COMPLEMENTARY APPROACH TO FILIGREE IN GHANA

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DECLARATION

I hereby declare that this submission is my own work towards the certification of Master of Philosophy in Integrated Art and Industry and that to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the university except where due acknowledgement has been done in the text.

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ABSTRACT

Complementary approach to filigree in Ghana was chosen by the researcher as a means to break monotony in the filigree integrative materials such as emerald, ruby and diamonds. These have been in play for too long, and the use of these in Ghana blends Ghana made filigree with others. The researcher in this respect introduces Ghanaian materials as attributes into filigree making in Ghana. This is to serve as a bridge between the Ghanaian and the art and also as another genre of filigree that would be associated with Ghana. The set objectives considered for the study include: to assess the applicability of certain Ghanaian materials and concepts in filigree, to design techniques by which selected materials and concepts could be integrated into filigree and to demonstrate the practicality of the technique by producing samples of filigree with Ghanaian attributes. The Research questions for the study are as follows: What Ghanaian cultural concepts can be introduced into Filigree made in Ghana? What materials popularly associated with the Ghanaian culture are also applicable to filigree work? How can these materials and concepts be integrated into the Ghanaian concept of filigree? The research employed the qualitative approach. From the qualitative approach, the action research and content analysis research designs were used to facilitate the collection of relevant data. The experimental and observational research were also used. Cowries and beads were used as the complementary materials adopted for the study. Adinkra symbols were employed in the formation of the filigree wires, by manipulating the wires to resemble the symbols. The wires used were between the range of 16 -25 gauge wires and these were used at various stages of the work with a bar size of 3.8mm by 2mm for the work frame. The infill wires were twisted and flattened wires. Three sample frames were produced and the final work was a framed filigree work of the Independence Arch of Ghana. Results proved

that bead and cowry integration is possible with filigree. Filigree wires can be manipulated to resemble some Ghanaian symbols, and it is also possible to translate known Ghanaian themes into a filigree work. This project makes room for further study and exploration of more integrative methods and materials. Filigree integration with cowry and beads must be done after soldering. Cowry integration should be done after pickling. The adaptation of the adinkra symbols into the filigree wire work adds identity, even in the wire formation of filigree. While the integrative materials add colour, identity and enrich the value of the filigree work.

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CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter being an introduction to the thesis, focuses on the background to the study, statement of the problem, objectives, research questions, delimitations, importance of the study, definition of terms, and arrangement of the rest of the text.

1.2 Background to the study

The trend of filigree in Ghana is slowly coming to a standstill. Filigree works made in Ghana have not yet reached a stage of complete recognition and peculiarity as compared with works from other places like India. The researcher consequently has the solitary ambition of raising the filigree platform in Ghana to an estimable phase for the Ghanaian and the world at large. The rich material bases in the culture of the Ghanaian, are the resources selected to make it an art piece that the Ghanaian can relate with. The outcome of this research seeks to give filigree a Ghanaian identification.

The intensely ingrained motivation of the researcher can also be found in the fascinating appearance of filigree works. The researcher sees filigree works as a means for reflection and moments of relaxation. Furthermore Ghanaians have rich cultural concepts and materials such as beads, stones, casted symbols, cowries and other shells that are of great significance to the culture of Ghana. These notwithstanding, Ghanaian hand-crafted beads popularly known as Krobo beads cannot be underestimated.

1.3 Statement of the problem

Some existing problems that caught the attention of the researcher to tackle such a topic are that, there is generally the issue of monotony with the integral materials used in filigree in other parts of the world. Stones such as emerald, ruby and diamonds have been in play for too long in the filigree made in Ghana. The filigree works made in Ghana generally have no Ghanaian identification. These notwithstanding the integrated materials are not locally obtained.

Moreover due to the foreign nature of the concept and materials used for the filigree in Ghana, market survey revealed that the majority of Ghanaians do not relate with the filigree made in Ghana. Due to this, the patronage is comparatively low as to other art forms made in Ghana. These problems necessitated the need to come up with the Ghanaian concept of filigree. This is to serve as a bridge between the Ghanaian and the art and also as another genre of filigree that would be associated with Ghana.

1.4 Objectives

The research seeks to answer the research question by the following strategic objectives.

1. To assess the applicability of certain Ghanaian materials and concepts in filigree.
2. To design techniques by which selected materials and concepts could be integrated into filigree.
3. To demonstrate the practicality of the technique by producing samples of filigree with Ghanaian attributes.

1.5 Research questions

1. What Ghanaian cultural concepts can be introduced into Filigree?
2. What materials popularly associated with the Ghanaian culture are also applicable to filigree work?
3. How can these materials and concepts be integrated into the Ghanaian concept of filigree?

1.6 Delimitations

The main metal used was copper and later plated Nickel for the purpose of lustre, aesthetics and the prevention of oxidation. The availability of wires influenced the choice of copper. The wire techniques used included twisting, and flattening. The Ghanaian based materials employed were cowries and glass beads. The adinkra symbols employed as concepts included nkonsokonso, dwenemmen, sankofa and ananse ntentan.

1.7 Importance of the study

1. This study will bring a different approach to filigree integration

The present and existing filigree integrations do not have a link with our Ghanaian culture since the integrations are made suitable mainly for pearls and precious stones. With the integrations employed in this study, the researcher touched on different approaches to filigree integration with the use of cowries and Ghanaian local beads.

2. Increase and diversify the material base of filigree.

The material base of filigree has been almost restricted to precious stones and pearls. By the different approach to filigree integration, the researcher is able to

add diversity to the material base of filigree, making it possible for jewellers to also employ the use of cowry and Ghanaian local beads.

3. It will promote Ghanaian cultural materials to the bead and jewellery producers

These integrates which are Ghanaian local beads and cowries would now be highly patronised for filigree integration thereby promoting the production of the Ghanaian local beads to create room for employment.

4. It would serve as means of generating more income.

Since the demand for the Ghanaian local beads for integration would be rising high, it would be a means to generating more income in the country. When these works hit the international market, there would also be a greater yarning for the beads on such a platform also.

5. It will reduce monotony in the art of filigree creations in Ghana.

The employment of the different approach to filigree integration would help reduce monotony in the art of filigree creations in Ghana thereby promoting creativity in filigree works. The introduction of complementary materials into the filigree work would be introduce to the local craft men in Ghana since their filigree works do not make room for integration at all.

6. To raise the demand for filigree made in Ghana.

The Ghanaian concept of filigree would definitely mean a new genre of filigree that would attract international collectors and dealers of filigree. Which will trigger the demand of filigree work from Ghana.

7. Will serves as a means to introduce Ghanaian cultural materials to existing filigree lovers.

The new approach to filigree integration would pave way to introduce Ghanaian cultural materials to filigree lovers beyond the borders of the country Ghana.

1.8 Definition of Terms

To facilitate the understanding of the report, technical terms used in the text are explained as follows:

Metal complementary material: it is any material which is compatible and can suitably be used with metal for aesthetics and utilitarian values.

Filigree**:** this is a metal art technique done by twisting wire together into a single yarn which is used to make a decorative pattern and then soldered.

Integration: it is an art of incorporating two or more allied materials into a whole.

Jewellery: an art made from metal and other materials for the purpose of adornment.

1.9 Arrangement of the rest of the text

In accordance with the research objectives, the project document comprises five chapters. After this chapter, Chapter Two relates to the background information for the study. This is followed by Chapter Three which elucidates on the entire process of the research. Subsequently Chapter Four presents findings; that is, the outcome of the works produced in Chapter Three. Chapter Five contains the summary, conclusion and recommendations made by the researcher during the research. These are ended by the list of references and appendixes.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Overview

This chapter reviews related literature the complementary approach to filigree under the following topics: concept of filigree, historical account on filigree, metal forms in filigree, metalsmithing techniques, filigree techniques, types of filigree, filigree application, precautions in filigree work, finishing techniques used in filigree, review of selected complementary materials, review of filigree integration methods, review of filigree works and review of research methods and tool.

2.2 Concept of Filigree

Filigree is a delicate type of work done by transforming metal into thin wires for the purpose of twisting, flattening, crumpling and manipulating into a frame to create an intricate design that, when developed, looks like lace.

2.2.1 Definition of Filigree

According to Stefano (2013), filigree denotes jewellery that integrates into its structure handcrafted twisted filaments drawn from gold and silver or other metals. The metallic filaments are arranged in delicate designs of various patterns and soldered on the gold or silver jewellery; its appearance depicts that of lace. Accounts by Mithra (2014) suggests that filigree refers to a type of design in metallurgy which makes use of twisted wires and creates them into delicate, lacelike and openwork jewellery. Generally composed from fine metals such as silver, gold and platinum, this art form has been employed for centuries for crafting jewellery such as brooches, rings, earrings and pendants. The jeweller in his attempt to craft filigree produces

thin threads from malleable metals, twists and manipulates them into elaborate shapes that bear a resemblance to paisley scrolls, spun sugar and suggestive arabesques.

Steffano and Mithra reach an agreement that filigree is a work of art made by the means of twisting thin wires together. Goud (2005) asserts that filigree is an art of making lacey-like decoration with silver or gold wires. An obligatory step in making filigree is forming the wires. The wires are formed by twisting two strands of very thin wires very tighty together and then flattening it. Steffano (2013) adds that, normally, the term filigree refers to light, intricate, twisted wire designs which are placed in cut-outs of a jewellery piece. He also admits however that, the same twisted motif is sometimes used right on the metal itself.

Wieser and Deplazes (n.d.) emphasize that the outlook of filigree is based on its construction. Thus the filigree construction is a composed structure of thin filaments or elements assembled together to form a two or three-dimensional mesh in which the loadbearing and separate functions are satisfied by diverse components. Chrisholm (2013) is of the opinion that filigree is a subtle jewellery technique in metalwork, structured from silver, gold and any other malleable metal. It can be constructed with twisted threads with or without tiny beads soldered in composition or to the surface of a metallic object. Andreeva (n.d.) proclaims that filigree is an antique form of embellishment on metal, fashioned by modelling fine wire into elusive or intricate designs. Filigree jewellery is multifaceted in design, a true art form that incorporates ancient techniques to produce jewellery that is utterly unique and beautifully designed. Andreeva concludes that filigree craftwork may be either

backed or openwork. The wires may be plaited, plain, untwisted or twisted. The metals used are usually bronze, silver, gold, or platinum.

Filigree work indeed is an intriguing art form. Considering that thin wires are used, there is therefore the need to use very malleable metals. Integrated materials referred to by Goud (2005) can no longer be found in contemporary works done in India. The various inspirations for filigree designs and motives are peculiar to people practicing the craft hence the design may vary but the principle remains.

2.3 Some Historical accounts on filigree

Ebay (2013) asserts that filigree is a striking form of metal craftwork which originated in the historic era. It is also known as *Telkari* (an Anatolian word implying "wire work"). It is constructed with delicate twisted threads of gold and silver, often with repetitive curvy themes, that suggest lace. These intricately arranged wires are then soldered together to create a larger piece. This skill became very widespread in French custom jewellery, from 1660 to date. The feminine attractive look of filigree is in fashion every year! This technique has advanced predominantly to gypsy rings, chandelier earrings, boohoo and elegant pendants. Information gathered from wikipedia (2008) affirms that :

> the English word filigree is shortened from the earlier use of *filigreen* which derives from Latin "filum" meaning thread and "granum" grain, in the sense of small bead. The Latin words gave *filigrana* in Italian which itself became *filigrane* in 17th-century French.

Chrisholm (2013) augments by saying that filigree is widespread in the Indian, Asian,

Italian and French metalwork from 1660 - late 19th century. According to Lohmann (2013) filigree originates from Latin words filium: thread and granum: grain and has existed for over 4000 years, as proved by specimens from Mycenae and Troy. The Etruscans were found to have once adorned their tableware and weapons with fine filigree, based on the finest wires prepared from precious malleable metals. Filigree traditions and techniques represent many styles including Yemenite, Turkish, Norwegian and Russian. Although filigree in modern times has grown to be a distinct aspect of jewellery, it was archeologically a subset of the average work of the jeweller. Unquestionably, however the costume jewellery of the Greeks and Etruscans was made by soldering and constructing metal, instead of engraving and chiselling. In ancient Mesopotamia findings retrieved confirm that filigree was fused into jewellery since 3,000 BC. In the 15th Century at Midyat in Mardin Province, upper Mesopotamia, a composition in filigree employing the use of silver and gold threads, known as "telkari", was industrialized. To this day, skilled artisans in this constituency still make elaborate works of telkari. Andreeva (n.d.) is of the opinion that filigree can be traced back to metal work from Egypt, Ancient Macedonia, Etruria, Mesopotamia and Byzantium.

Baral (2013) also noted that exquisite filigree works in centres like Karim Nagar in Andhra Pradesh (India) and Cuttack in Orissa took their inspiration from the Mughal era (1526 - 1707). The base material is twisted silver wires used to create articles that have a lacy look. Cuttack has been famous for its spider web work and the filigree work is locally known as Tarkashi. It produces very exquisitely patterned jewellery pieces. The rose flower dominates in Cuttack, most of the works are floral designs. In Karim Nagar, creepers and leaves predominate. They employ an exceptional method for fitting resolutely the several constituents. The artisans, who hail from the

Sunar, (goldsmith) regions of Orissa, practise the craft which was made accessible to them during Mughal rule. Thicker drawn silver wires were used to create the frame structure while small designed pieces (sikko) manipulated from thin wires were fitted into the frame.

Magdalena and Isbister, (2002) advocate that the filigree art is of primeval date, and was practiced by the Etruscans and Egyptians, as well as in Central Asia and India. Unalloyed precious metals are drawn into extremely fine threads. These were then skilfully inter-woven into a virtually transparent object. Kedareswari (2010) articulates that the filigree craft was broadminded to the highest excellence by the Etruscans and Greeks between the 6th to 3rd centuries BC, both in design and form and at some point in time, cross cultural influence led to the craft reaching the shores of the Indian Sub-Continent. The earliest confirmation of filigree ornaments in Andhra Pradesh are the round filigree ear pendants in gold found in the 10th to 11th Century AD about the early Kakatiyan Chalukyan period. Small round flat gold discs, mangalasutras (marriage medallions) with gold filigree work on the rim are datable to the 17th Century, (Vijaynagara period in the Andhra Pradesh State Museum.) The art of filigree craft in gold and silver is popular all over India. Some of the famous focused areas of the silver filigree works in India are Cuttack in Orissa, Srinagar in Kashmir, Karimnagar in Andhra Pradesh, Tiruchirapalli in Tamil Nadu, Agartala in Tripura, and Thiruvananthapuram in Kerala.

Dr J. Kedareswari also enunciates that the main items produced include jewellery, figures of gods and goddesses, articles for worship or puja items, decorative art pieces depicting flora and fauna, utility wares, cutlery, ashtrays, cigarette cases, photo frames, multipurpose cases, lamp stands, flower baskets, rose water sprinklers

and other fancy items. Apart from the Asians, the Saxons, Britons and Celts were also skilled in the art and, in medieval times, much of the filigree was associated with religious items. Mithra (2014) also chronicles that at the period of the Edwardian era at about the late 19th and early 20th centuries, the art of filigree became very popular. Lee (2014) affirms that The School of Art and Architecture in America, developed into Art Nouveau, during this period majority of the antique jewellery of the Art Nouveau style such as diamond rings, brooches set with emeralds or rubies, connected silver bracelets, or hanging earrings of gold were produced. The filigree art adjusted itself to the intellectual phase of the Art Deco period around the thirties and forties, making it appealing to the middle class consumer. In this era, filigree-fashioned wedding ring mounts were made to show off geometric styles and repetitive arrangements to mirror the simplified modern designs. During the Art Deco period when the beauty of delicate artwork became prevalent in printing, fashion, and architecture, filigree was adopted for use in reference to an openwork motif made on artefacts such as lawn furniture, book covers, or fabrics. The filigree motives often depicted spider webs, buds, leaves, wavy hair or vines integrated into its texture or design. Traditionally motivated replicas of antique works might employ the *filigree* work to mean a broad-spectrum design, instead of using it to describe the explicit technique for forming jewellery.

2.4 Contemporary filigree

Baral (2013) asserts that traditional jewellery items made in Orissa includes nose rings, arm jewellery, necklaces, and anklets. Also the contemporary jewellers produce hair pins, brooches, pendants, earrings and bangles as well as common utility articles like cups, trays, candle stands, plates, bowls, incense containers, ash-trays,

vermilion containers, flowers, peacock, birds, animals, purses and chariots. Baral emphasises that various products are made out of filigree such as plates, bowls, cups, trays, necklaces, bracelets, and many others. The motifs frequently used are peacock, birds, flowers, leaves and many more. Steffano (2013) and Andreeva n.d. contend that unlike in ancient times when filigree work was believed to be part of the standard work of jewellery designers, in modern times, filigree work is considered a specialist branch of jewellery design. Andreeva n.d. asserts that jewellery which includes filigree shows how much care and thought gone into the jewellery piece. Each item must be handcrafted and intricately designed with hours of thought going into each design, ensuring that the final piece is absolutely unique and, of course, undeniably beautiful.

2.5 Metal forms in filigree

Saliba (2003) groups the metal forms in filigree under two classifications: border wire (vultar), and the filling wire (rizzol). Whitfield (2009), however, breaks it down by critically analysing every metal form found in the Tara brooch. Border wire (*vultar*) is a flattened, single stranded wire as seen in Plate 2.1B that is shaped into the form of frame needed to retain the filling wires in Plate 2.1A.

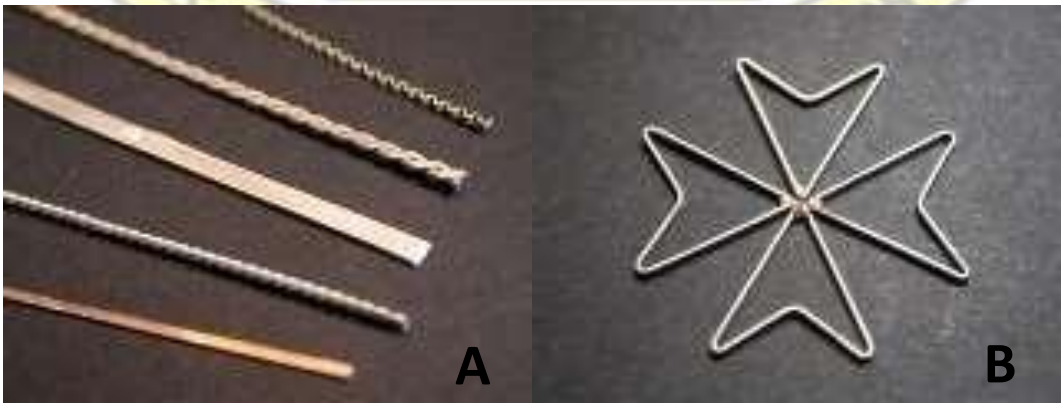


Plate 2.1 A and B: Some filigree infill wire types needed for filling a frame

[Source: (Saliba, 2003)]

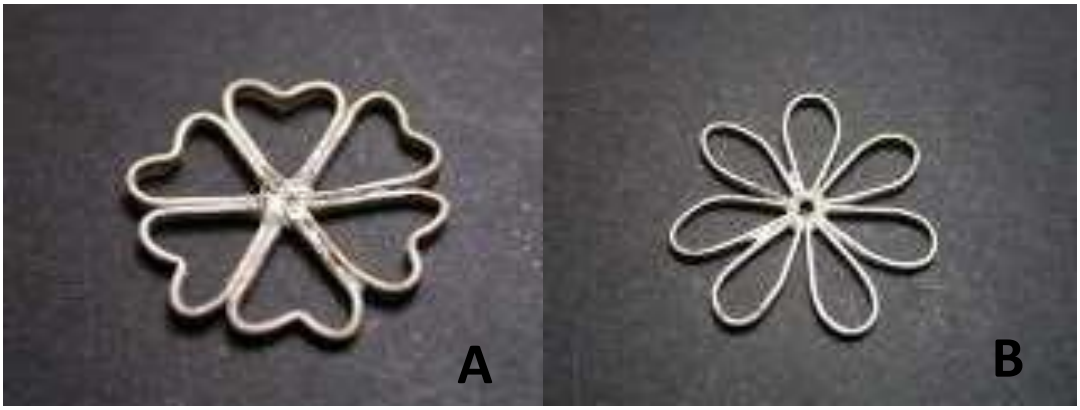


Plate 2.2 A and B: Filigree frames [Source: Saliba (2003)]

According to Saliba (2003) Filling wire (*rizzol*) as seen in Plate 2.3A and B is composed of two twisted strands which are subsequently flattened and then used for filling within the border wire.

Plate 2.3 A and B: Filigree two ply flattened and coiled infill wires [Source: Saliba (2003)]

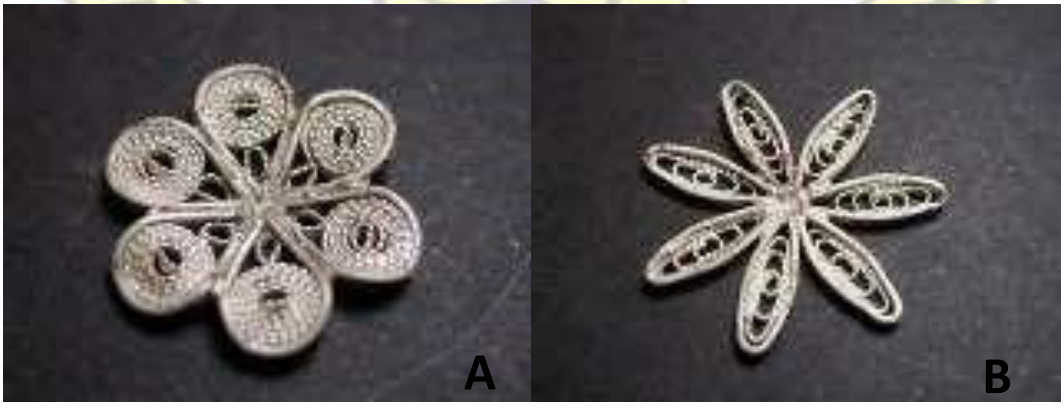


Plate 2.4 A and B: Filigree coils manipulated into the frame for soldering. [Source:

Saliba (2003)]

The most frequently used traditional designs are the Maltese cross, the Maltese boats (Dghajsa) and other historical motifs. Traditional hand-made Maltese filigree also includes geometric shapes, rosettes, flowers and figures of animals, especially butterflies and birds. Large ornaments such as trays, dishes, figures, models are also often manufactured. According to Whitfield (2009) the following are filigree forms found on the 'Tara' brooch, a masterpiece of late Celtic metalwork dated 700AD.

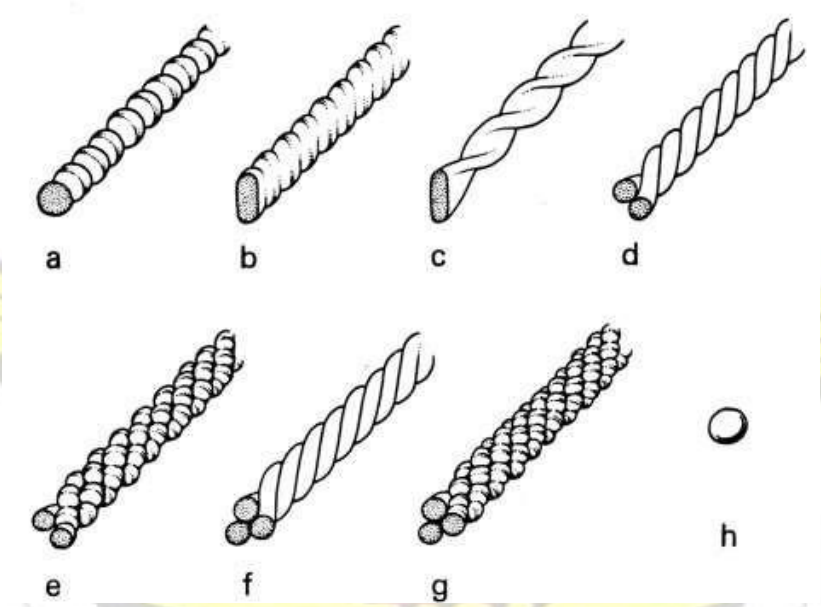


Figure 2.1 Kinds of filigree twists. Drawing: Nick Griffiths [Source: Whitfield (2009)]

The fig 2.1 above according to Whitfield (2009) are simple filigree forms that are found on the tara brooch:

1. Figure 2.1a **Beaded wire**: The beaded wires can be found along the axis strand on its right-angles.
2. Figure 2.1b **Flattened beaded wires:** These can be found on the curvy ribbon.

3. Figure 2,1c **Twisted ribbon**: This entails a flat strip of gold twisted by the means of clamping one end while winding the other side. It often creates an irregular twist. These ribbons in fact have no specific measurements, yet are equally thin.
4. Figure 2.1d **2-ply twisted wire:** This is made by winding two drawn wires around each other in one chosen direction be it to the left or right. The twist gained is objectively even.
5. Figure 2.1e **2-ply twisted beaded wire:** This is achieved by winding two beaded wires around each other as shown for fig. 2.1d.
6. Figure 2.1f **3-ply twisted wire ropes**: This is a somewhat deviation of Fig. 2.1d it is achieved by winding three thin wires to gain a thicker twisted or wound rope.
7. Figure 2.1g **3-ply twisted beaded wire rope**: This wire type is a variant of Figure 2.1e, achieved by means of winding three beaded wires instead of two beaded wires.
8. Figure 2.1h **Granules**: Granules are small balls fashioned as a result of melting short scraps of metal and allowing them to naturally amalgamate into minuscule balls.

Plate 2.5: The Tara Brooch [Source: (Whitfield, 2009)]

2.6 Metalsmithing techniques in jewellery.

Metalsmithing, according to Dougherty (2011), is defined as creating jewellery by the process of manipulation of different metals. These manipulations otherwise referred to as metalsmithing techniques, comprise fabrication of metal to form jewellery by making and modelling it with tools such as mandrels, hammers, etc. Other means include forging, soldering, doming metal using a dapping set, using a jeweller's saw or metal snips for sawing or cutting metal respectively, fold forming, drilling holes as designs or textures, cold connections such as screwing and riveting, texturing or metal stamping by using hammers and matting tools.

According to Jirousek (1995) the techniques in metallurgy apply the same or analogous principles, be it sculptural or industrial designs, or small pieces such as earrings or finger rings. Additionally, many of the elementary techniques for working metals relate in other media as well; for instance engraved plates are employed in

printing, while textiles and ceramics adopt applique and repousee in their media as well.

Dougherty's description for metalsmithing techniques embraces casting, raising, swaging, chasing and repoussé, electroforming and electroplating, etching and engraving, reticulation, and settings such as bezels. All these techniques must be properly finished by the employment of finishing techniques: filing and polishing. Patination (the use of liver of sulphur and heat) can also be done on the metal for the purpose of metal colouration. She mentions some metalsmithing techniques which are finishing and patination. Bone (2011) establishes the following under subheadings. Metalsmithing techniques: Soldering, Annealing, Pickling, Cutting and Filing. Metal Shaping: dapping, swaging, fold forming, forging and raising. Metal Texturing: hammering, metal stamping, roller printing, chasing and repoussé, etching, engraving and reticulation and Metalwork finishing; the use of abrasive and polishing machines.

Schwarcz and Varga (2010) state and elaborate the following techniques:

Hammering: Rod or wire can be stretched or formed by hammering it with a forming block.The result of hammering often produces an uneven surface.

Drawing: Drawing is the process of thinning out rod into wire. This process is achieved with the aid of a drawing plate as illustrated in Figure 2.2 below. A wire or tube with the desired diameter and thickness can be produced either from a rod or a wire or out of a plate that is passed through the holes in the draw plate from the larger hole to the lesser, ending on the guage of wire desired.

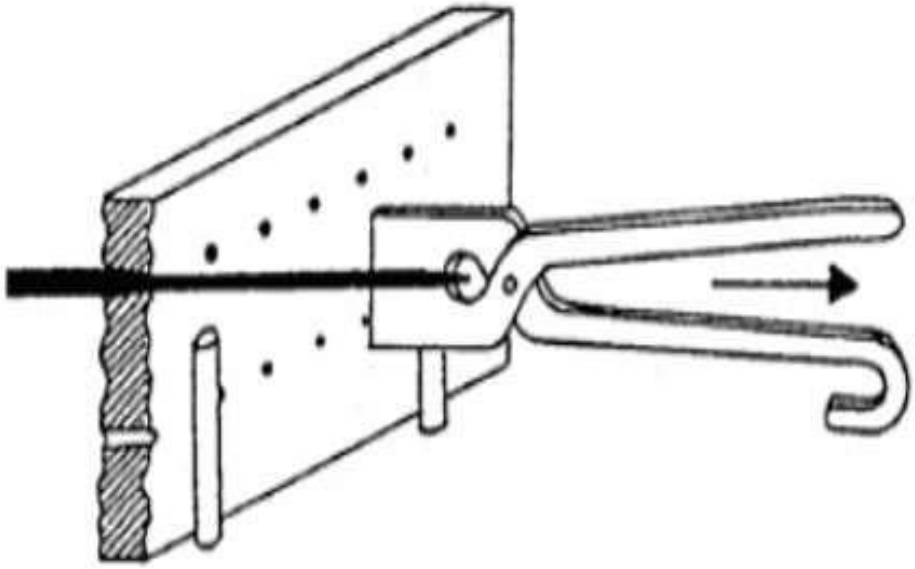


Figure 2.2: Drawing wire from a drawing plate [Source: Schwarcz and Varga (2010)]

Twisting: the twisting technique is applied in case of tube production. The two basic methods are the strip and block twisting and this is seen in figure 2.3 below.

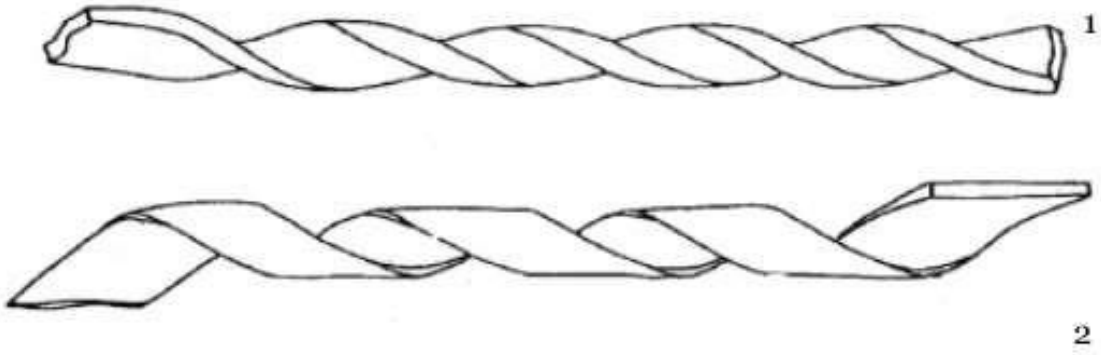


Figure 2.3: Strip twisting and 2 block twisting [Source: Schwarcz and Varga (2010)]

Jirousek (1995) outlines the following as metalsmithing techniques; alloying, annealing, applique, casting, chasing, enamelling, forging, granulation, piercing, raising, repoussé, and reticulation.

2.7 Filigree Techniques

It must be well noted that the techniques vary slightly depending on whether the filigree is being used as a stand-alone form or as a surface treatment. For stand-alone forms, care must be taken to make the piece structurally stable. The wires are carefully formed using fingers and pliers/tweezers. This is done by using the tweezers and tweaking the wire slightly to start a circular pattern. Once the beginning of the circle is formed, it is then rolled between the fingers and the thumbs. This is repeated to get many different exact pieces. The pieces of wire are placed together in a frame so that they touch. Care should be taken by creating a fairly compact form, with no loose ends that can catch on hair or clothing. Individual wires are placed compactly close to each other. Flux solder is applied to the piece then soldered together. Eirny (2013) states that in cases where the filigree is being used as surface treatment, the base piece of the metal is created first. The filigree is then placed on the surface and soldered in place. Such surface treatments rely on the surface for stability. The form can be as simple as a circle or as complex as the most elaborate spiral flourish.

Schwarcz and Varga (2010) admit that filigree and granulation are techniques already practiced in ancient Mesopotamia. Both techniques were closely related in most time periods. Commonly it is the combination of the filigree and granulation which appear on objects, even though the way they are produced is completely different. While granulation is composed from small metal balls (granulars), filigree employs thin metal wires. Their correlation stems from the fact that usually filigree or thin wire provides the basis and/or the framing for granulation.

After critical study of filigree works, the following metal techniques were found by Bone (2011) to be employed in the filigree production:

Soldering: this technique creates a stable joint of two or more touching metals, it adopts the use of solder (a mixed alloy). The solder intrinsically melts at a lower smelting point as to the metal being joined. The application of the solder to the area for joining must be accompanied by flux and heat. These enhance the flow of the solder onto the metal to make a joining.

Annealing: this is a process employed to retain the malleability of metal. The metal is heated (annealed) to allow for more manipulations at a stage when the metal is hardened. Annealing the metal comprises heating it to a particular temperature and placing it into water to relieve the tension that was built up in the metal prior to annealing. This restores the metal to the state of its workability.

Pickling: this is the procedure of cleaning metal surfaces after heating and soldering, the metal is placed in a diluted acid solution with the aim of getting rid of dirt such as flux and oxides from the surface. The metal must be rinsed well after pickling.

Cutting and filing: When wire is cut with a cuter (side or top) the cut end is left distorted thus needs filling. Filing can be used to refine, contour, eliminate burrs and defects, form grooves in metal and widen holes. It is imperative that the right file be used for the job needed. Bone (2011) advised that rough files be used to eliminate excess metal and a smooth file for finishing the edges.

Shaping metal: metal must be malleable to allow for shaping, hence it should be annealed frequently. Techniques for shaping metal include:

i. Dapping or doming: this is a process of fashioning a dome out of a disc or flat metal sheet, by employing the use of a dapping/doming block and punch.

ii. Swaging: to create gullies, curves and tubes from flat metal sheets, steel formers with comparable grooves or channels are used with a suitable former.

Finishing: basic steps taken must begin with filing to get rid of marks left by tools and solder excesses.

i. Abrasives: wet or dry papers and emery are accessible in a variety of rough to smooth grades. These can be glued or taped unto various sizes of wooden sticks for use by hand or and as flat sheets, or could be applied on split pin in a pendant motor to work on the inside of rings, etc. Examples of abrasives may be of brass and glass brushes, steel wool, pumice powder, and flexible abrasive blocks. Pendant motor enhances the efficacy of the finishing processes. There are also great diversity of abrasives and texturing tools obtainable in a form of attachments.

ii. Polishing: Polishing could be finished by the hand or by using a pendant motor, barrel polisher or a buffing machine. Polishing made with the hand can be appropriate for minor areas or pieces that are very delicate and the polishing can be with cream, using a cloth that is soft and clean or with a glued leather on a stick or wood that has Tripoli polish/rouge used against it. Polishing with Machine Polisher is very fast and could be done with polishing mops that fit to a buffing machine by a rotating spindle. Pendant motors have various attachments designed mainly for accessing and polishing areas that are hard to reach. Tripoli and rouge polishes can be applied to these

attachments. Tumbling is used to burnish or polish and also to work harden metal pieces without the removal of metal unlike abrasive do. Pieces that are particularly delicate or have stones should not be tumbled.

The following techniques from Jirousek (1995) are applicable in filigree making.

1. Alloying: making a combination of various metals that have diverse properties (colour, malleability, or point of melting) from pure metal components. The following could be classified as common alloys: Brass (zinc and copper), Bronze (tin and copper), Pewter (copper and tin); and Sterling (copper and silver).
2. Annealing: This is the process of restoring the malleability of metal that has been work-hardened.
3. Malleability: It is the capability of a metal to be able to extend or shaped to a degree by the activity of stretching or forging without breaking and cracking.

Filigreenus (2012) proves that in filigree production, thinner wires are drawn for the filling of the frame. Tightly twisted 2ply wires are usually flattened. Spirals are formed and inserted into the frame to create the design. The spirals are compactly arranged into the frame before soldering it. Pickle the work after soldering and then polish.

Dennis (2013) describes the filigree forming procedure as basically being made out of very thin strips, by rolling or drawing plain or twisted wire which is turned into loose spirals, coaxed into shape and fitted tightly into a decorative frame. Soldering is done with filings of solder, or with pallions. From Baral's (2013) perspective, the

processes in filigree include wire being drawn and then pressed in different shapes. There is the direct moulding of smaller articles into different designs. Smaller components are made and collectively pieced for larger ones. Intricate designs are carefully made and shaped with thin silver wires. Strings of silver that are of fine threads are formed by drawing through the drawing plate with a series of small diameter. They are fastened together later by heating it and winding around the charkha. Various patterns and designs are shaped with these threads. Thus, filigree is an arrangement of different pieces that are joined into one piece.

The process of filigree jewelry making, according to Andrejsarevski (2014), begins by gold or silver granules being melted at a high temperature. Ingots are obtained after metal has been melted and poured into molds to cool. Thin wires of varying thickness are gotten after stretching and compressing the ingots severally and consistently. Thick wires are used for making the outer frame of the craft being designed. Forming of wires is one of the necessary steps in making filigree. This is produced by tightly twisting two pieces of very small or thin wires of silver, after which they are flattened. Fine grades of silver or sterling could either be used. The former is preferred, even though it comes at a higher cost, it carries with it the advantage of resisting fire scale thus less annealing is required as compared to sterling. Intricate procedures are involved with the filling in of the outer skeleton. Heating and flattening precedes the winding of two fine wire strands. The flattened filigree wires are cut and manipulated into curvy designs. These are then placed into a frame and are soldered together. Designs made in filigree are classic, eye catching and very durable. They can be used for adornment for special occasions considering their perfect unique style.

Polasani (2009), in describing how filigree is done, submits that in making filigree alloyed silver or gold is melted and poured into an ingot, these are compressed through a milling machine until a thin rod is gained. Draw thick wire for the frame, then form the shape of the frame and solder the wire ends together using hard solder. Flatten wire into thin strips and then pass through a zig zag machine, the zig zagged wires can be used to fit into the outline shape of the design. Draw thin wires and twist together after passing twisted wire through a mill to flatten it. Using a tip pointed tool, roll the wire into one dimensional spirals or scrolls and use that to fill the frame. The scrolls, or spirals should be manipulated as desired to create a pattern. The fillings must fit tightly to prevent it from falling apart when lifted. Turn the work to the wrong side and solder. Pickle the work after soldering, brush with soapy water and apply any other polishing methods.

Amies (2013) outlines the filigree approach under three main headings which are; creating the frame, making scrolls and soldering the filigree

Perry (2012) discusses the executing of filigree members under the main techniques employed during the filigree production. He highlights the following as major techniques used in the filigree approach:

1. Twisting
2. Annealing
3. Forming
4. Joining and finishing

However, Hornstein (2013) deals with the formation of the filigree wires, the approach to making the wire, the technicalitities involved, the width of wire needed,

winding the wire and flatening it, the length and mechanical proceedure are extensively discussed.

According to Amies (2013) making filigree needs careful planning to ensure a successful art piece. At least two different gauges of metal wire are used: The heavier wire forms the frame and the lighter or thinner for the filling. Hence soldering has to be done in systematic steps so that the more delicate metal coils do not get melted. Filigree can be made free form yet it is important to sketch a pattern out beforehand to use as template for creating the jewellery piece.

Creating a Frame: The construction of open work filigree frame is done by bending the metal into shape; this is normally made with pliers after which they are soldered. Hard solder is required for this soldering because of its ability to withstand the heat during multiple soldering. Heavier gauge wires must be used for the frame and thinner wires for making scrolls that would be closely fitted into the frame. The individual scrolls should be properly soldered together and to the frame to ensure it does not fall apart, hence remaining stable.

Making the Scrolls: The scrollwork can be fashioned from round wire, twisted wire, or twisted wire that has been run through a mill to flatten it. Round pliers can be used to twist the wire into delicate scrolls. Twist the wire in one direction, wrapping it around the tips of the pliers, then turn the wire and twist it in the other direction to make a double-ended coil with a V in the middle. Bend the wire against flat pliers to create a zig zag pattern and other shapes – hearts, oval, checkmarks, etc. that will form your design. Use a mallet to flatten the top edge of the metal scrolls so that they are flat and uniform for soldering.

Soldering the filigree: Preferably all pieces should be soldered at once so that the design remains stable. Medium or easy solder should be used for soldering the inner scrolls. Use silver solder and flux for soldering. Using the solder in powder or fillings helps make soldering easy. Solder the filigree on a charcoal block that would reflect the heat and help the solder melt quicker, reducing your chances of overheating the delicate scrolls and melting them.

Perry (2012) also relays instructions or guidelines for filigree forming procedure under twisting, annealing, forming, joining and finishing as follows:

Twisting

- Measure and cut 8 feet of 26-gauge wire. Fold together to make it double.
- Place together the loose ends, in the vice in order to tighten.
- Loop end must be placed through the hook with the screw. Insert the hook into a hand-held drill chuck.
- Turn on the drill to wind the wire together, until it shortens to 40 inches. Keep the tension consistent and not too tight.

Annealing

- Wrap a small, 2-inch diameter, coil of wire with binding wire to prepare it for annealing.
- Heat this coil, with a constantly moving propane torch, until it has a slight hint of redness.
- Drop and submerge the coil in a heat-resistant dish of water.

Forming

- Uncoil the wire and put one end in the vice. Pull the wire and feel it lengthen.
- Form some of the wire into small ovals, spirals, tendril spirals and double inverted spirals, using a small pair of jeweller's needle-nose pliers.
- Place the wire creation onto a work surface of flat steel. A ball-peen hammer can be used in flattening the wire. Keep the thickness uniform by steady striking blows. For most designs, one will want the components to have a consistent thickness.
- Make a wire frame in the shape of the finished jewellery design. Use a charcoal block as your work surface, so you can solder right where it lays.
- Use tweezers to place your spiral elements into the frame. Do not leave spaces in-between wires, fill the frame completely with twisted elements by pressing them down with your fingers and keeping it compacting them.

Joining and Finishing

- Paint flux unto the joints using a fine brush.
- Place a speck of solder unto the joints while heating with the propane torch to melt it and cause it to flow and join the pieces of filigree.
- After soldering, dip the piece into pickling solution and rinse.

Hornstein (2013) asserts that to begin a filigree piece, pick a 26guage wire and measure about 8 feet, double it and then anneal. Place two ends into a vice and the other ends into a hand drill and wind in one direction. There should not be too much tension exerted on the wire thus wind the wire carefully. The length of the wire would shorten to about 40'' and the gauge to about 20-21 gauge. Anneal the wire properly taking note of a cherry red colouration of the silver that can be well noticed in dim light. Quench the hot silver in a bowl of water, uncoil the wire and place one end into a vice then pull until the length is 47 to 48 inches again. The wire must be carefully pulled and, through experience, one could understand by feel the length of wire gained. Remember, the wire can break when there is overstretch through hard pull. At this point, the wire should be measuring 21 gauge with the length of 47 - 50 inches approximately. The wire must be flattened with steady strokes, thus make even strokes on a steel plate or a vice using a medium heavy ball peen hammer. The thickness and width must be kept as uniform as possible. The dimension must be checked frequently. The measurement of the width should be between 18 - 21 gauge and thickness of about 29 - 30 gauge. The rolling mill is a more efficient tool for easy flattening of the wire. The mill must be set to .006 inches gauge test the flatness and flatten. The wire should now have 30 gauge thickness and 17 - 18 gauge for its width with an approximate length of 70 inches. The wire should be annealed properly after which wire is ready to be formed into scrolls. The similarity that can be noticed from Perry (2012) and Hornstein (2013) accounts suggests a solid confirmation of an agreed filigree composition procedure.

Street (2007) in his amplification about one filigree integration method known as wrapping submitted that an odd shaped stone can be wrapped in a filigree flat piece as an alternative to stone setting.

Step 1: In Plate 2.6B the stone is placed in the central back side of the filigree.

Step 2: The pink lines in Plate 2.6B serve as imaginary guidelines for bending the filigree with pliers to hold the stone.

Step 3: after the stone has been placed into the raised sides as depicted in Plate 2.6, the edges of the filigree piece should be push to clamp the stone.

Again, Streets (2007) cautions that stone settings vary based on the configuration of the stone. Full faceted stones require an open back setting, Cabochons and flat back stones can make do with a closed back setting. In most cases, the prongs attached to a decorative setting are not envisioned to hold or secure the stone. Glue the stone in position with a thin spread of glue and leave to properly set. After setting of glue push the prongs to clip the edges of the stone to give the impression that the prongs are the means by which the stone has been held in position.

Plate 2.6: Filigree integration with precious stone [Source: Street (2007)]

Harris (2014) is of the view that sophisticated filigree designs can be incorporated in mounting engagement rings. The antique filigree mount styles used are made (cast) from a master mould.

2.8 Joining techniques

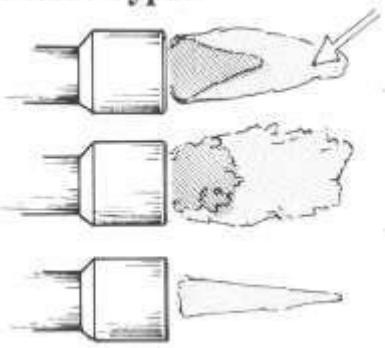
Contributions from Goffer (2007) states that due to the subtle nature of the filigree wire construction, it's impossible to hold joints in place while still in the production process. The regular joining methods in metal therefore cannot apply in joining filigree. Hence fusion joining or soldering are the joining techniques found to be most reliable for filigree production.

Goffer (2007) further elaborates that to join metal parts of a related composition to form a single unit that would be permanent, the use of metallurgical techniques such as soldering or welding are imperative. Solders (filler alloys) required for use in brazing or soldering are fashioned to melt at a lower temperature than the metal or alloy to be soldered. As solder cools it sets and adheres with the metallic parts, giving a perpetually stable joint. Hard or soft soldering techniques can be employed; their difference being that the solder type is dependent on the temperatures at which it melts. Soft solders melt at temperatures below 425C, while hard solder, also known as brazing metals, are made to melt at higher temperatures.

Whitehouse (n.d.) suggests that the technicalities involed in joining parts of metal can be done by using heat and filler metals. Joining metals between 593° C to 871°C range is correctly known as brazing, while temperatures below 427°C is termed soldering. However since "soldering" has already been termed and established by silversmiths, it would be used in the discussions that follow, instead of exact technical term "brazing" As long as it is understood that soldering here refers to a joining range of between 593°to 871° C.

Soldering Technique: Whitehouse boldly asserts that, it is impossible to solder without flux. Cleaning the surface to be soldered before fluxing is imperative. For small joint the borax flux can be used; other modern powder fluxes can also be used. The joint to be soldered must be closely fitted. Heat must be focused onto the joint until the melting point of solder is reached. Since solder bonds by capillary attraction, the solder would flow until it runs along the joints. After soldering, the joint must be left to cool then placed in pickling solution until the traces of oxides and flux is removed before further finishing is done.

Table 2.1: Types of flame from the soldering torch [Source: Whitehouse (n.d.)]

Flame Types		
	**Neutral**	Sharp point, gentle hiss, medium blue color. All gas is being ignited. Hottest point is at the arrow.
	Reducing	Bushy, pulsing flame, deep blue color. This fuel-rich flame absorbs oxides and is best for soldering.
	Oxidizing	Thin cone, angry hiss, pale lavender. This fuel-starved flame has no advantages when soldering.

Whitehouse adds that a clean metal surface either done mechanically or by the use of acid pickle treatment to promote capillary action.

Fluxing: Whitehouse versions flux as a chemical compound used unto a joint or surface before soldering. A coat of flux preserves the surfaces or joint from getting oxidized which interferes in the adhering of solder. Flux can be smeared as a paste to the joint by brushing unto the metal surfaces. Most fluxes liquefy during soldering temperatures, thus shielding the metal piece from oxidisation.

Application of flux on solder

Again, Whitehouse states that there are three types of solder and these types are soft solder, easy solder and hard solder. Solder is an alloyed composition with silver as the main metal, other metals added are copper and zinc. Soft solder is used in electronics for soldering lead-based alloys or tin. Easy solder is used for soldering metals such as steel, copper and brass, while hard solder is used for soldering silver.

Extra Easy Solder Strip 2mm x 0.45mm 5g.
Melts between 667°C- 709°C

Easy Silver Solder Strip 3 x 0.5mm 9g.
Melts between 705°C- 723°C

Medium Silver Solder Strip 1.5 x 0.7mm 6g
Melts between 720°C- 765°C

Hard Silver Solder Strip 6mm x 0.6mm 18gms
Melts between 745°C- 778°C

Enamelling Silver Solder Strip 1.0mm x 1.5mm 9gm
Melts between 730°C- 800°C

All hallmarking silver solders is sold in 600mm lengths

Plate 2.7: Types of solder [Source: (Whitehouse, n.d.)]

Goffer (2007), claims that silver solder is obtainable in paste form (easy, medium or hard). The solder pastes come in handy for works such as jewellery findings, jump rings or small joining that may require minute solder on the joint. The melting point of silver is pegged at 962° C (1764° F). As seen in Plate 2.7, the melting points of the solder has been tuned to that of the metal to be soldered. It is advised that lower melting point solders be used after the higher melting point solder. Whitehouse (n.d.) also submits five diverse sorts of solder for silver soldering:

Chip or pallion. This solder can be found cut into small bits (2-4mm). They are placed very close to the joint after fluxing it. Heat is gently focused unto the joint so as to melt the solder and cause it to fill up the joint.

Sweating or tinning: This type requires that after solder has been smeared unto one surface, a second surface is placed over it and heated. This method conceals solder and is usually employed for use on overlay works.

Probe or pick: Solder is cut into small bits as chips, purposely for use on small jewellery or metalwork. After fluxing the metal, probe or picks are placed on the joint with a tweezer and heated until the joint is soldered.

Stick: This is best used for large metal works which may have trouble heating the work at one time. The flame from a gas touch is used on the metal for heating it, after the solder stick has been placed on the joint. The torch must be controlled to direct the solder along the fluxed joint via capillary attraction.

Paste: These come in handy for very delicate works such as soldering filigree wires. They are available in syringes. The paste can either be squeezed or smeared unto the area to be soldered. Heating is done until solder melts into the joints. Since the solder paste already has flux, no extra fluxing is required unto the joint.

Mithra (2013) asserts that soldering is a method of attaching two metal pieces together. This can be done by melting another metal over the metals to be joint to form a solid connection. The technique of soldering has been adopted into other fields as plumbing, electricals, crafts and jewellery. Solders must be well prepared and cleaned, taking into account that the solder grade should be dependent on the nature of the joint to be soldered. The flow of solder, even though it is aided by flux, also depends on the combination of the alloys for the solder mixture. The right type of solder should be used to prevent casualties.

2.9 Types of filigree

Filigree types differ, depending on the mode or criteria used for classifying them. Classification can be done in reference to the origin, the structure type, zoomorphic, handmade or machine made and the craft type employed in its production. Different

schools have been gathered under this topic. Hence the type of filigree has been classified based on selected views by various authors.

2.9.1 Filigree based on origins

This type is classified by the origin of the filigree work in reference to the people who usually do that design or type. Under filigree classification based on origins, Irish filigree and filigree from India: Orissa filigree and Karim Nagar filigree have been well elaborated. The researcher also throws light on some Ghanaian filigree works done by the indigenous blacksmiths.

2.9.1.1 Irish filigree

Facts established from Filigree and Ajoure (2009) states that the manner in which a single twisted metallic yarn can be traced in a complicated design and through knots brands Irish filigree different from the other filigree made elsewhere. Plate 2.8A and B reveal that although the wires cover a large surface on a piece of jewellery, they create a fair balance thereby adding special variety and patterns, making it problematic to trace with the eye.

Plates 2.8 A and B: Irish filigree [Source: Lane (2011)]

Lane (2011) adds that no further speckled or attentive seeking designs have been originated in filigree like the works from Ireland. Irish filigree differes by the way that a single filigree thread can be mapped out amist various knots and complex designs, instead of the usual fine curls used by others in creating filigree jewelry.

2.9.1.2 Filigree from India

Baral (2013) enunciates that filigree work of Orissa is an example of a great artistic excellence which is rarely found in India. Thin silver wires are prudently fashioned into elaborate curly designs. These fine wires are shaped into innumerable designs and outlines. The motifs frequently used are peacocks (Plate 2.18) birds (Plates 2.10 and 2.13), flowers (Plate 2.16) , leaves as seen in Plate 2.8 and many more. Karmali (2010) argues that presently, over a hundred households in Cuttack, Orissa, are involved in the filigree craft. Known in their local palance as "Cuttacki tarkasi", the silver filigree found in Orissa is famous for its subtle skillfulness and brilliant artistry. The process of making a silver filigree product is very peculiar in character, for it does not involve carving, engraving or moulding a block of metal into jewellery; rather, building the piece bit by bit, by joining hair-thin silver wires. Designs are first drafted on a piece of paper, inspirations for which are derived from temples, the Konark wheel, gods and goddesses, flora and fauna. The wires for outlines are placed on the design sheet and shaped according to the drawing. Hair- thin wires are crimped with a machine for a zigzag effect.

Using tweezers, the craftsmen carefully solder these fine wires to the outlining frame. There are about ninety types of taar (wire) designs of spirals and curls as seen in the central part of Plate 2.16, creepers (Plate 2.15) and jaals (Plates 2.14 and 2,18), which the craftsmen use to fill in the outlines, like delicate spider webs of silver. Taking

care not to break the thin strands of silver, yet curling and twisting them with great precision, craftsmen fill in the outlines, creating delicate gauzy patterns. This process requires extreme precision. The soldered piece is then heated to fuse the joints properly as illustrated also in Plate 2.9. The object is then polished and sometimes lacquered, for a final finish. Jewellery is just one of the beautiful objects of desire that the craftsmen make with filigree, along with idols of gods and goddesses, decorative animals and replicas of temples. Traditional utility items like betel nut boxes, sindoor (vermilion) containers and spoons for the first solid meal of a newborn, all are taken from mundane to extraordinary, by crafting them in silver filigree.

Plate 2.9: Karimnagar Silver Filigree [Source: Karmali (2010)]

Srinivas (2005) mentions that in the filigree art, twisted silver wires is the material used to create articles to have the lacy-like look of jali (network) as seen in Plate 2.13 which bequeaths them in an erratic charm. The silversmith tucks thin threads of fine silver to form a zig-zag loops and patterns, then uses them to form the grounds of designs made by thicker silver threads as clearly seen in Plates 2.10, 2.11, 2.12 and

2.13. The zigzag threads and fine silver is then cleverly soldered, reasonably to avoid messing up the trellis-like patterned filigree. Animals, trees, leaves, flowers,, and birds are predominant. Nevertheless, the flexibility of the art is not limited to the tradition only. This artistry has been protracted from jewellery to household articles such as ornament containers, key chains, tea-trays, and even cigarette boxes. Baral (2013) points to the fact that in Karim Nagar, creepers and leaves dominate. The natives have an exceptional method for setting firmly the innumerable components together before soldering them.

Plate 2.10: Container in peacock form is beautifully composed in flower and zigzag motifs. [Source: Baral (2013)]

Plate 2.11: Jewelry box with leaf shaped stands. [Source: Baral (2013)]

Plate 2.12: Silver wallets with stems, creepers and beaded designs. [Source: Baral (2013)]

Plate 2.13: Swan in zigzag patterns. [Source: Baral (2013)]

Plate 2.14: Veena in intricate Jaali work, an exclusive art form [Source: Baral (2013)]

Plate 2.15: Pen made in creeper motif. [Source: Baral (2013)]

Plate 2.16: A plate with sophisticated floral design used in festive and wedding occasions. [Source: Baral (2013)]

Plate 2.17: Idol of lord venkateshvara. [Source: Baral (2013)]

Plate 2.18: Peacock feather is artistically depicted in silver filigree work [Source: Baral (2013)]

Kedareswari (2010) is of the view that Karimnagar silver filigree derives its name from the name of the town - Karimnagar - where this craft was traditionally adopted as a livelihood by many families for generations during the 19th and 20th centuries.

Since 19th Century AD, the craftsmen of Karimnagar produced rich intricate trellis–like network (referred to as ‘jali’ in the local parlance) made of twisted silver wire. It was believed that this craft was adopted nearly 200 years ago in the Elgandal town near Karimnagar district in Andhra Pradesh before it moved to Karimnagar town in the first decade of the 20th Century. This craft was introduced by Kadarla Ramayya, a native of Yalagandala (Elgandal) who was a proficient goldsmith and learnt the new filigree jewel technique and style. In Telugu parlance, filigree is referred to as vendi teega pani (silver wire work). The making of this silver wire is in itself a fascinating process. Ingots are passed through a wire drawing mechanism to gain fine hair–like wires. Two thin wires are annealled and wound round a charkha, twisted together and flattened and then crimped into zigzag patterns used around the ribs of the design formed by thicker strips of silver and expertly soldered. The motifs and designs are inspired from flora, fauna and geometric patterns.

Ruchita (2011) confirms that India has its unique awe in the field of filigree work. Indian artisans are inspired by Greek filigree work. In India the art of filigree is very popular in Andhra Pradesh and Orissa. Filigree works in India is known by different names. In Orissa it is called ‘Tarkashi’. It is also done in Andhra Pradesh, 'Karim Nagar' is mainly known for this work. In Orissa, filigree is localized in Cuttack town and a few settlements in that district. Silver filigree is a vital export item in Orissa since ancient times and is an emblem of the heights of distinction reached by the Orissa craftsmen. Hence conclusion can be drawn that both Orissa classified filigree and Karim Nagar filigree are from different sects in India.

2.9.1.3 Ghanaian filigree

In most cases filigree made in Ghana maintain a clam appearance, the designs are simply made with a frame and filigree scrolls. One can tell by taking a look at works produced in Ghana and draw conclusions that the Ghanaian indigenous jeweller does not concentrate much on exploring the filigree art. According to Anum (2015), wire work as they popularly call it has been a well known blacksmithing technique in Ghana over a long period of time. These works were done using delicate copper wires which are latter plated gold hence the indigenes in Accra named the works Nungua Gold since that was where it was mostly produced or they simply refer it it as wire work. To the researchers amazement, Mr Anum, a well known blacksmith, had been in the trade for over 30years and yet did not know the work as a filigree work but rather as wire work.

Plate 2.19 Ghanaian made filigree necklace known as agushi 99. [Source: Anum (2015)]

Plate 2.20 A and B: Ghanaian made filigree bracelet. Nungua gold bracelet.

[Source: Accra Mall, Nungua gold trader Naa (2015)]

Plate 2.21: Locally made Ghanaian filigree necklace for adornment of Royals and Corpse [Source: Accra Nungua gold trader. Naa (2015)]

Plate 2.22: Locally made Ghanaian filigree pendant for Royal adornment. [Source: Accra Mall, Nungua gold Mall, trader. Naa (2015)]

2.9.2 Structural types

According to Giorgio (2004) the structural types deal with the appearance of the filigree in terms of its form. Basically, there are four structural ways to develop filigree. One type is the openwork type, which is the most common type used in

filigree production. As illustrated in Plate 2.23, the design does not have any backing or background support.

Plate 2.23: Open type filigree work [Source: Inliquid (2013)]

Secondly there is the ground-supported, where a background metal is used on which filigree wires are soldered for support as depicted in Plate 2.24 A and B. Plate 23 C demonstrates a final result of a ground supported filigree work.

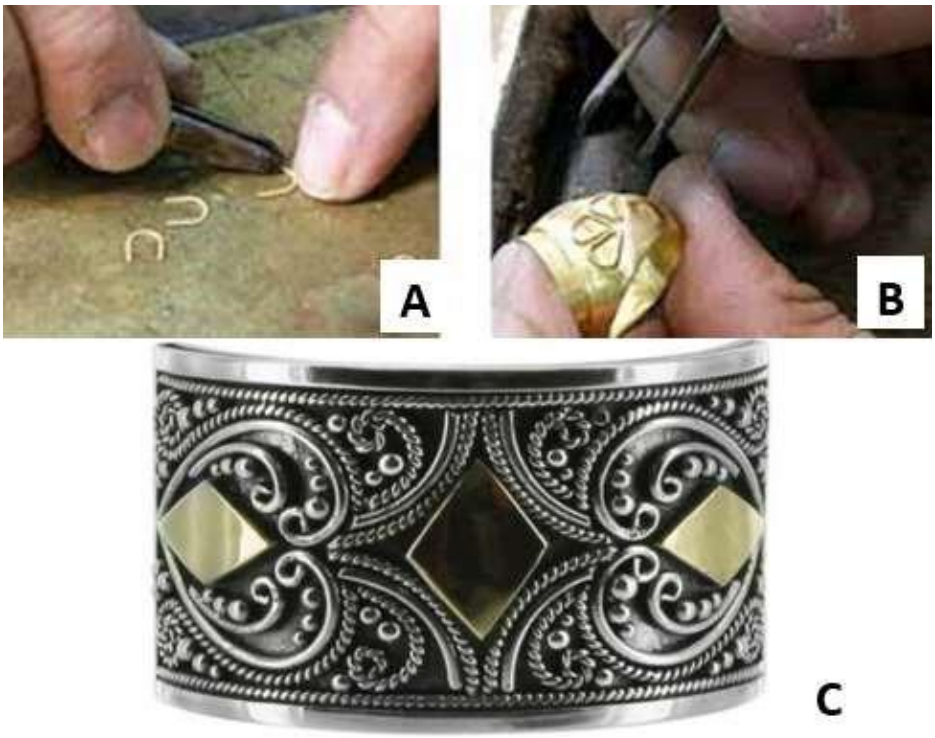


Plate 2.24A, B and C: Forming and arranging ground supported filigree [Source: (A&B: (Lalalounis, n.d.) & C: (Fire & Ice Inc., 2006)]

The third type as seen in Plate 2.25 combines both open work and ground supported types. In this case, the openwork filigree is joined to a sheet metal. Joining can be by non-soldering methods.

Plate 2.25: Silver filigree mounted on a sheet brass background support [Source: (Madridscloset, n.d.)]

The fourth type as clearly shown in Plate 2.26 is done by fusing a material such as enamel to seal the gaps created between the wires.

Plate 2.26: Filigree inner layers filled with enamel [Source: Ebay, (2013)]

2.9.3 Zoomorphic filigree

Hal (2013) affirms that zoomorphic filigrees are so called per the animalistic patterns they resemble. A clear example of an unassuming zoomorphic design has been shown the pommel cap K457 (Plate 2.27): The description of creatures on Anglo Saxon articles are not usually tangible; at times the animals are quite abstract and tough to deduce. These animal patterns are referred to as 'zoo morphs'. Consider pommel cap K686 (Plate 2.28)

Plate 2.27: (K457) The Gold pommel cap [Source: Hal (2013)]

Plate 2.28: Gold pommel cap K686 with zoomorphic filigree design. [Source: Hal (2013)]

Abstract zoo morphs

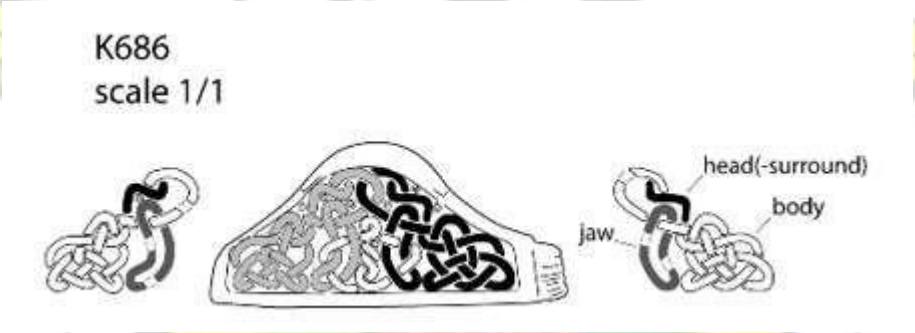


Figure 2.4: Illustration of a pommels cap showing two intertwined zoo morphs found on gold pommel cap K686. [Source: Hal (2013)]

2.9.4 Machine-made Filigree

Island Filigree Articles (2013) voiced out saying that originally, filigree jewellery is a handmade artefact. There are a few things that can make one see if jewellery is handmade or fake. One would notice that the coils are similar but not equal and that there are little differences with each coil. It is impossible to find two that are exact.

Things to notice include different wire gauges used (the heavier for the frame and a thin grainy wire for the inner filling), and no casting nor machine work is noticed. Giorgio (2004) also suggests that false filigree is a style of decoration on metal that is an imitation of filigree. False filigree is made mainly by soldering ornamental wire to a punch and embossing it, or by casting a piece from a model that was already decorated with true filigree or by die-stamping. Veberod (2014) establishes that since the making of traditional filigree jewellery is so labour-intensive, techniques such as casting a wax model of the original is massively employed. This technique produces close descriptive replicas of filigree, yet on a handy scrutiny, it lacks the fine details hand - produced filigree jewellery. Another method mentioned in crafting the filigree appearance is machine stamping. Here the designs and shapes are translated unto a metal cast. This cast is then used to accurately punch and imprint the design unto a sheet metal. This technique is generally used to mass produce fashion jewellery made from cheaper metals such as brass and nickel.

2.9.5 Filigree crafts

Silver Filigree (2013) asserts that three known types of the filigree crafts such as Jali, Siko, and Rose works are used to make filigree articles. These different categories are named according to the filigree art used, the design, the finish, and the textures derived. For example, Rose work filigree is well known as the craft type that creates flowers out of the filigree design. Baral (2013) adds, that Rose flower dominates the design in the Cuttack region and most of the designs are built up around flowers. In sikko work filigree Dr. Baral records that artisans belonging to the Sunar, (goldsmith) a communal of Orissa, practise the craftsmanship which was acquainted with the state through Mughal rule. Thicker wires were used to make the framework while

the tiny wired designs (sikko) was made from thinner wires and fitted into the framework. The craftsmanship is basically the artistry involved in assembling the small fragments flawlessly in the frame. Jali work or crafts concentrates more on achieving network patterns. Kedareswari (2010) confirms that the craftsmen of Karimnagar produced rich intricate trellis–like network (referred to as 'jali' in the local parlance).

2.10 Filigree Application

The fascinating lacy designs created in filigree have been very much adopted as a concept and used in other areas of art, due to its interesting design pattern and its extreme uniqueness. Filigree therefore can be used to apply to the design rather than the jewellery piece, hence giving us a broad area in filigree application. The researcher seeks to consider these in reference to nail art, metal railings, wall papers, art cards, icing on pastries, for prints and posters and embroidery. Some of these are as follows:

2.10.1 Paper Filigree

Etsy (2013) brings to light that paper cut in strips is used to depict the filigree art instead of metal. Paper is cut, rolled and glued together using quilling techniques. Some of these can be viewed in Plates 2.29-2.31. Sealer is also used on paper filigree works to make the decoration very strong, glossy and to protect the work from fading or gathering oils and dust from the air.

Plate 2.29: Unframed white daffodils made from 1/8" acid free quilling paper Dimensions: 12 in (31 cm) x 9 1/2 in (23 cm) [Source: Etsy (2013)]

Plate 2.30: Paper filigree using quilling techniques; 3/8" strips of acid free carton paper rolled and glued together. Dimensions: 10 in x 8 in (26 cm x 20 cm) [Source: Hal (2013)]

Plate 2.31: Paper filigree wall hang Dimensions: 13 in x 7 in (33 cm x 18 cm)
[Source: Images from Cristea (2013)]

Dorman (2014) confirms paper quilling (filigree) to be a skill or craft customed by the artist to creates elaborate designs by modelling and bonding thin shreds of paper. This artistry necessitates tolerance, neatness and a lot of time, yet it yields amazing turnouts and stunning results that can be used for various purposes such as decorations, handmade greeting cards, wall hangings three-dimensional miniatures and jewelry.

2.10.2 Nail Arts

As exemplified in Plates 2.32 & 33, Bobit Business Media (2013) also attests to the fact that filigree art has been translated in the artistic design and polishing of the finger nails, be it natural, stick on or acrylic nails.

Plate 2.32: Bridal/prom Nails by nails by rainbow Posted on Jun 03, 2013)

Plate 2.33: Black with silver filigree by nails by disha Posted on Feb 28, 2013)

Plate 2.34: White with black filigree design on nails

2.10.3 Metal Railings

Sanders (2013) exposes that railings are made with a curlicue or filigree design to create a look as can be seen in Plates 2.35 & 2.36. The twisting of the metal rod suggests the twisting of the filigree wires. The forming of the scrolls at the edges and the touching of the scrolls to the metal also brings out the imitation of filigree work.

Plates 2.35: Balustrade and gate bearing a curlicue or filigree design. [Sources: Vita (2014)

Plates 2.36: Decorative railing bearing a curlicue or filigree design. [Sources: Sanders (2013)]

Angus & Robertson Sydney (1995) asserts that the first iron founder made locally was manufactured by Richard Dawson who set up his business at Sydney in 1833, re-melting imported pig- iron bars. The most significant cast-iron works in those times were those related with veranda posts that depicted ultra-thin classic columns, friezes, brackets, balustrades, and fringes. Their verandas as portrayed in Plates 2.37 and 2.38 were made to depict lacy-like screens viewed against a pool of hazy shadows. The subtle filigree patterns were in the several classical and medieval styles, whether the designs were of great peculiarity or not; the filigree lacy-like screens were the visually prevailing elements transforming the architecture in that era.

Plate 2.37: Sir William Wallace Hotel, Balmain built in New South Wales (1879)

[Source: Angus & Robertson Sydney (1995)]

Plate 2.38: Reid's Coffee Palace. Ballarat, Victoria Completed in 1886 [Source:

Angus & Robertson Sydney (1995)]

2.10.4 Wall Papers

HardSoftCo. (2013) creates awareness on the filigree designs that have been used for wall paper. This wall paper (Plate 2.39) depicts a lively scenery of beautiful butterflies beating their wings, flowers rocking back and forth and hearts falling from above. The butterflies and some of the flowers were designed using the filigree art.

Plate 2.39: Lively wallpaper with filigree butterflies and flowers [Source: HardSoftCo. (2013)]

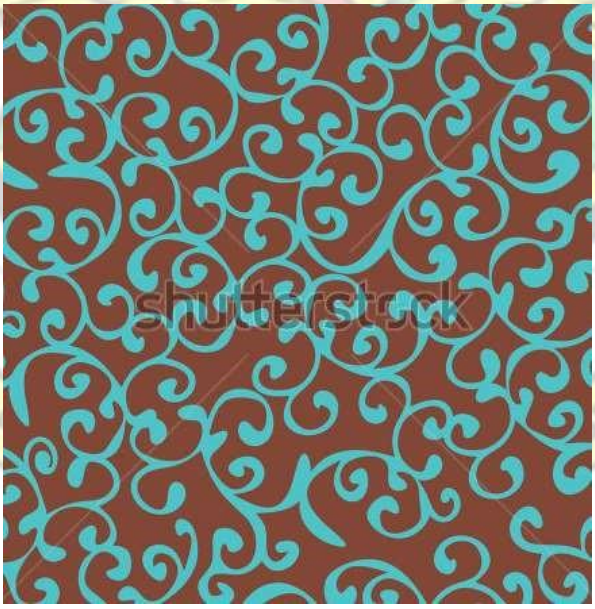


Plate 2.40: Seamless floral curly vintage background wallpaper [Source: Shutterstock (2014)]

Plate 2.41: A gilded filigree motif design with a trompe loeil precious stone in the centre. [Source:White (2014)]

2.10.5 Art Cards

Filigree Border Luxury Wedding Invitations (2013) designed Vintage invitation cards. The vintage texture of these invitation cards originate from the late 1800's adornments used to custom the filigree edging, giving the branding of a frame round the text. The image as seen in Plate 2.42 reviews a typical feel with a modern flair, going beyond the everyday engraved invitations.

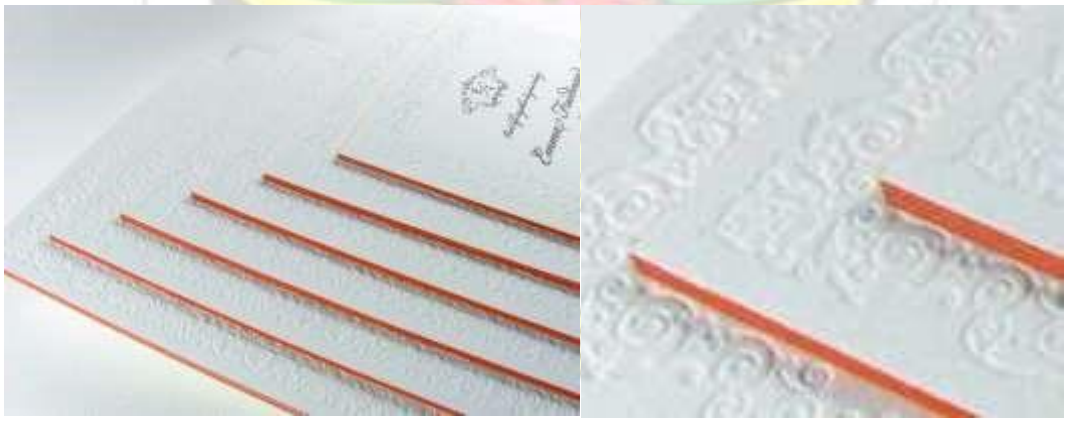


Plate 2.42: Filigree customizable, 100% cotton paper. [Source: Filigree Border Luxury Wedding Invitations (2013)]

Plate 2.43: Filigree corners clear twin stamp Set [Source: Inkylicious (2011)]

The twin stamp set of fabulous filigree flourish corners as seen in Plate 2.43 above is not just a stamp for corners but used to create edge effects on frames and backgrounds. It is purposed to look fantastic when used for embossing.

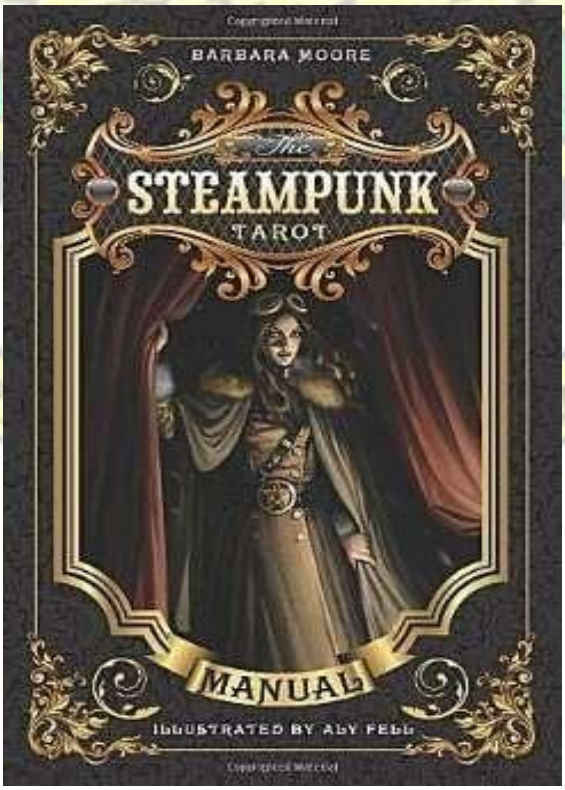


Plate 2.44: The Streampunk Tarot Manual [Source: (Koneta, 2012)]

Koneta (2012) on commenting on The *Steampunk Tarot Manual* portrayed in Plate 2.44 mentions that it is gorgeous both inside and out, each page richly decorated with an Ivy-filigree design in each corner.

2.10.6 Icing on Pastries

Shaffer (2013) admits that filigree designs are applicable to fondants. Viewable in Plates 2.45 & 2.46 are a cake and cookies that use the filigree art form as inspiration for their design.

Plate 2.45: Gold filigree by SweetAmbs. [Source: Shaffer (2013)]

Plate 2.46: Black RI filigree damask stencil and sugar black and white anemones.by EvoirMilk. [Source: Shaffer (2013)]

2.10.7 Prints and Posters (zazzle art)

Zazzel (2013) articulates that the metal filigree concept has also been translated into posters (Plate 2.47A & B). This artistic design serves as a source of inspiration to the artist. The filigree designs are placed on a background usually plain to highlight the filigree art. On the filigree art page one would find a unique assortment of filigree artwork for prints and posters of all sizes. Prints are done on seven different types of media, from paper to canvas.

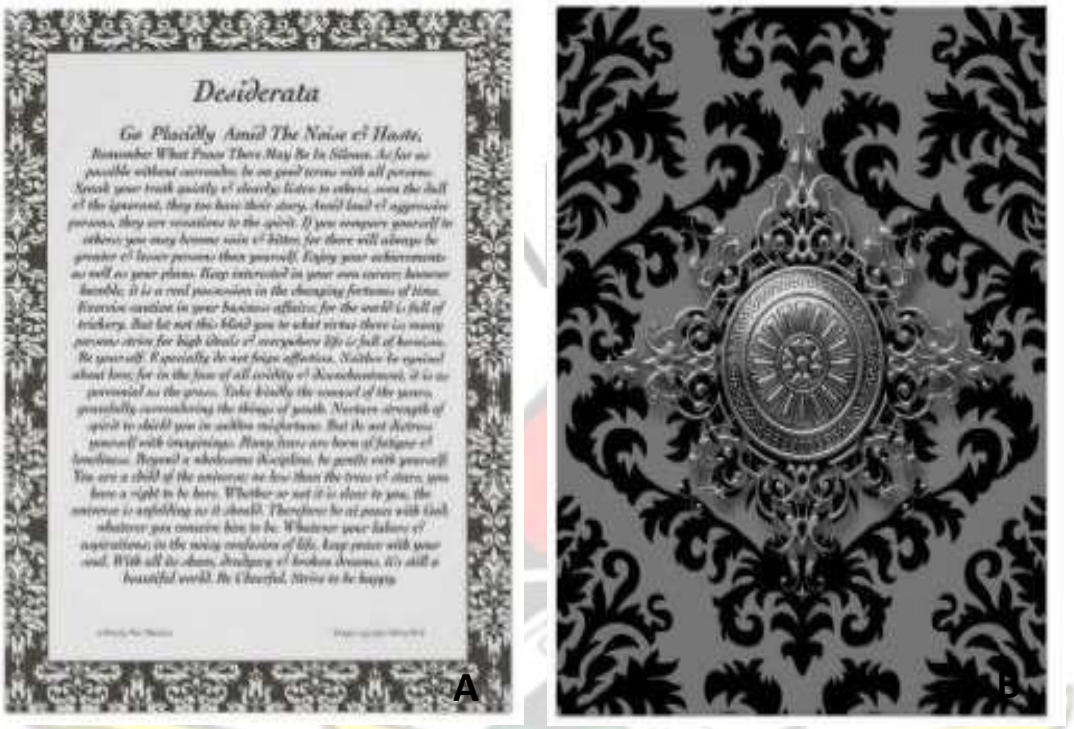


Plate 2.47 A: DESIDERATA Plate 2.47 B: Filigree Medallion in Cheerful Black Filigree Damask design

This Black & White cheerful version of The DESIDERATA by Max Ehrmann has an Elegant Filigree Border. Having it Matted & Framed makes for an Inspiring Wedding/Engagement Gift. These are Wonderful Words of Wisdom to Live By :) Damask Design - Filigree Medallion. Here is a damask pattern of the Burnout Velvet series, simplified into a plain black pattern on a softly coloured background. The design is topped with a beautifully detailed metal medallion set off from the background by shadowing.

2.10.8 Embroidery

Plate 2.48: Filigree & Monograms- Embroidery [Source: Global (2013)]

Global (2013) asserts that embroidery for monograms, labels or strips of labels has to be worked delicately and finely. The smallest size of less than 4 mm is fashionable. They therefore require an extremely fine embroidery thread which can accurately produce the smallest symbols. The delicate nature of the thread and the finely done embroidery as in Plate 2.48 credits it to be named filigree monograms, hence the use of the name filigree is in agreement with the appearance of a thread and design.

Plate 2.49 A and B: Black and white background filigree embroidery [Source: McAuliffe (2014)]

McAuliffe (2014) mentions that these Jacobean style flowers were named filigree because it looked like a fine gold filigree chain on black fabric captured in Plate 2.49A. These stitches can be used for many projects including cushions, tablecloths & placemats.

2.10.9 Tattoos

A tattoo is a body art, done by using indelible ink to create a design in the upper dermis of the skin. Plates 2.50 & 2.51 show filigree concepts translated unto the skin by means of the tattoo art. Johnson (2013) also records that tattoos serve as a means to communicate status and rank, rites of passage, cryptograms of religious and mystical zeal, symbolisms for bravery, marks of fruitfulness, erotic decoys, inductees of love, penance, charms and talismans for protection, markings on outcasts, slaves and convicts. The tattoo symbolisms vary pending on the culture of the people who use them. Kilmer (2013) states clearly that tattooing involves the employment of colouring into the skin's dermis.

Plate 2.50: Filigree tattoo done on the arm [Source: Johnson (2014)]

Plate 2.51: Filigree tattoo with stars done on the right side of a lady's belly. [Source: MuddyGreen (2012)]

Filigree inspired tattoos are found to only carry the purpose of body beautification rather than a spiritual or rather in-depth meaning.

2.11 Precautions in filigree work

Bamja (2000) advices the use of the right tool for the right job to prevent inaccuracies. Tuvia (2010) mentions that stands made for stone integration should have their shanks in good condition and prongs should not have sharp or pointed edges that can pick at threads in a fabric or cause minor accidents. Dougherty (2011) presents safety cautions, saying that one should wear a mask when filing or sanding to prevent inhalation of little metal bits into the lungs. He also admonishes that one should use earplugs when banging and hammering metal. Polasani (2009) advices that one must set the smaller filigree wires into the model frame firmly to avoid infilling from removing when the work is picked or moved for soldering. Secondly, application of heat during soldering as much as possible should be done evenly to prevent the wires from melting.

Fahmy (2010) asserts that the right solder should be used for soldering in terms of the metal's melting point. Soft solders ought to be used for soldering the inner wires with flux to aid in easy melting. Medina (2009) suggests that one cylindrical bar size for meandering should be used for all the cut pieces to have uniform scrolls. The same wire gauge size is best employed for the inner filling. Measurements of filigree wire pieces should be exact to have perfect windings and uniform windings. It is also imperative that the twisted and rolled infilling design be made accurate to have a uniform arrangement. Tammy (2014) cautions that during the finishing stages with a motorized tool, care should be taken to avoid wearing off much metal, wear eye and dust mask. While polishing/buffing filigree, start with a higher compound to the least noting that much polishing is not needed for filigree polishing since it may wear off the wired design.

Whitehouse, n.d. makes mention of five precations only, making reference to the soldering process. These precautions are as follows:

- Soldering should be done in a well ventilated area.
- Clean metals thoroughly before fluxing and soldering.
- Flux fully to reduce fume chances and protect the metals while heating.
- Metals should be heated uniformly and broadly, taking note to apply heat unto the metal instead of the solder.
- Know your metals. Do not overheat assembly when using solder that contains cadmium. Check recommended brazing temperature required for the specific solder type being used.

2.12 Finishing techniques used in filigree

After the filigree has been formed and soldering done to keep it in place, finishing techniques are employed. Finishing in general refers to processes undertaken to bring a metal surface to the ideal state for the market. The finishing techniques used in filigree therefore include:

2.12.1 Pickling metal

Whitehouse (n.d.), Honaman (2014) and Bone (2011) assert that pickling denotes a cleaning procedure used on metal after heating and soldering. It involves placing the filigree work in a weak acid solution with the intension to remove oxides and flux from surface. The jewellery piece can also be slightly heated before placing it into the pickle solution. Filigree must be rinsed and dried thoroughly to ensure that moisture does not remain in the open spaces or between the wires. (Dropping the filigree in saw dust is also an easy way of achieving this.)

2.12.2 Filling and sanding

Honaman (2014) and Bone (2011) both agree that small files be employed to shape, refine, round sharp edges, remove burrs and defects, and remove excess solder that may be found on the surface. It is very important that the file to be used is one that isn't rough so as to reduce the intensity of scratches on the surface. Sanding, on the other hand, seeks to remove fire scales or smoothen the metal surface after filing has been done to further get rid of lighter scratches. The sanding compounds should be used in progressive levels and ensuring the piece is cleaned in between each grade, would bring the finish all the way to a high polish.

2.12.3 Metal shaping

Bone (2011) says that dapping or doming, comprises fashioning a heavy dome from a disc or shaped metal by light forming, with the aid of a dapping/doming block and a punch. This is done to give shape or depth to the filigree. Metal shaping can be ignored since it is just an option. Metal shaping can be done with designs such as peacocks, plates and other filigree items that need it. Metal shaping falls under finishing techniques in filigree since it is the last effect added to the filigree work.

2.12.4 Polishing

According to Bone (2011), polishing can be enhanced by hand, buffing machine, pendant motor or barrel polisher. In the case of polishing filigree, hand polishing is the best option since it is most appropriate for use in small and delicate work pieces. Under utmost care, tumbling can be used as well as buffing machines for final finishing/polishing.

2.12.5 Surface treatment

Since metals have a lifespan of lustre, some metal smiths suggest further finishing. According to Dougherty (2011), patination can be employed. Liver of sulfur is used to darken bronze, copper and silver to give it an antique finish. A thin amount is needed in a bowl of warm water to attain diverse effects on the metal. With the use of gloves, heat the metal before dipping it in the bath (liver of sulfur solution). Rinse in cold water, dry and redo until the antique effect is desired. The use of a wooden or rubber tip tongs is needed for picking the metal so as to avoid marking it. A numbler can be used to enhance the finish after patination, in cases where the metalwork is not a fragile one.

FusionBeads (2011) presents that painting could also be an option for surface treatment. Nail polish or any other polish or paint can be used. Use a small brush to paint the filigree. After the entire piece has ben painted pick the jewellery with a tweezer and blow on the holes to rid of excess paint. The paint or polish coats the entire filigree jewel yet the colour seems to settle primarily in the recesses, showing off the filigree details. Another choice would be to use an enamel spray paint. Spraying must be done in a very well ventillated area. Follow same guide lines as used for painting. One can use gloss, matt, satin or mettallic paint to achieve desired effect. Honaman (2014) contends that hand burnishing with a highly polished tool will press the surface to a smooth reflective finish. No material is added or removed in this process. Electroplating as defined by Woodford (2009) comprises the use of a solution known as an electrolyte. This solution is electronically charged and two terminals (electrodes) plunged into it. When the electric current runs through the circuit it causes the electrolyte to split up triggering the metal atoms in its contents

to be adhered in a thin layer (film) over one of the electrodes, hence causing electroplating. Lead, copper, tin, cadmium, chromium, nickel, zinc, silver, platinum, and gold are examples of metals that can be plated.

Woodford (2009) further states reasons for electroplating, asserting that metals like silver and gold are plated for aesthetics considering it is cheaper to own a plated jewelry than a solid one. Some metals are plated (galvanised) with zinc and tin to give them a protective and more attractive surface for instance, food pans are often tin plated to make them resilient to corrosion, while daily used items produced from iron are zinc plated.

According to Spring-i-pedia (2011), electroplating comprises the construction of a galvanic cell whereby the metal to be plated is the cathode and the plating material is the anode. These metals are immersed into an electrolyte bath and a electrical current applied from anode to cathode. Ions of the plating metal are driven into the plating substrate through the electrolyte covering it with a thin coating layer of the plating metal. Steel, lead, copper based alloys, and other metals can be electroplated. Chromium, nickel and tin are often used to plate steel for the purpose of corrosion resistance.

Sarnacke (1996) agrees that electroplating is a means of applying a thin coating of a metal over another metal. The reasons for electoplating include: friction reduction, corrosion resistance, heat tolerance, and aesthetis. The metal coating process is done by passing current into an anode, through a salt solution of the metal you want to deposit, and is deposited unto the cathode. The process involves fine tuning diverse mixtures of salts with different physical and chemical properties. These chemicals

(brighteners, carriers, and wetters) are intended to enhance the brightness and shine of the deposited metal. In the auto industry original steel car parts are plated with various nickle coats or layers for corrosion resistance and for decoration and aesthetics chrome plating is employed.

2.13 Review of selected complementary materials

Complementary materials for jewellery are any materials other than the metal being used which are added or incoporated into the work piece for the purpose of adding value to the work or for aethetics.

2.13.1 Cowry shells

Damme (2007) acknowledges that cowry shells (Plate 2.52), as a means of payment and a symbol of wealth and power, continued until the 20th century. All characteristics of money being durability, accessibility or expediency, divisibility are embodied in these small shells. In an article published by diaryofanegress (2012) it was indicated that cowry shells have many uses and meanings. Undeniably, cowry has shown up in the form of money, jewelry, and religious accoutrements in almost every part of the world. Found in the islands of the Indian Ocean, the cowry shells have gained acceptance throughout much of ancient Africa. It also epitomises goddess protection. The cowry denoted the power of destiny and prosperity. It has also been adopted as an African female symbol; worn around the hips, as a credence to increase fertility.

Gaibole (2005) suggests that the cowry shells are the most identifiable of all African spiritual and cultural symbols. This symbol is worn to represent realisation, spirituality, and Africans identity. They are used as interpretations in the cultural,

spiritual, political and social palances. The cowry symbolism depends intensely on the used setting. However, notwithstanding the use, cowries constantly stimulates awe and respect. The cowry shells were the initial symbol of currency and wealth known to mankind in Ancient Africa. The cowry was used much like the dollar is used today, as a means for trading of goods and services. Gaibole adds that cowry shells have many uses, both traditional and modern. While they are currently used by many people as beautification and a fashion or social statement, their traditional uses are many. Some of these include gifts, gambling, sympathetic magic, readings, ancestral offering, and symbol of fortune. Even though cowry has outdated its use for trade, its symbol of wealth remains engraved silently on the minds of many.

According to oral history the name given to the Ghanaian currency cedi originates from the twi translation for cowry (cediɛɛ). This was profoundly due to the fact that the cowry for a long time was the currency in use before the introduction of coins and notes. In Ghana, cowry shells are held in high exteem. They stand as a symbol for wealth and are also used in divination by traditional priests. Considering the durability and cultural value of cowries in Ghana, the researcher finds it very suitable as a complementary material in filigree. No trial work of filigree with cowry has been found, hence this makes it a challenge for research in finding a suitable way for integrating it with filigree. However, cowry was found used in integration in other fields for jewelery making examples can be seen in Plate 2. 53A and B.

Plate 2.52: Front and back view of cowry shells [Source: Damme (2007)]

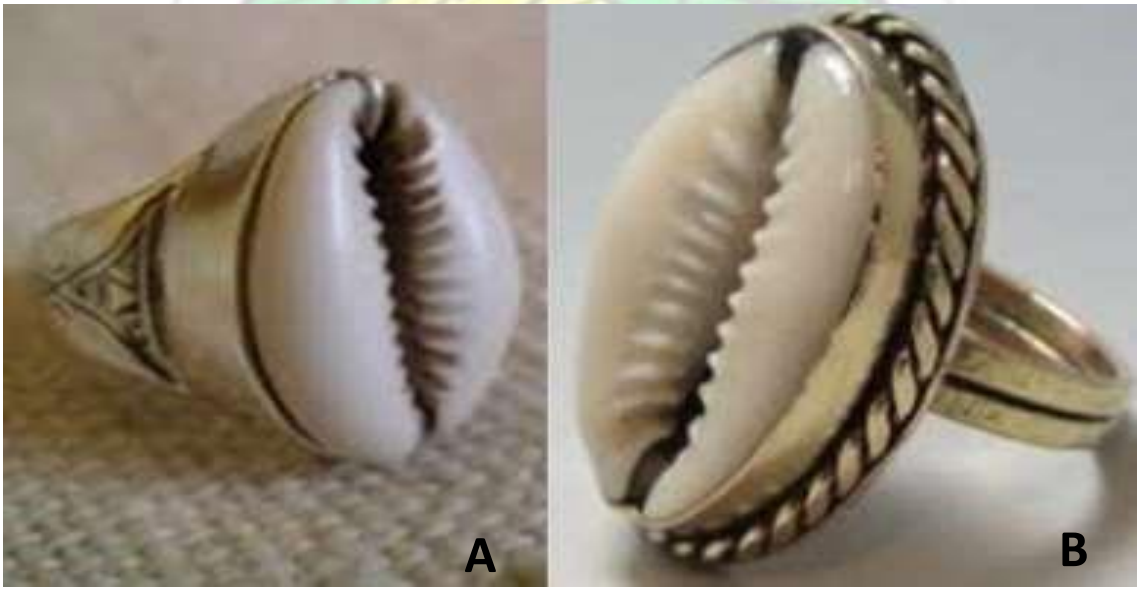


Plate 2.53 A and B: Cowry integration with silver rings. [Sources: A: Africa Normad (2008) and B: Etsy (2015)]

2.13.2 Beads

Rex (2012) expounds that the rich antiquity of the Ghanaian bead dates back to primordial times when Kings used them as a trade medium for alcohol, textiles and slaves. Currently, they are cherished by foreign exchange earners and tourists. Its also important to note that the colors of Ghana beads have meanings; white- fertility, blue- purity, and gold- wealth. A fair knowledge of the bead colours provokes a more personal experience between the bead and its wearer. Plate 2.54 illustrates typical Ghanaian waist beads used by young ladies in the puberty for adornment and hip shaping as believed by the indigenes.

Plate 2.54: Ghanaian made beads [Source: Rex (2012)]

Onuman (2011) suggests that "***Anwennɛɛ pa nkasa"*** meanig g*ood beads are silent,* communicates that quality does not promote itself. This akan proverb has a rtelationship with the manner in which Ghanaians relate with the worth and relevance of beads in their culture. Akpabli (2012) affirms that Krobo beads are precious stones

that have stood the test of oven fire. They are made from pounded recycled bottles or glass. In the primordial past, however, natural constituents such as shells, stones and bauxite were used. Rex (2012) establishes that there are three varieties of Krobo glass beads: painted glass beads, translucent and powder glass. The bottles and other glass items go through glass serparation before they are washed, crushed with a pestle in a metal mortar, and sieved to get a very fine powder for making powder glass beads. The varring colours are gotten by appling dye chemicals. Moulds are created to obtain the different shapes. Sticks are then placed in the middle to leave holes for threading the beads. They are then baked in kilns. Translucent beads demand heating for almost an hour at a temperature of 850-1000 degrees celsius. The beads must be allowed to bake at a slow rate so as to prevent cracking up before they are done. Ahiabor (2013) states that the uses of beads in Ghana are mainly for ceremonies such as marriage rites, birth rites, puberty (such as 'Dipo') and death rites. They are also used to communicate status of the wearer be it a chief or traditional leader. Onuman (2011) confirms that beads can be used by both sexes for adornment and other purposes. Some of these beads are made specially for babies to wear for their naming ceremonies. The Krobos and Akans also make use of waist beads to suggest femininity and also for puberty rites. The Aggrey or Krobo beads are mixed with gold pieces and used by royalty. Some traditionalist make use of beads, wearing them as talismans.

Plate 2.55: Ghanaian contemporary glass beads [Source: (Butler, 2010)]

As displayed in Plate 2.55 contemporary beads have been found to be very classy and fashionable. They range in various pattterns, sizes and colour. Ghanaians mostly value the use of these beads as a means to show of their pride and cultural heritage. Now a wider range of beads size and colours exist which allow for various combinations for use in clothing assesories. Webber (2009) admits that the people of Krobo have a stretched past account of producing beads from recycled glass as proven in Plate 2.56.

Plate 2.56: Krobo beads [Source: Hye (2008)]

Hagan (2009) states that beads are considered possessions to be passed on from one generation to another. They reflect wealth and status. In the historic days, they were not only commercial items; they also served as exchange, facilitating commercial transactions or exchange of goods. They were used even to purchase slaves. *Me 'Ahwinee pa'*as popularly called by Ashantis, is a high quality bead with a rich cultural history. 'Ahwinee pa' is translated to mean quality beads. This type of bead is expensive and very much regarded by Ghanaians. This bead was made from some natural material. The appearance of the beads usually has a matt surface or feel. The bead is found to be relatively heavier than the usual glass beads and does not make much noice when hit agianst each other. This rich bead has the added perception of wealth, and is usually passed down to people as inheritance, making it a very prestigeous gift. The researcher faced much difficulty in acquiring some of these beads on the local market because of the value that has been placed on it. Without exaggerating, one can say that the value placed on this item for the indigene is next to gold.

According to Rex (2012), clay beads as depicted in Plate 2.57 originated around 1000 BC in numerous provinces around the world. In Africa, these beads were mediums of exchange used to trade in Mali and Ghana. The clay beads were usually used by the poor in society because they were inexpensive. They were used in prayer and as amulets by the natives. Large holes were made through the beads to accommodate thongs of leather strands. Presently, clay bead are so highly prized by some nations and their export prohibited.

Plate 2.57: A beautiful strand Etched Black Clay Beads. [Source: (Rex, 2012)]

2.13.3 Adinkra symbolism

Adinkra symbols are motifs or symbols that carry rich cultural history and symbolism. Adinkra symbols are symbols most appreciated by the Ashantis. Tetteh (n.d.) records that the Adinkra symbols represent themes that relate to the Asante philosophies, history and beliefs. Embedded in the adinkra symbols are proverbs which play a significant role in the culture of the Asantis. Culturally the use of proverbs marks wisdom. Some Adinkra symbols depict historical happenings, animalistic behaviour, human conduct and attitudes, plant life forms and shapes of objects. Adinkra symbolism can be said to be a means of communication as depicted in Figure.2.5 by Ameyaw-Akumfi (2013). He illustrated this by bringing together some adinkra symbols that portrayed fatherhood qualities, stressing on the heritage that fathers should uphold and represent.

Figure 2.5: Adinkra chart depicting fatherhood virtues [Source: Ameyaw-Akumfi (2013)]

2.14 Review of works in filigree

The components that constitute a design could be said or termed to as the features of the design. Below are descriptions of filigree works per their features and origins. Accounts from Cyndie's Studio Designs (2009) affirm that Russian filigree as captured in Plate 2.60 A and B is well known for their smooth and delicate ornamental lines with mild curves of wire running through the design. Clearly defined ornaments and numerous designs can be found within an individual object. Further research also proved that Phoenician filigree jewellery shown in Plate 2.61 have an extraordinary oriental influence of floral and figurative images. Yemenite filigree art is considered one of the oldest filigree styles in the world. As can be viewed in Plate 2.63 Yemenite filigree exhibit cultural as well as religious applications and artefacts. The Yemen Jews work mainly with silver and rarely gold.

Macedonian filigree style as shown in Plate 2.59 combines filigree with granulation, creating a beautiful effect for artefacts of all types. The filigree crab shown in Plate 2.60 is one of the many outstanding Chinese filigree works. Maltese Filigree works as shown in Plate 2.62A&B traditionally exhibits great intricately woven silver metalwork of flowers and butterflies in filigree.

Plate 2.58 A and B: Russian filigree boxes from a collection at the Hermitage. [Source: Cyndie's Studio Designs (2009)]

Plate 2.59: An antique handcraft silver filigree candy bowl made in the Macedonian style. [Source: Cyndie's Studio Designs (2009)]

Plate 2.60: A handcrafted filigree crab box made for Catherine the Great, from a collection in The Heritage in St. Petersburg [Source: Cyndie's Studio Designs (2009)]

Plate 2.61: Phoenician jewellery, gold filigree [Source: Cyndie's Studio Designs, (2009)]

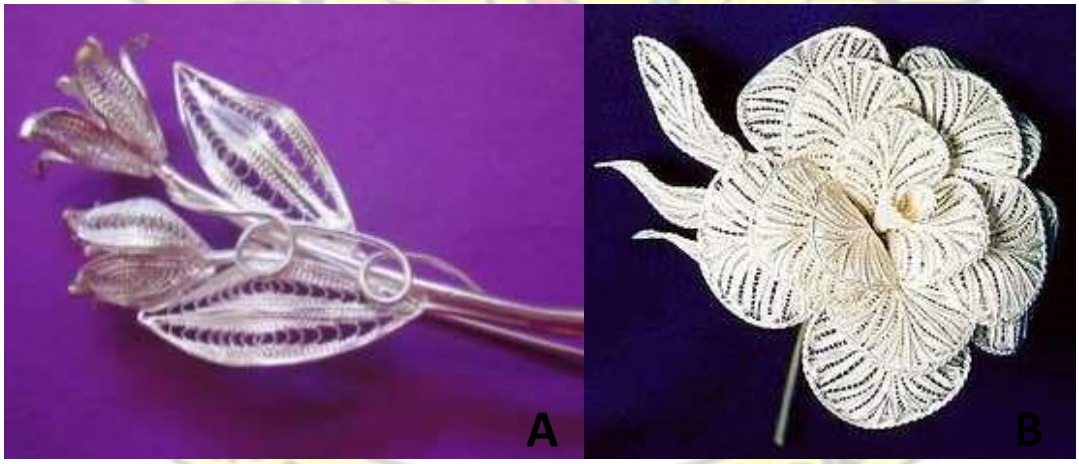


Plate 2.62 A&B: Filigree Lapels from Maltese Filigree works [Source: AurumEve (2012)]

Plate 2.63: Yemenite art filigree style [Source: Ebay (2008)]

2.15 Review of research methods and tools.

2.15.1 Introduction

The proposed topic: **Complementary approach to filigree in Ghana** has been chosen by the researcher with the aim of coming up with another phase in metal production, notwithstanding its allied materials. This was achieved through a combination of different methods and approaches to research. These include the following:

2.15.2 Research Defined

Sharma (2014) defines that *Research* as the methodical procedure of gathering and scrutinizing information to grow our knowledge of a phenomenon being studied. In

addition Babbie (1998) is of the opinion that Research is a systematic autopsy used to control, define, enlighten and foretell an observed phenomenon.

Coming from OECD (2002), research embraces resourceful exertion embarked on systematically for the purpose of intensifying knowledge of man, culture and society as a basis to formulate ideas for development or advancement. Encyclopedia Britannica (2011) brings one to the understanding that the word research, derived from French words 'recherche'- 'to go about seeking', also derived from an ancient French term "recerchier" which is compound word "re-" + "cerchier", or "searcher",- search. Shuttlewoth (2008) believes that research is mainly is the gathering of any information or facts for the further improvement or advancement. Creswell (2008) acknowledges research as a procedure for the collection and analysation of information to advance an understanding of an area of study, issue or topic.

2.15.3 Research Types

According to Kowalczyk (2013) there are two research types exist; applied research and basic research. Hale (2011) admonishes that for research methodology discussions, it is significant to differentiate *applied* and *basic research*. **Applied research** scrutinizes a detailed set of conditions, and its objective is connecting the results to a precise situation. **Basic research** emphasizes on vital principles and proving theories, while applied research makes use of data directly for actual world application. Kowalczyk (2010) defines Applied Research as a research type used to solve problems by explicitly answering questions that have direct submissions applicable to the world, while the Basic Research type is motivated solely by a curios desire to expand our knowledge base. Basic research is very likely found to be indirectly related to the real world, yet it boosts our intellect of the physical world.

McMahon (2014) observes that both basic and applied research are essential to the progression of human knowledge, even though they are different, and seek to meet different goals. Their difference being that while basic or pure research is solely conducted for gathering information and advancing existing knowledge, applied research is rather focused towards resolving a specific question. There is a united agreement among Lynn Henrichsen, Michael T. Smith and David S. Baker (1997) suggesting that basic research is based on theoretical knowledge rather than the practicality of knowledge found, whilst applied research demonstrates how the discoveries can be used or summarized practically. From the above it can be deduced that basic research is the foundation on which applied research is built.

2.15.4 Research Approach

According to Creswell (2008) there are three major research paradigms or approaches: qualitative, quantitative, and mixed researches. Two major types of research design exist which are qualitative research and quantitative research. Usually researchers would either prefer qualitative or quantitative methods depending on the nature of the topic to be investigated and the research questions in view for answering.

2.15.4.1 Qualitative research

Creswell (2008) submits that qualitative research broadly encompasses asking questions and data collection in the form of video, words, images, etc. for theme searching and analyses. This research type aims at scrutinizing a question minus making an attempt to measure variables or find a potential relation between the variables. This research is interrelated with the philosophical and theoretical stands of society.

Garbarino and Holland (2009) claim that qualitative methods have equal chances for evaluation and can bring about sophisticated, vigorous and timely records and analysis.

2.15.4.2 Quantitative research

Creswell (2008) states quantitative research to be a progressively realistic investigation of calculable properties and occurrences in connection. The research designs used are correlational, experimental, and survey or descriptive. Quantitative research is connected with the rational and theoretical bearings of positivism. Kara (2012) submits that research be it qualitative or quantitative, may require the collection of primary or secondary data. Primary data is specifically gained by means of questionnaires and interviews. Secondary data already exists and can be either turned around or re-used for the research. Principled research practices suggest the possibility of using secondary data. More so the use of both primary and secondary data is common and termed as mixed research. Mixed research also includes the use of both qualitative and quantitative elements. Guba (2008) observes that quantitative research was generally accepted in educational research as the research paradigm till the early 1980s, after the promoters of quantitative and qualitative research advanced to new height amiss their wars.

Sabine Garbarino and Jeremy Holland (2009) agree that data gotten from quantitative research is static based, while qualitative research produces data that are literal, hence different methods are used in gaining data.

Babbie (1998) classifies research approaches into deductive and inductive research approaches. While inductive methods analyse identified observation of occurrences, processes, structures and general principles, underlying an observed phenomenon, the deductive methods verified the theorized principles by observations. Babbie E.

in 'The Practice of Social Research' Cengage Learning (2010) advices the necessity of determining the appoach being implemented since scientific investigations typically practice alternating both deduction and induction methods. In both cases logic and observation are itineraries used for the construction of social theories.

2.15.5 Research designs

The research designs adopted for the study include the action research, content analysis, experimental research, observational research and artistic research.

2.15.5.1 Action Research

Gilmore (1986) explains Action research as having an aim to contribute to the practical and present problematic situations or concerns of a people in the bid to advance the goals of social science alongside. Achieving these goals require the dynamic partnership of both the researcher and client, and consequently stresses on the prominence of co-learning as a chief facet of the research procedure to reach a desirable agreement by both parties. McCallister (2014) in Figure 2.6 below depicts the cycle used in action research. The processes include identifying a problem, devising a plan and then acting or implementing it. At the stage of implementing the plan, the researcher can assess the tangibility of the process. After observing the situation the whole process of action research is reflected upon.

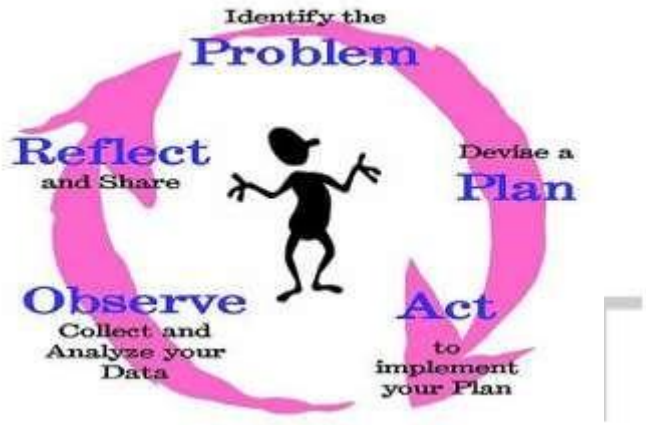


Figure 2.6: Action research processes diagram [Source: (McCallister, 2014)]

Methods of Action Research

McCallister (2014) places the following under methods used in the action research design:

- Individuals or groups observation
- Video and audio recording
- Interviews (structured or semi-structured)
- Field notes collation
- Use of analytic memos
- Photography
- Surveys and questionnaire distribution

Researchers can employ the use of any of the above methods in their bid to collect rich and useful data. Parsons, Rick D., and Kimberlee S. Brown (2002) explain Action Research as a way of investigation designed for teachers in an endeavour to help solve problems and advance professional performance in the classroom. Action research comprises systematic observations and data collection used by the research

practitioner in decision-making, development and reflection of effective classroom stratagems. Miller (2007) explains Action Research as a teaching practice style used by teachers in continually observing, collecting data and the altering of systems to develop the learning environment in the classroom. Action research offers a framework that chaperons the dynamisms of teachers toward a healthier understanding of how to turn a students into a better learner.

2.15.5.2 Content Analysis

Conclusions drawn from Colorado State University (2014) suggests content analysis as a research tool used for outlining words or concepts within a text. Texts can be defined generally as articles, historical documents, speeches, interviews, conversations, books, chapters, essays, informal conversation etc. that are found relevant to a study. To conduct a content analysis, the text should be broken down into manageable groupings and then scrutinised by the use of a basic content analysis methods: conceptual analysis or relational analysis. According to Hsieh and Shannon (2005) content analysis is a broadly adopted qualitative research technique. The application of content analysis demonstrate three different approaches: summative, directed, or conventional. These are used to deduce meanings from the text or data observing naturalistic paradigms. The main variances in approach are origins of codes, coding schemes, and coercions to credibility.

Obaid (2011) delineates content analysis in general as a research technique used to gain systematic, objective, and quantitative description from evidence content of a communication such as found in books, websites, journals and paintings. It is a research tool or technique which seeks to analyse actual contents and features of any type be it words, pictures, themes and texts presenting the content an objective and

quantitative style. It focuses on the definite content and core features of the media. Content analysis is a term sometimes used to describe both quantitative and qualitative approaches to analysing content.

Since content analysis can be useful in the examination of any piece of writing, occurrence, or recorded communication. It is adopted for use in many fields: marketing, literature, psychology, media studies, information studies, sociology and political sciences.

Conceptual analysis establishes the actuality and frequency of concepts often embodied in a text by words or phrases while relational analysis examines the relationship that exist in the concepts in a text.

2.15.5.3 Experimental research

Shavelson & Towne (2002) concluded from a scientific perspective that random trials are the ultimate way of establishing if one or more elements cause change in a result as a means to enable coherent comparisons. Mayer (2005) affirms that experimental methods make use of random assignments of variables. Mayer also states that when experiments are carried out professionally it allows learning and drawing of instrumental conclusions. Melanson (2013) explains experimental research to be a type of research that has parameters or conditions set and controlled by the researcher to determine their outcome. It often takes place in laboratories even though the experiments can be performed anywhere. The main requirement is for the researcher to be able to control the conditions of the experiment. This method helps to advance the researchers understanding of how different variables work during the testing processes, hence adding substance to the research.

2.15.5.4 Observational research

Melanson (2013) opines that observational research is the gathering of data without the intervention or participation of the researcher. It reviews the natural or inherent abilities of things as they are. The data derived are analysed and used for drawing conclusions. Shuttlewoth (2008) says that enough accuracy cannot be obtained by just observing, with data that in a form of statistics is testable and can be analysed, which is the only accepted results in the discipline of science. There may be variance in the process of experiment, notwithstanding they all stick to rudimentary principles which are the same. Scientists could have their opinions they stick to, just as everybody, who normally stick to their own logics, though the proof may show alternatively. Research serves as a platform for them for their testing, including theories of others, through the usage of this by using this antagonism in finding a solution and quite excellent facts or information. Research and its purpose is indeed a current method of hypotheses in its amendments and purification, making some scientific truths accepted. According to ATLAS.ti (2002), field research (or observational research) is a type of research (i.e., non-experimental) relationship in which there is an observation by the researcher concerning ongoing behaviour. There are a diversity of kinds of research by observation, and each possesses its weaknesses and strengths. These kinds are planned beneath by the degree to which the one who experiments has interference on or handles the environment. In social sciences and, marketing research by observation is chiefly dominant. Direct phenomena observation according to their normal setting has to do with social research as a technique.

2.15.5.5 Artistic Research

Lesage (2009) declares that the contentious movement of artistic teaching which is turning out to be more of academics is pointing towards artistic research having the acceptance as primary method of query in art as in the circumstance of other studies. Eisner (1981) is of the opinion that one of the characteristics of artistic research is that it must assent subjectivity as divergent to the typical scientific methods. As such, this is related to the social sciences in the use of qualitative research and inter subjectivity as tools in the application of critical analysis and measurement. University of Dance and Circus (Dans och Cirkushögskolan, DOCH), Stockholm, have propounded a definition for artistic research as "Artistic research is to investigate and test with the purpose of gaining knowledge within and for our artistic disciplines. It is based on artistic practices, methods and criticality." (DOCH, 2011) According to Topal (2014) in artistic research, instinct is used as a means to recognise a wide variety of new and unpredicted industrious modalities. Hoffman (2003) is of the view that maximum writers, if of fiction or non-fictional books, there must a research work in support of their work in creativity. This could be truthful, background research or historical. Geographical or procedural research could be an example for background research.

In conclusion a comprehensive study of these research types and the right translation of these types into the research would better enable the researcher to make a detailed research and answer the research questions: What is the Ghanaian identity lacking in filigree made in Ghana? What materials popularly associated with the Ghanaian culture are applicable in filigree?

CHAPTER THREE

METHODOLOGY

3.1 Overview

This chapter expounds on the research design and the methods of research adopted for the study. Here the data collection and data analyses are objectively taken into account. The following topics form the structure of this chapter; research design, population of study, sampling and the specific treatment of objectives; data needed, data collection methods, data collection instruments, data analyses and treatment of data. In this chapter the working procedure undertaken during the production of the sample frames and the final project is narrated with pictures showing proof of work.

3.2 Research design

The premise of the project is to improve the Complementary approach to filigree in Ghana. This research emphasised on introducing a Ghanaian cultural look into the production of filigree.

The research design elucidated how, when and where data was collected and how that data was analysed. The research design introduced sought to address the research questions for the study. The research employed the use of action research design and content analyses design under the qualitative approach. The Action research was used by the researcher in decision-making, development and reflection of effective tactics while content research identified and presented important aspects of literature relevant for the study.

3.3 Population for the study

The population for the study included metal smith artisans, bead making artisans filigree works and adinkra symbols. The following adinkra symbol collection from MacDonald (2007) below are a few adinkra symbols found easy by the researcher to be adopted or manipulated with filigree wires.

Table 3.1: Some adinkra symbols that can be wire manipulated

SYMBOL	NAME	TRANSLATION	MEANING
	**SANKOFA**	"return and get it"	Learn from the past
	**SANKOFA**	(alternate version)	
	**NKONSONKONSON**	"chain links"	unity, human relations
	**KWATAKYE ATIKO**	"hairstyle of Kwatakye,a bravery, valour war hero"	
	**ANANSE NTENTAN**	"spider's web"	wisdom, creativity
	**ASASE YE DURU**	"the Earth has weight"	divinity of Mother Earth
	**AKOMA**	"the heart"	patience & tolerance

DWENNIMMEN	"ram's horns"	humility and strength

3.4 Sampling techniques

Amidst a number of sampling methods available, the Random sampling method was the main sampling method employed for the study. This method was used in the selection of some; Metal smith artisans from shops in Kumasi and in Accra, Bead making artisans and beads from Krobo (Aggrey) beads and Filigree works from Jewellery shops and the internet. Due to the complex nature of the study and the technicalities involved, a wide range of people, objects (complementary materials with Ghanaian origin) and filigree (existing) works were employed. This was done to gain a fair representation for all the various strata making up the population size.

3.5 Specific treatment of objectives

To adopt and give filigree a Ghanaian cultural look, the researcher employed the following strategies by means of setting objectives to facilitate the process of answering the research question. The objectives were treated as follows:

3.5.1 Objective one: To assess the applicability of certain Ghanaian materials and concepts in filigree.

3.5.1.1 Data needed

To assess the applicability of chosen Ghanaian materials and concepts, the following data were needed;

1. Different types of cowries in their sizes.
2. Different bead shapes and colour combinations of beads
3. Techniques for linking filigree with the complementary material in reference to their forms.
4. Types of filigree wires in relation to shape and what type would be best appropriate with the complementary material in use.
5. Adinkra symbols that can easily be manipulated with filigree wires.

3.5.1.2 Data collection methods

To satisfy the objective the data collection methods used were direct observations and experiments. The researcher had to go through a rigorous cognitive analysis in order to assess the applicability of some Ghanaian materials and adinkra symbolism for the project. A number of Ghanaian complementary materials were randomly selected, then after many tests, some materials were dropped. Knowledgeable informants were contracted to obtain information on the practicality of using some of the suggested complementary materials. The adinkra symbols were also randomly picked after which they went through various manipulations and trial testing.

3.5.1.3 Data collection instruments

To effectively collect the data by the ways listed above guide sheet on information needed was made. As a means to gaining information from knowledgeable informants, pictures were taken and shown on cameras for easy communication. Notepads and a computer were means of translating a mental idea into the physical or pictorial reality. Practical activities/experiments were made with copper wires and complementary materials for the purpose of experimentation and observation.

3.5.1.4 Data analyses/ treatment of data

After assembling the data needed, data were analysed and interpreted. Table 3.2 reveals that the various integral materials were assessed by ranking and testing them on a scale of 1-5 to gain the best suitable choices. Specific opinions raised by lecturers, skilled and knowledgeable men in the art field were also analysed and interpreted. Plate 3.1, Reveals the beads come in different sizes, shapes and texture (design). Plate 3.2 & 3.3 also asserts that even though the same design or form may exist, there was the challenge with obtaining the same sizes or lengths.

Plate 3.1: Some varying bead sizes

Plate 3.2 Bead comparisons in reference to sizes

Plate 3.3 Cowry comparisons

Table 3.2: Assessment table for finding best integrative materials for use.

CRITERIA - MATERIAL	A	UNIFOMITY	C	ACID RESISTANCE	TERMAL RESISTANCE	ACID RESISTANCE	ELECTROLITE RESISTANCE	INTEGRATION WITH WIRE	TOTAL
COWRIES	3	5	5	0	0	0	5	4	22
BEADS	0	5	3	5	2	5	5	5	30
STONES	0	1	2	5	3	5	5	0	21
CASTED PIECES	4	5	3	5	5	5	0	5	27
SHELLS	1	2	3	0	0	0	5	3	13

UNIFORMITY; A-Size, B- colour, C-texture

3.5.2 Objective two: To design techniques by which selected materials and concepts could be integrated into filigree.

3.5.2.1 Data needed

To design techniques by which selected materials and concepts could be integrated into filigree, the researcher needed the following data;

1. Wire twisting styles in filigree that can allow for the integration of other complementary materials.
2. Creative approaches for integration in filigree.
3. Styles in filigree that can make room for complementary materials.

3.5.2.2 Data collection methods

The data collection methods used to satisfy this objective were, direct observations, internet sources and experiments. The researcher had to go through a process of designing ideas in reference to existing ones to come up with some ways by which the complementary material can be integrated. Experiments were made in relation to the complementary materials to check the possibility of soldering the work while the complementary materials have already been set.

3.5.2.3 Data collection instrument

Data collection instruments employed were cameras, sketchpads and images from the internet. Practical demonstrations were made with copper wires and complementary materials for the purpose of experimentation and observation.

3.5.2.4 Data analyses / treatment of data

The data collected during the designing processes and suggestions that came in during the idea development and experimentation were noted and implemented.

These were as follows:

1. Preliminary sketches

Based on the information gathered, sketches were made in pencil and placed for suggestions from the research supervisor and other technical personnel. Some of the approved sketches were further developed. This is shown in Plates 3.4 and 3.5 other sketches that were made can be seen in the Appendix one.

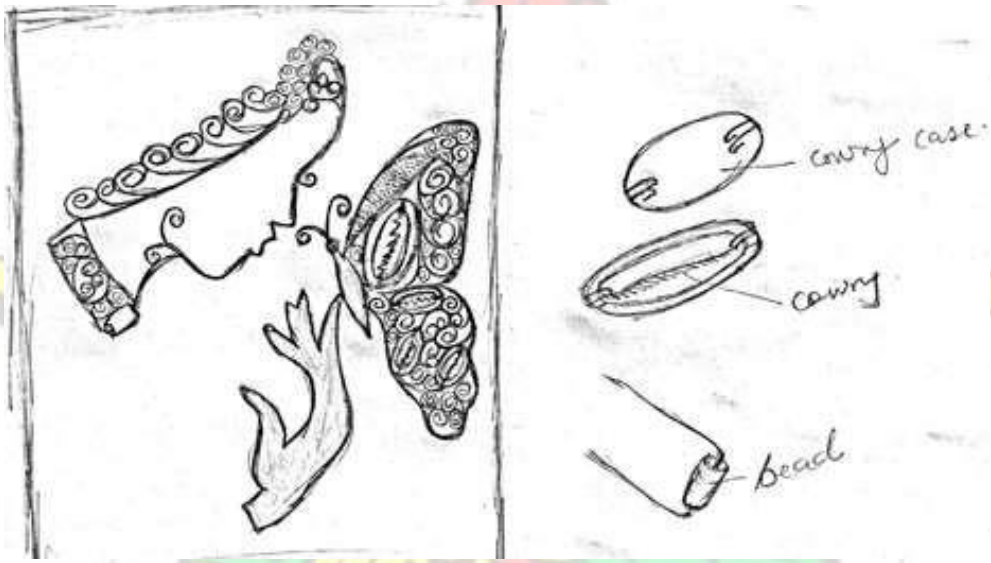


Figure 3.1: Sketches of Filigree butterfly with cowry and bead integration

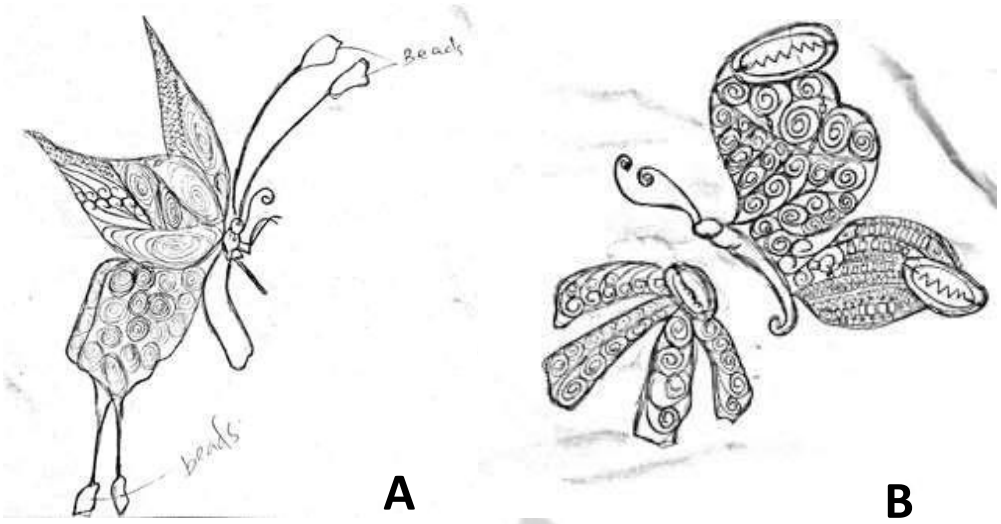


Figure 3.2 A and B: Sketches of Filigree butterfly with cowry and bead integration

Other images of the sketches submitted can be found in the appentix one

2. Filigree wire types

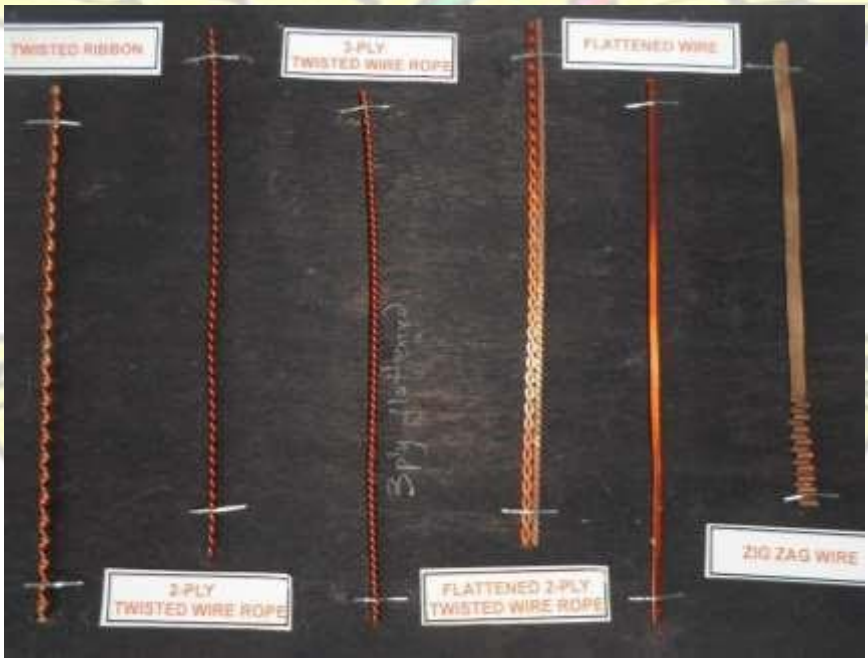


Plate 3.4: Compilation of wire forms in filigree

3. Sketches of complementary integrative methods

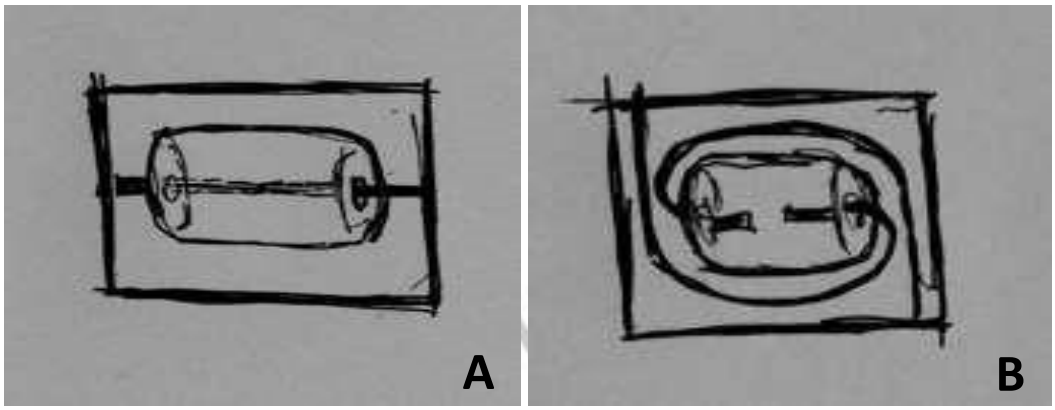


Figure 3.3A and B: Sketches of suggested integrative methods for bead integration.

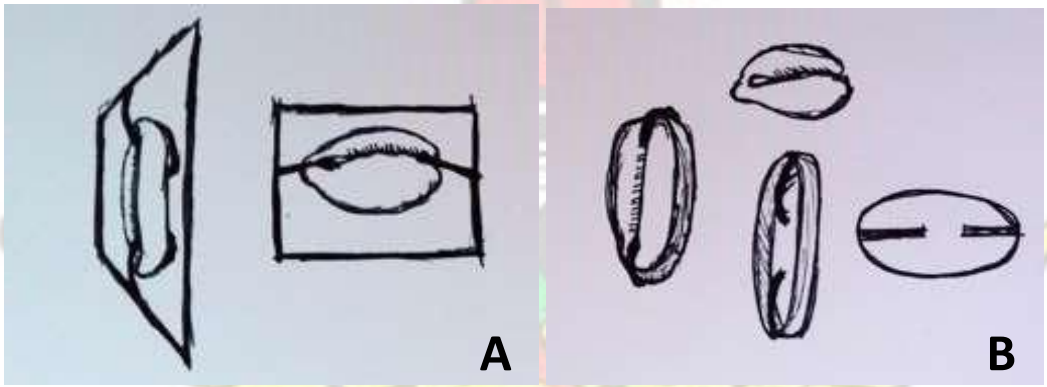


Figure 3.4 A and B: Sketches of suggested integrative methods for cowry integration.

4. Samples of complementary materials integrative methods

Most samples were made in a small rectangular frame with 16gauge 2ply flattened wire. A 16gauge wire was employed for the integration. Soldering was used to join the wire to the frame. In plate 3.6 both sides of the wire were soldered and the cut in the middle to make room for the bead, In Plates 3.7 the wire was soldered at both ends and cut very close to the edge toward one side of the frame. In Plate 3. 9 &10, wire were soldered diagonally at the corners of the frame and skilfully inserted into

the bead by winding it half way around the bead before inserting wire into the bead hole. As can be seen in Plate3.14, the wires were soldered half way along the inside of the frame and the wires inserted into the bead. In plate 3.13 and 14 the wires were soldered at one end of the frames and then made to pass though the bead. The remaining wire length was bent towards one side of the bead as a design.

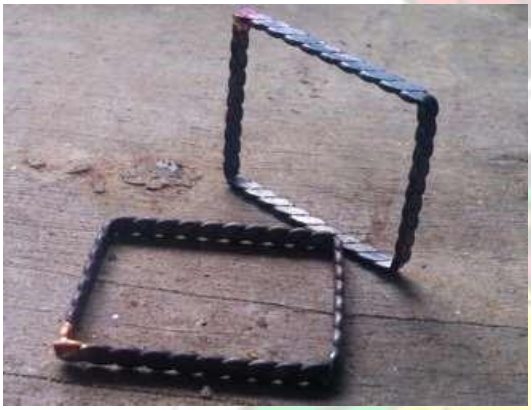


Plate 3.5: Sample frames

Plate 3.6: Wire cut in the middle

Plate 3.7: Wire cut on one side

Plate 3.8: Beads inserted into frames

Plate 3.9: Wires soldered at the corners

Plate 3.10: Wire inserted into beads

Plate 3.11: Sample frame with double wire

Plate3.12: Wires inserted into the bead.

Plate 3.13: Sample frame with single wire

Plate3.14: Bead inserted into the frame

For the sample cowry integration methods in Plate 3.15, a 16 gauge wire was flattened and manipulated to form a circular frame. Claws were soldered on both side and then after a bead was placed to sit on the frame, the claws were inserted through the cowry as seen in Plate 3.16. The same was done in Plates 3. 18 and 3.20 the major

difference being that Plate 3.17 employs twisted wire claws while Plate3.20 employs flattened wire claws and both made use of a rectangular frame. However in Plate 3.23, the 18gauge wire was made very flat and manipulated around the cowry then soldered. Filigree wires were also soldered at the ends. After soldering, slits were made along the edge of the flattened wire, the cowry was inserted into the frame and with the aid of a flat plier the wire was pressed around the cowry so that it took the shape of the cowry holding it together as seen in Plate 3. 22.

Plate 3.15: Circular frame with 2 prongs

Plate 3.16: Cowry placed into the frame.

Plate 3.17: Twisted wires used as prongs

Plate3.18: Wire wound around cowry

Plate 3.19: Integration from behind

Plate 3.20: Flattened wire claw to cowry

Plates 3.21: Fitting frame for cowry

Plate 3.22: Frame clamped to cowry

5. Preliminary experiments on finishes

Some of the samples produced were picked for the experiments suitable for finishing the final work to be produced. These experiments centred of getting the most desirable finishing style that would not only preserve the metal surface but would also draw attention to the integrative materials.

Oxidation and plating were finishing types that were experimented for use. Three different approaches to oxidation also known as patination were experimented with the allied materials. Considering the fact that cowry eats away when placed in acid solution (Plate A7.7), only the bead samples could stand the patination test. In Plates

3.23 caustic soda and sulphur were mixed in warm water after sulphuric acid was slowly and carefully poured into the solution. The samples were dropped into pickling solution which caused the cowry shells to perish slowly eating away. After 10 minutes the samples were removed and brushed. The mixture for oxidation used in Plate 3.24 was caustic soda and sulphur which was mixed in warm water. After 10 minutes the sample was retrieved and brushed. The copper wire had taken on a bluish look which when exposed to air for a long period of time darkened. The next sample test (Plate 3:25) was conducted using only caustic soda in warm water. After 10 minutes, the retrieved sample looked yellowish however it was noted that the solder excesses on the metal did not change colour. After more exposure to air, the metal darkened yet the yellow tint still remained. Plate 3.26 & 3.27 were bead and cowry samples sent for nickel plating. The plated samples were found to be brighter in appearance hence throwing more light unto the integral materials. No damage was found done to the complementary materials rather they turned out looking brighter and better.

Plate 3.23: Oxidation A

Plate 3.24: Oxidation B

Plate 3.25: Oxidation C

Plate 3.26: Plating with bead

Plate 3.27: Plating with cowry

3.5.3 Objective three: To demonstrate the practicality of the technique by producing samples of filigree frames with Ghanaian attributes.

3.5.3.1 Data needed

To demonstrate the practicality of the technique by producing samples of framed filigree with Ghanaian attributes, the following data would be needed;

1. Inspirations from existing works.
2. Idea developments
3. Concepts

3.5.3.2 Data collection methods

The data collection methods used to satisfy this objective were experiments, interviews and observations. The researcher had to go through a process of constant practical hard copy and pictorial productions of concepts. These concepts were then sent round randomly for comments and work appreciation.

3.5.3.3 Data collection instruments

Notepads and a computer were used to show drawings of designs before they were produced. Samples that carried the idea were also instruments used to gain effective communication between the researcher and the population.

3.5.3.4 Data analyses / treatment of data

The data collected through interviews on the outcome of samples produced at each stage was analysed. The opinions raised during the interviews were analysed and used during the production of the next assignment. The sampled frames produced were displayed indirectly to gain the views of some critics. These responses were received and analysed

3.6 Approved sketches translated into CorelDraw

The sketches were made in CorelDraw as depicted in Fig.3.5-3.7 and shown at various conceptual developmental stages for supervision and criticism. The laudable suggested imputes were effected into the design at the various stages until all there samples were finally produced in CorelDraw.

3.6.1 Sample one in CorelDraw

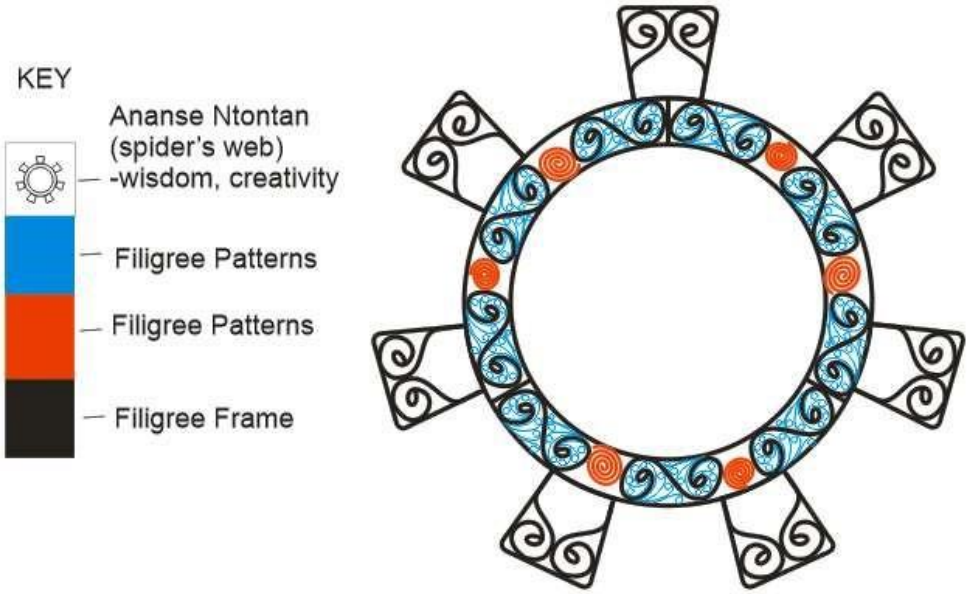


Figure 3.5: CorelDraw representation of sample one (Anase Ntentan filigree frame)

3.6.2 *Sample two in CorelDraw*

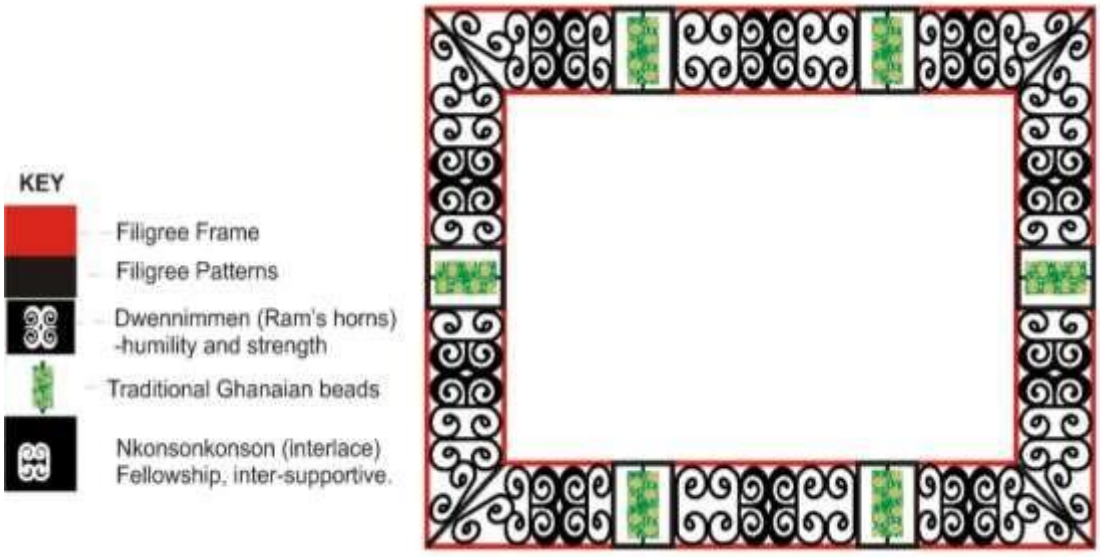


Figure 3.6: Approved design of sample two in CorelDraw representing

Dwennimmen and Nkonsonkonson filigree concepts.

3.6.3 Sample three in CorelDraw

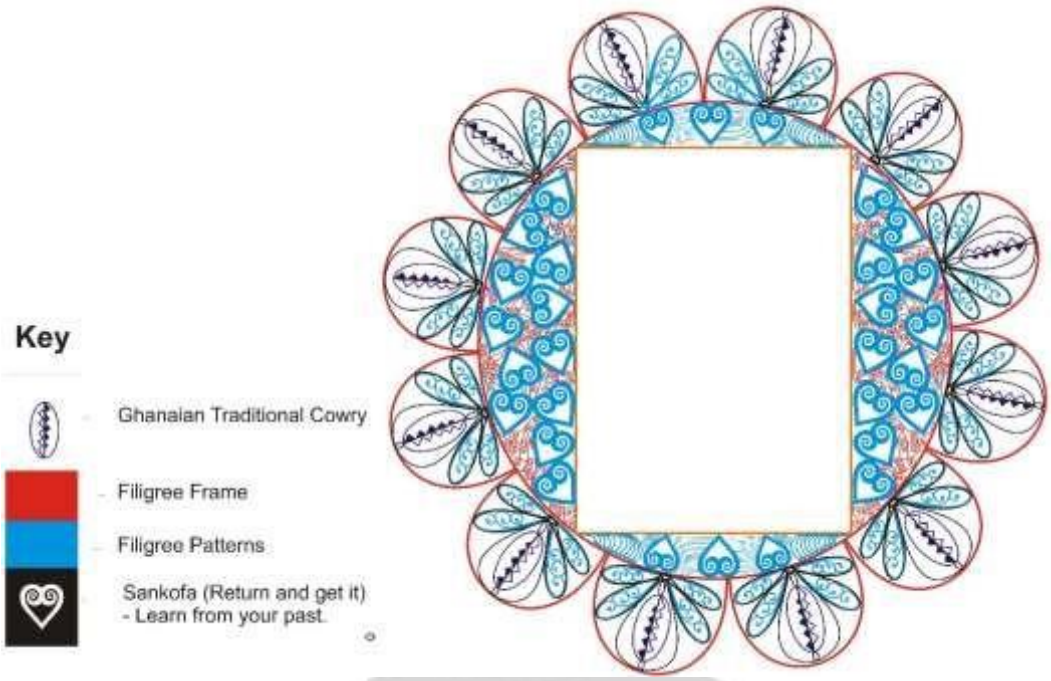


Figure 3.7: Approved design of sample three in CorelDraw representing Sankofa filigree in a petal frame.

3.7 Production of Samples

The samples produced were made to serve as proof that filigree could be made with a Ghanaian identity. The chosen criteria for depicting a Ghanaian identity for the sample frames focused on the use of adinkra symbols, beads and cowries. The first sample employed the 'Ananse Ntentan' symbol for the outline of the frame as seen in Plate 3.28. The second sample was a simple rectangular frame representing filigree wires transformed into the 'Nkonsonkonson' and 'Dwennimen' symbols and integrated with beads as depicted in Plate 3.32. The third sample (Plate 3.39) was a flower concept designed with each petal carrying a cowry. The 'sankofa' symbol was used to fill the area around the frame rectangle.

3.7.1 Sample One

This frame was made employing the 'ananse ntentan' symbol as a frame. The researcher upon facing challenges translated the design into reality (Plate 3.29). Sample one was made free hand without following a guide.

3.7.1.1Procedure

Thick 16guage wires were twisted using the 2ply method. A lot of annealing needed to be done to gain even twisting along the wire. After the twisting was found to be tight enough, annealing was done and then wire flattened to the desire thickness. The wires were then manipulated with the help of pliers to bring them to the selected designed shape. Wire measuring 11inches was cut and with the help of a mallet and a mandrel was made into a perfect circle and soldered. The projected portions of the design were then soldered to the bigger circle of circumference measuring 14.5 inches. The smaller circle was inserted and supported with 2ply flattened wire to meet the inner parts of the outer circle. Prongs were added to serve as holding claws for the picture as shown in Plate 3.28. Due to serious challenges in reference to filling the filigree wires the prongs were removed. These challenges were mainly due to the fact that the surface for filling was not levelled on the table or platform but rather there was a gap created by the prong.

Plate 3.28: The Ananse Ntentan frame

After the prongs were removed by applying heat unto its joints, filigree wires were inserted into the frame with ease. The 16gauge thicker flattened wires were inserted first and soldered before inserting the smaller 2ply flattened 23gauge wires for soldering also.

Plate 3.29: Complete soldering of the Ananse Ntentan frame with infill wires

After the soldering process it was found that some of the solder had leaked out of the previous soldered areas. The researcher had to block soldered joints with clay and then re-solder.

Plate 3.30: A and B Gap created on outer frame after soldering the inner wires.

3.7.2 Sample two

The shape employed for the frame was a rectangle. Here more emphasis was centred on the filigree translated adinkra symbols: 'Nkonsonkonson' and 'Dwennimen' with the beads for aesthetics (Plate 3.32). The design was verbally communicated and translated to CorelDraw.

3.7.2.1 Procedure

16gauge wires were twisted (2ply) and measured out to get 2 rectangles of varying sizes. The outer rectangle 3measured 7 by 9inches while the inner measured 5 by 7inches. The rectangles were later joined at the corners by the employment of a 2ply 16gauge flatten wire bar measuring 1.4inches. This bar was placed to slant diagonally hence touching the outer corner of the 5/7 rectangle and the inner corner of the 7/9 rectangle. Rectangular slots were placed in certain parts of the frame to make room for the complementary material.

Plate 3.31: Soldering filigree square frame

18guage flattened wires were used to create curves to depict the 'Dwennimmen' adinkra symbol and the 'Nkonsonkonson' adinkra symbols. These filigree curves were inserted into the frame to fit tightly and the soldered. Due to the soft malleable nature of copper the researcher was faced with serious challenges of deformation. The soldering board that was employed for the sample one was too small so an improvised surface was used. Since the surface was not flat the filigree wires easily fell out at some sections.

Plate 3.32: Filigree work with beads

After soldering, the sample two was found to be very much distorted. Hence a lot of attention was given to reforming the filigree curves and flattening the sample to bring it to shape. The round nose pliers, flat pliers and a rubber mallet were used. The wires that were inserted in the complementary box section gave way while the beads were being placed. Hence they were removed and replaced.

Plate 3.33: Resisting soldered joints with clay slip.

Due to some soldering challenges and broken wires there was the need for the use of clay slip as a resistant on the soldered joint to make work ready for re-soldering. After the second soldering phase the work was flattened again and the filigree curved wires were corrected.

Plate 3.34: Results gained after re-soldering and correction of deformation.

3.7.3 Sample three

With sample three, the designed work in CorelDraw was printed out and used for every detail. This is depicted in Plate 3.35 and Plate 3.36. The measurements and patterns were strictly followed. Due to the issue of inexperience and design complexity, there was the need to solder some parts of the work directly on printed sheets. The finished product however became more like a direct copy of the design. A flower concept was picked for use, its complementary material was the cowry and the 'sankofa' symbol was used.

3.7.3.1 Procedure

For this procedure an attempt was made to gain the exact copy of the idea translated into CorelDraw. After designing the Frame C it was printed out. With the help of the flexible wires and a piece of thread, the lines were measured and used for cutting out

the wire. The various parts of the units were formed and assembled together on the sheet of paper before soldering. Due to the perishable nature of paper many printouts were needed to keep repeating the process.

Twisted 2ply 16guage wire was flattened and used to create the boarders of the frame. The circumference of the circle was measured and cut out. The wire was then placed unto the printed sheet and moulded along the circular line then soldered. To gain the petal like designs, the measurements were traced and cut out. With the help of a bangle mandrel the curves were gained and soldered to the circle. A rectangle measuring 4.25 by 6.50 was formed and inserted into the circle. Equal sized wires were melted to form metal balls which were soldered at the midpoint of every petal. The 16gauge wire was flattened to create the designs inside the petal shapes.

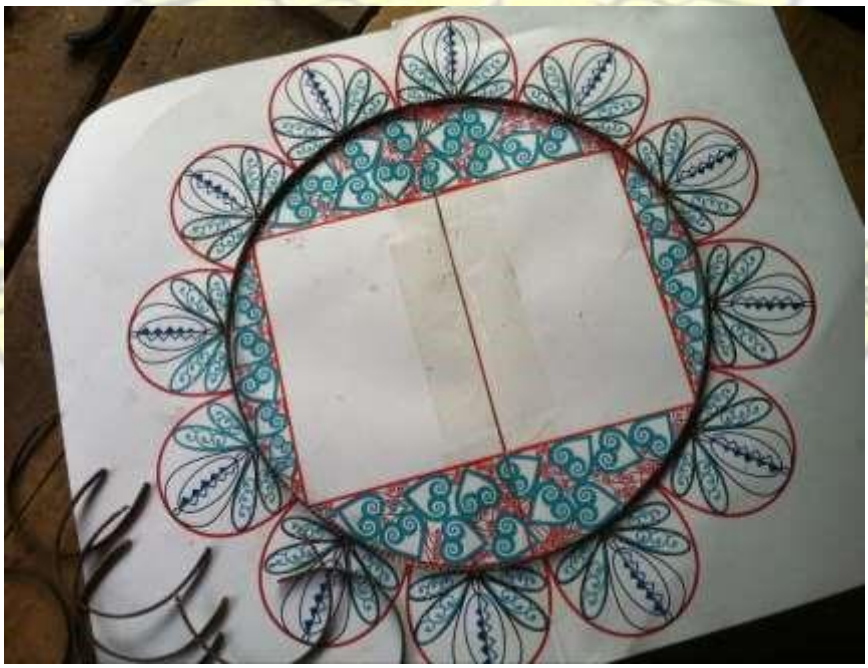


Plate 3.35: Formed circle and petals ready for soldering.

Plate 3.36: Placement and marking of petal shapes to the circle for soldering.

Plate 3.37: Refractory material (clay) placed at the petal joints to resist joint before the soldering of the rectangle.

Plate 3.38 A and B: Melting of copper balls to be soldered in the midpoint of the petal.

Plate 3.39: Soldered 16guage flattened wire design in the petal shape

18gauge flattened wires were employed for depicting the 'sankofa' symbol. The researcher had to form the symbols with the aid of a round nose plier as seen Plate 3.40. The cut out wires for creating the symbols where measured equally and the centre marked so that as much as possible the symbols could all have equal sizes. The size of the symbols however were rechecked by placing them unto the printout. After the symbols were completed, 23guage 2ply flattened wires were cut and

manipulated to create the infill designs. Medium solder was filled using a rough file to gain soldering filings for soldering the thinner wires.

Plate 3.40: Forming the ‘sankofa’ symbol with the round nose plier

Plate 3.41: Soldering of the ‘sankofa’ symbols on the printed sheet after resisting all the soldered joints

Plate 3.42: Filigree scrolls for petal infill ready for soldering

Plate 3.43: Sprinkling solder filings unto thin wires for soldering.

Plate 3.44: Arrangement and filling of thin wires around the ‘sankofa’ symbols for final soldering.

3.8 Procedure for final project work.

Based on various levels of experience gained from sample works and challenges faced during their production, the final project was designed with a lot of divisions and complexity. The Independent Arch of Ghana was preferred to the Ghana coat of arms and the KNUST logo after the sketches were made and submitted.

3.8.1 Sketches made for project consideration.

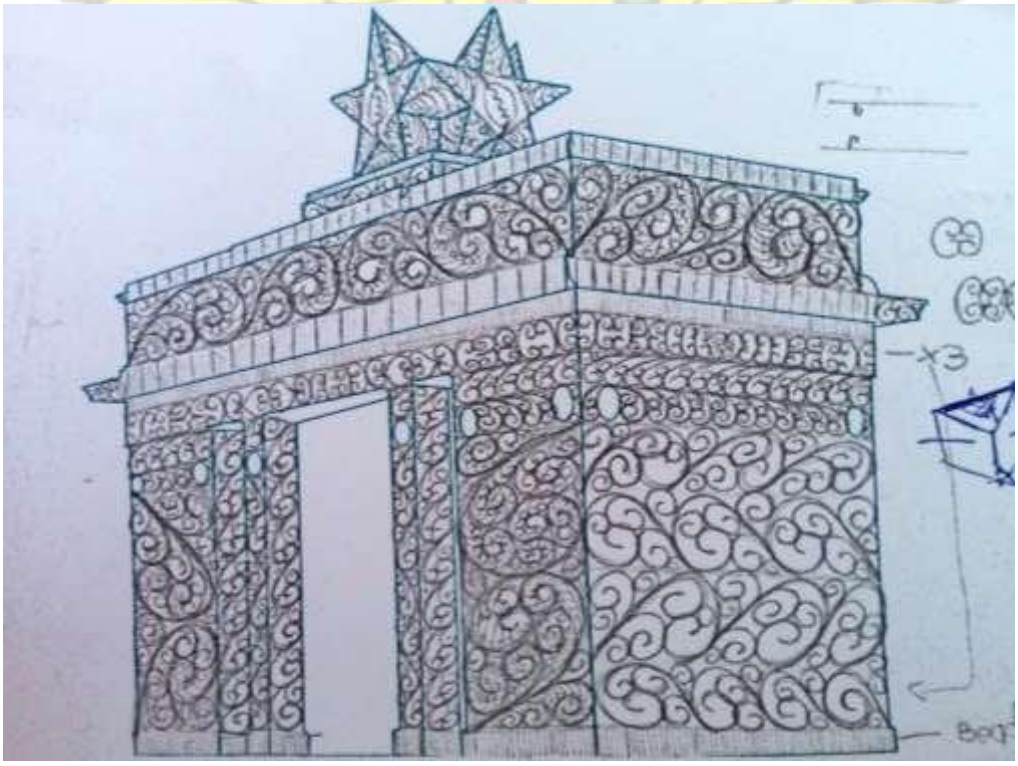


Figure 3.8: Sketch made for independence arch.

Figure 3.9: Sketch made for Ghana Coat of Arms

Other related sketches made can be found in appendix.

3.8.2 Corel draw representation of approved sketch.

Figure 3.10: CorelDraw version of work used as working guide.

3.8.3 Appropriation of wires and their respective gauges and forms

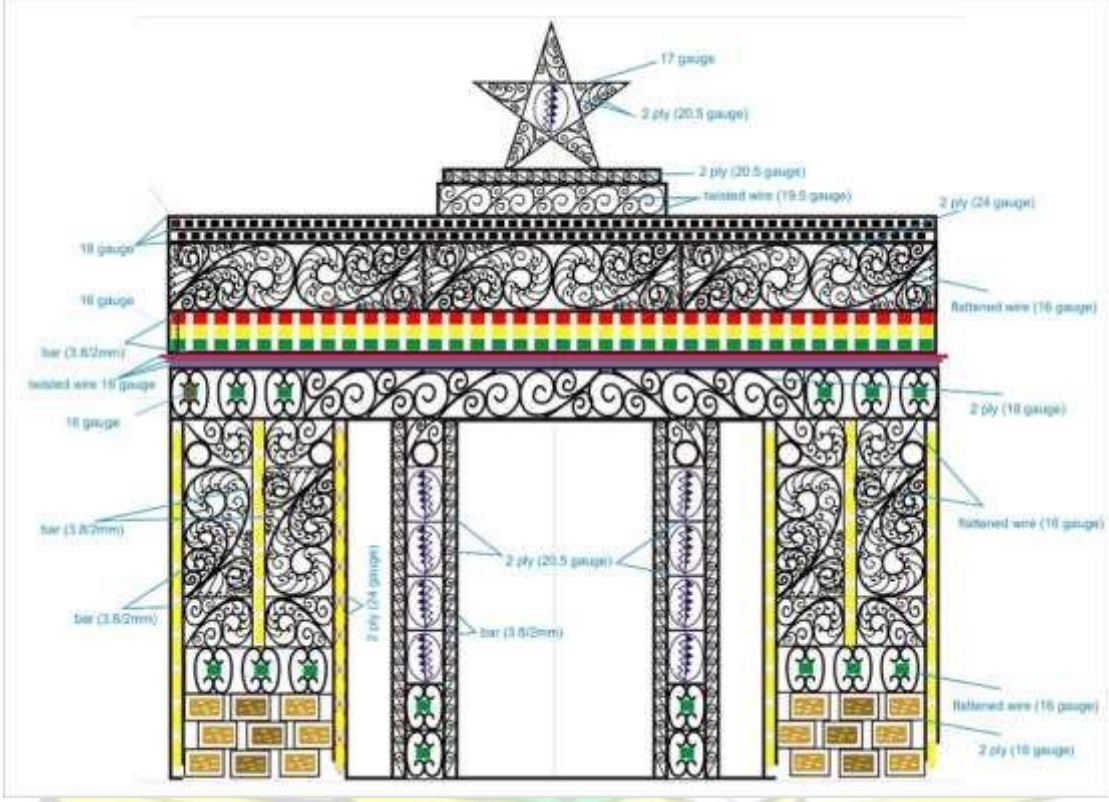


Figure 3.11: CorelDraw version of wire appropriation.

3.8.4 Adinkra concept development for design.

Figure 3.12: Sankofa bird as derived motivation for filigree curved wire.

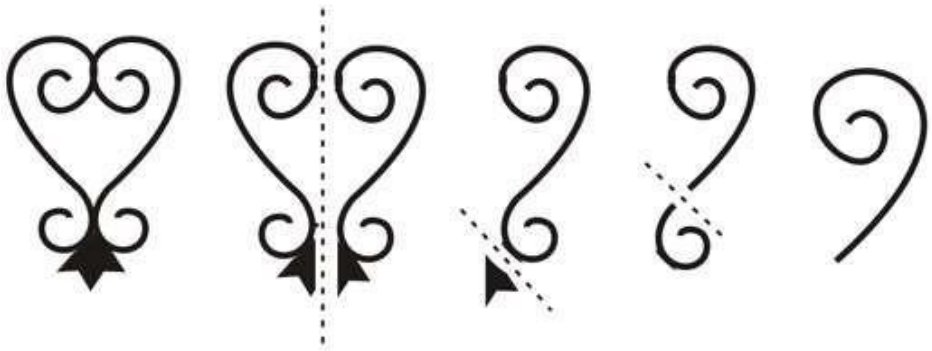


Figure 3.13: Motivation for filigree swirl development.

3.8.5 CorelDraw representation of approved framing

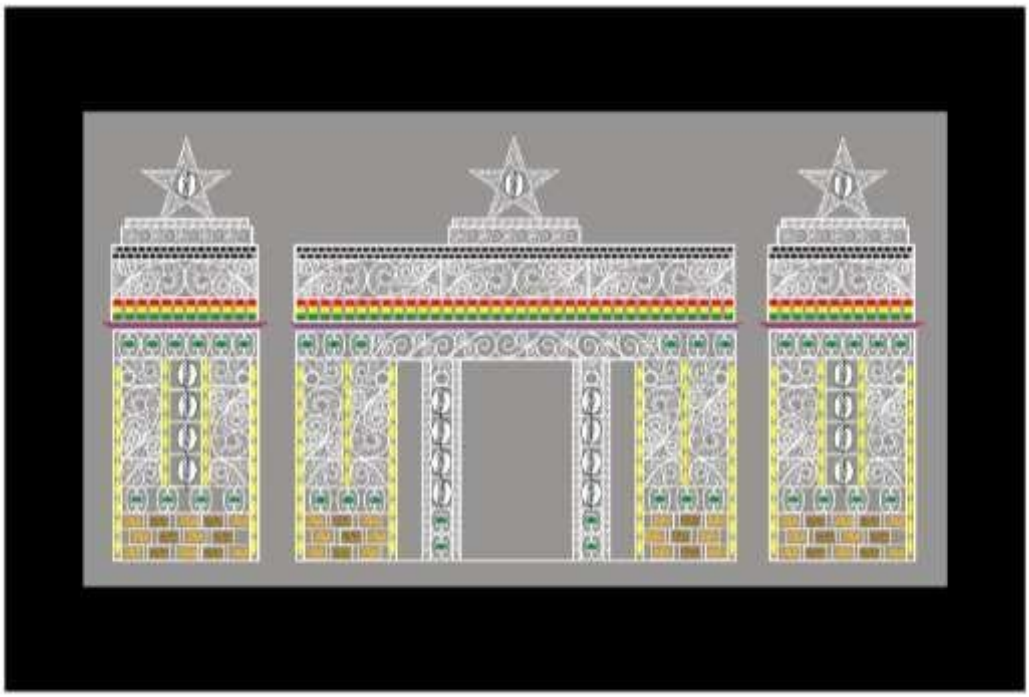


Figure 3.14: Approved frame and work spacing placement into frame

3.8.6 Procedure

Copper wires were melted for the production of the work's frame but during milling, it was found that the copper was breaking even after annealing it several times. The conclusions drawn from this phenomenon suggested that the copper wires produced for use on the market are not exactly pure copper they have definitely been alloyed and manipulated purposely for gaining thin flexible wires. Due to this complication, copper scraps were sought for and used. The services of a jewellery shop was needed to make the copper smelting and casting ordeal successful. After casting the copper in the ingots, cast bars were turned in a milling machine and then flattened to gain a 3.8mm by 2mm thick rectangular bars. This process was repeated consistently until all the bars were gained for the frame. A range of 16, 18, 19.5, 20.5, 24 gauged wires were employed for use in various parts of the work. These respective wires were

twisted (2ply) and flattened for use in various sections of the project work. This could be seen in Plate 3.46. 16 gauge wire was flattened for the major curved lines (Sankofa lines) of the design and for forming the adinkra symbol (Nkonsonkonson). The 16 gauge wires were used as supporting wires for the bigger bead slots while the 18 gauge wires were cut for the smaller beads. Figure 3.11 shows an exact depiction of wires used for the project and the various sections of allocation.

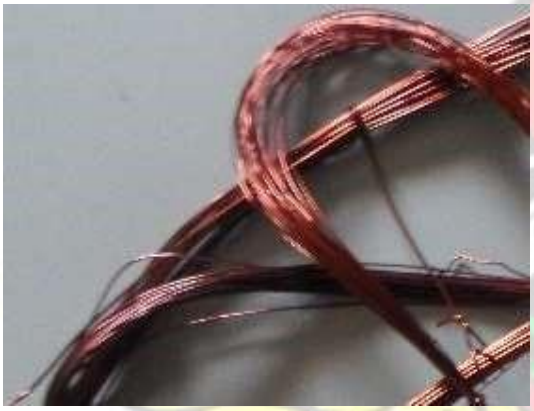


Plate 3.45: Varring wire sizes

Plate 3.46: 2ply wires to be flattened

Plate 3.47 A and B: Annealing stages inbetween the milling stages

Plate 3.48: Milling of the copper rod

The 3.8 by 2mm bars were measured according to the printout measurements for building up the outer frame and soldered (Plate 3.49 A&B and Plate 3.50 A&B). A file was used to file the cut out edges to ensure that they were levelled enough for the soldering joint. As can be seen in Plate 3.49A file was used to mark out exact spots to be soldered.

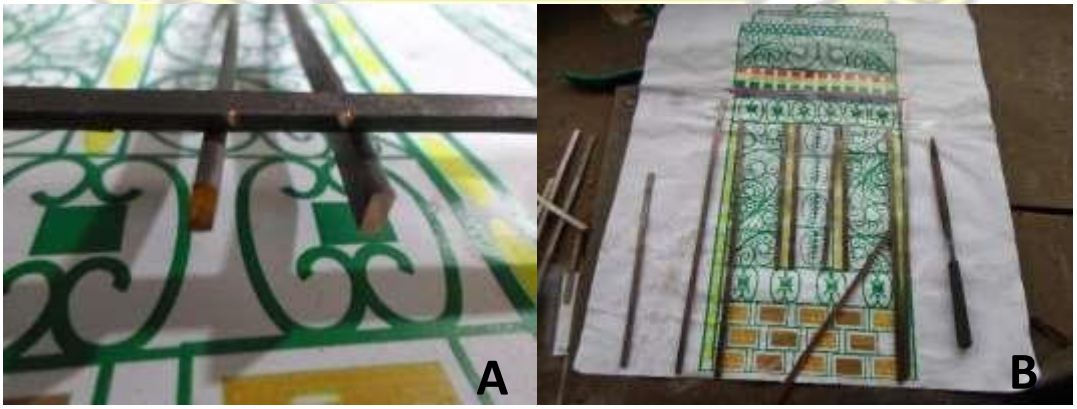


Plate 3.49 A and B: Marking and cutting of rectangular rods for building the frame

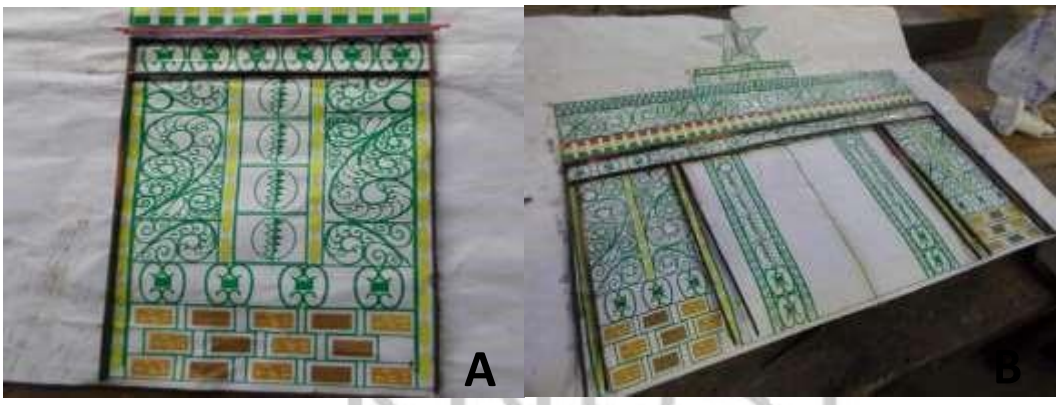


Plate 3.50 A and B: Crosschecking assembled cut out wires that have been soldered

The filigree wires that were used for the infills were prepared beforehand for use. With the help of a cut out template, the various wires with the exception of the 20.5 and 24gauged wires were manipulated. After annealing the wires, they were cut out in equal lengths and wound around the Sankofa template to gain very similar pieces of each required filigree scroll. These scrolls were labelled and packaged neatly for use when the need arose.

Plate 3.51: Sankofa templates used for coiling the wires

Plate 3.52: Employed wire coiling process

Plate 3.53: Labelled and packaged coiled wires

After the filigree scrolls and been made ready, the other units of the design being the symbols and the bead units were also made ready. 16gauge 2ply flattened wire was used to build rectangles with 16 gauge wires soldered in between on one side. The 'nkonsonkonson' symbol was also made by manipulating 16guage flattened wire around a template and pairing them as seen in Plates 3.54-3.56. The pairs were

soldered together and a cut piece of 16guage wire was placed in the middle part of the upper joint.

Plate 3.54: Manipulating the symbols

Plate 3.55: Pairing and soldering

Plate 3.56: Bead slot ready for soldering

Plate 3.57: Forming the bead frame

Plate 3.58: Soldering the bead frame

Plate 3.59: Soldering the bead slot

Building the frame

The building of the frame came with a lot of complications. Considering the chosen size of the frame a lot of adjustments needed to be done to gain a suitable soldering surface. The frames were made in sections for later joining. This is shown in Plates 3.60-3.76. After the frame was built, the many other units were inserted into the frame.

Plate 3.60: Building the top of the frame

Plate 3.61: Soldering bead slots

Plate 3.62: Building the body of the frame

Plate 3.63: Buiilding the star

Plate 3.64: Resoldering broken beadslots

Plate 3.65: Completed beadslots frame top

Filling the units and wires into the frame

The various filigree units that were made along with the wires were gradually inserted into the frame. During this process, the other sections of the work were built to create of smaller frames inside the major frame work. During the construction of the body, already soldered parts needed to be resisted with clay to prevent solder from running out from those joints. The nature of copper being that it easily expands thereby leaving the work deformed was a big challenge to comprehend with. Re-soldering therefore was done for areas that were affected by expansion which caused some joints to break open. In some extreem causes, bricks were used to support areas that were likely to deform.

The thiner wires were soldered with filed solder filings mixed with borax(flux). The mixer was springled over the area to be soldered after borax solution had been poured over the area to allow for easy flow of the solder.

Plate 3.66: Soldered bead brick slots

Plate 3.67: Inserting inner frame divisions

Plate 3.68: Inserted sankofa filigree

Plate 3.69: Inseting Nkonsonkonson symbols

Plate 3.70: Soldering sankofa filigree

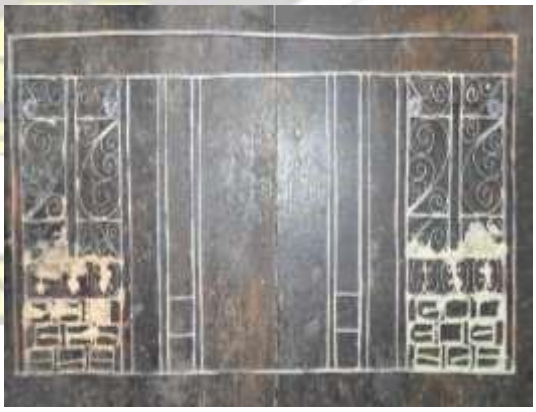


Plate 3.71: Frame of main lower body

Plate 3.72: Filling filigree scrolls

Plate 3:73: Soldering filigree

Plate 3.74 A and B: Forming and fixing of filigree infills before soldering

Plate 3.75: Sprinkled solder over work

Plate 3.76: Soldering infill wires

Forming the filigree letters unto the filigree plate

19.5 gauge wires were twisted to gain 4ply wire and then slightly flattened. The wire was manupulated by cutting into measured length according to the print out and

Plate 3.77: Forming the letters

Plate 3.78: Soldered letters

Plate 3.79: Soldering the letters onto the filigree plate.

Plate 3.80: Scraping resist from plate

Plate 3.81: Soldering prongs to plate

Plate 3.82 A and B: Brushing and cleaning clay from work

Plate 3.83: Constructed bath for pickling

Plate 3.84: Pickling the work

Plate 3.85 A and B: Placing coal into furnace to maintain fire intensity for boiling (hardening) work.

Plate 3.86: Brushing work after hardening in boiling alum water.

Linking the beads with filigree wire

The 24 guage 2ply wires were used to link the beads together by inlocking the wire through the bead hole. This pattern was followed until the desired length was achieved according to Plates 3.87-3.92. The motive of this linkage was to get the bead circumference to sit on each other vertically. When the desired length had been gained, the wires were twisted at the sides, cut and pushed into the hole with a flat plier. The plates before relay clearer understanding. The beads were then placed into the work mounting them on hooks employed for their integration (Plate 3.97). The cylinderically shaped beads were selected with a particular measurement to ensure that the beads were not too short or too long for filling the slots created for them (Plate 3.93-3.97).

Plate 3.87: Passing wires through the bead

Plate 3.88: Vertical formation of beads

Plate 3.89: Rough ends of strings

Plate 3.90: Finishing the vertical bead filigree wire at the side of the beads

Plate 3.91: Cut wire pressed to fill bead hole with gap left on top of the integration.

Plate 3.92: Finished vertical string beads ready to be integrated. bead for

Plate 3.93: Inserting beads into the frame

Plate 3.94: Completed bead fixing

Plate 3.95: Measuring bead sizes

Plate 3.96: Inserting beads into top slots

A 16guage flattened wire hook was used to clamp wires together to secure them and keep them in shape. Cowries were interted into the work and sent for plaiting.

Plate 3.97: Small bead slots positioned by means of a hook.

Plate 3.98: After cowries were inserted into the work, work was ready for plaiting.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Overview

This chapter tackled ways and means adapted by the researcher in fulfilling the research questions.

1. What Ghanaian cultural concepts can be introduced into Filigree made in Ghana?
2. What materials popularly associated with the Ghanaian culture are also applicable to filigree work?
3. How can these materials and concepts be integrated into the Ghanaian concept of filigree?

4.2 Popular Ghanaian cultural materials applicable in filigree

This is the answer to objective two and three which are answers to the research question: "What materials popularly associated with the Ghanaian culture are applicable in filigree work?" The Ghanaian in fact has a graciously rich and endowed culture that is symbolised by materials, virtue, values and beliefs. The research question seeks to find materials associated with the Ghanaian culture that can be applicable in filigree work. The materials chosen by the researcher for the study were cowries and locally made beads. The addition of these materials by means of integration into filigree immediately brings filigree home to the Ghanaian. The cowry was chosen because of its great historical account that links with the influence of the name given to the Ghanaian currency in the local dialect (Twi). Beads on the other hand came in as the most popular material suggested by the population sampled.

Hence locally made beads were employed for use.

4.2.1 Bead application in filigree

Wires where used as the agent of integration. The advantage of using the beads and integrating them by means of wire was made easy due to the fact that beads already come with a hole in them. The holes therefore was popularly employed as a means of linking or integration. Despite the fact that various style of bead application was found the main principle of passing the wire through the bead run through all the methods. The beads were placed in sections of the work that draws attention to the bead hence projecting the culture of Ghana by the use and identification of the Ghanaian bead. Plate 3.93, 3.96 and 3.97 reveal the means by which the beads were applied for use in filigree. Hooks were also employed for integrating the vertically linked beads. The Glass Beads were found to melt during soldering hence they were inserted in the design after soldering before pickling since they were resistant to the pickling.

4.2.2 Cowry application in filigree

Wires had to be manipulated around the cowries to grip and translate them into the design. The back of the cowries were broken to flatten it and also make room for easy integration. The natural colour of the cowries easily draws the attention of the viewer towards it. This feature also served as a means to easily appreciate the filigree art work surrounding it. Claws were improvised in the cowry application. All the methods that were chosen to make the cowry applicable sought to place emphasis on the cowry yet not mar the features of filigree. As much as possible the cowry was left as natural as possible and not distorted especially at the face. During the research however it was noticed that cowry shells can only be applicable in filigree production when it was placed unto the work after soldering and picking is done. This is

primarily due to the fact that cowries, being a natural and perishable materials cannot withstand fire and pickling solution. Out of the many integrative styles that were developed for cowry integration, Plate 3.27 was employed for the project work.

4.3 Ghanaian cultural look lacking in Filigree made in Ghana

This is the result of objective one which is the answer to the research question: "What Ghanaian cultural concepts can be introduced into Filigree made in Ghana?" The researcher identified three elements that are lacking. These are: the rich symbolisms in Ghana such as adinkra symbols and elements such as typical Ghana cowries and bead which can be integrated with filigree wires. The results therefore encompasses creative wire elements in some of the Ghanaian adinkra symbols and integrated elements of the wire and beads, notwithstanding the wire and cowries. The results are as follows:

4.3.1 Wire elements in the sampled adinkra symbols

Filigree is a metal art work that allows for many adjustments. The only strong rules in filigree creations are that the design must be built from wires and should be soldered. Many cultures have taken the lead in adopting the filigree art. To answer the research question above the researcher sought to add a Ghanaian known concept in the production of filigree. Some filigree wires were coiled depicting the most popular Ghanaian symbols (adinkra). Hence when one comes in contact with the work on identifying the symbols can directly link the work to Ghana. Most of the symbols that were chosen fell within the adinkra range that allowed for easy wire manipulation. Primarily due to the fact that adinkra symbols have already gained popular international standing the use of adinkra symbols serves as a plus to highlight the new trend. From the researchers point of view giving filigree a Ghanaian look

would enhance the purchasing rate of filigree in Ghana and on the international market.

The following are practical examples made to depict adinkra symbols by the use of wires with a filigree twist.

Plate 4.1: Wires were used to form the 'Nkonsonkonson' Ghanaian symbol and a bead inserted in the middle

Plate 4.2: Flattened wires used to form 'sankofa' filigree as main filigree scrolls for the design

4.3.2 Bead and wire integrated Ghanaian elements

While still observing the basic rules in filigree, the use of beads were introduced into the filigree art works. Beads have been introduced as a substitute for gems, precious stones and pearls which have the foreign look. Beads are popular in many parts of the country, Ghana. The different types of beads found across board have been integrated into the filigree art to bring the Ghanaian cultural look into the filigree work of art. The beads were placed at specific areas of interest that project it.

The following are examples of beads with wire integration that were employed to give filigree a Ghanaian cultural look. This confirms the research question "How can these materials and concepts be integrated into the Ghanaian concept of filigree?"

Plate 4.3: Soldered wires to bar as mean of integrating black tiny beads

Plate 4.4: Soldered wire to bar as means of carrying the three coloured beads

Plate 4.5: vertically strung beads hooked to marked boarders of the design.

Plate 4.6: Beads placed at bottom part of the work to create a brick build up

4.3.3 Cowries and wire integrate elements

The fundamental role of cowries in the history and culture of Ghana makes the cowry a very valuable Ghanaian assert. Cowries naturally come without holes and have a

peculiar shape. The wire integrate elements were done with the aim of maintaining .and keeping a Ghanaian touch. As much as possible foreign designs around the cowries were avoided yet the basic filigree rules were fervently adhered to. The looks of the cowries have been emphasised to expose them hence highlighting the Ghanaian cultural look. In fulfilling the research question "How can these materials and concepts be integrated into the Ghanaian concept of filigree?" cowries were used in parts of the work that holds them in central position this was a means of projecting also the spiritual connotation that the Ghanaian associates with them.

The following are examples of cowries with wire integration that were employed to give filigree a Ghanaian cultural look.

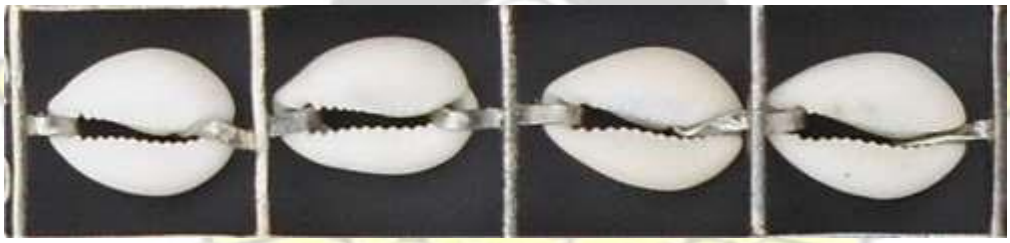


Plate 4.7: Placement of cowries in prongs made for pillars

Plate 3.8: Cowry placed in the centre of the star by means of prongs

The final representation of the 'Complementary approach to filigree made in

Ghana'

Plate 3.9: A representation of the Independence Arch of Ghana done in Filigree with complementary Ghanaian approach.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.1 Overview

This final chapter deals with the summary of the findings in the project work, conclusions based in findings and challenges the researcher faced during the project, and recommendations based on the results and for further study.

5.2 Summary of findings

The study acknowledges seventeen fundamental findings as follows:

Various wire sizes exists from 16 gauge downwards. It was however impossible to obtain wires bigger than the 16gauge wire hence thicker copper bars were milled.

Results from the test showed that, after the copper wires had been melted and cast for milling, it lost its malleability (Plate A8.5). This suggests that the copper wires available on the market may not be purely copper.

Soldering the thick copper bars of the final work with the hard solder was an issue to recon with. Despite the use of clay on already soldered joints, there was solder leaking out of the joint hence re-soldering.

Due to the irregularity of the soldering board surface, as depicted in Plate A6.2 weight was placed on some parts of the work to create balance. This gave a better outcome of work after soldering.

Broad flow of fire from blow torch led to the melting of some filigree fills which were not meant to be in contact with fire. A more pointed torch would be more appropriate.

Clay crucibles are not appropriate for melting copper because of the high melting point of copper. At the melting stage of copper the clay crucible cracks or breaks causing smelting copper to seep into the furnaces.

Soldering should not be done on metal surfaces because the metal refracts the heats hence solder takes longer time to melt.

Application of clay slip as heat resistant should be lightly done. A thicker application tends to prevent the metal from heating up quickly to allow for soldering on the next joint. Thus causing metal distortion.

Cowries cannot be fixed as integrates in filigree work before pickling because cowries perish in acid. Cowry eats way when placed into acid (pickling solution) therefore pickling must be done before the cowry is integrated. Electroplating however does not affect the cowry shells it rather makes it look cleaner.

Ghanaian locally made glass beads should not be fixed in filigree work during soldering because it is vulnerable in fire in terms of melting and discolouring.

During soldering thicker filigree wires should be soldered first before thin wires. This is primarily due to the fact that thicker wires take longer time to solder than thinner wires.

Most Beads do not exactly have the same sizes, they may have the same structure running through but some maybe bent to one side or shorter than the others even though the colours used identify them as belonging to one group. It is therefore difficult to find exact size and shaped beads for a work on the local market. It is very easy however to gain the same colours of a particular bead but even with that the design on the bead would not be exact since it's made freehand.

Appendix 6.4 reveals since metal expands, deformation of design is bound to occur with copper.

While soldering the frame it was found vital to hold bars in place to prevent wires from falling apart or shifting from the marked joints (Plate A6.5).

After plating metal, metal becomes very brittle hence plating material breaks away when metal part is bent. It is therefore expedient to place the complementary material into the filigree work before plaiting (after pickling).

When integrating the beads and cowries it was relevant to find an average size range of the complementary material as measurement for integration space, since there was the high possibility of not getting exact measurements for the complementary material.

Metal sculpture and monument can be made in filigree since its lighter in weight hence saves a block of metal.

5.3 Conclusion

There is enough symbolisms, monuments and materials Ghanaian filigree makers can depend on for the Ghanaian concept of filigree.

The refractory properties of cowry and glass beads are not enough for the soldering process of filigree. Therefore the cold mechanism of integrations are the most ideal methods for integrating bead and cowry into a finished work.

The making and finishing of filigree with glass bead and cowries must be procedural to avoid the adverse effects of fire and acids.

From interviews and data collected, it was observed that the introduction of local beads and other Ghanaian materials is a new twist in filigree making. This new twist was considered to convey a psychological supremacy of identity and belonging to the filigree art and its user as well.

Most metalsmiths have lost importance in filigree production since it is time consuming and patronage is low due to high cost. The research however being a new creation that adopted Ghanaian complementary materials was done to meet the objectives and address the research questions for the study. The study proves that

further integration in filigree with Ghanaian complementary materials is very possible. Since these integrations would further highlight culture and place more value on the filigree art work. The practical works done prove that the designs employed in filigree allow for diverse integration techniques and styles.

The need for professional skills, techniques and approach to filigree was an issue to reckon with. The researcher faced difficulty executing certain processes easily. The tools and equipment provided by the department were woefully inadequate. In place of an asbestos board usually used by jewellers for soldering a 1cm thick steel plate was provided for use. At the end of the study the research objectives and questions were addressed.

The results and outcomes were translated into the thesis. The researcher found six bead integrative methods applicable in filigree production and four cowry methods. The cowry integrative methods can be viewed in the following Plates; 3.15&16, 3.18&19, 3. 21&22 and 3.27. Bead integration also includes images in Plates; 3.6, 3.7, 3.10, 3.12 and 3.14.

5.4 Recommendations

Concepts of Ghanaian monuments, symbolisms and materials should be put together for production of filigree made in Ghana.

Further research should be done on more integration techniques with other materials.

Filigree with a complementary Ghanaian approach can be designed for the Ghanaian textile industry, for bill board background, for designing paper wrappers and in other media to promote the cause for this study.

Basic filigree work should be encouraged to enrich art creativity on the part of students in the department of integrated rural arts.

Intensified education on the complementary materials relevant in metal work should be considered for study at both the masters and the undergraduate levels.

Due to the conflicting nature of works done by the undergraduate and the MPhil student, the department must carefully consider getting a well-equipped shed exclusively for the MPhil students' use. A silent room (library) should be made available to only MPhil students to enhance proper concentration and work efficiency during research. The department of integrated rural art and industry must take keen interest in the students organised to pursue MPhil in the department. Days allocated for studies being Fridays and Saturdays for the first year must be strictly adhered to for effective learning since the time frame is relatively short.

Filigree work must always be soldered on a broad flat surface, relatively bigger than the work to be soldered. An appropriate soldering touch such be provided by the department for the purpose of effective easy soldering.

The final work should be donated to a visiting center in Ghana such as the flag staff house and the Ghana National Museum to allow for public viewing. This would throw more light on the possibility of a Ghanaian approach to filigree.

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APPENDICES

APPENDIX ONE

Preliminary sketches on the concept of filigree

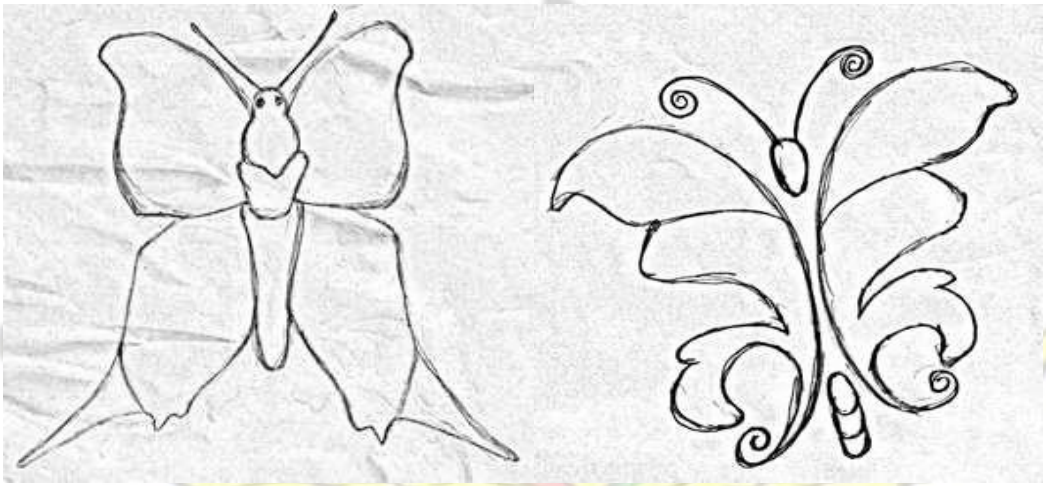

Figure A1.1: Filigree butterfly outline sketches

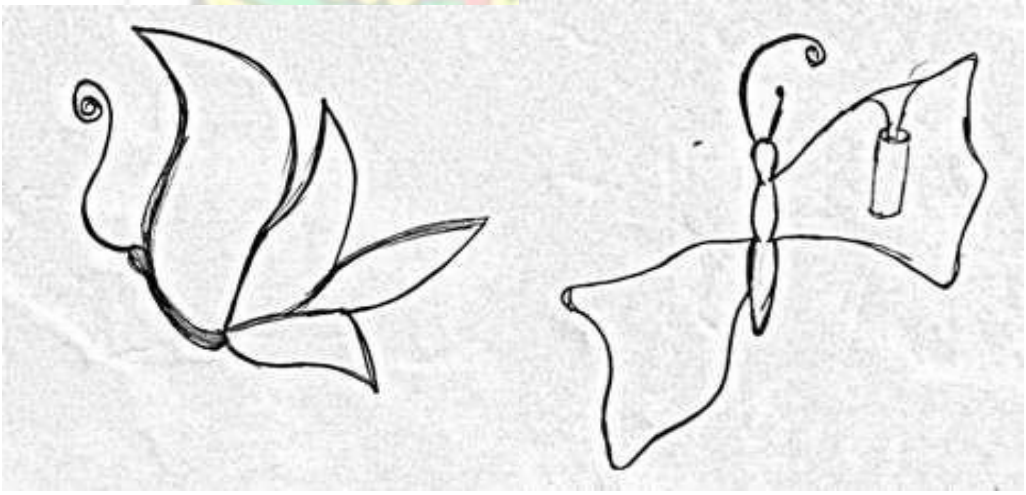

Figure A1.2: Filigree butterfly outline sketches

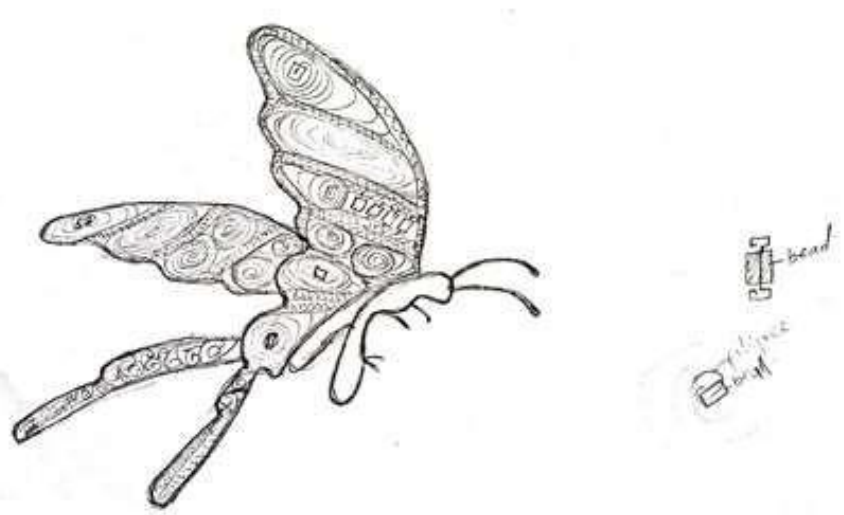

Figure A1.3: Sketches of Filigree butterfly with cowry and bead integration

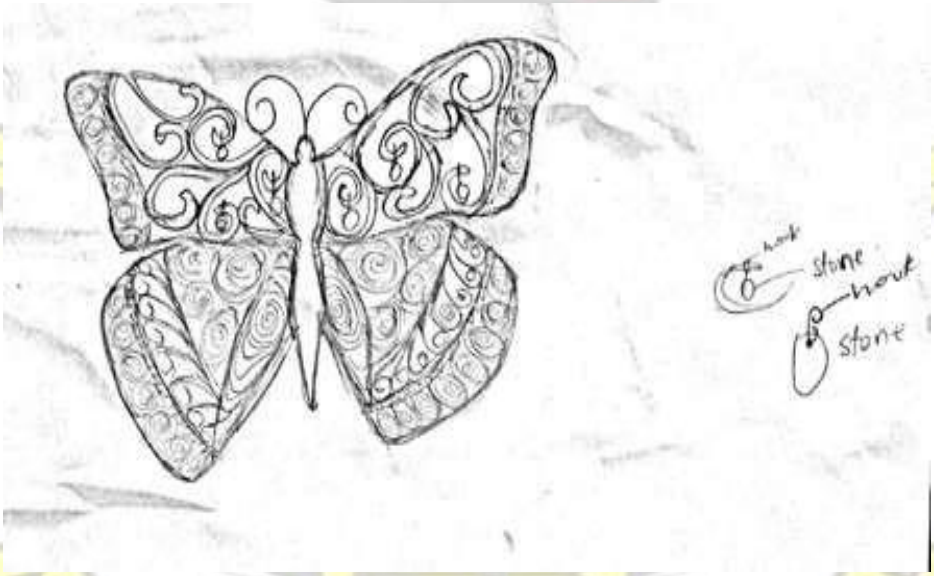

Figure A1.4: Sketch of filigree butterfly with stone integration

Figure A1.5: Sketch of Filigree butterfly with cowry integration

APPENDIX TWO

Practical filigree butterfly assignment

Plate A2.1: Filigree butterfly assignment.

APPENDIX THREE

Sketches of complementary integrative methods

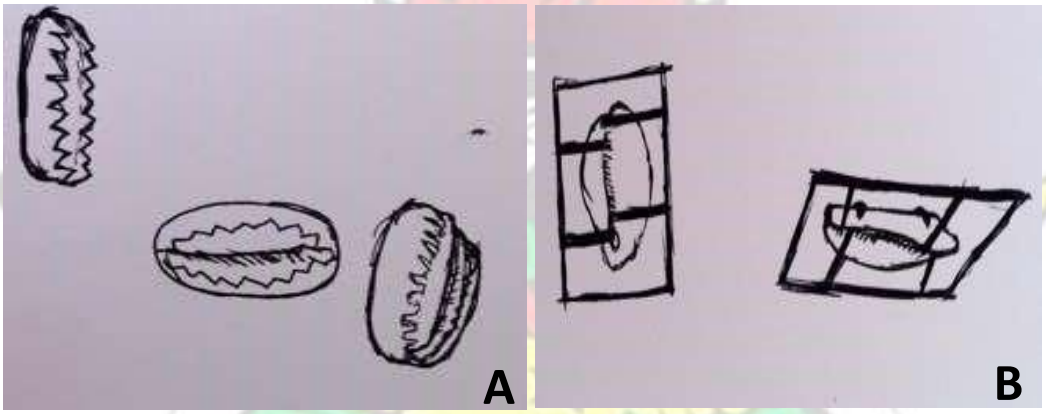

Figure A3.1 A and B: Sketches of suggested integrative methods for cowry integration.

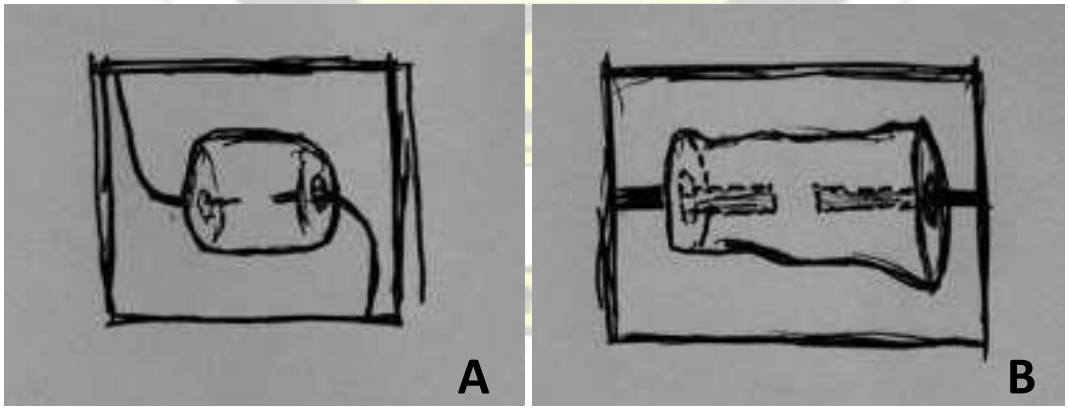

Figure A3.2 A and B: Sketches of suggested integrative methods for cowry integration.

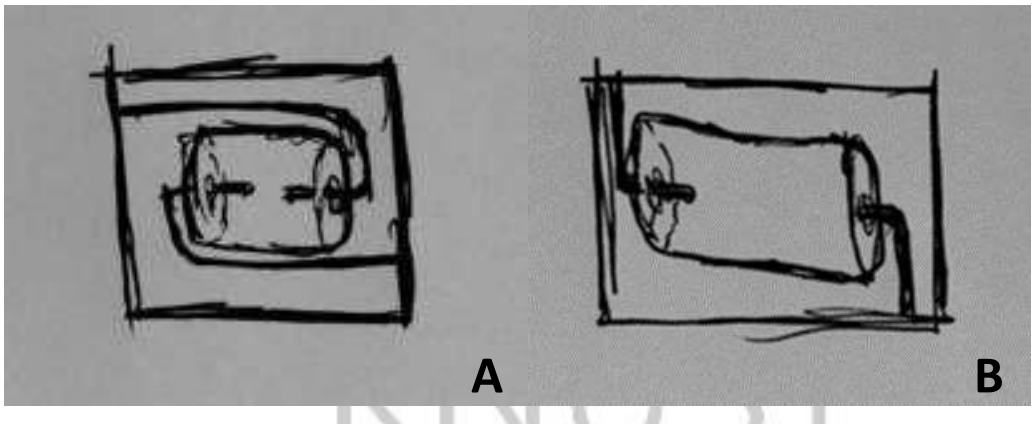

Figure A3.3 A and B: Sketches of suggested integrative methods for bead integration.

APPENDIX FOUR

Sketches made for project consideration.

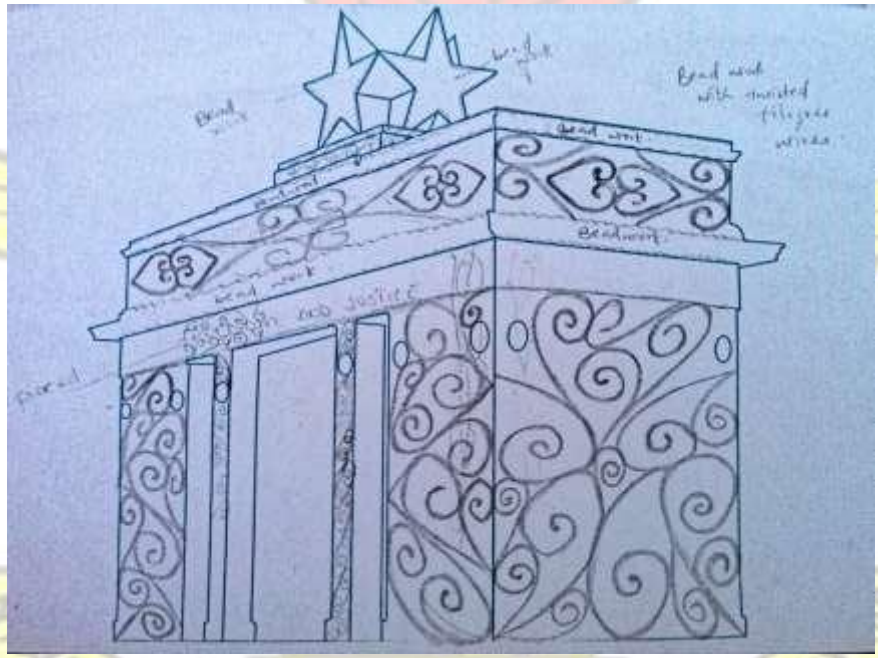

Figure A4.1: Suggested sketches for independence arc

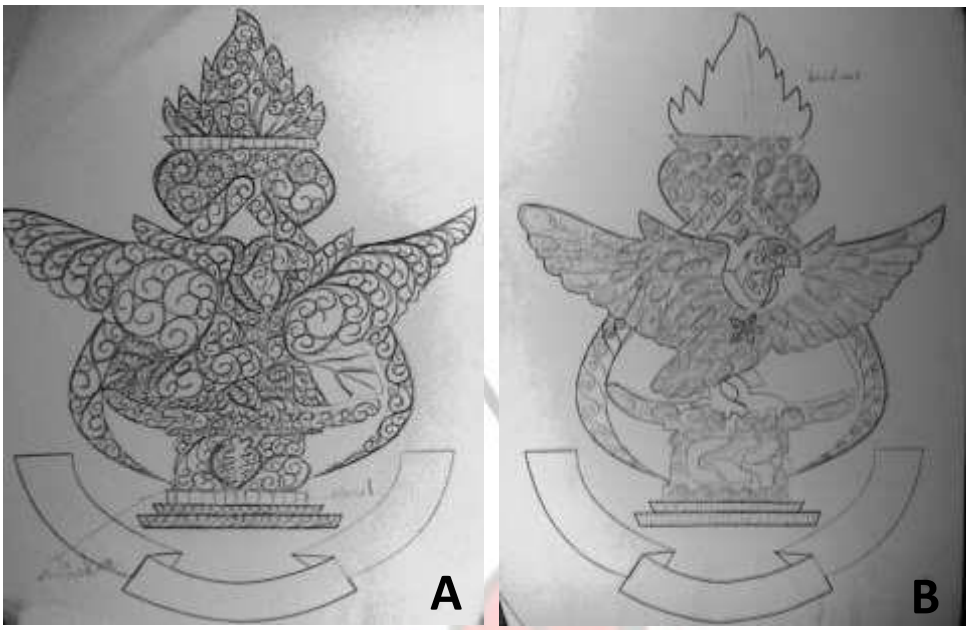

Figure A4.2 A and B: Suggested sketches for KNUST crest

APPENDIX FIVE

Thermal test for beads and cowry

Plate A5.1:Beads and cowry placed under fire Plate A5.2: Results after 3minutes.

Plate A5.3: Soldering wire while bead is coated with clay.

APPENDIX SIX

Working processes

Plate A6.1: Arrangement and leveling of bricks for use as soldering board.

Plate A6.2: Appling pressure on one side of the bar during soldering to hold it in position.

Plate A6.3: Gap created at the upper part of bead slot.

Plate A6.4: Deformation of wire close to soldering joint during soldering.

Plate A6.5: Holding bars in firm position while soldering.

APPENDIX SEVEN

Preliminary experiments on finishes

Plate A7.1: Sample in pickle solution

Plate A7.2: Sample in Caustic Solution

Plate A7.3: Results after removal

Plate A7.4: Sample being placed into caustic soda and sulfur solution.

Plate A7.5: Results after removal.


Plate A7.6: Cowry and bead sample into pickle. PlateA7.7: Cowry eating away


Plate A7.8: Bead sample after oxidation Plate A7.9: Cowry sample after oxidation

APPENDIX EIGHT

Copper smelting processes


Plate A8.1: Copper scraps Plate A8.2: Melting copper in a furnace

Plate A8.3: Results after 1hr 30mins

Plate A8.4: Cusible damage and leage

Plate A8.5: Breakages found during milling