

# Mechanical Engineering in Ancient Egypt, Part 64: Stelae Industry (Early Dynastic to Middle Kingdom)

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**Abstract—** The production of stelae in ancient Egypt is investigated as a step in the study of evolution of mechanical engineering in ancient Egypt. Design and application of stelae during the periods from the Early Dynastic to the Middle Kingdom are presented as used by the ancient Egyptians. Material, dimension, shape, inscriptions and present location are outlined for each stele.

**Index Terms—** Mechanical engineering history, ancient Egypt, stelae industry, Early Dynastic to Middle Kingdom Period.

## I. INTRODUCTION

The ancient Egyptians used stelae for multi-purposes including funerary, definition, offering, donation and other purposes. They produced stelae from stone slabs to withstand the severe conditions inside tombs and temples. Most stelae included text and colored or non-colored graphical scenes.

Demaree (1983) in his Ph.D. Thesis presented a catalogue for stelae compiled according to alphabetic order of names. He listed the name, date, material, dimensions, technique, color, conservation, type, text, bibliography and commentary. At the end of his thesis he presented photos and line diagrams for some of the stelae presented in his catalogue [1]. Onstine (2001) in her Ph.D. Thesis outlined that most of the stelae recorded in her work were dedicated by fathers, brothers, husbands or sons of 'sm ymt'. She didn't present any photos for the stelae she referred to [2]. Cwiek (2003) in his Ph.D. Thesis about relief decoration referred to the stele of Netjerykhet, stele of Qahedjet and stele of Sneferu [3]. Rosati (2004) presented a catalogue for the Middle Kingdom stelae in Turin Museum. He considered 25 stelae emphasizing their scenes and their production (painting or engraving) [4].

Excell (2006) in her Ph.D. Thesis analysed 436 Egyptian votive stelae dating to the Ramesside Period (1295-1060 BC). Her analysis was based on the iconographic context, function related information and original location or context of the stele [5]. Pirell (2007) described two inscribed stelae found in cave WG24 in Mersa Gawasis in 2004/2005. She outlined the dimensions, material, decoration and the hieroglyphic text. She described in details the scenes in each stele [6]. Hays (2009) outlined that Berlin stele 1204 presented by its hieroglyphs the first person account of the Middle Kingdom officer 'Icherneferet' during the reign of King Senwosret III.

He didn't present any photo for the stele and concentrated on the text analysis [7].

Rosati (2010) the Turin stele Cat. 1628 and provided a translation for a four-columns hieroglyphic text [8]. Labudek (2010) in her M. Phil. Thesis outlined that private Egyptian stelae contained a wealth of socio-cultural and religious information about the individuals who dedicated them. Her aim was to un-cover and evaluate the socio-cultural and religious information contained in the stelae with respect to their location. She investigated unofficial private stelae from the Serapeum at Saqqara. She presented for each stele: text, transliteration, translation, provenance and bibliography [9]. Piquette (2013) in a book chapter about writing in the Lower Nile Valley of Egypt presented a limestone stele No.48 from the first Dynasty in the Egyptian Museum at Cairo [10]. Boraik (2013) presented a funerary stele from the New Kingdom featuring two scenes from funerary texts of the Book of Dead by Amduat. He presented colored photos for the stele and outlined that probably it was from Late Ramesside Period [11].

Darnell (2014) outlined that the text of Usersatet stele provided a glimpse of interpretation cross-cultural attitude during the reign of Amenhotep II of the 18<sup>th</sup> Dynasty. He outlined also that the images on the stele provides a number of clues to the meaning of the text filling most the surface of the stele [12]. Ouda (2015) investigated the identity of 'Werethekau' starting from a stele located in Bristol Museum and Art Gallery. He presented a colored photo for the stele showing a relief in its top part and a horizontal hieroglyphic text in three horizontal bounded bands. He presented another votive stele with cobra-headed 'Werethekau' located in Petrie Museum at London [13]. Tomich (2016) in his paper about the Second Intermediate Period presented a stele from the 16<sup>th</sup> Dynasty for King 'Bebiankh' found in Gebel Zeit of the Red Sea. He presented also a stele for an Egyptian officer loyal to the ruler of Kush and a stele of an official 'Horemkhauef' from the 16<sup>th</sup> Dynasty [14].

Hotep (2017) presented a colored photo for a funerary offering stele from the 12<sup>th</sup> Dynasty located in the Louvre Museum. The stele had a scene in its top part, a hieroglyphic text written in eight vertical columns, one horizontal text above the scene and two 'Wadjet Eye' symbols below the scene [15]. Dunn (2018) in his article about stelae of ancient Egypt presented a number of stelae. He pointed out that the earlier stelae were erected during the 1<sup>st</sup> Dynasty to mark the

tombs of the Kings consisting of large stone slabs with rounded top, inscribed with the name of the ruler in a serekh frame [16]. Hassaan (2017,2018) in his investigation of the Mechanical Engineering in ancient Egypt presented writing means used by the ancient Egyptians to authorize their daily life through some means including symbols [17], papyri [18] and palettes [19].

## II. STELE PRODUCTION DURING THE EARLY DYNASTIC PERIOD

The Early Dynastic Period of ancient Egypt covers the 1<sup>st</sup> and 2<sup>nd</sup> Dynasties over a time span from 3150 to 2686 BC [20]. We have six examples to present from the 1<sup>st</sup> and 2<sup>nd</sup> Dynasties as follows:

- The first example is a 382 mm height limestone stele for Niseret, a woman from the reign of King Djer of the 1<sup>st</sup> Dynasty (3050 BC) in display in the Metropolitan Museum of Art at NY and shown in Fig.1 [21]. Its front surface was covered by scenes and some scripts. The surface was rough, it had a rectangular shape with rounded corners with large diameter fillet.
- The second example is a 1.43 m height sandstone stele for King Djet from the 1<sup>st</sup> Dynasty (3000-2990 BC) in display in the Louvre Museum at Paris and shown in Fig.2 [22]. It presented a carved shrine with falcon and cobra scenes. It has rectangular shape with sharp corners.
- The third example is a stele for Queen Mereneith, Royal Wife of King Djet from the 1<sup>st</sup> Dynasty (3000-2990 BC) in display in the Egyptian Museum at Cairo and shown in Fig.3 [23]. The main engraved scenes in her Royal stele are a symbol for Seith (the Deity of War) [24] and a hoe referring to the agricultural power of ancient Egypt. It had a rounded top and flat bottom with sharp corners.



**Fig.1 Niseret stele from 1<sup>st</sup> Dynasty [21]**



**Fig.2 King Djet stele from 1<sup>st</sup> Dynasty [22]**

- The fourth example is a 1.48 m height Royal basalt stele for King Qa'a from the 1<sup>st</sup> Dynasty (2920-2890 BC) in display in the Penn Museum at Pennsylvania, USA and shown in Fig.4 [25]. It has a rounded top and a flat-sharp bottom similar to that of Queen Mereneith of Fig.3. It is inscribed by a shrine

including the King name, a falcon on its top and two cobras (Uraeus symbol) from the bottom sides.



**Fig.3 Mereneith stele from 1<sup>st</sup> Dynasty [23]**



**Fig.4 King Qa'a stele from 1<sup>st</sup> Dynasty [25]**

- The fifth example is a 1 m height granite stele for King Raneb from the 2<sup>nd</sup> Dynasty in display (2880 BC) in the Metropolitan Museum of Art at NY and shown in Fig.5 [26]. It has a semi-circular top and a rounded corners rectangular bottom. It is inscribed by a shrine housing the name of the King and a falcon on its top.
- The six and last example is a 1.135 m height granodiorite stele of King Peribsen from the 2<sup>nd</sup> Dynasty (2890-2686 BC) in display in the British Museum at London and shown in Fig.6 [27]. It has a circular top, a rounded corners bottom end (base) and inscribed by a shrine housing the King's name and an animal on the top of the shrine.



**Fig.5 King Raneb stele from 2<sup>nd</sup> Dynasty [26]**



**Fig.6 King Peribsen stele from 2<sup>nd</sup> Dynasty [27]**

## III. STELE PRODUCTION DURING THE OLD KINGDOM

- The Old Kingdom comprises the ancient Egyptian Dynasties from the 3<sup>rd</sup> to the 6<sup>th</sup> over a time span from 2686 to 2181 BC [28]. Again we have seven examples illustrating the production of stele during the Old Kingdom
- The first example is a 0.59 m height limestone Niankhtet



stele from the 3<sup>rd</sup>-4<sup>th</sup> Dynasties (2686-2494 BC) in display in the World Museum and shown in Fig.7 [29]. It has a rectangular shape showing the owner setting in front of an offering table with hieroglyphic inscriptions written in horizontal and vertical lines.

- The second example is a 2.5 m height granite stele describing seven years of drought and famine during the reign of King Djoser from the 3<sup>rd</sup> Dynasty (2686-2667 BC) in display in Sehel Island, New Aswan, Egypt and shown in Fig.8 [30]. The stele comprised a scene in its top part for four persons then a text written in vertical parallel columns describing the seven-years famine.



Fig.7 Niankhtet stele from 3<sup>rd</sup>-4<sup>th</sup> Dynasties [29]



Fig.8 Famine stele from 3<sup>rd</sup> Dynasty [30]

- The third example is an 0.71 m height limestone stele of Iry and Inet from the 4<sup>th</sup> Dynasty (2613-2494 BC) in display in the British Museum at London and shown in Fig.9 [31]. It has a rectangular shape with sharp corners. The scene was engraved on the stele surface showing the owner Iry sitting on a chair facing his wife Inet with an offering table between them. A two lines hieroglyphic text was engraved in the top part of the stele.

The fourth example is a 375 mm painted limestone stele of Princess Nefertabet from the 4<sup>th</sup> Dynasty, reign of King Khufu (2590-2565 BC) in display in the Louvre Museum at Paris and shown in Fig.10 [32]. The stele was engraved and colored showing the princess sitting on a chair and a funerary table in front of her. The whole other area was inscribed by hieroglyphic text, birds and symbols.



Fig.9 Iry and Inet stele from 4<sup>th</sup> Dynasty [31].



Fig.10 Nefertabet stele from 4<sup>th</sup> Dynasty [32].

- The fifth example is a 455 mm height painted limestone stele of Wepemnefret from the 4<sup>th</sup>

Dynasty, reign of King Khufu (2589-2566 BC) in display in the Brooklyn Museum at NY and shown in Fig.11 [33]. The designer showed the owner sitting on a chair with an offering table in front of him. It was of the slab rectangular form with sharp corners and full of hieroglyphic text written in vertical lines except the text in the top of the stele written in a horizontal band.



Fig.11 Wepemnefret stele from 4<sup>th</sup> Dynasty [33].

- The sixth example is a 0.787 m height stele of King Unas from the 5<sup>th</sup> Dynasty (2375-2345 BC) in display in Saqqara of Egypt and shown in Fig.12 [34]. The stele had a rectangular shape and engraved by scenes in its lower part and hieroglyphic text in the rest of its surface are written in horizontal bounded bands with the Cartouche of the King engraved in a horizontal position (in the left-top corner) and in a vertical position (in the right-bottom corner).

- The seventh example is a 440 mm height limestone stele of Senefereshempepy from the 6<sup>th</sup> Dynasty (2345-2181 BC) in display in the British Museum and shown in Fig.13 [35]. The stele had a square shape and engraved showing the owner striding and holding a staff and a scepter and the rest of the stele engraved in hieroglyphic text in horizontal bands giving the titles of the owner.



Fig.12 King Unas stele from 5<sup>th</sup> Dynasty [34].



Fig.13 Senefereshempepy Stele from 6<sup>th</sup> Dynasty [35].

#### IV. STELE PRODUCTION DURING THE FIRST INTERMEDIATE PERIOD

The First Intermediate Period of ancient Egypt comprised the 7<sup>th</sup> to 10<sup>th</sup> Dynasties over a time span from 2181 to 2055 BC [36]. We have three examples of the production of stelae during the First Intermediate Period presented as follows:

- The first example is an 0.723 m height painted limestone stela of Official Maaty and his wife Bedwi from the First Intermediate Period (2170-2008 BC) in display in the Brooklyn Museum and shown in Fig.14 [37]. The designer showed the owner striding while holding a staff in his left hand and his wife is standing behind him. It took a rectangular shape with sharp corners, decorated and inscribed using a hieroglyphic text in horizontal lines.

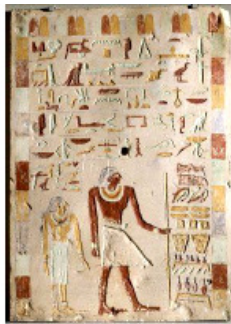


Fig.14 Maaty and Dedwi stela 1<sup>st</sup> IP [37].



Fig.15 Meny stela from 9<sup>th</sup> Dynasty [38].

- The second example is an 0.525 m height limestone stela of official Meny from the 9<sup>th</sup> Dynasty (2100 BC) in display in the Museum of Fine Arts at Boston and shown in Fig.15 [38]. The designer showed the stela-owner striding and holding a staff in his left hand and a scepter in his right hand. A Wadjet eye symbol appears on the top of a hieroglyphic text written within three bounded vertical bands.
- The third example is a 371 mm height painted limestone stela of the Nubian Soldier Nenu from the 10<sup>th</sup> Dynasty (2100-2040 BC) in display in the Museum of Fine Arts at Boston and shown in Fig.16 [39]. The designer showed Nenu and his wife striding and presenting offerings. Hieroglyphic texts were written in two bands one horizontal in the top and one vertical in the LHS of the stela. The stela was of the rectangular shape.



Fig.16 Soldier Nenu stela from 10<sup>th</sup> Dynasty [39].

#### V. STELE PRODUCTION DURING THE MIDDLE KINGDOM

The Middle Kingdom comprised the 11<sup>th</sup> and 12<sup>th</sup> Dynasties over a time span from 2050 to 1710 BC [40]. Historically, this is one of the wealthy and strong periods of ancient Egypt. Therefore we expect to get extensive use and production of stelae as will be presented by the following examples:

- The first example is a 292 mm height limestone stela of Beb from the 11<sup>th</sup> Dynasty (2134-2040 BC) sold by Christies for 8,125 US\$ and shown in Fig.17 [41]. It had a rectangular shape with rounded top similar to that appeared during the 1<sup>st</sup> Dynasty. The designer showed the owner (Beb) seated in the middle of the stela in front of an offering table with symbols and hieroglyphic text written in horizontal lines and vertical columns.
- The second example is a 410 mm width painted limestone stela of Tetu and Nefertjentet from the 11<sup>th</sup> Dynasty (2124-1981 BC) in display in the Metropolitan Museum of Art and shown in Fig.18 [42]. The designer showed the stela owner Tetu and his wife Nefertjentet seated beside each other and receiving offerings from men and women with an offering table in front of them. Text was written in relatively short vertical columns.



Fig.17 Beb stela from 11<sup>th</sup> Dynasty [41].





Fig.18 Tetu stele from 11<sup>th</sup> Dynasty [42].

- The third example is a painted limestone funerary stele of Ipepi, his wife, his mother and his sisters from the 11<sup>th</sup> Dynasty (2120-1980 BC) in display in the Neues Museum at Berlin and shown in Fig.19 [43]. The stele has a rectangular shape with domed top. On the domed part the designer set two Wadjet eyes and a Shen symbols. Below to this came four hieroglyphic horizontal bands. Below which came a scene for Ipepi presenting an offering table to Osiris with texts in two vertical bands. Then in the bottom came his family: Mother, wife and sisters with vertical text in two adjacent bands.
- The fourth example is a 445 mm height limestone stele of King Intef II from the 11<sup>th</sup> Dynasty (2108-2059 BC) in display in the Metropolitan Museum of Art and shown in Fig.20 [44]. The designer showed the King striding and making offerings in his both hands while funerary text was written in horizontal direction (in the top part) and in the vertical direction (in the bottom part) using the ancient Egyptian hieroglyphs.
- The fifth example is a 354 mm length limestone funerary stele of Intef and Senettekh from the 11<sup>th</sup> Dynasty (2065-2000 BC) in display in the Brooklyn Museum and shown in Fig.21 [45]. The designer showed Intef and his wife Senettekh seated behind an offering table and receiving offerings. Three registers of an hieroglyphic text was shown written in three horizontal bands in the top of the stele.



Fig.19 Ipepi stele from 11<sup>th</sup> Dynasty [43].



Fig.20 King Intef II stele from 11<sup>th</sup> Dynasty [44]



Fig.21 Stele of Intef and his wife from the 11<sup>th</sup> Dynasty [45].

- The six example is an 0.59 m length limestone stele of the Gatekeeper Maati from the 11<sup>th</sup> Dynasty, reign of Mentuhotep II (2051-2030 BC) in display in the Metropolitan Museum of Art at NY and shown in Fig.22 [46]. The designer showed the owner of the stele seated on a chair with an offering table in front of him smelling a band of flowers. A hieroglyphic text was written in a horizontal bounded band in the top of the stele and in a four vertical bounded bands in the left side of the stele.



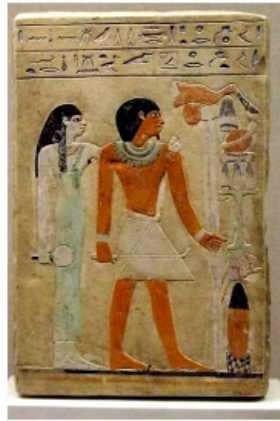
Fig.22 Stele of Maati from the 11<sup>th</sup> Dynasty [46].

- The seventh example is a limestone stele of Sabu from the 12<sup>th</sup> Dynasty (1985-1795 BC) in display in the British Museum at London and shown in Fig.22 [47]. It had a rectangular shape with domed top and decorated by two Wadjet eye and one Shen symbols in the top within the rounded part. In the middle the designer showed the owner seated, holding a lotus flower and receiving offerings from others with an offering table between them. Hieroglyphic text was registered above him and below him to the bottom of the stele.
- The eighth example is a 380 mm height painted limestone stele of Dedu from the 12<sup>th</sup> Dynasty (1981-1952 BC) in display in the Metropolitan Museum and shown in Fig.23 [48]. The designer used a rectangular stele design with rounded corners and showed the owner Dedu and his wife behind him with an offering table just in front of him. He used a hieroglyphic text written in two bounded rows in the

top of the stele.



**Fig. 22 Stele of Sabu from 12<sup>th</sup> Dynasty [47].**



**Fig. 23 Stele of Dedu from 12<sup>th</sup> Dynasty [48].**

- The ninth example is a 455 mm height limestone stele of Butler Senebef from the 12<sup>th</sup> Dynasty (1981-1802 BC) in display in the Kunsthistorisches Museum at Vienna, Austria and shown in Fig. 24 [49].

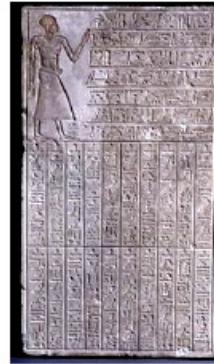


**Fig. 24 Stele of Butler Senebef from 12<sup>th</sup> Dynasty [49].**

It was of the rectangular design with domed top. Here the designer used four windows, three of which housed (may be) owner statuettes and the big one in the centre housed Ankh symbol.

- The tenth example is a 0.65 m height limestone stele of Intef from the 12<sup>th</sup> Dynasty (1965-1920 BC) in display in the British Museum at London and shown in Fig. 25 [50]. It was of the rectangular type with sharp corners showing the owner (Intef) in its top right corner confronted with a hieroglyphic text written within seven bounded bands and another text in the lower part of the stele written in ten vertical bounded columns.
- The eleventh example is an 0.59 m height painted limestone stele of Amenemhet and his mother Yatu from the 12<sup>th</sup> Dynasty (1776-1794 BC) in display in the Oriental Institute of Chicago and shown in Fig. 26 [51]. This is a wonderful decorated rectangular stele

with curved top from the 12<sup>th</sup> Dynasty showing Amenemhet and his mother seated in the middle of the stele with table in between them and holding a flail and his mother smelling a flower band. Above them comes an area full of scenes (of hieroglyphic text).



**Fig. 25 Stele of Intef from 12<sup>th</sup> Dynasty [50].**



**Fig. 26 Stele of Amenemhet from 12<sup>th</sup> Dynasty [51].**

- The twelfth example is a 1 m height limestone stele of Ikhernefret, the treasurer of King Senusret III (1878-1839 BC) in display in the Berlin Museum at Berlin and shown in Fig. 27 [52]. It had a trapezoidal shape with domed top and a thick frame. The stele presented in its top part Osiris and King Senusret III standing under a winged sun-disk, then a text of 24 horizontal lines ended by a scene for the owner of the stele and his family presenting an offering table [52].
- The thirteenth example is a 355 mm height limestone stele of Senbef son of Neketpu, the Overseer of the Army of King Amenemhat III (1860-1814 BC) from the 12<sup>th</sup> Dynasty sold by Christies for 23,065 US\$ and shown in Fig. 28 [53]. It was of the rectangular design with domed top, decorated by a winged sun-disk under which came a cartouche (may be for King Amenemhat III), Ankh symbol at both sides of the cartouche and a hieroglyphic text written within three horizontal bands towards the bottom of the stele.



**Fig. 27 Stele of Ikhernefret from 12<sup>th</sup> Dynasty [52].**



**Fig. 28 Stele of Senbef from 12<sup>th</sup> Dynasty [53].**



- The fourteenth example is a 1.03 m height painted limestone stela of Steward Mentuwer from the 12<sup>th</sup> Dynasty (1944 BC) in display in the Metropolitan Museum of Art and shown in Fig.29 [54]. It was of the rectangular design with sharp corners. The designer showed the owner seated in the lower part of the stela with an offering table in front of him while others offering to him. In the top comes a hieroglyphic text in three horizontal lines (in the top) and sixteen vertical lines (under them).



Fig.29 Stela of Mentuwer from 12<sup>th</sup> Dynasty [54].

## VI. CONCLUSION

- The design of stela in ancient Egypt during the period from Early Dynastic to Middle Kingdom was investigated.
- The ancient Egyptians produced stela with height ranging from 292 mm to 2.5 m during the period from Early Dynastic to Middle Kingdom.
- Materials used in producing stela: limestone, sandstone, basalt, granite and granodiorite.
- They started producing known stela since the 1<sup>st</sup> Dynasty including symbols, scenes and text.
- Stela were produced for Kings, Nobles and normal people.
- They produced stela with and without domed-top.
- Most of the stela produced during the period studied had rectangular shape with and without rounded corners.
- During the 3<sup>rd</sup> Dynasty, they carved a 2.5 m height granite stela for King Djoser describing the 7-years famine occurred during his time.
- They produced stela with wonderful scenes for the owners starting from the 3<sup>rd</sup> Dynasty.
- They produced painted stela using limestone starting from the 4<sup>th</sup> Dynasty.
- They authorized their funerary activities using

hieroglyphic texts written in both vertical and horizontal directions.

- They were keen to appear in some of their stela as a couple: husband and wife since the 4<sup>th</sup> Dynasty.
- Some ladies produced their own stela since the 1<sup>st</sup> Dynasty.
- Decorating the limestone stela started during the First Intermediate Period.
- Some stela were produced and inscribed only using symbols during the 1<sup>st</sup>, 2<sup>nd</sup> and 12<sup>th</sup> Dynasties.

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