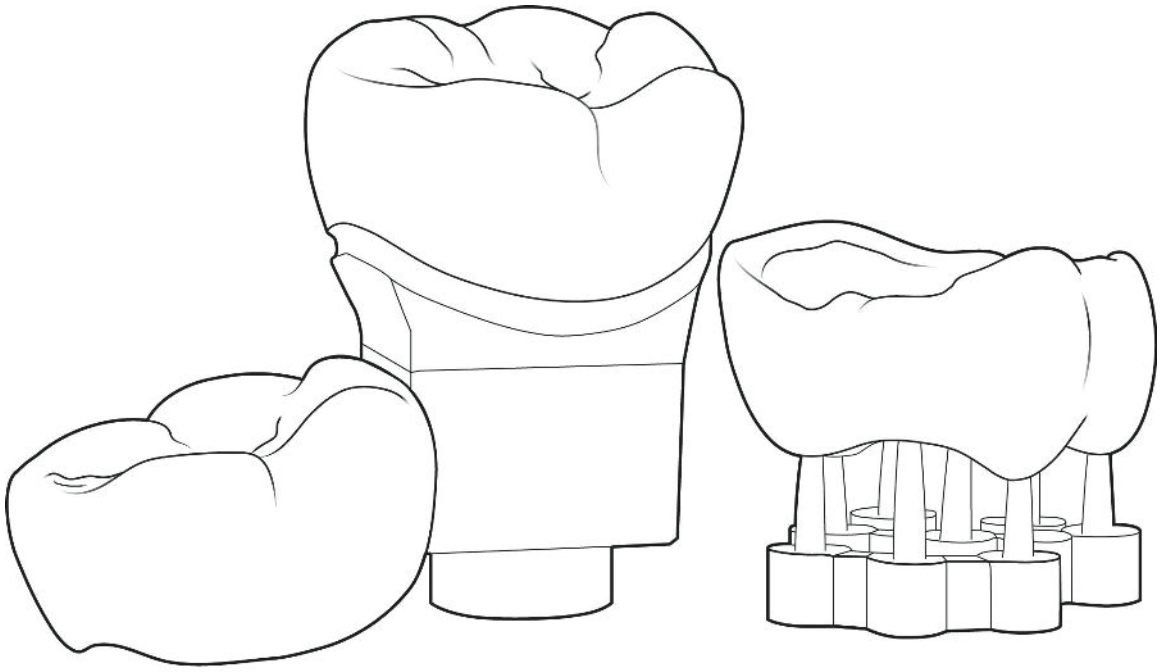
Workflow Guide:

3D Printing for Crowns



With 3D printing, you can provide 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.

> ⚠ *This workflow guide is not recommended for use with SprintRay Ceramic Crown. If using Ceramic Crown resin, follow the Ceramic Crown workflow guide. All times are estimates; always consult the IFU for your material for official instructions for use.*

Workflow at a Glance

1.Prep and Data Capture

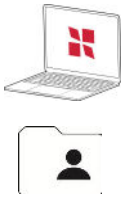
Time:

30 mins

Tools:

- **Intraoral scanner**
- **Digital X-ray**

2. Plan Treatment



Time:

5 mins

Tools:

- **Computer with internet**
- **Patient data**

3. Create a Print Job

Time:

5 mins

Tools:

- **Computer with internet**
- **SprintRay account**

4. 3D Print

Time:

15 mins

Tools:

- **SprintRay Pro S 3D printer**
- **Pro S Crown Kit**
- **Crown resin**

5. Clean

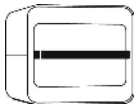
Time:

5 mins

Tools:

- **Absorbent paper towel**
- **Spray bottle with IPA 99%**
- **Compressed air**
- **Snippers**

6. Post Cure



Time:

7 mins

Tools:

- **SprintRay ProCure 2**

7. Wash with IPA

Time:

5 mins

Tools:

- **Absorbent paper towel**
- **Spray bottle with IPA 99%**
- **Compressed air**

8. Prepare Prosthetic

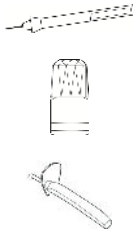
Time:

10 mins

Tools:

- **Lab handpiece**
- **Polishing wheel**
- **-Toothbrush & non-medicated soap**
- **Glazing or polishing tools**

9. Lute the Crown



Time:

10 mins

Tools:

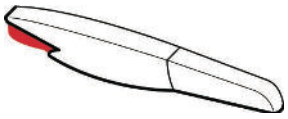
- **Variolink Esthetic DC cement**
- **Monobond Plus primer**
- **Handheld curing light**

1. Capture Data and Prep Tooth

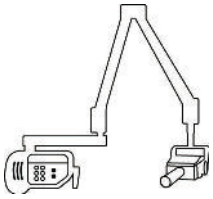
Time

30 minutes

Tools



Intraoral scanner



Digital X-ray

1.1 Pre-prep Scans

Digital X-ray
Capture an X-ray of the current tooth for documentation and to understand the patient's anatomy.

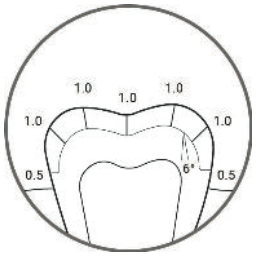
Pre-prep Scans
Before the patient is numb, use an intraoral scanner to capture the opposing arch and bite scan.

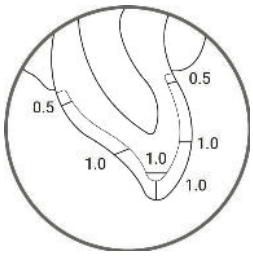
> ⚠ *Scans may be taken after the patient goes numb, but scanning beforehand will provide the most accurate data for your design*

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. 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 and posterior**
- **Incisal edge: 1 mm**





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

1.3 Post-prep Scans

Retract the surrounding gums. You'll need to generously capture the margin around the prep in order to use AI design. Remove blood and saliva from the affected area before scanning.

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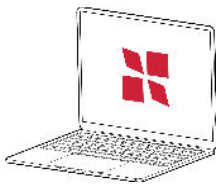
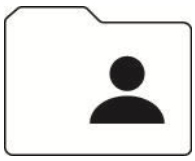
2. Plan Treatment

Time
5 minutes
Tools



Computer with internet access



Pre- and post-prep patient data

SprintRay account

2.1 Submit Treatment Request

Visit dashboard.sprintray.com and sign in or sign up for a SprintRay account. Select or add your patient, then choose the 'Crown' treatment type. Follow the prompts on the screen to upload all the data you gathered during step 1.

2.2 Review and Approve Design

Thanks to Cloud Design, you can receive a crown design in just a few days. Review the design and approve or request a redesign. Once you approve, you'll be able to download and send it to print. With AI Crown Design, the turnaround time is even quicker. Get ready to print STL files in just a few minutes.

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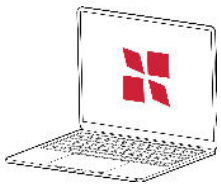
3. Create a Print Job

Time

5 minutes

Tools



Computer with Internet Access

SprintRay Account

3.1 Import into RayWare

Navigate to [RayWare Cloud](), then start a new print job. Select appropriate 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. Select your printer and platform type. For this treatment, we recommend the Crown Kit for maximum speed. Continue to Upload and add your crown treatment file.

> ⚠ *Always consult the IFU for the resin you use for best results; the following is a general guideline for producing and placing 3D printed crowns*

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 the print platform. Choose 'Max Strength' supports.

> ⚠ *Always print with the occlusal surface facing the platform or it may not print properly*

3.3 Queue to Printer

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

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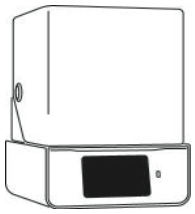
4. 3D Print

Time

15 minutes

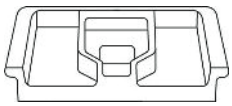
Tools



SprintRay Pro S

Crown Resin

Crown Platform

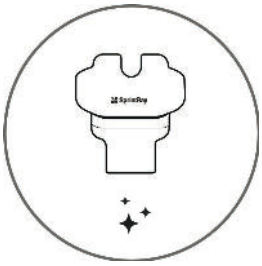


Crown Tank

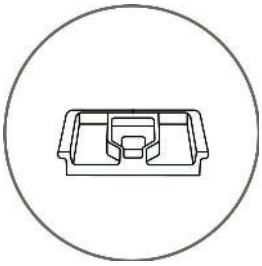
4.1 Install the Crown Kit

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

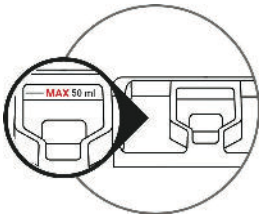
> ⚠ *Crown Kit is compatible with the Pro S 3D printer only and you need to install Print OS 8.0.1.11 or higher. Check for updates in your printer settings*



Check that the platform is clean, locked, and ready



Check that the resin tank is seated in its cradle



Fill the tank to the max line

Mix resin with the Crown Kit squeegee

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.

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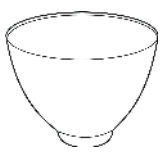
5. Clean

Time

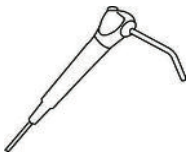
5 minutes

Tools

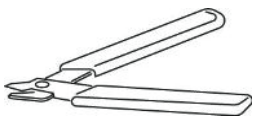
Micro applicator



Dental rubber bowl with IPA 99%



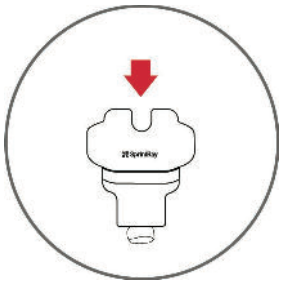
Compressed Air



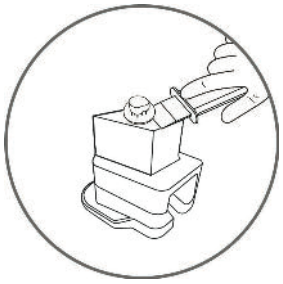
Snippers

5.1 Remove From the Build Platform

Unlock the build platform and gently pull it toward you to release it from the printer.



Twist the prosthetic to remove it by hand. If it doesn't release easily, place the platform on a flat surface and use the print removal tool to scrape it off.



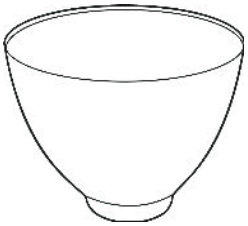
5.2 Remove Supports

If there are any supports remaining on the crown, 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.

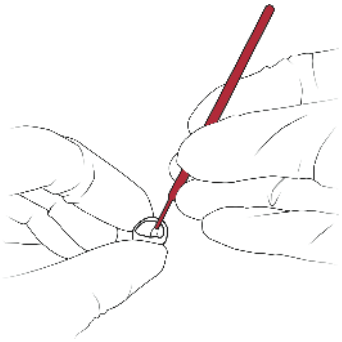
5.3 Clean

For most clinics, we recommend washing 3D printed crowns by hand. Resins with high ceramic content can develop a chalky surface if left in contact with IPA for too long.

Fill a dental rubber bowl with IPA with ~2-3 cm or a ½ inch of IPA . Submerge the crown 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 residue. Repeat if necessary.



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

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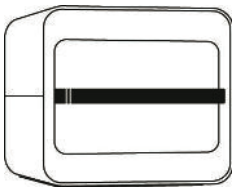
6. Post Cure Prosthetic

Time

7 minutes

Tools



Pro Cure 2

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.

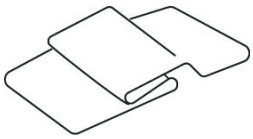
If you're using ProCure 1, place the prosthetic in the chamber and cure it for 20 minutes at 20-degrees celsius. Then turn the crown upside down and repeat. select the correct profile.

7. Wash with IPA

Time

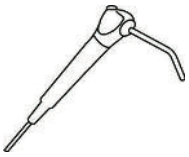
5 minutes

Tools



Absorbent paper towel

Dental rubber bowl with IPA
IPA 99%



Compressed Air

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

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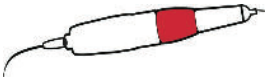
8. Prepare for Placement

Time

10 minutes

Tools



Lab handpiece

Polishing wheel

Toothbrush and non-medicated soap

Steamer (optional)

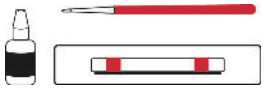
8.1 Smoothen the Prosthetic

Use a fine lab carbide bur or a polishing wheel attachment to remove remaining stubs leftover by the support structures until the surface is smooth and uniform.

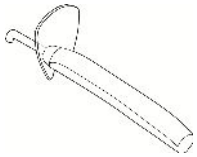
8.2 Characterize

Tools

If Glazing

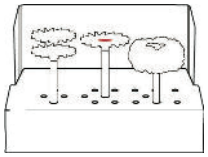


GC OptiGlaze™ kit



ProCure 1 or handheld curing light

If Polishing



SprintRay Restorative Finishing Kit

Dental lathe

Glaze

1. Prepare

Tool: IPA and compressed air
Technique: Clean and dry

Spray the crown with IPA to clean the surface, then dry with compressed air.

2. Apply

Tool: Brush and glaze
Technique: Thin, even coats

Polish

1. Prepare

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

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; do not blow air on the uncured glazed surface*

Shine all surfaces of the restoration except the intaglio.

3. Light Cure	3. High Gloss
Tool: Handheld curing device with 400-430nm wavelength **Technique: Light exposure on all surfaces**	**Tool: Cotton buff wheel** **Polishing Wheel: Meisinger Cotton Wheel (150-220)** **Bar: Hatho Polistar Pink bar, Keystone (670546)** **Technique: Consistent pressure**

Use a handheld curing device at an approximate distance of 1 cm. 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 (0ºC for 1 min) or a handheld curing light with a wavelength of 400-430nm (40 sec per surface)*

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

8.3 Disinfect

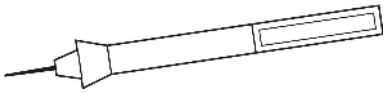
Disinfect the crown using a steamer if possible, then brush lightly with non-medicated soap to disinfect the crown before placement. Ensure that the crown is completely dry before cementation.

9. Lute the Crown

Time

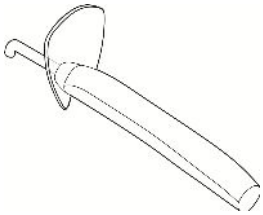
10 minutes

Tools



Variolink Esthetic DC cement

Monobond Plus primer

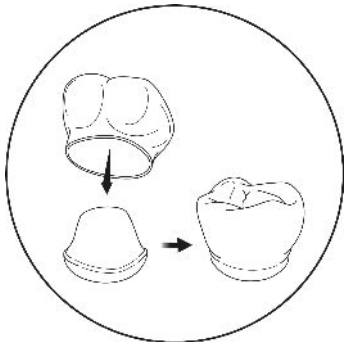


Handheld curing light

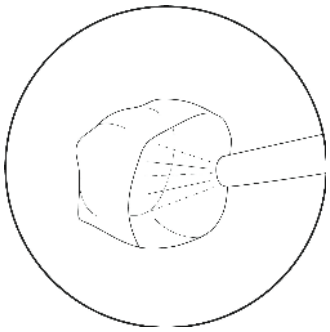
9.1 Luting Protocol

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

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

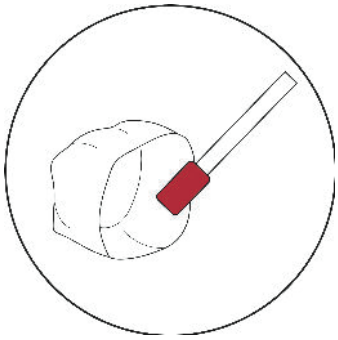


Clean and Prepare the Crown
Clean and prepare the intaglio surfaces of the crown. Remove residue from the crown by washing thoroughly with IPA . For the best bond strength.



Apply Primer to Crown

Apply Monobond Plus to the intaglio bonding surface of the crown. Dry the adherent surface with compressed air.

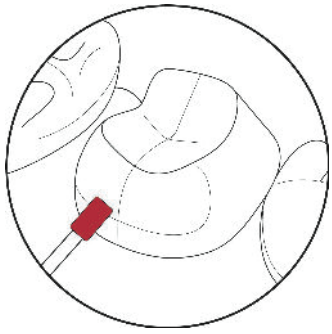


Clean and Prepare Tooth or Ti Base

Clean the surfaces of the prepped tooth or Ti Base.

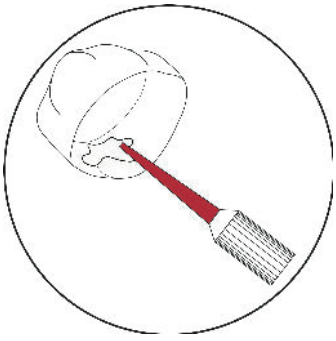
For Ti Base:
Follow the manufacturer's instructions for for priming the Ti base.

For Prepped Tooth:
Follow the manufacturer's instructions for priming of the prepped tooth.



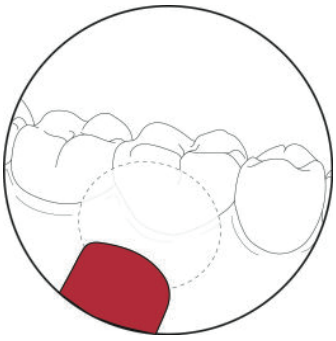
Apply Cement

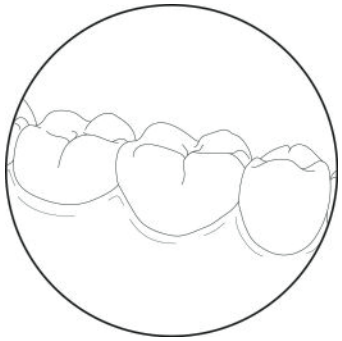
Apply the cement to the intaglio surface of the crown, distributing evenly. Place the crown onto the prepped tooth. Apply gentle pressure until it is fully seated.



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.