

# POST-SOLDERING TECHNICAL GUIDE

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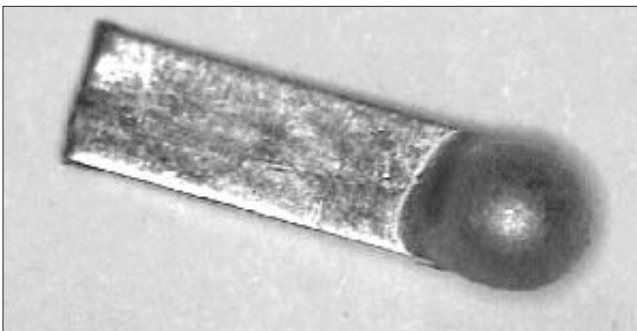
A successful post-porcelain solder connection starts in the design of the wax-up.

- Surfaces to be joined must be flat, parallel and spaced 0.3mm apart.
- Vertical and lateral extension of lingual marginal ridges next to the solder joint should be enlarged to provide a greater metal surface to receive solder. This type of design also provides protection for the porcelain during the solder operation.

It is difficult to post solder as an afterthought to a case, or as a means of repair. If the case is not designed for post solder, the chances of making a clinically successful case are low.

## PREPARATION:

Surfaces to receive the solder should have a smooth, “satin” type finish, such as what is obtained from rubber wheels or sandpaper disks. Less preferable but acceptable is a sandblast finish. If rubber wheels are used, clean the surfaces with alcohol prior to investing the bridge.



Before you lute the bridge together, you want to fit your solder to the joint. Jensen solders are rolled slightly thicker than 0.3mm, so that you can grind the solder to a snug fit into the joint. Some technicians will fit the solder, then cut it, and melt one end into a ball in a torch or Bunsen burner flame to make a “tadpole”, as shown below. The melted ball-shaped end will keep the solder from falling out of the joint when it is placed later on in the process.

## ASSEMBLY:

Lute the units together.

**TECHNIQUE A:** Lute the units with sticky wax. Invest the case (see below), then remove the wax by boiling it out or steaming it out. Apply some flux to the joint, then proceed to the burnout step.

**TECHNIQUE B :** Lute the units with pattern resin. Invest the case (see below). Leave the pattern resin in place. The pattern resin burns slowly, and keeps the joint from oxidizing during the burnout.

With either technique, a steel bur can be luted to the bridge across the joint, which helps to reinforce the strength of the joint through the investing steps.

## INVESTING:

The investment step can make or break the post-solder job.

- Dedicated soldering investments or phosphate bound casting investments can be used. Select an investment material that has good strength so that the size of the patty can be minimized.
- If a casting investment is used, it should be mixed primarily with distilled water, with only a milliliter or two of special liquid.
- Mix the investments by hand to a very thick consistency.
- Take care to keep investment off of the porcelain; you can apply wax over the porcelain before investing if desired.
- Try to keep the patty as small as possible, and don't bury the case in the investment.

One popular technique involves elevating the case off of the patty by filling the units with investment, inserting firing pegs into the units, and then in turn fixing the pegs into a patty. This takes a little more time and care, but can work well because it keeps the case away from the investment, which acts like a heat sink.

## FLUX:

Fluoride based flux (such as Jensen Brown Fluoride) or borax-based C&B fluxes may be used successfully.

**KEEP FLUX FROM CONTACTING THE PORCELAIN.**

## SOLDER SELECTION:

In most situations, any crown and bridge solder can be used for post-soldering. It is always a good idea to use the solder recommended for the alloy.

## DRYING & PREHEATING:

Dry the investment for at least 30 minutes before burning out. Put the case into a burnout furnace; raise the temperature gradually (rate of 10 to 15 degrees F per minute) to 1000°F (540°C) and hold for 10 minutes. To keep joint oxidation to a minimum, do not hold longer than 10 minutes or so.

## SOLDERING:

- Take the hot case out of the burnout oven.
- Flux the joint, and place an adequately sized pre-cut and fluxed post solder piece in position on the connector area. Do this quickly so as not to let the case cool off.
- Put the case into a pre-programmed porcelain furnace.

**Fire to the schedule below:**

Start Temp	Dry Temp	Firing Rate	Vacuum	End Temp	Hold Time
600° C	0-2 Min	55°C/Min	None	770-870° C	30 Sec-2 Min
600° C	0-2 Min	100°F/Min	None	1420-1600° F	30 Sec-2 Min

### Notes:

- Chose an end temperature that is about 10-20 degrees higher than the liquidus temp of the solder being used.
- A rule of thumb on firing rate: Use the same rate as you fire the porcelain. Generally, the solder will flow easier if the rate of soldering is faster, but if you fire too rapidly you may crack the porcelain.
- Start with a 30 second hold at the temperature you've selected. Increase the hold to get more flow.

*We encourage all technicians who have not post soldered recently to practice at least once on a scrap crown or piece of sprue, to establish the high temperature and hold time for the furnace, alloy, solder and flux being used.*

*If you run through this procedure, and the solder hasn't flowed, increase the end temperature by 20°F or 10°C, increase the hold time to a minute or more, add a little more flux, and try it again. If it still doesn't flow, clean everything up and try it again using a little more flux and the higher temperature. You may think you've done everything the same, but don't be surprised if the solder flows! Now, take what you've done and apply it to your case.*

## DEVESTING & FINISHING:

Devest and clean when the case has cooled. Slight staining of flux on porcelain can be removed by ultrasonically cleaning in an 18% hydrochloric solution for 2 to 3 minutes. Shape, contour and polish the soldered areas using standard techniques.

**NOTE: The porcelain manufacturer may suggest a different technique, or modifications to the technique, to be used with their particular porcelain.**

### FOR EXAMPLE:

- Creation porcelain users should solder at a minimum of 1550°F (840°C). After soldering, the case should be cooled quickly.

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