PlaniLink

4Dental Technology

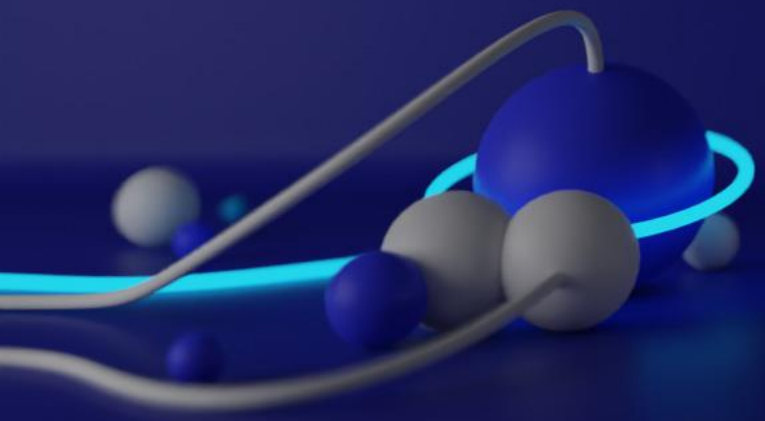
Guide to independent aligner manufacturing

PaniLink

Content

We have carefully selected an optimal combination of equipment, materials and software to ensure quality and precision in creating aligners. However, we recognize that each client has unique preferences. It is up to you to choose the combination that best suits you ~~and.~~ Remember to always comply with the necessary parameters to ensure the correct implementation of the aligners.

We present the process of creating aligners in five simple steps. Follow them precisely to get your aligners.



Equipment, consumables and supplies

Our recommended selection

PlaniLink

3D printer
Anycubic Photon Mono X2

Ministar Scheu dental positive pressure thermoforming machine
Dental oil-free air compressor
• Recommended thermoforming option

Vacuum thermoforming machine
• Thermoforming Option B

Office printer

Laboratory micromotor
• Optional

Heat sealer
• Optional

Anycubic Construction Standard UV Resin

Isopropyl alcohol

Aligner bags

Stickers for aligner bags
Sheet size Din A4

Aligner polishers
• Optional

Aligner scissors

Small spatula

Scraper

Cutter

Tungsten milling cutter for acrylic
• Optional

Button Aligner Cutter Pliers
• Optional
• Recommended

Hook aligner cutting pliers
• Optional
• Recommended

Aligner material, thicknesses, thermoforming programs and tensile curves

PaniLink

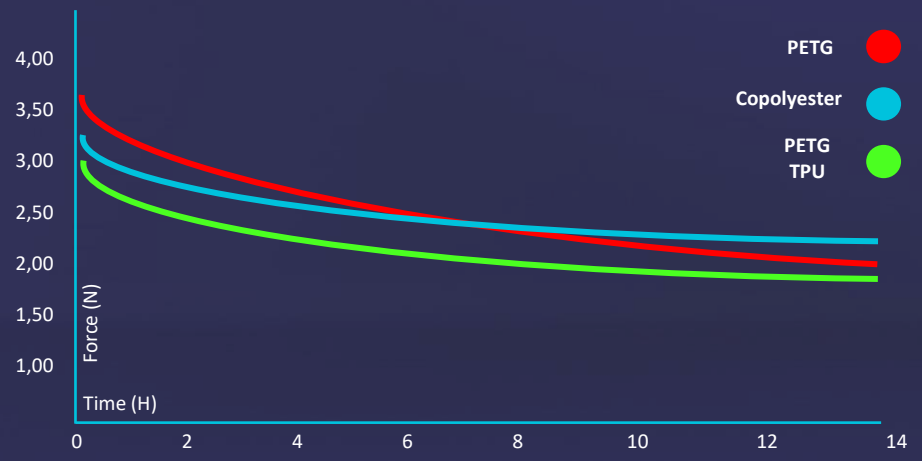
The essentials to make the best decision about the material

Material	Appearance	Characteristics
PETG	Clear	Very resistant and hard material.
Copolyester	Clear	Viscoelastic-hard material, resistant to breakage and with dimensional stability. Approximately 35% softer than PETG. Aligner memory loss is low, effective force lasts longer.
PETG TPU	Transparent	Plates made of two materials, soft and hard. Durable and comfortable material.

Thickness	Use
0,5 - 0,6 mm	Cement attachments
0,75 - 0,8 mm	For all types of aligner treatments
1 mm	Final retention

Material	mm	°C	min	min
PETG	0,50	160	0:35	0:30
	0,60	160	0:40	0:30
	0,80	160	0:45	0:45
	1	160	0:50	0:45
Copolyester	0,60	195	0:50	0:45
	0,80	195	0:55	1:00
	1	195	1:00	1:30
PETG TPU	1	160	1:00	2:00
	1,3	160	1:10	2:00

Layer thickness (mm) | Thermoforming temperature (°C) | Heating time (min./sec.) | Cooling time (min./sec.)



- Check the biocompatibility approval and physiological safety of the material, as well as the layer thickness and other measurements before making the purchase..

Packaging

Your stamp on each aligner

PlaniLink

Creation of the packaging

- There are countless websites on the Internet for designing your packaging in very few steps and with very user-friendly tools.
- Many of the packaging design websites are supported by printing companies, create your design and send it to be produced from the same website.

- Choose the size of the boxes and bags carefully. Keep in mind that each item goes inside the other.
- Do not print large runs of packaging if you are not clear about the design and measurements.
- Customized packaging can help establish your clinic as a reference in your area.
- You do not need to hire design companies for packaging. Save that budget.

1A Prepare biomodels for 3D Printing

PaniLink

How to use Photon Workshop software

Download software

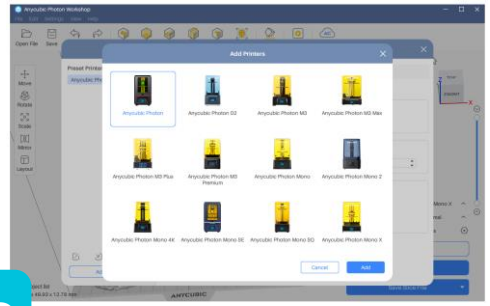
• Download the “Photon Workshop” software from the official website and install it on your PC.

www.anycubic.com

01

Selection

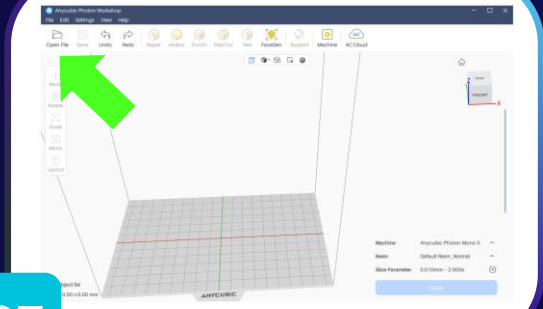
• Choose your printer, the resin and the thickness of the 3D printing layer you are going to use.



02

Load the biomodels into the software

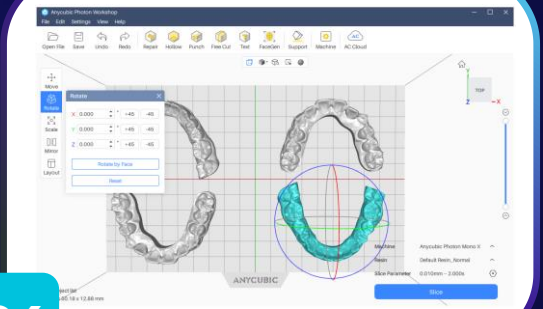
• Upload as many biomodels as you can fit on the printer's work platform.



03

Sort the biomodels

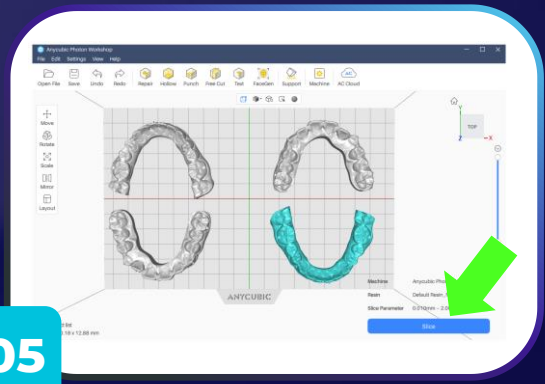
• You can sort them manually or with an automatic software tool. Make sure ~~Check~~ that they do not overlap.



04

Convert the job to a printable file

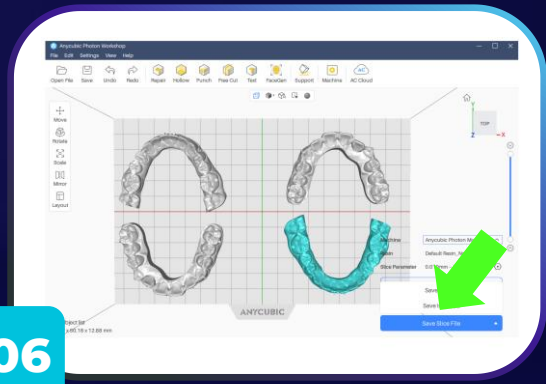
• When the models are ordered, click on “slice”.



05

Export

• Save and copy the file to a USB drive.
• You can also send the file to the printer via WIFi if you have it configured.



06

Print

• Insert the USB into the 3D printer and start printing job

07

• We suggest choosing a layer thickness of 0.1 mm to achieve a highly detailed result with reduced construction time.
• When choosing the printer and resin, the software will automatically load the resin curing program. You don't need to touch any parameters.
• You can always find the resin curing and printer calibration parameters on the manufacturer's official website.
• Review the technical specifications, maintenance and correct way of working ~~of~~ the 3D printer you have.
• "Photon Workshop" software is designed exclusively for Anycubic printers; If you have a different brand of printer, you can opt for the "Chitubox" software.

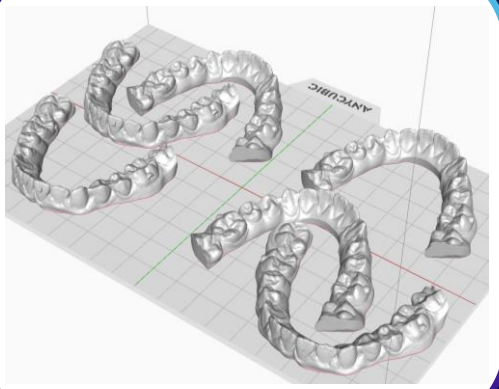
1B Prepare biomodels for 3D Printing

Different placements of the biomodels on the 3D printer platform

PlaniLink

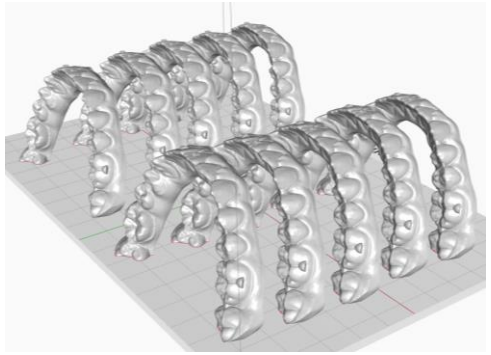
Printed directly on the build platform

- Greater precision and construction speed.
- Biomodels printed directly on the platform do not require any support structure.
- Lower loading capacity of printed biomodels per job.



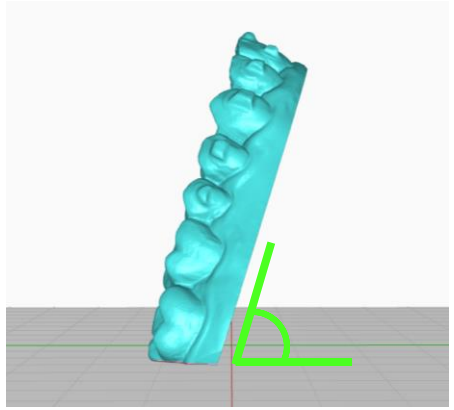
Almost vertical prints

- Lower construction speed, but higher number of biomodels printed per job.
- When printing vertically we recommend an angle of 65 to 75º between the biomodel and the platform.
- It may be necessary to add support structures but avoid them if not necessary.



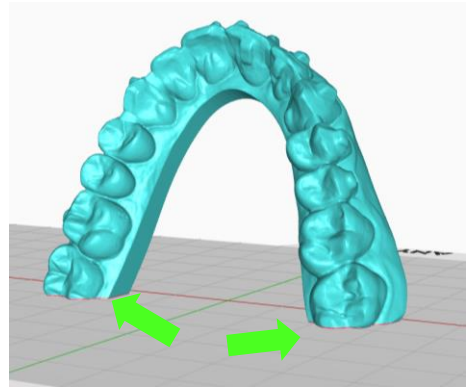
Correct angle

- When printing vertically we recommend a 65 to 75º angle between the biomodel and the printer build platform.



Almost vertical, without base and without supports

- If you want to print the biomodels vertically without any type of support structure, you will have to slightly sink them into the printer's work platform through the rear tails. This is essential to ensure good adhesion and prevent them from coming off.



- If you want to print the “near vertical” configuration, make sure the first layers of print are well adhered to the work platform. Simply increase the exposure time per layer on the first four layers.
- For those who are just starting out in 3D printing, we suggest printing biomodels that lie directly on the build platform.

2 3D print

Removal and washing of the biomodels

PaniLink

Elimination of biomodels

• Remove the printed parts from the build platform by engaging the removal tool underneath the printed biomodels. This technique may need to be applied to ~~in~~ several locations around the biomodels.

If the process is too difficult or if the biomodel is damaged it may be due to:

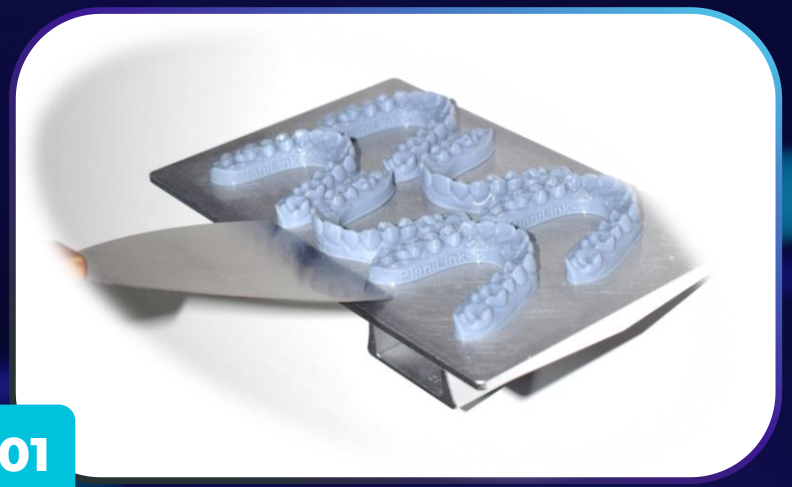
• The leaf is not completely below the biomodel.
• The blade must be replaced or sharpened.
• Too much force is being applied to one particular area of the biomodel.

Cleaning the biomodels

• Place the parts in the cleaning bucket with isopropyl alcohol.
• Shake the pieces for 15 or 20 seconds in the liquid to facilitate cleaning.
• Keep the pieces submerged for 15 or 20 minutes. Do not exceed that time, swelling of the biomodels could occur if submerged for a long time.

Drying of the biomodels

• After immersion, place them on paper, cardboard or some absorbent surface and wait 10 minutes for the cleaning liquid to evaporate. You can use an air blower to speed up the process.
• Check if there are still resin residues on the surface of the biomodel. If residue still exists, wash and dry it again.



01

02

03

• If there is little or excessive adhesion of the biomodels on the printer work platform, raise or lower the exposure values per layer in the first 4 layers.
• Post-curing the biomodels is not necessary, skip that step.
• When you notice that the isopropyl alcohol starts to look cloudy, change it.
• When washing biomodels with isopropyl alcohol, make sure you are in a ventilated environment.
• Numbering the biomodels with a permanent marker can be ~~a~~ good practice. Biomodels will always come numbered but the number is small and difficult to see with the naked eye.
• Check that the biomodels are perfectly printed (without deformities) after drying and before thermoforming.
• Remember to properly scrape and clean the printer work platform before printing another job.

3A Thermoforming and finishing

PlaniLink

Complete process

Stamping

- Place the biomodels centrally in the thermoforming area and start the heating program.
- Use the recommended program for the equipment, plastic material and thickness of the iron you are going to use.

Initial trim

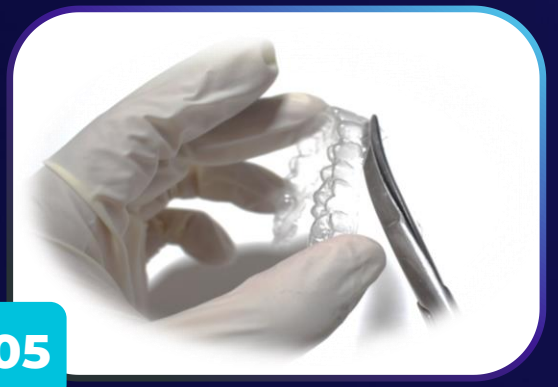
- Make the preliminary exterior cut using scissors.
- Make the preliminary interior cut using a utility knife.
- Cut the tails of the biomodel with the utility knife to release the plastic.
- Always avoid rotating cutting discs for initial trimming. There's a high risk of injuring your hands .

Lifting

- Using a pry tool, wedge it between the biomodel and the thermoformed sheet and lift the aligner. Repeating the action, unfasten the aligner from the back to the front.
- Avoid bending the aligner when removing it.

Final trim

- Using high-quality scissors, trim the straight aligner to the desired cervical distance.
- Avoid leaving angles or edges that could harm your patient.



Inspection

- Perform a quality control check to confirm that the aligner is perfect.

- We recommend positive pressure thermoformers instead of suction. Aligners made by suction thermoformers have variable and unreliable thickness.
- Positive pressure thermoformers provide excellent fit around biomodels.
- In most cases, positive pressure thermoforming machines have automated and standardized programs based on the type of material and thickness.
- Some forming machines that you can consider are: Ministar and Erkopress.
- Depending on the cycle or heating variations, the thickness of the aligner may vary. Having the thermoforming cycle controlled helps maintain consistency throughout the aligner sequence.

3B Different finishes of the aligner

PlaniLink

Various techniques can be used to finish the aligner.

Straight aligner

- Significantly shorter completion time.
- More consistent and with greater traction force.
- Lower probability of breakage.
- Device is less aesthetically pleasing.

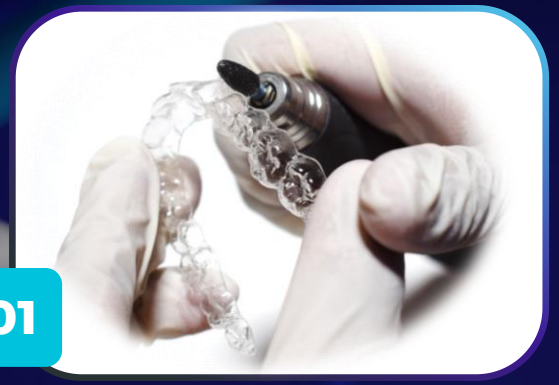
Contoured aligner

- Significantly longer completion time.
- Less consistent and with lower traction force.
- Greater probability of breakage.
- Device is more aesthetically pleasing.

Alternative cropping method

Contoured

- With a cross-cut tungsten carbide bur, contour the shape of the teeth 1mm below the neck of the teeth. (> 30,000 rev./min.).



Polished

- Use a rotary polishing wheel to finish the edges of the appliance. (> 15,000 rev./min.).

Inspection

- Perform a quality control check to confirm that the device is perfect.

- To perform the contoured cut, a micromotor and a (silent) dental laboratory aspirator is necessary.
- To perform the contoured cut, always use protective glasses and a dust mask.

4 Prepare the labels

How to use Apli label software

PlaniLink

Download software

- Download the “APLI Soft PRO” software from the official website and install it on your PC.
- We will only use “APLI Label” of the four programs that will be installed. You can eliminate the other three.

Label creation

- Within the “Apli Label” software, select the label size you have purchased.
- Use the different tools to create your label.
- You can design it however you like. Don't forget to add the image of your logo.
- Once the label is created, it will be used for all your patients. Only the name and number of stages change.
- Implement the stage counter number with the “counter” tool. When they print the labels, the numbering of the stages changes automatically.

Send to print label

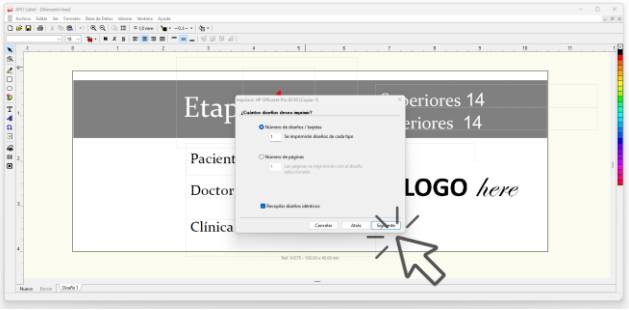
- Select the print icon.
- Add the number of how many stickers / stages you want to print. • Click “Next” and the printer will start working.

01

www.apli.com

02

03



- Check carefully the size of the label that you are going to print and stick on the packaging before buying them.
- You can easily buy these labels online. Simply search: “Dimensions and their use”.
- There is no editing limit, you can unleash your creativity. A label with well-selected colors and images can give your packaging a lot of appeal.
- You can also create labels for the attachment template or for the box in which you will give the aligners to your patient.
- We recommend that you maintain a standard label design for all your patients.

5 Labeling and packaging

Very easy: four steps

PaniLink

Label inspection

• Verify the printing and information on the labels before gluing.

01

Label pasting

• Peel off the stickers and carefully stick them on the packaging.
• Maintain a sticking standard so that all bags are the same.

02

Aligner packaging

• Insert the aligners into the packaging without folding them. • Check that the aligner number corresponds to the stage number on the packaging label.

03

Sealing the bags

• To close the packaging you can use heat sealing or ziplocks

04

• A common office printer can print the labels perfectly as long as the label sheet is Din A4 size. You don't need to buy a printer with special features.
• Check the size of the packaging carefully before purchasing them. Remember that not all mouths are the same size. For the aligner packaging we recommend a minimum interior size of 9 x 13cm.
• We recommend that you maintain a standard packaging design for all your patients.

PlaniLink

4Dental Technology

Planning is essential, but acting is the most important.
Take the first step to forge your own path.

www.planilink.com