3D Printing Dental Models

SprintRay's Gray and Dental Model Resin allow you to print accurate models for dental study, removable die models, wax up models, and models used for the fabrication of other appliances. Both are of these products are photopolymer resins 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

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.
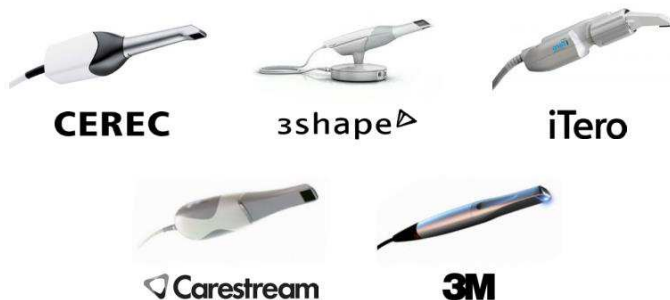
Designing Clear Aligners

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

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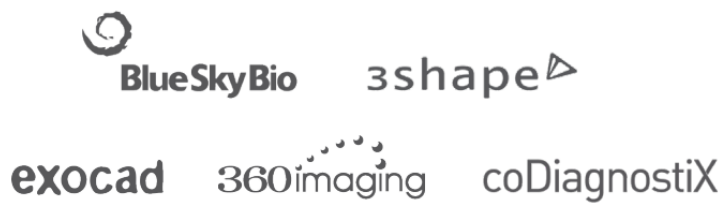

Step 2

**Print Preparation in Software**

To begin, import the dental model into SprintRay Software. Recommended layer thickness for dental model is 50 microns. Note that they can be printed at 100 microns, but this will adversely affect the surface quality.

In cases where a fully printable model is not created with the scanner, a 3rd party software is required to prepare the model for print. For additional information on how to repair non-printable models please visit support.sprintray.com
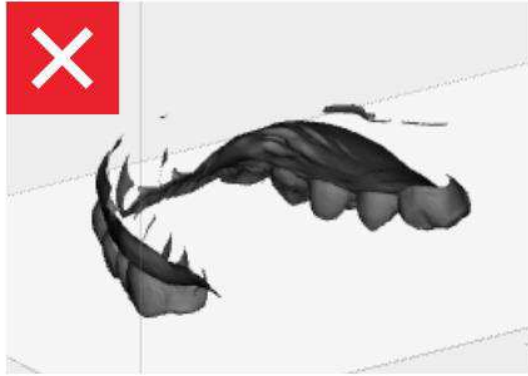
Non-Printable Data
Direct scanned data will be displayed as open mesh in SprintRay Software. This data requires 3rd party software to make it printable.
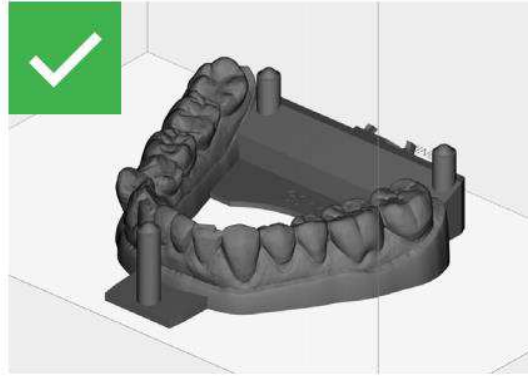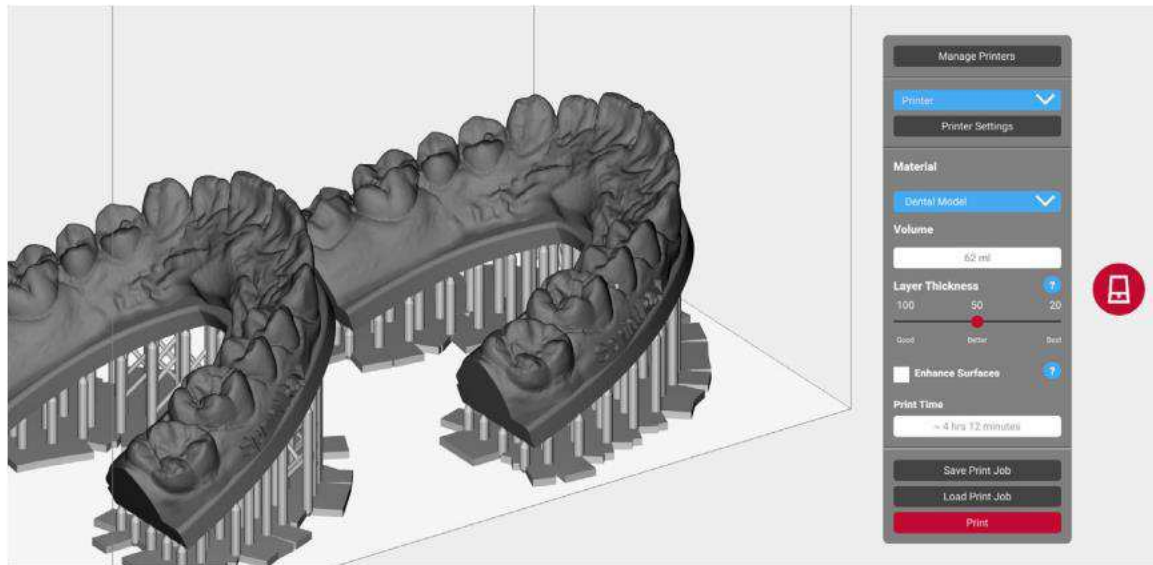
Printable Data
Example of ready-to-print data.

Setting Up Accurate Prints

To print precisely with SprintRay Gray and Dental Model resin, it is important to orient the model correctly to avoid generating support structures on important holes or surfaces; this ensures accuracy of the fit.
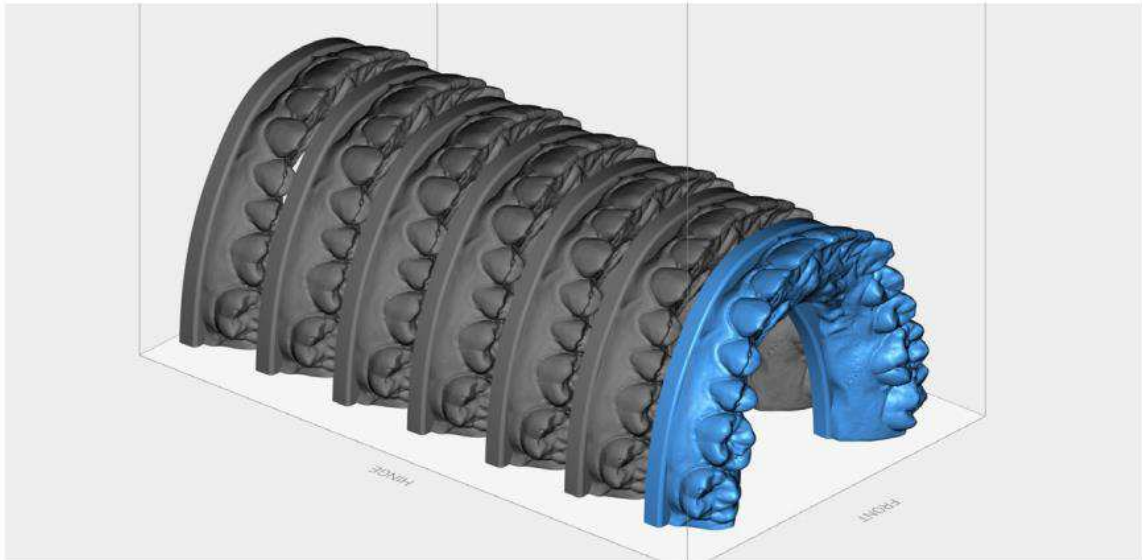
Printing

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.
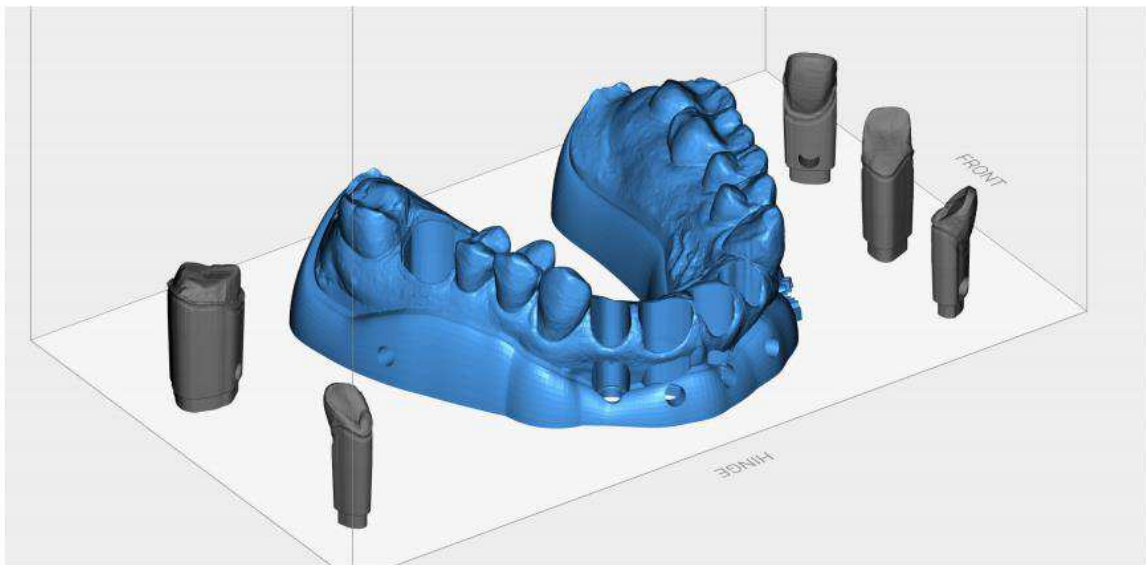

Models with No Supports (Advanced)

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

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.
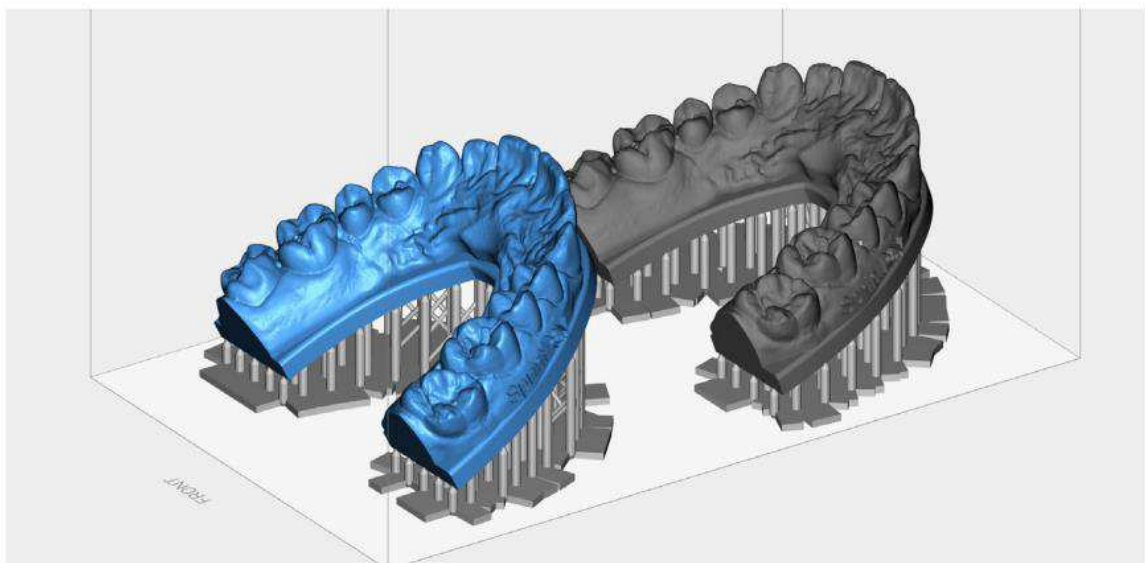

Models with Supports

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.

Step 3

Printing on MoonRay

Before you begin printing, shake the SprintRay Resin bottle 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.
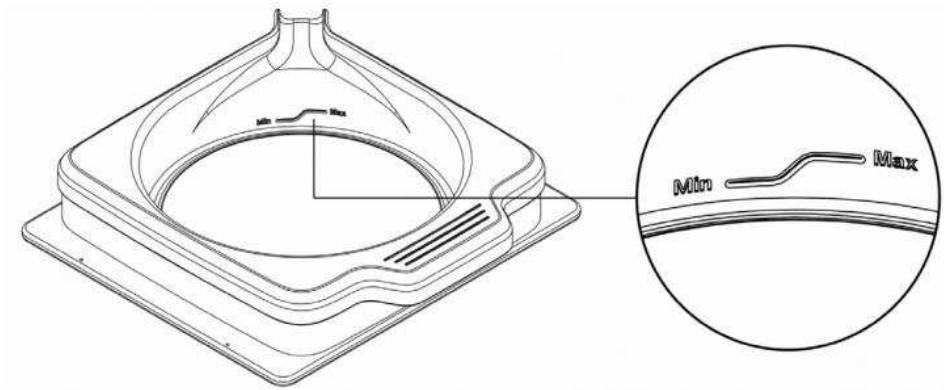
If there is leftover resin in the tank from the previous print, use the provided resin wiper to stir the resin before printing. This ensures that the resin is properly mixed and clean.

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.

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	SECOND	THIRD
IPA Brush <5 minutes	**UltraSonic** <10 Minutes	**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.

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 between 15-25 minutes depending on the specification of your curing unit.

Polishing Printed Models (Optional)

To ensure a smooth surface finish, take a small file and sand away any remaining nubs left over by the support structure. Sand in a circular motion to remove the nubs without leaving deep sanding marks; the goal is to blend the nubs into the surface of the print. Once finished, use high grit sandpaper to blend the sanded areas. To achieve a polished look, apply chapstick to mask the sanding scratches.