Print-to-Cast™ System

R&R's Print-to-Cast (P2C™) System provides a reliable process for 3D printing, investing, casting, and cleaning.

Designed for compatibility, each step of the P2C system works together to produce consistent, high-quality castings with the metal casting quality preferred by the dental industry.

3D Model Printing – Create detailed master models with **R&R® 3D Model Elite™** and **R&R 3D Model Standard™** resins, designed for accuracy and stability.

Castable Resin Printing – R&R's **P2C Dental Cast** resin is formulated for an ash-free burnout and low expansion, delivering precise, accurate castings from the start.

Flash-Fire Investment– Developed to work with R&R's resins, **Biovest®** investment supports detailed reproduction and smooth casting surfaces. For optimal results, use with R&R's **Universal Expansion Liquid**.

Validated Burnout Cycle – A predictable, optimized burnout cycle using the **Vulcan®** burnout furnace enables a complete burnout utilizing our flash-fire investment.

Cast Alloy – R&R's **Neoloy® Plus** CoCr alloy is a high-quality cobalt-chromium alloy with quick melting, reduced oxidation, and durable high-luster castings.

Divesting Abrasive - The **R&R WFA™** white fused alumina is a fine blasting abrasive that removes residual investment, leaving a clean surface before polishing the final cast.

The P2C system is easy to integrate into any dental lab and offers repeatable, dependable outcomes. Whether you're printing models for restorations or casting directly from resin, every product is designed to work together for efficient, high-quality production.

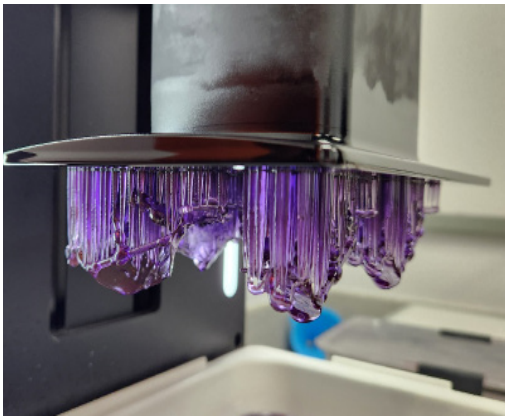
Print-to-Cast System Process

Step 1: Model and Castable Printing

The process begins with printing a master model using **R&R 3D Model Elite** or **R&R 3D Model Standard** resin. This model is used for fit verification and is not castable.

Next, a castable pattern is printed using R&R's **P2C Dental Cast** resin, specifically formulated for clean burnout and precise metal casting.

Before printing, it is important to thoroughly mix both R&R 3D Model resin and R&R Dental Cast resin to maintain consistency. The STL file should then be imported into the appropriate slicing software, with support structures configured to minimize print failures. Using R&R's recommended print settings based on the specific printer ensures the best results. The print platform should be clean, dry, and properly secured before starting the print process.



Step 2: Post-Processing

Both the master model and castable pattern follow the same post-processing steps:

Carefully detach the printed objects from the build platform using a firm spatula and remove any support structures as needed. Verify the fit of the 3D printed part on the master model before proceeding.

Clean the printed objects in two stages using isopropyl alcohol (IPA):

- **Dirty Wash:** Clean for 2 minutes in reusable IPA solution
- **Final Clean:** Thoroughly clean for 2 minutes using an IPA solution.

Step 3: Post-Curing

The post-curing process differs between the master model and castable pattern to optimize material performance.

- **Master Model:** Cure the printed object by exposing it to 2,000 flashes on each side, following the curing unit manufacturer's instructions.
- **Castable Pattern:** Cure the printed object using 1,000 nitrogen flashes, ensuring complete polymerization and stability before casting.

Step 4: Pattern Setup

Check the fit of the castable pattern on the corresponding master model. Lightly polish the part with a rotary brush to remove any remaining support marks.

Using a rubber base, sprue the patterns in a conventional manner, either by attaching wax sprues or utilizing printed sprues. A removable flask or a burnout compatible flask (such as a cardboard flask with a water-resistant liner) is recommended for best results.

Step 5: Investing the Flask

For high-accuracy casting, invest using **Biovest®** investment by following these steps:

1. Weigh Biovest investment powder according to the flask size.
2. Measure the **Universal Expansion Liquid** in the appropriate quantity for Biovest investment. Use a water-to-powder ratio of 25:100 with the Universal Expansion Liquid diluted at 86:14 (Universal Expansion Liquid to deionized water).
3. Adjust dilution for desired expansion – higher concentrations of Universal Liquid Expansion Liquid result in greater expansion.
4. Gradually add the powder to the liquid mixture, start a stop watch, and hand-spatulate for 30 seconds to ensure the powder is thoroughly wetted.
5. Mix under a vacuum at 250-350 RPM for 60 seconds.
6. Pour the investment in a thin stream down the side of the flask while on a vibration table to reduce air bubbles.

Optional: To further reduce air bubbles, place the filled flask in a pressure unit for the full bench cure time.

Step 6: Bench Cure

Allow the investment to set undisturbed until the stopwatch reaches 20-23 minutes. If desired, the mold can be placed in a pressure unit during the bench cure time.

Open the mold's pores on the top and bottom using a model trimmer (approximately 1/8 in or 3.18 mm) to aid in moisture release. This can be completed with or without water.

Step 7: Burnout

Place the mold in a preheated oven at 1600-1800°F (871-982°C) for at least one hour. After one hour, the mold is ready for casting. For best results, R&R's **Vulcan®** burnout furnace is recommended as part of this complete workflow.

Step 8: Casting

After the burnout process, proceed with casting using **Neoloy® Plus** CoCr alloy which has a melting range of 1375-1400°F (746-760°C). Configure the casting machine for high-temperature alloys and follow the manufacturer's operation recommendations.

Step 9: Divesting & Cleanup

Once the mold has cooled, carefully break it apart. Remove any residual investment by blasting with **R&R® WFA™** white fused alumina, for a smooth, clean finish for the final cast.

Step 10: Final Inspection & Finishing

Check the casting for proper size, fit, and detail. Perform final polishing as needed to achieve the desired surface finish.

Safety

When working with 3D printing resins, investment materials, and casting processes, always wear appropriate personal protective equipment (PPE), including gloves, safety glasses, and a mask. Follow all manufacturer safety guidelines for handling materials. See SDS for more information.

Contact

For questions regarding the P2C System or its process, please contact technical support by emailing Digital@Ransom-Randolph.com.

Availability

R&R® 3D Model Elite™ resin
Beige - 1 kg (2.2 lb.).....57061
Gray - 1 kg (2.2 lb.).....57085

R&R® 3D Model Standard™ resin
Beige - 1 kg (2.2 lb.).....57146
Gray - 1 kg (2.2 lb.).....57153

P2C™ Dental Cast resin
Purple - 1 kg (2.2 lb.)..... 57528

Biovest® investment
100 grams (80 count).....26421
400 grams (30 count).....26416
25 lb. (11.3 kg).....264151

Universal Expansion Liquid
32 fl oz (0.95 L).....26410

R&R® WFA™ white fused alumina
100 microns - 44 lb. (20 kg).....19300
50 microns - 44 lb. (20 kg).....19400

Vulcan® burnout furnace
Single-stage 100-120 V.....5355730002
Single-stage 200-240 V.....5355730001
3-stage 200-240V.....5355740001
3-stage 100-120V.....5355740002
3-stage 200-240V.....5355740003
3-stage 100-120V.....5355740004

Neoloy® Plus CoCr alloy
1 kg (2.2 lb.).....600000
Hard - 1 kg (2.2 lb.).....600030

To order, visit Shop.Ransom-Randolph.com, contact your region's R&R Customer Service Team, or contact an authorized distributor. For a list of authorized distributors, visit Ransom-Randolph.com/Distributors.

About R&R

With over a century of experience, Ransom & Randolph is the world's leading supplier in investment casting, trusted across industries including dental, art, aerospace, and automotive. Our technical expertise, dedicated support team, and comprehensive R&R Academy resources ensure that our customers receive not only innovative products, but also the guidance and knowledge needed for success.

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