

Investing Resin Models

Tips for Increasing Mold Strength

BY J. TYLER TEAGUE One of the issues that arise when casting resin models is what happens inside the investment mold during the burnout process. Unlike wax, which softens and drains out of the flask as a liquid, resin models continue to sit in the mold, expanding in the heat and, in some cases, swelling from water absorbed through the investment. And if your mold isn't strong enough to withstand all of this expansion and swelling, it could crack and lead to casting problems.

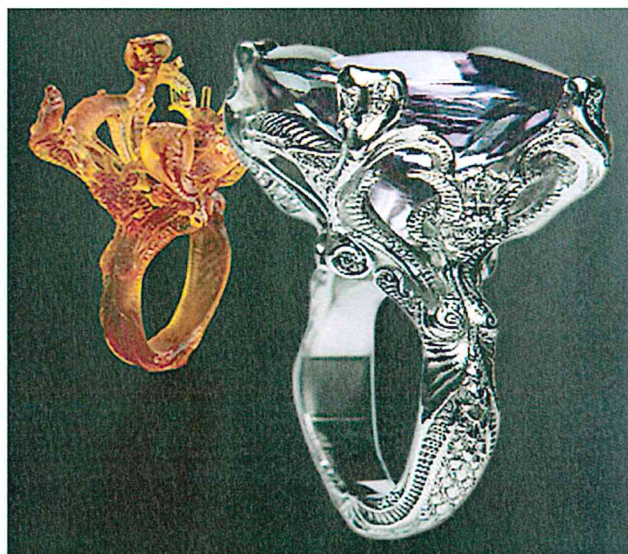
But that isn't the only thing happening. While that resin model is basking in the mold, it's also most likely bleeding out acidic liquid at the same time. This can interact with the chemical structure of the investment, weakening it. And as the mold weakens, so too do its chances of withstanding the resin's expansion.

To improve your odds of this not happening, you need to first strengthen your investment material. One way to do this is by purchasing special (low-cristobalite) investments that are specifically designed to handle greater-than-normal expansion issues. Another way is to strengthen your current investment material.

STRENGTHENING YOUR INVESTMENT

To do this, you can add water-soluble boric acid to your investing water: It will migrate to the inner and outer surfaces of the investment mold during the drying process, forming a very thin but concentrated layer. Dissolve about 1 to 1.5 percent boric acid/weight of investment powder into your investing water.

You can also adjust your investment's water-to-powder ratio and its setting time. With most gypsum-bonded investments for wax models, you normally have a 40 percent water-to-powder ratio. After being poured into the flask, the mixture would then typically sit for 2 hours before the flask was put into the oven. For resin models,



try lowering your water-to-powder ratio down to between 37 and 38 percent, and increase the setting time to a minimum of 4 hours. This will not only strengthen the investment, but also thicken it and shorten the total work time of the investing procedure. However, make sure to do some trial runs first—especially before you start using it on your “due tomorrow” parts!

CLEAN, CURE, AND CLEAN AGAIN

A strong investment is important, but it's only the first step; the second

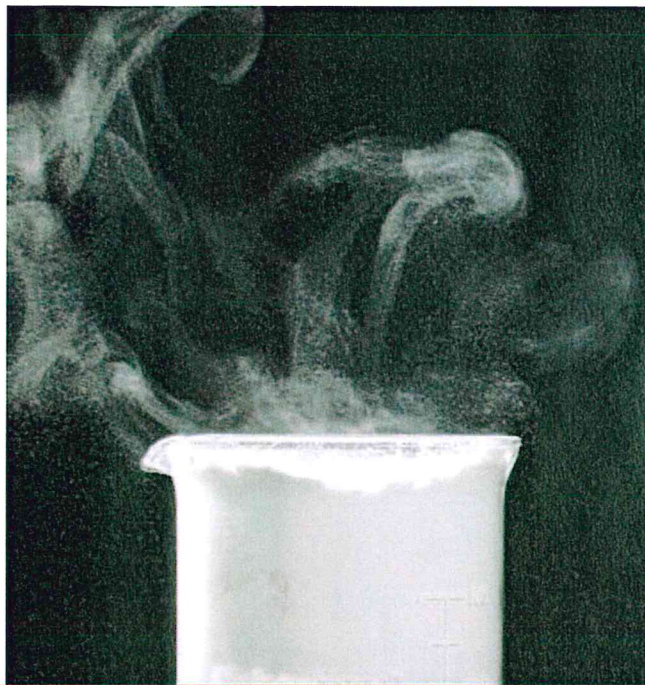
step is to eliminate the acid in the model. All resins are based on some form of methacrylic acid, and because the main goal of additive machines is achieving dimensional accuracy and *not* fully curing the resin edge to edge, a built model will typically contain uncured resin inside it. When the resin heats during burnout, that acid will bleed out and weaken the mold—and all your attempts to strengthen the investment will be wasted.

What to do? When your grow is complete, clean your parts well in the high purity alcohol that your machine company recommends. Use a two- or three-step cleaning process, in which each successive step is using fresher alcohol. (If your model is designed not to absorb water, you can also place them in an ultrasonic with cool water and a small amount of tri-sodium phosphate.) After a thorough cleaning, cure the parts in a light box, then apply another alcohol swish (and, if applicable, another 30 seconds of ultrasonic time). The bottom line here is that you do not want uncured resin in your burnout oven. Eliminate it, and your investment will be much stronger—and your models much more castable. ♦

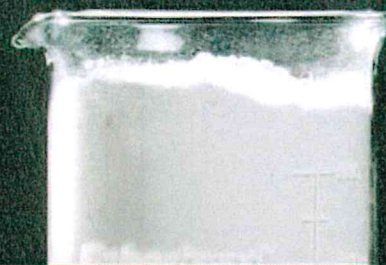
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