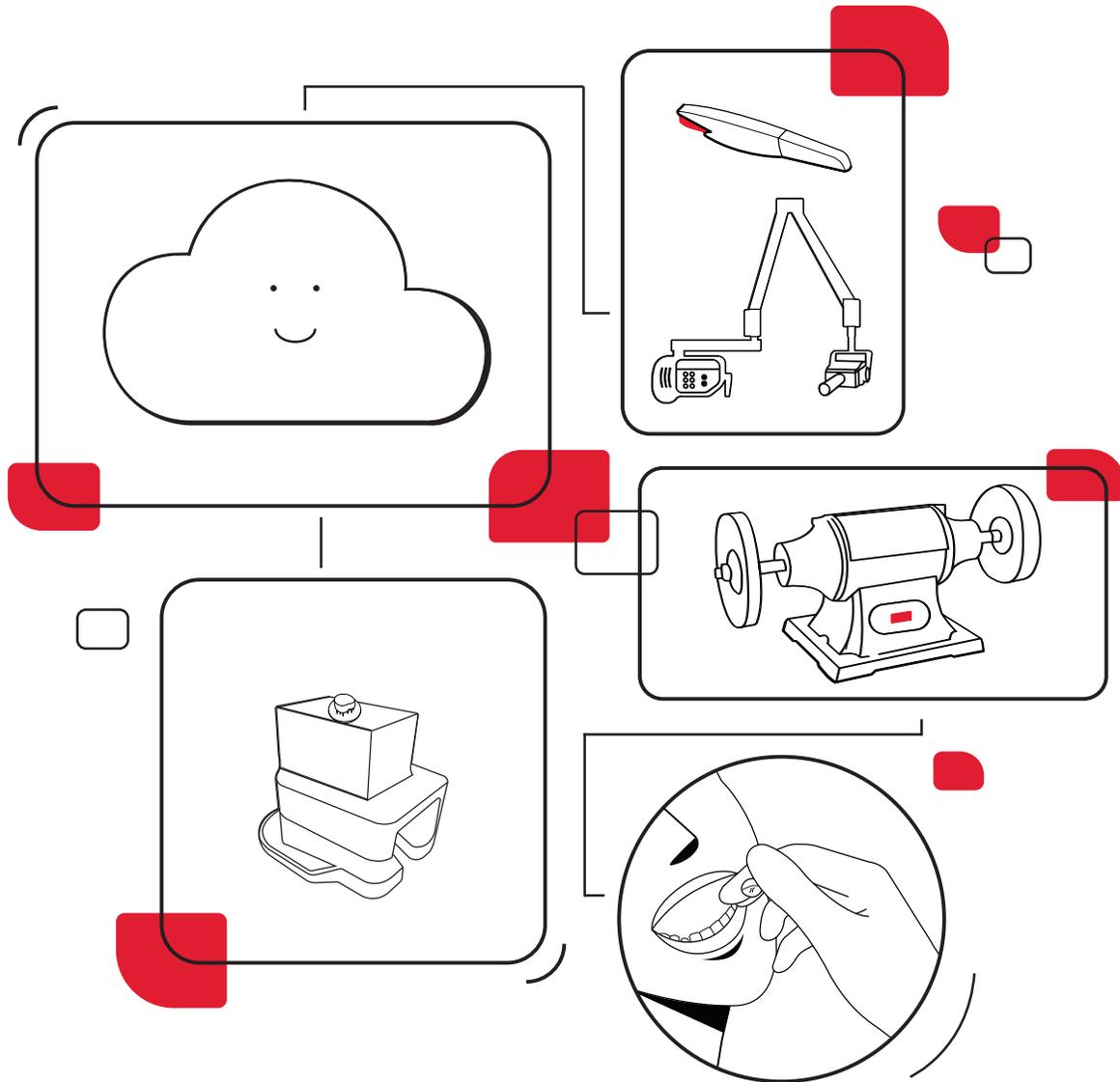


SprintRay • 3D Printing for Crown Workflow Guide

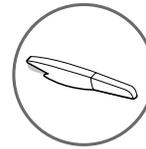


With 3D printing, you can provide chairside ceramic crowns to more patients for a fraction of the cost of other in-office methods. This guide will walk you through the process of data gathering, design, fabrication, preparation, and placement.

Table of Contents

1. Capture Data and Prep Tooth

- 1.1 Pre-prep Scans
- 1.2 Prep Tooth
- 1.3 Post Prep



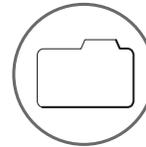
2. Plan Treatment

- 2.1 Submit Treatment Request
- 2.2 Review and Approve Design



3. Create a Print Job

- 3.1 Import into RayWare
- 3.2 Verify Setup
- 3.3 Send to Printer



4. 3D Print

- 4.1 Import into RayWare
- 4.2 Verify Setup



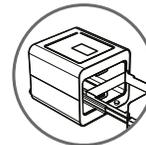
5. Clean

- 5.1 Remove from the Build Platform
- 5.2 Remove Supports
- 5.3 Clean



6. Post Cure Prosthetic

- 6.1 Place in ProCure 2



7. Rinse with IPA



8. Prepare for Placement

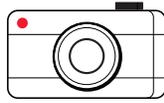
- 8.1 Smoothen the Prosthetic
- 8.2 Characterize
- 8.3 Disinfect and Deliver



1. Capture Data and Prep Tooth

Time:
20 minutes

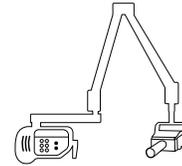
Tools:



Camera



Intraoral Scanner



X-ray Scanner

1.1 Pre-prep Scans

Digital X-ray

Capture an X-ray of the current tooth for documentation and to maximize your anatomical understanding of the patient's anatomy.

Intraoral Scans

Before the patient is numb, use an intraoral scanner to capture the opposing arch as well as a bite scan. These points of data will be used during the design phase.



Scans can be taken after the patient goes numb, but scanning beforehand will provide the most accurate data for your design.

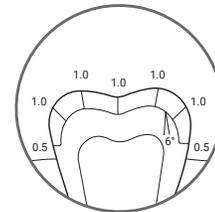
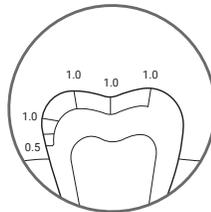
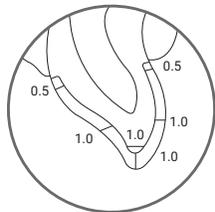
1.2 Prep Tooth

Evenly reduce the tooth while observing the minimum thickness, creating a circular shoulder with rounded inner edges. Always consult the IFU for the material you're using. The below are best practice guidelines when prepping for a 3D printed crown.

Shoulder width: 0.5 mm incisal, 1 mm occlusal

Vestibular or lingual reduction: 1 mm for anterior, 1 mm for posterior teeth

Incisal edge: 1 mm



For partial crown and veneer cases, consult the resin IFU for guidelines and minimum thicknesses.

1.3 Post-prep Scans

Once you've prepped the tooth, it's time to capture the prepped area and surrounding anatomy. Take a detailed intraoral scan of the prepped area, as well as the adjacent teeth and gums. This data will be used in designing the crown.

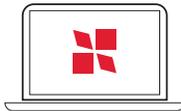
Retract the gum surrounding the prepped tooth, as you'll need to capture the margin around the prepped area for a good scan. Make sure to remove blood and saliva from the affected area before scanning.

2. Plan Treatment

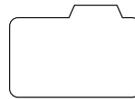
Time:

5 minutes

Tools:



Computer with internet access



Patient Data



SprintRay Account

Once the tooth prep is complete and you've captured all the necessary data, it's time to submit for an AI design through SprintRay Cloud.

2.1 Submit Treatment Request

To submit a design request, visit dashboard.sprinray.com and sign in with your SprintRay account. Select or add your patient, then choose the 'Crown' treatment type. Follow the prompts on the screen to upload all the files you gathered in Step 1.

2.2 Review and Approve Design

Thanks to AI technology, you'll receive a crown design in just a few minutes. Review the design and approve or request a redesign. If your case involves a difficult path of insertion or has other complexities, you may request an expert design, but this will take up to 24 hours.

When you approve your design, you'll be able to download and send it to print.



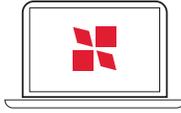
Once your design is ready, you can send it straight to your printer; if you do this, skip to Step 4.

3. Create a Print Job

Time:

5 minutes

Tools:



Computer with Internet Access



Sprinray Account

Once you've approved your design, it's time to bring your crown to life. If you used SprintRay Cloud Design to create your model, it's time to bring it into RayWare and prepare it for 3D printing.

The fastest way to print a crown is with the SprintRay Crown Kit for Pro S. Though not required, we highly recommend the Crown Kit as it saves resin and drastically improves print speed.

3.1 Import into RayWare

Navigate to RayWare Cloud, then start a new print job. Select Crown & Bridge as the job type, then select the printer you'll use for this job. Select the Crown Kit platform for maximum speed and minimum material waste.

Select the material you'll use for this print job. For definitive crowns, we recommend SprintRay Ceramic Crown in the shade best suited for your patient.

Once you upload or import your file, RayWare will automatically orient your model and generate the ideal support structures.

3.2 Verify Setup

RayWare Cloud uses AI to determine the best orientation for your print job and will automatically avoid placing supports in the intaglio surface. Double-check that the orientation is correct with the occlusal surface facing down. Choose 'Max Strength' support.



If you print with the intaglio surface facing the platform, your crown may not fit properly. Always print with the occlusal surface facing the platform.

3.3 Send to Printer

Once you're happy with the setup of your print, select the 'Send to Queue' button, then select the printer you'd like to use for this print job. Now it's time to prepare the printer.



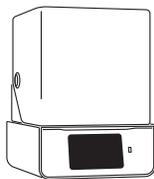
You can also use the 'Print Now' button, but be sure to thoroughly inspect your printer before you start printing

4. 3D Print

Time:

15 minutes

Tools:



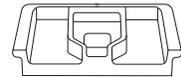
SprintRay Pro S



Crown Resin



Crown Platform



CrownTank

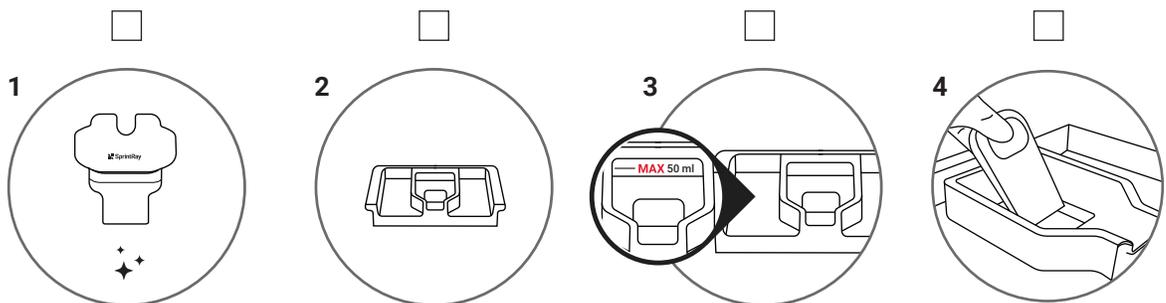
It's time to prepare your 3D printer to fabricate the crown and begin the printing process. The amount of time required for printing will increase if not using the Crown Kit.

4.1 Install the Crown Kit

Install the Crown Kit, following the onscreen prompts to set up.

Once installed, complete the following checklist to make sure your printer is ready:

1. Check that the Crown Kit build plate is attached, clean, and locked
2. Check that the Crown Kit resin tank is seated in its cradle
3. Make sure the resin is filled up to the max line in the tank
4. Use the small squeegee included with the crown kit to mix



4.2 Start the Print Job

On the printer touchscreen, go to the 'Queue' tab and locate your crown print job. Select 'Start Print'. It may take a few minutes before the printer arm starts to lower, depending on whether or not the resin tank and/or build platform need to be heated up.

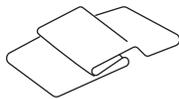
You can view the progress of your print on the printer's touchscreen, including how much time is left before your job is complete. This information can also be viewed via our cloud Dashboard and on RayWare Cloud.

5. Clean

Time:

5 minutes

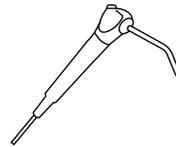
Tools:



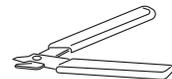
Blue Shop Towel



Small Bowl with IPA %91



Compressed Air

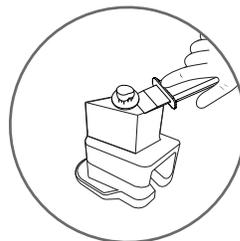
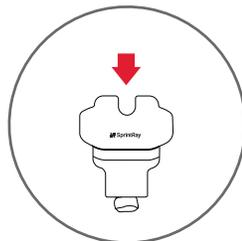


Flush Cutter

Your crown comes out of the printer with a layer of uncured resin still attached. You'll need to wash it off with isopropyl alcohol.

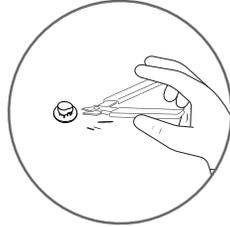
5.1 Remove from Build Platform

Unlock the build platform and gently pull it toward you to release it from the printer. By twisting the prosthetic, you should be able to remove it from the build platform by hand. If it doesn't release easily, place the platform against a hard surface and use the print removal tool to scrape it off.



5.2 Remove Supports

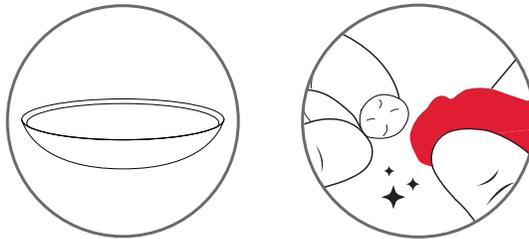
The support structures in RayWare Cloud are specifically designed to twist away from the model by hand. If you have any supports remaining on the prosthetic, use flush cutters to clip them off. Don't worry if there are still small stubs left on the model, you'll remove those later.



5.3 Clean

Resins with high ceramic content develop a chalky surface finish if left in contact with IPA for too long, which requires sandblasting to remove. For most clinics, we recommend washing Ceramic Crown by hand.

Fill a small bowl with $\sim\frac{1}{2}$ inch (~ 13 mm) of IPA. Submerge the crown in the IPA and brush all the surfaces. Use a micro applicator to thoroughly clean the intaglio socket. Remove the crown from the bowl and use compressed air to thoroughly remove any IPA residue. Repeat if necessary.



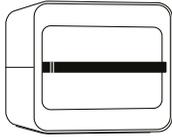
Do not let IPA stand on the surface of the prosthetic for more than 30 seconds, otherwise it will develop a chalky surface finish.

6. Post Cure Prosthetic

Time:

7 minutes

Tools:



Pro Cure 2

To optimize mechanical properties and ensure biocompatibility, your printed appliances must be fully cured.

6.1 Place in ProCure 2

Place the crown in ProCure 2. On the touchscreen, select the curing profile for the resin you used to print the prosthetic. If you're only curing a few crowns at once, place them in the center and select Bolt Mode curing for the fastest results.

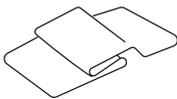
If you're using ProCure 1, place the prosthetic in the chamber and select the correct profile. The curing process may take up to 60 minutes.

7. Wash with IPA

Time:

5 minutes

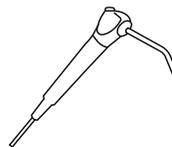
Tools:



Blue Shop Towel



Small Bowl with IPA %91



Compressed Air

After post curing, the prosthetic needs a final rinse. Submerge the crown in IPA within a small bowl and brush all surfaces, then remove from IPA and wipe off the surface with shop towel. Use compressed air to thoroughly dry the prosthetic.

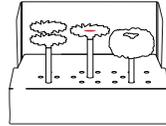
8. Prepare for Placement

Time:

10 minutes



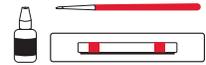
Lab Handpiece



Sprintray Restorative
finishing Kit



Dental Lathe

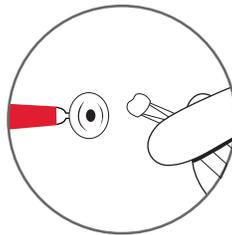


CG OptiGlaze Kit

Before placing the crown, you'll need to smoothen off any imperfections left by support structures, then characterize.

8.1 Smoothen the Prosthetic

Use a fine lab carbide bur or a red Scotch-Brite™ Fuzzies attachment to remove remaining stubs leftover by the support structures until the surface is smooth and uniform.



8.2 Characterize

Polish Workflow:

1. Prepolish

Tool: Lab handpiece

Polishing Wheel: Meisinger Pink Polisher (9769M-170)

Technique: Light, consistent pressure

Speed: 7000-10,000 rpm

Apply light, consistent pressure across all surfaces except the intaglio.

2. High Shine

Tool: Lab handpiece

Polishing Wheel: Meisinger Brown Polisher (9790-170)

Technique: Light, consistent pressure

Speed: 10,000 rpm

Shine all surfaces of the restoration except the intaglio.

3. High Gloss

Tool: Cotton buff wheel

Polishing Wheel: Meisinger Cotton Wheel (150-220)

Bar: Hatho Polistar Pink bar, Keystone (670546)

Technique: Consistent pressure

Use polishing compound and cotton wheel to achieve a high gloss on all surfaces except the intaglio.

Glaze Workflow:

1. Prepare

Tool: IPA and compressed air

Technique: Clean and dry

Spray the crown with IPA to clean the surface and dry completely with compressed air.

2. Apply

Tool: Brush and glaze

Technique: Thin, even coats

Shake bottle thoroughly before use and dispense into a dispensing dish. Apply thinly on the crown surface with a brush. If applying a second coat of glaze, use an intermediate (short) cure before applying the second coat.



Do not glaze intaglio surfaces inside of the crown and do not blow air.

3.Light Cure

Tool: Handheld curing device with 400-430nm wavelength

Technique: Light exposure on all surfaces

Use a handheld curing device at an approximate distance of 1cm. Cure each coated surface, repeating as needed to fully cure any undercuts or areas in shadow.



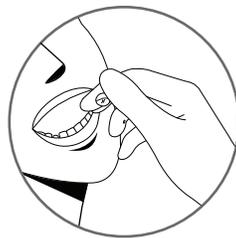
OptiGlaze cannot be fully cured with ProCure 2; use ProCure 1 or a handheld curing light with a wavelength of 400-430nm

8.3 Disinfect

Disinfect the crown using a steamer if possible, then brush lightly with dish soap to disinfect the crown before placement. Ensure that the crown is completely dry before cementation. You can sandblast the intaglio surface of the restoration to improve bond strength.

8.4 Cementation

The finished permanent restorations can be cemented using a dual cure resin cement (Panavia V5 recommended). The use of an adhesive primer (e.g. Clearfil) on the intaglio surface of the crown should comply with manufacturer instructions. Please see the Ceramic Crown Cementation Guide for validation of common cementation workflows.



Follow the manufacturer instructions for use of the luting agent and ensure compatibility with 3D printed crowns. Note that the prep may require etching or priming with certain cements. Do not etch crowns with phosphoric or hydrofluoric acid.

9. Lute the Crown

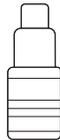
Time:

10 minutes

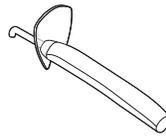
Tools:



Panavia V5 Resin
Cement



Clearfil Ceramic
Primer Plus



Handheld curing
light

9.1 Luting Protocol

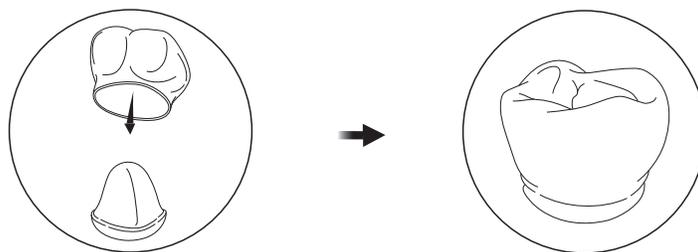
Follow the SprintRay recommended workflow to maximize the strength between the resin cement and Ceramic Crown.



This Luting protocol uses recommended products based on SprintRay research to maximize strength. Ceramic Crown is compatible with a wide range of cements and

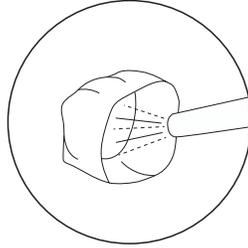
Fit Check

Check the fit of the restoration on the prep. If necessary, make adjustments to the crown to ensure a proper fit.



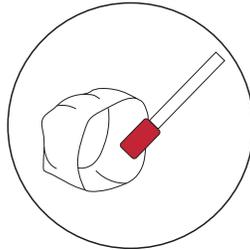
Clean and Prepare the Crown

Clean and prepare the intaglio surfaces of the crown. Remove residue from the crown by washing thoroughly with IPA. For the best bond strength, sandblast the intaglio to create surface roughness.



Apply Primer to Crown

Apply Clearfil Ceramic Primer Plus to the intaglio bonding surface of the crown. Dry the adherent surface with compressed air.



Clean and Prepare Tooth or Ti Base

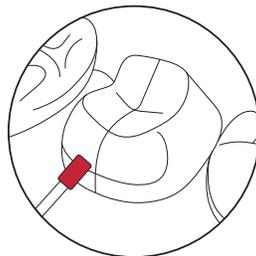
Clean the surfaces of the prepped tooth or Ti Base.

For Ti Base:

Follow the manufacturer's instructions for Clearfil Ceramic Primer Plus for priming the Ti base.

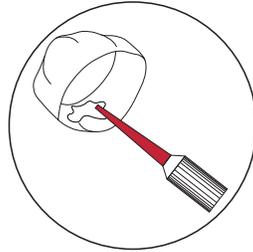
For Prepped Tooth:

Follow the manufacturer's instructions for Panavia V5 Tooth Primer for priming of the prepped tooth.



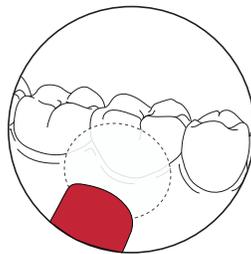
Apply Cement

Apply the cement to the intaglio surface of the crown, distributing evenly. Place the crown onto the prepped tooth. Apply gentle pressure until it is fully seated.



Initial Polymerization

Remove excess cement from the margins of the crown and light cure for 5 seconds. Remove remaining excess cement with a dental hand instrument. Ask patient to bite softly and hold in occlusion for 3 minutes for initial polymerization.



Final Check

Perform a final check to ensure that it is fully seated, the margins are sealed, and the occlusion is correct.

