

LOST WAX BRONZE CASTING

The art of lost wax originated in the third millennium BC, somewhere between the Black Sea and the Persian Gulf. It began when an artist created a sculpture from beeswax. The sculpture was then covered in clay and baked in a fire. After the beeswax was melted away and the clay had hardened, an empty space was left within the clay mold. The clay mold was then filled with molten tin and copper (alloys of bronze). When the bronze had cooled and hardened, the clay was knocked away revealing the first bronze cast.

Over thousands of years, the process of lost wax has developed into the most precise metal casting technique in existence. It is the singular process that ensures the most accurate reproductions of a sculpture by capturing the exquisite detail of the original. The lost wax casting process is an expensive and time consuming method, but it is necessary in order to produce the finest pieces of bronze sculpture. For every individual piece of bronze sculpture created through this process, a wax sculpture and a ceramic or plaster cast have to be created and then destroyed in order to get the final bronze piece.

Bonded Bronze is another less costly method of producing the effect of a bronze sculpture, but it does not compare to the real thing. Bonded Bronzes are created by mixing a plastic resin with bronze powders. A patina is then applied to the finished piece and a "faux" or false bronze is created. Via this lesser process, much of the sculptural detail and full brilliance maintained in a true (lost wax method) bronze is lost. In addition, Bonded Bronzes do not stand the test the time. Bonded Bronze sculptures, although a less expensive initial cash outlay, are typically a poor investment in the long run because quality, detail, brilliance, and longevity have been sacrificed.

THE PROCESS

CREATING THE ORIGINAL ARTWORK

The first step in the lost wax process is the creation of a full-scale original sculpture. For smaller pieces the artist can work directly in sculpture wax. For larger pieces the sculptor usually works in non-hardening oil based clay.

A MOLD IS MADE FROM THE ORIGINAL ARTWORK

If the original artwork was created in clay or any other non-wax medium a mold must be created in order to get a positive shaped form made from wax. The mold is usually formed of a rubber material. The negative shape of the mold is then filled with wax creating a positive shape wax sculpture. Larger sculptures may be broken down into multiple molds and then the various molds are pieced together.

CHASING THE WAX

The surface imperfections of the wax sculpture are then carefully "chased" away by skilled hands with wax-working tools.

SPRUES AND VENTS

The refinished wax is then fitted with a series of wax tubes called sprues and vents. Later in the process, after the wax tubes are melted away the sprues become the entry passage for pouring the bronze into the ceramic cast and the vents are the exits for air and hot gasses.

CASTING THE CERAMIC MOLD

The wax sculpture is then coated with a liquid plaster or ceramic outer shell. The shell will form to all of the details of the wax sculpture creating a fireproof mold that will later be filled with the molten bronze.

BURN-OUT

The mold is then placed in a kiln and fired at 1200 degrees Fahrenheit. The plaster cast will harden while the wax will melt away. Thus the term "lost wax." During this process the space left by the wax creates a spatial cavity that is exactly opposite of the original wax sculpture-- complete with channels created by the sprues and vents.

CASTING

Bronze is melted at a temperature somewhere between 1950 and 2300 degrees Fahrenheit depending upon the make-up of the ceramic or plaster mold. Before pouring, imperfections are skimmed from the top of the molten bronze. While pouring the bronze, extra care is taken not to agitate the bronze. The bronze is poured through the sprueing system at the top of the mold.

BREAK-OUT

Once the bronze cools to a manageable temperature, the mold is carefully broken away using a hammer and a chisel. The sprues and vents are now hardened bronze rods that must be cut away to free the sculpture.

ASSEMBLY

At this point if multiple molds were created from the original artwork they are welded together to create one whole sculpture.

CHASING, SANDBLASTING, AND POLISHING

The bronze usually contains imperfections from air bubbles or seams from welding. The surface of the sculpture is rough chased with a variety of metal working tools to work out any imperfections and to sharpen the details. Once chasing is completed the bronze is sandblasted to remove any working marks that remain. The sandblasting also creates a slightly rough surface that allows the patina to bite. A polish is also used to prepare the surface for the application of the patina.

PATINA

Patina is a chemical substance that reacts to the bronze causing different colors upon the surface of the bronze. Multiple layers of patina create the final color of the sculpture.

WAXING

When the application of the patina is finished the surface is then lacquered or waxed to stop the chemical reaction.

MOUNTING AND INSPECTION

The bronze is then mounted upon a base and goes through one final inspection.