

Tips for Casting CAD/CAM Models

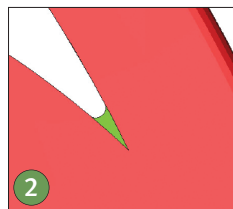
by Teresa Fryé and J. Tyler Teague

Most would argue that CAD/CAM technology has changed the jewelry industry landscape for the better. But to ensure casting success, care must be taken when designing models in CAD and working with the various model materials used with rapid prototyping systems. The following are two tips from Teresa Fryé of TechForm Advanced Casting Technology LLC (techformcasting.com) in Portland, Oregon, and J. Tyler Teague of JETT Research (jettresearch.com) in Johnson City, Tennessee, for anyone casting CAD/CAM models.

EMBRACE THE RADIUS

By Teresa Fryé

What do fine jewelry castings and aircraft turbine blade castings have in common? They both love a radius. Thankfully in the jewelry world we don't have to worry about our creations falling from the sky, but we do have the same concerns about how to produce a high quality cast product. To this end, one of the smartest things you can do to ensure successful jewelry castings is to protect them from investment breakdown. You can

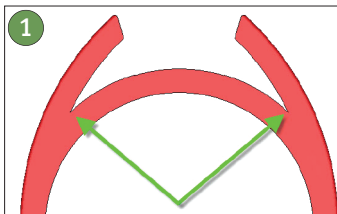


do this by paying close attention to the negative spaces in your CAD designs. Thin sections or sharp knife-edge features in the investment (Figure 1) are prone to fracture at low stresses. When investment breaks down in these areas, it becomes mixed with molten metal, risking contamination and destroying the crispness of the design. The good news is that a small radius—even as little as 0.2 mm—can eliminate thin sections and the vulnerability for failure (Figure 2). This small design change can make all the difference in producing a quality casting.

OVEN MODS

By J. Tyler Teague

To successfully burn out rapid prototype models in a small programmable electric oven, you need an adequate supply of oxygen. I've tried simply drilling holes into the bottom of the oven door to aid airflow, but found that it helped more with the flasks in the front of the oven than in the back.



The following modification enables you to introduce oxygen into the entire oven using a chimney effect.

Begin by obtaining a 309 or 309S stainless steel pan that fits inside the oven. The one I use is 1.5 inches deep and leaves about 0.5 inch of space on both sides between the pan and the oven wall.

You can use small stainless steel pins to affix the pan to the oven floor to prevent shifting.

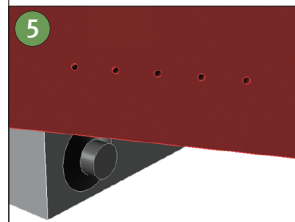
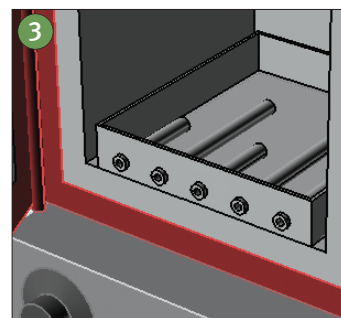
Drill 0.5 inch diameter holes into the side of the pan at the front of the oven, leaving about 0.25 inch between the hole and the bottom of the pan. (For my Neycraft 9 inch³ oven, I drill five evenly spaced holes.) Fill the bottom of the pan with 0.25 inch of sand. Insert ceramic tubes (0.5 inch outside diameter/0.25 inch inside diameter) into the holes; you'll find multiple tube suppliers online. Alternate the lengths of the tubes to be 1/3 and 2/3 the length of the pan (Figure 3).

When the tubes are resting on the sand, cover everything with pumice stones of various sizes (Figure 4). These are commonly sold for grilling at hardware and home improvement stores. Try to keep the pumice-stone covering as level as possible. When you set the flasks in the oven button-down, the pumice allows the

sprue wax to easily drain so the oxygen can get to the model material.

Next comes the tricky part: Drill corresponding holes (0.25 inch diameter) into the oven door that line up with the holes in the pan (Figure 5). You can countersink a small bit of ceramic tube into the insulating material of the door. Do yourself a favor and use a ruler to plan this carefully so you don't mess it up.

This inexpensive modification creates a chimney effect that draws outside air into the oven through the ceramic tubes and up through the very porous pumice stone, enhancing burnout. ♦





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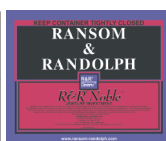
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