

Fine Tuning Your Casting Alloys

by Daniel Ballard

"Have you listened to the difference that fine tuning makes in a good guitar or piano?" writes Daniel Ballard. "For that wonderful harmony of sounds, that last 1 percent of the tuning must be just right. The same holds true for alloys." Ballard, the national sales manager for Los Angeles-based Precious Metals West/Fine Gold, offers the following primer for how to ensure your alloy and your casting process are in harmony. As he says, "that last one percent [of any alloy] can contain many additives that make an important difference."

Silicon (and other deoxidizers) can benefit open-air casting.

If you cast 10k or 14k—an alloy with higher levels of copper—and you use a torch or an electric smelter that exposes the melt to the air, you'll want an alloy that includes silicon or some other deoxidizer. When copper is hot, it easily reacts with oxygen, potentially resulting in porosity or the appearance of dark, hard spots in the casting. Silicon additives compensate for this, promoting better fill and also serving as a brightener.

However, if the concentration of silicon is too high, the metal could become brittle. When purchasing your alloy, you should describe exactly what you're casting to your supplier, who can then help you apportion the amount of silicon needed for the job at hand.

One final bit of advice: 18k gold alloys in general should not contain a silicon deoxidizer. There is so little copper in this alloy that the risk of brittleness outweighs any potential benefit.

Use grain refiners with care.

Grain refiners are trace amounts of high temperature elements, such as iridium, mixed into the alloy. They turn the gold's grain structure into a network of very tiny crystals. This provides for greater malleability and better surface finish, making polishing much easier. However, if not mixed thoroughly, these refiners could clump into large particles that lead to inclusions—and some may not stay blended unless induction melting is used. If you decide to go with grain refiners, use limited concentrations and apply with caution.

For better fills, try a little zinc.

Zinc is one of the more common additives to gold alloys, and it offers sev-

eral benefits, not the least of which is increased form filling. Normally, you'll need no more than about a 2 percent increase in zinc to improve your alloy's fluidity and fill rate. It's particularly useful with nickel white gold alloys, which are famous for not filling as well as yellow.

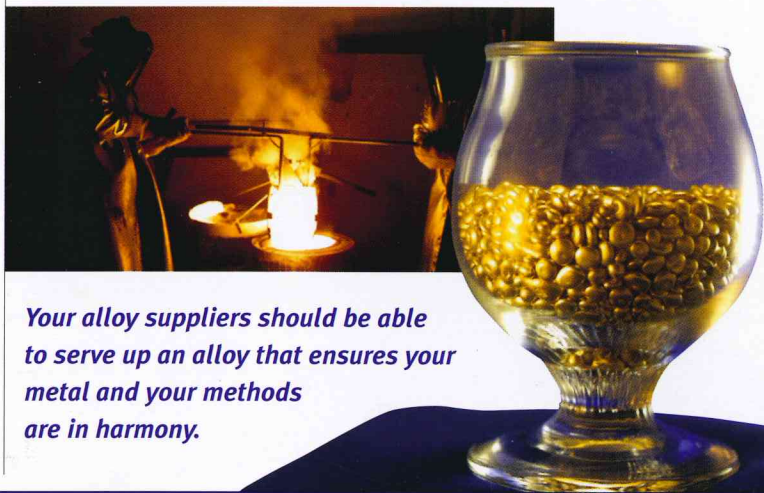
Know the properties of your alloys.

The alloys you need to get just the right color and karat also introduce not-so-welcome side effects. Nickel white gold is a perfect example: The more nickel you have, the whiter the metal—and the more difficult it will be to cast, since nickel whites aren't as fluid as other alloys, solidify faster, and lead to more non-fills and instances of shrinkage porosity.

However, sometimes reworking an alloy's formula comes down to choices. For instance, the reworking of a nickel white alloy to improve fluidity would most likely lead to reduced nickel content—which would also lessen the whiteness of the final castings. At that point, it comes down to what's more important: a bright white casting that needs no rhodium plating (and will sell at a higher price), or a trouble-free casting process.

Have confidence in metallurgy, and your supplier.

Your alloy maker can often, within the parameters of metallurgical possibility, give your casting gold exactly the tune-up it needs. Metallurgy is a complex and often counterintuitive science that, frankly, only a practicing metallurgist can love. Let that person be your guide to enhanced quality in your production.



Your alloy suppliers should be able to serve up an alloy that ensures your metal and your methods are in harmony.

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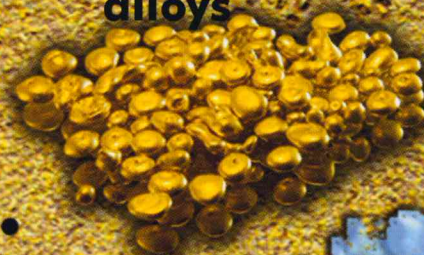
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608 South Hill Street Suite 407 Los Angeles, Ca 90014
(213)689-4872 (800)999-7528 Daniel@preciousmetalswest.com