

THE CONTRIBUTION OF BRONZON OF SCULPTURE

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Abstract

This paper studies the relationship between Bronze casting (one of the processing methods of bronze and its alloys) and sculpture. The pursuits of sculpture became challenges for bronze casting and its achievements were the cause for the expansion of the boundaries of art.

Often sculpture, art, society in general, feel the need to "retrace" their course, "look" as far back and as deep as they can. In such cases (the Renaissance, the modern era, etc.) it comes across notions and values that have obtained a timeless, an eternal even, significance. The case of bronze casting invites us to consider this since despite massive scientific and technological progress it remains obstinately unchanged. The characteristic smell of the vaporizing wax pleasantly welcoming every visitor to the atmosphere of an artistic foundry where later the "miracle" will take place before their very eyes; where the shapeless lump of metal is melted and transformed into works of art capable of surviving into eternity. Perhaps this is nothing more than the very meaning of art, the very meaning of creativity.

Key words: *bronze casting, sculpture.*



Bronze casting (one of the processing methods of bronze and its alloys) was from the start inextricably connected with sculpture. The pursuits of sculpture became challenges for bronze casting and its achievements were the cause for the expansion of the boundaries of art.

By studying the history of one we concurrently observe the history of the other. The contribution of bronze casting and its strong affinity with the evolution of sculpture can be observed throughout its course; a turning point in this synergy is the discovery and application of the "lost wax process" in the 6th century BC in Greece.

Greek Bronze Age civilization began declining in the 12th century BC without bequeathing the sculptural tradition that could have survived during the dark years that followed. The complex technique and rich decorative elements that characterized it were forgotten alongside the destruction of the palatial authorities that protected it. This decline was followed by collapse at all levels from approximately the mid 11th to the mid 10th century BC during which time contact with bronze and pewter production centres was lost. Exemptions to this rule were Crete and Cyprus that, throughout history, played an important role both in the preservation and development of bronze casting and the renaissance of Greek art.

Contact with the East and Egypt, which was re-established in the mid 10th century BC, brought with it, apart from knowledge of bronze and bronze casting, new imagery, experiences, stimuli, that contributed to the revival of the fine arts in Greece which began with the early Geometric period. A new period of revival began at the start of the 8th century BC; apart from the small, artless idols produced until that time, numerous small bronze statuettes and animal figures began being cast. These were intended as fixtures on utility objects or as offerings to recently established temples.

Casting and forging–toreutic techniques were used for the creation of these works. The first form of casting consisted of the creation of the statuette in wax encased in a layer of clay. The form created was then fired and the wax was expelled. The place of the gap resulting from the vaporization of the wax was filled by the molten metal; the initial wax statuette was thus transformed into bronze.



This casting method is only suitable for small, solid and relatively simple, in composition, works. Any other efforts came up against serious technical problems. This method, therefore, limited artistic creativity but fulfilled the notions and demands of its time.

Forging – toreutics were widely used in the 8th and 7th centuries BC for the production of medium-sized statues. Forgers, with their rich experience from the construction of shields, etc., could create larger - sized works by hammering sheets of bronze and then attaching them to wooden cores. Characteristic examples of this method are the three bronze statuettes discovered in Crete and the fragment of a life-sized statue of a winged goddess at the Archaeological Museum in Olympia.

The craftsmen initially used clay to mould the statuettes. Transition to wax was a comfortable and natural development since, as we know, such materials have similar qualities and can be moulded in the same way for the small-scaled demands of the time. In the evolution of bronze casting, wax is the all-important intermediate stage/material.

After firing, the clay statuettes were decorated with colours while the bronze underwent processing following casting and maintained their colour. This was one of the first differences

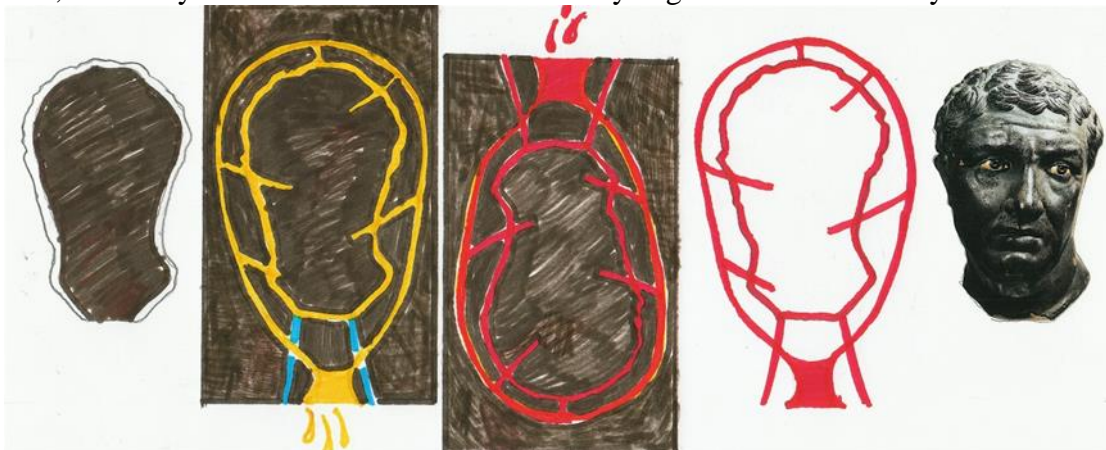
between bronze and other type of statuettes which, throughout the evolution of sculpture remained one of the main points of differentiation.

The Geometric period was succeeded by the Daedalic period and its own formal characteristics. During this period statues became larger. A characteristic example of this technique is the “goddess of Auxerre”, 65 cm high, created c. 640-630 BC in limestone and others, including the famous “Nikandrae”, 1.70 m high, carved in marble in c. 650 BC and housed in the National Archaeological Museum. Another important characteristic of this period is the systematic use of the mould. Its introduction to and use in ancient Greece offered the opportunity for the mass production of works and led to the standardization and ultimately, the dissemination of the Daedalic technique. It also introduced us to the notion of the copy and the multiple which was realized later in the history of bronze casting and played an important role in the course of art and culture in general.

Although the casting method described above did not permit the casting of large-scale sculptures, the experience accumulated and the know-how established contributed to bronze casting passing onto a higher level after the mid-7th century BC at which time the casting of internally hollow works such as the “female Daedalic head” from Olympia, created at around 650 BC, was introduced.

In the 6th century BC sculpture was dominated by the forms of the kouros and the kore; monumental works usually placed outdoors. The sculptures’ supernatural size became a rule during the Archaic period. The material chosen for these works was marble, a material that was both abundant and of good quality in Greece and, at the same time, stood up to exposure and outdoor conditions.

The kouros genre began with the “Kouros of New York”, from around 600 BC, with its anti-realistic and decorative rendition of the various parts of the human body, e.g. the ears, muscles, etc., and reached examples such as “Aristodikos”, 510-55 BC, which presents more naturalistic sculptural solutions. The era’s conceptions and the construction methods of the kouroi were served by their choice material, marble, and by the carving process. At the same time however, one can discern all the constrictions imposed by the material and its processing on the compositions, the movement, the gaze, etc. During the 6th century BC the accumulated experience of bronze casters led to the invention and application of the “lost wax method”, the process, in other words, of casting large-scale, internally hollow statues which had already begun in the 7th century BC.



The characteristics of this new phase of casting are that the artwork is moulded in wax around a pre-fabricated clay core. As such, the artist has the opportunity to work on his creation more comfortably and add greater details to the form. The resulting artwork, once the clay core is removed, is internally hollow.

This is how the “Piraeus Apollo” was cast in around 530-520 BC, using single casting, while the “Delphi Charioteer” was cast in sections during the 5th century BC.

The method is called the “lost wax method” and this variation “direct casting”. It is called

direct because it involves the casting of the actual work created by the artist in wax. This allows, on the one hand, the casting of large-scale works moulded directly by the artist but has the disadvantage that if there are any problems during the execution the work may be entirely lost. Also, the work remained unique; multiples, that had become so popular already since the Daedalic period, could not be cast. The invention of the “lost wax” casting method has been attributed to Roikos and Theodors, 6th century BC craftsmen from Samos.

The application of this method coincided with the archaic art of the kouroi, an era in other words, dominated by marble carving. As such, and although, sculpting in wax is an entirely different process, works such as the “Piraeus Apollo” are characterized by the aesthetics of the marble kouroi. The road, however, for the creation of artworks using other materials, different sculptural norms and technical processes had already opened. The changes brought about by the new process can be observed if we compare “Aristodikos” with the “Piraeus Apollo”, both works dating from the end of the 6th century BC.



Archaic period artists were taught by nature and evolved without perceiving or pursuing realism, or seeking a more sculptural rendition of form, freedom of movement and composition; the general expansion, in other words, of artistic creativity.

The leap took place in the 5th century BC at which time the degree of realism moved forward. The very notion of space came under scrutiny and finally, in the 4th century BC, sculpture managed to depict three-dimensional sculptural space.

The sculptural process, already widely-known, improved in the 5th century BC and with the help of realism moved forward in leaps and bounds. Statues were now moulded in clay supported by an armature/skeleton and could depict any movement selected by the artist. Clay is a malleable material that offers ease of moulding, can be added and removed easily and is easily corrected in case of mistake. These clay prototypes are then transferred to plaster using mould casting; these plaster works in turn become the prototypes either for carving into marble or for casting in bronze.

During this period, the casting process was gradually modified. A new mould is made from the original plaster cast; the mould is then lined with wax that will, eventually be replaced by the bronze. This variation of the “lost wax method” is called “indirect casting” since it is not the original artwork that is cast like in “direct casting” but a wax copy.



This process had much to offer. The work is safely cast in sections; it offered the possibility of more complex compositions, greater freedom of movement, etc. The cast from which the wax mould occurred is not destroyed so any section that may have been damaged during casting can be re-cast. Also, the same mould can be used for multiple castings of the same artwork.

This technique liberated and imparted substance to the sculptural process which, alongside the carving process, became and continue to form the two basic pillars of sculpture. It also liberated all the possibilities of sculpture, a process observed throughout the subsequent course of the history of art. This casting process was a landmark in the evolution of bronze casting and sculpture which has, in essence, remained unchanged to this day. Today the “indirect casting” method is used primarily for safety reasons although the “direct” or a combination of the two are also used quite often.

Great numbers of bronze sculptures were cast during the Classical era which is, however, better known for the marble artworks found at Olympia and the Parthenon. Thousands of bronze artworks existed in Rhodes, Athens, Corinth, Olympia and elsewhere. The bronze caster Lysippus alone is thought to have made around 1500 works. The great sculptors were also bronzecasters and toreuts. Landmark works such as Lysippus’ “Apoxyomenos, Myron’s “Discobolos”, Polykleitos’ “Doryphoros” and others were created using the “lost wax method”.

5th and 4th century BC marble statues were, as we know now, painted while bronze ones were not. New expressive opportunities occurred from the exploitation of the very nature of the materials. The final colouring of the bronze works resulted from the proportions used in the alloy and the particular additives used, per case, by the sculptors. Greek sculptors used different alloys; Myron, for example, used Aegenean bronze, PolykleitosDelean, etc. The Iliad mentions that Hephaestus addedgold and silver to his bronze and pewter alloy. Plutarch notes that the sculptor Silanion added silver to bronze in order to achieve the pallor of death to the portrait of Iokaste, while Aristonidis from Rhodes managed to add iron to bronze to achieve the blush of shame. A 15% ration of pewter gives the alloy a gold colouration and this was widely used in the period following the Renaissance. The horses of St. Mark’s were cast using an almost pure bronze alloy in order for the latter gold-plating to be successful. Also important were the combination of toreutics, the exudation and inlay of metals on the main body of the statue and the combination with other materials, e.g. bone for the eyes, and others.



The aesthetic exploitation of materials systematically applied by the era's bronze casters continued throughout the later course of the history of sculpture and particularly in the modern period. Time also brought about additional surprises regarding the final colouring of bronze sculptures. These included patina, the chemical compound in other words, with various other elements which is explored and applied systematically to this day.

"And then art stopped," wrote Pliny, describing the post-Lysippus era, despite noting a renaissance some 150 years later. There is no doubt that the personality and conquests of Alexander the Great changed the then-known world. The new political and social climate created had a deep influence on the arts which were destined to please rulers and mortals rather than glorify the gods and the state.

During this period casting techniques were perfected. This allowed the casting of massive statues such as "The Colossus of Rhodes" which was created in the 3rd century BC by Lysippus' pupil, Charis, and was over 30 metres tall.

The notion of larger-than-life size achieved via bronze casting on such a grand scale is one which reappears throughout the history of art. From mythical Tallos, the bronze giant guard/protector of Crete, to the "Colossus of Rhodes," one of the seven wonders of the world, the mounted statue of Peter the Great, 6 meters tall and cast in one piece using 16 tons of bronze in the 18th century, H. Moore's 20th century super-natural works, to this day.

The copying of classical artworks also began in the Late Hellenistic period and was one of its main characteristics also systematically adopted by the Romans.



During the Roman period, which was largely based on the Hellenistic, apart from the copying of works of classical antiquity, the transportation of sculptures from Greece to Rome for the decoration of imperial and high-ranking officials' gardens was also prevalent. Unfortunately many of these were lost in ship-wrecks and even more did not escape people's fury for melting down and turning into coins, canons and other objects. Of the thousands of classical era works only twelve have survived but these are more than capable of bearing witness to the high standards sculpture and bronze casting had reached.

The casting of even larger-scale sculptures such as the mounted statue of Marcus Aurilius (4.24 metres tall) continued during the Roman period. The Romans also mainly used brass – a bronze-mercury alloy – in order to achieve thinner walls.

For long periods of time sculpture, for historical reasons, remained stationary and without significant progression; in the Middle Ages, for example, in the Byzantine period and others. The fate of bronze casting was similar during these periods. It either remained stationary or it was partially or completely forgotten, as in the case of Greece. It is however, equally impressive how every time sculpture moves forward and evolves so sculptors strive to learn about or rediscover artistic casting.

The classical Renaissance (15th-16th centuries) was just such a period. Many of the era's landmark works were bronze castings; the "Gates of Heaven" by Lorenzo Ghiberti were made of gold-plated bronze. The mounted statue of "Gattamelata" (3,40 m high) by Donatello and Leonardo da Vinci's attempts to cast the 7m-high mounted statue of Francesco Sforza are just some of these. Particularly revealing in his autobiography Benvenuto Cellini (1500-1571) describes the enthusiasm and passion caused by the casting process every time he performed or re-discovered aspects of it.



He considered bronze casting part of the sculptural process and he himself was a sculptor, bronze-caster and metal smith at the same time continuing thus the tradition of the bronze caster Lysippus and transmitting it to the sculptors of the 20th century.

The modern period of sculpture (19th-18th centuries) was inaugurated by “The Age of Bronze,” the masterpiece by A. Rodin, first exhibited in 1877. During this period when expressive possibilities reached their absolute peak, the opportunities of sculpture could not have been revealed without the contribution of bronze casting. The exploitation of the expressive possibilities of the materials which began in antiquity with the casting of statues is thus expanded and becomes one of its main characteristics preserved to this day.



Works such as those by A. Giacometti or the larger-than-life sculptures of H. Moore mentioned earlier, may not have existed were it not for the possibilities offered by casting.

In Greece, it is worth noting the works of the sculptor Christos Kapralos who had to re-discover the “lost wax method” in order to cast the works for his participation in the 1962 Venice Biennale. In his autobiography he mentions: “... the foundry operated in a primitive way. In other words, we retraced, without realizing it, the footsteps of our ancestors...”

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welcoming every visitor to the atmosphere of an artistic foundry where later the “miracle” will take place before their very eyes; where the shapeless lump of metal is melted and transformed into works of art capable of surviving into eternity. Perhaps this is nothing more than the very meaning of art, the very meaning of creativity.

While studying the history of bronze casting and sculpture we may come across the truth through myth at a time when the bronze caster Hephaestus forged the shield of Achilles, when the goddess Athena moulded the image of a horse in clay, when the sculptor Daedalus attached Icarus’ wings with wax, when the notion of the artist was encompassed by the word craftsman.