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Mechanical Engineering in Ancient Egypt, Part III: Jewellery Industry (Necklaces)

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Abstract:

This is the third paper in a series of research papers exploring the history of mechanical engineering during the Ancient Egypt era. The industry of necklaces in Ancient Egypt is investigated over seven periods of Ancient Egypt History from Predynastic to Late Period. The paper presents samples of necklaces from the seven periods and tries to analyze each sample showing its materials and location if known. The various designs of necklaces are outlined showing the characteristics of each design.

***Keywords* — Mechanical engineering history, Ancient Egypt, jewellery industry, necklaces, production materials.**

I. INTRODUCTION

The evolution of mechanical engineering goes through different civilizations of the human beings over centuries. This is a trial to point how the mechanical engineering is developed starting from very old civilizations. Since the Ancient Egyptian Civilization is one of the oldest civilizations leaving evidence of its glory up to now, this series of research papers are devoted to the role of mechanical engineering in production of different things required during the daily life of the ancient Egyptians.

Smith (1960) briefed the history of Ancient Egypt from Predynastic to the Late Period. He presented some features of each period through the available scenes and artefacts including necklaces [1]. Scott (1972) studied the Egyptian jewellery covering periods from predynastic to the 19th dynasty. He included some necklaces from predynastic period, 18th dynasty and 19th dynasty [2]. Pinch (1994) studied different aspects regarding magic in Ancient Egypt. He presented samples of necklaces in Ancient Egypt starting from the predynastic period where they added amulets to the necklaces and from the Middle Kingdom [3].

Hardwick et. Al. (2003) presented a gallery for the Egyptian antiques in the Ashmolean Museum. His gallery included a necklace from the 12th dynasty [4]. Tate et. Al. (2009) examined a 17th dynasty gold necklace by optical microscopy, X-radiography, air-path X-ray fluorescence and protoe induced X-ray analysis. They summarized their findings and proposed the method of manufacture [5].

II. PREDYNASTIC PERIOD

The predynastic period covers the timeline 5500 – 3100 BC [6]. The first sample of Ancient Egyptian necklaces is from Badarian (4400 – 3800 BC) and located in the Metropolitan Museum of Art. It is shown in Fig.1 [7].

Fig.1 Necklace from Badarian [7].

It is composed of a 8 beads of different sizes and design. Another necklace sample was produced in 4000 BC with beads manufactured from shell, coral, bone, invory and glazed steatite. A collection of necklaces produced in the predynastic period is shown in Fig.2 [8].

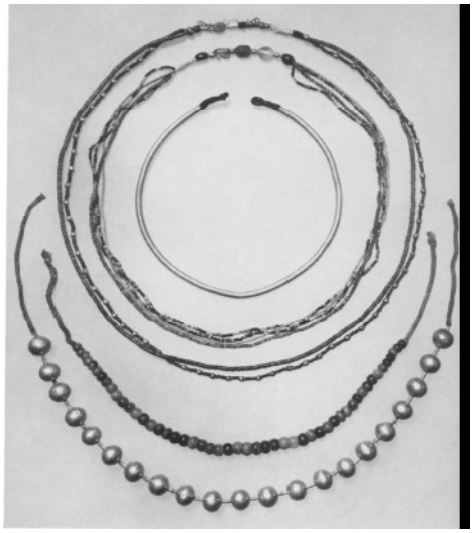

Fig.2 Predynastic necklaces 4000 BC [8].

The five necklaces shown in Fig.2 have different designs.

Another example of necklaces of the Ancient Egyptians was produced about 4000 BC and produced from shell, coral, bone, invory and glazed steatite. The necklace is shown in Fig.3 [9]. It is consisted of a large number of small beads with three amulets at the middle on the chest including a hippo in the centre.

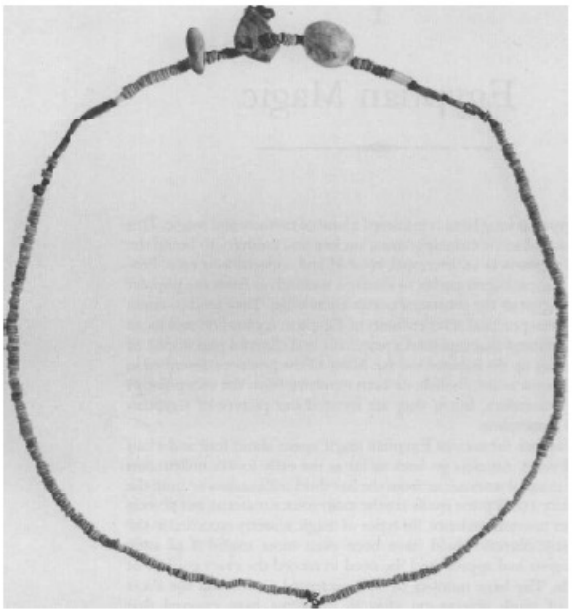

Fig.4 Predynastic necklace 4000 BC [9].

The last model in this period returns to 3200 BC. Fig.5 shown two necklaces from late predynastic found in a tomb in Gerza south of Egypt [10]. The necklaces have beads manufactured from lapis lazuli, carnelian, agate and gold. Separate beads manufactured from iron of different size are also shown in Fig.5 (2000 years befor Egypt's iron age).

Fig.5 Predynastic necklaces 3200 BC [10].

III. OLD KINGDOM

It looks that the great pharaohs of this period had paid all their attention to building the great structures such as pyramids and statues. I could not find enough samples of necklaces from this period. It seems that its a continuation of the predynastic and early dynasties. Fig.6 shows a necklace from the 4th dynasty located in the FitzWiliam Museum [11]. It has 3 long faience beads, round carnelian bead, 2 bone or shell beads, 2 dual conical green

faience beads. All beads are separated by small ring faience beads [11].

Fig.6 Necklace from the 4th dynasty [11].

IV. MIDDLE KINGDOM

Well designed and accurately produced necklaces with excellent use of available and new materials appeared during this period of Ancient Egypt history. Fig.7 shows a necklace for Queen Khnumit from the 12th dynasty is shown in Fig.7 [12].

Fig.7 Necklace of queen Khnumit of the 12th dynasty [11].

The are a series of 10 amulets on either sides of the central symbol Ankh (Ancient Egyptian Symbol). The amulets are located between 2 columns of golden beads. The amulets are manufactured from gold and semiprecious stones: carnelian, turquoise and lapis lazuli. There are 60 pendants joined to the outer beads row. The necklace is fastened using two falcon heads at the two ends of the necklace. The complexity of the design is clear and the high technology of units production and necklace assembly is dominant.

Another different design model from the 12th dynasty is shown in Fig.8 [13].

Fig.8 Faience necklace from 12th dynasty [13].

The beads have graduating diameter from smallest at the end to largest in the middle and are produced from faience. The beads are spaced by thin carnelian beads.

An outstanding and fantastic model of necklaces of this period is that of Sathathor the daughter of Pharaoh Senwosrt II of the 12th dynasty. The necklace is shown in Fig.9 [14]. It has beads manufactured from carnelian of different colours and sizes. The long beads are separated by small blue ball beads. There is a pendant in the front presenting 2 falcons holding the Pharaoh cartouche.

Fig.9 Necklace of Sathathor from 12th dynasty [14].

The last example from the middle kingdom is a unique necklace manufactured from the gold-silver alloy (electrum). Fig.10 shows the electrum necklace [15]. Its length is 154 mm and it is located in the Metropolitan Museum of Art.

Fig.10 Electrum necklace from the middle kingdom[15].

V. SECOND INTERMEDIATE PERIOD

This is one of the weakness periods in the Ancient Egyptian history. Even though we have some samples of necklaces in this historical period between 1780 to 1546 BC. Fig.11 a long necklace from Thebes of Upper Egypt [16]. It is manufactured from garnet, gold, silver, carnelian, blue faience and turquoise. Its length is 340 mm and is located in the Metropolitan Museum of Art.

Fig.11 Long necklace from the 2nd intermediate period [16].

Another necklace model from the 17th dynasty is shown in Fig.12 [5]. It consists of a large number of thin gold rings. There is one strand at the back split into 4 strands in the front. It is located in the National Museum Scotland.

Fig.12 17th dynasty necklace [5].

VI. NEW KINGDOM

The new kingdom is the greet kingdom in Ancient Egypt and it is expected to demonstrate a large collection of its necklaces either for the Pharaohs, Nobles of public.

Fig.13 shows a necklace of faience beads and carnelian amulet from the 18th dynasty [17]. The necklace was donated to the Kelsey Museum of Archaeology by William Petrie in 1923.

Fig.13 Faience necklace from 18th dynasty [17].

The beads are gradually increasing in size from back to front without spacing beads.

Another faience beads necklace is shown in Fig.14 [18]. It has 2 strands with long dual-conical beads and short ball spacers. The strands are connected near the necklace fastening device. The

outer strand has aqua beads with two spacers one yellow and one aqua. The inner strand has dark blue beads and aqua single spacers.

Fig.14 Two strands necklace from the 18th dynasty [18].

A multiple materials necklace from the 18th dynasty is shown in Fig.15 [19]. It has a big pendant in the front centre and a single strand beads ended with a number of blue cords at the back of the necklace not to harm the user. It is manufactured from faience, copper alloy, glass, agate, carnelian, lapis lazuli and turquoise.

Fig.15 Multiple materials necklace from the 18th dynasty [19].

More sophistication in necklaces industry appeared in this period. This is illustrated in the sample shown in Fig.16 which was found in Zawyet el-alaryan of Egypt [20]. The beads are manufactured from carnelian and gold. The carnelian beads increases gradually in size from the end at back to the front centre. The biggest bead is at the centre and has a dual-conical shape. The first 20 beads from both sides of the fastener have almost no spacer beads. The last three carnelian beads are separated from each other and from the main carnelian bead by three or four gold beads. The gold beads are completely symmetric.

Fig.16 Carnelian and gold beads necklace [20].

The ancient Egyptians in the new kingdom were innovative in thinking and jewellery design. The used insects and animals to decorate their necklaces. For example they used fly as a main unit in producing the necklace shown in Fig.17 [21]. There 38 gold fly pendants separated by two small ball bead. There is a fastener at each end of the necklace

Fig.17 Gold fly necklace [21].

Here, a sample of using the designer both insects and animals as important symbols in designing 18th dynasty necklaces. The designer used a scarab and two monkeys in the pendant of one of Pharaoh Tutankhamun necklaces. It is shown in Fig.18 [22].

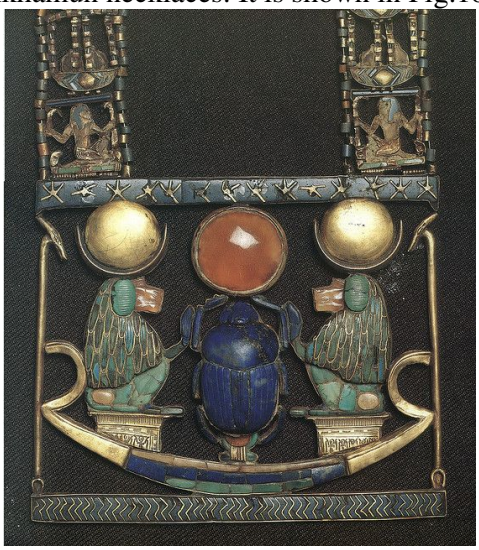

Fig.18 Pendant necklace of Pharaoh Tut [22].

It is manufactured from gold and a number of semiprecious stones. The scarab carries a ball representing the sun and the monkeys carry a crescent representing the moon and enclosing the sun.

The have used also plants in decorating their necklaces and indicating the wealth of Egypt. For example they used a gold date-shaped pendants in a necklace from the 18th dynasty as shown in Fig.19 [20].

Fig.19 Gold necklace with date-shaped pendants [20].

It is composed of about 68 gold pendent of date shape spaced by spherical beads. There are 20 spherical beads at the end around the fastener.

From the 19th dynasty we have a golden necklace of Queen Tausret, the last Pharaoh of the 19th dynasty. Her golden necklace is shown in Fig.20 [23].

Fig.20 Gold necklace of queen Tausret [23].

It is consisted of 80 gold spherical beads and 26 gold pendants having a plant shape. It is located in the Metropolitan Museum of Art.

THIRD INTERMEDIATE PERIOD

In the third intermediate period classical materials such as faience and semiprecious stones were in use by the Egyptian jewellery engineers and technicians. A sample of necklaces in this period is shown in Fig.21 [24]. It has one strand at the back with large number of small semiprecious stone beads, split into two strands of same size beads and faience amulet in the front middle of the necklace. It is located in the Metropolitan Museum of Art.

Fig.21 Semiprecious stone necklace [24].

Necklaces of Pharaohs have gold with semiprecious stones as materials used in necklace

production. For example, Fig.22 shows a necklace for Pharaoh Psusannes I of the 21st dynasty [25]. It is consisted of two strands ending at the back at the fastener. The outer strand composes 24 spherical lapis lazuli beads and one spherical gold bead. The inlet strand composes 22 bead and one gold bead.

Fig.22 Pharaoh Psusennes I necklace [25].

A sophisticated necklace model for Pharaoh Pasussennes I is shown in Fig.23. It weighs more than six kg and manufactured from gold, lapis lazuli and agate [26]. It consists of five golden strands gathered together by a clasp taking the form of the Pharaoh cartouche. From the clasp comes down 14 pendants taking the form of a palm. It is available in the Egyptian Museum.

Fig.23 Gold necklace of Psussennse I [26].

The last example of necklaces in the 3rd intermediate period is from the 22nd dynasty is shown in Fig.24 [27].

Fig.24 Necklace from the 22nd dynasty [27].

It has small red jasper spherical beads separated by pendants and gold amulets of various shapes. The pendants and amulets take the form of lotus flowers, tawerets, Hathor head, fly bird and falkon [27].

VII. LATE PERIOD

We have two necklace models from the 26th dynasty of the Late Period. The first model is shown in Fig.25 and consists of one strand shaped in two loops [28]. The disc beads are manufactured from faience and joint at the back by silver clasps. Its lengtj is 482 mm and it is a collection of Simonian Family of Switzerland.

Fig.25 Two loops necklace of the 26th dynasty [28].

The other model is also from the 26th dynasty. It is shown in Fig.26 [28].

Fig.26 Six strands necklace of the 26th dynasty [28].

The design is completely different than that in Fig.25. The necklace consists of a single beaded-strand at the back of the user. The, six strands are joint to the single strand with a conical ring. The beads are of the tubular type and have different colours. Its length is 458 mm and it a collection of Simonian Family of Switzerland.

VIII. CONCLUSIONS

- The paper presented necklaces industry in Ancient Egypt.
- Samples of necklaces from the predynastic, old kingdom, middle kingdom, second intermediate period, new kingdom, third intermediate period and late kingdom were presented.
- The ancient Egyptians produced necklaces with beads, pendants and amulets from bones, shells, ivory, steatite, iron, semiprecious stones, silver and gold.
- They designed necklaces with number of strands from one to six.
- They could produced necklaces of up to 6.3 kg mass.
- They used beads of various configurations: disc, cylindrical, spherical and dual conical.
- They used pendants and amulets within the construction of the necklace for decoration and religious purposes.
- The pendants took the shape of insect, birds and animals.
- In most of the designs, they used spacer beads to separate the main beads of the necklace.
- Some of their designs of necklaces were attractive and fantastic and remains suitable for reproduction in all over the world.

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BIOGRAPHY

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