



## Dental Application Print Guide

# 3D Printing Dental Models For Clear Aligners

SprintRay's Gray Resin allows you to print accurate models used for making clear aligners, retainers, and other orthodontic appliances. Gray resin is a photopolymer resin with high strength and excellent dimensional accuracy.

In this workflow guide we will cover the following:

- ✓ Best practices for 3D printing dental models
- ✓ Cleaning and post-processing
- ✓ Fabrication of clear aligners

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## STEP 1

### Digitizing Impression

In order to print the dental model, the patient's impression must first be captured digitally. This can be accomplished with intraoral impression scanners, desktop impression/model scanners, or via CBCT impression/model scanners.



### Designing Clear Aligners

3D printed models can be used in the fabrication of clear aligners, retainers, and other orthodontic appliances. This process involves printing the models, then thermoforming the aligner or appliance on the 3D printed model.

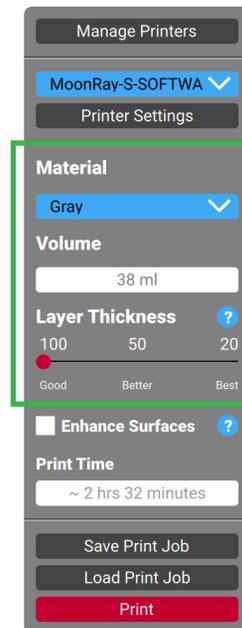
SprintRay Software allows you to choose the orthodontic design software that best meets your clinical needs. This list shows our recommended options, however our software accepts any design file formatted in .STL, which means you can use whichever software you're most comfortable with.



## STEP 2

### Print Preparation in Software

To begin, import the dental model into SprintRay Software. The recommended model resin is SprintRay Grey Resin and layer thickness for a dental model being prepared for orthodontic applications is to be set at 100 microns.



### Print Settings

Note that models can be printed at 50 microns or even 20 microns, but this will adversely increase print time with only minor enhancements to surface quality.

### Printable Data

Example of ready-to-print data.



### Non-Printable Data

Direct scanned data will be displayed as open mesh in SprintRay Software. This data requires 3rd party software to make it printable.



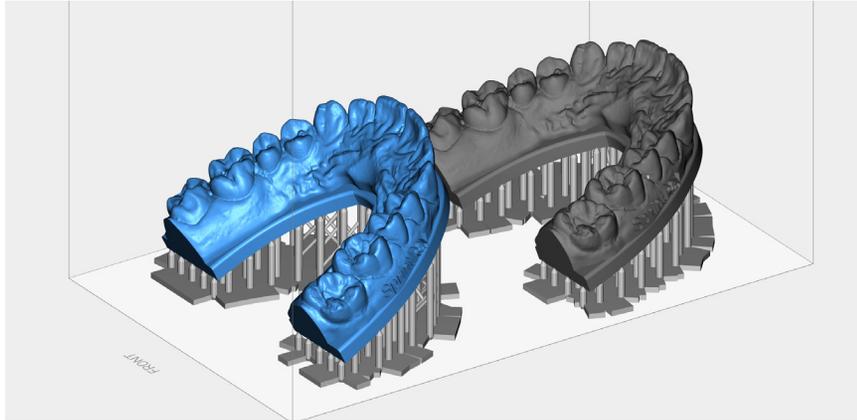
### Setting Up Accurate Prints

To print precisely with SprintRay Gray resin for Orthodontic purposes, it is important to orient the model correctly in order to avoid generating unnecessary support structures or support attachment points on or near clinically important surfaces; this ensures model accuracy and overall fit.

To accomplish this it is recommended to print models base down directly on the build platform; ensuring SprintRay Gray Resin is selected, and Layer Thickness is set to 100um or microns.

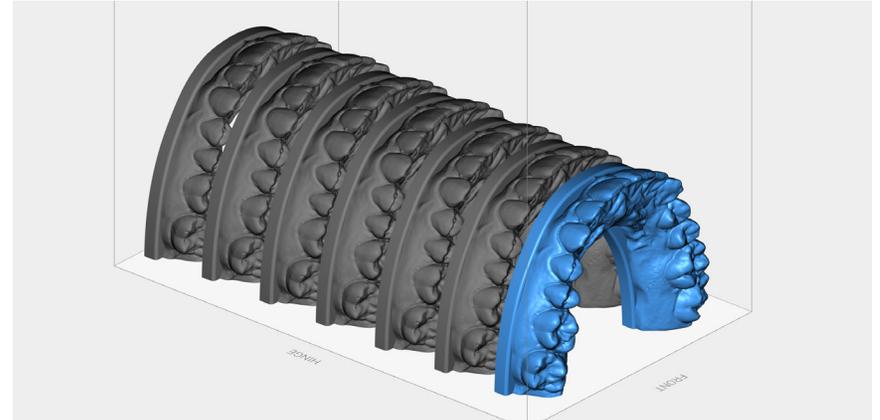
## STEP 2

### Setting Up Accurate Prints



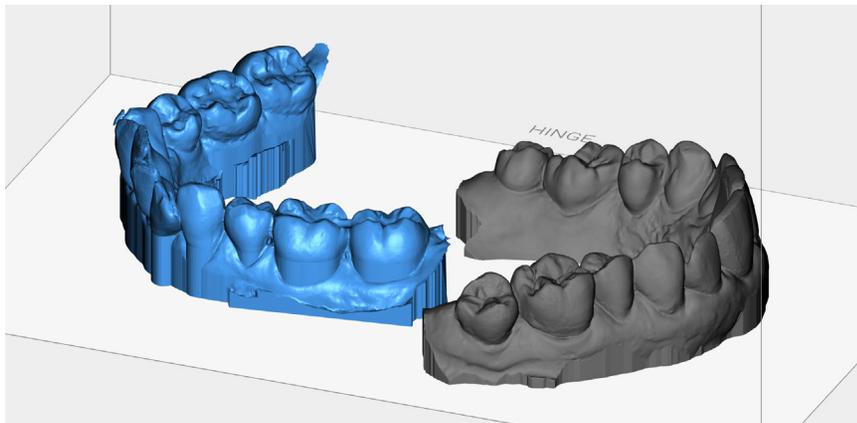
#### Models with Supports

Import models, orient them at the desired angle, and add supports to ensure they are printable. You can duplicate models if you'd like to print simultaneously.



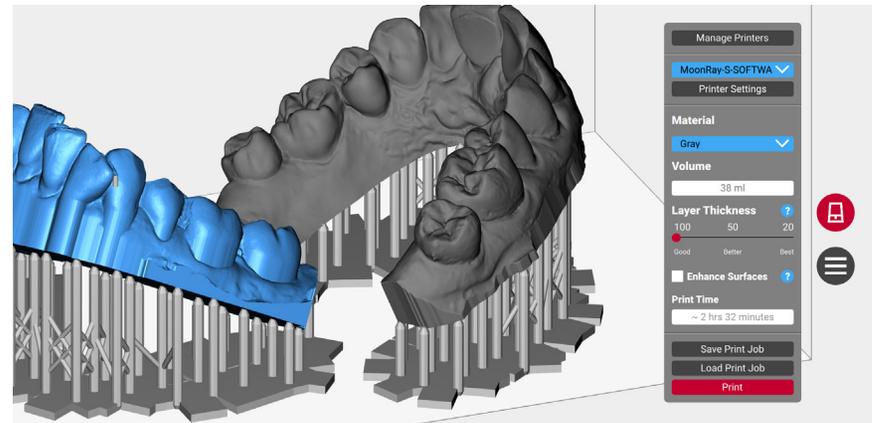
#### Printing Models Vertically (Advanced)

You can orient models vertically to maximize the number of dental models that fit within the parameters of the build platform.



#### Models with No Supports (Advanced)

Advanced users can print models with no supports by placing the models directly on the build platform. This technique increases overall print speed but it is only recommended for advanced users.



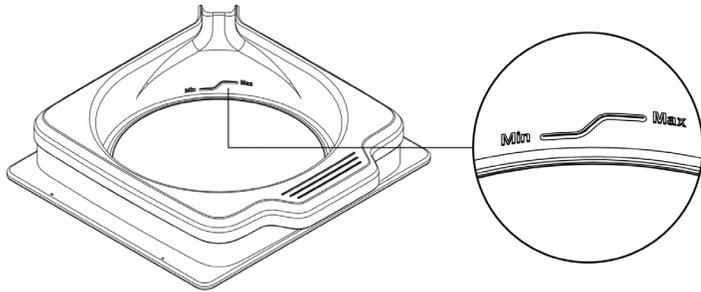
#### Printing

Connect to your 3D printer, select the desired settings, and send to print. Make sure to double check that you have selected the correct resin.

## STEP 3

### Printing on MoonRay

Before you begin printing, shake the SprintRay Resin bottle for 10 minutes to ensure complete mixture of the resin's chemical formulation. Fill the tank with the resin until it is above the min fill line, careful not to exceed the max. Now the print can begin.



If there is leftover resin in the tank from the previous print, use the provided resin wiper to stir the resin before printing. This ensures that the resin is properly mixed and clean.

### Maintaining the Resin Tank Drum

When cared for properly, the resin drum in MoonRay is designed to last for 50 liters of use. Resin left over after a print can be left in the tank for up to 24 hours. However, note that prolonged exposure to bright lights and air may inadvertently cause it to begin curing. It's therefore recommended that you pour extra resin back into the bottle and clean the tank within 24 hours.

To clean, gently use a paper towel and isopropyl alcohol to wipe the interior. Avoid using a coarse cloth or sharp tools to loosen cured resin from the tank, as this may cause damage. After 50 liters of use, the tank may become cloudy, causing your models to peel. If this happens, replace your resin tank to ensure continued print accuracy.

## STEP 4

### Post-Processing

After printing, models must be rinsed, dried, removed from the support structure, and then post-cured. Read the following for detailed instructions on how to effectively post-process the 3D printed model.

#### Washing Parts

Bathe the 3D printed model in a bath of 96% isopropyl alcohol (IPA) to remove any liquid resin. Use a toothbrush to scrub the surface of the model to remove any partially-cured resin.

Once the majority of the resin is removed, transfer the model into an ultrasonic cleaner filled with clean IPA for no more than 5 minutes. For this process, orient the occlusal surface of the model downward to allow resin to fall away during the agitation process.

In total, the print should spend no more than 10 minutes in alcohol to avoid micro-cracks and abrasions. Once cleaned, air-dry the print using compressed air. If there are any particles or residue still on the model, spray it down with more alcohol. Rinse, dry, and repeat until all uncured resin is removed.

**FIRST**

**IPA Brush**  
<5 minutes

**SECOND**

**UltraSonic**  
<10 Minutes

**THIRD**

**Air Dry**  
5 Minutes

#### Removing Supports

Manually snap off or use a flush cutter to snip away the support structure from the printed model. Using the flush cutter, cut the supports as close as possible to their attachment points on the model. Be careful not to nick the model itself, as this can cause pitting that may be difficult to remove during sanding.

## STEP 4

### Post-Curing Requirements

The 3D printed models must be properly post-cured to manufacturer's specifications before use. The color of the model will slightly change during the post-curing process. Recommended post-cure time is 30 minutes ± 25 °C with a post-curing unit equipped with 405 nm LEDs with the output of 36 watts.

Duration	Temperature	Wavelength
30 Minutes	25 °C	405 nm



## STEP 5

### Thermoforming Clear Aligners

3D printed models can be used in the fabrication of clear aligners and other dental appliances. This process involves printing the models then thermoforming the aligner or appliance on the 3D printed dental model.

Follow your thermoforming device manufacturer and aligner plastic manufacturer guidelines for the thermoforming processes.



#### Preparation

Use manufacturer's instructions to setup molding process.



#### Place and Align

Place the model in the center of the base of the machine. Align plastic and heating element over the model.



#### Molding Process

Perform molding process according to your thermoforming machine manufacturer's instructions.



#### Finishing Process

Remove molded appliance from thermoforming machine and trim it to specifications.



## Customer Support

Successful printing is crucial to your practice. If you're experiencing issues, please get in touch. Our customer support team works Monday through Friday, 9AM - 5PM PST.

[www.support.sprintray.com](http://www.support.sprintray.com)

## Free Consultation

Set up a free consulting session with our sales team to see how 3D printing can dramatically enhance your dental practice and help improve patient care from day one.

[sales@sprintray.com](mailto:sales@sprintray.com)



3577 N Figueroa St,  
Los Angeles, CA 90065

[www.sprintray.com](http://www.sprintray.com)  
[info@sprintray.com](mailto:info@sprintray.com)