CREATING INNOVATIVE CONCEPTS FROM FAILED METAL CAST SCULPTURE

Sullayman, Sa’ad Taiwo
Department of Sculpture,
Auchi Polytechnic, Auchi,
Corresponding Author’s e-mail: Sultai2001@yahoo.com

Abstract
Failed metal cast sculpture is a partial distorted concept or form due to accidented occurrence during the process of casting. Failure in lost wax (cire-perdue) process of metal casting is inevitable because any minor technical error or mistake in the process has already registered. The paper examines the technical stages of hot metal casting and identified stages where problem may likely occur. It analyses the means and stages of re-conceptualization, manipulation and reconstruction of the destroyed design that differs from the intended concept. It interrogates the phenomenon of accident and design, and finally encouraged casters and sculptors not to always abandon their failed metal cast as waste because a lot can be achieved from destroyed forms.

Introduction
Failed metal cast sculpture is partial or complete deformation of intended concept due to accidental occurrence during the process of hot metal casting through lost wax (cire-perdue) process. Failure in this technique of metal casting is inevitable because any minor technical error or mistake will register failure. Lost wax (cire-perdue) process has been the technique adopted by sculptors/casters in producing cast metal work till date. The earliest methods of metal casting and use of cast metals by human is lost to the distant past, but it can be linked to the early hunter story as pointed out by Langland (1999), that as early hunters gathered and were sitting by the fire, a lump of copper fell into the coals. In the intense heat, the copper melted and ran out on the ground in glowing stream. When cool, this shining, heavy material became very hard and took new shape.

Early people saw this repeating episodes and they were excited in the process and began to collect lumps of copper so that they could throw them into the fire to watch the glow stream flowing. Someone among them (early people) had an idea and formed a shape in the sand, and allowed the metal run into it and it took the shape of the impression on the sand, perhaps a spear point or head for hunting. And from that moment came the metal casting of the century and that is what is been practiced up till date. Nearly in all occupations, different people devise different
techniques of carrying out operation or get work done due to constant practicing. And when you discover new methods, process or tricks and added to your own, it now made it two ways of doing it. As the art of metal casting gained popularity the urge for experimenting in complicated forms started arising and the idea of using wax as temporary model began, that was how lost-wax (cire-perdue) process emanated. Sometimes complicated and intricate design enhanced failure in hot metal casting if spatial forms are not well linked to each other to feed directly from sprout or pouring gate.

There would be vacuum in the history of metal casting without mentioning the astonishing and skilful contributions of Benin traditional bronze casting culture. The tradition has been in practice for a very long time. According to the Benin traditions, the sixth recorded Oba Oguola to be precise who must have reigned about 1280 A. D. or slightly before, sent a request to the Oni of Ife, for the service of a master bronze-founder to instruct Benin craftsmen in the making of memorial heads in cast metal(bronze) for the ancestral alters. History had it that bronze pieces had been possessed and cast previously at Ife before being used in Benin (Fagg. 1990).

The Oni responded by sending one Iguegha who taught the Benin craftsmen the art of bronze casting. According to Fagg (1990), Oguola is still being remembered and was represented with terracotta head by the bronze caster of Iguneromwon quarters in Benin City who are the custodian and controller of art of bronze casting in Benin kingdom. The trade or craft had been taught since about A.D. 1280 and has been in practice till date with little or no modification on the technique, process, materials, concepts and forms.

Egonwa (2003), stressed that the bronze or arts are made to the glorification of the Oba. From the range of materials that Oba’s items were made (ivory, beads, brass, copper, bronze) it is vivid that they are the types that cannot be easily possessed by everybody. Peju (2002), buttressed the point that the processes involved in traditional metal casting are numerous, cumbersome, time consuming and very tedious.

The traditional methods of casting does not allow mass production, alteration of forms and design from identical concept, or design compared to modern or moulding technique of bronze casting that allow flexibility. Lost wax (cire-perdue) is the old aged method or technique of metal casting and is still very relevant up till date. However, there is new technologically improved method of metal casting that is being practiced in developed countries; they are ceramics shell and centrifugal methods. Moulding technique is an improved method of metal casting by sculptors/casters.

**Stages of moulding technique**

* Model (which could be in plastic, clay, wood, metal, etc.)
* Mould Taking (flexible rubber mould is required in order to achieve registered detail impression of the model.)
* Wax Model Casting.
* Wax Model Chasing and Iron Pin Tacking
Introduction of Sprue, Vent(s) and Runners.

Introduction of Investment, Core and Reinforcement.

Introduction of Anchor

De-waxing and Pre-Heating

Pouring Molten Metal

De-moulding, Chasing and Presentation.

Model: is a desired finished concept from any material that the negative impression can be taken from.

Mould taking: the mould should be taken in piece mould technique, section model into different areas with clay fence (area separator) for undercut to be taken care of. Apply surface separator (engine oil, grease, Vaseline, soap paste, palm oil, etc.) to cover all areas and surface. Mixed your chosen mould material with proportional and appropriate aggregates and apply several coats and reinforcement depending on the size of the model. In case of rubber mould, mould jacket is needed to hold the flexible material in place; this can be done in plaster or concrete.

Wax model casting: couple piece moulds in place after surface separator must have been applied. Melt wax (bee wax) into liquid form and allow it cool for a while, it will be ready to pour into the mould when clot is noticed on the wax. Ensure that the shim lines are being shielded with clay to prevent wax leakage. Liquid wax will be left in the mould for about 3-4 minutes in case of concrete mould; the rate of absorption varies from different materials. After pouring out the excess wax from the mould, cool water should be turned in and filled to the brim to prevent wax from cracking and cool it to facilitate quick removed from the mould. The thickness of the wax model could be checked at the tip of the mould. As many copies as possible can be cast out at this stage and it gives room for flexibility.

Wax model chasing and attachment pouring channels: this is very important stage where creativity and craftsmanship are being displayed. From the same mould, different concepts can be achieved through alteration of forms. At this stage cleaning of shims line, work up, signature, ornamentations and serial numbers are done. Attachment of pouring gate, vent(s) and runners are been done. Iron pins are been tacked on the high point of the wax model to put in place core and investment, when wax has been melted out of invested mould. Attachment of pouring channels is one important and delicate stage which if not well handled can lead to failure of the cast. All the channels (sprues, vents, pouring gates, runners) should be well attached to the right place and direct to the wax model.

Introduction of investment, core and reinforcement: This is another vital stage which if handled with levity can lead to failure of the cast. If the materials are not proportionally measured and mixed properly, it may lead to crack of the invested mould and may be too weak to carry the weight of the molten metal when poured inside the mould cavity. Either core or investment can come first, according to Mills (1976), but it is advisable to introduce investment first in order not to distort the form while turning the wax model round and while stuffing in
core, it is just matter of handling and choice. Investment materials are mixed according to the specified ratio and proportion (plaster and grog or silica sand, sand and clay, laterite, etc).

The mixing ratio of plaster/sand or grog investment and core is 30% plaster and 70% sand or grog while mixing ratio of clay/sand investment and core is 5% clay and 95% of sand. After the first layer of investment to safe guard the fragile wax model form, core materials are mixed proportionally and stuffed in hollow cavity of the wax model. Reinforcement wire gauze and binding wires are introduced on the first layer of investment and covered up with final layer of the same material, proportioned and allowed to get dried before the next stage. The use of plaster and grog instead of red sand saves time and improve registration of forms and it also reduces the amount of clean up after casting.

**Introduction of anchor:** construction of anchor with iron rod or wire round the invested mould is needed to enhance its lifting from kiln after de-waxing or pre-heating.

**De-waxing and pre-heating:** this is the method of removing or eliminating wax from invested mould in preparation for pouring molten metal. The mould is subjected to severe heat that is enough to burn off the wax in the mould. Flaming or smoking at the sprue or vent(s) indicate that there is still trace of wax in the mould and with wax inside the mould molten metal cannot penetrate. The two operations can be done simultaneously, but little or no wax will be retrieved except the operation is done one after the other.

**Pouring molten metal into the mould:** the invested mould must be securely packed in the sand pit, for it to be able to withstand the pressure and weight of the molten metal when pouring. The ideal sand in the sand pit is foundry sand, but clean-sieved sharp sand can also serve. The whole mould must be buried leaving the pouring gate and vent(s) to prevent leakage. The openings must be taken care of to prevent foreign matter from entering as this may affect the quality of the casting. Then the molten metal is poured through the pouring gate. The operation must not stop until both pouring gate and vent(s) are completely filled to the brim. After the pouring the mould is de-invested, the positive metal cast is ready for chasing and finishing.

**Accident and design**

Accident is the unplanned, unforeseen and unfortunate event or circumstance resulting especially from carelessness or ignorance. Wikipedia free encyclopaedia 2013, defined accident as “an unexpected happening causing loss or injury which is not due to any fault or misconduct on the part of the person injured but for which legal relief may be sought”. In this instance of accident destroyed design in the process of metal casting, creative relief is the next line of action to be sought in order to overcome the trauma that accident created.

Design is the means of creating or executing a given task in an artistic or highly skilful manner. Wikipedia free encyclopaedia 2013, also define design as “strategic approach for someone to achieve a unique expectation”. It defines the specification, plans, parameters, costs, activities, processes and how and what to do within environment, safety, and economic constrains in achieving that objective. The person designing is called a designer, which is also a term used for people who work professionally in one of the various design areas, usually
specifying which area is being dealt with (such as fashion designer, concept designer or web designer). A designer’s sequence of activities is called design process; the scientific study of design is called design science.

The ability to create innovative concept out of failed metal cast sculpture requires skill to be able to identify the right and matching found object that would be suitable to fix into the lost or failed area. Sometimes construction technique could be adapted, but found object assemblage is more interesting and creative. Found object assemblage technique have to do with association learning, to associate previous experience with present situation in order to come out with what is unique and original. Originality is what distinguishes art from craft and what is been referred to as original work must not be a copy, reproduction, imitation or translation (Grillo1960).

The idea or attempt to create innovative concept out of destroyed form came about as a result of accident that led to induced-design. As stated by Odutokun (1981),

> life’s pattern is considerably influenced by the phenomena of accident and design. They turn out to be mutually complimentary, accident inducing design, accident destroying design and design transforming a design to be destroyed later by accident and recreated and so the process continue in an endless cycle.

![Fig. 1 Accident Induced Concept](image1.jpg)  ![Intended concept](image2.jpg)
Art is problem solving activity, art brings ideals together to reinvest and reorganize things into new whole and this problem solving is achieved through selection of varied alternatives. If design is destroyed by accident there is alternative with an artist's creative instinct to recreate the destroyed design in another form that is different from the initially intended concept and the operation can be improve upon continuously without end.

Although there is more to recreation, artists are embodied with sufficient potential to make unique form or concept in as much as the artist is unique in style. Of course there have been, and will continue to be concept in sculpture that require articulation. Mills (1977), says accumulative knowledge is not the sole province of science, and to explore form at wide range as possible can lead to a proper use of influence. Such exploration of concepts will demand
personal decisions, which coupled with technical accomplishment will result in a personal statement. 

Conclusively, recreating destroyed concepts that are products of accident is not an easy task, they end up as new inventions though it is challenging and such trauma ignites artistic creativity to explore this aspect of art. It is matter of confidence and consistency in the practice that is required. According to Sullayman (2008), “There is no one way to reconceptualise, no better tool to use, no lesson that will make one perform creditably in re-creating accidental design until the first attempt and consistency in the practice is sustained”. What matters about the phenomenon of accident and design is for artist to strive to express his/her inner most feeling towards rehabilitating destroyed design and to achieve unique dimensions in sculpture.

Recommendations:
Accidental metal cast piece should not be always abandon as waste since type of unique design can be achieve from distorted forms.
Adequate precaution should always be taken or considered while going through the technical procedures of hot metal casting in order to avoid error.
Materials and methods involved in production of metal casting should be improve to sophistication and advance level to abolish or minimize failure in casting.
There should be a forum organized by art organization where experienced and skilful metal cast practitioner would share his/her experience with the sculptors and casters.

References

http://www.wikipedia.org/design&oldid=562929731(29/8/13)
http://www.matric.asn/accident/ info(4/6/13)