

An Examination of the Production Processes of Brass Casting Among the Asantes: The Case of Krofofrom in Ashanti Region of Ghana

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Abstract: Brass casting in Krofofrom is well known and unique; this is because it embodies a lot of history and the cultural heritage of the people of Krofofrom, which is portrayed in visual art forms. The purpose of this study was to examine the production processes employed during brass casting. This is because the current generation is losing in the ancient technology due to the problem of generational gap. The researchers critically observed the casting technology performed by the indigenes, interviewed some relevant people who have enough knowledge about the craft and could provide enough information which served as primary data. The descriptive method of qualitative research approach was employed in this study through interviews and observation. The study established that lost wax casting, which is popularly known as “cire per due” is still the most accurate and reliable means of reproducing complex shapes in brass or other metals with all the fine details of an original pattern.

Keywords: Krofofrom, Brass Casting, Ashanti, Culture, Tradition

1. Introduction

In the Akan society of Ghana, metal activities like smelting and casting was first located in areas like Brong Ahafo, Atebubu, Ntonso, Techiman, Bekwai just to mention a few. However the art of casting in metals like gold, brass, silver and copper was seen as a profession unlike blacksmith. It was entirely different to that of the blacksmiths with regards to the items they produced. Whilst the founders produced jewelries and items like gold-weights, spoons, gold dust containers just to mention a few, the blacksmiths on the other hand produced items like hoes, spears and other farming tools. Silverman opines that the technical craft of casting reached its high state of development when the Asantes dominated the Bono's in the Bono-Asante war of 1722-23 [12].

The study of the craft of casting after it gained high

prominence since the 1700's in the Asante kingdom has survived in their primitive mode of production and technique (lost-wax). Though there has been a decline in the production due to inadequacy of the major raw materials: beeswax and brass scrapes (N. O. Agyare II & brass casters, personal communication, 1st January, 2017).

Traditional craftsmen in Krofofrom, in the Atwima Kwanwoma district of the Ashanti region of Ghana, have historically been engaged in casting, using brass and occasionally using other metals like aluminium and copper. It therefore, appears that, the brass casting in Krofofrom which is our focal point for this research provides a great source of aesthetic orientation which is manifested in the cultural lives of the people. According to Asmah many artefacts produced were inspired by proverbs and folktales, and other ornaments produced also displayed power of royalty. Nevertheless, the artistic skill which is portrayed by the craftsmen in Krofofrom does not only serve its

purpose of creation [1]. There is also an amount of beauty in their production, processes and the artefacts produced which people have little or no knowledge on. Moreover, Garrand as cited in Kissi supports with this statement:

“The creativity and fashioning of brass casting did not flourish until 1700 when the best casters were charged with a task to work for the Asantehene” [3, 6].

Waters attest to the fact that bulk production is currently encouraged by demand, and supply of these brass artefacts as per the means of fabrication, much awareness and interest for the cast works are always high as compared to previous brass casters producing ornaments solely for Asantehene’s consumption. These artefacts are made using the traditional brass casting technique known as the lost wax [15]. The art of lost wax casting has remained the same throughout various cultures. The basic technique is the same though there might be slight differences in the kind of material for making the mould or the mode of finishing the cast pieces [6].

In Krofofrom during the early 90’s, brass casting was slightly different in terms of the kind of equipment’s that were being used. Currently bellows which were used for air blowing are now replaced with electronic air blowers (personal communication, July 24th, 2016). Also spatulas which were used for making wax threads are now replaced with the wax plunger. The castings that were made in the 90’s were categorised by some high level of creativity. However, the current mode of production at Krofofrom is mass production which make sure that large numbers of similar objects are produced for the market. Implying that, demand is driven by the market. Also brass casters initially formed small bowl-shaped crucibles using clay and filled with a measured quantity of brass [12]. It was then completed with the clay crucible placed on the de-waxed mould directly and they are completely sealed together with extra mixture of clay and palm fibre. The sealed mould is then placed in a furnace and then after a while the mould is turned for the molten metal to run down into the hollow mould [1]. After cooling they are then smashed to reveal the solid cast work. The glossy finish was effected by the application of lime.

2. Methodology

This section specifically deals with the methodology that was employed in producing the Brass artefacts. It gives a description of the processes and techniques used during the casting. The descriptive technique was used in order to have a rational and a well-defined presentation of how brass casting is represented by the indigenous casters from Krofofrom. The qualitative research design was adopted for the study. The researcher also adopted the comparative study approach. With this, the production process that existed in the 90’s was compared to that of the millennium. This because according to Crossman, qualitative research, also called field research, typically involves fieldwork in which the researcher observes and records behaviour and

events in their natural setting [2]. The researcher employed interviews and observations as instruments. The target population covered all brass casters in Krofofrom. Out of the 270 people the researcher planned to interview and observe their production process, only 81 were accessible to the researcher. From the 81, they were randomly selected according to those who willingly agreed to work with the researcher.

2.1. Wax Preparation

The basic material that is beeswax which the ancient casters used for casting still remains unchanged. However, there has been a bit of scarcity with regards to obtaining the basic raw material nowadays (retired brass caster, personal communication 20th December 2016). Aside from its use as a foundation for storing honey, it has been one of the most precious desirable materials discovered by the traditional casters. According to the casters, any quality wax has a yellowish beautiful colour which when modelled and cast, gives a fine surface finish. But if it appears dark, means it contains a lot of impurities which makes it unacceptable to work with. It was also revealed that when wax becomes scarce, casting becomes temporary suspended. The researcher discovered how fascinating it is to experience a melodious cracking sound of the beeswax when it is introduced to excess heat and the wonderful glowing fire it catches sometimes. Also beeswax in its molten state generates a sweet smell with a golden brown colour [14].

After conceptualizing their ideas, the wax preparation is then approved by the chief brass caster who needs to access the purity and the quality of the wax that is its workability. The casters mostly take inspiration from the old experienced caster, philosophical ideas and sometimes ideas are given from demand or instructions from clients and already existing designs. Both the young and the old casters sit together in a circular form with the chief caster situated in the center. He then gives specific roles to the casters to help with cohesion and movement at the production site. The duty of preparing the wax is usually left in the care of the young casters. Small heat sources made out of clay are then arranged in a horizontal manner with each caster carefully manipulating the wax in the warm water by occasionally pressing, twisting and pulling interchangeably with both left and right hands [10].

The wax preparation stage and the sitting arrangements of both the old and the young brass casters express some sense of balance. This can further be elaborated as aesthetically pleasing in a visual context. There are little to no distractions at the working area at the early stages of wax preparation by non-brass casters thus creating perfect team work among them in a harmonious environment. An expression of some form of rhythmic movements at the early stages of production through the systematic movement of the wax from the left hand to the other and vice-versa in a continuous motion until the desired malleable state of beeswax is achieved and effective to work with [8].

As this duty is been performed the other casters, while

conversing, also get all the items required for the next stage clearly and perfectly composed together. The view at the working area displays some sort of unity. Because the relationship between the craftsmen, equipment and the ongoing activities of preparing the wax at the working site displays some sense of cohesion and togetherness. The working scene at this stage looks so serene devoid of any form of chaos that can hinder the working conditions and the working progress of the craftsmen. The perfect arrangements and coordination at the preparation of the wax stage is a confirmation of how the young casters relate with the elderly with maximum respect [13].

There are a lot of important activities that are been encountered during the initial wax preparation stage as stated. The preparation of the wax stage perfectly reflects the theory of instrumentalism. This is because the idea of the wax preparation activity serves a purpose which is part of the creation of the artefact this can further be referred to as functionalism [9]. Instrumentalism then becomes evident throughout the initial production activity because the craftsmen serve a particular function by assisting in the production.

2.2. Discussion of Production Processes, Techniques and Outcomes of the Brass Casting

In brass casting, the casters most of the time work under sheds in aerated places with aluminium or corrugated aluminium roofing sheets and wooden long poles supporting the four corners to provide shade as (see Figure 1). The artisans normally work with locally made furnace popularly called “*ebura*” in the Asante Twi dialect see Figure 2. It is a thick clay walled mould in the shape of the letter “U”; at the bottommost part to the ground are several holes created, which serve as the mouthpiece to the air blower machine or sometimes bellows which are not mostly common. The average dimensions of a regular furnace come with a height of 24 inches, length of 65 inches and a breadth of 7 inches.



Source: Field Research 2016

Figure 1. A brass casting shed.



Source: Field Research 2016

Figure 2. A Caster's furnace or “*Ebura*”.

2.3. Tools and Materials

The first major tool used for modelling is the human hand. However with the help of other tools like wire brush, a thin iron skewer for design patterns on the wax model, small wooden spatula (*adwini aba*) for bringing out details of the modeled wax designs or motifs, iron needle (*dwin dadi 3*) for engraving when heated, a hammer, pocket knife and an electronic blower all come handy. Below is a list of tools and materials used by brass casters in Krofofrom which the researcher observed when the craftsmen were employing them in their craft.

Tools

Crucible, Electric, Blower, File, Iron needle, Tongs, Knife, Iron needle, Sanding grinding machine, Wire brush, Weighing Scale, Wooden spatula.

Materials

Beeswax, Charcoal, Clay, Cow dung, Palm fibre, Lime.

2.4. Preparation of the Wax and Modelling of Designs

Before the beeswax could be accepted as good to work with, the caster cuts a workable size puts them in a small aluminium container with lukewarm water in it. According to Mr. Fosu, (brass caster at Krofofrom) (Personal communication, 19th December 2016) it is however ensured to keep the beeswax soft to be able to be moulded into desired designs as seen in Figures 3 and 4. However the beeswax should always be free from all impurities since they are most often obtained from the beehives which are boiled and the impurities separated from the wax surface when scooped and allowed to settle, cool and solidify into a block form. As placed in warm water, the wax is then modeled and kneaded with the hand into the desired motif and with the help of the “*dwin aba*” which literally means modelling stick and “*dwin dadi 3*” which also literally means modelling rod to bring out details, Figure 5. The wax is then made soft or solidly achieved by pouring cold water or dipping it in hot or warm water. This finish will then be a solid model of wax and cast to obtain a solid cast.



Source: Field Research 2016

Figure 3. Wax in warm water.



Source: Field Research 2016

Figure 4. Kneading soft wax.



Source: Field Research 2016

Figure 5. Modelling desired motif in wax.

On the other hand to obtain a hollow cast work, powdered charcoal mixed with cow dung is made into the desired shape. Here the cow dung and charcoal mixture is preferred over the clay and charcoal mixture as a core component because it is easy to separate from the cast when complete. Now as the desired shape is ready (core), it is allowed to harden and thin threaded beeswax which is made by compressing the wax using the wax plunger also called “mmiasor” is coiled around it to imitate the shape of the core into the desired thickness. After casting the charcoal and cow dung, core is removed using a simple needle or pocket knife leaving the casting hollow. Figures 6, 7 and 8 shows wax threads, designs being made and complete hollow brass casts.



Source: Field Research 2016

Figure 6. Wax threads for hollow cast design.



Source: Field Research 2016

Figure 7. Compressing wax into thin threads.



Source: Field Research 2016

Figure 8. A complete hollow brass casts.

Individual long thin wax threads are made using a spatula or the palm of a human hand into cylindrical shapes and allowed to harden in cold water. It is then cut into equal lengths and used to make other complex designs by carefully twisting, crisscrossing or braiding them to obtain the preferred impressions. Also other beautifications that are most often engraved on the wax models are repetition of lines, dots and circles using a very small wooden spatula as seen in Figure 9.



Source: Field Research 2016

Figure 9. Wax models with lines and dots.

At this point, what is left is to join thing wax threads “*gyinae*” which literally means standing channels are connected to some parts of the wax model mostly to the base of it. These wax threads or channels “*gyinae*” are attached to the wax models to serve as a canal or an outlet where molten metal can be poured into the model [5, 7].

2.5. Coating the Wax Models

After the wax threads are joined to the wax models, the

caster applies a fine mixture of clay slip and palm fiber or grog to the whole model. Clay in the composition provides strength to the mould to be able to withstand the high temperature and pressure of the molten metal introduced into the mould during casting [16]. However, the first coat is made of smooth powdered charcoal, clay and water. It is applied and allowed to dry, and a second coating is repeated until it becomes a thick mould using the human hand or spoons to scoop the mixture onto the model. After various rounds of coating of the wax models, they are then placed on large flat plywood and allowed to dry, see Figure 10. As shown in Figure 11, the final application is done on the next day but with this, the mixture is made up of kneaded wet clay mixed with palm fiber and applied all over the work. The reason been that, it prevents the clay from cracking. The mould is then allowed to dry after several days or even weeks and is determined by state of the drying processes.



Source: Field Research, 2016

Figure 10. Coating wax models.



Source: Field Research 2016

Figure 11. Smooth charcoal & clay coating.



Source: Field Research 2016

Figure 12. Wax channels joined together.



Source: Field Research 2016

Figure 14. Molten brass poured into mould.

2.6. De-waxing and Casting

The joint tips of the channels are then located on the mould by scratching to reveal them to allow de-waxing to commence, through the opening created. The opening in the mould is then placed downwards over fire in the furnace. The wax model in the mould is allowed to melt and run out, or burn out through the channels that were created to leave the mould empty with the shape to be cast. After the mould is empty or de-waxed completely with the signal of smoke no longer coming out of the channels, they are allowed to cool and molten brass melted in an improvised crucible “ananee”, “afere” made from an engine in a refrigerator is held with tongs and poured through the channel openings created to fill up the mould with a measured amount of brass scraps Figures 13 and 14.



Source: Field Research 2016

Figure 13. Mould with palm fibre coating.

The mould is allowed to cool and is broken off to reveal the solid cast brass artefact Figure 16. This operation is often performed by more than one caster to bring out effective and quality works since it is laborious. However, bad castings are always re-melted and reused for other castings (Anokye, a local brass caster, personal communication 19th December 2016). The surface roughness or smoothness of the cast artefact usually depends on the first smooth mixture or feel of the first coat of grog that was applied to the wax model until the mould becomes thick to ensure a fine finish to the surface and other forms of irregularities too.



Source: Field Research 2016

Figure 15. De-waxing.



Source: Field Research 2016

Figure 16. Cast item.

2.7. Direct Casting

On the other hand, lost wax casting process is not the only technique that is used by the brass casters; another method is the direct casting process. Intermittently, objects from nature which can be cast directly like shells, insects and cowpea were coated with the charcoal and clay slip and allowed to dry. The natural object encased in the mould is later fired to burn out the object and replaced with molten metal to take the shape. These two techniques were sometimes brought together to create wonderful artefacts. As seen in Figure 17 is a natural object about to be directly casted.



Source: Field Research 2016

Figure 17. Natural objects ready to be coated and casted.

2.8. Finishing

As seen in Figure 18, the first step in finishing of a brass work is the cutting away of the sprues and gates using the shears or a hacksaw after which the work is introduced to a grinding machine. For an extra smooth finish, sanding is done using different grades of sand paper. Filing and chiselling are also employed where necessary. Lime juice is then applied on the work which is then washed with water and a steel wool used to polish it, to give it a shiny finish like Figure 19. On the other hand, to create the aging effect or a patination, the work is applied with lime juice or left overnight in lime solution but this time it is allowed to dry on the work to create the patina on the surface of the artefact as seen in Figure 20.



Source: Field Research 2016

Figure 18. Cutting away sprues & gate.



Source: Field Research 2016

Figure 19. A shiny finished brass item.



Source: Field Research 2016

Figure 20. Patination finish of brass item.

3. Results and Discussion

The comparative study of the production process of lost wax casting technique between the 1700's and present at Krofofrom revealed some still maintained philosophy. However, the present technique of lost wax casting has gone through some transformations even preceding to this research work. In the 17th century, the basic material that is the beeswax which was readily accessible were obtained from nearby farms and forest with ease. However, in this era there is the scarcity of beeswax for the production according to N. O. Agyari (personal communication, 20th July, 2016). The current production process of brass casting has witnessed a lot of changes.

This assertion was collaborated by all the veteran brass casters and some young casters of what they experienced growing up. It was due to the current scarcity of beeswax that propelled the researcher to recommend the use of other materials like the gel flex and paraffin wax. Also in the 17th century castings, the designs were solely used to decorate traditional artefacts from the palace and the Asantehene and his sub chiefs (personal communication, 29th May, 2016). It was further stated that, because of the beauty and philosophical meanings attached to the designs, rich people started using them.

Going forward, the basic core materials used for the lost wax brass production at Krofofrom has gone through a lot of transformations even preceding to this research. In the 17th century, the casters of the Asante Kingdom were using a certain kind of core material whose composition was 3 parts of charcoal powder and 2 parts of clay mixed with water to a consistency appropriate for core modelling. Though the castings have fine inner walls, core compositions which were often difficult to remove resulted in warped castings in the 1700's [6].

In the present era of mass production as practised in Krofofrom because of the influx of tourist and local visitors, the brass casters cannot afford to lose valuable cast items

through distortion and difficulty in the removal of the core composition as of the 17th century castings. Also, the finished works in the 1700's after casting had pinholes in them which was as a result of the core composition. However, the present era has revealed that, the core composition is mixed with cow dung to make it easy to remove during hollow casting but also pinholes still appear on the surface of the works as defects. Also in the present era, paraffin wax is mixed with beeswax by brass casters at Krofofrom to obtain a wax that is very hard, crack resistant and easy to carve or appropriate to work with even in a warm environment. However natural beeswax is too soft and does not provide the properties or qualities stated. With these qualities, very sharp corners or planes desired for the work are achieved when works are cast. In concluding, it was observed that hollow artefacts produced by brass casters at Krofofrom are characterised by pinholes in their inner walls. This is as a result of the presence of cow dung in the core composition of charcoal and clay. Moving further, brass products observed in the 1700's did not have finer planes, sharp planes and corners. This is due to the lack of paraffin wax which the present casters mix with the beeswax when carving.

4. Conclusion

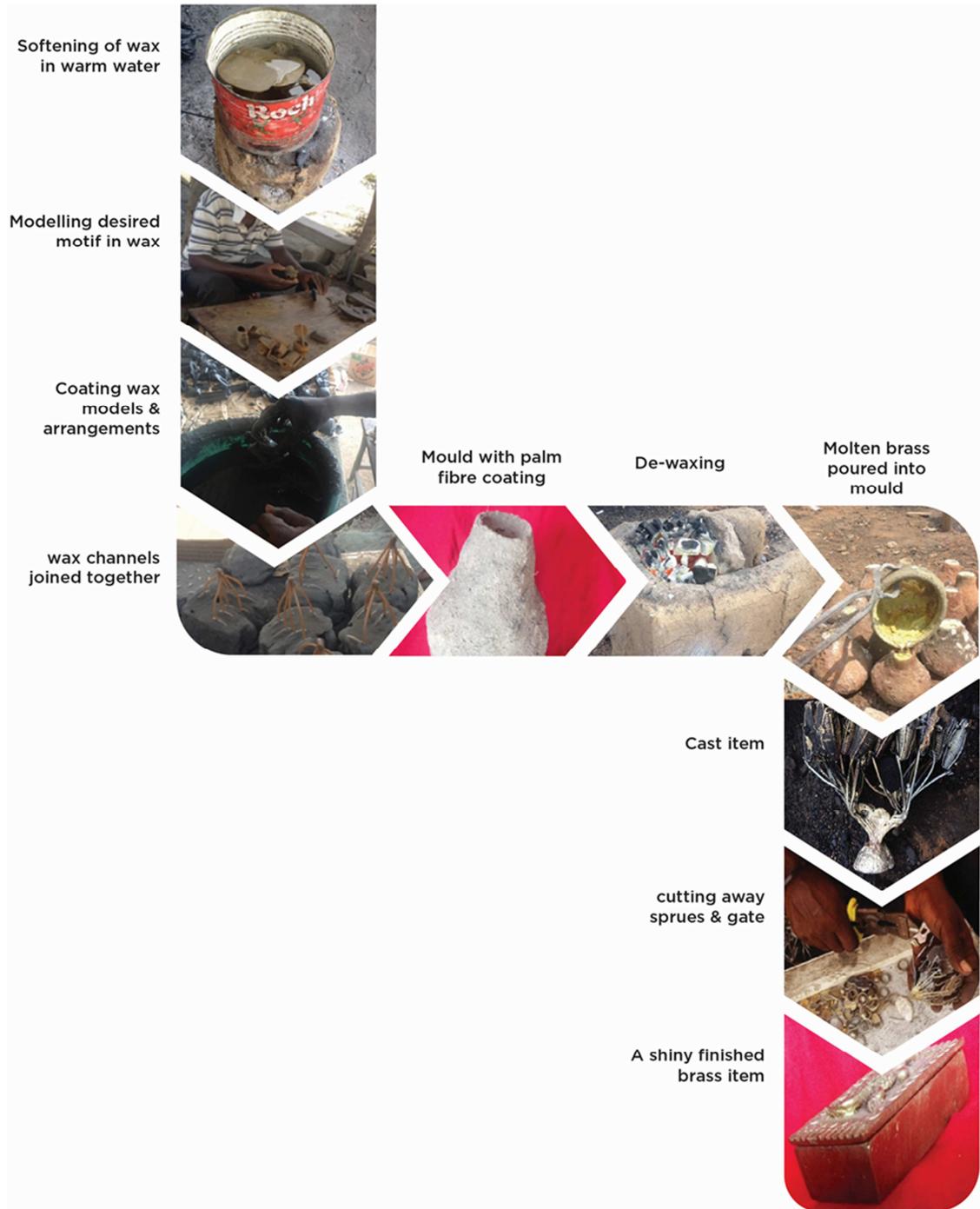
Per the information gathered in this study, it could be said that the production process of wax preparation, wax modelling, coating of wax models, de-waxing and their brass finishing remain unchanged depicting the once flourishing and sustained aspect of the Asante culture. Nevertheless, the problem of availability of some major raw materials such as beeswax and scrap brass metal and the high cost then pose a challenge to the survival of this ancient and noble profession. Another disturbing phenomena is the problem of unfavourable or bad weather conditions which often interrupts the production process of brass casting. The current generation is also not so much interested in the craft because they find it unattractive, laborious and less rewarding.

5. Recommendations

The researchers recommend that other materials like paraffin wax, gel flex, aluminium with similar characteristics like the beeswax and the scrap brass metal should be experimented with. This will possibly complement the scarcity of the beeswax and the brass there by increasing the production. Also, the production processes of brass casting using the lost wax method should be explained and documented and possibly, placed at public libraries by researchers and other academic institutions for people to have access to them and study them thus serving as art history of the craft.

Also, the Ministry of Tourism, art historians, chiefs, opinion leaders at Krofofrom should all encourage people on the brass casting craft through the organisation of workshops. This will help the community and other interested persons to continue learning the craft and also to understand the designs produced so as to incorporate them in other creative fields

and also keep the craft alive.



Source: Field Research, 2016

Figure 21. Flow-chart showing the production process of brass casting at Krofofrom.

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