cutters.
Main elements of CNC Pro toolhead:

Specification:

Construction: Stainless steel housing
Hot End: ER-11 1/8" COLLET
Spindle motor: DC motor
Power: 300 W
Default work speed: 5 mm/s
Max work speed: 120 mm/s

Work area: up to 235 x 250 x 85 mm
Recommended cutting depth: 0.5 mm for soft wood and polymers
Max cutting depth: 15 mm for ø 3 mm bit
Dimensions: 90 x 55 x 175 mm

13.2 Materials compatible with CNC PRO toolhead

CNC PRO toolhead allows for milling in soft materials.
The list of tested materials is as follows:

- Wood derivatives: wood, plywood, wood fiber boards
- Plastics: ABS, nylon, HDPE, PTFE, PC, PP, POM, PMMA, PVC, HIPS, LDPE, PET
- Composites: carbon fiber laminate, copper clad laminate FR4, Dibond, TCF

- Metals: aluminim, brass, copper
- Others: cardboard, machining wax, modelling board, styrodur

To explore all materials please follow this link to ZMorph Materials Library:
https://zmorph3d.com/product/materials.

13.3 Material fixturing

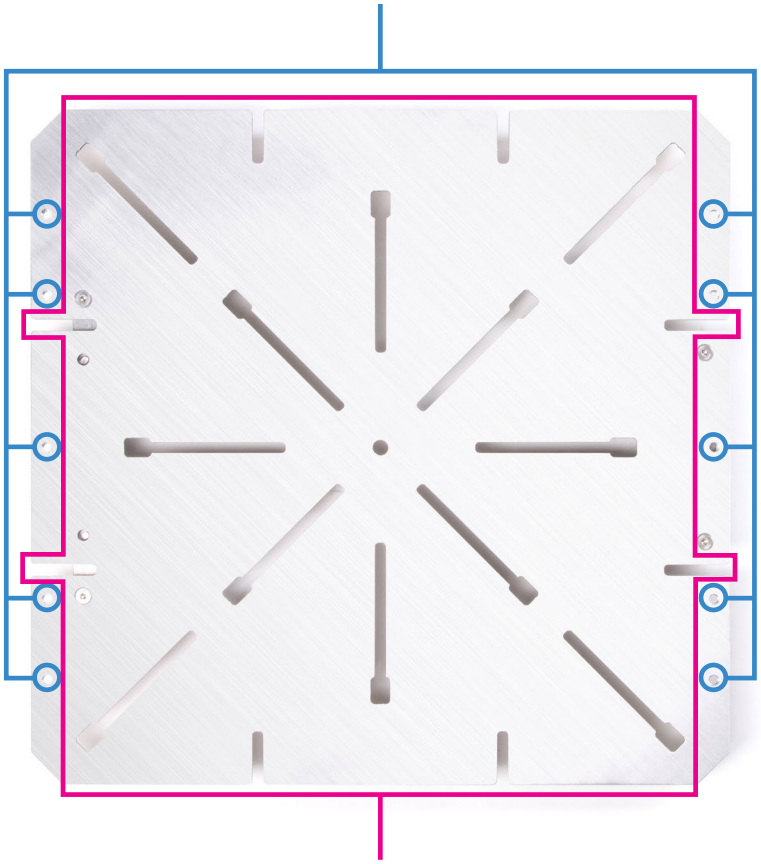
For proper material fixturing during CNC milling operation you need to mount aluminium bed that is added to every ZMorph VX Full Set or is available in store. To learn how to change your worktable, follow next parts of the manual.

CNC Worktable explained
Your aluminum worktable can be divided into two fixturing areas.

- For materials smaller than workspace of ZMorph VX there are T-slots milled for mounting your workholding with M4 screws and square nuts.

- For materials larger than workspace of ZMorph VX there are M4 threaded holes for mounting your material with M4 screws.

T-slots for M4 screw / square nut based fixturing



M4 threaded holes for out-of-workspace fixturing

Types of workholding solutions

Your workholding solution should be adapted to material and its dimensions to ensure best results.

Below you can find most common solutions with pros and cons of every one of them.

Workholding	Usable for	Ease of use	Pros	Cons
Double sided tape	Sheet material Block material	1/5	-> Cheap -> Easy to use -> Does not stick out above material surface	-> Surface must be scraped of tape residues
Sheet clamps (added to ZMorph VX)	Sheet material	3/5	-> Can be custom 3D printed	-> Harder to use -> Only for flat, sheet materials like plywood
Step clamps	Sheet material Block material	2/5	-> Allow for mounting materials of different heights	-> Stick out above material surface
Vises	Block material	2/5	-> Robust -> Can be custom 3D printed	-> Must have custom mount to CNC worktable

13.4 Milling cutter fastening

To ensure safe and reliable milling process, you must properly mount your milling cutter. The process is the same regardless of cutter type and geometry.

Remove CNC Pro toolhead from your machine.

Take 13/10 and an adjustable wrench.

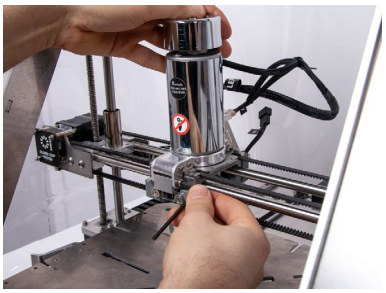
Slide 13-sized end of wrench into shown slot.

Adjust size of wrench to 17 mm and hold down the collet fastening nut. Loosen the nut.

Take out the old cutter if any is inserted.

Put in a new cutter. Ensure that it is inserted at least 15 mm deep.

Firmly tighten the collet nut.

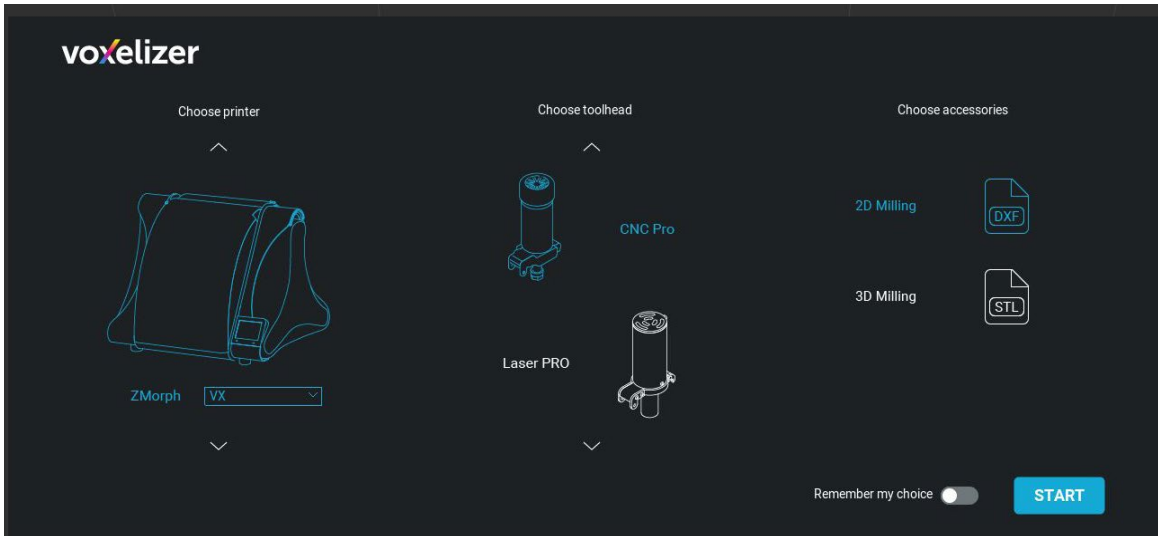


Mount the CNC PRO toolhead on the X-carriage.

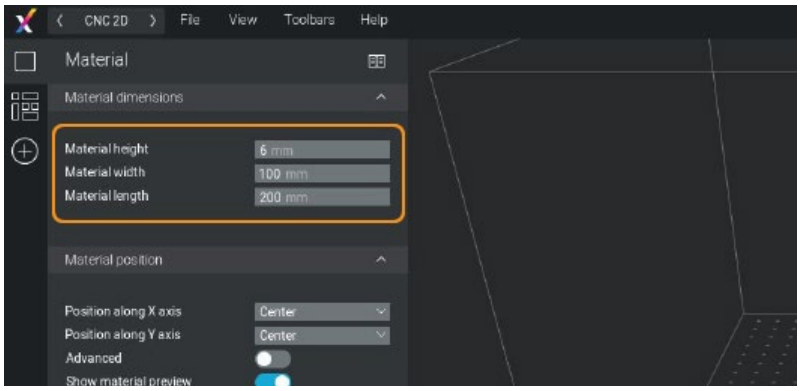
13.5 CNC Milling file preparation

2D Milling

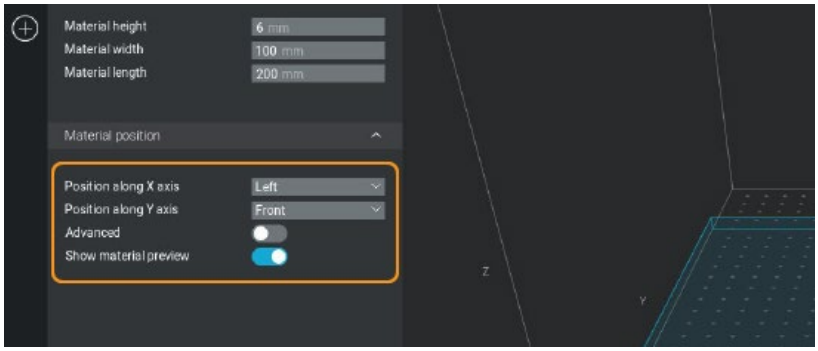
Open Voxelizer 2.0 software and choose ZMorph VX machine, CNC PRO Toolhead and 2D Milling operation. Click START.



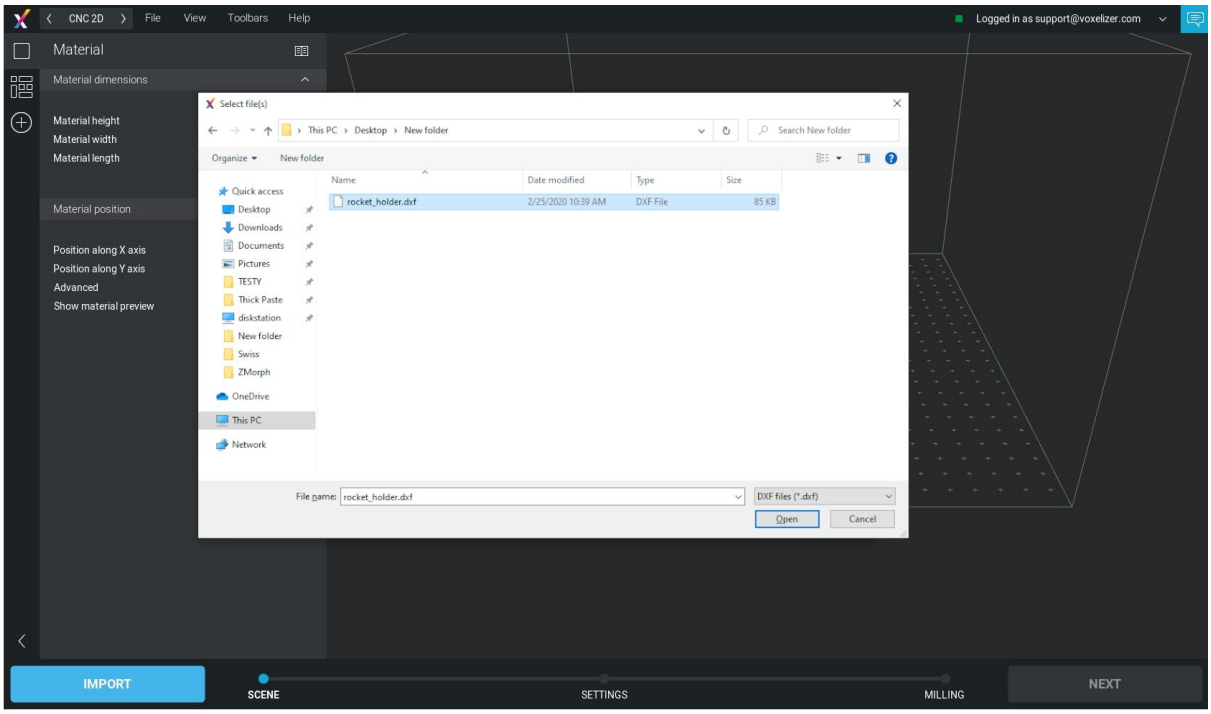
Set material dimensions to match Raw material that would be used for milling.



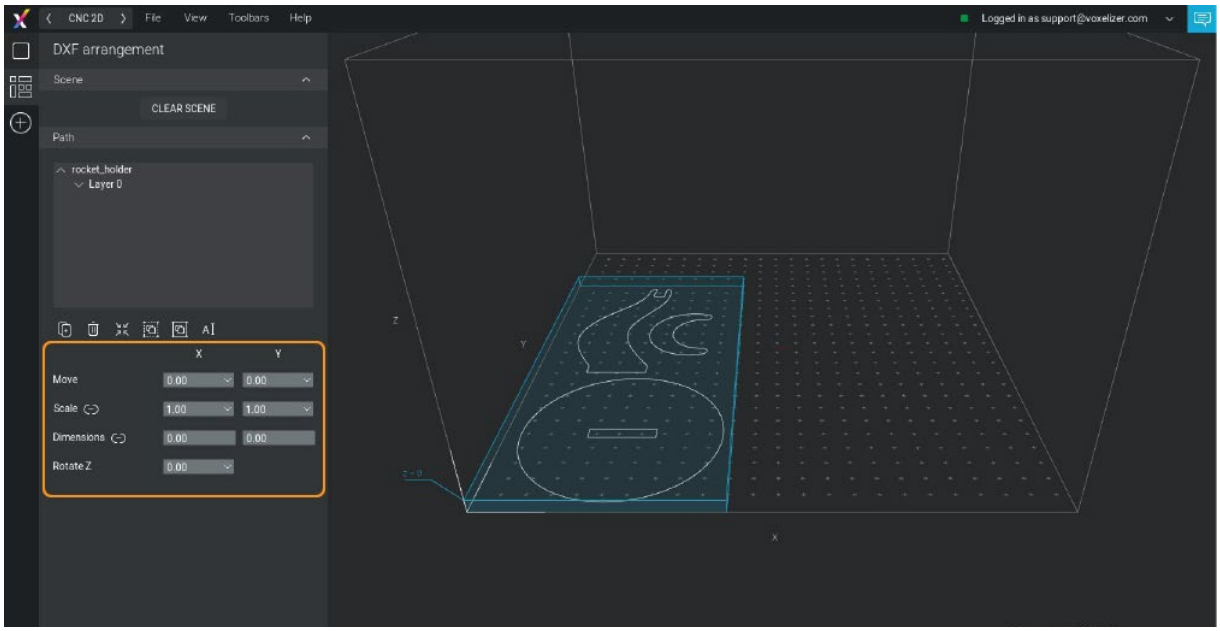
Change material position to LEFT along the X axis and FRONT along Y axis.



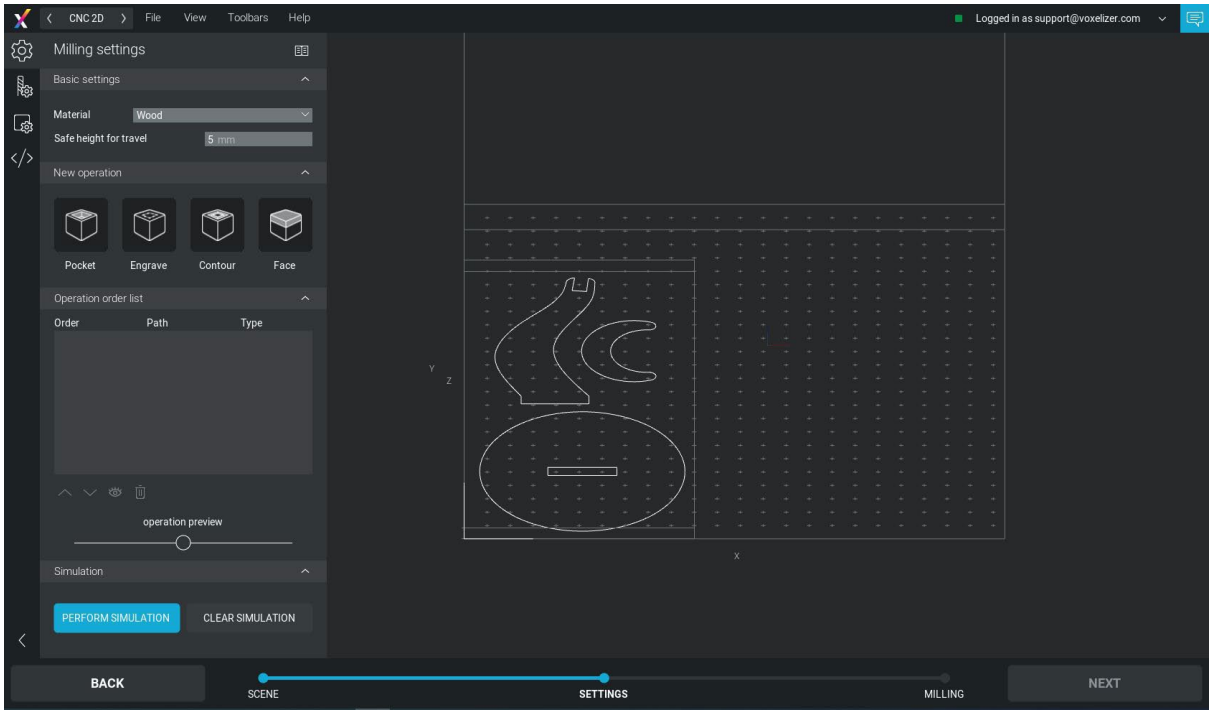
Import your DXF file.



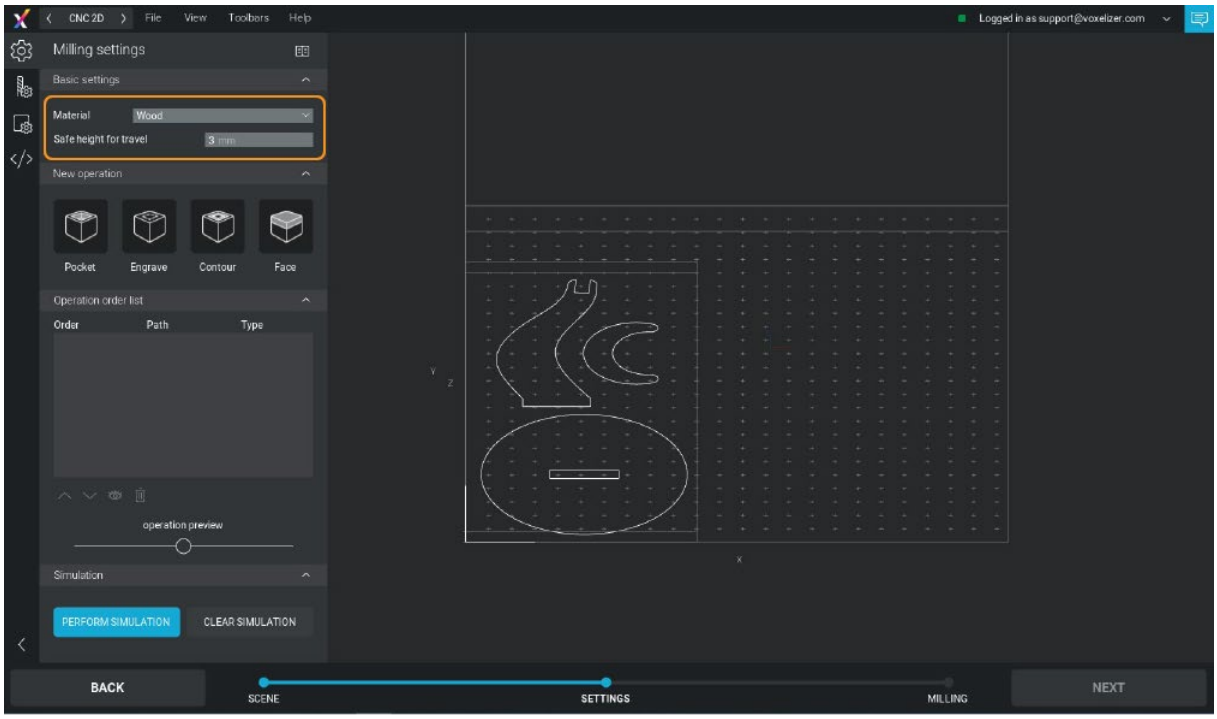
Now the drawing can be freely moved, scaled and rotated on the table preview.



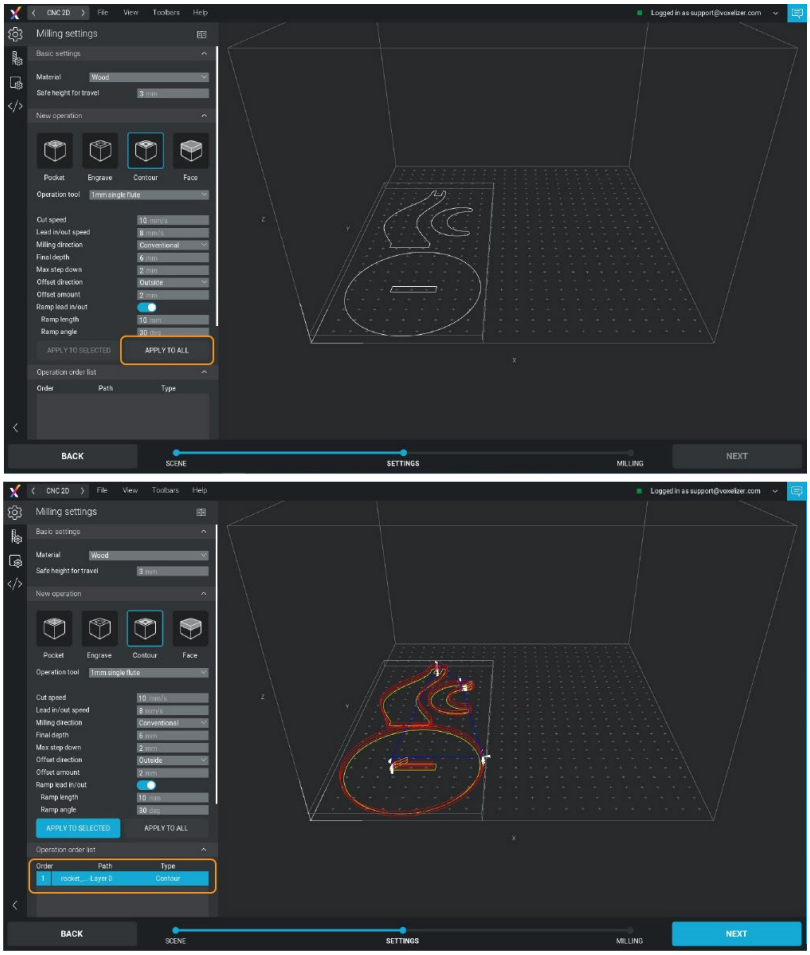
Click NEXT when ready. You will me automatically moved to SETTINGS tab.



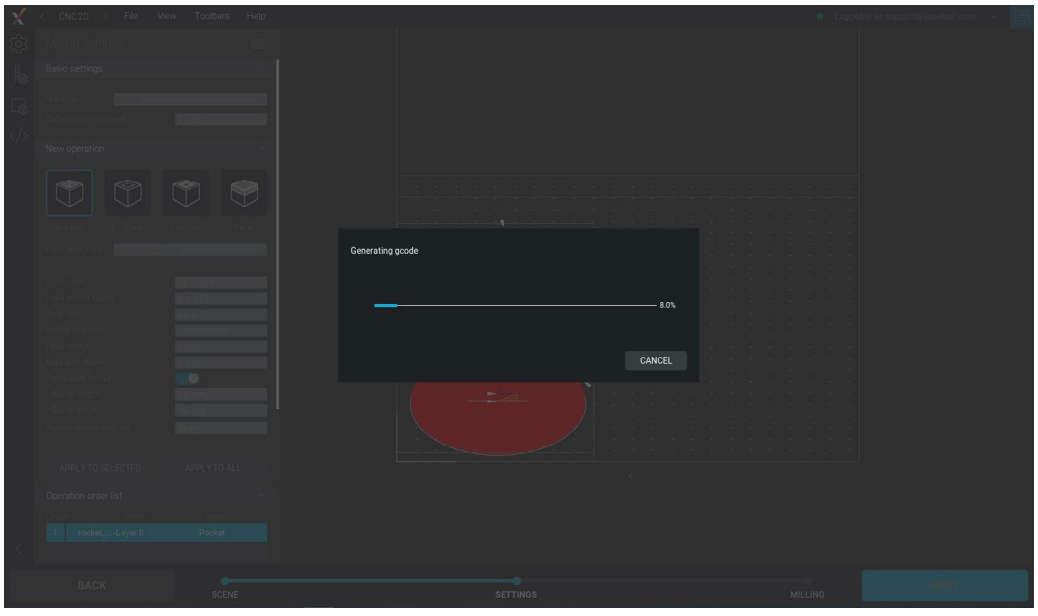
Choose material from drop down list and Set Safe height for travel - remember to take into account any fixtures that might stick out over material surface.



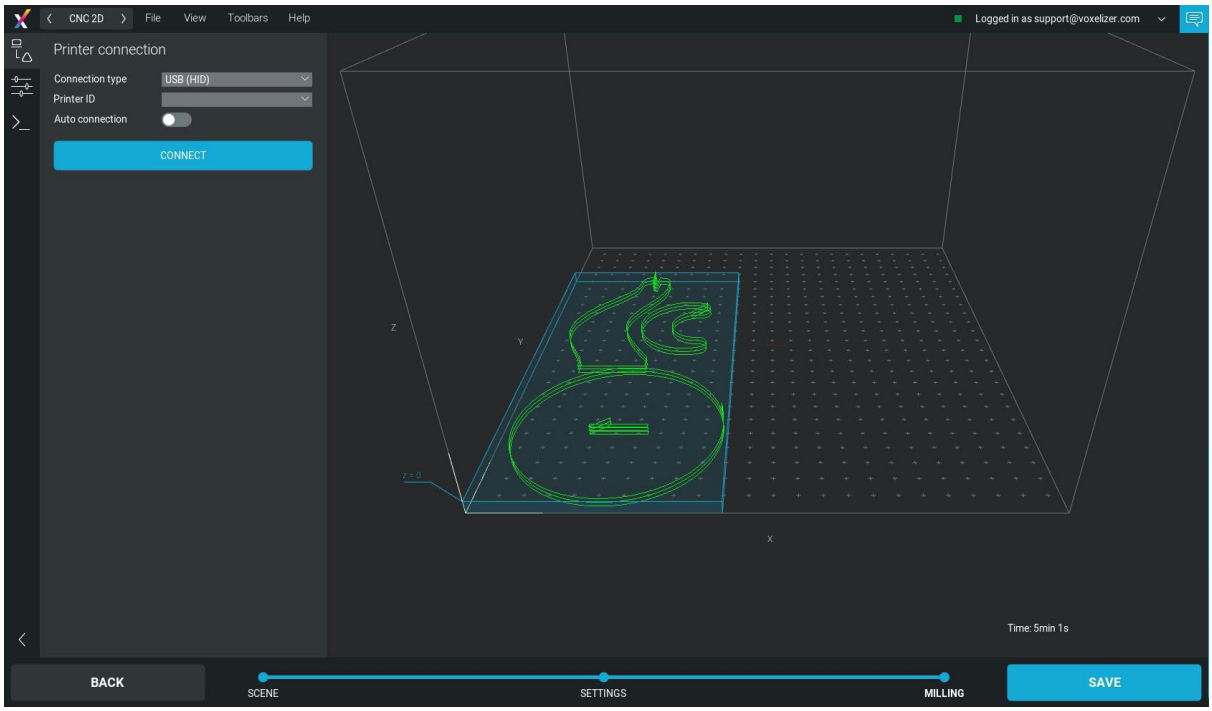
Choose operation that you would like to mill your drawing with. Choose operation tool. Parameters are set by default - adjust them according to your needs.



Apply operation settings to chosen parts of the drawing. When all operations are ready, click NEXT and wait for your G-code to be generated.

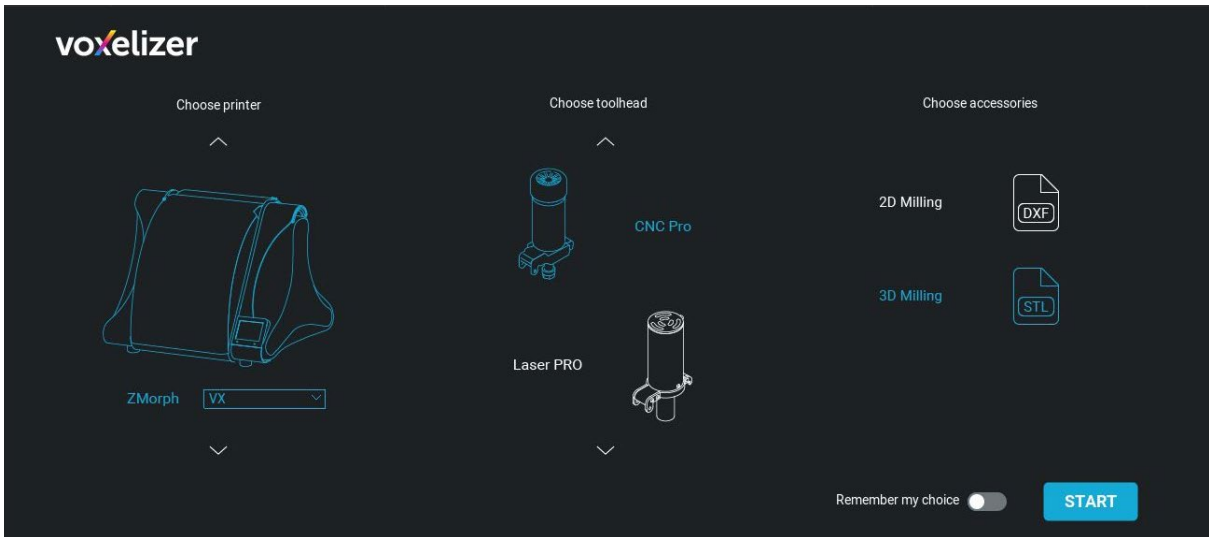


Now you can check generated G-code and save it. Start your file according to 13.6 part of the manual.

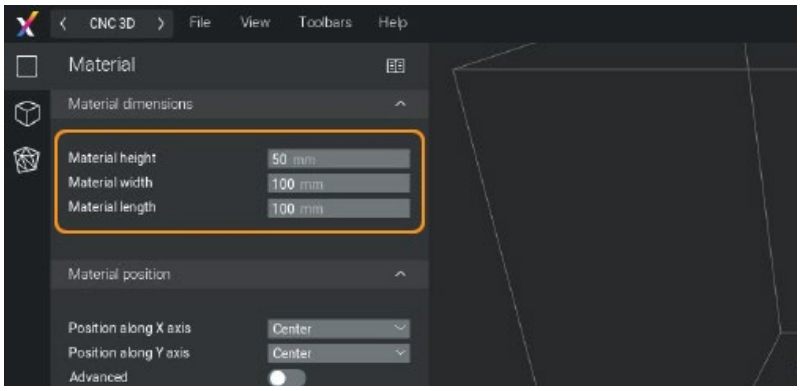


3D Milling

Open Voxelizer 2.0 software and choose ZMorph VX machine, CNC PRO Toolhead and 2D Milling operation. Click START.

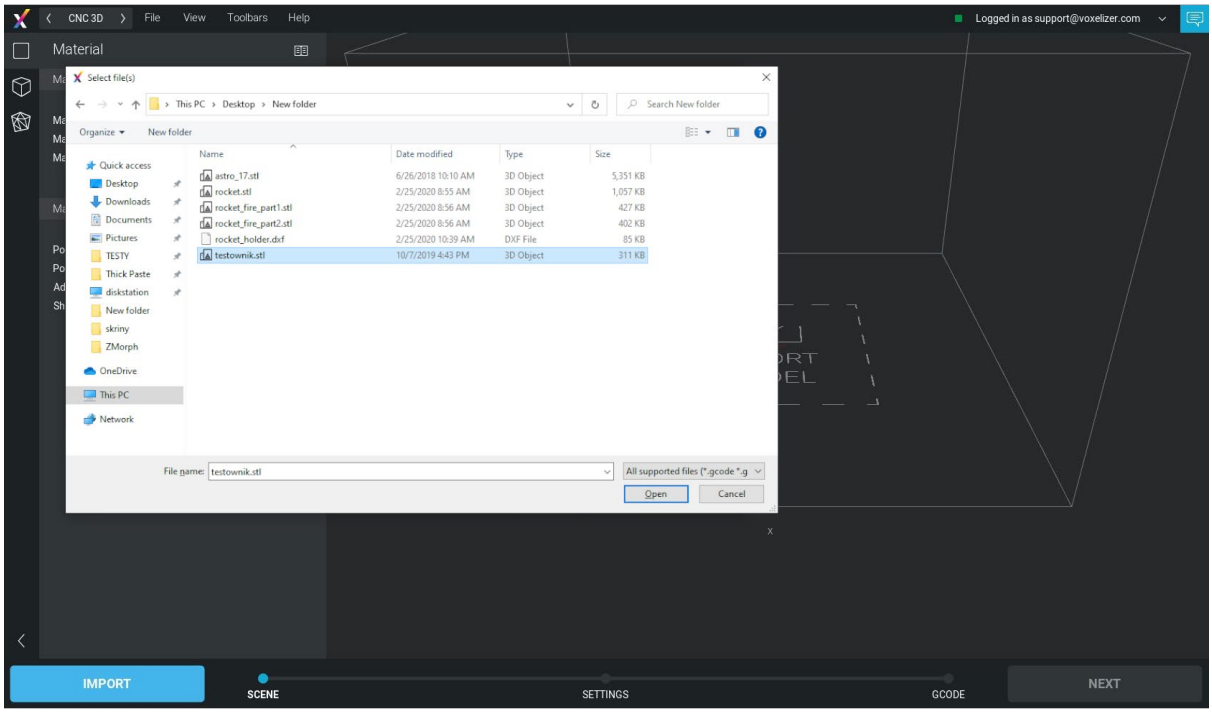


Set material dimensions to match Raw material that would be used for milling.

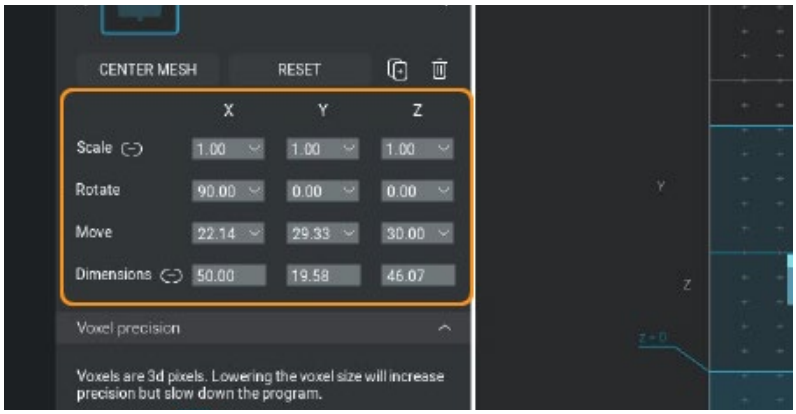


Change material position to LEFT along the X axis and FRONT along Y axis.

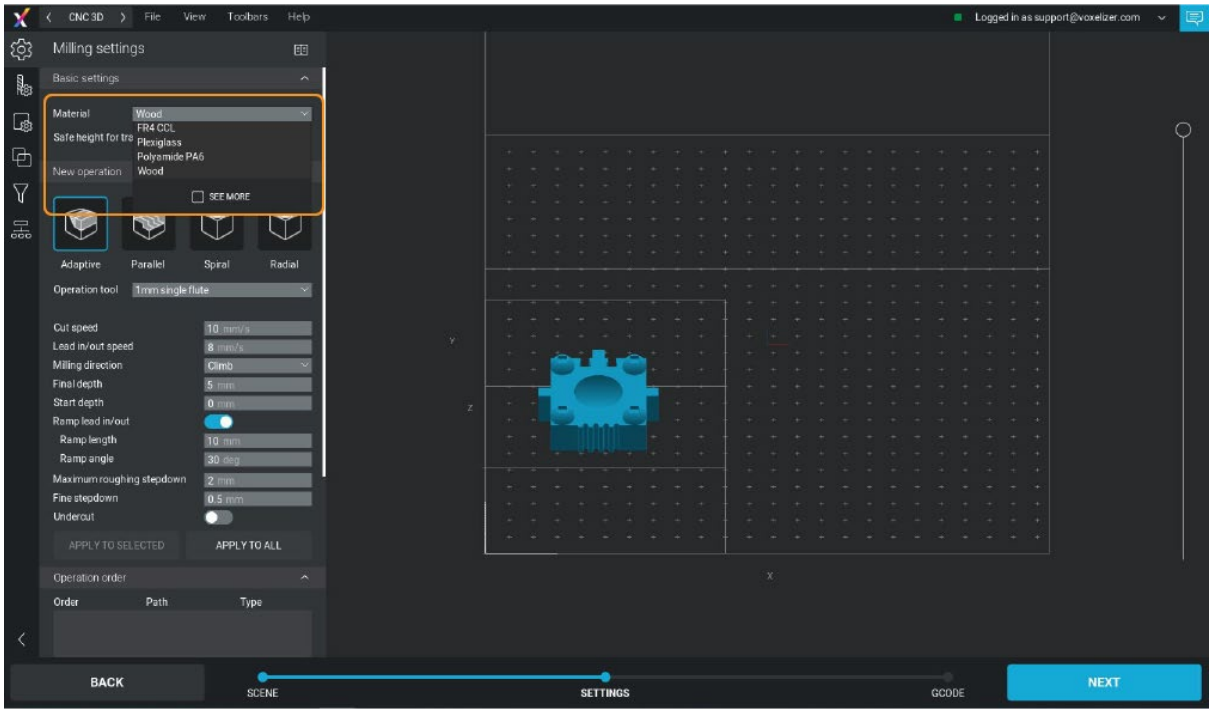
Import your DXF file.



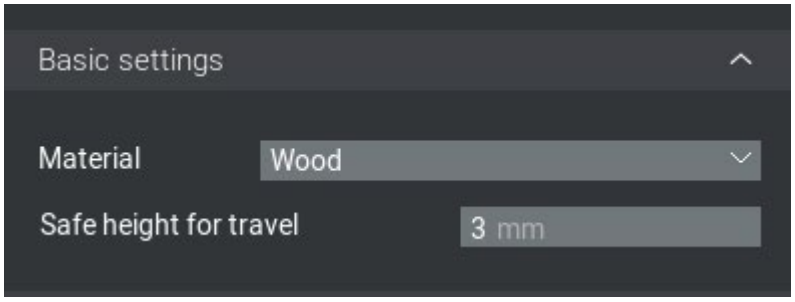
Now the drawing can be freely moved, scaled and rotated on the table preview.



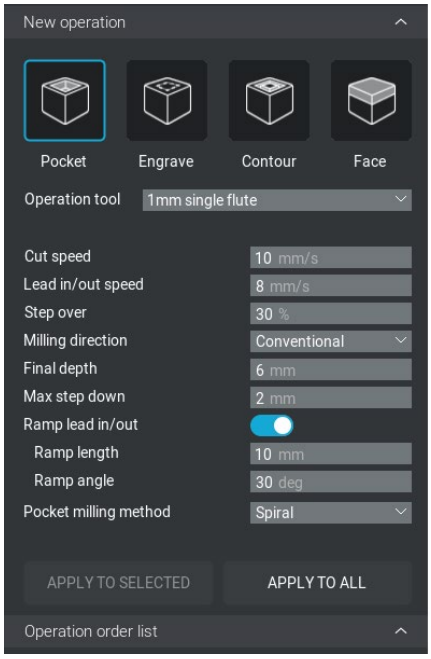
Click NEXT when ready. You will me automatically moved to SETTINGS tab.



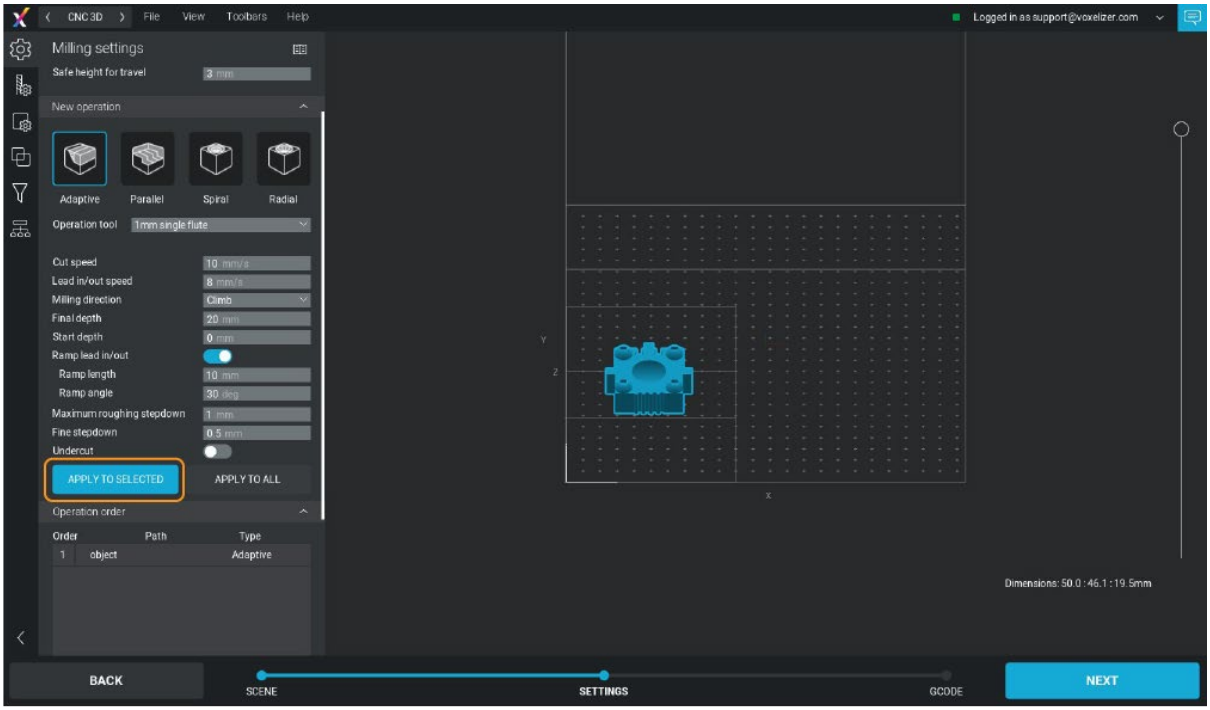
Choose material from drop down list and Set Safe height for travel - remember to take into account any fixtures that might stick out over material surface.



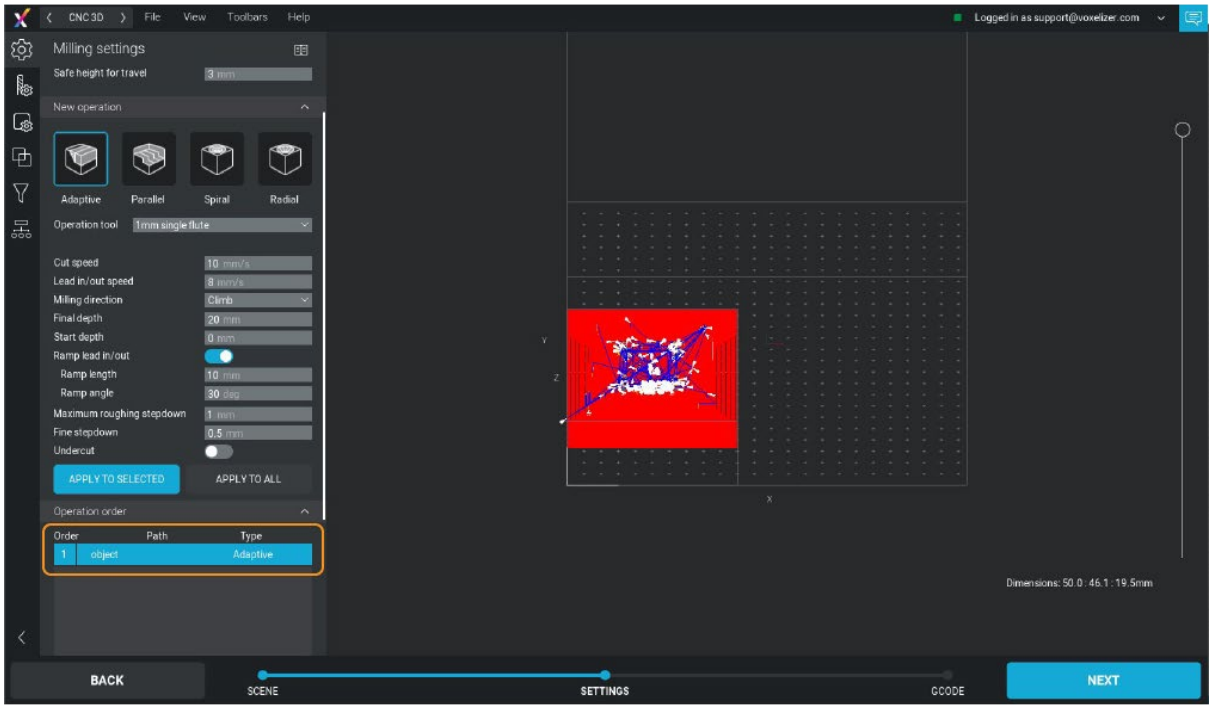
Choose operation that you would like to mill your drawing with. Choose operation tool. Parameters are set by default - adjust them according to your needs.



Apply operation settings to chosen parts of the drawing. When all operations are ready, click NEXT and wait for your G-code to be generated.

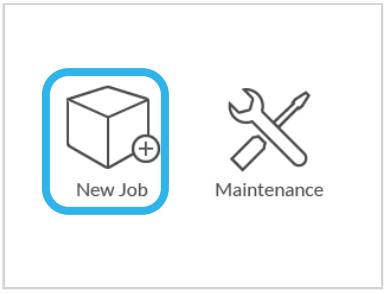


Now you can check generated G-code and save it. Start your file according to 13.6 part of the manual.

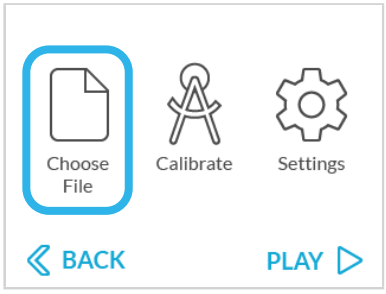


13.6 CNC Milling file starting (with calibration)

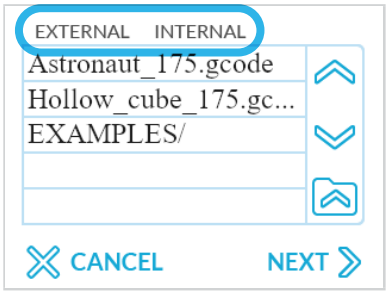
After uploading the file to an internal card or inserting an external SD card with the prepared file:



Enter the 'New Job' menu.



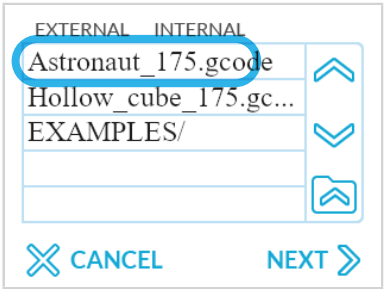
Go to the 'Choose file' section.



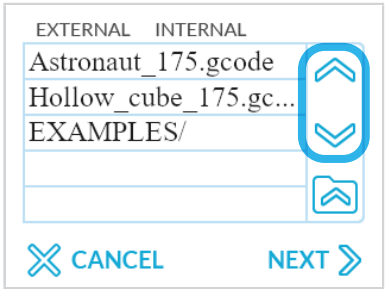
Files uploaded to the internal SD card are located in the 'INTERNAL' tab, files uploaded to the SD card are located in the 'EXTERNAL' tab.

NOTE: If the user inserted the external SD card the screen should jump forward to the 'Choose File' section screen on the 'EXTERNAL' directory.

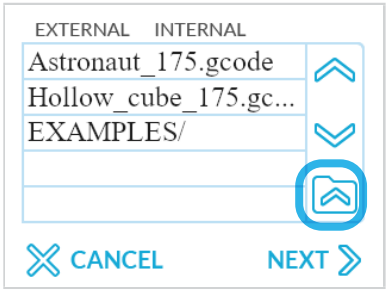
NOTE: If there was no previously chosen file, after pressing on the 'New job' menu the screen will go directly to the 'Choose File' section.



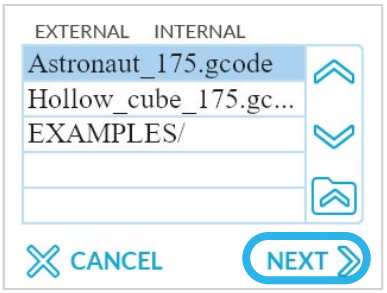
Select the prepared Gcode file.



If the prepared file or folder is not visible on the list press the up/ down arrow buttons to navigate through the file list.

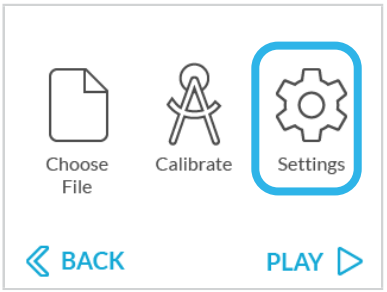


Exiting the folder is done by selecting the folder icon with the upward-facing arrow.

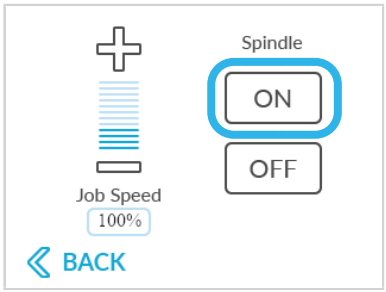


After selecting the file, press 'NEXT'.

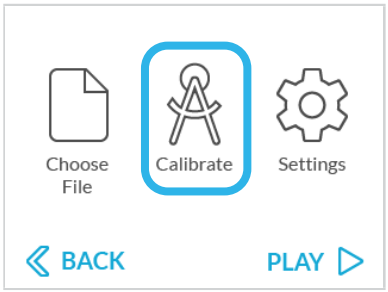
Before starting the CNC milling process the machine must be calibrated to the mounted material on the worktable. Skipping the calibration process may result in damaging the milling cutter, machine or the toolhead and after that hurting the user.



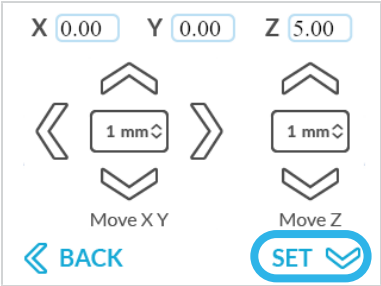
Enter the 'Settings' section.



Turn 'ON' your Spindle.



Go to the 'Calibrate' section.

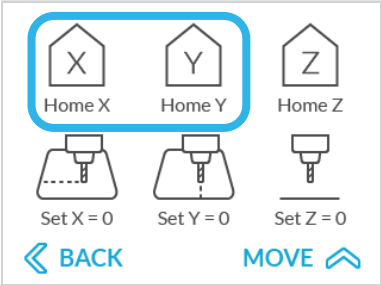


Press 'Set'.

NOTE: The movement in the X and Y axes will be disabled until they are homed. It is a safety procedure, to protect the machine against damage.

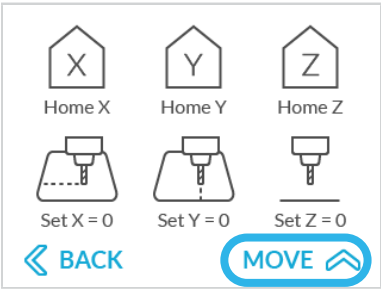
NOTE: The movement in the Z axis is avaliable all the time. Use it to move the milling cutter above the surface height of the prepared material.

NOTE: The information on the Z axis height is stored in the motherboard internal memory. That is guided by the fact that this value is not easy to change manually by the user unlike the X and Y axes.

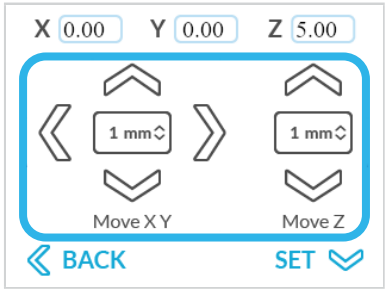


Press the 'Home X' and 'Home Y' buttons. Watch out for your cutter not to hit the material on the worktable.

NOTE: Don't home the Z axis when the milling cutter is in the spindle and when there is material on the CNC worktable. This will damage the milling cutter and might disarrange the Z axis motors.



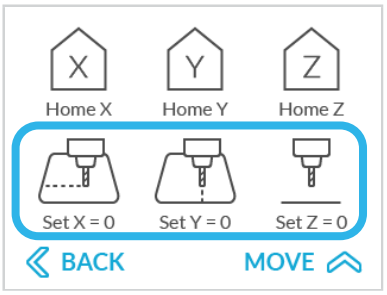
Go back to 'MOVE' menu,



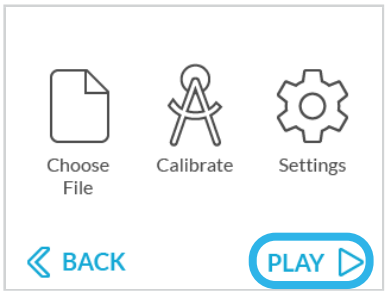
Using provided arrow buttons, move the spindle to the LOCAL starting position.

NOTE: In most cases the local starting position will be the material surface left, front corner.

NOTE: Toggle the distance button for better control over the cutter.



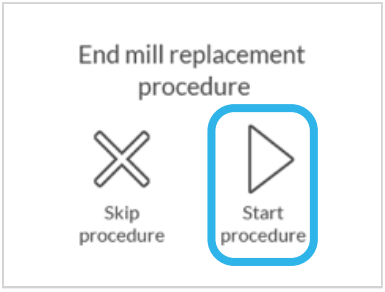
When the cutter is in its local position, go to the 'SET' menu and set the local 0,0,0 coordinates by pressing the 'Set X = 0', 'Set Y = 0' and 'Set Z = 0' buttons.



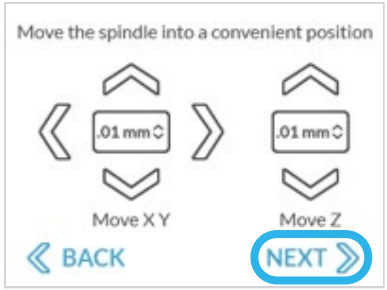
Go back to the main menu and choose 'PLAY'. Your machine will start working.

13.7 Tool changing process

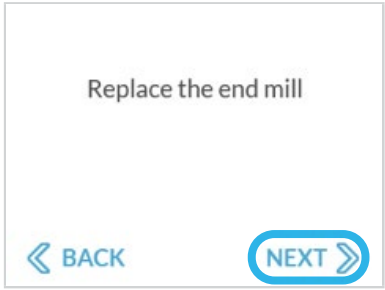
If you have generated milling G-code with tool changes, machine will stop operation at the right moment and ask if cutter changing process should be executed.



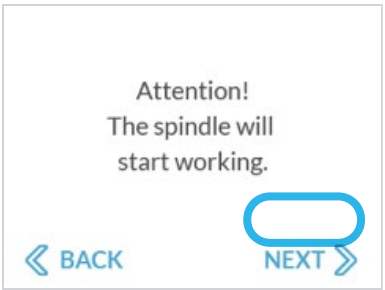
If you selected "start procedure" you will be walked through the process.



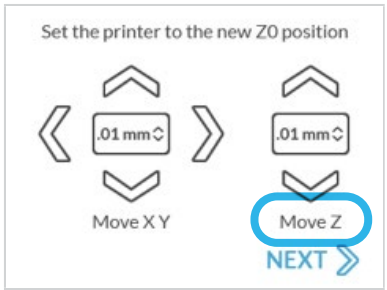
Using arrows move the toolhead to convenient for operation position. Watch out for any work-holding that may stick out above material surface. Choose "NEXT" when ready.



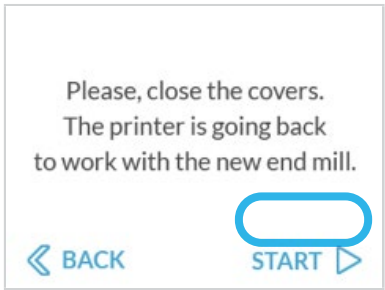
Using 13 and adjustable wrench as in cutter fastening, loosen collet's nut. Because your toolhead is still mounted on X-carriage, you will need to slide 13 wrench under belts and find slot on spindle's shaft. This way XY position of CNC Pro toolhead is saved. Replace your endmill Choose "NEXT" when ready.



CNC Pro toolhead starts working. Choose "NEXT"



Set new Z-height of your cutter. Using arrows move the toolhead to position which will be your new Z-0 position. Make sure to use the same surface as in the begging of gcode file. Choose "NEXT" when ready.



Close covers. The machine will go back to milling operations.

13.8 CNC PRO Toolhead safety rules

Preparing the workstation

- Secure the room with the ZMorph VX machine against any improper usage (the key to the room should be held only by a person authorized to operate the machine),
- Mark the entrance door to a room where a machine with a working CNC PRO toolhead is used with a suitable sign to wear hearing protectors (e.g. headphones, stoppers),
- Depending on the material being processed, the CNC spindle can produce a noise level up to 70dB. Noise is not a risk of hearing damage, but can cause discomfort and stress due to prolonged exposure to a working device,

"Hearing protection required" sign

- Mark the entrance to the room where a machine with the CNC PRO toolhead is with a proper sign saying that eye protection is required,

"Ear protection required" sign

- When working with the device with the spindle attached without covers (e.g. if material is larger than the platform), provide personnel and bystanders in the room with safety goggles,
- The electrical installation of the ZMorph VX requires it to be connected to a grounded outlet,
- Place the device on a level and stable surface. The machine is equipped with a vibration-damping base but when working on uneven or sloping surface, vibrations can cause the device to move,
- The room where the ZMorph VX device with the CNC PRO toolhead is located must be well ventilated as vapours may escape from the device during operation,
- If you install a ZMorph VX device with the CNC PRO toolhead in a room where smoke

detectors are installed, make sure they do not cause false alarms.

Health and safety instructions for handling CNC PRO Milling Toolhead.

General information.

- Use the ZMorph VX device with the CNC PRO toolhead in a separate room which cannot be accessed by children or unauthorized persons,
- Do not put your hands in the workspace after turning on the spindle. The spindle rotates at high speed and has rotating blades that can cause serious injuries,
- Use of the machine by unqualified personnel can lead to injury and/or damage to the machine,
- If you notice any malfunctions of the machine, stop it immediately by pressing the reset button (red ring button on the right on the front panel of the machine) and contact ZMorph Technical Support,
- Do not use a malfunctioning machine under the risk of voiding the warranty,
- Make sure that the material to be machined is firmly attached to the work platform and cannot move in any direction. Failure to follow the instructions may result in injury and/or damage to the machine,
- When using a ZMorph VX machine with the CNC PRO toolhead without covers, both operators and bystanders must always wear safety goggles; failure to do so may result in eye damage.

Safety at work

- Do not place your hands in the workspace under any circumstances after starting the spindle. Any exposure of the body to rotating parts of the machine can lead to serious injury. It is therefore essential to use the device safely and in accordance with the instructions,
- The ZMorph VX machine on which the CNC PRO Toolhead is mounted and running cannot be left unattended,
- The use and maintenance of the machine must always be carried out in the manner described in the operating instructions,
- Under no circumstances should you open covers that conceal electronic components of the machine when the power supply is connected. If there is a need for repairs or an overhaul of components contact ZMorph Technical Support. For local repairs, the housing may only be removed after the machine has been disconnected from the power supply and the plug has been disconnected from the socket,
- Make sure the room ventilation is working properly,
- The workpieces and tools must be mounted in a stable manner at the correct locations. Avoid collision between the workpiece and the machine. Otherwise, the ma-

chine may be damaged,

- Before starting work, check that there are no obstacles in the working area,
- Stop all operations while the workpiece is being changed,
- Do not touch electrical parts with wet hands.

Warning signs

Caution: Danger from moving parts. To avoid injury or damage to parts of the body, do not reach inside the unit or insert any foreign objects while the unit is in operation, during operation or at rest.

Caution: High voltage - this symbol indicates the area where the user may be electrocuted.

14. Laser cutting and engraving

14.1 Laser PRO Toolhead

Laser PRO is a toolhead used for cutting and engraving operations. It consists of 2.8W diode laser in full aluminum casing and mounting that allows for attachment of the toolhead to X carriage of ZMorph VX machine.
Main elements of Laser PRO Toolhead:

Specification:
Construction: High quality CNC-milled aluminum
Laser type: 2.8W class 4 Blue Laser
Default work speed: 15 mm/s
Max work speed: 120 mm/s
Work area: up to 250 x 235 x 85 mm
Recommended cutting depth: 1 mm for cardboard
Max cutting depth: 5 mm for cardboard
Dimensions: 90 x 55 x 165 mm

14.2 Materials compatible with Laser Pro Toolhead

Laser PRO Toolhead allows for engraving and cutting in soft materials.
The list of tested materials is as follows:

- Wood derivatives: wood, plywood, wood fibre boards
- Plastics: EPP, EVA foam
- Others: leather, felt, laser foil, cardboard, foamiran

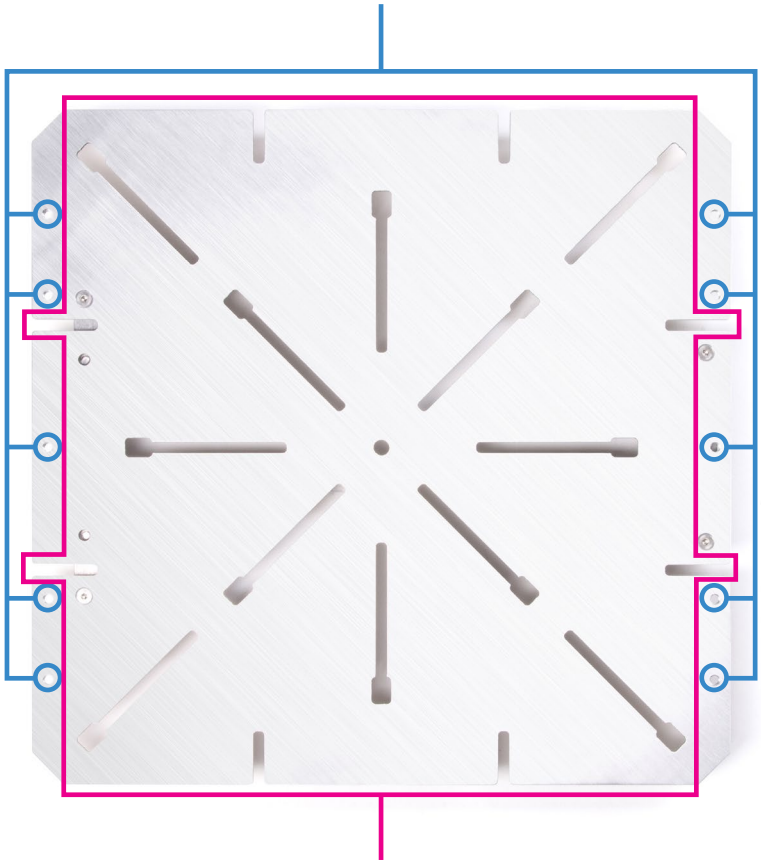
To explore all materials please follow this link to ZMorph Materials Library:
http://bit.ly/ZMorphMaterialsLibrary

14.3 Material fixturing

For proper material fixturing during laser cutting and engraving operations, you need to mount aluminum bed that is added to every ZMorph VX Full Set or is available in store. To learn how to change your worktable, check the 10.2 part of the manual.

CNC Worktable explained
Your aluminum worktable can be divided into two fixturing areas.
For materials smaller than workspace of ZMorph VX there are T-slots milled for mounting your workholding with M4 screws and square nuts.
For materials larger than workspace of ZMorph VX there are M4 threaded holes for mounting your workholding with M4 screws.

T-slots for M4 screw / square nut based fixturing



M4 threaded holes for out-of-workspace fixturing

Types of workholding solutions

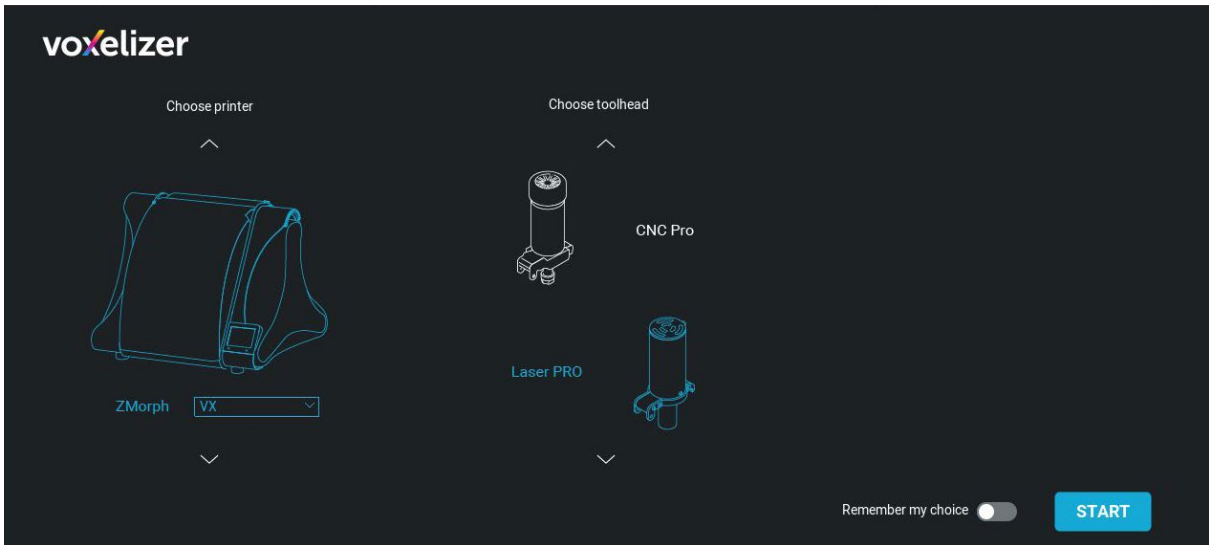
Your workholding solution should be adapted to material and its dimensions to ensure best results.

Below you can find most common solutions with pros and cons of every one of them.

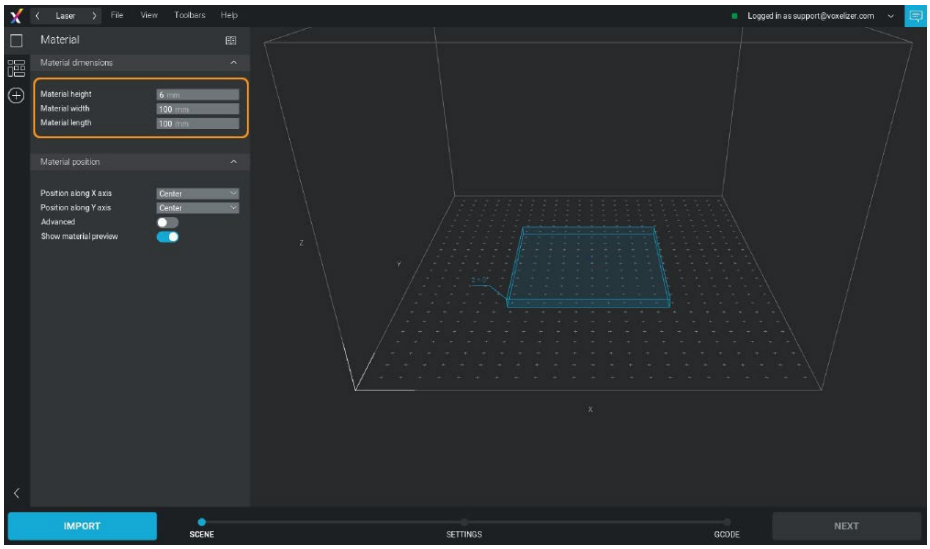
Workholding	Usable for	Ease of use	Pros	Cons
Double sided tape	Sheet material Block material	1/5	-> Cheap -> Easy to use -> Does not stick out above material surface	-> Surface must be scraped of tape residues
Sheet clamps (added to ZMorph VX)	Sheet material	3/5	-> Can be custom 3d printed	-> Harder to use -> Only for flat, sheet materials like plywood
Step clamps	Sheet material Block material	2/5	-> Allow for mounting materials of different heights	-> Stick out above material surface
Vises	Block material	2/5	-> Robust -> Can be custom 3d printed	-> Must have custom mount to CNC worktable

14.4 Laser engraving file preparation

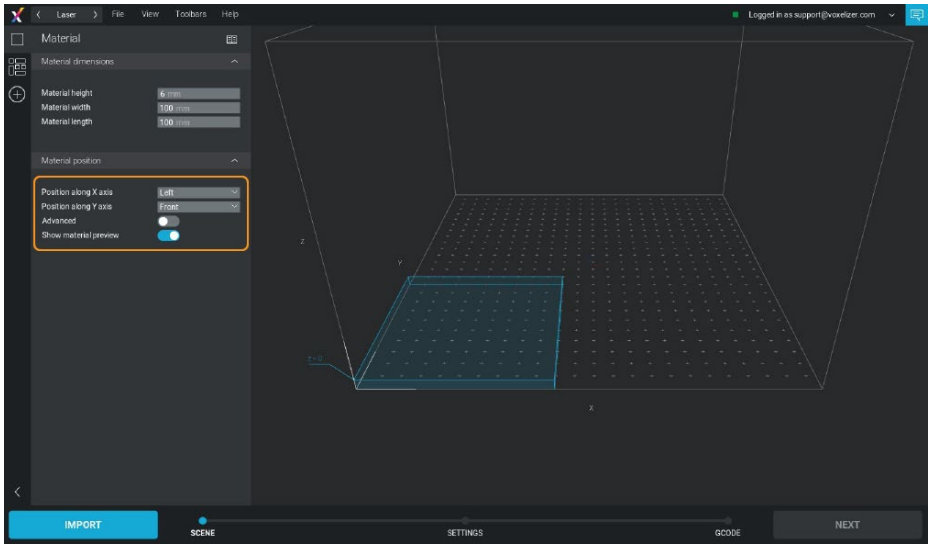
Open Voxelizer 2.0 software, choose ZMorph VX machine and Laser PRO Toolhead. Click START.



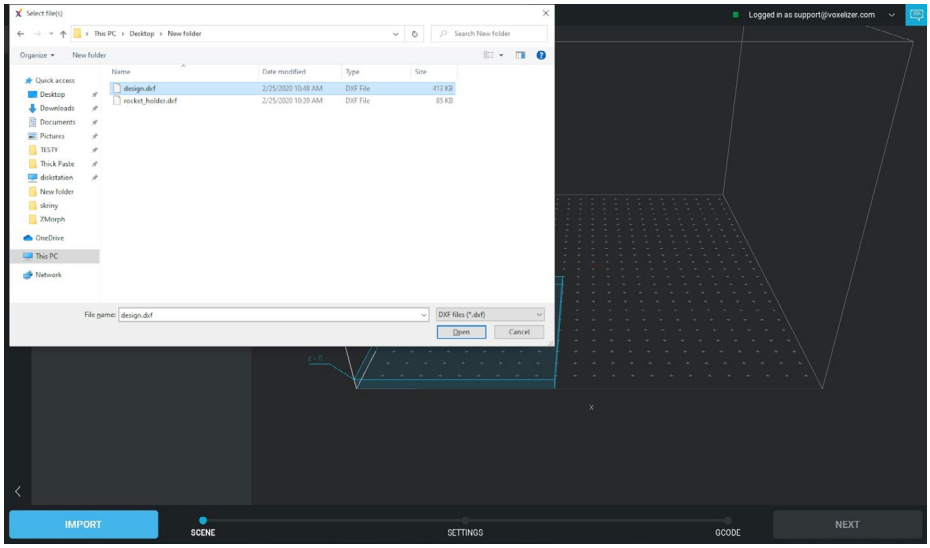
Set material dimensions to match Raw material that would be used for engraving or cutting.



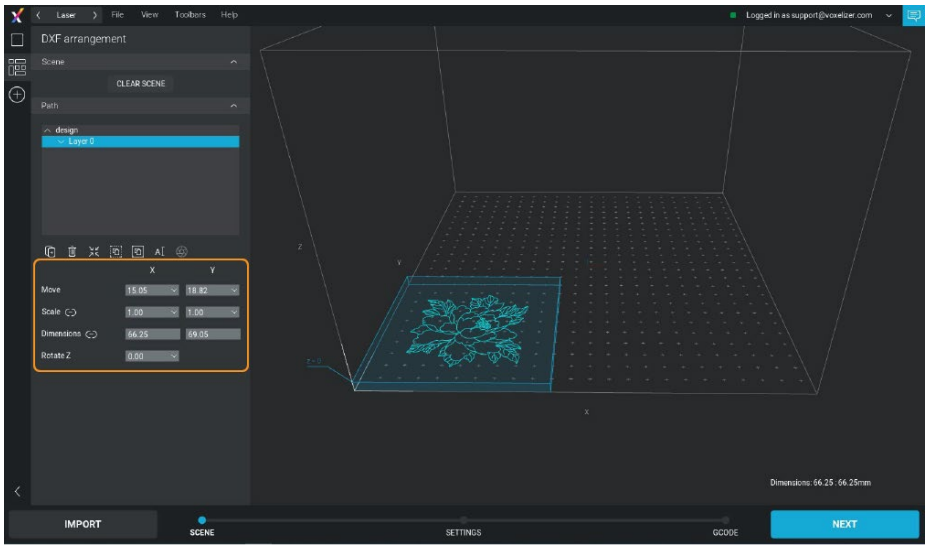
Change material position to LEFT along the X axis and FRONT along Y axis.



Import your DXF file.

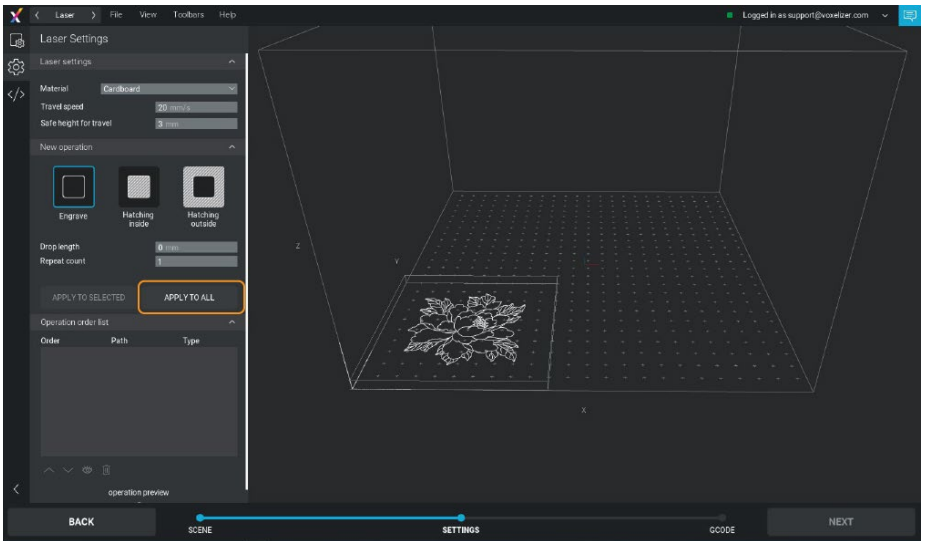


Now the drawing can be freely moved, scaled and rotated on the table preview. Click NEXT when ready. You will be automatically moved to the SETTINGS tab.

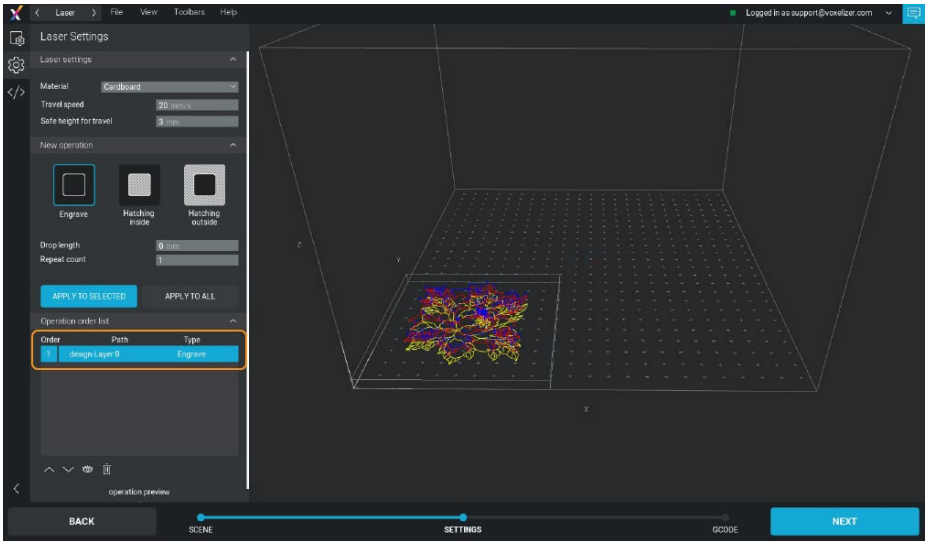


Click NEXT when ready. You will me automatically moved to SETTINGS tab.

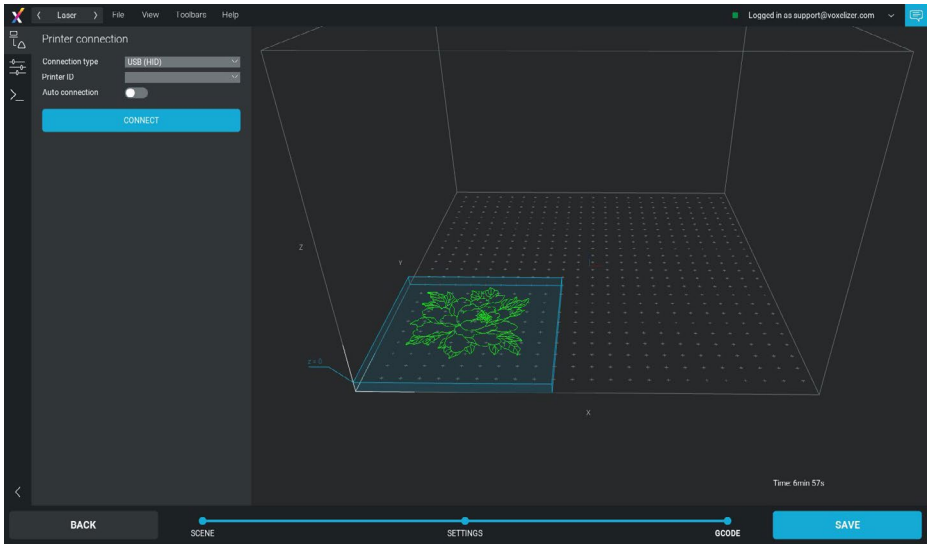
Choose material from drop down list and Set Safe height for travel - remember to take into account any fixtures that might stick out over material surface.



Choose an operation that you would like to engrave your drawing with Parameters are set by default - adjust them according to your needs.
Apply operation settings to chosen parts of the drawing. When all operations are ready, click NEXT and wait for your G-code to be generated.

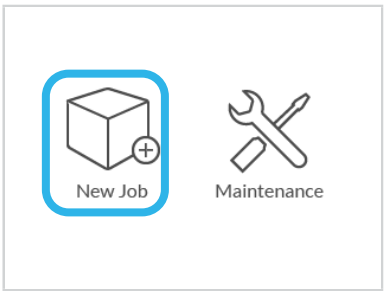


Now you can check generated G-code and save it. Start your file according to 15.5 part of the manual.

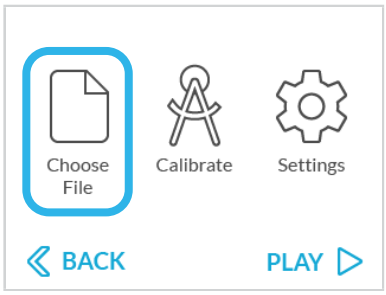


14.5 Laser engraving/cutting file starting (with calibration)

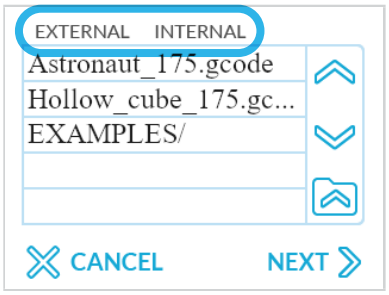
After uploading the file to an internal card or inserting an external SD card with the prepared file:



Enter the 'New Job' menu.



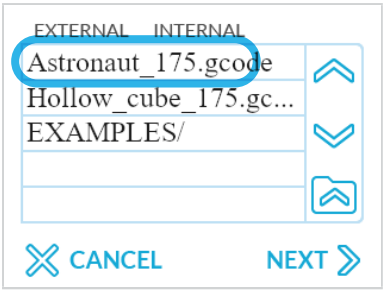
Go to the 'Choose file' section.



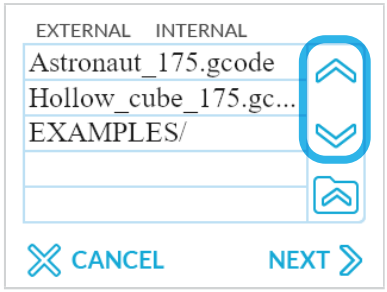
Files uploaded to the internal SD card are located in the 'INTERNAL' tab, files uploaded to the SD card are located in the 'EXTERNAL' tab,

NOTE: If the user inserted the external SD card the screen should jump forward to the 'Choose File' section screen on the 'EXTERNAL' directory.

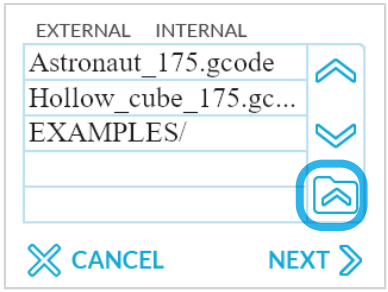
NOTE: If there was no previously chosen file, after pressing on the 'New job' menu the screen will go directly to the 'Choose File' section.



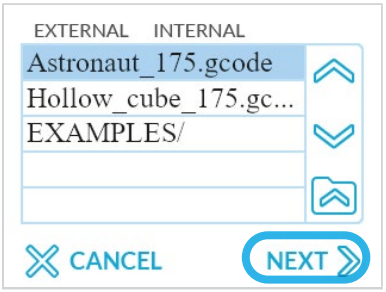
Select the prepared G-code file.



If the prepared file or folder is not visible on the list press the up/ down arrow buttons to navigate through the file list.

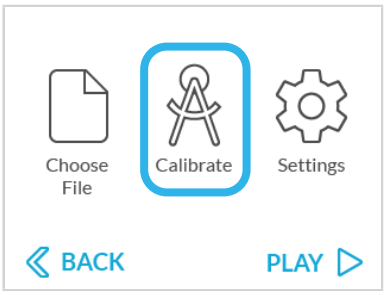


Exiting the folder is done by selecting the folder icon with the upward-facing arrow.

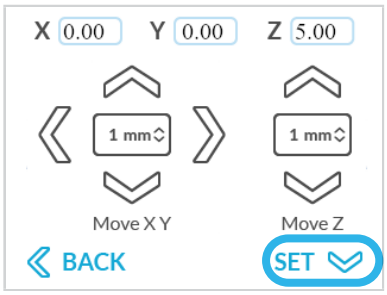


After selecting the file, press 'NEXT'.

Before starting the Laser engraving/cutting process the machine must be calibrated to the mounted material on the worktable. Skipping the calibration process may result in damaging the machine or the toolhead.



Go to the 'Calibrate' section.

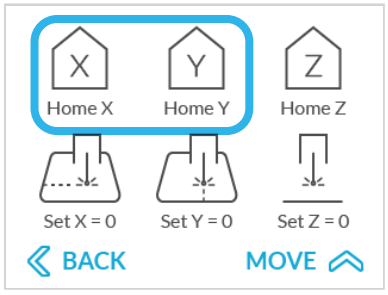


Press 'Set'.

NOTE: The movement in the X and Y axes will be disabled until they are homed. It is a safety procedure, to protect the machine against damage.

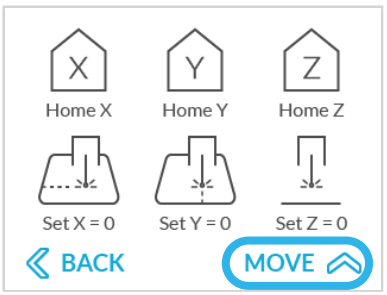
NOTE: The movement in the Z axis is avaliable all the time. Use it to move the milling cutter above the surface height of the prepared material.

NOTE: The information on the Z axis height is stored in the motherboard internal memory. That is guided by the fact that this value is not easy to change manually by the user unlike the X and Y axes.

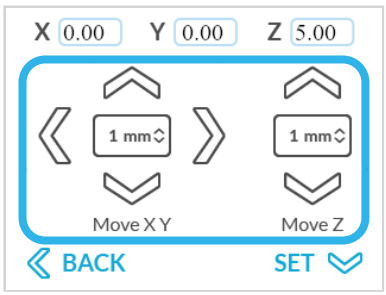


Press the 'Home X' and 'Home Y' buttons. Watch out for your cutter not to hit the material on the worktable.

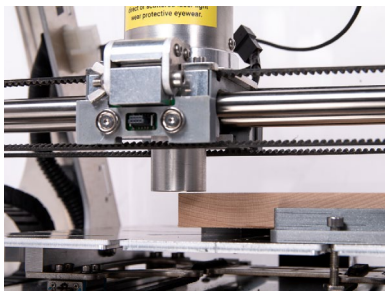
NOTE: Don't home the Z axis when the milling cutter is in the spindle and when there is material on the CNC worktable. This will damage the milling cutter and might disarrange the Z axis motors.



Go back to 'MOVE' menu,

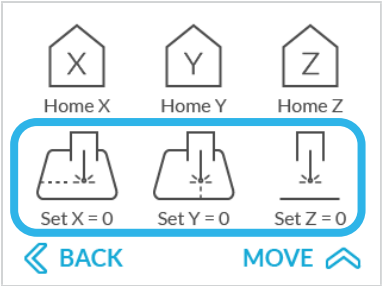


Using provided arrow buttons, move the spindle to the LOCAL starting position.

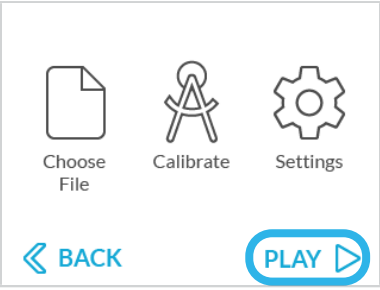


NOTE: In most cases the local starting position will be the material surface left, front corner.

NOTE: Toggle the distance button for better control over the cutter.



When the cutter is in its local position, go to the 'SET' menu and set the local 0,0,0 coordinates by pressing the 'Set X = 0', 'Set Y = 0' and 'Set Z = 0' buttons.



Go back to the main menu and choose 'PLAY'. Your machine will start working.

14.6 Laser PRO safety rules

Instructions for preparing the workplace and how to safely operate the Laser PRO on ZMorph VX.

The Laser PRO Toolhead supplied with the ZMorph VX machine is a 2.8 Watts class 4 laser with emitted wavelength of 450nm.

These types of lasers are extremely dangerous, they emit visible or invisible radiation and they cause irradiation greater than allowed. Diffuse radiation is dangerous to eyes and skin. Potential hazards are materials evaporated from the surfaces of illuminated objects. Depending on the material used, toxic fumes may affect the user's respiratory tract and eyes.

Workstation

- Avoid using any reflective surface in the room in which the laser is used (eg mirrors, equipment with shiny metal-chromed, nickel-plated, aluminized - or glass parts),
- It is necessary to secure the room in which the ZMorph machine with Laser PRO is located and not working before an unprofessional start-up (the key to the room should only be held by a person authorized to operate the laser),
- It is necessary to mark the entrance door to the room where the device with the attached Laser PRO is used with an appropriate laser radiation warning sign,

Laser beams warning sign

- It is necessary to mark the entrance door to the room where the device with the attached Laser PRO is used with the appropriate sign to wear protective goggles,

Information sign - Eye protection required, wear protective goggles.

- Place in a visible place next to the laser workplace a label with the words "visible and invisible laser radiation, protect the eyes and skin from direct or diffuse radiation",
- Provide personnel and bystanders in the room where the laser device works with protective eye shields (glasses, safety goggles) appropriate to the type of laser device,
- The appropriate safety goggles are those which, in a visible place (e.g. on the outside of the frame) have the required markings (e.g. in the form O.D. = 3 for wavelengths of 660 nm or L = 3 for wavelengths of 820 nm). The value of 7 for the O.D. informs that such glasses weaken the power of radiation falling on them 10000000 times. For example, for a 1 W laser with such eyepieces, 0.1 uW of power will reach the eye and it is a radiation level that is completely safe for the human eye,
- Provide personnel and bystanders staying in the room where the laser device works with mouth and nose masks equipped with a filter absorbing smoke particles (FFP3),
- Electrical installation of the ZMorph VX machine requires connecting it to a grounded socket,
- Provide a room in which a working ZMorph machine with Laser PRO is installed in a valid powder extinguisher, it should be located in an accessible place and marked with appropriate markings,
- When installing the ZMorph machine with Laser PRO in a room where smoke detectors are installed, make sure that they do not cause false alarms,
- The room in which the ZMorph machine with the Laser PRO machine is located must be well ventilated, hazardous vapors may escape from the machine.

Safety instructions for handling LaserPRO on ZMorph VX

1. General information.
    - The ZMorph VX machine with Laser PRO mounted should be used in a separate room without the possibility of outsiders getting in,
    - Regardless of the laser class, it is forbidden to look at the laser beam (i.e. to look into the opening of the laser from which the beam is emitted); this also applies to the reflected beam,

- Using the machine by unqualified personnel may lead to damage to health and / or damage to the machine. ZMorph VX machine and Laser PRO toolhead are not toys and can't be used by children without adult supervision,
- If you notice any abnormalities in the operation of the machine, stop the process immediately with the reset button (red button on the right side on the front panel of the machine) and contact the ZMorph Technical Support,
- Do not use a defective machine under the threat of losing the warranty,
- When using the ZMorph VX machine with Laser PRO, both the staff and the by-standers (if any around) must always wear safety goggles, failing to comply with this recommendation may result in damage or loss of sight,
- Never open any covers under which the machine components are hidden with the power supply connected. If it is necessary to repair or inspect components, please contact the official ZMorph Technical Support,
- Before starting work on the machine with Laser PRO, make sure that the machine's surroundings (work room) is closed and that there is no possibility of unauthorized access without proper eye protection.

2. Safety at work with Laser.

- Any exposure to laser emission may cause physical burns or damage to your eyesight. It is extremely important to use the device in a safe manner and in accordance with the instructions,
- The ZMorph VX machine on which the Laser PRO is mounted and working can not be left unattended,
- A fire extinguisher with valid approval should always be located as close as possible to the machine to which the laser is connected,
- The use and maintenance of the machine must always be carried out in a manner consistent with the description in the manual,
- Make sure that the room ventilation works correctly,
- Install the workpieces and tools in the correct places in a safe manner. Avoid colliding the workpiece with the machine. Otherwise, the machine may be damaged,
- Check that there are no obstacles in the work area before starting work,
- During the change of the workpiece, stop all operations,
- Do not touch electrical parts with wet hands,
- Do not place your hands in the working area during processing.

Warning signs

Prevent eye exposure: Class 4 visible-beam lasers are high-powered. A Class 4 laser can cause a significant eye injury if the beam, whether direct or reflected, enters the eye.

Avoid skin exposure: Avoid exposure to skin and sensitive materials. A Class 4 laser can burn skin and materials, especially dark and/or lightweight materials at close range.

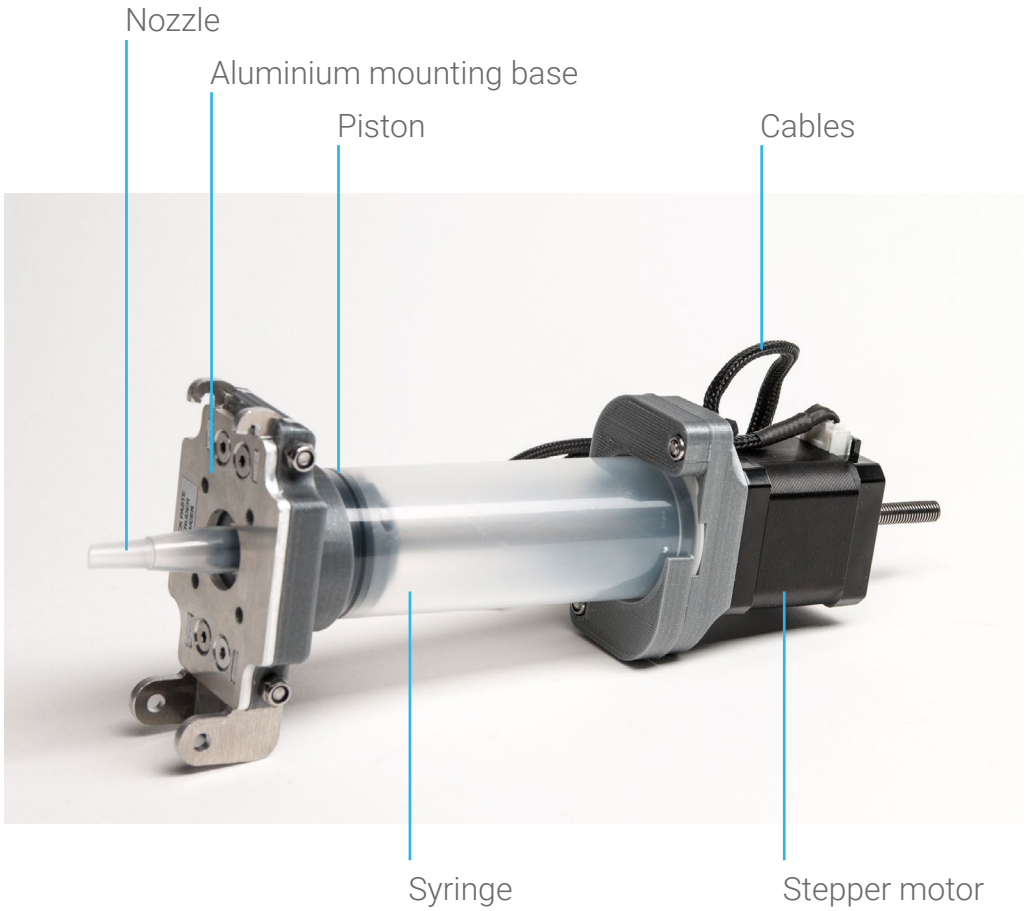
Attention! Danger: General warning sign. W001, according to PN-EN ISO 7010.

Laser beam warning: Warning sign used to warn of danger presented by laser beams. W004, according to PN-EN ISO 7010.

15. Thick Paste Extruder

15.1 Thick Paste Extruder

Thick Paste Extruder is a toolhead usable in 2D and 3D printing. It consists of a stepper motor that pushes material in syringe through nozzle.
Main elements of Thick Paste Extruder:



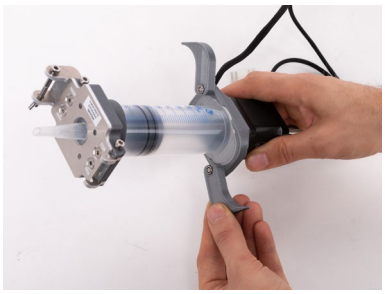
Specification:
Construction: 3 mm aluminum base with ABS printed parts
Nozzle: 2 mm, 4 mm
Motor: Nema 17 stepper motor
Default work speed: 10 mm/s (depends on the material)
Extrusion: Direct Drive
Work area: up to 250 x 235 x 165 mm (without covers)
Recommended printing resolution: 2 mm layer height (2000 microns)
Supported printing resolution: 0.5 - 4 mm layer height (500 - 4000 microns)
Material capacity: 100 ml
Extruder dimensions: 90 x 55 x 271 - 380 mm

15.2 Materials

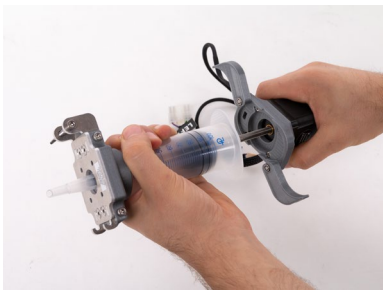
Thick Paste Extruder has a wide potential for experimental applications in art projects, material research, and custom cake decorations. Its simple construction also makes it safe for educational purposes and working with children. The toolhead can print using medium and dense masses like ceramics, Nutella, chocolate and sugar toppings, and cookie dough. Feel free to experiment with other materials like silicone, porcelain, avocado paste, or cheese, to achieve results through trial and error.

15.3 Material application

Prepare the Thick Paste Extruder.



Unlock the syringe blockade.

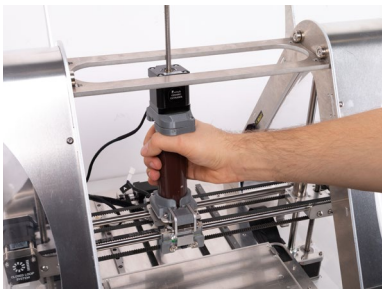


Pull the piston out from the syringe.

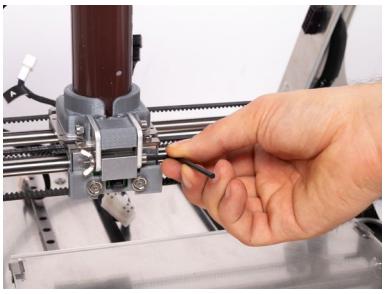
Manually move the piston to the starting position.

Fill the syringe with the prepared material.

Push the piston inside the syringe and lock the syringe blockade.



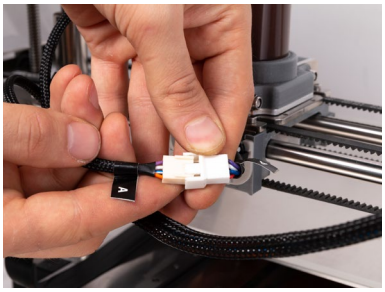
Put the Thick Paste toolhead on the X-cariage mount.



Screw tight the front screw.

Connect the "LEFT" connector to the Left socket on the machine frame.

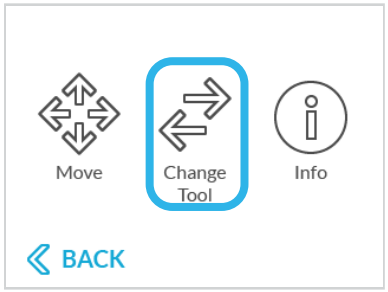
Thick Paste Extruder workflow



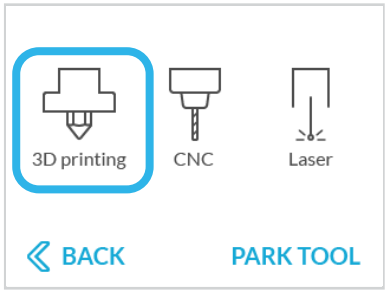
Connect the "A" cable to the A cable from X-carriage.

Turn on the machine.

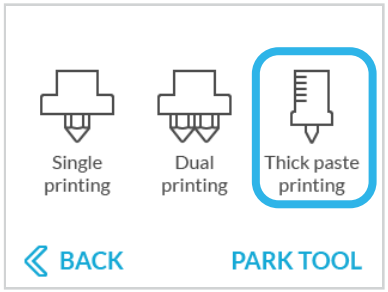
Enter the "Maintenance" menu.



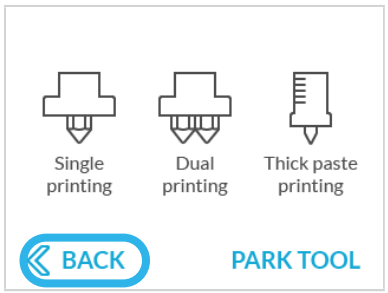
Go to the "Change Tool" option.



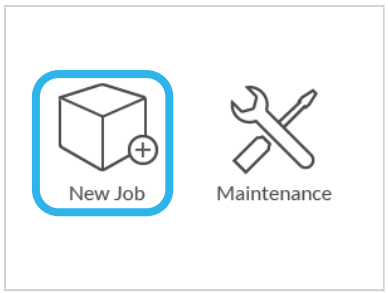
Go to the "3D printing".



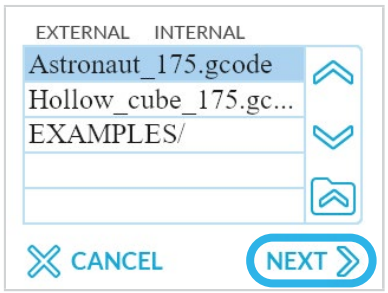
Choose "Thick Paste printing" option.



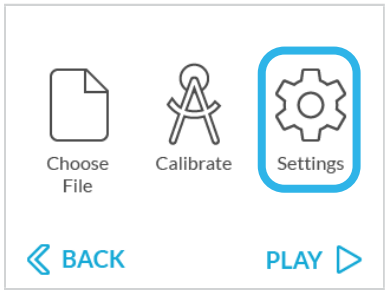
Go back to the "main menu" screen.



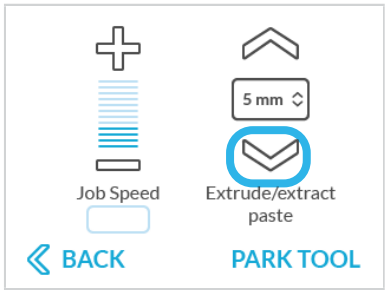
Enter the "New Job".



Choose file and press "NEXT" button.

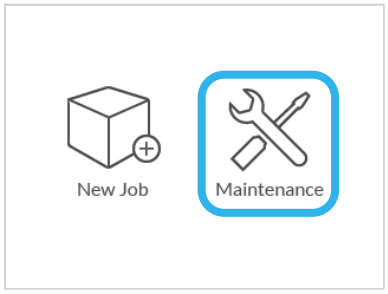


Go to the "Settings" option.

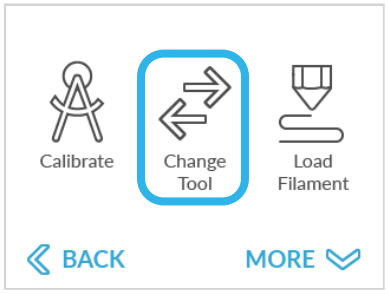


Push the "extrude/extract paste" button until the paste flow from the syringe.

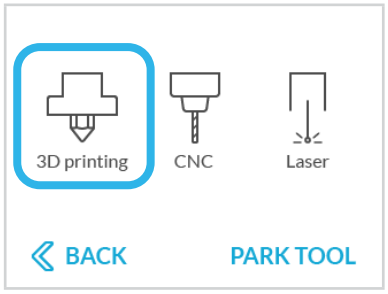
15.4 Calibration



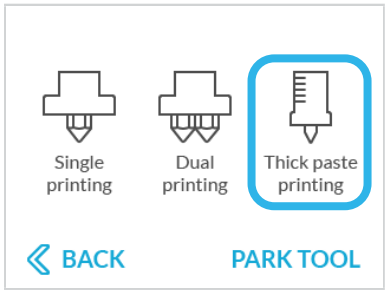
Enter the "Maintenance" menu.



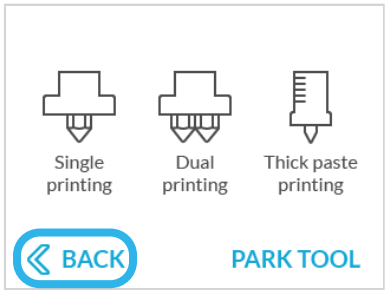
Go to the "Change Tool" option.



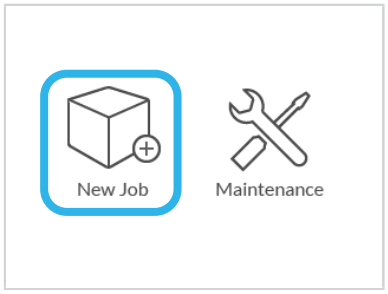
Go to the "3D printing",



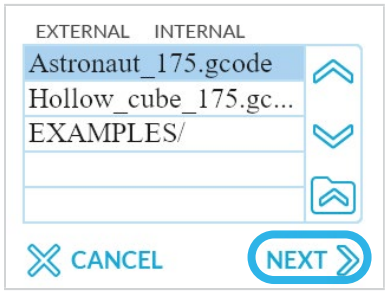
Choose "Thick Paste printing".



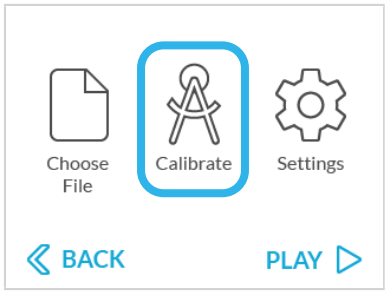
Go back to the "main menu" screen.



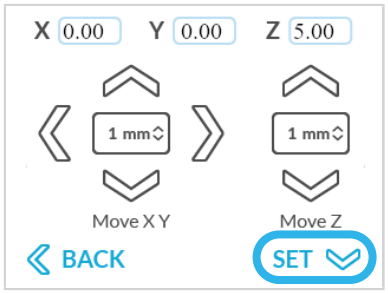
Enter the "New Job".



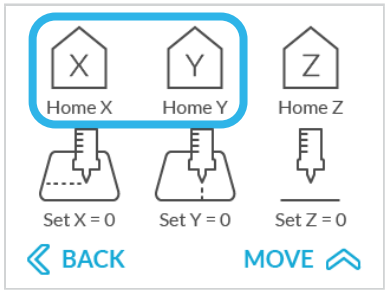
Choose your Gcode file and press "NEXT".



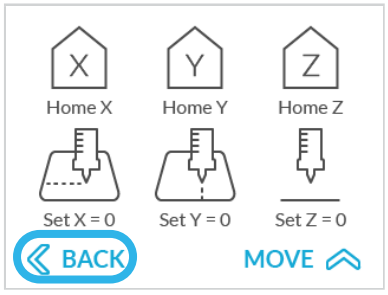
Go to the "Calibrate" option.



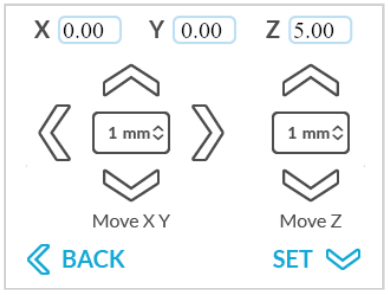
Press the "SET" button.



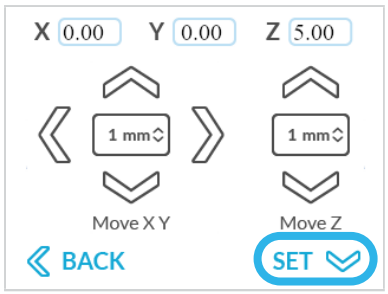
Press the "Home X" and "Home Y" buttons.
Warning! Do not press the "Home Z" button.



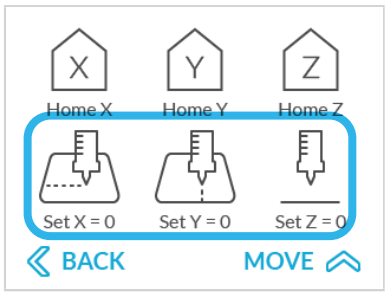
Go back to the "Move" page.



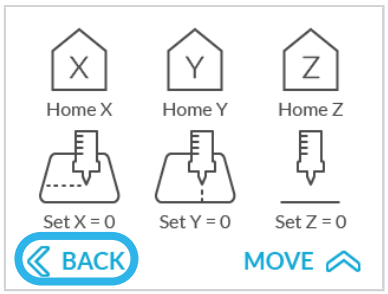
Use the "Move x,y,z" buttons to maneuver the Thick Paste syringe to be 1mm above the front left corner of the table.



Return to the "SET" page.



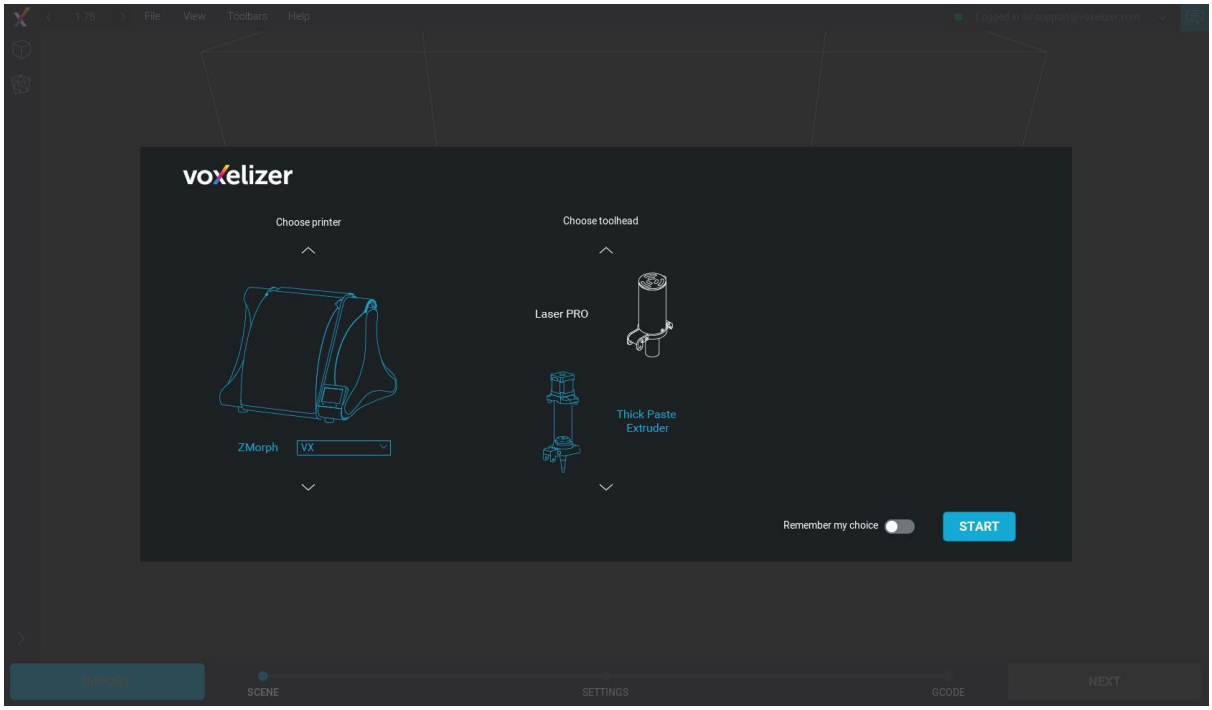
Press all the "SET x,y,z=0" button to define the local zero points.



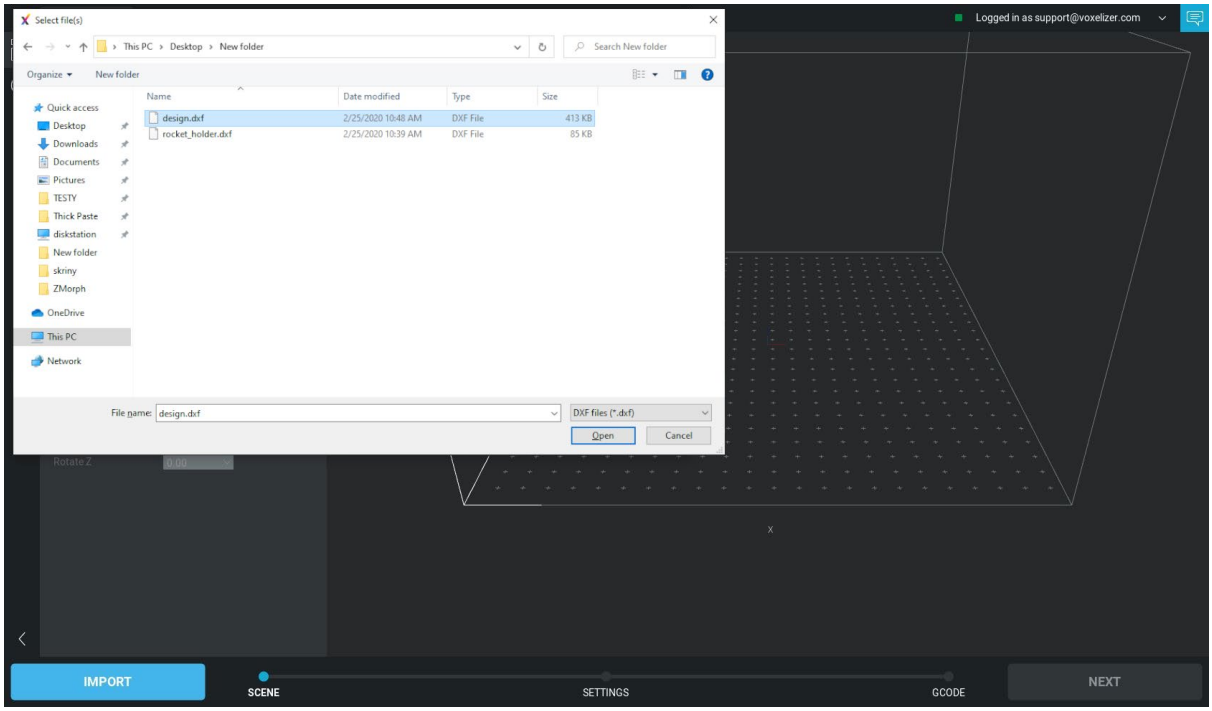
Press the "Back" button to return to "New Job" menu.

15.5 File preparation

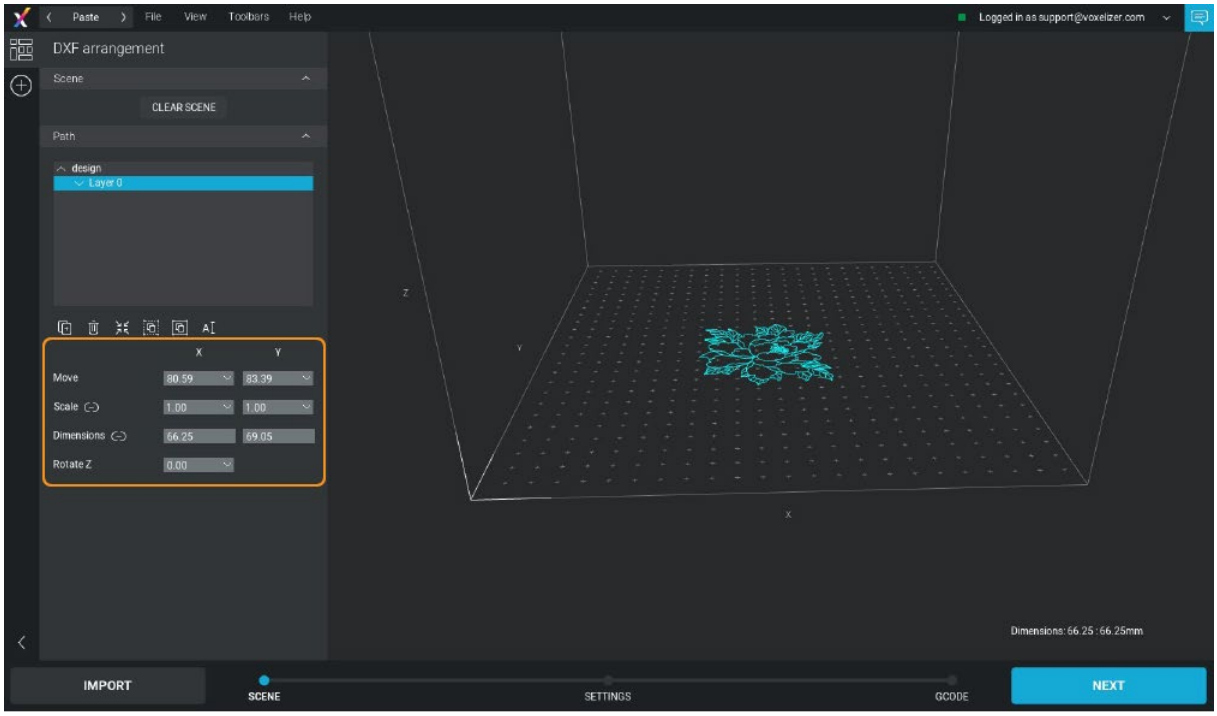
Open Voxelizer 2.0 software, choose ZMorph VX machine and Thick Paste Extruder toolhead. Click START.



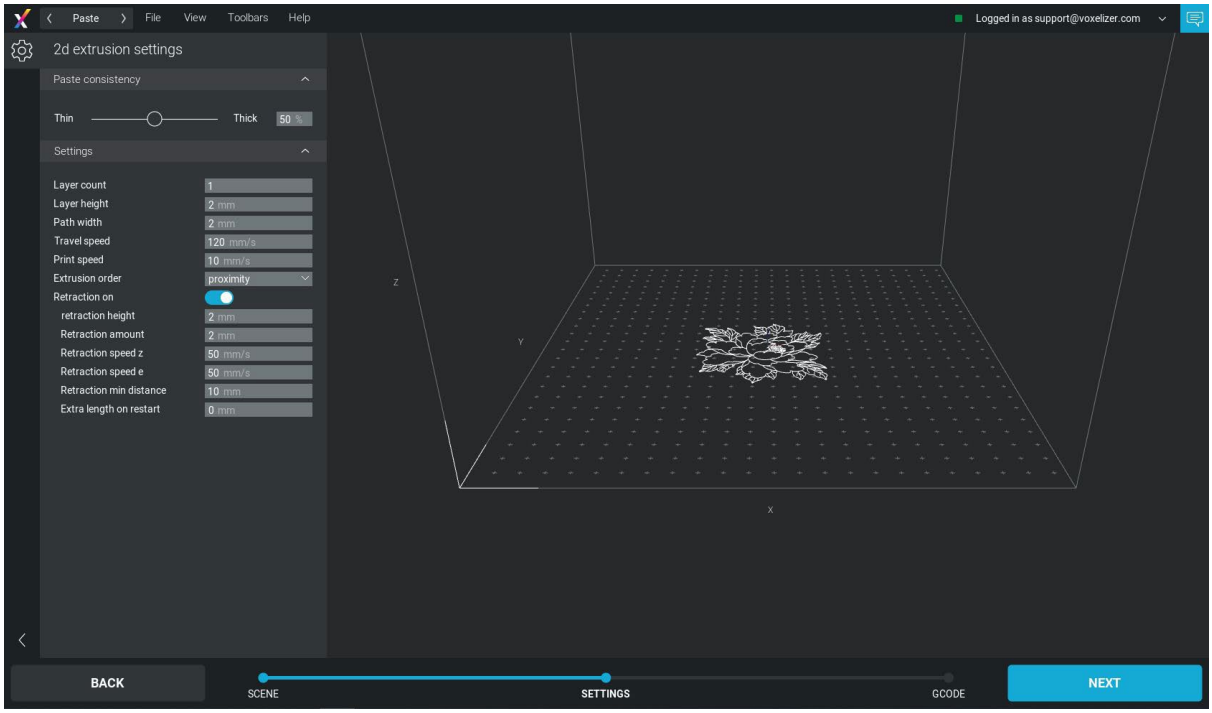
Import DXF File.



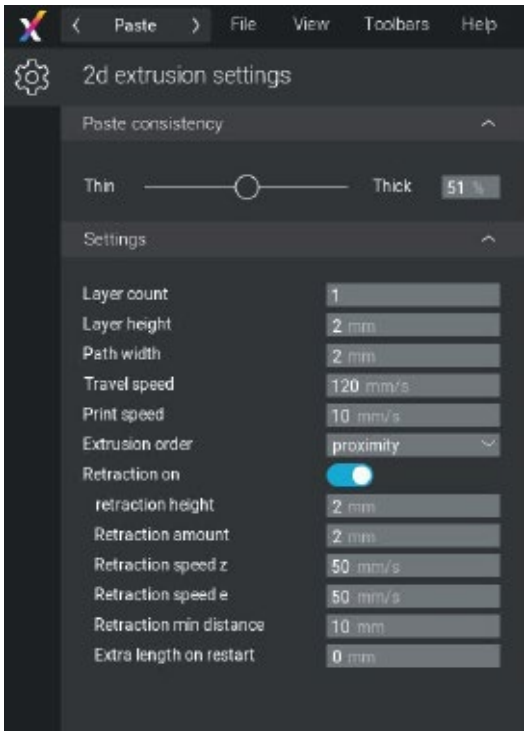
Now the drawing can be freely moved, scaled and rotated on the table preview.



Click NEXT when ready. You will be automatically moved to settings tab of software.

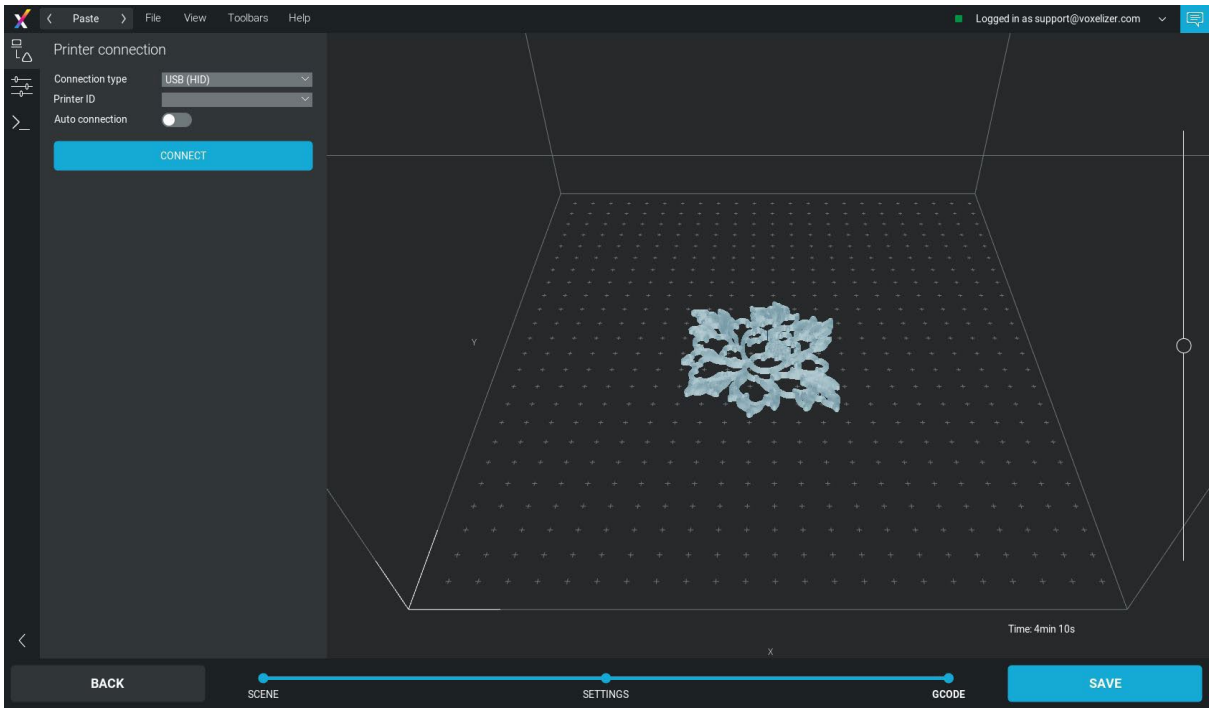


Set operation parameters according to paste you would like to use.



Click NEXT when ready.

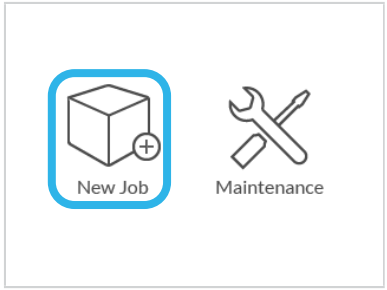
Check your generated gcode file, save it and start your work.



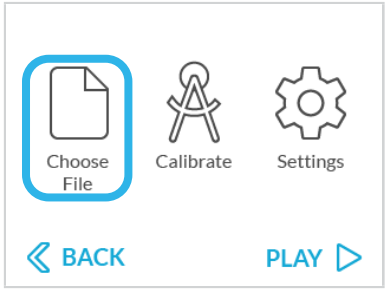
15.6 File starting

Copy .gcode file to external SD card

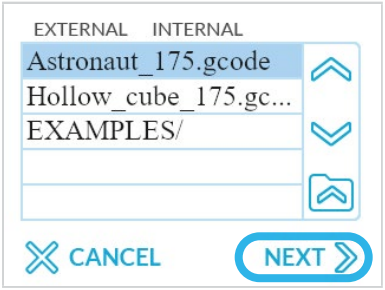
Turn on the machine.



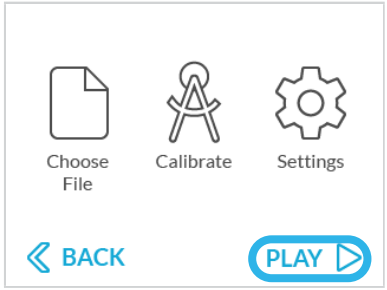
Tap "new job" button.



Tap "Choose file" button.



Choose your prepared gcode file from external source. Click "Next".



Go back to main menu and choose PLAY. Your machine will start working.

15.7 Safety instruction for Thick Paste Extruder

Thick Paste Extruder enables 2D and 3D printing of dense masses which are extruded at high pressure through an exchangeable nozzle. During the work remember to always follow safety restrictions:

- Objects printed with the Thick Paste Extruder are not certified as edible.
- Do not inject any hard and solid materials inside of the Thick Paste syringe. It may damage the Thick Paste Extruder.
- Do not place your hands in the working area during Thick Paste Extruder work.
- Install the workpieces and tools in the correct places in a safe manner. Avoid colliding with the workpiece with the machine and the Thick Paste. Otherwise, it may be damaged.
- Check that there are no obstacles in the work area before starting work.

16. Machine maintenance and operation

16.1 Basic maintenance

Maintenance work should be carried out regularly to keep the machine in good condition and to achieve a high-quality printed object every time. Some parts of the machine require maintenance before each job and some only periodically. Maintenance is not complicated or time-consuming. During the maintenance process, the machine should be cooled down (preheat only if necessary) and disconnected from the power source (turn on only if necessary). It is recommended to equip yourself with additional protective equipment such as thermal insulation gloves and safety goggles. The machine is supplied with a basic set of tools for maintenance and service.

The following tables summarize the maintenance and repair guidelines for the main components of the machine, the tables are divided by place of inspection, necessary tools, and their frequency.

16.2 General procedures

To Do	Tools	Frequency	Solution
Cleaning the work area from model residues and chips.	• vacuum cleaner, • fast evaporating cleaners (containing alcohol) • compressed air	Before each job	For the safety of the machine, the vacuum cleaner pipe should not be made of metal or it should have a plastic cap. When the worktable is removed from the machine, using the vacuum cleaner pipe with a plastic cap, remove all bits of material and residues from the work area. The side covers can be disassembled for better access. If there is not a lot of dirt, disassemble all covers and use compressed air to blow out the bits of material.
Cleaning the interior of the machine and the power supply from dust	• compressed air	Every 10,000 working hours	To clean the machine electronics from dust, first, disconnect it from the power supply and lay it on its side. Be careful not to damage it. The mainboard and its cooling fan can be blown with spray air through the holes in the bottom cover. The power supply electronics can be blown through the ventilation holes in the power supply case.

16.3 Worktable procedures

To Do	Tools	Frequency	Solution
Cleaning the surface of the glass worktable	• dry cloth • fast evaporating cleaners (containing alcohol) • paper towel • spatula	Every couple of prints	To remove the old adhesive from the surface of the worktable use a piece of damp cloth and a cleaning agent. The worktable should be cold. If there are any plastic parts on the table, remove them with a spatula.
Checking the surface of the glass worktable for any damage	--	Before each job	The surface of the glass sheet should be inspected to ensure there is no chipping or cracking.
Calibrating (leveling) the worktable	--	After changing the toolhead	Auto-calibration or manual calibration must be performed each time the toolhead or nozzle is changed in the toolhead.

16.4 3D printing toolhead procedures

To Do	Tools	Frequency	Solution
Cleaning the nozzle surface from dirt and material residues	• tweezers • wire brush	Before each job	Remove any residual material from the heated nozzle with tweezers. If the leftover material cannot be removed with tweezers, a wire brush can also be used.
Nozzle (interior) cleaning	• drill 0.3mm or 0.4mm	After each material spool	After using the whole spool of material, burnt material may begin to settle on the internal walls of the nozzle. To avoid clogging clean the nozzle with a drill pushing it inside the nozzle from below in a few moves. Then, pass through the nozzle a few centimeters of material.
Nozzle change	• wrench 10 • adjustable wrench 150	--	**The nozzle must be warmed up to 200°C, after heating it up, switch off the machine and remove the toolhead from the X carriage.** The adjustable wrench must be placed on the heating block just above the thermistor (heat sensor) and tightened, with the use of a flat wrench (10) unscrew the nozzle from the heating block taking care not to damage the heating barrier.

PTFE tube change	• wrench 10 • adjustable wrench 150 • Wood screw or drywall screw	Every 750 working hours or after 4kg of material	**The nozzle must be warmed up to 200°C, after heating it up, switch off the machine and remove the toolhead from the X carriage.** The adjustable wrench must be placed on the heating block just above the thermistor (heat sensor) and tightened, with the use of a flat wrench (10) unscrew the nozzle from the heating block taking care not to damage the heating barrier. Replace the old PTFE tube with a standard 2/4 mm. You can use the old tube to cut a new one at the same length. **The new tube must be the same length** (0.1 mm longer than the thermal barrier is acceptable), **otherwise the material might leak out of the heating block.**

16.5 X,Y,Z axes procedures

To Do	Tools	Frequency	Solution
Checking the friction on the X and Y axis carriages	--	Every 400 working hours	**This is done while the machine is switched off**. Manually move the toolhead left/right and the worktable move forwards/backwards to determine if something is hindering their movement.
Cleaning the X and Z axis rails from dirt and lubricating them	• lubricating oil • PTFE grease • dry cloth • paper towel	Every 2500 working hours	**This is done while the machine is switched off**. Apply some grease to a dry cloth or paper towel and spread it on the X and Z-axis rods. For easier access to the Z-axis guides, the side covers can be removed. Check the rods for dirt, remove it with a dry cloth or mechanically. Manually move the toolhead left/right to spread the grease.
Cleaning the Y axis rails from dirt and lubricating them	• lubricating oil • PTFE grease • dry cloth • paper towel	Every 1500 working hours	**This is done while the machine is switched off**. Apply some grease to a dry cloth or paper towel and spread it on Y-axis rails. Manually move the worktable forwards/backwards to spread the grease.
Checking the tension of the timing belts of the X and Y axis	• adjustable wrench 150 • Allen key 2,5 mm	Every 1500 working hours	In the case of loose timing belts, tighten the tension bar screws. For the X-axis belts, evenly tighten the two screws located on the right-hand Z-axis lift. In the case of the Y-axis belts, first, loosen the 4 screws securing the tension bar at the front of the machine. Then, using a tension wrench or simply a M4 bolt with a nut, tighten the Y-axis straps and tighten the tension bar screws.

Checking the mounting screws in the timing pulley for the X and Y axis	• Allen key 2mm	Every 2500 working hours	Tighten all mounting screws in the timing pulley on the X and Y axes
Lubrication the Z axis	• lubricating oil • PTFE grease	Every 1500 working hours	Apply the grease directly to the Z-axis screws just above the Z-axis lifts, and then use the LCD interface to move the Z-axis up and down to distribute the grease through the screws.

- Lack of proper axis maintenance may have an impact on the printed model, the model quality might drop or the axis may get stuck (axis blockage). Regular cleaning and proper lubrication of the axis can bring benefits in the form of saved material or time spent preparing the device for printing.

- Failure to clean the machine may result in unwanted damage or malfunction of the drive components.

17. Spare parts

List of consumable parts

- Teflon tube (PTFE) 2mm/4mm - Single Extruder 1.75 mm and Dual PRO 1.75 toolheads
- Teflon tube (PTFE) 3mm/5 mm - Single Extruder 3.00 mm toolhead
- Knurled roller - Single Extruder 1.75 mm toolhead
- Knurled roller - Dual PRO 1.75 toolhead
- Knurled roller - Single Extruder 3.00 mm toolhead
- Nozzle 0.2, 0.3, 0.4 [mm] - Single Extruder 1.75 mm toolhead
- Nozzle 0.3, 0.4 [mm] - Single Extruder 3.00 mm toolhead
- Nozzle 0.4 [mm] - Dual PRO 1.75 toolhead
- Borosilicate glass - Worktable for 3D printing (heated bed)

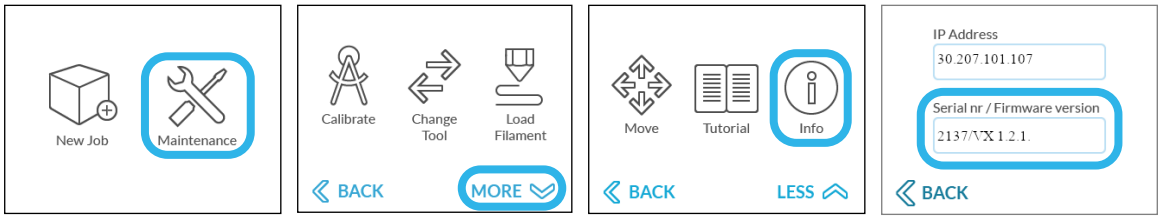
In case of physical damage or failure one of the machine parts, do not install spare parts other than the ones recommended by the Manufacturer. Please contact Technical Support to receive the list of available spare parts or their replacements.

18. Firmware upgrades

18.1 General informations

Once in a while ZMorph releases a firmware update for VX model. The current firmware-version is available to download at the ZMorph Knowledge Base.
http://bit.ly/ZMorph_VX_Firmware.

To check the firmware version of the machine on the main screen choose Maintenance -> More -> Info. Version is displayed in lower box after the slash symbol (/) and contains three digits separated by dots. For example 1337/VX 1.0.1. means that firmware running on the machines is versioned 1.0.1



The information about new firmware release is always published at our website, social media, and via newsletter so be sure to follow these.

Firmware update is available in several language versions (German, English, French, Kazakh, Polish, Spanish). The update pack is an archive file with .zip extension.

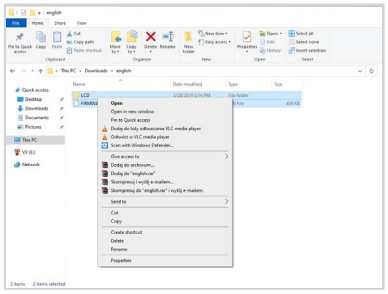
File naming convention is as follows: VX_Firmware_FIRMWARE_VERSION_NUMBER_LANGUAGE.zip e.g. VX_Firmware_1_0_1_German means that it's firmware 1.0.1 with german language.

The archive contains folder named the same as chosen language, inside there is a LCD folder and file named FIRMWARE.bin.

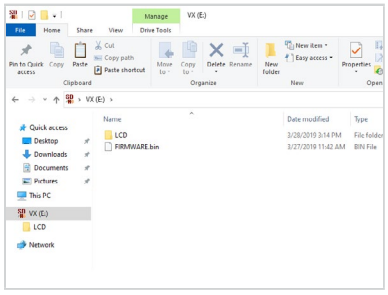
18.2 Updating firmware

Prepare a SD card.

Download the newest firmware archive file with .zip extension from Zmorph Knowledge Base.



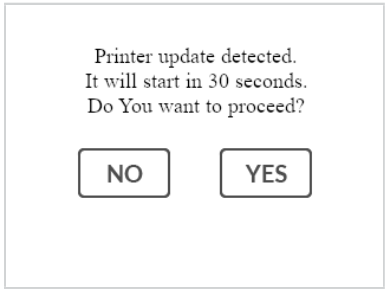
Extract files from from downloaded archive.



From the extracted folder copy the LCD folder and FIRMWARE.bin and place it in the main directory of the SD card.

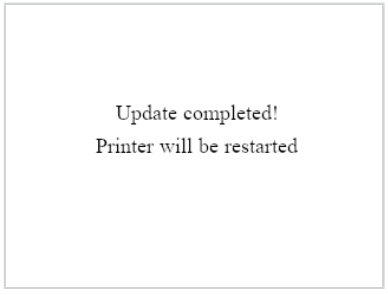
Make sure that machine is powered on. If not, turn it on by pushing the power button.

Insert the SD card into the slot located next to the LCD screen.

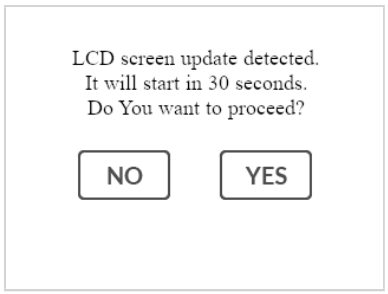


Message about firmware update detection should appear and the 30 seconds countdown should start. After this time the update will begin automatically. Choose "Yes" to proceed and skip countdown.

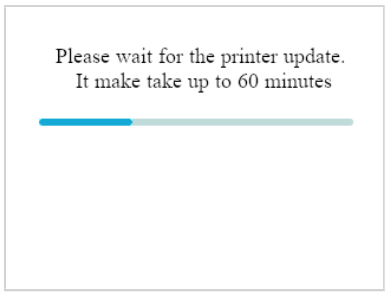
The machine will start updating the firmware. You must not remove the SD card, turn off or reset the printer during this process.



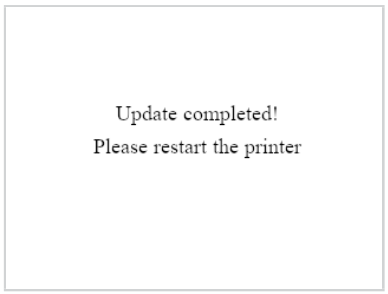
After update finishes, the machine should restart itself.



Message about the screen update should appear and the 30 seconds countdown should start. After this time the update will begin automatically. Choose "Yes" to proceed and skip countdown.



he machine will start updating the LCD screens. You must not remove the SD card, turn off or reset the printer during this process. This process may take up to 60 minutes, the progress bar will inform you about update status.



After the successful update the proper message will be displayed. Restart the printer. The machine is fully updated.

19. Help and support

19.1 Support request

In concern for ZMorph VX customers, our company provides technical support to solve the problems. In case of problems with the machine or toolhead, review the trouble-shooting suggestions in this instruction. If the information provided with the instruction is insufficient you should contact your local supplier from which you bought the machine or contact directly ZMorph Technical Support by submitting the request on the website:

https://support.zmorph3d.com/hc/en-us/requests/new

Before you submit the request please prepare all of the required information:

- Machine serial number.
- Firmware version of the machine.
- Error name if it occur in front LCD screen.
- Video or photo which shows the problem is not required but it will help us to solve your problem faster.
- If you have a print-quality problem, please provide information like: type of material, material producent, used toolhead, attached .gcode file, slicer you used for preparing the .gcode file.

19.2 Troubleshooting

Here is the list of the most common problems:

Symptom	Cause	Solution
Filament is not going through the nozzle.	The material is tangled The material is defective The nozzle is clogged The material is blocked inside the extruder	Check if the material is not tangled and the spool is properly installed. • Check if the material is properly inserted inside the tool. • Check if the used material is not defecti-ve (there are no bubbles, the diameter is constant etc.). • Check if the end of the material is cut at a right angle • Contact with Technical Support

The print doesn't stick to the worktable (warpinig) The print is warping.	Work table is not clean. There is no adhesive. First layer is too high above the work table. The temperature of the work table is too low.	• Check is the work table cleaned. • Make sure there is adhesive agent applied. • Perform new autocalibration. • Restore factory default, and repeat the calibration process. • Use 1-point manual calibration to set proper Z0 value • Make sure that the work table has a proper temperature.
The print is cracked.	No covers attached. Improper print temperature.	• Make sure that covers are attached on the machine. • Make sure that print temperature is proper according to material producent specification. • Make sure that the .gcode file is designed correctly .
The print is melted.	The print temperature is too high. There is no cooling fan attached.	• Make sure that the cooling fan is attached. • Make sure that the print temperature is proper according to material producent specification. • Make sure that the .gcode file is designed correctly. • Check if the thermistor is correctly installed inside the heating block.
No connection via USB.	PC is not detecting the machine.	• Check the USB cable with other device. • Push the red reset button in front of the machine. • Check for drivers update.

In case when an error occurs while the machine is working, an error message will be displayed on the machine LCD screen. The following table explains the error meanings, provide probable cause of the error and suggested solutions.

Error message	Cause	Solutions
External SD Card unmounted.	• SD card has lost the connection. • No reading from external SD Card.	• Reconnect the SD Card. • Format external SD Card (FAT 32) • Check the connection with other SD Card. • Contact with Technical Support.
TouchProbe cable not found. Please, connect B cable.	• The B cable is not connected • The B cable is not detected	• Check the connection of the B cable, reconnect the B cable. • Contact with Technical Support.
TouchProbe problem detected. Please, check A cable.	• The A cable is not connected • The Tensometer is not detected	• Check the connection of the A cable, reconnect the A cable. • Connect another extruder to check the connection. • Contact with Technical Support.

Internal electronics is too hot. Please check the fan in the bottom of the machine.	• Internal electronic has too high temperature, bottom fan probably not working	• Check the fan on the bottom of the machine. • If fan is not working please, contact with Technical Support.
Heating failure. Please, restart the machine.	• Error of the thermistor temperature reading	• Contact with Technical Support. • Check is the thermistor has no short circuit with the machine frame. • Check the current temperature reading.
Axes blockade.	• One of the axes got blocked by: • Rest of the material. • Toolhead hit the print. • CNC mill stuck in milled material	• Reset the machine. • Remove the elements which cause the blockade. • Check the X and Y axis work by hand. • Make sure that nothing is blocking the axes before new job.
Calibration result inaccurate.	• Inaccurate result of the auto calibration.	• Check if the work table is aligned correctly. • Check if the X-axis is leveled correctly • Check the position of the Z-axis sensor. • Restore the machine to factory default. • Contact with Technical Support.
Config file does not exist.	• Config file is missing. • No reading from internal uSD Card. • Internal uSD Card is unplugged or damaged.	• Check the uSD Card content. • Check the uSD Card connection to mainboard. • Visit knowledge base to download new config file. • Contact with Technical Support.
Config file corrupted.	• Config file is corrupted.	• Visit knowledge base to download new config file. • Contact with Technical Support.

In case of inappropriate machine behavior, take every precaution and disconnect the machine from the power source and immediately contact with Technical Support.

https://support.zmorph3d.com/hc/en-us/requests/new

19.3 Handy resources

- **ZMorph Academy** https://academy.zmorph3d.com/
  ZMorph Academy is a comprehensive online platform for ZMorph VX users. With almost 100 courses full of videos, pictures, and exercises, ZMorph Academy is designed to create and build skills with 3D printing, CNC milling, and laser engraving. After finishing, the user will be able to make custom working PCBs and other complex projects.

- **ZMorph Knowledge Base** https://support.zmorph3d.com/
  Knowledge Base gathers all technical wisdom of ZMorph products, like information about printers maintenance and quick tips on fabrication methods.

- **Voxelizer Software** https://voxelizer.com/
  ZMorph's original Voxelizer software is the intelligence behind the machine. It allows you to control all fabrication methods of ZMorph VX and gives you access to the most advanced 3D printing capabilities.

- **Zmorph Blog** https://blog.zmorph3d.com/
  ZMorph Blog presents news and stories from the ZMorph world: articles on all fabrication methods, use cases, special offers and many others.

- **ZMorph Materials Library** https://zmorph3d.com/product/materials
  ZMorph Materials Library is an essential resource that gives a comprehensive outlook on a wide range of manufacturing materials supported by ZMorph VX Multitool 3D Printers. The document provides detailed information about almost 50 materials including easy-to-read data, technical information, working parameters, features, and applications.

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