
How to Make Cold Cast Bronze Sculpture and Other Bonded Casts

The process called cold casting or bonded casting provides the look and feel of a hot foundry pour or other materials for far less in cost and time. But, better yet, you can easily do it yourself. By mixing a liquid bonding agent with a finely ground powder of metal or other substances such as porcelain and wood you can create extraordinary castings that mimic the real article.

For example a cold cast bronze is done by mixing the liquid bonding agent, typically a polyurethane resin, with a finely ground bronze powder (325-mesh). The bronze powder is very heavy -- a pint weighs ten pounds. The heavy slurry of resin and bronze powder, which has consistency of molasses, is poured into a partially fill a mold. The partially filled mold is then slowly rotated either by hand or on a roto casting machine. The rotation allows the mix to evenly coat the interior of the mold. As it hardens it will form a perfect bubble free exterior face coat on the casting. Subsequent pours can be used to either thicken the wall of the casting or create a solid cast.

A technique which conserves the bronze powder is first salted into the mold with plain powder so that it covers the surface. The resin and powder slurry is then coated on top.

Mix Ratio by volume for a typical polyurethane resin (results vary from manufacturer):

PART A	PART B	Bronze Powder
1	1	1-3

A second method of cold casting is achieved using bronze or other metallic (iron, aluminum, copper, etc.) powder and a casting material called Forton MG. Forton MG is a derivative of Hydrocal gypsum plaster, but is much harder, denser, and non toxic. It also has a water based acrylic polymer in the dry mix which creates a very hard, solid and waterproof casting.

When mixed with the bronze powder, Forton MG will create a very realistic bronze feel and look. The advantages of Forton MG over resin is that its curing temperature during curing is much lower and therefore the rubber mold will last longer. In addition, since it is a more dense and heavier material than resin, the Forton MG will accept a blowtorch used in some bronze patina applications. The only drawback is that because of the lower temperature, the casting will take longer to cure and fewer castings can be created per day from a single mold. For this reason major production facilities will probably use resin and smaller art supplies will probably use Forton MG. Both will create excellent bronzes.

Mix Ratio for Forton MG & Metal Powder by Weight

FGR-95	Latex	Resin	Hardener	Bronze Powder
100	70	10	.48	150

Once the casting has hardened it is removed from the mold and all imperfections are chased and cleaned up. Buffing the surface will remove all outer layers of the resin or Forton MG matrix and the remaining surface will be pure bronze. This bronze surface has the look, feel, and weight of a traditionally cast bronze and can be finished and patination in exactly the same manner as a traditional bronze.

To provide extra definition in the finished casting a liquid pigment of black may be added.

To add weight to the piece to give it the heft of an actual foundry metal you can add dry sand or calcium carbonate to the back up mix.

To bring forth the metallic finish, buff with steel wool ("00000") or sand paper (400 grit). Patina coloring can then be done using cupric nitrate (green) or ferric nitrate (yellow). Your casting should then be sealed with wax or clear acrylic spray to prevent oxidation.

Although not generally appropriate for limited editions, a cold cast bronze is the perfect medium for cabinet editions, open editions, figurines, and other decorative arts. Most importantly the process is many times more economical and faster than a traditional cast bronze.

As we mentioned earlier, the cold cast process is not limited to bronze. Almost any finely ground material can be used to create a bonded casting. Typical applications have included marble, pecan wood, and porcelain, and result in a casting which closely resembles the parent material.

Cold cast wood can be created using finely ground up pecan shells ("pecan flour") as a filler. The pecan flour is the same consistency as ordinary baking flour. Cured pecan resin has a dark woody look, similar to that of walnut wood. After abrading with steel wool it can be stained and finished just as you can with any fine wood. Porcelain resin is plastic resin in which powdered clay ("malachite") has been used as a filler to make imitation porcelain. Aluminum trihydrate can also be used for a more translucent look. Cultured marble is plastic resin in which calcium carbonate (also called 'marble dust') has been used as a filler.

Filler	Mesh Size	Purpose
Bronze powder	325	Simulated foundry casting
Calcium carbonate	325	Simulated marble
Malachite	325	Simulated porcelain
Aluminum trihydrate	325	Simulated translucent porcelain
Pecan flour	325	Simulated wood