

Mechanical Engineering in Ancient Egypt, Part 60: Symbols Industry in the New Kingdom

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Abstract— The production of symbols in ancient Egypt is investigated as a step in the study of evolution of mechanical engineering in ancient Egypt. Design and application of symbols during the New Kingdom are presented in as depicted in the daily life of the ancient Egyptians. Royal and non-Royal applications are presented highlighting the use of symbols in their design.

Index Terms— Mechanical engineering history, ancient Egypt, symbols industry, New Kingdom .

I. INTRODUCTION

The ancient Egyptians used symbols in an elaborated manner either directly through tomb and temple scenes, amulets, jewellery or statues. Their use of symbols has a lot of meanings concentrated in a single symbol saving a lot of time and cost in recording and authorizing their activities.

Hassaan (2017) studied the symbols production and use in ancient Egypt during the era between Early Dynastic and Middle Kingdom. He presented the signs and meaning of 31 symbols in a tabulated form and outlined the use of the ancient Egyptians of a number of those symbols analysing each application example and pointing out the type of symbols used and the present location [1]. This work aimed at studying the evolution of Mechanical Engineering in ancient Egypt through a number of industries practiced by the ancient Egyptians. This work started by studying the furniture industry in January 2016 [2], jewellery industry in February 2016 [3], vessels industry in April 2016 [4], ladies headdress industry in May 2016 [5], faience industry in August 2016 [6], textile industry in December 2016 [7], human statues industry in January 2017 [8], animal statues industry in February 2017 [9], another animal statues industry [10], alabaster products industry in May-June 2017 [11], mud-bricks industry in July 2017 [12], farming industries in October 2017 [13], basketry industry in November 2017 [14] and footwear industry in December 2017 [15].

II. USE OF SYMBOLS IN THE 18TH DYNASTY

We are with the most wealthy and strong Kingdom in all over the ancient Egyptian History. Therefore, we expect to see elaborated use of the symbols either separately or associated with other items. We have ten's of examples to present most of them are from the 18th Dynasty as follows:

- The first example is a 66 mm height jasper Tiet amulet

- from the 18th Dynasty (1550-1275 BC) in display in the Metropolitan Museum of Art at NY and shown in Fig.1 [16]. It was carved from one piece of jasper and all the surfaces were perfectly rounded not to harm the user.
- The second example is a limestone sphinx for Pharaoh Ahmose I, the founder of the 18th Dynasty (1550-1525 BC) in display in the National Museum of Scotland at Edinburgh, UK and shown in Fig.2 [17]. The designer showed the Pharaoh wearing the Nemes headdress. The statue was badly damaged by bad excavations.



Fig.1 Tiet amulet from 18th Dynasty [16].



Fig.2 Sphinx of Ahmose from 18th Dynasty [17].

- The third example is a head of Pharaoh Ahmose I from the 18th Dynasty in display in the Metropolitan Museum of Art at NY and shown in Fig.3 [18]. The Pharaoh is wearing the White Crown of Upper Egypt (Hedjet symbol) with Uraeus symbol on his forehead.



Fig.3 Ahmose head from 18th Dynasty [18].

- The fourth example is a heart scarab amulet of General Djehoety during the reign of Pharaoh Thutmose III of the

18th Dynasty (1490-1436 BC) in display in the National Archaeological Museum at Leiden, Holland and shown in Fig.4 [19]. The scarab symbol was used in this application as the main element of the amulet where it was inscribed by 11 rows of hieroglyphic text.



Fig.4 Scarab amulet from 18th Dynasty [19].

- The fifth example is a Pharaoh Hatshepsut's statue from the 18th Dynasty (1479-1438 BC) in display in her temple at Luxor and shown in Fig.5 [20]. The designer showed the Lady Pharaoh wearing the Double Crown of Egypt (Pschent symbol) holding Crook and Flail symbols in her left hand and an Ankh symbol in her right hand. The Uraeus symbol was stripped down leaving a bright sign on the Crown.
- The sixth example is a colored scene for Pharaoh Hatshepsut from the 18th Dynasty (1479-1438 BC) in display in the Royal Ontario Museum at Canada and shown in Fig.6 [21]. The designer showed the Pharaoh holding an Ankh symbol in her right hand and a Scepter in her left hand.

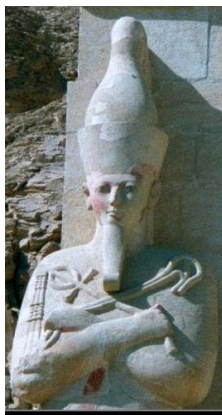


Fig.5 Hatshepsut statue from 18th Dynasty [20].



Fig.6 Hatshepsut scene from 18th Dynasty [21].

- The seventh example is a scene for 'Set' in the tomb of Pharaoh Thutmose III from the 18th Dynasty (1479-1438 BC) shown in Fig.7 [22]. The designer showed 'Set' holding an Ankh symbol in his right hand and a Was scepter in his left hand with another Ankh symbol on the ground.
- The eighth example is a The eighth example is a statue

of Pharaoh Hatshepsut from the 18th Dynasty in display in Metropolitan Museum of Art and shown in Fig.8 [23], UK and shown in Fig.9 [23]. The designer showed the Pharaoh wearing the Nemes symbol with Uraeus symbol on her forehead indicating her Royalty.

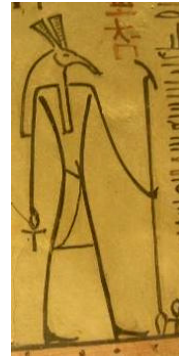


Fig.7 Scene of 'Set' from 18th Dynasty [22].



Fig.8 Hatshepsut statue from 18th Dynasty [23].

- The ninth example is a 3.43 m granite Sphinx of Pharaoh Hatshepsut from the 18th Dynasty in display in the Metropolitan Museum of Art and shown in Fig.9 [24]. The designer represented Pharaoh Hatshepsut in the shape of the Sphinx symbol with her head, wearing the Nemes headdress with the Uraeus symbol on her forehead.



Fig.9 Hatshepsut sphinx from 18th Dynasty [24].

- The tenth example is a 346 mm length quartzite statue of the Pharaoh Thutmose III of the 18th Dynasty (1479-1425 BC) in display in the Egyptian Museum at Cairo and shown in Fig.10 [25]. It was of the same design at that for Pharaoh Hatshepsut shown in Fig.9 and it may be produced in the same workshop.



Fig.10 Thutmose III sphinx from 18th Dynasty [25].

- The eleventh example is a relief of the Wadjet symbol in Hatshepsut's Temple at Luxor shown in Fig.11 [26].
- The twelfth example is a granite statue of the Pharaoh Amenhotep II from the 18th Dynasty (1427-1400 BC) in display in the Kimbell Art Museum at Texas, USA and shown in Fig.12 [27].



Fig.11 Scene of 'Wadjet' from 18th Dynasty [26].



Fig.12 Amenhotep II's statue from 18th Dynasty [27].

The designer showed the Pharaoh wearing the White Crown of Upper Egypt (Hadjet symbol) with Uraeus symbol on his forehead and holding a Flail symbol in his right hand and a Crook symbol in his left hand.

- The thirteenth example is a 4.8 m length Sphinx for Pharaoh Amenhotep II from the 18th Dynasty in display in the Louvre Museum at Paris and shown in Fig.13 [28]. It was a classical standard design of the sphinx statue similar to those in Figs.2, 9 and 10.



Fig.13 Amenhotep II's sphinx from 18th Dynasty [28].

- The fourteenth example is a relief of the Pharaoh

Thutmose IV from the 18th Dynasty (1398-1388 BC) giving offerings to the Great Sphinx of Giza in display in the Rosicrucian Museum at San Jose, USA and shown in Fig.14 [29]. Some symbols appears in the relief: Sphinx, Shenu and Ankh.



Fig.14 Relief of Thutmose IV from 18th Dynasty [29].

- The fifteenth example is a 38.1 mm height faience lotus pendant from the 18th Dynasty (1391-1337 BC) in display in the Cleveland Museum of Art at Cleveland, USA and shown in Fig.15 [30]. This application was based on using the Lotus symbol as the main element of the pendant.
- The sixteenth example is a faience sphinx of the Pharaoh Amenhotep III of the 18th Dynasty (1390-1352 BC) in display in the Metropolitan Museum of Art and shown in Fig.16 [31]. The designer showed the Pharaoh head with a Neems headdress and an Uraeus symbol. The sphinx design is slightly different than the other sphinx designs in Figs.2, 9, 10, 13 regarding the handles of the sphinx which were a human handles holding jars.

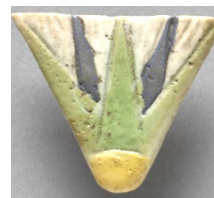


Fig.15 Lotus pendant from 18th Dynasty [30].



Fig.16 Amenhotep II's statue from 18th Dynasty [31].

- The seventeenth example is a statue of Queen Tiye, the Great Royal Wife of Pharaoh Amenhotep III of the 18th Dynasty (1388-1350 BC) in display in the Louvre Museum and shown in Fig.17 [32]. The designer showed the Queen holding a Flail in her left hand and wearing a Swty Crown with Uraeus symbol on her forehead and motives for her headdress based on using the Nekhbet symbol.

- The eighteenth example is a statue of Pharaoh Akhenaten of the 18th Dynasty (1351-1334 BC) in display in the Egyptian Museum at Cairo and shown in Fig.16 [33]. The designer showed the Pharaoh wearing the Nemes headdress and the most probably the Red Crown of Lower Egypt (Deshret symbol) with an Uraeus symbol on his forehead and holding a Flail symbol in his right hand and a Crook symbol in his left hand.



Fig.15 Tiye statue from 18th Dynasty [32].



Fig.16 Akhenaten statue from 18th Dynasty [33].

- The nineteenth example is a 1.05 m length relief of Pharaoh Akhenaten as a sphinx from the 18th Dynasty (1349-1336 BC) in display in the Museum of Fine Art at Boston and shown in Fig.17 [34]. This relief presented the Pharaoh as a sphinx worshipping the sun and presenting offering by his left hand while raising his right hand. The designer showed the Pharaoh wearing the Khat Crown without Uraeus. Symbols encountered in the relief: Shenu and Lotus.



Fig.17 Relief of Akhenaten as a sphinx [34].

- The twentieth example is one of the coffins of Pharaoh Tutankhamun of the 18th Dynasty (1332-1323 BC) in display in the Egyptian Museum at Cairo and shown in Fig.18 [35]. The designer showed the Pharaoh holding a Flail in his right hand and a Crook in his left hand.
- The twenty-first example is an Ankh-shaper mirror case of Pharaoh Tutankhamun in display in the Egyptian Museum and shown in Fig.19 [36]. The design of the mirror-case incorporated a number of symbols: Scarab, Uraeus, Shen, Shenu and Sun Disk.



Fig.18 Tutankhamun coffin, 18th Dynasty [35].



Fig.19 Ankh-mirror case from 18th Dynasty [36].

- The twenty-second example is a pendant of Pharaoh Tutankhamun in display in the Egyptian Museum at Cairo and shown in Fig.20 [37]. It was based mainly on the Wadjet eye and surrounded by a number of other symbols: Nekhbet, Uraeus, Deshret, Atef and Shen. It was produced from gold inlaid by semiprecious stones in a fantastic design reflecting the high technology of this era.
- The twenty-third example is a diadem of Pharaoh Tutankhamun in display in the Egyptian Museum and shown in Fig.21 [38]. The design was based entirely on the symbols Nekhbet and Uraeus produced from gold inlaid by semiprecious stones.

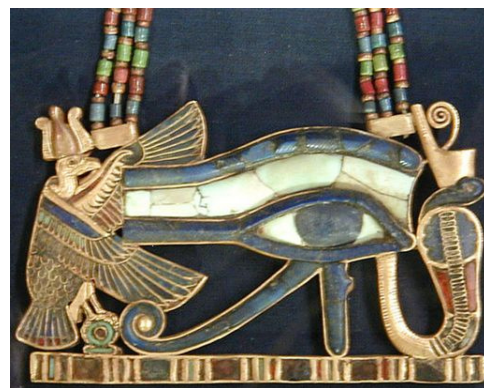


Fig.20 Pendant of Tut from 18th Dynasty [37].

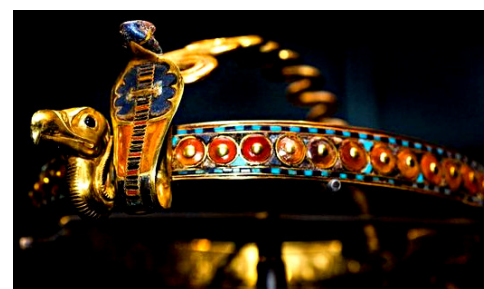


Fig.21 Diadem of Tut from 18th Dynasty [38].

- The twenty-fourth example is a pendant of Pharaoh

Tutankhamun in display in the Egyptian Museum at Cairo and shown in Fig.22 [39]. The designer used the Scarab symbol to be the main item of the pendant surrounded by the symbols: Uraeus, Wadjet, Shen and Akhet.



Fig.22 Pendant of Tut from 18th Dynasty [39].

- The twenty-fifth example is a pendant of Pharaoh Tutankhamun in display in the Egyptian Museum at Cairo and shown in Fig.23 [40]. It was based on the symbol Nekhbet holding the Shen symbol in both legs. The decorations are more than wonderful using gold and semiprecious stones.



Fig.23 Pendant of Tut from 18th Dynasty [40].

- The twenty-sixth example is the mask of Pharaoh Tutankhamun in display in the Egyptian Museum and shown in Fig.24 [41]. The royalty of the Pharaoh was indicated through using the Nemes and Uraeus symbols.
- The twenty-seventh example is a scarab-based pendant of Pharaoh Tutankhamun in display in the Egyptian Museum and shown in Fig.25 [42]. The designer used the Scarab symbol as the core unit of his design surrounded by a number of symbols: Shenu, Uraeus, Sun Disk and two Deities.



Fig.24 Tutankhamun mask, 18th Dynasty [41].



Fig.25 Tutankhamun pendant, 18th Dynasty [42].

- The twenty-eighth example is the side of the shrine of Pharaoh Tutankhamun in display in the Egyptian Museum at Cairo and shown in Fig.26 [43]. The side depended completely on using five Djed symbols and four Tiet symbols.



Fig.26 Tutankhamun shrine side from 18th Dynasty [43].

- The twenty-ninth example is a gilded statuette of Pharaoh Tutankhamun in display in the Egyptian Museum at Cairo and shown in Fig.27 [44]. The designer showed the Pharaoh wearing the Red Crown of Lower Egypt (Deshret symbol) with Uraeus on the forehead of the Pharaoh and holding a Flail and Crook symbols in his hands.
- The thirtieth example is a statue for Queen Ankhesenamun, Great Royal Wife of Pharaoh Tutankhamun from the 18th Dynasty and shown in Fig.28 [45]. The designer shoed the Queen wearing a Khat Crown with Uraeus on her forehead. I could not trace the location of this statue.



Fig.27 Tutankhamun statuette, 18th Dynasty [44].

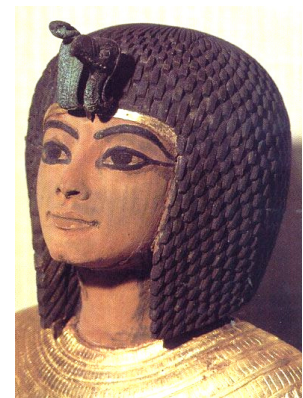


Fig.28 Ankhesenamun, 18th Dynasty [45].

- The thirty-first example is a colossal statue of Pharaoh Tutankhamun in display in the Oriental Institute Museum and shown in Fig.29 [46]. The designer showed the Pharaoh wearing the Nemes headdress and the Double Crown over it (Pschent symbol) with Uraeus symbol on his forehead.
- The thirty-second example is a chest of Pharaoh Tutankhamun in the shape of a Cartouche in display in the Egyptian Museum at Cairo and shown in Fig.30 [47]. The chest was designed entirely taking the shape of the Shenu symbol decorated by a number of other symbols: Ankh, Crook, Maat Feather, Sekhem and Palm branch.



Fig.29 Tutankhamun statue, 18th Dynasty [46].



Fig.30 Chest of Tut, 18th Dynasty [47].

- The thirty-third example is an ostrich fan of Pharaoh Tutankhamun in display in the Egyptian Museum at Cairo and shown in Fig.31 [48]. The fan was decorated by two Nekhbet symbols, two Shenu symbols, two Akhet symbols and a Scarab symbol.



Fig.31 Ostrich fan of Tutankhamun, 18th Dynasty [48]

- The thirty-fourth example is a scene for Pharaoh Tutankhamun as a Sphinx crushing Egypt's enemies within a decoration for one of the Pharaoh's boxes in display in the Egyptian Museum and shown in Fig.32 [49]. The designer here used a completely different design for the sphinx. The sphinx shows standing and crushing Egypt's enemies by three of its legs while the Pharaoh was shown wearing a combined Swty-Hedjet crown-symbol. Other symbols used in this design: Nekhbet, Shen and Ankh.

- The thirty-fifth example is a ceremonial shield of Pharaoh Tutankhamun in display in the Egyptian Museum at Cairo and shown in Fig.33 [50]. The sphinx design was similar to that in Fig.32 except the crown of the Pharaoh which was a combined white and red crown (Pschent symbol).



Fig.32 Tutankhamun sphinx, 18th Dynasty [49].



Fig.33 Shield of Tut, 18th Dynasty [50].

III.USE OF SYMBOLS IN THE 19TH DYNASTY

The 19th Dynasty covered a time span from 1292 to 1189 BC and ruled by eight Pharaohs [51]. I have collected 12 examples of using symbols during the 19th Dynasty presented as follows:

- The first example is a relief for Pharaoh Ramses II of the 19th Dynasty (1304-1237 BC) in display in the Temple of Karnak at Luxor and shown in Fig.34 [52]. The Pharaoh was shown wearing the Red Crown (Deshret symbol) of Lower Egypt and holding a Flail symbol in his left hand and a Sekhem (without stem) in his right hand. Ankh, Feather and Wadjet symbols appear also within the hieroglyphic scene.
- The second example is a statue of Pharaoh Seti I of the 19th Dynasty (1294-1279 BC) in display in the Metropolitan Museum and shown in Fig.35 [53]. The designer showed the Pharaoh wearing the Nemes symbol with Uraeus symbol on his forehead. The hands were broken either through bad excavation or through another reasons.



Fig.34 Ramses II relief, 19th Dynasty [52].



Fig.35 Seti I statue, 19th Dynasty [53].

- The third example is a stele from the 19th Dynasty (1292-1189 BC) in display in the Petrie Museum at London and shown in Fig.36 [54]. The stele shows the 'Ra' Deity holding a Was Scepter in its right hand and an Ankh symbol in its left hand.
- The fourth example is a scarab pendant from the 19th-20th Dynasties (1292-1069 BC) in display in the Egyptian Museum at Berlin and shown in Fig.37 [55]. The designer used the symbols: Scarab, Akhet, Dshret and Lotus.



Fig.36 Stele relief, 19th Dynasty [54].



Fig.37 Scarab pendant, 19th-20th Dynasties [55].

- The fifth example is a relief of Nekhbet in display in Pharaoh Seti I temple at Luxor (1290-1279 BC) and shown in Fig. 38 [56]. The designer showed Nekhbet flying and holding the Shen symbol by both legs. The scene was wonderfully painted with colors that could sustain the environments for more than 3280 years.



Fig.38 Scene of Nekhbet from the 19th Dynasty [56].

- The sixth symbol is a granite bust of Pharaoh Ramses II of the 19th Dynasty (1279-1213 BC) in display in the British Museum at London and shown in Fig.39 [57]. The designer showed the Great Pharaoh wearing the Double Crown of ancient Egypt (Pschent symbol) on a Khat Crown with Uraeus on his forehead, holding a Flail symbol by his right hand

and a Crook by his left hand.

- The seventh example is a scene of Queen Meritamen, Great Royal Wife of Pharaoh Ramses II in display in Tomb QV 68 at Thebes and shown in Fig.40 [58]. The designer showed the Queen wearing a Nekhbet-based headdress and used the symbols: Shenu, Shen, Ankh, Feather, Palm branch and some hieroglyphic symbols.



Fig.39 Bust of Ramses II, 19th Dynasty [57].



Fig.40 Scene of Meritamen, 19th Dynasty [58].

- The eighth symbol is a relief for Pharaoh Seti I of the 19th Dynasty (1290-1279 BC) in display in the Hypostyle Hall at the Karank Temple and shown in Fig.41 [59]. The designer showed the Pharaoh wearing the Blue Crown (Kheprish symbol) with Uraeus symbol on his forehead and holding a Flail symbol in his right hand.



Fig.39 Relief of Seti I, 19th Dynasty [59].

- The ninth example is a pendant of Pharaoh Ramses II of the 19th Dynasty (1279-1213 BC) in display in the Louvre Museum at Paris and shown in Fig.40 [60]. The designer used the Nekhbet and Uraeus symbols as the main symbols in his design showing Nekhbet carrying the Pharaoh Cartouche (Shenu symbol) and

holding a Shen in each foot.



Fig.40 Pendant of Ramses II, 19th Dynasty [60].

IV. USE OF SYMBOLS IN THE 20TH DYNASTY

The 20th Dynasty covered a time span from 1189 to 1077 BC and ruled by ten Pharaohs [61]. We have four examples of using symbols during the 20th Dynasty of Egypt presented as follows:

- The first example is a relief on a column in the Hypostyle Hall of the Temple of Pharaoh Ramses III of the 20th Dynasty (1186-1155 BC) shown in Fig.41 [62]. The relief includes the symbols: Rekhyt (meaning a group of people praising), Shenu, Feather and Seba.
- The second example is a colored scene in the Courtyard of Ramses III Temple at Medinet Habu at Thebes shown in Fig.42 [62]. The scene used the Seba and Palm branch symbols.
- The third example is a statue of Pharaoh Ramses IV of the 20th Dynasty (1155-1149 BC) in display in the British Museum and shown in Fig.43 [63]. The designer showed the Pharaoh wearing the Nemes headdress with Uraeus symbol on his forehead.



Fig.41 Relief in Ramses III Temple, 20th Dynasty [62].



Fig.42 Relief in Ramses III Temple, 20th Dynasty [62].



Fig.43 Statue of Ramses IV, 20th Dynasty [63].

- The fourth example is a scene from the Temple of Khonsu at Karnak for Pharaoh Ramses XI shown in Fig.44 [64]. The designer showed the purification process of the Pharaoh with Ankh symbol flowing from two jugs. The designer showed the Pharaoh wearing a Khat crown with Uraeus symbol on his forehead. The Shenu symbol appears in a number of locations in the scene. Ramses XI was the last Pharaoh of the New Kingdom, the greatest period of the ancient Egyptian history.

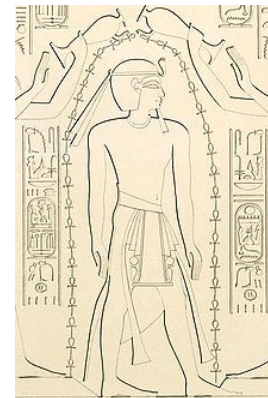


Fig.44 Scene of Ramses XI, 20th Dynasty [64].

V. CONCLUSION

- The use and design of symbols in ancient Egypt during the New Kingdom was investigated.
- The ancient Egyptians in the 18th Dynasty used some symbols to be the main units in their amulets such as: Tiet, Scarab, Sesen and Wadjet eye.
- They continued to use the Nemes, Hedjet, Deshret, Pschent, Swty, Crook, Flail and Uraeus symbols for Royal statues and scenes during the 18th Dynasty.
- They continued to use the Royal Sphinx for their Pharaohs: Hatshepsut, Thutmose III, Amenemhat II, Thutmose IV, Akhenaten and Tutankhamun.
- Ankh, Was scepter and Akhet continued to be used

during the 18th Dynasty.

- They used a single symbol as the Ankh to produce a mirror case in the 18th Dynasty.
- They designed a multi-symbols pendants during the 18th Dynasty such as: Winged Scarab, Akhet, Uraeus, Wadjet eye, Ankh and Solar disk.
- They designed pendants based on (Nekhet and Shen) and (Winged Scarab, Shenu, Uraeus and Nekhet) symbols in the 18th Dynasty.
- They used some symbols in designing some furniture components such as chairs and chests in the 18th Dynasty.
- Fans of Pharaoh Tutankhamun were decorated by symbols such as: Nekhet, Shenu, Scarab and Akhet.
- They designed Tutankhamun's shield decorated by Sphinx, Nekhet and Pschent symbols.
- Royal statues and reliefs continued to appear in the 19th Dynasty with Nemes, Khopesh, Deshret, Uraeus, Flail and Crook symbols.
- Applications using the Ankh, Was scepter, Scarab, Akhet, Sesen, Nekhet, Shen, Shenu, Uraeus continued to be used during the 19th Dynasty.
- During the 20th Dynasty, they used the symbols: Shen, Shenu, Ankh, Seba, Rekhyt, Palm branch and Uraeus.
- Royal crowns during the 20th Dynasty appeared based on using the Nemes, Khat and Uraeus symbols.

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