

Mechanical Engineering in Ancient Egypt, Part XV: Faience Industry (Middle Kingdom to Third Intermediate Period)

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ABSTRACT: *This paper investigates the development of faience industry in the Middle Kingdom, New Kingdom and Third Intermediate Period of ancient Egypt. Samples of the faience vessels in those periods are presented and investigated looking for their characteristics. Shape, elements and decoration of each vessel are outlined. The design of the decoration scenes is investigated for type, decorated surface and decoration scenes. Also, the location of the vessels in the world museums is assigned (if known).*

Keywords – *Mechanical engineering history, ancient Egypt, faience industry, Middle Kingdom to New Third Intermediate Period.*

I. INTRODUCTION

The ancient Egyptians have known faience since more than 5000 years ago. They have known its formulation and processing techniques leading to wonderful shining products keeping their characteristics for thousands of years. The ancient faience products reflect the level and development of mechanical engineering in ancient Egypt. This is the fifteenth research paper in a series aiming at exploring the role of the ancient Egyptians in evolution of mechanical engineering during the history of the mankind.

Friedman (1998) outlined that about 200 Egyptian faience works are found in 30 public and private collections in US and Europe. He stated that they represent some of Egypt's finest small-scale masterpieces from Late Predynastic to Roman Periods [1]. Riccardelli, Mass and Thornton (2002) studied the Egyptian faience inlay techniques by characterizing the properties of standard reproductions. They made visual comparison between cross-sections of replicated inlays and example of broken ancient Egyptian faience inlays [2]. Hardwick et. Al. (2003) pointed out that in the earlier periods of the ancient Egyptian history

faience was mostly blue-green and black. In the beginning of the New Kingdom new colors were added including yellow, white and dark blue [3]. Griffiths (2006) investigated some of the faience vessel fragments discovered during the 2005 excavations at the College sites in Siden. He examined them by non-destructive variable pressure scanning electron microscopy and associated energy dispersive X-ray spectrometry. The purpose of his work was to improve understanding of the materials and techniques used to manufacture the faience vessels [4].

Rehren (2008) outlined that faience and glass were made in ancient Egypt using a relatively pure silica source and plant ash as flux. He showed that the application of different techniques to the same raw materials, particularly in faience production, resulted in systematic and significantly different products [5]. Nicholson (2009) described the Egyptian faience and its raw materials and how the ancient Egyptians referred to it depending on its reflective quality like the shiny surfaces of the semi-precious stones. He discussed the coloring and firing at temperature up to 1000 °C [6]. Quirke and Tajeddin (2010) discussed faience production in the 14th century BC at Egypt and its potential for reconsidering the specific trajectories of archetype to prototype and the distribution of the prototype [7]. Stevens (2013) investigated some of the artifacts found during the excavations at the south tombs cemetery. Those included a faience Bes pendant, faience bowl, faience fish pendant and faience finger-ring with papyrus design [8].

Lo (2014) defined the Egyptian faience as a red colored earthenware decorated with glaze containing tin oxides. She stated that the faience production in ancient Egypt spanned over 5000 years from the Predynastic to the Late Periods. She

presented some faience products used by ancient Egyptians such as decorated bowl, funerary figures (shaptis), scarab amulet, figurine of Pharaoh Amenhotep III and cup. She explained the glazing techniques used by the ancient Egyptians [9]. Sparavigna (2015) showed how faience was produced and discussed some methods used for its analysis. She presented faience bowls blue-glazed and decorated located in the Egyptian Museum of Turin and the Aegyptisches Museum und Papyrussammlung of Berlin and faience shaptis of Pharaoh Seti I of the 19th century located in the Egyptian Museum of Turin. She presented also faience scarab amulets and seals from the New Kingdom located in the Egyptian Museum of Turin [10].

II. MIDDLE KINGDOM

The Middle Kingdom covers the 11th and 12th dynasties during the time span from 2000 to 1700 BC [11]. Some of the faience vessels from the Middle Kingdom and their characteristics are presented below:

- Fig.1 shows a faience pot stand of a man named Hekeku from the 12th dynasty located in the Ashmolean Museum of UK [3]. The stand has a thick round rim, concave body and a flat flared base. The body is inscribed using a black color inside a uniform band exactly in the middle of the stand.



Fig.1 Faience pot stand from the 12th dynasty [3].

- Fig.2 shows a 35 mm height faience feeding bowl from the 12th / 13th dynasties of the Middle Kingdom and located in the Metropolitan Museum of Art of NY [1]. The bowl has a blue color and decorated by black inscriptions of various animals between wide bands on its body. It has a wide mouth, narrowing round rim, ovoid body, small spout with round feeding orifice and a round base.



Fig.2 Faience feeding bowl from the 12th/13th dynasties [1].

- Another faience model from the Middle Kingdom is a cosmetic pot with lid located in the Pen Museum of UK and shown in Fig.3 [12]. It has a blue color, disc-lid with light blue color, wide mouth, round rim, small neck, semi-conical body and a medium flat base. Both pot and lid are decorated by geometric shapes using black color. The neck has a yellow color.



Fig.3 Faience cosmetic pot from the Middle Kingdom [12].

- A faience plate manufactured during the Middle Kingdom and displayed in the Pen Museum is shown in Fig.4 [12]. It has a blue color and has perfect circular mouth and complex decorations in black representing plants and geometric shapes.



Fig.4 Faience plate from the Middle Kingdom [12].

- The last model from the Middle Kingdom is a faience bowl with black painted rim shown in Fig.5 [13]. It has a large mouth of maximum bowl diameter painted in black, flat rim, hemispherical body and point base. It is not clear if the bowl is supported by a stand or it has a perfect stability to stand over its point base as practiced before in a stone vessel from the second dynasty of ancient Egypt [14].



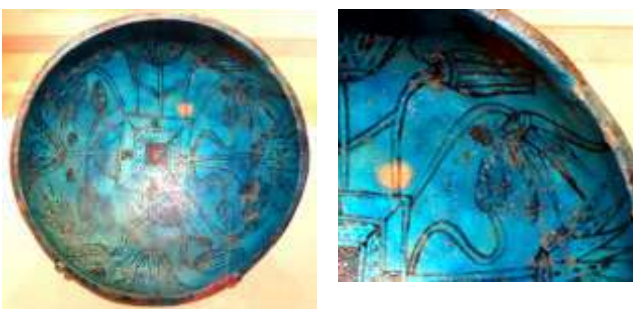
Fig.5 Faience bowl with painted rim [13].

III. NEW KINGDOM

The new kingdom includes the 18th to 20th dynasties covering a time span from 1570 to 1069 BC [38]. This one of the richest and strongest periods in the Egyptian old history. We have seen the great development of mechanical engineering during the New Kingdom, especially the 18th dynasty through studying the industries of furniture [16], pectorals jewellery [17], necklaces jewellery [18], bracelets jewellery [19], Royal Crowns and Headdresses [20], finger-rings [21], and pottery [22]. This means that the mechanical engineering has reached its peak development during the New Kingdom. The question now is: Does this cover also the faience industry? This is what we are going to investigate through the faience vessels models presented below:

18th dynasty:

- Fig.6 shows a faience vessel from Akhmim belongs to the early 18th dynasty and displayed in Brooklyn Museum of NY [23].



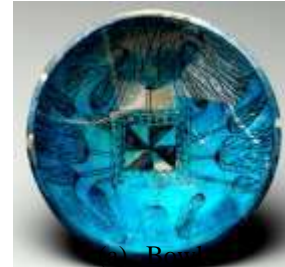
(a) Vessel (b) Decoration

Fig.6 Faience vessel from early 18th dynasty [23].

The vessel has a blue color and decorated by black paintings for geometric shapes and plant scenes as zoomed in Fig.6 (b).

- We have another faience bowl model from the rein of Hatshepsut–Thutmose III (1479–1458

BC) shown in Fig.7 (a) [24]. It has a blue color, wide mouth, round rim and extensive decorations in black paintings. The decorations are geometric shapes in the center and lotus scenes on most of the internal surface as clear in the zoomed view of Fig.7 (b).



(b) Decoration

Fig.7 Faience bowl of Hatshepsut[24].

- Here, we present a 175 mm length faience cup from the rein of Pharaoh Thutmose III, the 6th Pharaoh of the 18th dynasty located in the Museum of Fine Arts at NY and shown in Fig.8 [25]. It has a round top, flat rim, semi-conical body, small flat base and one handle between the rim and cup-shoulder. The cup is decorated by black triangles underneath the rim and spiral shapes in black color at about 40 % of the height from the cup-top.



Fig.8 Faience cup from the rein of Thutmose III [25].

- The next model is a faience funerary vessel from the tomb of Pharaoh Thutmose IV, the 8th Pharaoh of the 18th Dynasty (1400-1390 BC) shown in Fig.9 [26]. The vessel is manufactured from a blue faience and decorated by black paintings. It has a medium mouth, round shoulder, slightly concaved conical body and a large flat base. It has a conical lid of the same color and material. The decorations covers the whole seen surfaces of

the vessel. The lid is decorated by plant scenes, the shoulder is decorated by geometric shapes and probably plant leaves. The body is decorated by different designed scenes in vertical bands including the Pharaoh cartouche, fruits and ancient Egyptian symbols. The decorations are extensive and its black color could sustain for thousands of years without fading.



Fig.9 Funerary vessel of Thutmose IV [26].

- Another model from the rein of Pharaoh Thutmose IV is a faience tall jar of bag-shape located in the Museum of Fine Arts of Boston and shown in Fig.10 (a) [27]. It has a medium mouth, flared round rim, slightly concaved cylindrical neck. Ovoid body and small flat base. The decorations of the blue faience jar are zoomed in fig.10 (b), (c) and (d) for the neck, upper part of the body and its lower part respectively. The decorations are painted in black for geometrical shapes (on the neck and bottom) and lotus flowers and buds on the top part of the body.



(a)



(b)



(c)



(d)

Fig.10 Faience tall jar from rein of Thutmose IV [27].

- The last model from the rein of Pharaoh Thutmose IV is a kohl tube found in his tomb in the valley of the kings and shown

in Fig.11 [28]. It has a small mouth, flared round rim, small neck, semi-cylindrical body and a large flat base. It has a blue dark color except for the rim which is a light blue. It has three convex rings just after the neck. The body is decorated by scenes in black painting including the Pharaoh cartouche.



Fig.11 Faience kohl tube of Thutmose IV [28].

- Now, we move to the rein of Pharaoh Amenhotep III, the 9th Pharaoh of the 18th dynasty. The model we present her is well manufactured faience vessel displayed in the Walters Art Museum of Baltimore and shown in Fig.12 (a) [29]. It has a small mouth, round flared-flanged rim, small cylindrical neck, compound body of conical top and convex bottom and a large flat base. It has a very dark blue and decoration concentrated at the vessel body and represents three cartouches housed in a rectangular frame and belong to the Pharaoh and his Queen Tiye. The inscriptions are in light blue. The other model is manufactured from an orange faience and displayed in the Louvre Museum of Paris [1]. It has similar design to that in Fig.12 (a) except having a decorated lid, wider neck and almost ovoid body. It has the inscriptions on its body of the Pharaoh and Queen cartouches.



(a) [29]



(b) [1]

Fig.12 Faience vessels of Amenhotep III [29], [1].

- We are still with the production of faience vessels in the 18th dynasty. The Egyptians were so clever in designing paints of natural scenes

and scenes of human beings representing cultures of the society. A model following this conclusion is displayed in the National Museum of Antiquities of Leiden and shown in Fig.13 [30]. It is manufactured from a blue faience and has corrugated rim in a unique design.

It is decorated by a painting scene with a black paint. The scene is for a musician lady setting on a bellows in a garden and playing a lute and a baboon behind her. The scene fills completely the interior surface of the vessel.



Fig.13 Faience vessel with female lute player scene [30].

- Another model of faience vessels based in its decoration on natural scenes is displayed in Louvre Museum and shown in Fig.14 (a) [31]. The scene is a black painting depending on the water lily of the River Nile. The whole interior surface is full with the scene taking the form of a five wings star exactly in the middle of the vessel. Another model decorated in its external surface is displayed in the Metropolitan Museum of Art and its bottom view is shown in Fig.14 (b) [32]. It is manufactured in the 18th dynasty from blue faience, the base is small flat and has a small neck. The decorations are based on interchanging symmetric geometric shapes in a very accurate manner and applied by a black paint.



(a) Water lily scene [31]. (b) Lotus scene [32].

Fig.14 Faience vessel with plants scenes.

- A unique model of faience vessels is one simulating a lotus bud and has 159 mm length shown in Fig.15 [33]. It has a medium mouth,

flare round rim, medium cylindrical neck, ovoid body and flat medium base. The whole vessel is decorated on its external surface by black painting representing lotus flowers. The triangles at the body boundary with the neck belong to the actual bud at its bottom.



Fig.15 Faience vessel with lotus bud shape [33].

- The last model of faience vessels from the 18th dynasty is a nice well-decorated bowl displayed in the Walters Art Museum and shown in Fig.16 (a) [34]. It is manufactured from a blue faience and decorated by a black paint on the whole interior surface. The decoration scene represents two fishes holding lotus flowers and buds in their mouth. The scene is drawn inside a circular boundary from the plant leaves. Another fish and locus decoration scene is shown in Fig.16 (b) [35]. The scene is painted in black color and consists of four fishes inside a central circle perfectly drawn and between the internal circle and an outside circular frame of hatched lines there are four flowers separated by four groups of leaves. The decoration is completely symmetric about the x-y axes of the bowl at its geometric center.



(a) Design 1 [34].



(b) Design 2 [35].

Fig.16 Faience bowl with fish and lotus scene.

18th / 19th dynasties:

- Missing data of some artifacts especially their exact date is due to obtaining those artifacts through the sellers of the robbery criminal works inside and outside Egypt. Official excavations help in relating any artifact to its location and historical period. Otherwise, the data are missed. Here, we present some faience vessels related to the 18th/19th dynasties. Fig.17 shows a faience vessel with Bes image decoration displayed in the Ashmolean Museum of Oxford [36]. The vessel has a small mouth, flared round rim, medium neck, spherical body, round base and two thin-big handles between the rim and shoulder. The whole body is decorated. Bes is drawn winged and carrying a symbol in each hand including the eye symbol in its left hand and the ankh symbol is drawn between his head and hands. Other complex drawing exist on the whole body.



Fig.17 Faience vessel with Bes image based scene [36].

19th and 20th dynasties:

- The first model of faience vessels manufactured in the 19th dynasty of the New

Kingdom is a cup taking the form of a lotus flower displayed in the Metropolitan Museum of Art and shown in Fig.18 [37]. The cup has a flared rim, parabolic body, Inverted parabolic base-neck and a flat base. The cup body simulates a lotus flower representing its decoration in a unique blue color. A second model from the 19th dynasty is a marsh bowl displayed in the Metropolitan Museum of Art and shown in Fig.19 [38]. It has a blue color and decorated in its interior by black paint around a small circle in the middle. The is probably for plant leaves emerging from the circle at the middle up to the bowl circumference. Another model is an offering cup of Pharaoh Seti I, the second Pharaoh of the 19th dynasty which is shown in Fig.20 [39]. It has a blue-green glaze with flare rim, semi-conical body and a flat base.



Fig.18 Cup from the 19th dynasty [37].



Fig.19 Bowl from the 19th dynasty [38].



Fig.20 Offering cup of Seti I [39].

Now, we move to the 20th dynasty where we have a faience offering cup for Pharaoh Ramses III, the second Pharaoh of the 20th dynasty and shown in

Fig.21 [40]. It has a corrugated rim, semi-conical body and flat base. It is decorated by scenes in black color painting including the cartouche of the Pharaoh. Another model of offering cups is a royal offering cup from the 20th dynasty and shown in Fig.22 [41]. It has a flare rim, semi-conical body and a flat base. It is decorated by the Pharaoh cartouche and a line of ancient Egypt text.



Fig.21 Offering cup of Ramses III [40].



Fig.22 Royal offering cup [41].

IV. THIRD INTERMEDIATE PERIOD

The Third Intermediate Period covers the dynasties from the 21st to the 25th over a time span from 1070 to 664 BC [42]. We have models of faience vessels from both 22nd and 25th dynasties of the Third Intermediate Period of Egypt.

22nd Dynasty:

- Fig.23 shows a faience chalice from the 22nd dynasty displayed in the Metropolitan Museum of Art [42]. It has concave body, medium base-neck and a flat circular base. The whole surface of the chalice is decorated externally by lotus plant units and some human-figures. Another model is for a loti form cup displayed in the Metropolitan Museum of Art and shown in Fig.24 [43].



Fig.23 Chalice from the 22nd dynasty [42].



Fig.24 Loti form cup from the 22nd dynasty [43].

The cup in Fig.24 is designed in a similar way to that in Fig.23 with variation in the decoration scenes. It is decorated by complex scenes produced through the mold design representing plants, animals and human being.

- A third model of faience vessels manufactured in the Third Intermediate Period is a faience bowl belonging to the 25th dynasty displayed in Brooklyn Museum of NY and shown in Fig.25 [44]. The vessel has small round rim, parabolic body and a small round base. It is decorated by four bulls and scenes of the lotus plant over the whole body. The last model presented here is a blue faience vase in the form of a baboon displayed in the Ashmolean Museum of Oxford and shown in Fig.26 [45]. It takes the shape of a setting baboon with a wide mouth on the head, round flare rim and a large flat base.

- Most of the faience vessels were handleless, but some appeared handled.



Fig.25 4 bulls vessel from the 25th dynasty [44].



Fig.26 Faience vase from the 25th dynasty [45].

V. CONCLUSION

- The paper studied the development of the faience industry in ancient Egypt during the Middle Kingdom to the Third Intermediate Periods.
- Most of the faience vessels during those periods were decorated by natural scenes either internally or externally.
- Scene-design of the faience vessels used images for animals, human beings, geometric shapes or fish.
- In some decorations, they combined geometric shapes with flowers.
- Production quality and decoration scenes reached their top technology during the 18th dynasty of the New Kingdom.
- They manufactured some of the funerary vessels from faience and decorated both vessel and lid externally.
- They used images of some plants available in Egypt such as lotus and water lily.
- They used also, within their decoration schemes, some of the ancient Egypt symbols such as the 'eye' and 'ankh'.
- They designed some of their faience vessels to take the shape of 'bag', 'tube', 'lotus bud', 'lotus flower' and 'baboon'.

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