

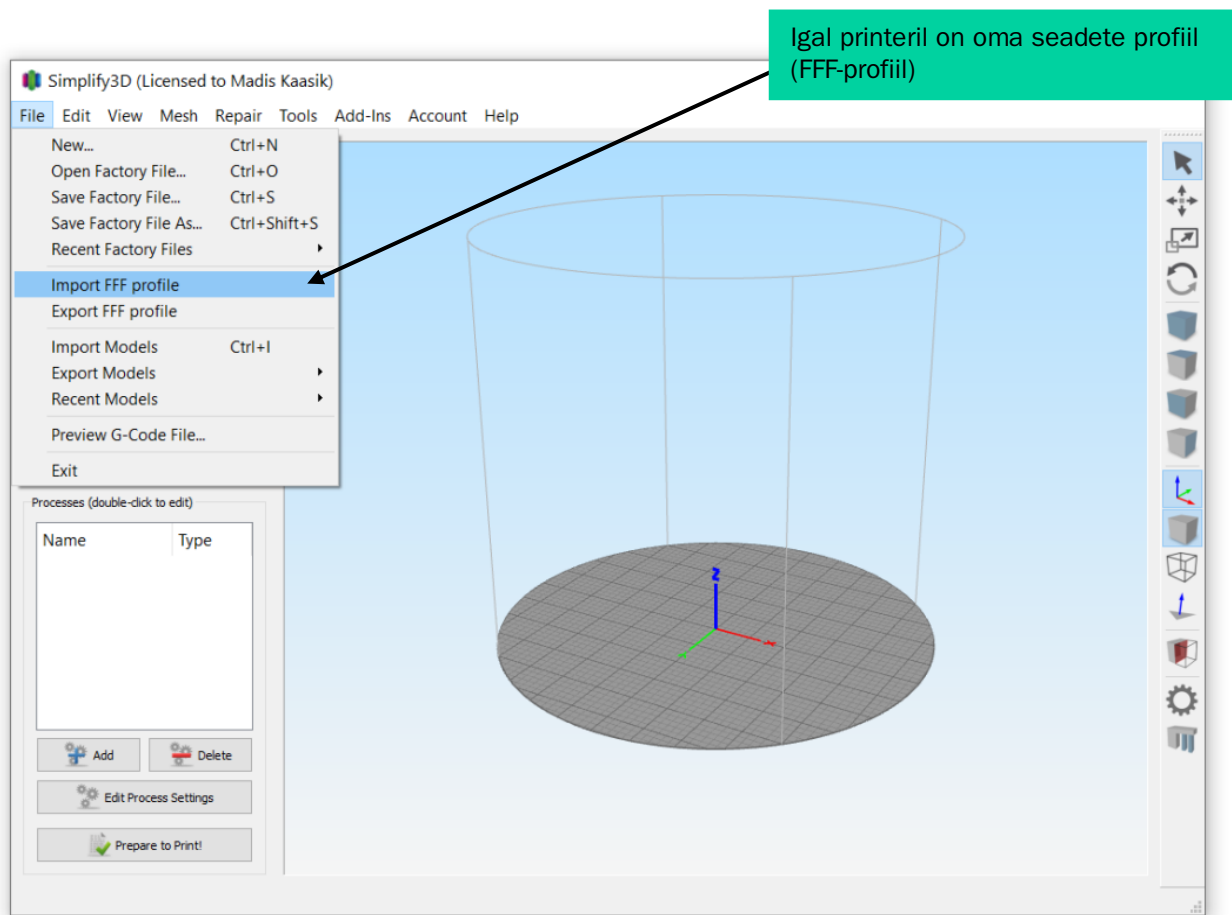
EKA

**Cartesiuse 3D-lameprinteri
kasutusjuhend Simplify3D jaoks**

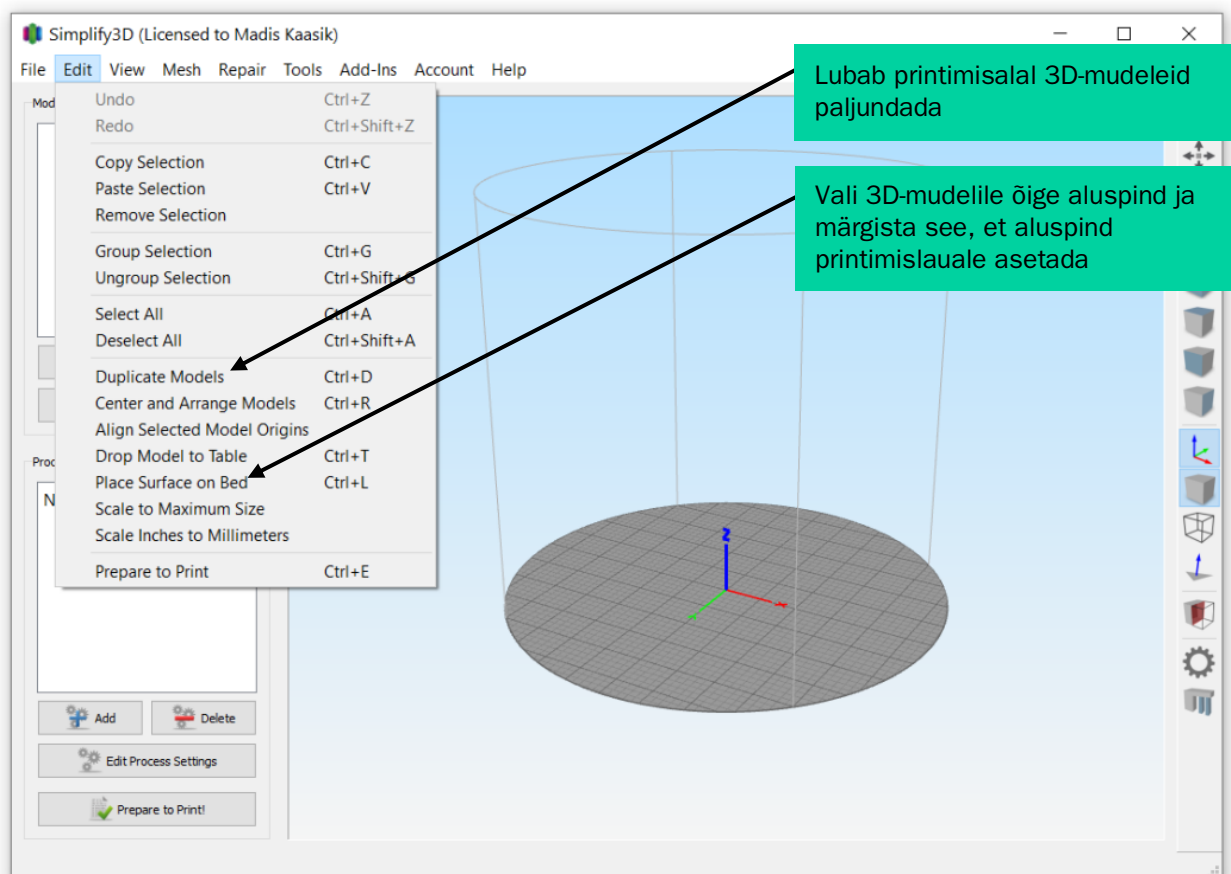
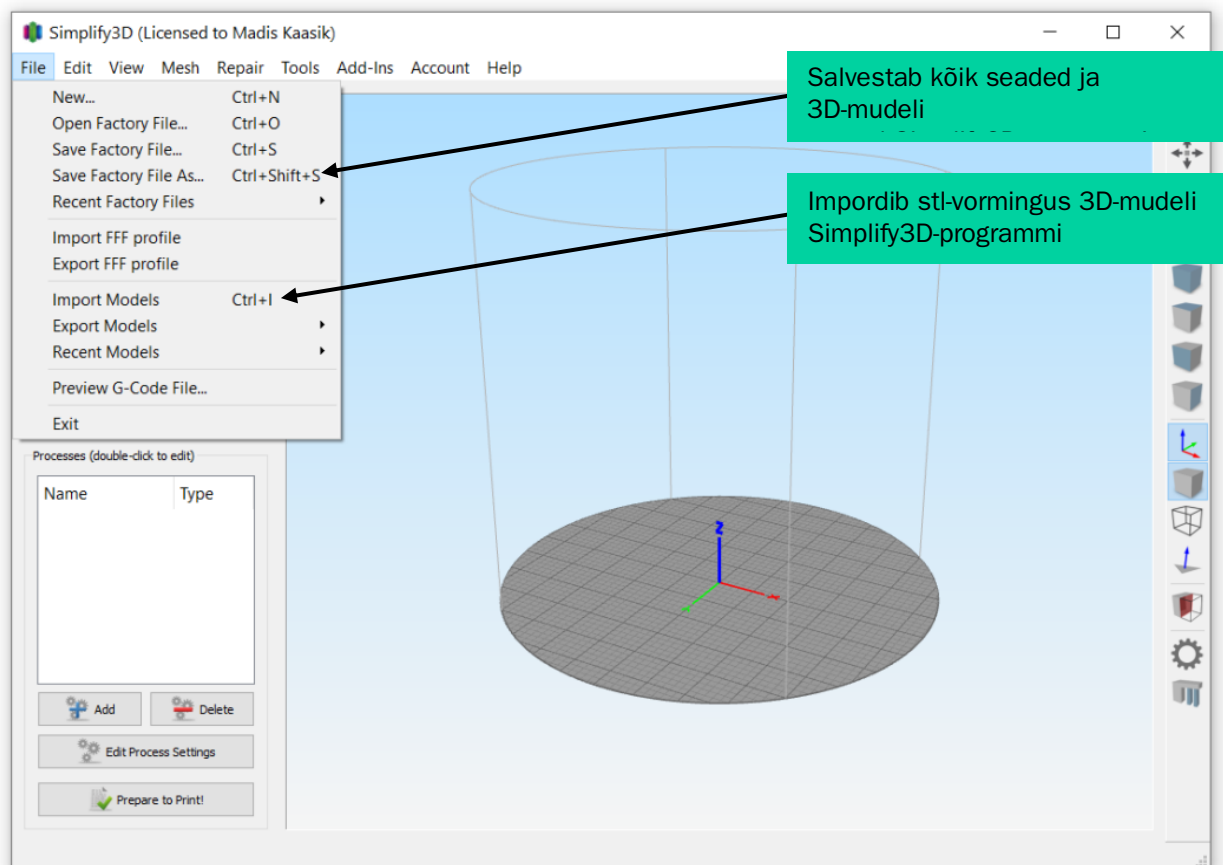
Dokumendis käsitletakse alljärgnevat:

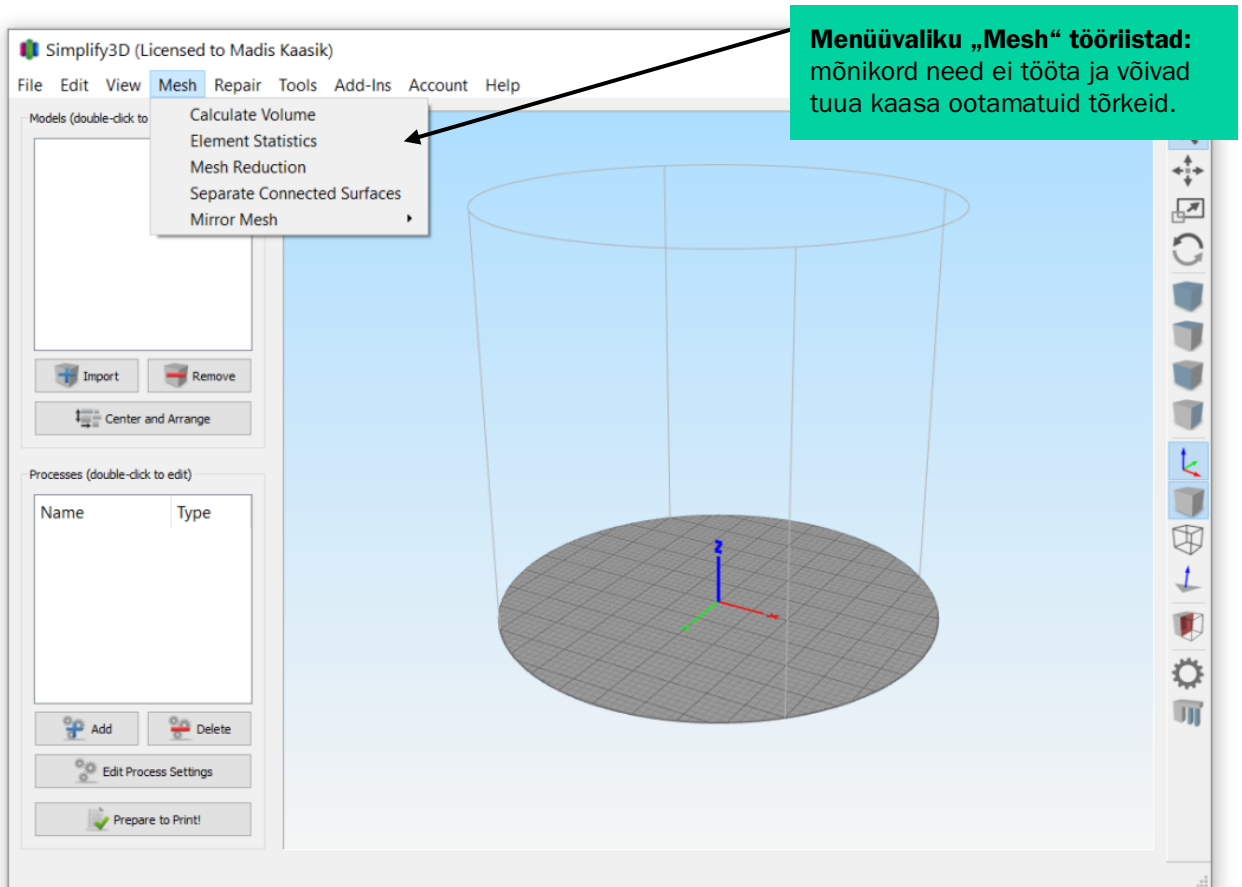
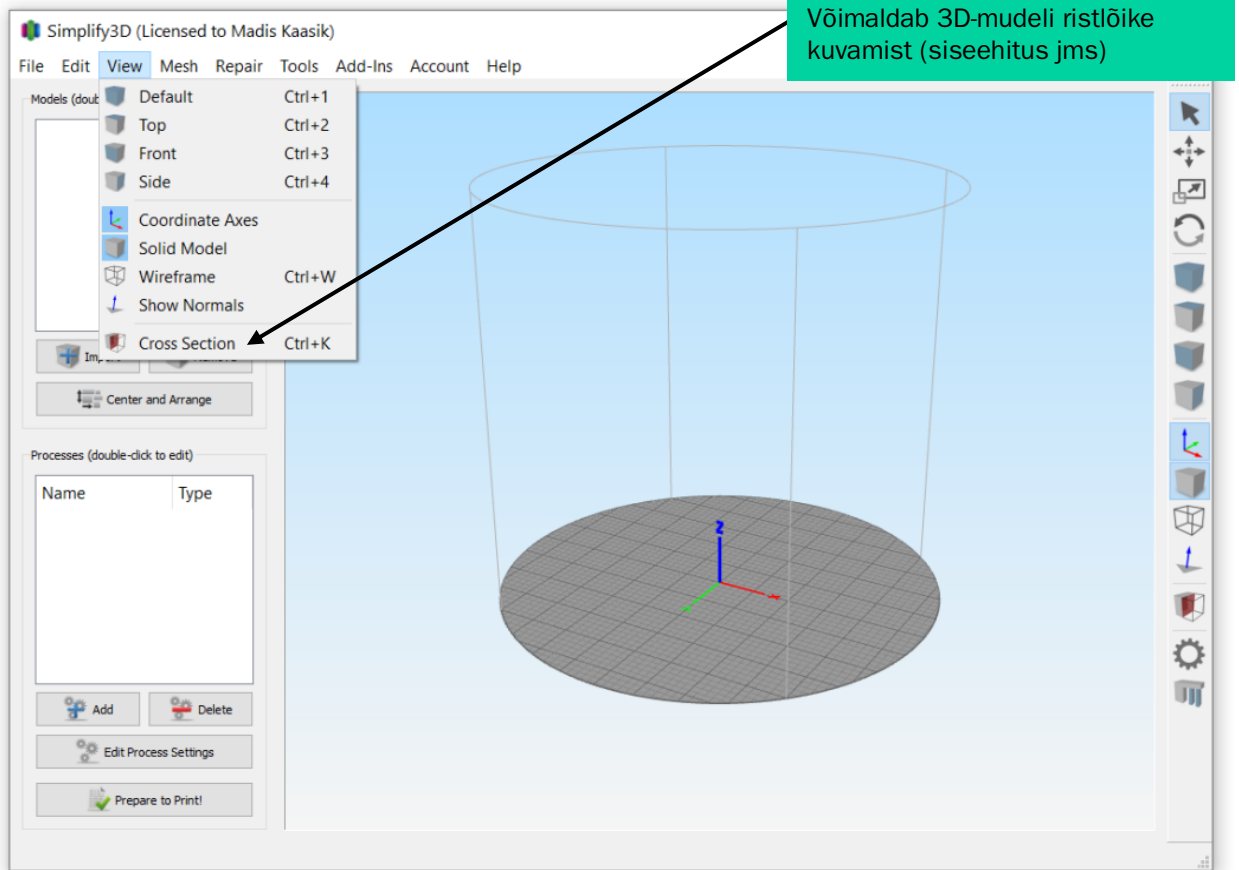
- 1.** Kuidas uut printerit esimest korda häälestada (lk 3)
- 2.** Simplify3D enim kasutatavad nupud ja sakid (lk 4–8)
- 3.** Punkthaaval printimisjuhiseid (lk 9–23);
kui prindid G-koodide importimisega, mine kohe lk-le 23)
- 4.** Seadme juhtpaneeli juhiseid (lk 24–26)

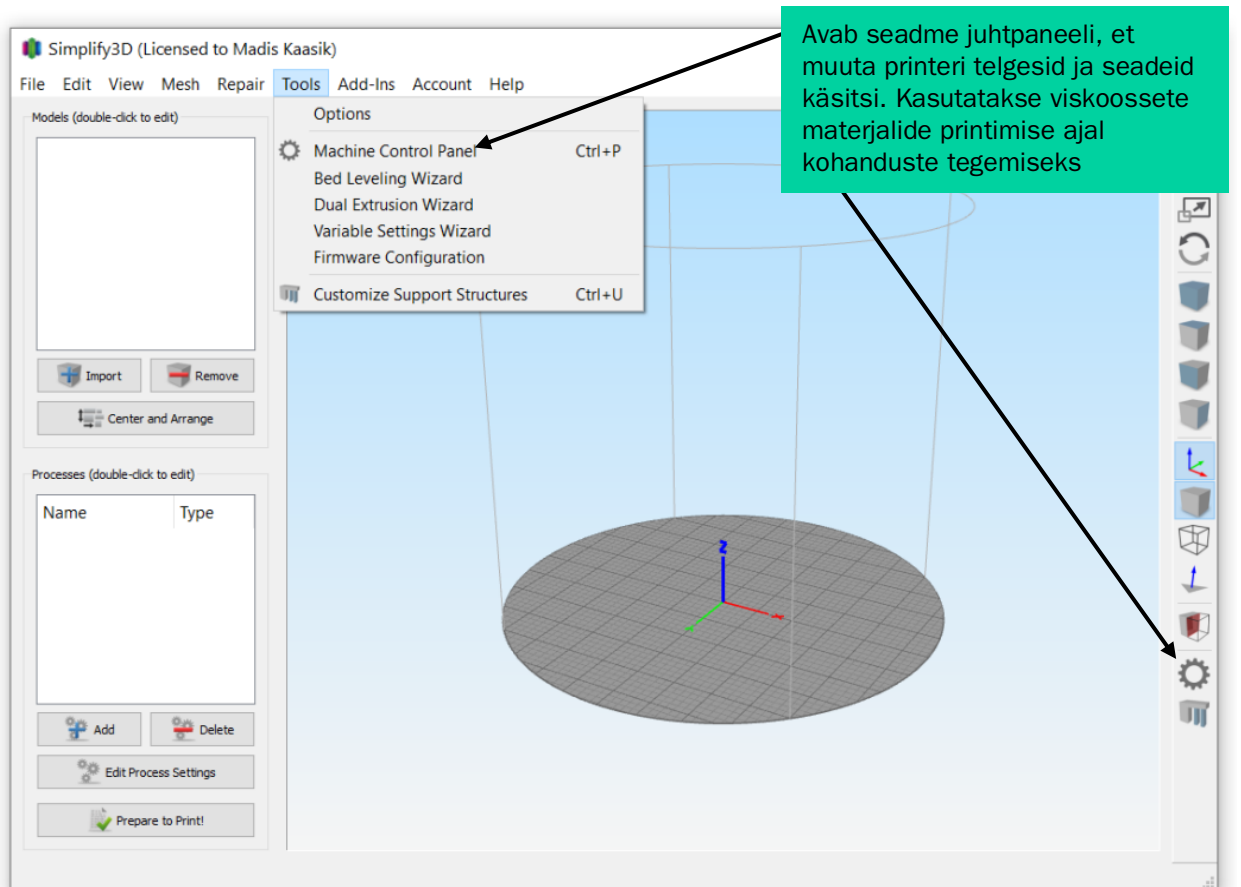
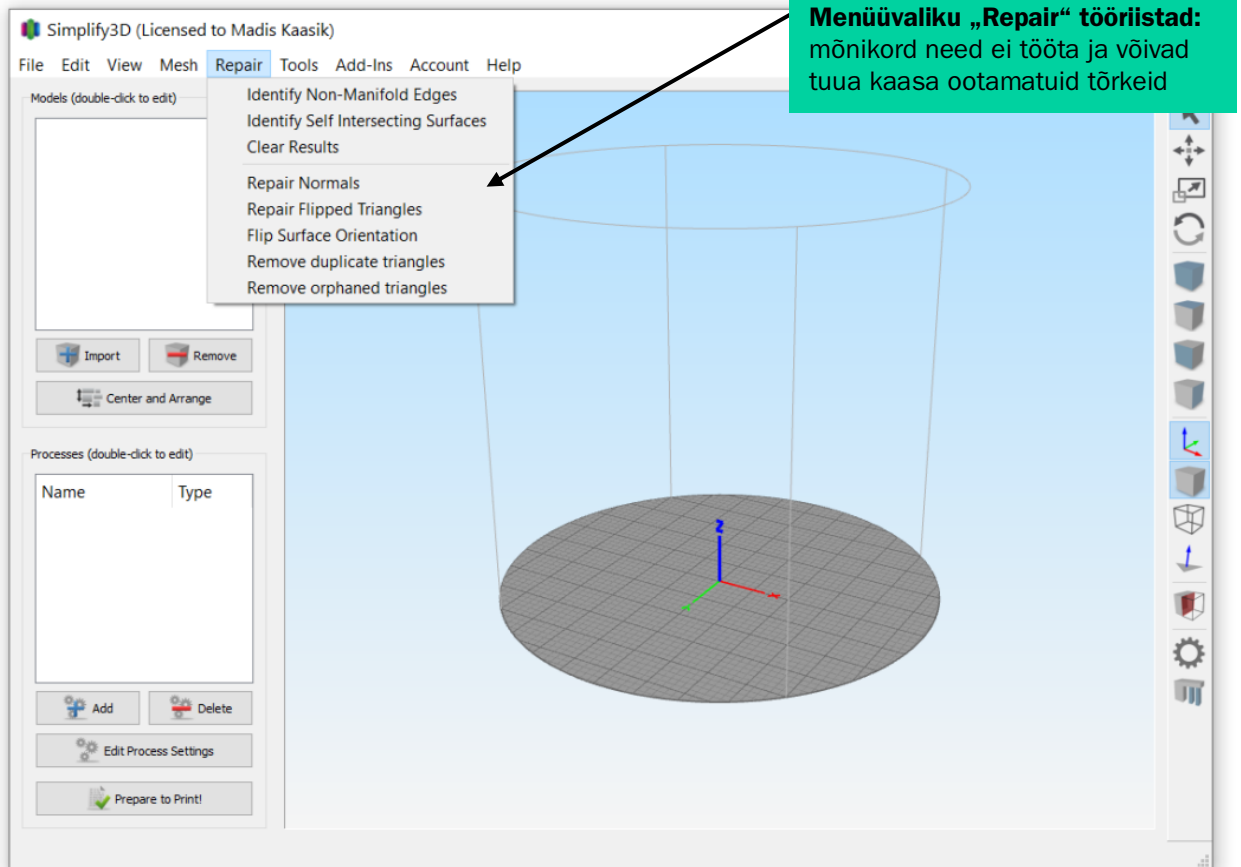
1. Kuidas uut printerit esimest korda häälestada

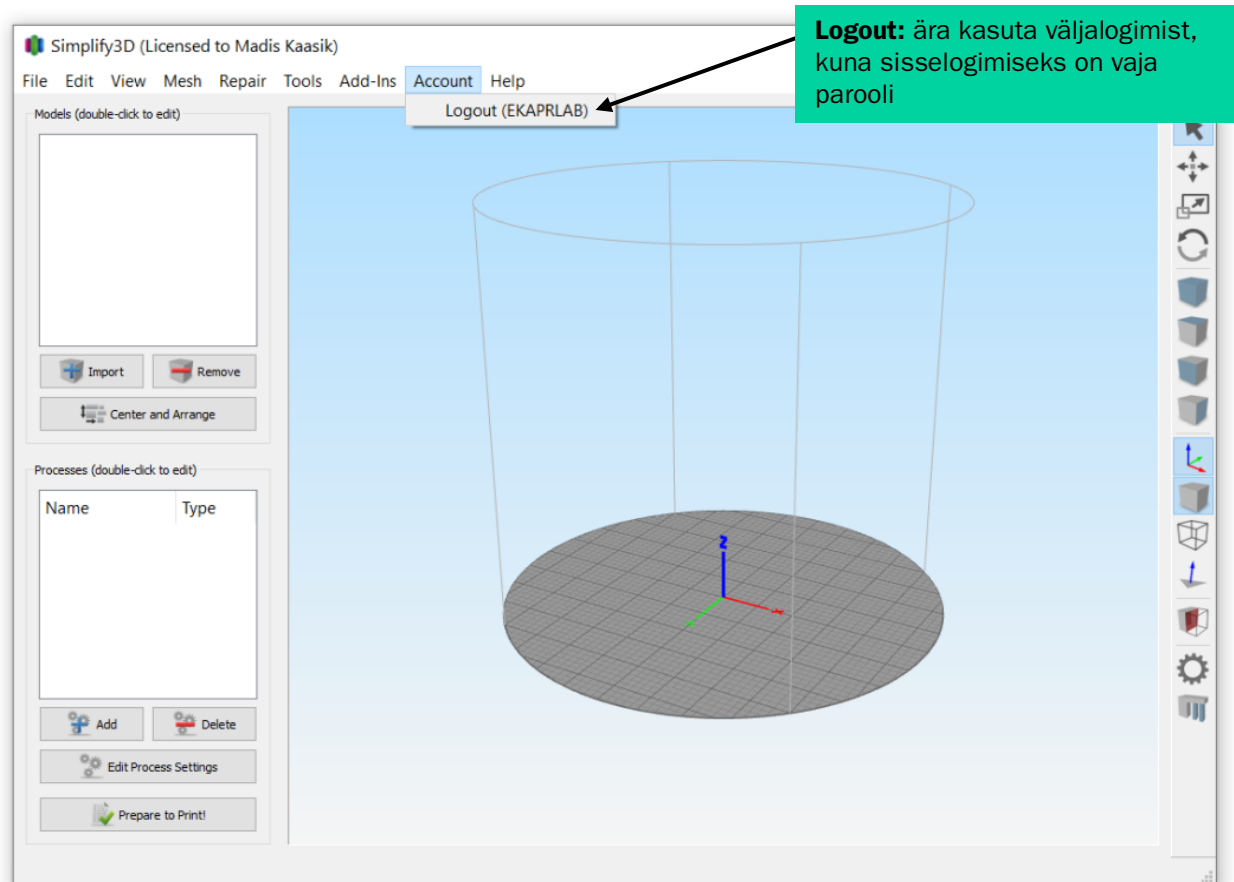
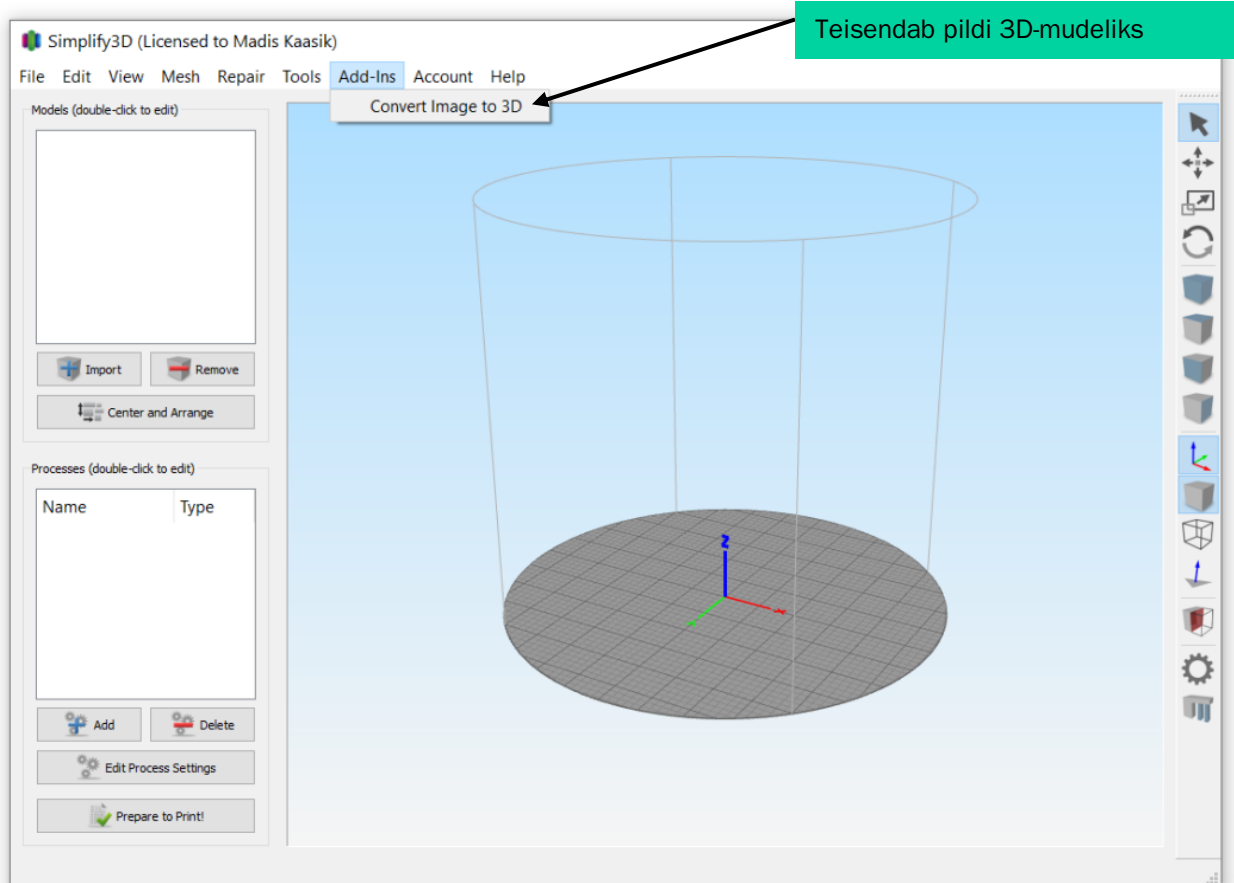


2. Simplify3D enim kasutatavad nupud ja sakid

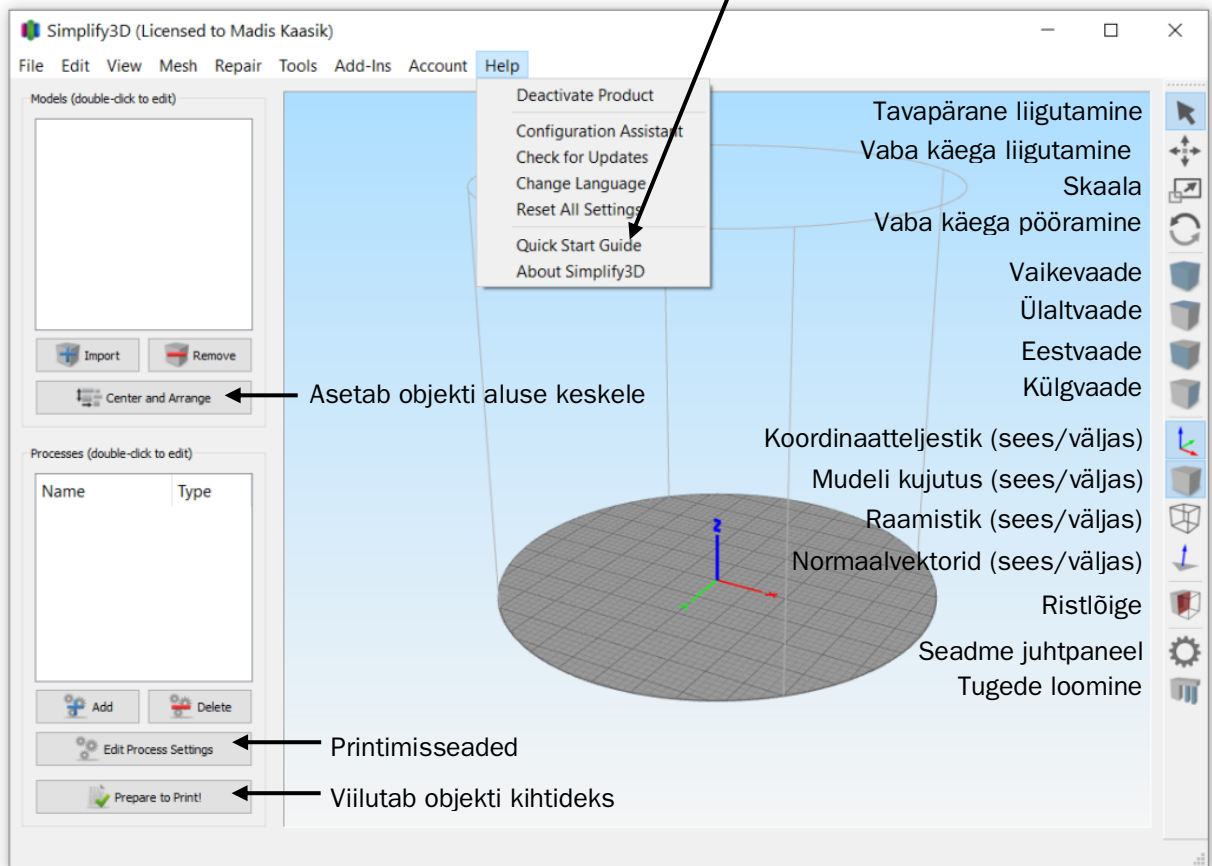








Kiirjuhend, kust leiab lisainfot



3. Punkthaaval printimisjuhised (kui prindid G-koodide importimisega, jäta vahele ja liigu kohe lk-le 24)

Punkt 01: impordi stl-vormingus fail

Punkt 02: tee mudeli peal topeltklõps, et avada seadete paneel (saad muuta orientatsiooni, skaalat ja asukohta)

Punkt 03: ava printimisseaded

The screenshot shows the Simplify3D software interface. On the left, the 'Models' panel contains a list with 'Sample - Vase - STL...' and buttons for 'Import', 'Remove', and 'Center and Arrange'. Below it is the 'Processes' panel with a table for 'Name' and 'Type', and buttons for 'Add', 'Delete', 'Edit Process Settings', and 'Prepare to Print!'. The central 3D view shows a yellow vase model on a grey grid. On the right, a settings panel is open, enclosed in a red dashed box. It includes sections for 'Change Position' (X Offset: -5,44 mm, Y Offset: 1,74 mm, Z Offset: -0,30 mm), 'Change Scaling' (Size in mm and Scale in % for X, Y, Z axes, with 'Uniform Scaling' checked), and 'Change Rotation' (X, Y, Z Rotation in degrees). A 'Done' button is at the bottom of the settings panel.

Punkt 04: vali rippmenüüst õige printer

Algne (**original**) tähendab, et see printeriprofiil töötab printeriseadetega kõige paremini

Punkt 05: salvesta uus „algne“ printeriprofiil enda ja oma projekti nimega

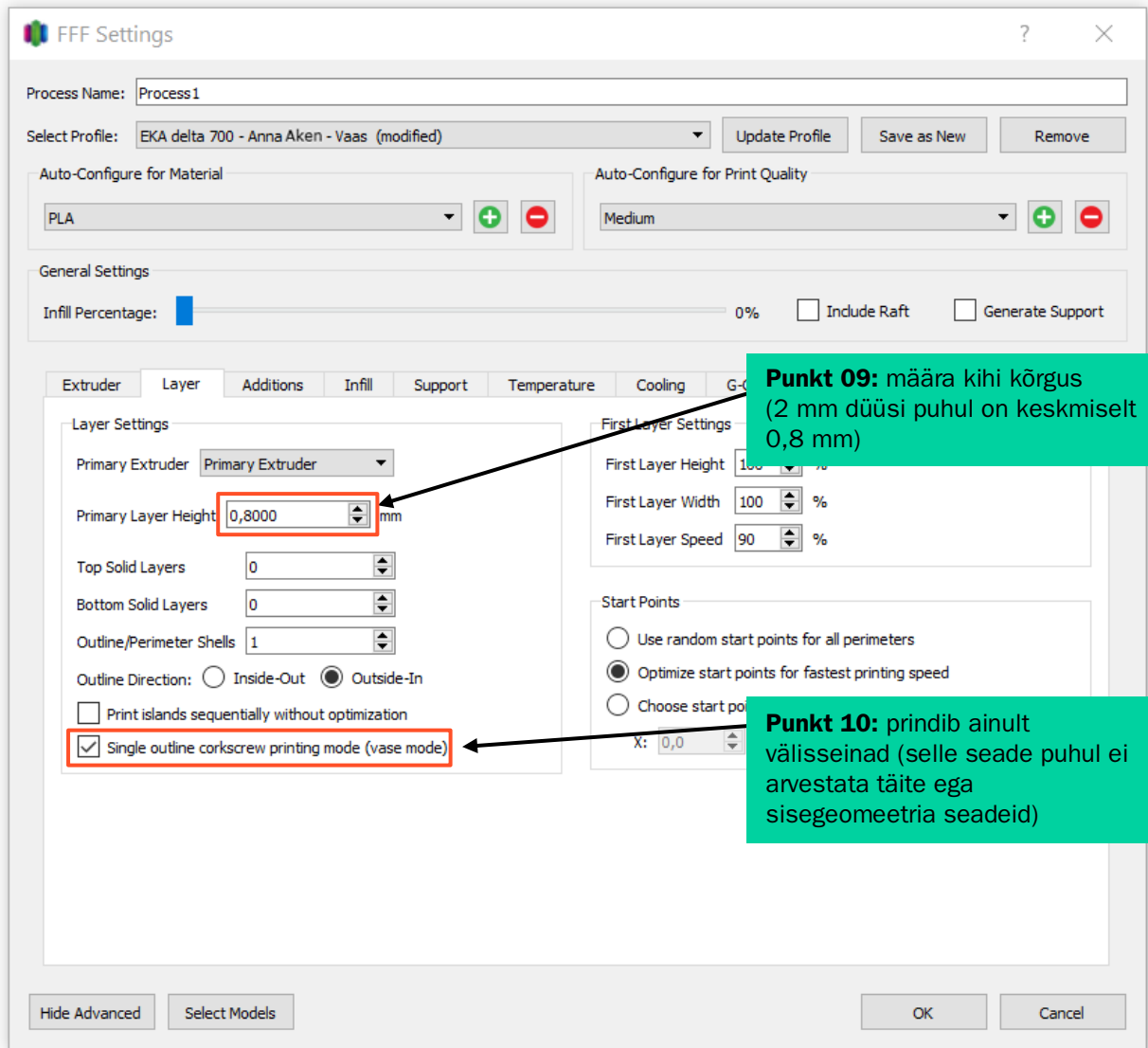
The screenshot shows the FFF Settings application window. The 'Process Name' is 'Process 1'. The 'Select Profile' dropdown is set to 'EKA delta 700 - original - 05082020'. The 'Auto-Configure' dropdown is also set to 'EKA delta 700 - original - 05082020'. The material is 'PLA' and the print quality is 'Medium'. The 'General Settings' section shows 'Infill Percentage' at 100%. The 'Primary Extruder Toolhead' section is expanded, showing 'Extruder Toolhead Index' as 'Tool 0', 'Nozzle Diameter' as '6,00 mm', 'Extrusion Multiplier' as '0,90', and 'Extrusion Width' as 'Manual 0,40'. The 'Ooze Control' section has 'Retraction' checked with a distance of '1,00', 'Coast at End' unchecked with a distance of '0,20', and 'Wipe Nozzle' unchecked with a distance of '5,00'. Two 'Profile Name' dialog boxes are overlaid on the main window. The first dialog box has the text 'EKA delta 700 - original - 05082020' in the input field, with an orange callout box pointing to it that says 'Kustuta see osa'. The second dialog box has the text 'EKA delta 700 - Anna Aken - Vaas' in the input field, with an orange callout box pointing to it that says 'Lisa enda nimi ja projekti nimi'. The main window has 'OK' and 'Cancel' buttons at the bottom right.

The image shows a screenshot of the 'FFF Settings' dialog box. At the top, there is a 'Process Name' field with 'Process1' and a 'Select Profile' dropdown menu showing 'EKA delta 700 - Anna Aken - Vaas'. Below this are two 'Auto-Configure for' sections: 'Material' (set to 'PLA') and 'Print Quality' (set to 'Medium'). The 'General Settings' section includes an 'Infill Percentage' slider at 10%, and checkboxes for 'Include Raft' and 'Generate Support'. The main area is divided into tabs: 'Extruder', 'Layer', 'Additions', 'Infill', 'Support', 'Temperature', 'Cooling', 'G-Code', 'Scripts', 'Speeds', 'Other', and 'Advanced'. The 'Extruder' tab is active, showing an 'Extruder List' on the left with 'Primary Extruder' selected. The main settings for the 'Primary Extruder Toolhead' are shown in the 'Overview' section: 'Extruder Toolhead Index' is 'Tool 0', 'Nozzle Diameter' is '2,00 mm' (highlighted with a red box), 'Extrusion Multiplier' is '0,90', and 'Extrusion Width' is set to 'Auto'. The 'Ooze Control' section has several checkboxes and numerical values: 'Retraction' (unchecked), 'Retraction Distance' (1,00), 'Extra Restart Distance' (0,00), 'Retraction Vertical Lift' (0,00), 'Retraction Speed' (1800,0), 'Coast at End' (unchecked), 'Coasting Distance' (0,20), and 'Wipe Nozzle' (unchecked), 'Wipe Distance' (5,00). At the bottom, there are buttons for 'Hide Advanced', 'Select Models', 'OK', and 'Cancel'. Three green callout boxes with arrows point to specific settings: 'Punkt 06' points to the 'Select Profile' dropdown, 'Punkt 07' points to the 'Nozzle Diameter' field, and 'Punkt 08' points to the 'Auto' radio button for 'Extrusion Width'.

Punkt 06: vaata, et valitud oleks uus profiil, mille just salvestasid

Punkt 07: määra düüsi diameeter

Punkt 08: automaatne laius ehk „Auto“ (käsitsi tuleb määrata puutuvate printimise joonte puhul)



FFF Settings

Process Name: Process1

Select Profile: EKA delta 700 - Anna Aken - Vaas (modified)

Auto-Configure for Material: PLA

Auto-Configure for Print Quality: Medium

General Settings

Infill Percentage: 0% Include Raft Generate Support

Extruder Layer Additions Infill Support Temperature Cooling G-Code Scripts Speeds Other

Use Skirt/Brim

Skirt Extruder: Primary Extruder

Skirt Layers: 1

Skirt Offset from Part: 4,00 mm

Skirt Outlines: 2

Use Raft

Raft Extruder: Primary Extruder

Raft Top Layers: 3

Raft Base Layers: 2

Raft Offset from Part: 3,00 mm

Separation Distance: 0,14 mm

Raft Top Infill: 100 %

Above Raft Speed: 30 %

Use Prime Pillar

Prime Pillar Extruder: All Extruders

Pillar Width: 12,00 mm

Pillar Location: North-West

Speed Multiplier: 100 %

Use Ooze Shield

Ooze Shield Extruder: All Extruders

Offset from Part: 2,00 mm

Ooze Shield Outlines: 1

Sidewall Shape: Waterfall

Sidewall Angle Change: 30 deg

Speed Multiplier: 100 %

Hide Advanced Select Models OK Cancel

Punkt 11: VALIKULINE: printer teeb enne objekti printimist selle ümber ühe ringi. Kasulik valik, et materjal korralikult voolama saada

FFF Settings

Process Name:

Select Profile:

Auto-Configure for Material:

Auto-Configure for Print Quality:

General Settings

Infill Percentage: 0% Include Raft Generate Support

Extruder Layer Additions **Infill** Support Temperature Cooling G-Code Scripts Speeds Other

General

Infill Extruder:

Internal Fill Pattern:

External Fill Pattern:

Interior Fill Percentage: %

Outline Overlap: %

Infill Extrusion Width: %

Minimum Infill Length: mm

Combine Infill Every: layers

Include solid diaphragm every layers

Internal Infill Angle Offsets

deg

Print every infill angle on each layer

External Infill Angle Offsets

deg

Hide Advanced Select Models OK Cancel

Punkt 12: VALIKULINE:
täitmisfunktsiooni ei kasutata tavaliselt.
Seda võib kasutada objekti sisse
tugistruktuuride printimiseks

FFF Settings

Process Name: Process1

Select Profile: EKA delta 700 - Anna Aken - Vaas (modified) [Update Profile] [Save as New] [Remove]

Auto-Configure for Material: PLA [+] [-]

Auto-Configure for Print Quality: Medium [+] [-]

General Settings: Infill Percentage: 0% [Include Raft] [Generate Support]

Extruder | Layer | Additions | Infill | **Support** | Temperature | Cooling | G-Code | Scripts | Speeds | Other

Support Material Generation

- Generate Support Material
- Support Extruder: Primary Extruder
- Support Infill Percentage: 30 %
- Extra Inflation Distance: 0,00 mm
- Support Base Layers: 0
- Combine Support Every: 1 layers

Dense Support

- Dense Support Extruder: Primary Extruder
- Dense Support Layers: 0
- Dense Infill Percentage: 70 %

Automatic Placement

Only used if manual support is not defined

- Support Type: Normal
- Support Pillar Resolution: 4,00 mm
- Max Overhang Angle: 45 deg

Separation From Part

- Horizontal Offset From Part: 0,30 mm
- Upper Vertical Separation Layers: 1
- Lower Vertical Separation Layers: 1

Support Infill Angles

- 0 deg
- [Add Angle]
- [Remove Angle]

[Hide Advanced] [Select Models] [OK] [Cancel]

Punkt 13: VALIKULINE:
toefunktsiooni ei kasutata
tavaliselt

FFF Settings

Process Name:

Select Profile:

Auto-Configure for Material:

Auto-Configure for Print Quality:

General Settings

Infill Percentage: Include Raft Generate Support

Extruder Layer Additions Infill Support **Temperature** Cooling G-Code Scripts Speeds Other

Temperature Controller List (click item to edit settings)

Primary Extruder

Primary Extruder Temperature

Overview

Temperature Identifier:

Temperature Controller Type: Extruder Heated build platform

Wait for temperature controller to stabilize before beginning build

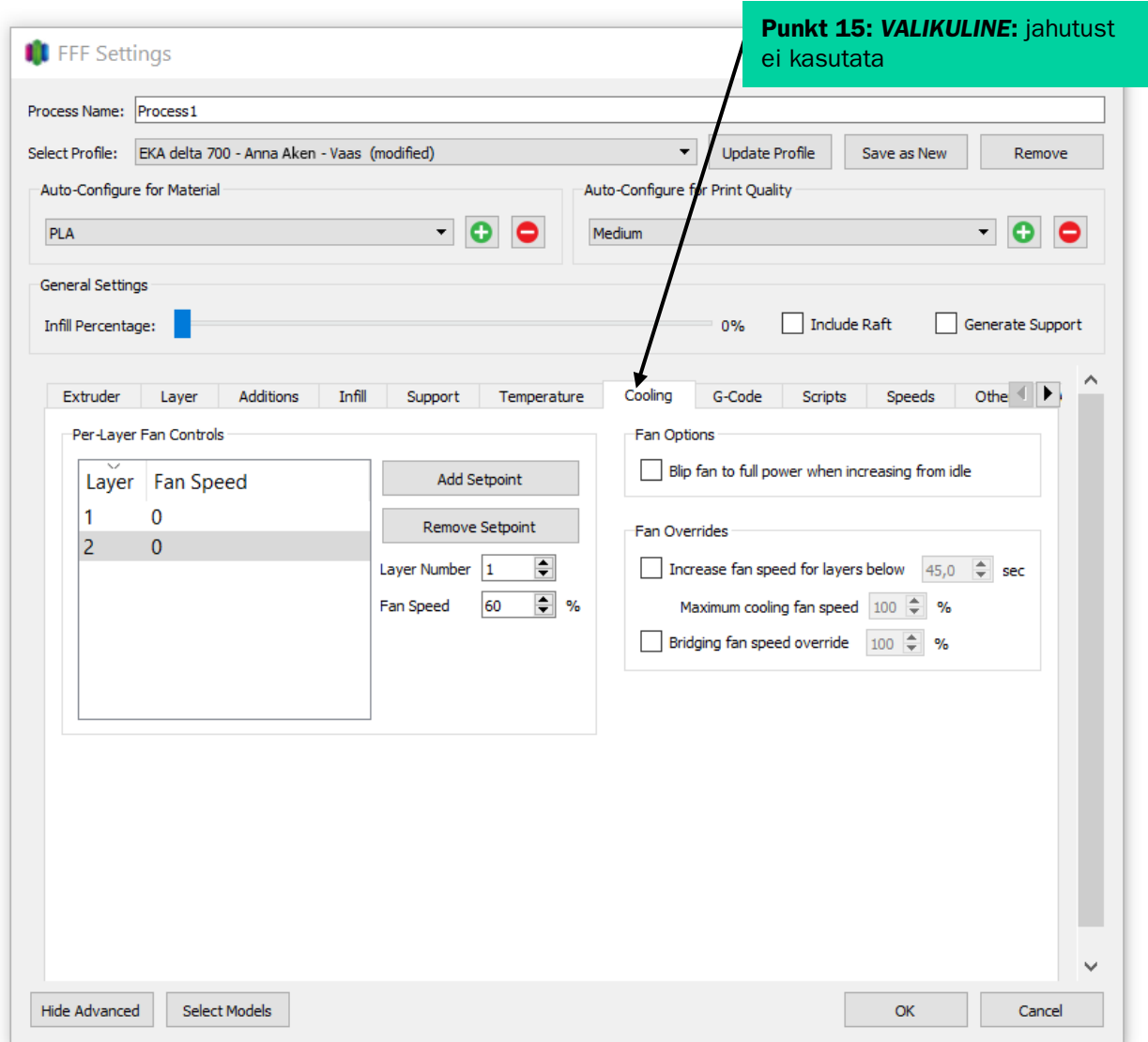
Per-Layer Temperature Setpoints

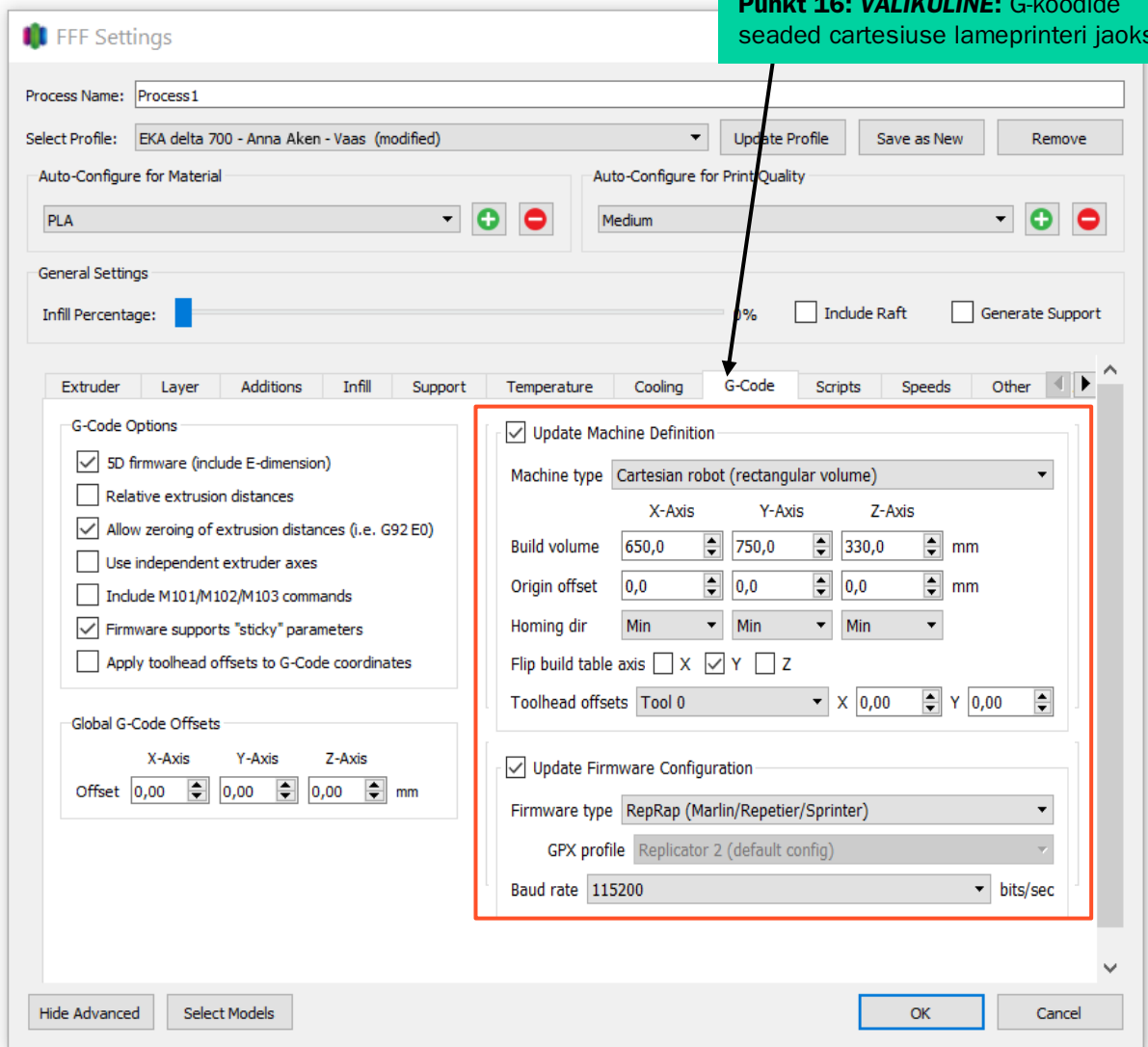
Layer	Temperature
1	20

Layer Number:

Temperature: °C

Punkt 14: VALIKULINE:
temperatuur tuleks seadistada
20 °C peale





Punkt 17: VALIKULINE:
genereeritud G-koodi algusesse ja lõppu on võimalik printerile erikäsklusi lisada

The image shows the 'FFF Settings' dialog box with the 'G-Code' tab selected. The 'Starting Script' section is active, showing a text area with the content 'G28 ; home all axes'. A red callout box with white text points to this section, stating: 'Punkt 17: VALIKULINE: genereeritud G-koodi algusesse ja lõppu on võimalik printerile erikäsklusi lisada'. The dialog box includes various settings such as 'Process Name', 'Select Profile', 'Auto-Configure for Material', 'General Settings', and 'Post Processing'. The 'G-Code' tab is highlighted, and the 'Starting Script' sub-tab is also highlighted. The text area for the starting script contains the G-code 'G28 ; home all axes'. Below the text area, there are tabs for 'Layer Change Script', 'Retraction Script', 'Tool Change Script', and 'Ending Script'. The 'Post Processing' section includes an 'Export file format' dropdown set to 'Standard G-Code (.gcode)', a checkbox for 'Add celebration at end of build (for .x3g files only)', and a 'Random Song' dropdown. At the bottom, there are buttons for 'Hide Advanced', 'Select Models', 'OK', and 'Cancel'.

Punkt 18 VALIKULINE: kogu printimise ajal on soovitatav hoida ühtlast kiirust

FFF Settings

Process Name: Process 1

Select Profile: EKA delta 700 - Anna Aken - Vaas (modified) [Update Profile] [Save as New] [Remove]

Auto-Configure for Material: PLA [+] [-] Auto-Configure for Print Quality: Medium [+] [-]

General Settings

Infill Percentage: 0% [Include Raft] [Generate Support]

Extruder Layer Additions Infill Support Temperature Cooling G-Code Scripts **Speeds** Other

Speeds

Default Printing Speed: 3000,0 mm/min

Outline Underspeed: 100 %

Solid Infill Underspeed: 100 %

Support Structure Underspeed: 100 %

X/Y Axis Movement Speed: 3000,0 mm/min

Z Axis Movement Speed: 3000,0 mm/min

Speed Overrides

Adjust printing speed for layers below 15,0 sec

Allow speed reductions down to 20 %

[Hide Advanced] [Select Models] [OK] [Cancel]

FFF Settings

Process Name: Process1

Select Profile: EKA delta 700 - Anna Aken - Vaas (modified)

Auto-Configure for Material: PLA

Auto-Configure: Medium

General Settings

Infill Percentage: 0% Include Raft Generate Support

Extruder Layer Additions Infill Support Temperature Cooling G-Code Scripts Speeds **Other**

Bridging

Unsupported area threshold 50,0 sq mm

Extra inflation distance 0,00 mm

Bridging extrusion multiplier 100 %

Bridging speed multiplier 100 %

Use fixed bridging infill angle 0 deg

Apply bridging settings to perimeters

Dimensional Adjustments

Horizontal size compensation 0,00 mm

Filament Properties

Filament Toolhead Index Tool 0

Filament diameter 2,0000 mm

Filament price 1,00 price/kg

Filament density 1,70 grams/cm³

Tool Change Retraction

Tool change retraction distance 12,00 mm

Tool change extra restart distance -0,50 mm

Tool change retraction speed 600,0 mm/min

Hide Advanced Select Models OK Cancel

Punkt 19 VALIKULINE:

1. Bridging: ei kasutata tavaliselt
2. Filament Properties: ei kohaldu
3. Tool Change Retraction: ei kasutata
4. Dimensional Adjustments: ei kasutata tavaliselt

Punkt 20 VALIKULINE:

1. Layer modifications: kiire võimalus lõpetada/alustada printimist kindlal kõrgusel
2. Thin wall behavior: eksperimentaalne seade, ei ole katsetatud
3. Single extrusion: ei kasutata
4. Ooze control: ei kasutata
5. Movement behavior: ristumise vältimise lahtrisse tuleb teha linnuke
6. Slicing behavior: eksperimentaalne seade, ei ole katsetatud

FFF Settings

Process Name: Process1

Select Profile: EKA delta 700 - Anna Aken - Va

Auto-Configure for Material

PLA

General Settings

Infill Percentage: 0% Include Raft Generate Support

Layer Additions Infill Support Temperature Cooling G-Code Scripts Speeds Other **Advanced**

Layer Modifications

Start printing at height 0,00 mm

Stop printing at height 0,00 mm

Thin Wall Behavior

External Thin Wall Type: Perimeters only

Internal Thin Wall Type: Perimeters only

Allowed perimeter overlap: 10 %

Single Extrusions

Minimum Extrusion Length: 4,00 mm

Minimum Printing Width: 100 %

Maximum Printing Width: 100 %

Endpoint Extension Distance: 0,20 mm

Ooze Control Behavior

Only retract when crossing open spaces

Force retraction between layers

Minimum travel for retraction: 3,00 mm

Perform retraction during wipe movement

Only wipe extruder for outer-most perimeters

Movement Behavior

Avoid crossing outline for travel movements

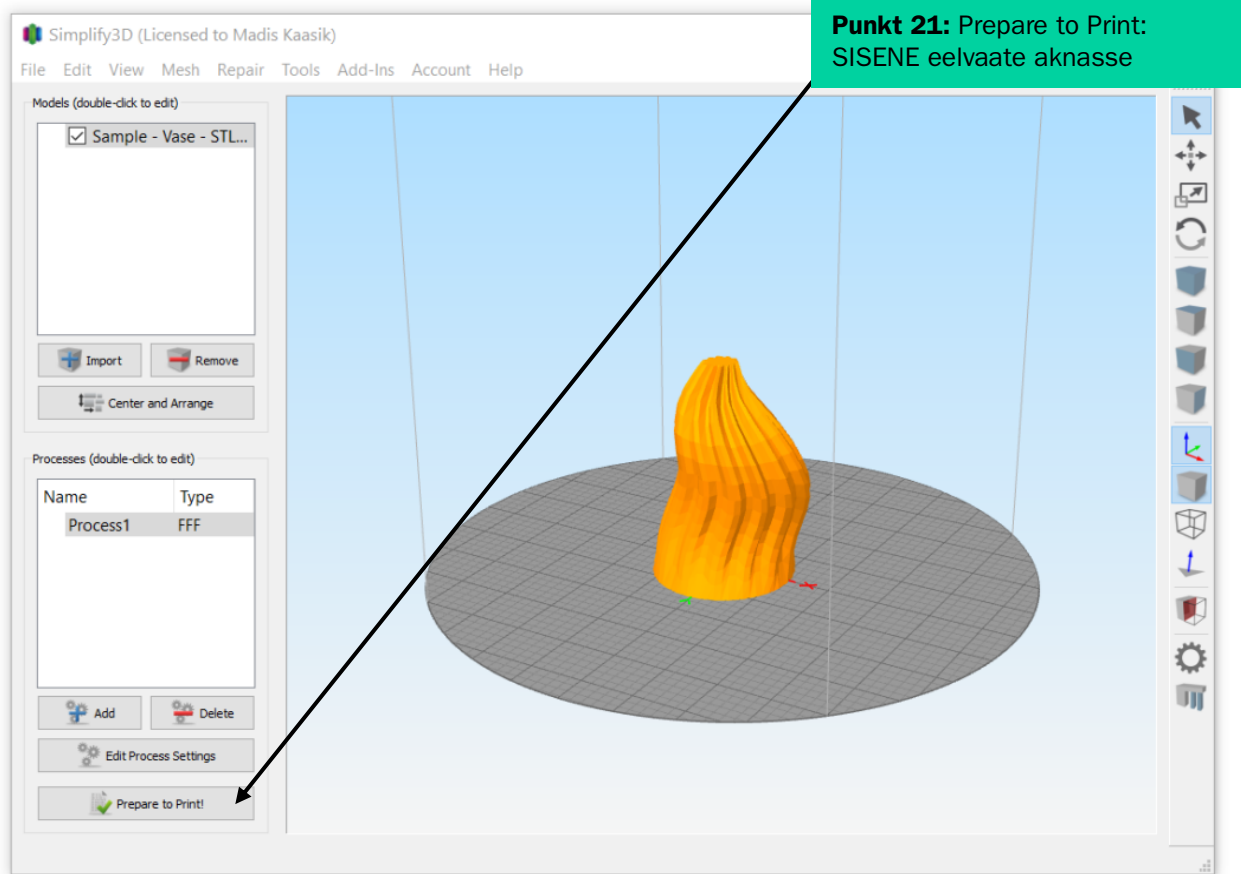
Maximum allowed detour factor: 1,0

Slicing Behavior

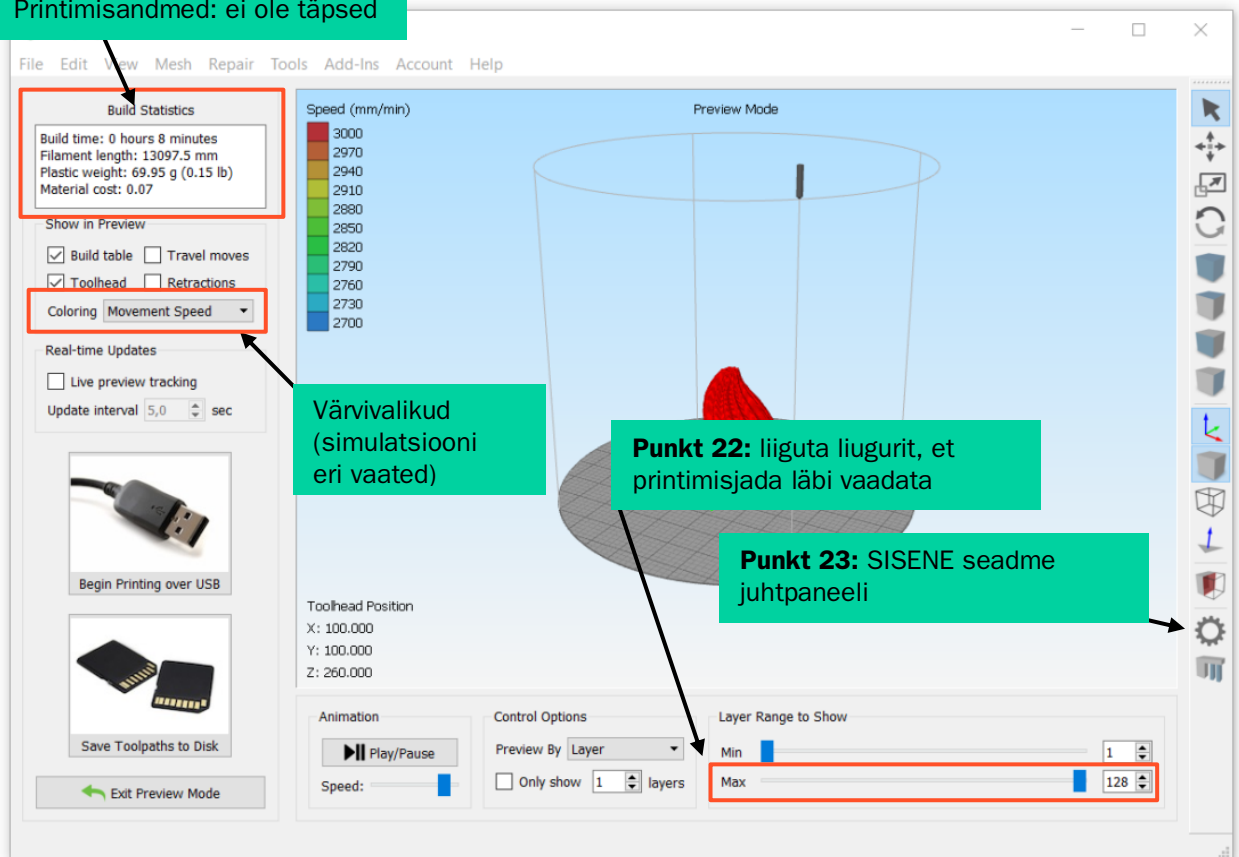
Non-manifold segments: Discard Heal

Merge all outlines into a single solid model

Hide Advanced Select Models OK Cancel



Printimisandmed: ei ole täpsed



4. Seadme juhtpaneeli juhised

The screenshot shows the Machine Control Panel interface. At the top, there are buttons for 'Connect', 'Print', and 'Pause'. Below these, the 'Port' and 'Baud Rate' (set to 250000) are visible. A 'G-Code Library' table is shown with columns for 'Filename', 'Run Time', and 'Material Usage'. On the right, there are 'Accessory Control' options for 'Extruder' and 'Heated Bed', and 'Override Settings' for 'Movement' and 'Extrusion'.

Punkt 01: vali port (port ilmub, kui oled printeri USB-kaabliga ühendanud)

Punkt 02: Cartesiuse baudikiirus on 115200

Punkt 03: vajuta ühendamisnuppu „Connect“ (kui programm on ühendatud, muutub nupp roheliseks)

Sakk G-code:
G-kood kuvatakse mudeli viilutamise järel või võite G-koodi ise importida

Punkt 04:
PRINTIMISE
ALUSTAMINE

PRINTIMISE
PAUSILE PANEK

TURVALÜLITI

Kui printeril esineb tõrge, peab
kindlasti vajutama seda nuppu

Machine Control Panel

Initialization

Disconnect Print Pause

Port \\.\COM3 Refresh

Baud Rate 250000 bits/sec Verbose

G-Code Library Communication Temperature Plot Jog Controls

SENT: M105
READ: ok T:39.3 /0.0 B:0.0 /0.0 T0:39.3 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.6 /0.0 B:0.0 /0.0 T0:39.6 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.8 /0.0 B:0.0 /0.0 T0:39.8 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.6 /0.0 B:0.0 /0.0 T0:39.6 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.0 /0.0 B:0.0 /0.0 T0:39.0 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.6 /0.0 B:0.0 /0.0 T0:39.6 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.1 /0.0 B:0.0 /0.0 T0:39.1 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.6 /0.0 B:0.0 /0.0 T0:39.6 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.7 /0.0 B:0.0 /0.0 T0:39.7 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.9 /0.0 B:0.0 /0.0 T0:39.9 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.4 /0.0 B:0.0 /0.0 T0:39.4 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.3 /0.0 B:0.0 /0.0 T0:39.3 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.5 /0.0 B:0.0 /0.0 T0:39.5 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.3 /0.0 B:0.0 /0.0 T0:39.3 /0.0 @:0 B@:0
SENT: M105
READ: ok T:39.4 /0.0 B:0.0 /0.0 T0:39.4 /0.0 @:0 B@:0

Send

Position Readout

X 0.00 Zero X
Y 0.00 Zero Y
Z 0.00 Zero Z

Emergency Stop

Force Next

Accessory Control

Active Toolhead Tool 0

Extruder 190 39 °C On Off
Heated Bed 60 0 °C On Off

Set Fan Speed

Custom Commands

Disable Motors Enable Motors
Print from SD Card Pause Current SD Print
Upload to SD Card SD Card Status
Macro 1 Macro 2 Macro 3

Override Settings

Movement: 100% 100
Extrusion: 100% 100

Sakk Communication :

Kuvab teavet ja võimaldab
printerile käsklusi saata

Custom Commands:
kasutatakse harva

Sakk Temperature:
temperatuuri teave ei ole
oluline

Machine Control Panel

Initialization

Disconnect Print Pause

Port \\.\COM3 Refresh

Baud Rate 250000 bits/sec Verbose

G-Code Library Communication Temperature Plot Jog Controls

Bed Setpoint Extruder Setpoint

Temperature (C)

200
175
150
125
100
75
50
25
0

0 5 10 15 20 25 30

Samples

Monitor Temperatures Clear Plot Data

Position Readout

X 0.00 Zero X
Y 0.00 Zero Y
Z 0.00 Zero Z

Emergency Stop

Force Next

Accessory Control

Active Toolhead Tool 0

Extruder 190 39 °C On Off
Heated Bed 60 0 °C On Off

Set Fan Speed

Custom Commands

Disable Motors Enable Motors
Print from SD Card Pause Current SD Print
Upload to SD Card SD Card Status
Macro 1 Macro 2 Macro 3

Override Settings

Movement: 100% 100
Extrusion: 100% 100

Machine Control Panel

Initialization

Disconnect Print Pause

Port \\.\COM3 Refresh

Baud Rate 250000 bits/sec Verbose

G-Code Library Communication Temperature Plot Jog Controls

-Y -100 -10 -1 -0.1 0.1 1 10 100 +Y

+Z Retract 100 -100 10 -10 1 -1 0.1 -0.1 -0.1 0.1 -1 1 -10 10 -100 100 -Z Extrude

Jog Speeds

X/Y-Axis Z-Axis Extruder

Speed (mm/min) 1800,0 1200,0 240,0

Home X Home Y Home Z Home All

Position Readout

X 0.00 Zero X

Y 0.00 Zero Y

Z 0.00 Zero Z

EMERGENCY STOP

Force Next

Accessory Control

Active Toolhead Tool 0

Extruder 190 39 °C On Off

Heated Bed 60 0 °C On Off

Set Fan Speed

Custom Commands

Disable Motors Enable Motors

Print from SD Card Pause Current SD Print

Upload to SD Card SD Card Status

Macro 1 Macro 2 Macro 3

Override Settings

Movement: 100% 100

Extrusion: 100% 100

1% 200% 50% 150%

Sakk Jog: kasutatakse printeri telgede ja ekstruuderi käsitsi liigutamiseks

Override Settings: ekstruuderi liikumise ja kiiruse muutmine enne printimist ja selle ajal

Valminud Hariduse Infotehnoloogia Sihtasutuse IT Akadeemia programmi toel.



Õppematerjalile kohaldatakse järgmist Creative Commonsi Eesti litsentsi (versioon 4.0):
autorile viitamine, mitteäriline eesmärk, jagamine samadel tingimustel

<http://creativecommons.org/licenses/by-nc-sa/4.0/>



Koostanud **Madis Kaasik ja Lauri Kilusk, Eesti Kunstiakadeemia**, jaanuar 2021