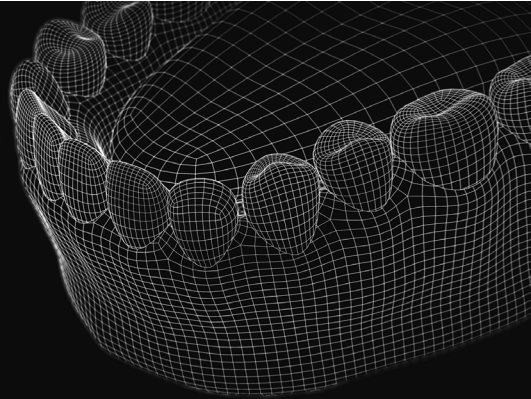
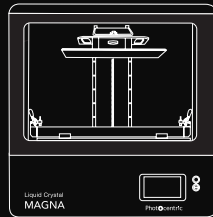




Liquid Crystal
MAGNA
CONCIERGE



1 PREPARE



2 PRINT



3 WASH



4 CURE

THE PROCESS FOR PRODUCING DENTAL MODELS ON MAGNA

DENTAL WORKFLOW

This workflow defines how to produce dental models for aligner manufacture, consistently, reliably to a very high level of resolution on the Liquid Crystal Magna 3D printer.

1- MINIMUM SYSTEM REQUIREMENTS TO RUN PHOTOCENTRIC STUDIO

- Windows 7, 8 or 10
- Minimum 2.0 Ghz processor speed 2 Cores. Recommended 4 cores.
- GPU capable of running opengl version 3.0 or higher. We recommend that you use GPU with at least NVIDIA GTX1050 specifications.
- .net framework version4.0
- 64bit system: minimum 2Gb of Ram, recommended 4Gb.
- 32bit system: minimum 1Gb or Ram, recommended 2Gb

You can run the software using MacOS by using a virtual workstation with Windows installed on it.

- Your system could operate with an intergrated or a non-intergrated graphics card. Photocentric Studio by default may run with the intergrated graphics card. To check this click 'File', 'Configuration', 'General Settings', 'Logging' (figure 1).
- If yes follow these steps to enable Photocentric Studio to run with the non-intergrated graphics card.

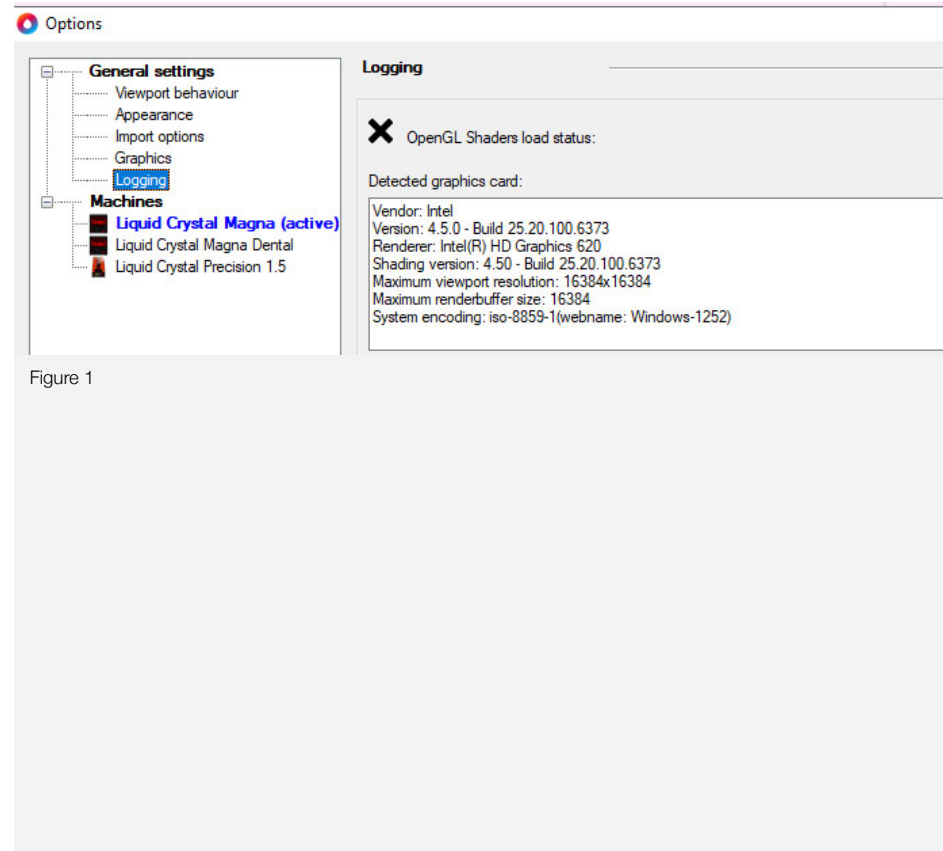


Figure 1

1. Right click on your desktop and select NVIDIA control panel (figure 2)
2. Select 'Program Settings', click 'Add' (figure 3).
3. Select 'Local Disk (C), 'Program Files', 'Photocentric', 'Photocentric Studio' then click 'Open' (figure 3).
4. Make sure 'Preferred Graphics Processor' is 'Nvidia Processor' (figure 3).

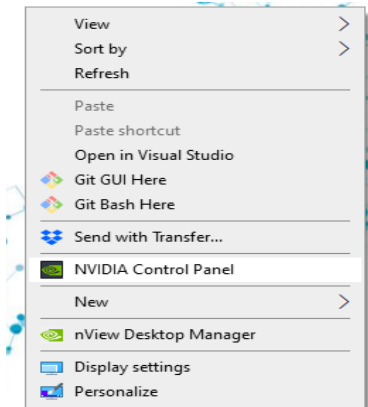


Figure 2

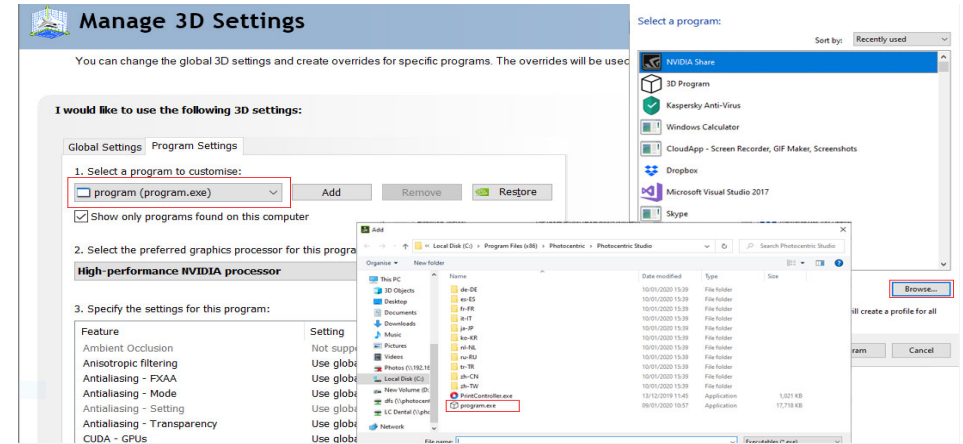


Figure 3

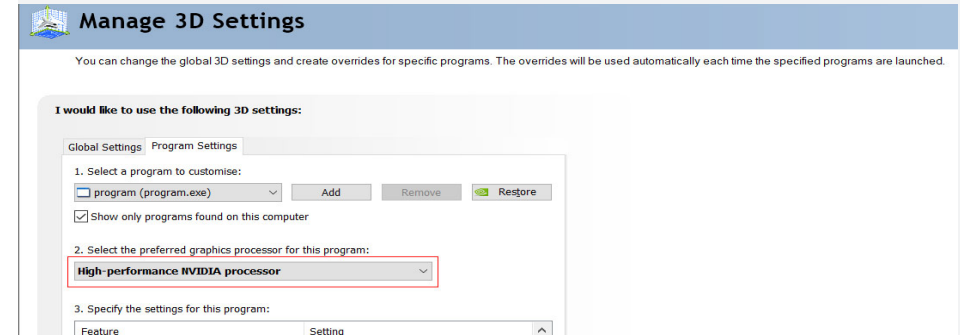


Figure 4

Loading Files

- Open Photocentric Studio. Check your version is the latest one by visiting our website and comparing to your one in 'Help' and 'About'.
- Select 'Liquid Crystal Magna' and 'Dental Model 100um' (figure 6).
- Click 'File' and 'Import File' to open your files in Photocentric Studio (figure 7).

Mesh Fixing

- To diagnose if any of your imported files has a mesh error, look at the top right window for yellow warning triangles (Figure 5).
- Select the model and press 'Delete' key on your keyboard to remove it.
- You can repair the faulty model with '3D Builder' software. 3D Builder Software' is a free app built for Windows to prepare, view and print 3D models. You can download the app from Microsoft online store.
- Find the faulty model file's location on your PC and open it with '3D Builder' (Figure 8).

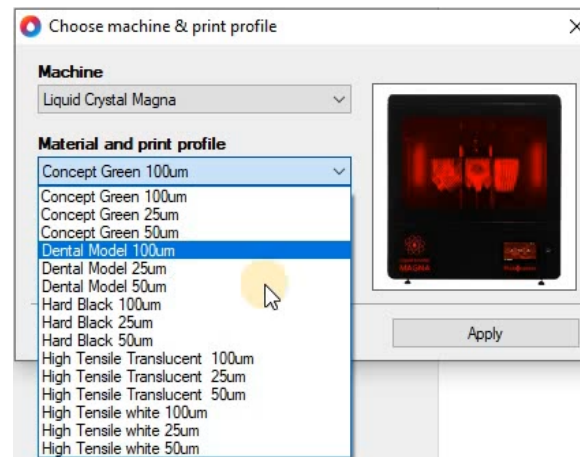


Figure 6

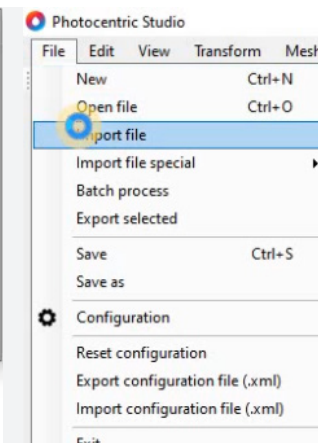


Figure 7

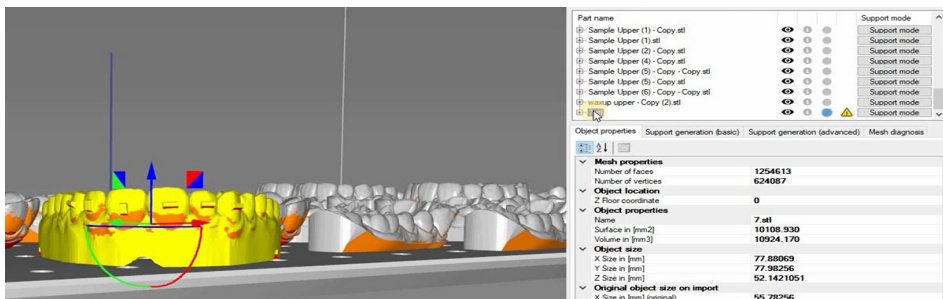


Figure 5

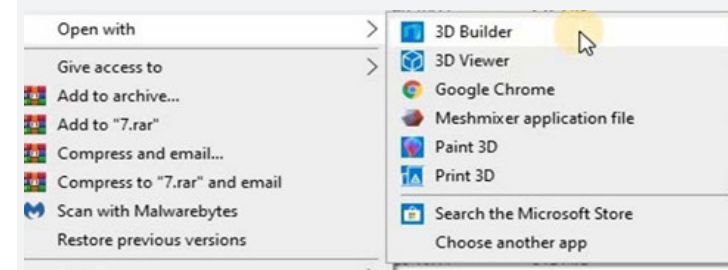


Figure 8

- Press 'Import Model' to allow '3D Builder' to check the mesh integrity (figure 9).
- Click on the error message appearing on right bottom corner to repair the model (figure 10)
- Press 'Save As' (figure 11).
- Find the faulty model's file location. Save the model as 'STL format' (figure 12).
- Replace the faulty file with the corrected one (figure 13).
- You can drag and drop the updated file into your Photocentric Studio preloaded platform (figure 14).

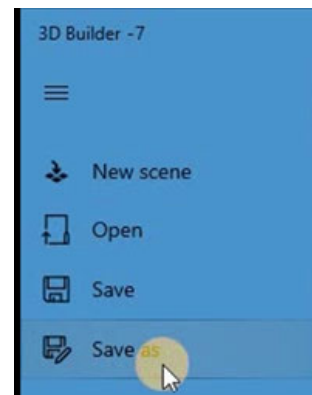


Figure 11

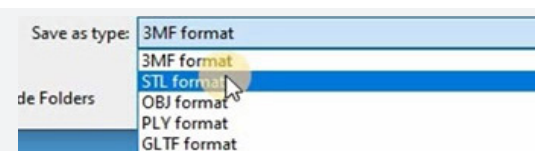


Figure 12



Figure 13

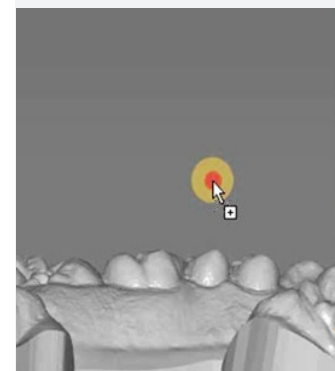


Figure 14



Figure 9

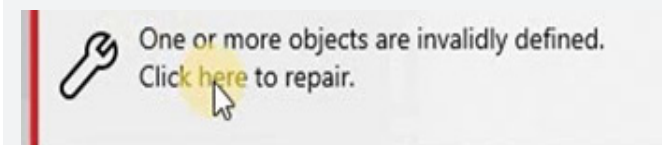


Figure 10

Scaling

- Click on a model and press 'Ctrl +A' to select all models. Click 'Transform' and 'Scale selected items' or click icon shown (figure 15). In scale window adjust 'uniform in all directions' to 1.005 to increase by 0.5% in the x, y and z axes (figure 16).

To preset the scaling function for each resin profile in order to scale them everytime automatically;

- Click 'File' then 'Configuration' and select 'Liquid Crystal Magna' in the machine tab. In 'Print Profiles' double click on 'Dental Model 100um' (figure 17).
- In 'Part pre processing' tick the 'shrinkage correction scale xyz' box and enter '1.005' in the x, y and z boxes. Click 'Save' and then 'Save and close' (figure 18).

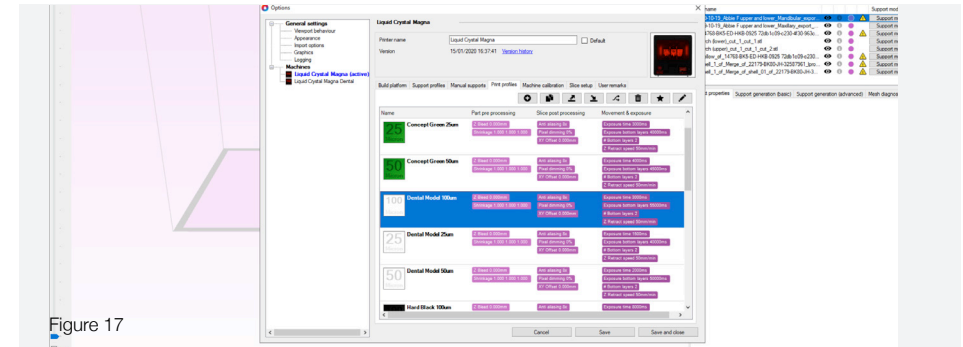


Figure 17

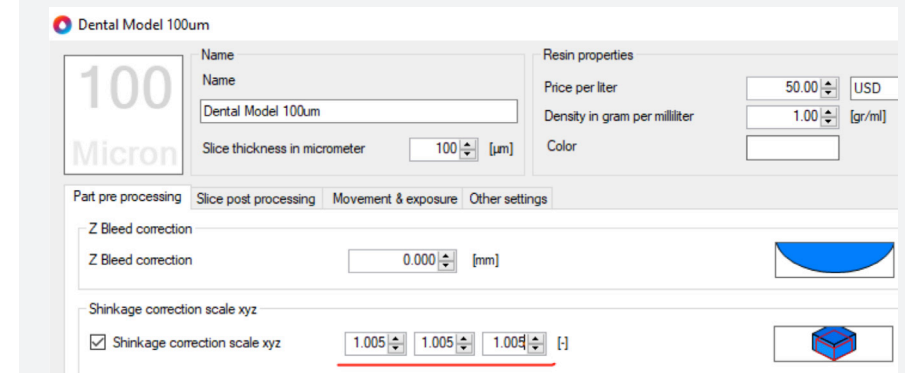


Figure 18

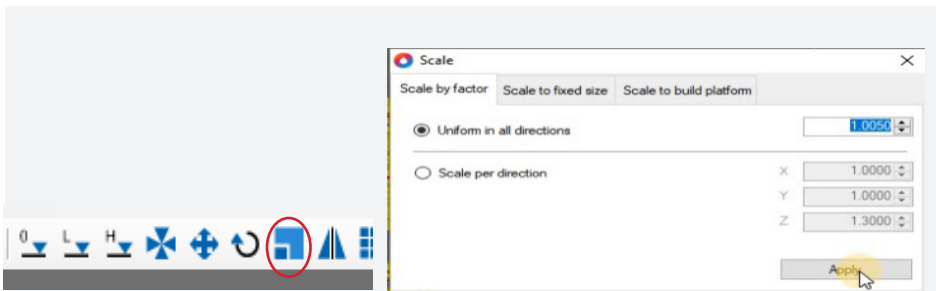


Figure 15

Figure 16

Hollowing

- We recommend using solid models for this process.
- If you wish to reduce resin usage and hollow your models you can do this by clicking on the model (it will highlight yellow) and click 'Support Mode' (figure 19) on the right hand tool bar. Select 'Mesh' and 'Hollow Mesh' or select the 'Hollow Mesh' icon (figure 20) and choose '2mm' wall thickness, leaving the rest of the parameters as in the default, then click 'Hollow Mesh' (figure 21).

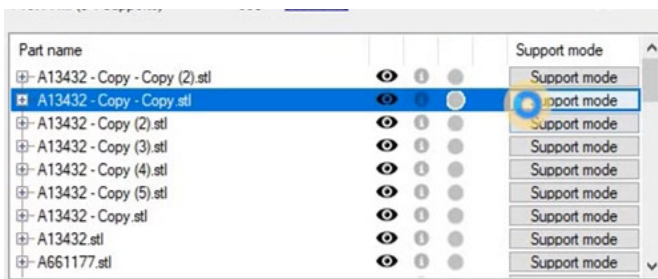


Figure 19

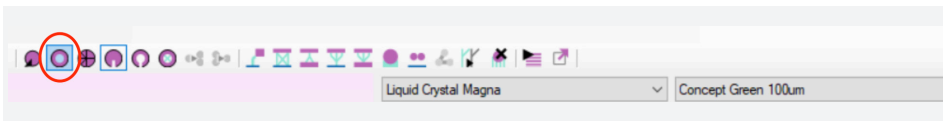


Figure 20

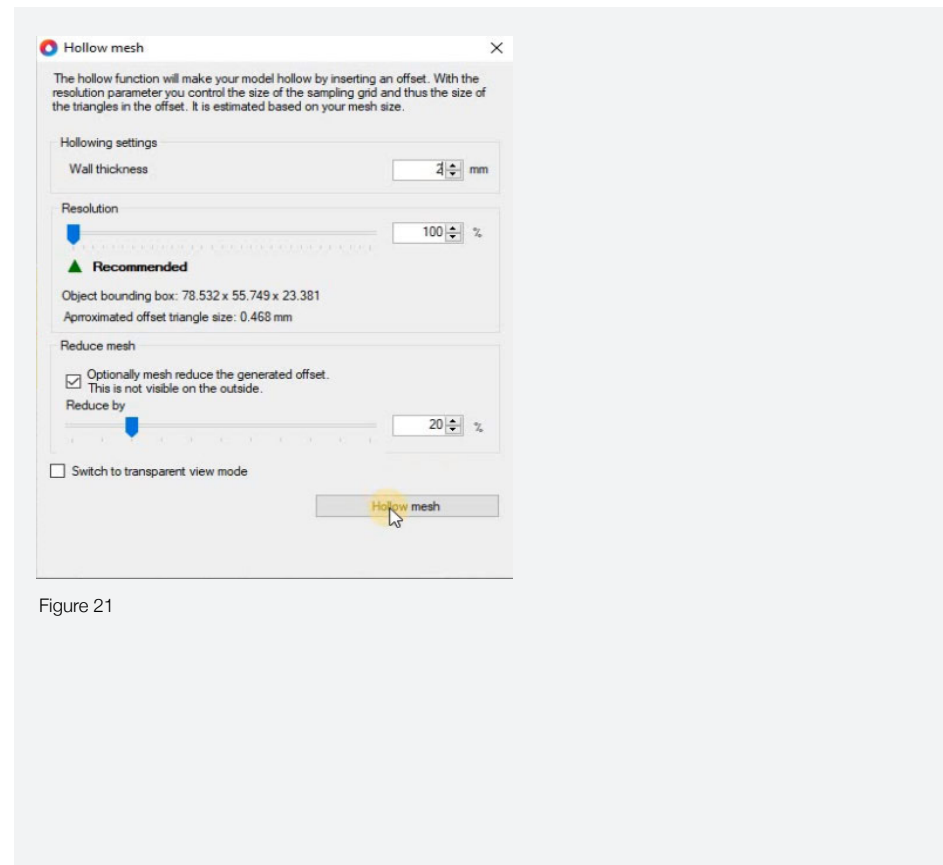


Figure 21

Infilling models

- To increase the rigidity of your hollow models you should add an infill by clicking the 'Infill' button. We recommend a 1mm 'Infill diameter' and 4mm 'Cell Size'. Select transparent view mode to see the lattice and then press 'Generate Infill' (figure 23).
- Click 'Display Mode' and select 'Shaded Mesh' to return to solid view (figure 24).

Adding drain holes

- It is essential to add drain holes to hollow models to avoid print failure,
- Add three drain holes per dental model, one in the middle of the arch and one on each of the legs. In 'Mesh' select 'Add drainage hole' or select 'Flexible drain hole' icon (figure 22).

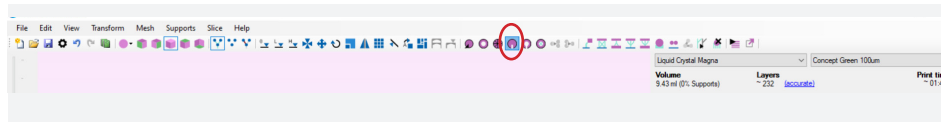


Figure 22

- If the model has a solid floor, position the hole just above the floor (figure 25). Click the cursor to make three holes. Click 'Add flexible drainage hole' again to release.
- Select all three holes, and set the diameter to 3mm and click 'Apply Selection' (figure 25).
- Click 'Finish Supporting' to exit.
- Drain holes will be created after slicing.

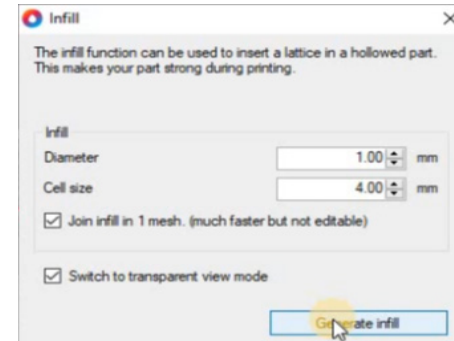


Figure 23

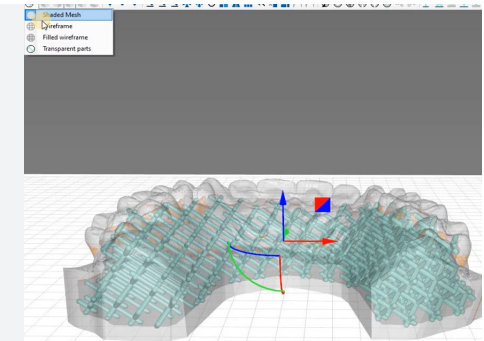


Figure 24

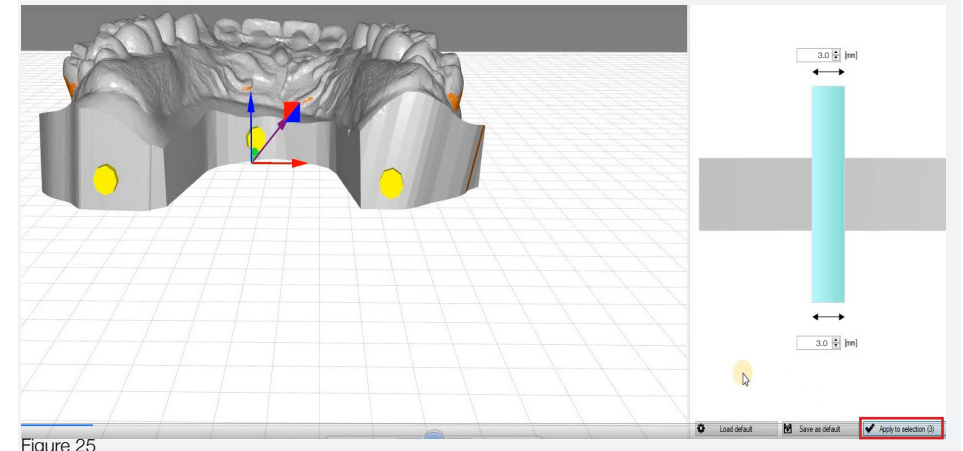


Figure 25

- If your models are already hollow before you imported them into 'Photocentric Studio' and they don't have a floor, add 3 drain holes by following the steps in the previous section and position them above the platform (figure 26).

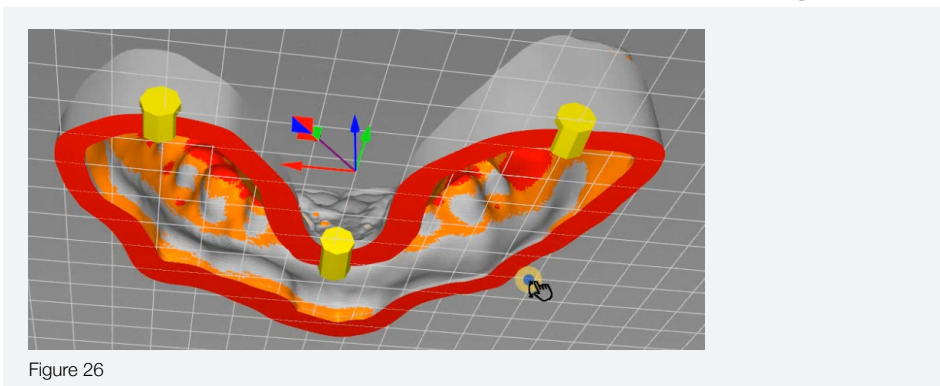


Figure 26

Optimising the orientation of the models

- If your models have not been imported flat to the build plate you will need to manually rotate them. In 'Transform' click 'Add Rotation' and adjust either the x or y axes (figure 27) and close the 'Rotate' window.
- If your model is not at 90° to the platform select the model,
- In 'Transform' click 'Orient to face' (figure 28), add move your cursor to the underside of the platform and click on it and the model will now be flat on the platform (figure 29). Repeat this process for each model (figure 27, 28 & 29).
- You can orientate your models in your dental design software before you import them into Photocentric Studio.

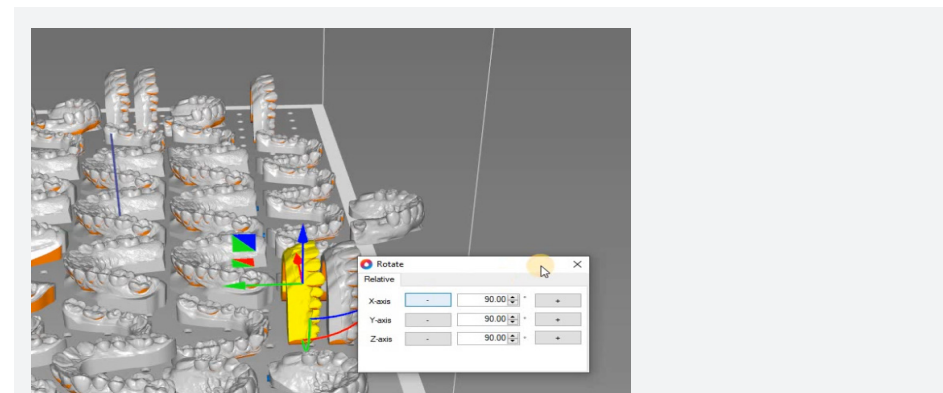


Figure 27

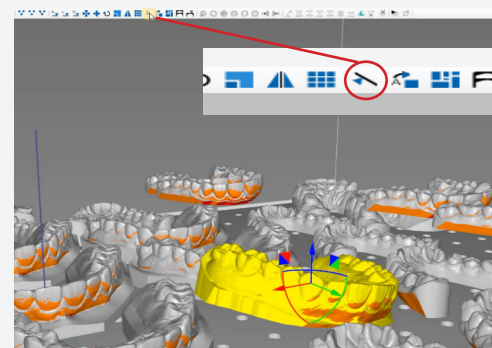


Figure 28

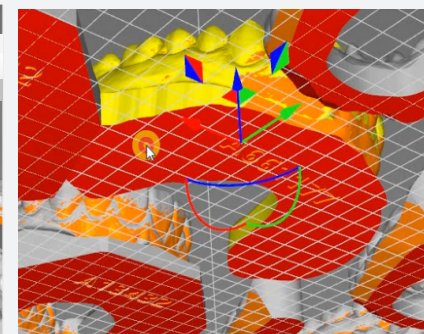


Figure 29

Automatic arrangement of your models on the platform

This is only suitable if you have a batch of more than 20 models.

- To automatically process a full bed of models in a batch, click 'File' and 'Batch Process'.
- Select 'None' for 'Auto orientation' and 'None' for 'Support profiles' (figure 30).
- To fit as many models as possible on the platform select 'Irregular shape nesting' and set the 'Object margin' to '2mm' (figure 31).
- If you are making less than 30 models on a platform, increase the 'Object margin' to '3 mm' to space them out more.
- Click 'Start batch process' and when it's finished close the window.
- If you are only printing a few models manually space them out evenly across the platform.
- The batch process is easier if you import your models into Photocentric Studio with them already positioned horizontally to the build plate. You may need to make manual adjustments to the dental model locations once the batch process has finished to ensure they fit perfectly (figure 32).
- Rotate adjacent models to maximise the empty space available always using a minimum 2mm separation.

Please select per part your settings for batch processing. For each part you can choose an orientation optimization, support algorithm and a number of copies. Press the start button if you would like to start the batch process.

Process	Part	Amount	Auto orientation	Support profiles
<input checked="" type="checkbox"/>	3 bars.stl	1	None	None

Figure 30

Nesting

Irregular shape nesting (default)
 Rectangular nesting (fast)
 None

Object margin [mm] mm

Number of part rotations to try

Origin

Cancel Start batch process

Figure 31

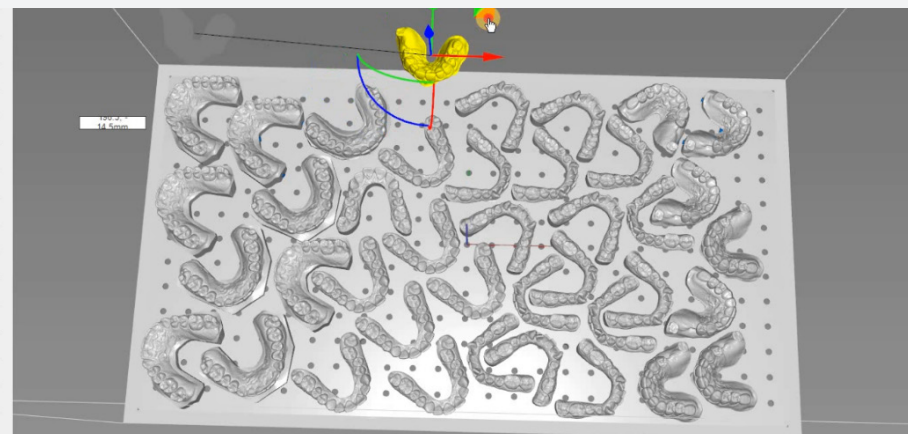


Figure 32

- Finally it's worth checking all of the models are going to print their first layer on the platform. To do this drag the slider showing the first layer (figure 33).



Figure 33

Slicing

- In slice click 'Start Slicing' or click the 'Slice' icon. Select the location to save your file in and click 'Select Folder'. You can now rename the file. Click 'Ok Start Slicing' (figure 34).
- Note down the estimated volume of resin required shown at the top of the right hand toolbar for future use.
- Note the print time as this is more accurate than the initial completion time made on the printer interface.
- You can transfer your sliced file using a USB, ethernet or WiFi. Please consult your Magna Manual instructions for more details.

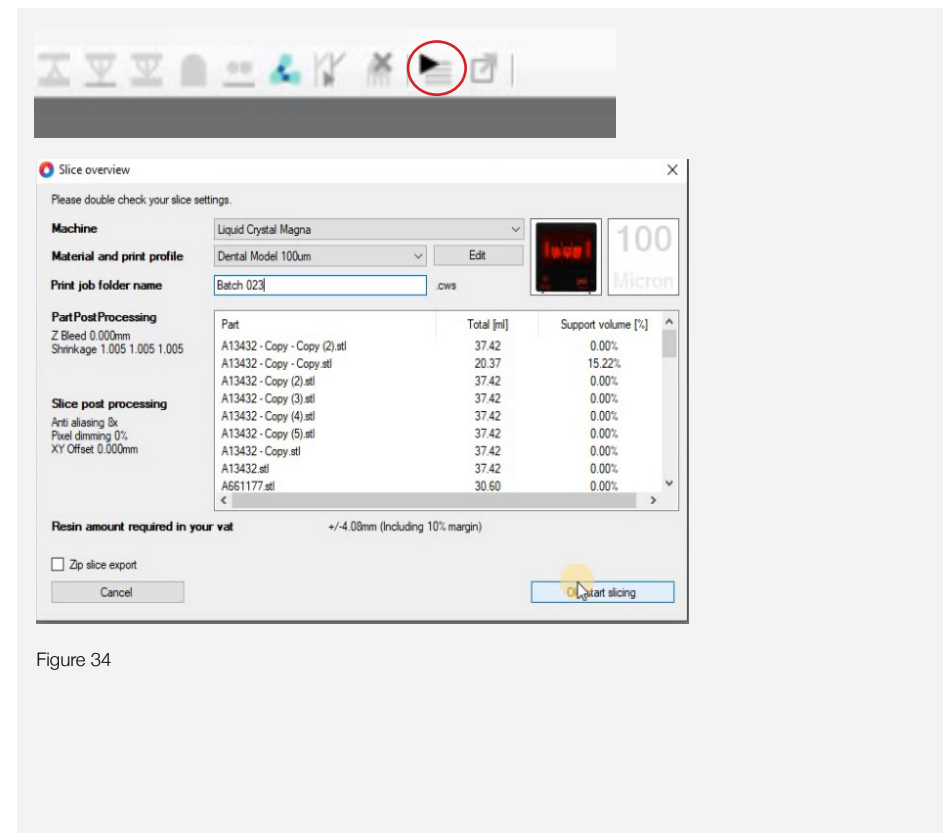


Figure 34



2- Print

- Ensure your print platform is thoroughly clean with no cured bits of resin left on either side. Cured resin can break off and cause vat damage or prevent a layer being made leading to a distinct layer line.
- All platform holes need to be kept clean with no cured resin inside them. You can use an air gun to ensure you have cleared out the holes.
- Secure the platform on the print arm. Tighten the central knob so the platform doesn't wobble.
- Check that the vat gasket is lying flat around the perimeter of the underside of your vat.
- Ensure your vat is completely clean before starting the print. Ensure there are no holes in the vat film, and it is under tension. If you have a small (about 1mm diameter or smaller) hole you can seal it with a small piece of clear Sellotape applied to it on the underside of the vat. If the tape creates a faint image on the built part above it, you will have to reskin your vat film.
- To reskin the vat, watch our vat reskinning video (accessed on our LC Magna support page).
- Tighten your vat with the bolts/clamps around its edge.
- Now test the blow peel is working by pressing 'Maintain' then 'Pump' and 'Test'. You should see the film rise and fall, you can feel the air pressure with your hand. Press 'Main' to return to the main menu.
- Always add resin that is at least at room temperature (>20°C / >68°F), if not warm it up.



- Shake the resin bottle before adding to ensure the pigment is thoroughly mixed in.
- Pour in the required amount of resin (take the total that was calculated by the software that you noted earlier and add 1.5). The vat is marked with the volumes.
- Close the door. Press 'Print Files', select your loaded file (it will be highlighted) and press 'Print'.

3- Wash

- Fill your Wash99 unit with 80 litres of Photocentric Resin Cleaner, which can be used to wash in excess of 200 platforms of prints.
- When your print has finished, loosen the platform knob, remove the platform and hold it vertically over the vat to allow the excess resin to drain back in the vat.
- Place the platform diagonally in the Wash99.
- Turn on the Wash99 and leave platform in it for 8 minutes. Then turn the platform 180° around and wash it for a further 8 minutes. The platform will then have been washed with the models facing upwards and downwards.
- After 16 minutes, take the platform out and place it over a rinsing tank to thoroughly rinse any remaining Resin Cleaner from the parts and platform. You should use hot water and if necessary spray with detergent.
- Any residual cleaner will leave a tacky surface finish on your models, Resin Cleaner should not be disposed off down the drain, but should be collected for disposal.



4-Cure

- Set the temperature controller to 65°C, 149°F and pre heat by setting the timer to maximum.
- Your Cure L unit should be 65°C before use.
- Place your platform on the arm at the top of the Cure L and close the door. For Dental White Magna Resin, post expose for 60 mins at 65°C or until you have a smooth dry surface.
- For faster post exposure you can place the platform in a tray under water in the Cure L.

5- Parts Removal

- You can remove your models very easily by thermally shocking them. With the platform still hot from the Cure L and wearing gloves place it straight into a vat of very cold water straight from the tap (alternatively run cold water over them). The arches will immediately pop off the platform.
- Alternatively, remove the platform and slide a spatula under each arch at the edge. Avoid levering them upwards as this can damage the accuracy of your models.



6- Housekeeping

- We recommend that you clean the vat between each print.
- Clean your platform thoroughly, leaving no cured parts on either the silver printing side or the upper side. Use an air gun to clear out the platform holes. You can use sanding paper (below 80) to remove any cured resin.
- If you have had a print failure, thoroughly clean the vat and platform and check the vat film has not become damaged.
- When you have become experienced using Magna you can clean your vat only every morning and in between a number of successful prints you can just wipe the bottom of the resin filled vat, with the squeegee. This will mix any settled pigment back into the resin.
- If you have a print failure completely clean the vat out.
- If there is a loud beeping noise the vat leak sensors have been triggered You will have to perform a cleaning procedure.

Scan QR code to watch video



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Should you have further questions or queries, please do not hesitate to contact us by emailing magna.concierge@photocentric.co.uk

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