



APPLICATION GUIDE

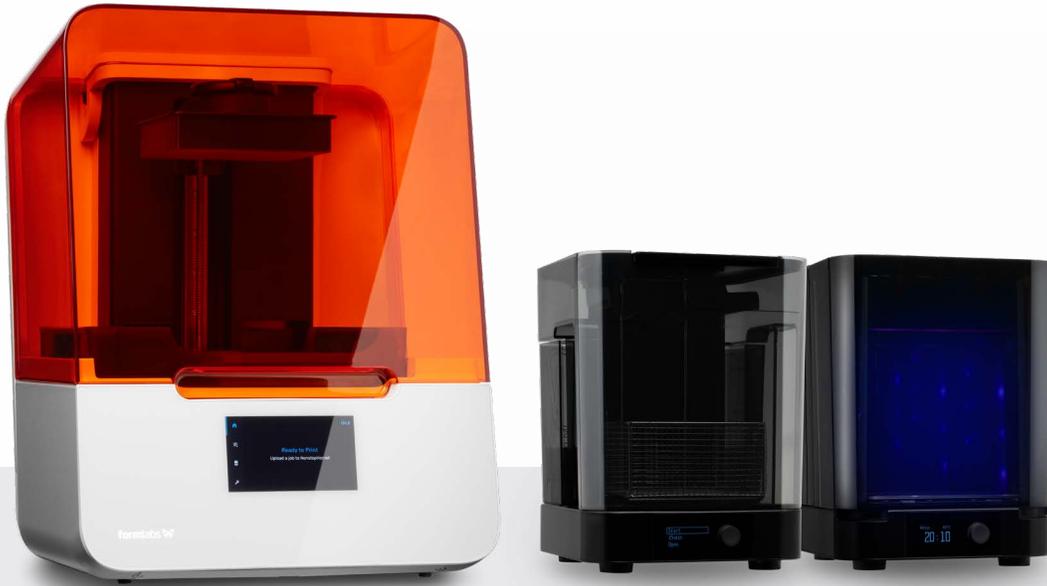
Indirect Bonding Trays for Orthodontic Bracket Placement With Formlabs 3D Printers

This application guide is a step-by-step walkthrough of the workflow for producing indirect bonding trays for orthodontic bracket placement with Formlabs IBT Resin and Formlabs Dental 3D printers. Always consult the official [Instructions For Use](#) included in the packaging of the resin for the absolute requirements.

IBT Resin is a flexible biocompatible material for efficient, accurate dental bracket placement. 3D printed indirect bonding trays reduce chair time and increase patient comfort by placing all of the brackets or entire quadrants at once. Class I compliant IBT Resin offers optimized tear strength, translucency, and flexibility, for appliances that are easy to plan, easy to use, and easy to remove.

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Workflow Requirements

Needed From the Dentist

A physical or digital impression of the patient's dentition

Made by Formlabs

- Formlabs SLA 3D printer
- Form 2 Resin Tank LT or Form 3 Resin Tank V2.1 or higher
- Standard Build Platform
- IBT Resin
- Form Wash
- Form Cure
- Finish Kit or secondary wash station
- PreForm 3.12.3 or higher
- Firmware 1.10.x or higher

Made by 3rd Parties

- Desktop scanner (if physical impression or model)
- Cutting and finishing tools (if printing on supports)
- Dental design software or outsourcing to a dental design provider
- Opaque or amber containers for appliance storage
- CBCT scanner (optional, depending on CAD software)

Note: For full compliance and biocompatibility, IBT Resin requires a dedicated resin tank, build platform, Form Wash, and Finish Kit, which should not be mixed with any other resins.

Note: Please [verify printer and resin compatibility](#) on the Formlabs support site before printing.

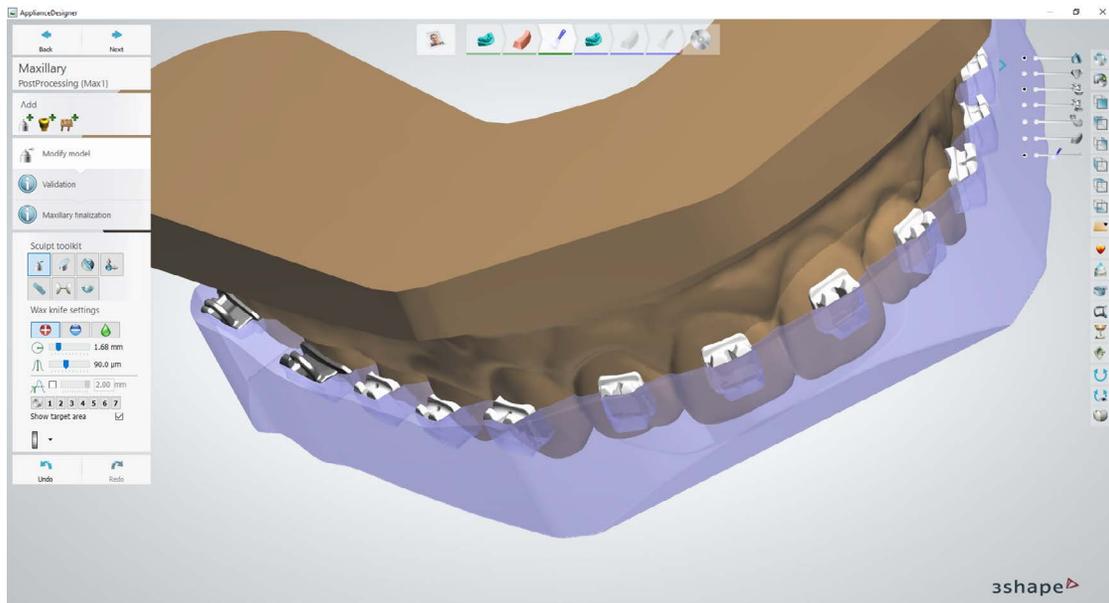
1. Scan



Dental design software requires a digital impression of the patient's anatomy in order to design the indirect bonding tray. To acquire this data, scan the patient directly with a 3D intraoral scanner or scan a physical impression or poured model with a desktop 3D scanner.

While CBCT data is optional, some IBT design software supports this data, which can be extremely useful for case planning and setup.

2. Design



2.1 Design the Indirect Bonding Tray

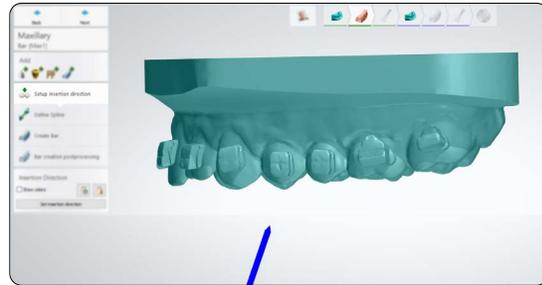
In this section we will outline design parameters and best practices for 3Shape Ortho System (Ortho Analyzer and Appliance Designer). The fundamentals and recommendations can still be helpful for other treatment and planning softwares and should be reviewed.

You can also send the digital impression and requirements to a dental CAD outsourcing provider, like a dental design center or specialized dental laboratory, to create the appliance and manufacturing file.

Using 3Shape Ortho System, we recommend using “Bar” type appliances. For more detailed guidance on how to set up and design these appliances, refer to 3Shape’s [application guide](#).

2.1.1 Insertion Direction

Ensure the correct insertion direction. This can influence how offsets and undercuts are applied and impact physical insertion of the final appliance.



2.1.2 Appliance Construction and Type

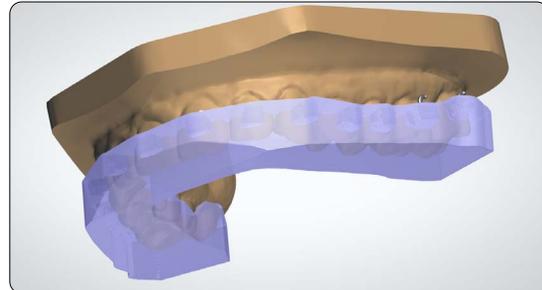
There are typically two ways to set up and create indirect bonding trays:

- 1 Bar
- 2 Offset

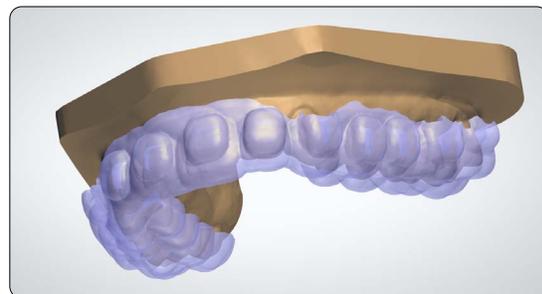
After our testing, we recommend **bar design** as it provides a few advantages:

- Flexibility around brackets since the appliance is still thin in critical areas
- Thicker bottom surface providing some useful rigidity to the appliance
- Ability to print directly on the build platform, removing the need for support structures

Note: There are different CAD offsets for bar designs and offset designs, see details below.



1 Bar type design example

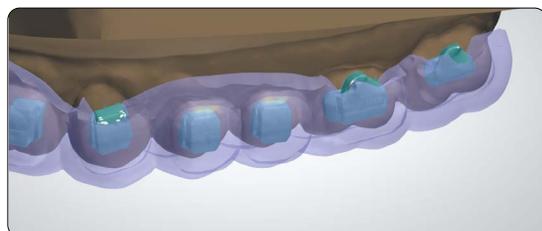
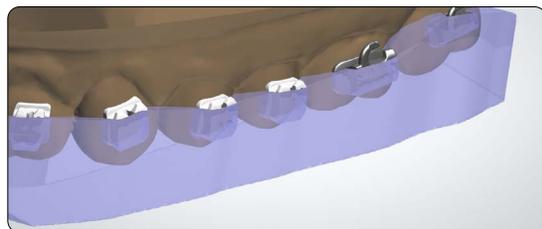


2 Offset type design example

2.1.3 Container Design and Coverage

In our testing, we found half- or three-quarter container coverage the best way to design IBT appliances, especially using the bar type design.

Since the offset appliance design type is a thinner (thus more flexible) appliance, certain brackets may benefit from full coverage containers. **Full coverage should not be used on brackets with hooks. The bracket hooks can be caught in the appliance during removal.**



1 BAR DESIGN SETTINGS AND OFFSETS

Appliance Minimum Thickness: 2.0 mm

1. Containers

Inner surface offset	0mm
Block-out angle	0deg
Retention amount	0mm
Prolongation length	1mm
Brack slot block-out	checked



2. Finalization

Do not modify	unchecked
Subtracted model	checked
Use offset for inside surface	unchecked
Remove undercuts	unchecked
Extra combine with model	unchecked

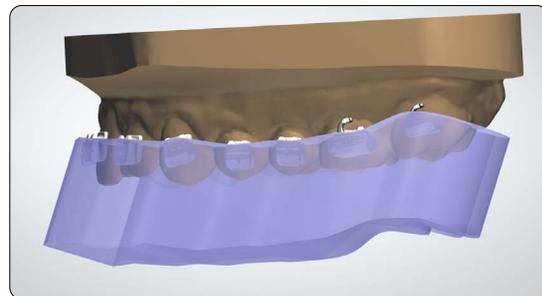


3. Modify Model



In the final step, you have the ability to **Modify model (see 1)**. In the **Bar Design** workflow, it is critical to remove excess material in this stage.

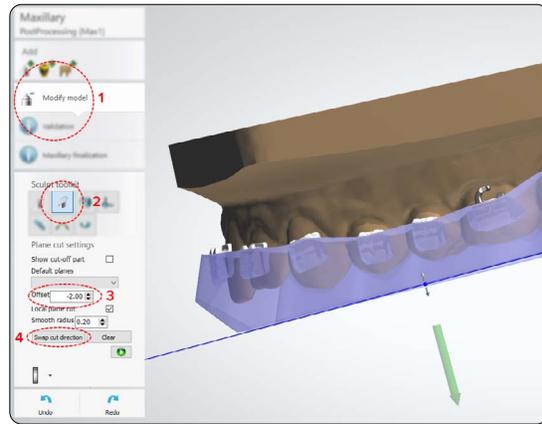
This is an example of a completed bar design that requires some modification.



To start, orient the model so the occlusal surface is perpendicular to the viewing angle. This ensures that any plane cuts will leave an equal amount of material from the bottom surface of the appliance to the intaglio surface.

Click the **plane cut tool (see 2)** and drag the mouse to cut any excess geometry.

You can check and edit the distance to the anatomy model by referencing or changing the **offset (see 3)** value.

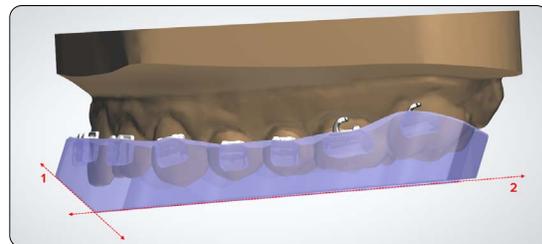


Note: Minimum material thickness is 2.0 mm.

After drawing the cut plane, be sure the green arrow is facing the side that needs to be cut away. Click **Swap cut direction** to change which side is removed (see 4).

Plane cut 1 is optional, but provides a pry point once the part is printed.

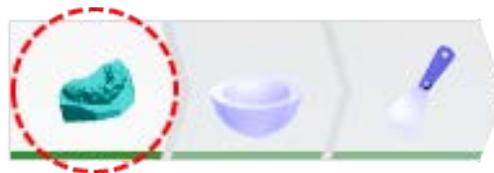
Plane cut 2 is drawn parallel to the occlusal plane and creates a flat surface to 3D print the part efficiently.



2 SHELL DESIGN SETTINGS AND OFFSETS

1. Setting

Thickness	2mm
Remove undercuts	unchecked
Use offset for inside surface	unchecked
Edges smoothing	none



2. Containers

Inner surface offset	0mm
Block-out angle	0deg
Retention amount	0mm
Prolongation length	1mm
Brack slot block-out	checked



2.2 Export the STL File

Once the case has been designed to specification, manufacturing can begin. The majority of dental design software generates a manufacturing file in STL format. Locate the file and move it into the [print preparation software, PreForm](#).

3. Print Setup in PreForm

Note: Use PreForm version 3.12.3 or higher and firmware 1.10.x or higher.

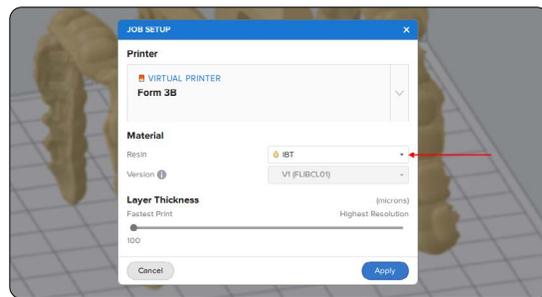
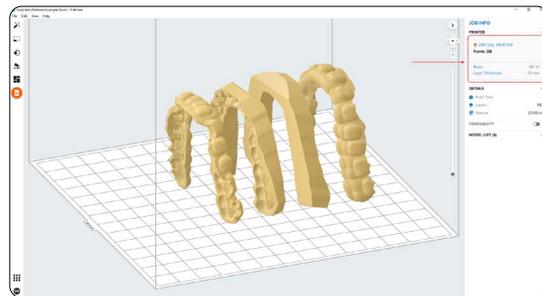
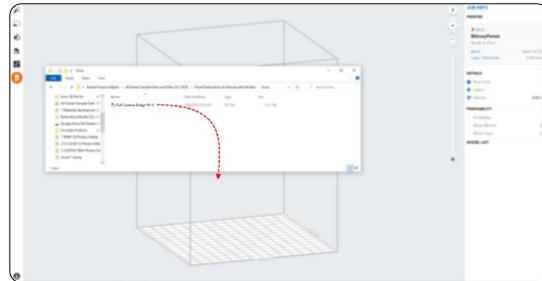
3.1 Import File(s)

Import or open the design file(s) by dragging them into PreForm, or use the File menu to locate them on your computer or network.

3.2 Material Selection

Select the material for printing by clicking the printer box in the Job Info menu on the right hand side.

Locate IBT in the material dropdown.



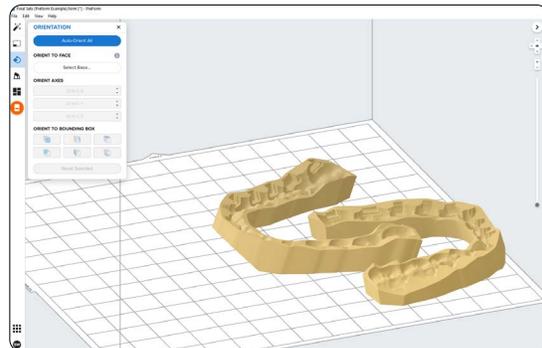
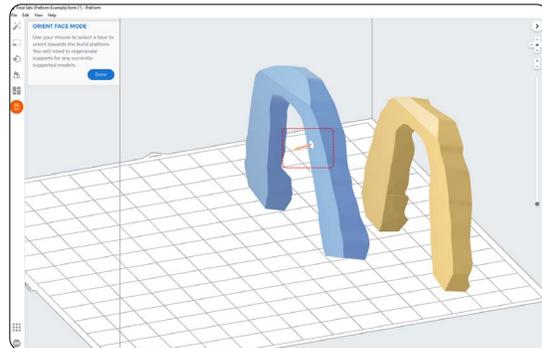
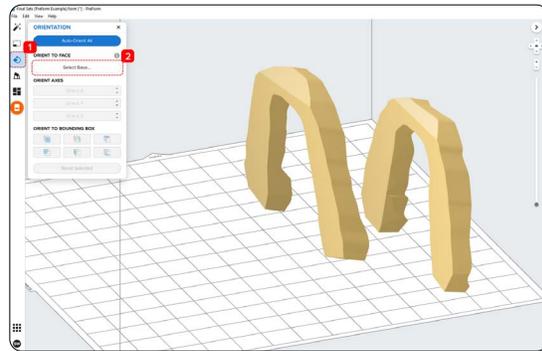
3.3 Orientation

3.3.1 Positioning Bar Type Appliances

If you designed the appliance using the bar technique, you can adhere the bottom surface directly to the build platform.

Open the **Orientation** tool (see 1) and click the **Select Base...** (see 2) button.

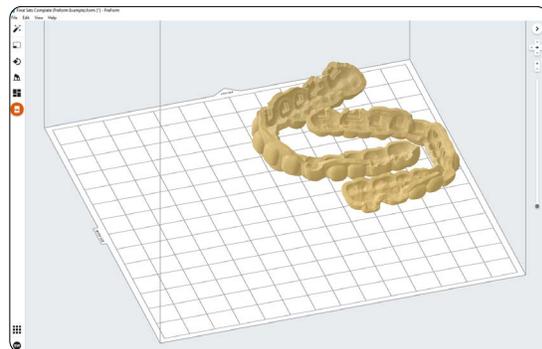
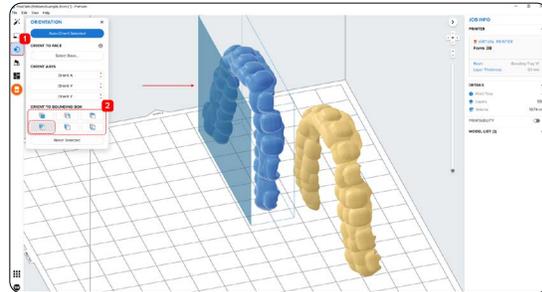
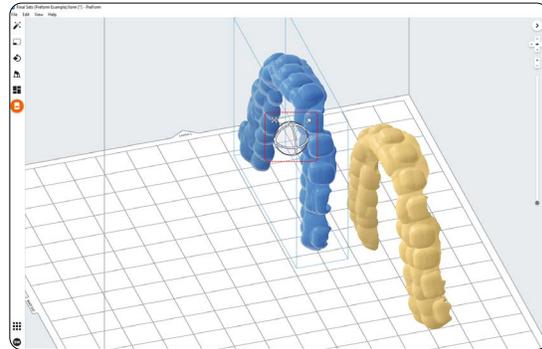
Next, click the bottom surface of the part to adhere it to the build platform.



3.3.2 Positioning Offset Type Appliances

To rotate a part into the correct position, with the part selected, click and drag the sphere manipulator.

Another option is to open the **Orientation** tool (see 1) and hover over the surface icons under the **Orient To Bounding Box** (see 2) section to find the bottom or occlusal surface of the part.

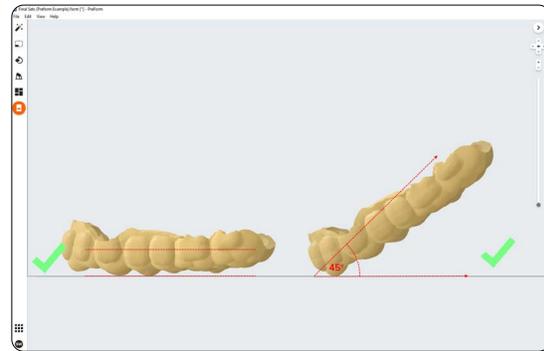


3.3.3 Angulation

Proper part orientation ensures part accuracy and fitment.

Always position the appliance with the intaglio surface facing away from the build platform.

The part should be **parallel to the build platform or at most a 45 degree angle**, with the anterior section toward the build platform.



Note: Printing times vary depending on object orientation and job setup.

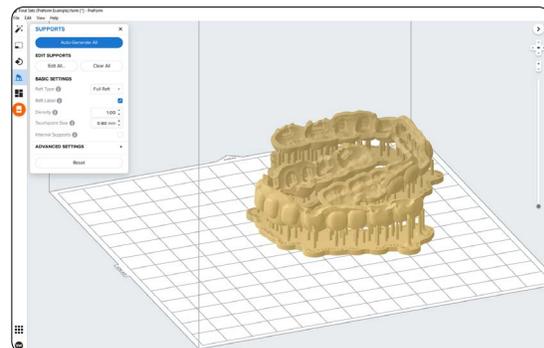
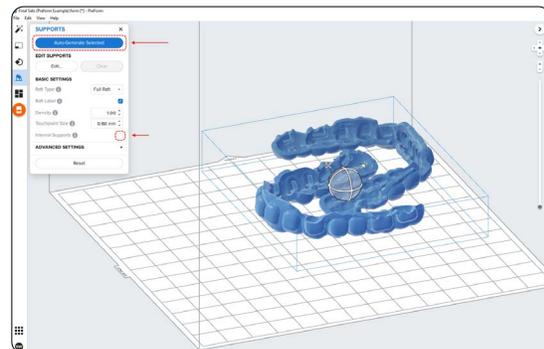
3.4 Generate Support Structures

Depending on the overhanging surfaces, it is possible to print **bar type appliances** that are adhered to the build platform without any support structures.

3.4.1 Automatic Support Generation

For cases where supports are needed, open the **Supports** tool on the left side of PreForm and click the **Auto-Generate Selected** or **Auto-Generate All** button.

If adding supports to a bar type design that should be printed directly to the build platform, change the **Raft Type** to **None** in the **Supports** tool.



Note: Uncheck the **Internal Supports** button to prevent generation of unnecessary support structures.

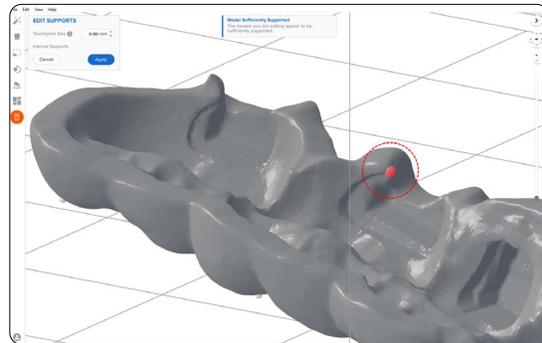
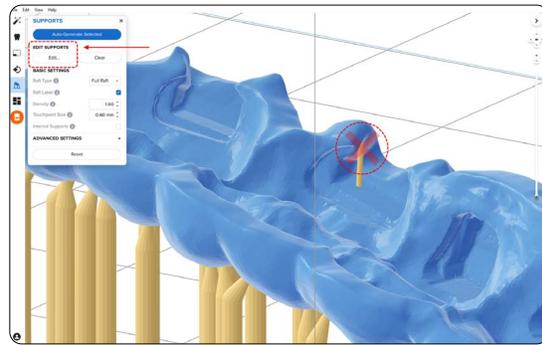
3.4.2 Manual Support Editing

Once supports are generated, verify their locations. If a support point is not in an ideal location, you can edit their location by clicking the **Edit...** button in the **Supports** menu.

Note: With internal supports turned off and correct orientation, there is typically no need to edit supports.

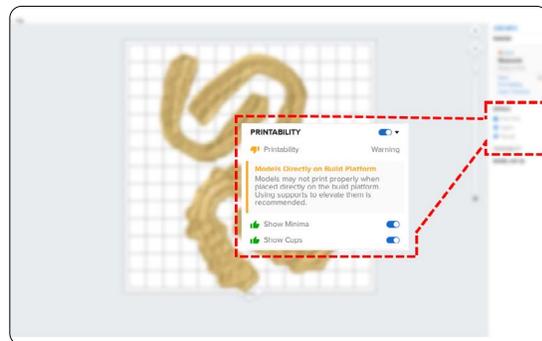
Click on a support touchpoint sphere to remove it and click on areas without supports to add touchpoints.

PreForm will indicate in red which areas might require additional support.



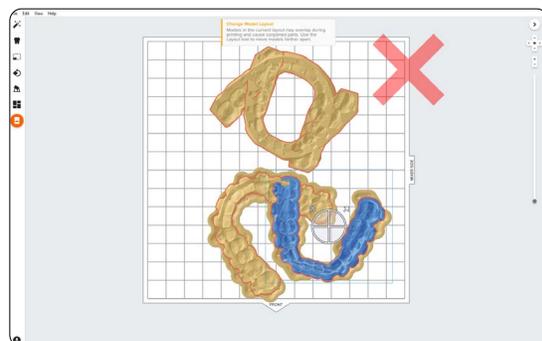
Confirm under the **Job Info** menu bar on the right side of the screen that **Printability** shows a green thumbs-up.

When printing parts directly on the build platform, you will see a printability warning. If the part is snapped down to the build platform as outlined in the above section, it is okay to ignore this error.

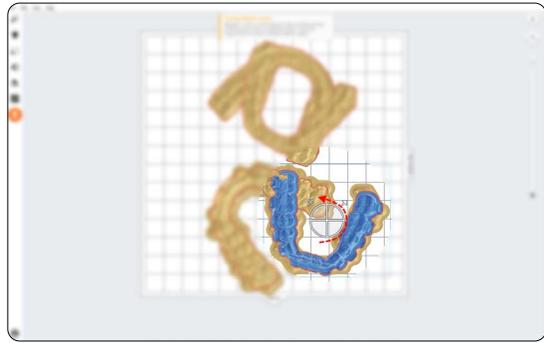


3.5 Printing Layout

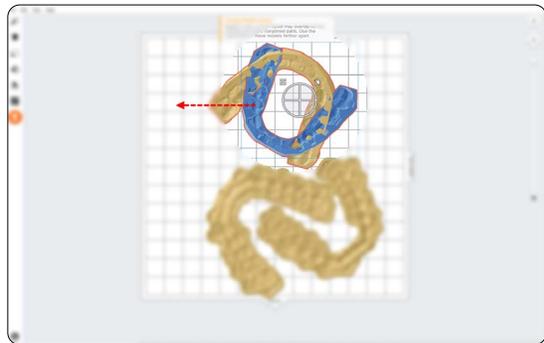
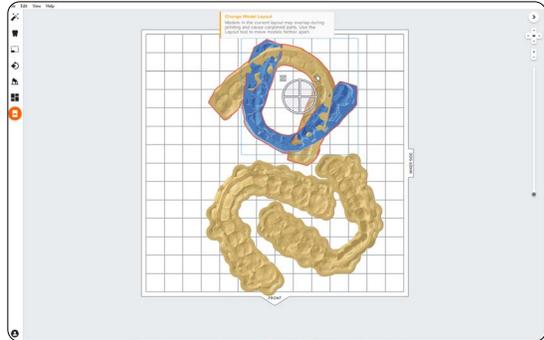
Whether you are printing on support structures or directly on the build platform, position the parts so they are not overlapping each other. Overlapping parts will be outlined in red.



To rotate the part while it is selected, click-and-drag the outer edge of the orientation sphere.

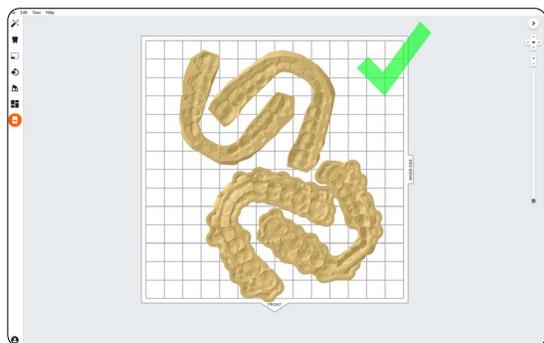


To move the part, click-and-drag anywhere on the part.



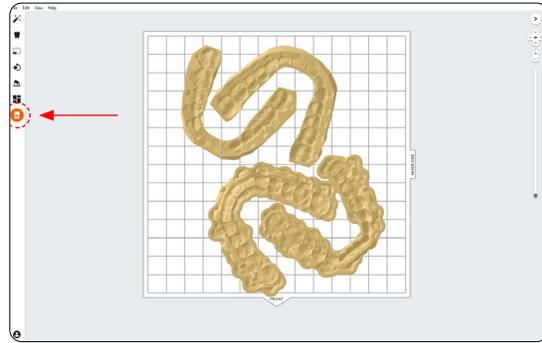
Note: Overlapping the support raft is okay.

Once layout is complete, the job is ready to send to the printer.

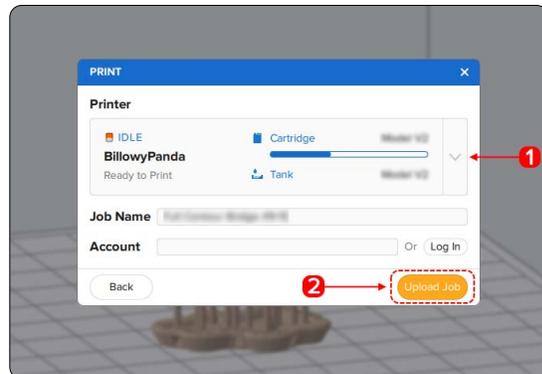


3.6 Transfer the Job to the Printer

Send the job to the printer by clicking the orange printer icon on the left side of the screen.



The **Print** dialog box will open. Here you can change **the printer the job is being sent to (see 1)**, rename the job, and send the job to the printer using the **Upload Job (see 2)** button.



3.7 Set Up the Printer

Shake the IBT Resin cartridge and then insert the cartridge, a build platform, and a compatible resin tank into the Formlabs 3D printer.

- Begin printing by selecting the print job from the printer's touchscreen.
- Follow any prompts or dialogs shown on the printer screen.
- The printer will automatically complete the print.

Attention: For full compliance and biocompatibility, IBT Resin requires a dedicated resin tank and build platform. Only use the Form Wash rinse station with other Formlabs biocompatible resins, such as Dental LT Clear V2 Resin.

4. Post-Processing

Note: Always use gloves when handling uncured resins and parts.

4.1 Part Removal

Remove printed parts from the build platform by wedging the part removal or scraping tool under the part raft and rotating the tool.



4.2 Washing

Precautions

1. When washing the printed part with solvent, ensure a properly ventilated environment with proper protective masks and gloves.
2. Expired or unused IBT Resin shall be disposed of in accordance with local regulations.

Place the trays in a Form Wash filled with isopropyl alcohol (IPA, $\geq 96\%$) and wash them for 20 minutes.

Make sure the parts are fully submerged in IPA when washing.

Exceeding wash duration may affect dimensional accuracy and performance of printed parts over time.



4.3 Drying

Remove parts from IPA and leave to air dry at room temperature for at least 30 minutes in a well-ventilated area.

Compressed air can be used to help dry parts and allow for rapid inspection of unwashed resin. Still allow for sufficient bench drying if using compressed air.

If extra drying time is needed, minimize the part's exposure to UV light.



Inspect printed parts to ensure that parts are clean and dry. No residual alcohol, excess liquid resin, or residue particles must remain on the surface before proceeding to subsequent steps.

If any wet, uncured resin is still present after drying, use a squeeze bottle with fresh IPA to remove uncured resin, then air dry the parts again. Again, use of compressed air allows for rapid inspection.



4.4 Post-Curing and Support Removal

To maintain dimensional accuracy and biocompatibility, specific post-curing instructions must be followed.

4.4.1 Post-Curing

If indirect bonding trays are printed with rafts and supports, place printed parts in a Form Cure with the raft side down. If the trays are printed directly on the build platform without supporting structures, place the part in a Form Cure with the intaglio surface of the appliance facing up.

Post-cure the parts in a Form Cure at 60 °C (140 °F) for 60 minutes.



4.4.2 Support Removal

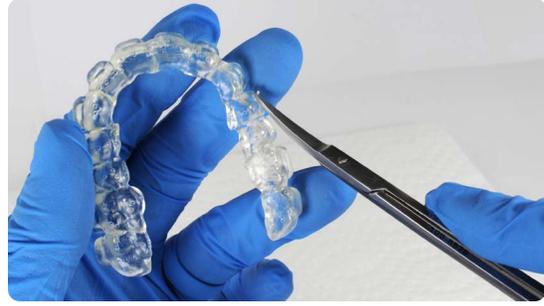
If supports were used, remove the supports using the clippers provided in the Formlabs Finish Kit or scissors.

Note: While ripping the supports from the part might be quicker, it can leave divots in the part or damage the flexible indirect bonding tray. We recommend cutting the supports off individually.



4.5 Finishing

After support removal, if any support structures are left on the surface of the 3D printed indirect bonding tray, you can remove them with a set of sharp iris scissors.



Inspect the appliance. Discard and reprint it if any damage or cracks are detected.



5. Appliance Care and Use

Adhesive UV Cure Light Recommendation

While working with orthodontists, we found having the right UV curing light greatly improves adhesion of the brackets through the indirect bonding tray. A fairly affordable, high powered light we recommend is the Ledex WL-090+ Curing Light.



Cleaning

Fully post-processed parts can be cleaned using neutral soap and room temperature water. After cleaning, always inspect parts for any cracks. Discard if any damage or cracks are detected.



Disinfection

The indirect bonding tray may be cleaned and disinfected according to facility protocols. Tested method of disinfection includes: soaking the finished indirect bonding tray in fresh 70% IPA for 5 minutes.

Note: Do not leave the part in the alcohol solution for longer than 5 minutes.

After disinfection, inspect the part for cracks to ensure the integrity of the indirect bonding tray.

Storage

When not in use, place printed parts in closed, opaque or amber containers. Store in a cool, dry place out of direct sunlight. Excess light exposure overtime may affect the color and performance of printed parts. Store the cartridges at 10 °C–25 °C (50 °F–77 °F). Do not exceed 25 °C (77 °F) when in storage. Keep away from ignition sources.



Disposal

1. Any cured resin is non-hazardous and may be disposed of as regular waste.
 - a. Follow facility protocols for waste that may be considered biohazardous.
2. Liquid resin should be disposed of in accordance with government regulations (community, regional, national).
 - a. Contact a licensed professional waste disposal service to dispose of liquid resin.
 - b. Do not allow waste to enter storm or sewer drainage systems.
 - c. Avoid release into the environment.
 - d. Contaminated packaging: Dispose of as unused product.



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