

Mechanical Engineering in Ancient Egypt, Part 54: Bread, Beer, Wine and Perfume Industries

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ABSTRACT

The evolution of mechanical engineering in ancient Egypt is investigated in this research paper through studying the production of bread, beer, wine and perfume. Examples from historical eras between the 1st and 20th Dynasties are presented, analysed and aspects of quality and innovation are outlined in each one. The leadership of the ancient Egyptians in the four industries studied in the paper was pointed out and illustrated. The application of remarkable mechanical technology is focused in the production of bread, wine and perfume.

Keywords: Mechanical engineering, ancient Egypt, bread production, beer production, wine production, perfume production

INTRODUCTION

This is the 54th paper in a scientific research aiming at presenting a deep insight into the history of mechanical engineering during the ancient Egyptian civilization. The paper handles the production of bread, beer and wine during the Predynastic and Dynastic Periods of the ancient Egypt history. This work depicts the deep knowledge of ancient Egyptians of the food industries based on their very old land cultivation cultures.

Lesko (1977) in his book about King Tut's wine cellar presented two actual wine bottles from King Tut's tomb in display in the Ashmolean Museum of Oxford, tomb scene and tomb engraving for wine making in ancient Egypt and a scene for workers using the gravity siphoning method to rack their wines [1]. Lehner (1994) announced that the ancient Egyptians started to use bread molds around 2900 BC. He presented two photos of actual bread molds found in a site some distance from the foot of the Saqqara Plateau [2]. Samuel (1996) investigated ancient Egyptian methods of baking and brewing using optical and scanning electron microscopy of bread loaves and beer remains. He showed that ancient Egyptian bread was made not only with

flour from raw grain but sometimes also with malt and with yeast [3].

McGovern et. al. (1997) presented an Early Dynastic wine jar from the Royal tomb of Den, the 7th King of the 1st Dynasty. They presented also some designs of wine jars from Near East [4]. Nicholson and Shaw (2000) outlined a complete part in their book about ancient Egyptian materials and technology for 'food technology'. It covered book sections about: brewing and baking, viticulture and wine production [5]. Redford (Editor, 2001) in volume 1 of the Oxford encyclopedia of ancient Egypt pointed out the baking relief from the tomb of Ti at Saqqara dated to the 5th Dynasty., the Middle Kingdom models such that from Meketre tomb and a baking scene from the tomb of Ramses III of the 20th Dynasty [6]. Ishida (2002) outlined that the beer bread of ancient Egypt was a good starter that protected beer from damaging effects of contaminating micro flora and could adjust the micro flora of the starting mash. He concluded that the folkloristic fermentation methods still in use today were more closely associated with ancient Egyptian brewing process than with modern brewing technologies [7].

McGovern (2003) in his book about ancient wine outlined that the earliest wine was made in the upland, northern parts of the Near East where it gradually spread to adjacent regions such as Egypt and Lower Mesopotamia (3500-3000 BC) [8].

Estreicher (2006) in his book about wine from Neolithic times to the 21st century wrote a separate chapter about wine in Egypt, Greece and Rome. He outlined that wines were a part of the ancient Egypt history at least since the end of the Predynastic Period. He stated also that 700 wine jars were found in the tomb of Scorpion I (3150 BC) [9].

Luoma (2009) outlined that beer production in ancient Egypt dated back to 35th century BC and it was an important daily activity and an important activity in religious line. He presented a scene from the tomb of Ti for baking and brewing [10].

Byl (2012) outlined that the ancient Egyptians were famous for their luxury perfumes in the ancient world and they exported their perfumes all over the Mediterranean. She presented some scenes from ancient Egypt for oil jars, tablet holding seven sacred oils and scenes for perfume flowers collection. She explained how ancient Egyptians produced oil and perfumes [11], Jane, Fonseca and Ibrahim (2013) documented the complete corpus of wine in ancient Egypt and analyzed the data to show the importance of the ancient Egyptian wine culture legacy in the Mediterranean region.

The presented a scene from Nakht's tomb regarding grapes harvesting and wine making [12]. Read Works (2014) declared that ancient Egyptians ate a lot of bread which was the most important carbohydrate source in the ancient Egyptian's diet. They stated that archaeologists discovered illustrations of bakeries and loaves of bread in ancient Egypt sites and professional bakers and home-bakers used the same production techniques [13].

Jane (2016) stated that the Egyptian wine culture was one of the worlds most ancient and the EGYWINE project addressed the viticulture origins, production and preservation of the ancient Egyptian wines and the diffusion of the Egyptian wine culture legacy to Europe. She outlined the objectives of the EGYWINE project, the research methodology and approach and the originality and innovative aspects of the research [14]. Wikipedia (2017) wrote an article about the history of bread and presented a stele

from the mastaba tomb of Itjer at Giza from the 4th Dynasty showing Itjer setting on a chair with bread slices on a table in front of him in display in the Egyptian Museum at Turin. They showed also conical loaves of bread from a tomb from the 5th Dynasty and in display also in the Egyptian Museum at Turin [15]. Wikipedia (2017) wrote an article about the history of wine and presented a colored scene for grape harvesting and winemaking and commerce in ancient Egypt from a tomb dated to 1500 BC. They stated that the winemaking industry was established in the Nile Delta in 3000 BC [16]. Hassaan (2017) in his investigation of mechanical engineering in ancient Egypt presented a large number of farming tools used by ancient Egyptians in their agricultural culture. He presented some scenes for grapes, grain and ornamental trees harvesting from different eras [17].

BREAD PRODUCTION

The ancient Egyptians as a civilized nation used bread in their diet from as early as 6000 BC during the Predynastic era of their ancient history [18]. They registered their bread making industry through three activities:

Tomb scenes: In a very awkward underground situation they could draw wonderful scenes on the walls of their tombs registering almost every aspect of their daily life. Here are some examples regarding the bread making industry:

The first example is a bread making scene from the reign of Mentuhotep II, the 5th King of the 11th Dynasty (2061-2100 BC) and shown in Figure 1 [19]. The scene shows two men in the left-bottom corner of the scene preparing the dough, another two men above them cutting the dough to bread and another man putting the bread-dough in molds to be ready for the final stage of putting the molds in an oven.



Figure1. Bread making during the 11th Dynasty [19]

The second example is a bread making scene from tomb of Senet at West Thebes during the

12th Dynasty (1991-1786 BC) shown in Fig.2 [20]. The beads have a spherical shape with all through hole in the middle for assembly purposes. Here, women are producing the bread. The woman in the scene-left is preparing the dough, while the other woman facing here is preparing the bread using the ready dough in the dough-jar.



Figure2. Bread making during the 12th Dynasty [20].

The third example is a bread making scene from the tomb of Ramses III, the 2nd Pharaoh of the 20th Dynasty (1186-1156 BC) presenting a Royal Bakery shown in Fig.3 [21]. All the workers in the bakery are men working in teams completing the individual processes leading to successful bread production. The scene illustrates workers transferring and storing water jars, preparing the dough, cutting the dough into bread loaves, others loading the bread-molds, others loading the ovens with the bread-molds and other carrying a ready bread stack.



Figure3. Royal Bakery of Ramses III of 20th Dynasty [21].

Tomb models: One of the wonderful works achieved by ancient Egyptians was their production of models simulating actual processes and operations. They kept such models inside their tombs and as a foundation deposits in their important building such as temples. Here are some examples of such models related to the baking industry:

The first example is a 47 mm length pottery model of a loaf of bread from the Old Kingdom

during the reign of Khufu, 2nd King of the 4th Dynasty (2589-2566 BC) in display in the Museum of Fine Arts at Boston and shown in Fig.4 [21]. The model presents on the bread shapes in this early era (more than 4500 years ago). This bread-loaf model took the shape of two adjacent human-being fingers or a U-shape using the English language characters.

The second example is a 320 mm length model for a woman baking bread loaves in molds, reign of Niuserra, the 6th King of the 5th Dynasty (2420-2323 BC) in display in the Museum of Fine Arts and shown in Fig.6 [22]. Here, a woman is doing the job and preparing the bread-molds to be ready to enter the oven. The model shows the woman in a relaxing position after finishing her job and may be thinking in the next step. Why not and it was a productive community could establish one of the greatest ancient civilizations.



Figure5. Bread-loaf model, 4th Dynasty [21].



Figure6. Baking bread loaves model, 5th Dynasty [22].

The third example is string operated grain milling model from the 11th Dynasty of the Middle Kingdom (2000 BC) shown in Fig.7 [23].

This is an amazing planar mechanism design by ancient Egyptians more than 4000 years ago. It is a three links planar mechanism having two revolute joints between link 1 and link 2 and between link 2 and link 3. There is a higher-pair

joint (G-joint) between links 3 and 1. By this the mechanism has a single degree of freedom and operated by a string attached to link 2. The mechanism by this mechanical design will allow grain milling in both directions. During the upward stroke over the inclined surface, the motion is controlled by the pulling force of the string. While, depending on the gravitational force of the mill, the inclination angle and the coefficient of friction between the mill and the inclined surface and the grains, the mill will move down in its backward stroke. This is a real mechanical engineering sophisticated technology relative to their time!!.



Figure7. Milling model from 11th Dynasty [23].

The fourth example is a model for a girl carrying a basket full of bread loaves from the 12th Dynasty (1950 BC) shown in Fig.8 [24]. The model reflects the intelligence of the ancient Egyptians. The bread-loaves are puffy indicating that they are just coming out of the oven. In this case they need ventilation to get cooled and not to stick to each other. This is why the bread loaves are arranged in the basket separated from each other.



Figure8. Bread transfer from 12th Dynasty [24].

The fifth example is a brewers and bakers model from the tomb of Meketre, Overseer, Treasurer and Chief Steward during the reign of four Kings of the Middle Kingdom (2010-1961 BC) shown in Fig.9 [25]. The bread production team as depicted by the model consists of four workers: two women preparing the dough, one man preparing the bread loaves and one man in charge of the oven. The designer showed the women standing since their process requires more strength to prepare the dough, while the other two processes requires little efforts. Therefore, their setting position is OK for them. The models reflects the skill character of the ancient Egyptian mechanical engineering designer.



Figure9. Bread making model from 12th Dynasty [25].

Actual bread-loaves: This is the third technique used by the ancient Egyptians to authorize their bread manufacturing technique. They left actual bread loaves inside their tombs which was a marvellous technique without any need to a single word to describe. Tracing those loaves indicates the grain types used and the different shapes of their bread loaves. Here are some examples from museums in all-over the world:

The first example is a stele from the tomb of Itjer at Giza from the 4th Dynasty (2543-2435 BC) in display in the Egyptian Museum at Turin and shown in Fig.10 [15]. The stela shows Itjer setting on a chair and a table in front of him

with bread-loaves on it. These loaves are similar to the present day bread loaves called 'Phino'. This artefact depicts that the ancient Egyptians know the 'Phino' from more than 4500 years



Figure10. Stele of Itjer from 4th Dynasty [15].

The second example are conical loaves of bread from a tomb in Gebelein from the 5th Dynasty (2435-2305 BC) in display in the Egyptian Museum at Turin and shown in Fig.11 [15]. Most probably those bread-loaves were produced using bread molds where it was easy to them this conical shape or any other desired shapes.

The third example is a semi-triangular bread loaves from the 11th Dynasty (2134-1991 BC) in display in the Egyptian Museum at Cairo and shown in Fig.12 [26]. This is the third unique design of bread-loaves in ancient Egypt after the Phino and conical designs.



Figure11. Conical bread-loaf, 5th Dynasty [15]



Figure12. Triangular bread loaves from 11th Dynasty [26].

The fourth example is bread loaves from the tomb of Kha, the architect of Amenhotep III, the 9th Pharaoh of the 18th Dynasty (1388-1350 BC) in display in the Egyptian Museum at Turin

and shown in Fig.13 [27]. This is the fourth shape of the ancient Egypt bread. It has a circular shape similar to that in production nowadays all over Egypt. It is really amazing that this 2350 years old bread is still existing without deterioration till now.

The fifth example is a bread loaf from Deir el-Bahri during the 18th Dynasty (1500 BC) in display in the British Museum at UK and shown in Fig.14 [28]. It had an ovoid elongated-body, large round rim, medium opening and medium flat base. It had no handles.



Figure13. Bread from Kha tomb, 18th Dynasty[27].

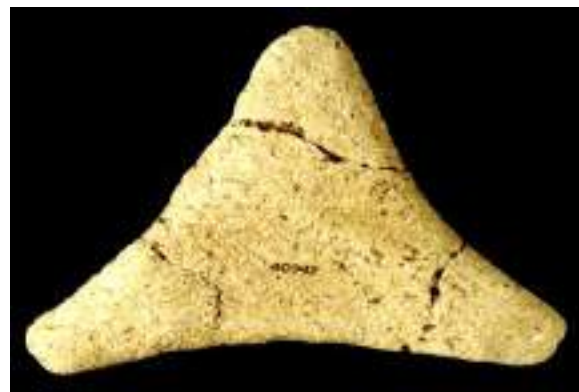


Figure14. Bread loaf from 18th Dynasty [28].

The sixth example is barley bread loaves from a tomb dated to the time of the 21st Dynasty (1070-945 BC) and shown in Fig.15 [29]. They are perfectly circular and could sustain the environmental effects for more than 3000 years!! Those genius people knew that barley had very important benefits for the human being health, so milled it and used it to produce bread. This tradition continued down to the era of the Islamic civilization in the Middle East.

The seventh example is a bread loaf shaped as a courtyard of a house in display in the Egyptian Museum and shown in Fig.16 [30]. Unfortunately, there are no data about its time period nor material. All artefacts have to be registered professionally with data availability for all researchers everywhere.



Figure 15. Barley bread from 21st Dynasty [29].



Figure 16. House-courtyard shaped bread loaf [30].

BEER PRODUCTION

According to Mr. Joshua Mark, the ancient Egyptians are known as the first civilization to perform the art of brewing beer and were the actual inventors of the process. He also outlined that men, women and children drank beer as a source of Nutrition [30]. The components used in producing beer changed depending on the historical era as declared by Mr. Mark. Dr. Delwen Samuel outlined that the microstructure of beer residues from ancient Egypt showed that it was remarkably similar to that of modern cereal foods [31].

The ancient Egyptians registered their beer production technique through models kept in their tombs concentrated in the Middle Kingdom tombs as depicted in the following examples:

The first example is a brewery model from the 11th Dynasty (2040-1991 BC) in display in the Museum of Fine Arts at Boston and shown in Fig.17 [32]. In this model, two porter are carrying water required for the brewery process, two women are grinding grain, one worker is mixing the constituents, one woman is charge about the oven. There are three big-jars used in the brewery process.

The second example is a painted wood brewery model from the Middle Kingdom (2033-1710 BC) in display in the Louvre Museum at Paris and shown in Fig.18 [33]. The model shows two millers grinding the grains and a an overseer supervising the process with brewery jar and four beer storage jars of different sizes.



Figure 17. Brewery model from 11th Dynasty [32].



Figure 18. Brewery model from Middle Kingdom [33].

The third example is another brewery model from the Middle Kingdom (2010-1961 BC) in display in the Museum of Fine Arts at Boston and shown in Fig.19 [34]. The brewery team consists of one porter, one grinding worker, one brewer and one in charge of the oven. One storing jar is ready to receive the produced beer.

The fourth example is a brewery model from Deir el-Bersha manufactured during the era of the Middle Kingdom and in display in the Ashmolean Museum at Oxford and shown in Fig.20 [35]. The brewery team is using shallow bowls instead of the tall jars appeared in the models of Fig.17, 18 and 19. Two women are brewing while setting using the bowl on the ground while a man is brewing while standing using the other bowl secured on tall base. The other two men may be supervising the process and giving instructions.



Figure 19. Brewery model from Middle Kingdom [34].



Figure 20. Brewery model from Middle Kingdom [35].

The fifth example is a brewery model from the tomb of Meketre of the 12th Dynasty (1975 BC) in display in the Metropolitan Museum of Art at New York and shown in Fig.21 [36]. The working team of this model is male workers. One of them is preparing the beer-stuff in a tall-open jar, another is ready to grind the stuff using a hand pole and the third is preparing the liquids required for the brewery process. This means that this model is for a preparation process for the beer production process.

The sixth example is a brewery model from the 12th Dynasty (1991-1786 BC) in display in the Princeton Art Museum and shown in Fig.22 [37]. This is again a male working team in which one man is grinding the grains, another is performing the brewery process and a third is serving them. The model shows also the storage jars and an oven.



Figure 21. Brewery model from 12th Dynasty [36].



Figure 22. Brewery model from 12th Dynasty [37].

The seventh example is a brewer model from the Middle Kingdom-Second Intermediate Period (2040-1640 BC) in display in the Museum of Fine Arts at Boston and shown in Fig.23 [38]. In this model, one man is producing beer using the same technique applied in the other models presented before in Figs.17 through 22.



Figure 23. Brewery model from Middle Kingdom-2nd Intermediate Period [38].

WINE PRODUCTION

Wine was produced in ancient Egypt for Royalty, upper-class people and funerary requirements for elite. The early indication of Egyptian wine came from the beginning of the first Dynasty (3000 BC) [39]. On the other hand, it was reported that the tomb of King Scorpion of the first Dynasty (3150 BC) included about 700 jars containing 4500 liters of wine [40]. The ancient Egyptians registered their wine production industry through scenes from different eras as will be illustrated by the following examples starting from the 1st Dynasty:

The first example is a wine jar from the 1st Dynasty during the reign of Den, the 7th King of the 1st Dynasty (2979-2928 BC) may be from the collection of the Australian Institute of Archaeology [41] and shown in Fig.24 [42]. It seems that this is a large closed container for storing water or wine. The jar had a length of 650 mm, maximum diameter of 200 mm and a rim diameter of 120 mm [41]. It had a small flat base and a stopper (cover) inscribed by the King name.

The second example is an inscription on the stopper of a wine jar for Khasekhemwy, the last King of the 2nd Dynasty (died 2686 BC [43]) shown in Fig.20 [42]. It is an indication of the management technology in the ancient Egyptian society more than 4700 years ago.



Figure24. Wine jar from 1st Dynasty [42].

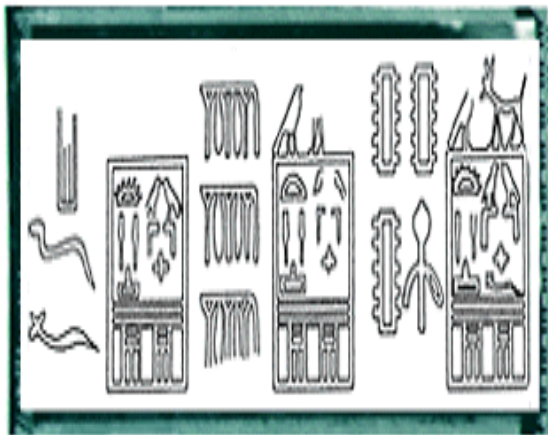


Figure25. Stopper Inscription from 2nd Dynasty [42].

The third example is a wine production and storage scene from the tomb of Imry, Priest of King Khufu and Overseer of the Royal Court, 4th Dynasty (2589-2566 BC) shown in Fig.26 [44]. Five workers are operating a wine production machine. There two options of the grape juice production technique. Either the sack holding the grape is pressed or twisted to extract the grape-juice. The two workers in the bottom of the scene fills the jars with the grape-juice.

The fourth example is a wine production scene from the tomb of Ptahhotep at Saqqara, Vizier during the reign of Djedkare, the 8th King of the 5th Dynasty (2414-2375 BC) shown in Fig.27 [39]. The scene of Fig.25 depicts two production techniques of wine in the ancient Egyptian society. The first one is through pressing the grape by both feet of men-workers. All the workers work according to a unified procedure. They hold a pole by left hand to maintain stability during operation for long times while pressing the grape by feet in turn and by the same frequency for all the workers. The second technique is through pressing a bag full of the grape using a first-class lever.



Figure26. Wine making scene from 4th Dynasty [44].

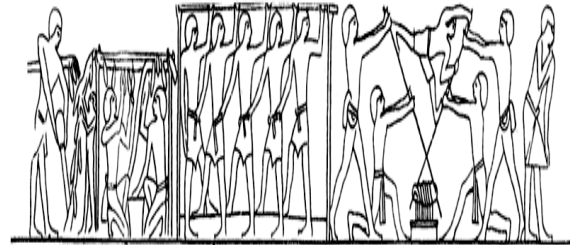


Figure27. Wine making scene from 5th Dynasty [39]

The fifth example is a wine production scene from the tomb of Kynebu at Thebes, from the 18th Dynasty (1450 BC !) shown in Fig.28 [45]. The scene depicts a wine-worker using three siphon-tubes to fill a pot from three wine jars. The other worker is pouring (may be) a flavor to the wine jars. This means that the ancient Egyptians knew the fluid mechanics of the siphoning phenomena from more than 3450 years ago. This phenomena was used extensively by Banu Musa Bin-Shaker in the 9th century AC [46] and Ibn El-Razzaz Al Jazari in the 12th century AC [47].

The sixth example is a wine production scene from the tomb of Menna, Scribe of the Fields during the 18th Dynasty (1420 BC) shown in Fig.29 [48]. The technique used here is the feet-pressing technique registered in the 5th Dynasty and shown before in Fig.27. Fig.29 shows a discharge tube discharging the produced wine into an external basin from which a worker fills the jars stacked on a shelf.



Figure28. Wine making scene from 18th Dynasty [44].



Figure 29. Wine making scene from 18th Dynasty [48]

The seventh example is a wine making scene from the tomb of Ipy at Deir el-Medina, Thebes during the reign of Ramses II, the 3rd Pharaoh of the 19th Dynasty (1297-1213 BC) shown in Fig.30 [49]. Again, they are using the same wine production technique depicted by Figs.27 and 29 but without wine discharge in a separate external basin.



Figure 30. Wine making scene from 19th Dynasty [49]

PERFUME PRODUCTION

The ancient Egyptians recognized the positive effect of perfumes on health and well being and because of this Egypt was the world leader in the production of perfume [50]. As a leader nation in perfume production and as a leader nation in Management, they registered their perfume industry extensively as will be illustrated by the following examples from time era from the 6th to the 30th Dynasties:

The first example is an offering tablet holding 'seven sacred oils' from the tomb of Tetiankh, the elder son of Teti (the 1st King of the 6th Dynasty, 2345-2333 BC) in display in the Egyptian Museum at Cairo and shown in Fig.31 [51]. The seven semi-spherical holes are cut in a one piece of stone (may be alabaster), then identified by vertical lines as borders for each hole. Each oil is designated by a text just above its hole giving the name of the oil. i.e. each oil is labelled in a way could sustain for more than 4350 years.

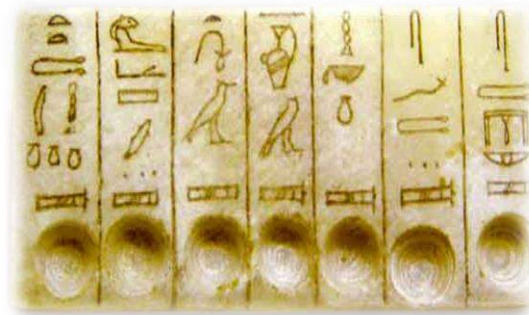


Figure 31. Seven oils tablet from 6th Dynasty [51]

The second example is scene for providing perfume in the mastaba tomb of Kagemni, Vizier of Teti, 1st King of the 6th Dynasty (2321-2290 BC) shown in Fig.32 [52]. The scene may depict the process of quality control after perfume production. The setting man is a quality auditor and the standing man is handing him the perfume-jars one by one and pours perfume on a pig (already of a bad smell). This gives one of the answers for the question: How could the ancient Egyptians build this great civilization?.

The third example is a scene for men pulling huge perfume jars on a sledge from the tomb of Vizier Kagemni shown in Fig.32 [53].



Figure 31. Wine quality control from 6th Dynasty [52].



Figure 32. Huge wine jars from 6th Dynasty [53]

Because they produced large quantities of perfumes, they required non-classical means of perfume storage. They produced these huge jars having almost a man's height and needed to transfer it from place to another using a sledge and proper tying of the jars on the sledge and pulling them safely.

The fourth example is a scene from the tomb of Rekhmire, Vizier during the reign of Pharaohs Thutmose III and Amenhotep II of the 18th Dynasty (1479-1398 BC), for a girl offering perfume jars to the guests shown in Fig.33 [54]. In this party scene, one girl pours beer while the other behind her offers perfume jars to the elite guests.



Figure33. Offering perfume jars in the 18th Dynasty [54]

The fifth example is a scene for pouring perfume by Nakht from the 18th Dynasty (1398-1388 BC) from his tomb shown in Fig.34 [55]. The scene shows Noble Nakht pouring perfume on his offerings while his wife behind him watching this operation.



Figure34. Pouring perfume jars in the tomb of Nakht [55]

The sixth example is a scene from the tomb of Userhat, Overseer of the Fields during the reign of Pharaoh Thutmose IV of the 18th Dynasty (1398-1358 BC) showing Userhat and his wife

receiving offerings shown in Fig.35 [56]. The scene depicts Noble Userhat and his wife setting and receiving offerings while each of them is putting a perfume cone on his head.



Figure35. Userhat and wife receiving offerings [56]

The seventh example is a scene in the hypostyle hall in the temple of Luxor showing Amenhotep III, the 9th Pharaoh of the 18th Dynasty (1388-1350 BC) pouring perfume on a statue for Amun-Ra shown in Fig.36 [57]. Perfume is used here by the Pharaoh of Egypt to perfume the deity Amun-Ra indicating a great respect from the Pharaoh.

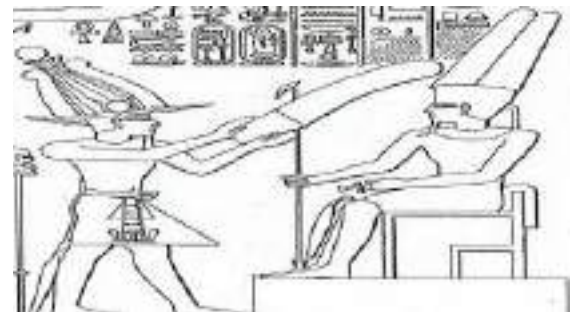


Figure36. Amenhotep III perfuming Amun-Ra [57].

The eighth example is a scene for offering perfume oils in the tomb of Ramose, Vizier of Amenhotep III and Akhenaten, 9th and 10th Pharaohs of the 18th Dynasty (1388-1334 BC) shown in Fig.37 [58]. The offerings may be empty jars and jugs or it may be full of perfume as something precious.



Figure37. Offering perfume oils in Ramose tomb [58]

The ninth example is a scene for perfume production in a tomb from the 18th Dynasty, reign of Pharaoh Thutmose IV (1398-1388 BC) shown in Fig.38 [59]. The owner of the tomb is unknown, but it seems that he was in charge of one of the biggest perfume factories during the 18th Dynasty. The storage jars are big, decorated and labelled by lotus flowers indicating the type of the perfume. The man in the left holding a flag in his right hand may be an overseer of the process.



Figure38. Perfume production factory from 18th Dynasty [59]

The tenth example is a banquet scene from the tomb of Nebamun, scribe and grain accountant during the New Kingdom (1350 BC) in display in the British Museum and shown in Fig.39 [60]. The colored scene depicts a music band consisting of five beautiful girls with full ornament including perfume cones on their heads. This set of colored scenes was cut from the wall of the tomb, robbed, sold and then located in the British Museum!!!



Figure39. Banquet scene in Nebamun tomb from the 18th Dynasty [60]

CONCLUSION

- The evolution of mechanical engineering during the ancient Egypt history was investigated in this research paper through the manufacturing of some farming industries.
- The ancient Egyptians used bread in their diet as early as 6000 BC.

- Wonderful scenes about bread production in ancient Egypt were drawn in tombs during the 11th, 12th and 20th Dynasties.
- They authorized the bread production in their society through a number of models during the 4th, 5th, 11th and 12th Dynasties.
- In the 11th Dynasty they left a model for grain milling in a tomb which was a one degree of freedom planar mechanism having three links, revolute joints and a higher-pair joint !!.
- They put actual bread loaves in some of their tombs during the 5th, 11th and 18th Dynasties.
- They used molds to produce bread with different shapes.
- They registered their beer production industry through models produced during the Middle Kingdom (more than 3700 years ago).
- There was evidence that they produced wine starting from the 1st Dynasty (more than 5000 years ago).
- The tomb of King Scorpion of the 1st Dynasty (3150 BC) incorporated 700 wine jars.
- They labelled their wine jars or stoppers by text indicating the owner name.
- They registered wine production through scenes in the tombs of the 4th, 5th, 18th and 19th Dynasties.
- They were the world leader in perfume production.
- They registered their perfume production through physical tablets and scenes from the 6th and 18th Dynasties.
- They stored perfume in jars ranging between small to very large.
- They used perfumes extensively in too many occasions including funerary and banquets activities.
- They devised perfume cones for the good smell of their ladies and girls of all society classes.

- They devised different techniques for extracting perfume oils from different flowers.
- They could produce 7 types of oils called the 'seven sacred oils'.

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