

Manufacturing Wooden and Armored Doors in the Mamluk Era

Dr. Ola M. Mohammed Ahmed

Interior architecture department - Faculty of fine arts, Alexandria University

FA.OLA.MOHAMED@alexu.edu.eg

Abstract

The Mamluk era was characterized by skill, creativity, good design, Mamluk architecture, perfect craftsmanship and accuracy. The doors remained in the mosques of the Muslims for the applied arts, which were used by the worshipers, both in religious and civil architecture, in addition to the defensive war, especially the outer doors, which were a hallowed title for those who looked behind these doors. It was remarkable that the Muslims did not care about the greatness of their doors and always chose two-legged types of mosques, schools and palaces, while the author relied on one piece of houses mainly as well as the doors of castles and forts. The doors of the wooden doors were characterized by fine panels decorated with strips of ivory or precious wood, as well as , it was flourished the manufacture of many of historical doors which was an art of Islamic war architecture, both those built in the Fatimid or Ayyubid, and the most famous were the eight doors Fatimid, which represented the valve safety and security to defend Cairo throughout the ages, each of these doors had a name which was known to the people, and they had been repeating it for hundreds of years, and behind it is a historical story. The doors in the Mamluk era were constructed with an architectural genius. They had holes to throw arrows against enemies, pour boiling oil on enemy soldiers to prevent them from entering the fortified city of Cairo. Carpenters developed industrial and decorative styles as well as the development of decorative units. The decorative purpose was the most important of what the manufacturer intended in the Mamluk era, perhaps because of that period characterized by prosperity in various arts and the keenness to enrich most of its products with various writings and decorations.

The study aims to study the design of the wooden and armored doors in the Mamluk era, an archaeological and historical study, which was considered Mamluk architecture, as well as the study of the decorative elements in it. These doors were richly decorated, with a variety of floral, written and geometric decoration. The research is based on the study of the different types of doors and their important impact during wars through many parameters; firstly, the research discusses designing door types and then discusses developments within design over time. Secondly, the study of the technical and industrial methods used in the Mamluk era and the techniques of manufacturing the basic components of these artifacts and decorating the surface with a variety of decorative devices. Finally, the favorite decorative elements of each species, which consist mostly of engineering, floral designs and writings will be studied. Consequently, the research concluded a series of basic concepts and techniques for the manufacture of doors throughout the Mamluk period. The doors of the Mamluks were used as the main executive place in the Mamluk era.

Keywords:

Martial Mamluk Architecture, Military Doors Shapes Design and types, Layout of Doors, Mamluk Doors Techniques for Manufacturing, Ornaments and Motifs in Mamluk Era, Mamluk Metalwork Fittings.

المخلص

تميز العصر المملوكى بالمهارة والابداع وحسن التصميم وتطور العمارة المملوكية وحسن صنعها ودقة تفاصيلها. تبقى الأبواب في عمارت المسلمين من أجلّ الفنون التطبيقية التي عني بها المشيدون سواء في العمارة الدينية أو المدنية ، إلى جانب الحربية الدفاعية ولا سيما الأبواب الخارجية التي تعد عنواناً موحياً للناظرين بما خلف هذه الأبواب، ومن اللافت للنظر أن المسلمين لم يعنوا بضخامة أبواب منشآتهم واختاروا دائماً الأنواع المؤلفة من ضلفتين للمساجد والمدارس والقصور بينما اعتمد المؤلف من قطعة واحدة للمنازل بصفة رئيسة فضلاً عن أبواب القلاع والحصون. تمتاز الأبواب الخشبية بالخشوات الرقيقة المطعمة بأشرطة من العاج أو الخشب النفيس كما ازدهرت صناعة العديد من الأبواب التاريخية التي تعد من فنون العمارة الحربية الإسلامية سواء تلك التي بنيت في العصر الفاطمي أو الأيوبي، وأشهرها هي الأبواب الثمانية الفاطمية، والتي مثلت صمام الأمن والأمان للدفاع عن القاهرة التاريخية على مر العصور، لكل باب من تلك الأبواب اسم عرف به بين الأهالي، وظلوا يرددونه طوال مئات السنين، وأيضاً وراءه حكاية تاريخية. وشيدت الأبواب في العصر المملوكى بعقريّة معمارية، فكان بها فتحات لرمي السهام ضد الأعداء وصب الزيوت المغلية والسوائل الكاوية علي جنود العدو لمنعهم من دخول المدينة المحصنة القاهرة. وقد قام النجارون بتطوير اساليب الصناعة والزخرفة وكذلك تطوير الوحدات الزخرفية لهذه الأبواب. ان الهدف الزخرفي كان اهم ما قصد اليه الصانع في عصر المماليك ربما لما تميز به ذلك العصر من ازدهار في مختلف الفنون والحرص على اثراء معظم منتجاته بالكتابات والزخارف المتنوعة.

ويهدف البحث إلى دراسة تصميم الأبواب الخشبية والمصفحة في العصر المملوكى دراسة أثرية وتاريخية والتي تعد من فنون العمارة الحربية المملوكية وأيضاً دراسة العناصر الزخرفية به ، إذ تتميز هذه الأبواب بثناء زخرف بالغ ، تنوع ما بين زخارف نباتية وكتابية وهندسية. يقوم البحث على دراسة الأنواع المختلفة من الأبواب وتأثيرها الهام أثناء الحروب من خلال العديد من المتغيرات وهي أولاً تصميم أنواع الأبواب، ثم مناقشة التطورات داخل التصميم عبر الزمن. ثانياً ، دراسة الاساليب الفنية والصناعية التي استخدمت بالعصر المملوكى وتقنيات تصنيع المكونات الأساسية لهذه القطع الأثرية ولتزيين سطحها بمجموعة متنوعة من الأجهزة الزخرفية. وأخيراً ، سيتم فحص العناصر الزخرفية المفضلة لكل نوع ، والتي تتكون في معظمها من الهندسة والتصميمات الزهرية والكتابات. وفي النهاية استنتج البحث مجموعة من المفاهيم والتقنيات الأساسية لتصنيع الأبواب طوال فترة المماليك ، ولعبت الأبواب في حياة مدينة المماليك كمكان تنفيذي رئيسي في العصر المملوكى.

كلمات البحث:

العمارة المملوكية القتالية ، تصميم أشكال وأنواع الأبواب العسكرية ، تصميم الأبواب ، تقنيات التصنيع للأبواب المملوكية ، الزخارف والوحدات الزخرفية المتكررة في العصر المملوكي ، التركيبات المعدنية المملوكية.

1.Introduction

The Muslim architecture took special care of the entrances to the buildings, as their various decorations added elegance and splendor to them [1]. The Mamluk era was characterized by skill, creativity, good design, Mamluk architecture, perfect craftsmanship and accuracy. The doors remained in the Muslim buildings for the applied arts, which were used by worshipers,

both in religious and civil architecture, in addition to the defensive war, especially the outer doors, which were a hallowed title for those who looked behind these doors. It was remarkable that the Muslims did not care about the greatness of their doors and always chose two-legged types of mosques, schools and palaces, while the author relied on one piece of houses mainly as well as the doors of castles and forts - figure(1).

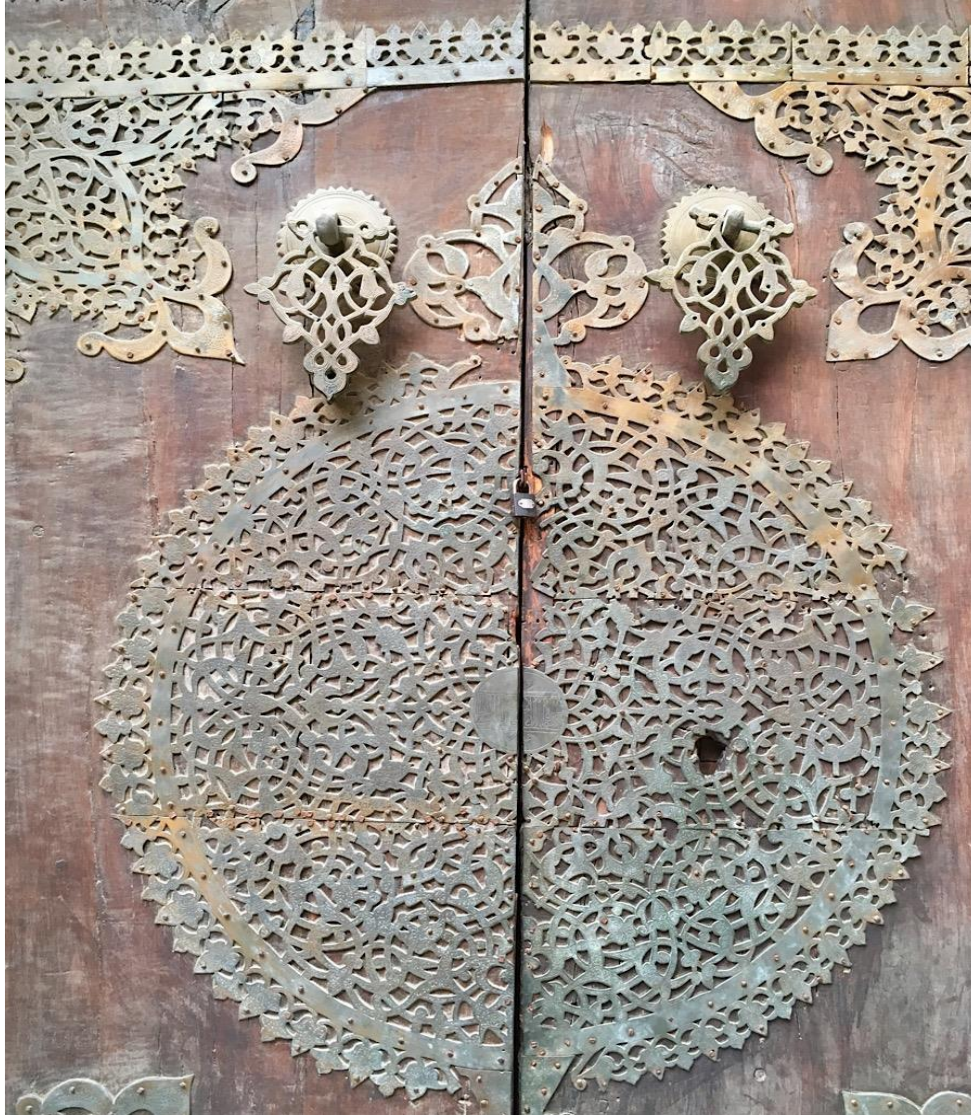


Fig. (1) Detail of Medallion Door in Courtyard [2].

2. Mamluk era

The architectural style in Mamluk Egypt depended on the local Egyptian heritage and the intimate Egyptian spirit overwhelmed it, as long as it did not show external influences other than the motifs and inscriptions of Mughal art as a result of Egypt's contact with the Mongols during this period. The Mamluk era in Egypt was distinguished by mosques, schools, baths, castles, and other buildings which were featured by their beauty, exquisite decoration, stiffness and high entrances. The vast activity of the Mamluk sultans in Egypt and the Levant in the construction of various buildings increased the demand for the wooden products which these buildings required (ceilings - windows - doors and others).

2.1 Mamluk architecture

Mamluk architecture initially relied on Fatimid and Ayyubid forms nevertheless developed in a distinct style [2]. The Ayyubids adopted some Fatimid architectural details, which lasted until the end of the Mamluk era. Several features emerged which distinguish Mamluk architecture from its predecessors. The **Maritime period** witnessed the arrival of most innovations in Mamluk architecture, the **Circassian period** developed, besides from here the research will be conducted on:

- Studying the design of wooden and armored doors in the Mamluk era, an archaeological and historical study, which was considered one of the Mamluk war architecture.
- Studying the ornamental elements in armored doors in the Mamluk era, as these doors were characterized by a great richness of ornaments, a variety of floral, epigraphic and geometric motifs.
- Studying the different types of doors and their significant impact during wars through many variables.

3. Door shapes in the Mamluk era

The walls and doors were the title of the Fatimid era with its distinctive architectural design and Islamic arts. The Great Wall included eight doors in its four directions, where two doors were built in each direction. In the north, “Bab al-Futuh” and “Bab al-Nasr”, and in the south “Bab Zuweila” and “Bab al-Faraj, in the east, Bab al-Mahrouq, Bab al-Barqiyya, and finally in the west, Bab Saada and Bab al-Qantara, and only three of those eight gates remain: Bab al-Futuh, Bab Zuweila, and Bab al-Nasr [3]. Doors were manufactured throughout the entire period of the Mamelukes, in addition the first door design was to have pairs of clerical strips above and below. All Mamluk doors consisted of a wooden beam on which metal plates were fixed. These either cover the entire surface or leave bits of wood visible to the onlooker. Four types of Mamluk metal doors could be distinguished based on their design: **overall star style door, medallion door, paneled door, and door with metal bands**. After determining the main characteristics of the planning for each of these, the development of designs of each type would be traced, in addition it would study the technique and decoration. The Egyptians excelled in the manufacture of woodwork despite Egypt's lack of types which were suitable for this except for the manufacture of simple antiques: Like sycamore, olive, and cypress trees, however they overcame this by importing to make various types of decorations from Turkey, Syria, Sudan and India. The characteristics of wooden and laminated doors in the Mamluk era were divided into architectural and decorative elements - figure (2-3-4).



Fig. (2) (3) (4) A pair of massive Mamluk revival silver and gold inlaid brass overlaid wooden doors Signed Elias Hatoun, Egypt, 1906 A.D [4].

3.1 Architectural elements

The field of Mamluk art and architectural history was well developed. This study explores some of the links between art pieces and the architectural environment in Mamluk Cairo [2]. The muqarnas gate became the favorite type. It usually consisted of a three-lobed or conical vault with a muqarnas vault. The gates were huge in size, almost reaching the top of the facades which crowned them, as in the Fatimid and Ayyubid monuments.

1) The facades and doors were given more attention in terms of design, decoration and exaggerated height.

- Often, it was found grouped windows (two or more round windows above).

2) The gates protruded from the façade, preceded by a staircase.

- The gate was composed of an iwan, the height of the façade or a little higher than it.

3) Arches were varied (semicircular, spiral, tapered, Abbasid, Fatimid, etc.).

3.2 Ornamental elements

Inscriptions were a major decorative form during the Mamluk period [2]. The manufacture of wooden doors flourished in the Mamluk era and the era of the Sultan al-Mu'ayyad Sheikh. The artist was creative in decorating them with a variety of methods indicating high skill and mastery of making them. Therefore, this was evident in the stylized wooden doors and the obelisk overlooking the qibla iwan in Al-Muayyad Sheikh Mosque – figure (5-6) [1].



Fig. (5) Entrance Doors in mumluk era [5].

Fig. (6) Door in Southern Wall of Eastern Iwan [2].

The armored doors with bronze foil in this era, they were found in the main door of the Al-Moayad Mosque, the main door of the Prince Abdul-Ghani Al-Fakhry School, and the main element in the decoration in them consists of the star plate, as well as, appeared in the door of the Qadi Abdul Basit School.

This method was not limited to doors only, however it extended to include wooden windows for buildings and pulpits.

This is the characters of ornamental elements in mamluk era:

- **Bequin:** the stones of the tiles are intertwined and inlaid with colored marble.
- **Mosaic:** marble, earthenware and glass.
- **Inscriptions:** stucco, stone, and wood.
- **Writing:** Kofi or transcription.
- **Muqarnas:** at the top of doors, windows, bases of minarets, domes, and capitals of columns.
- Caring for **colored marble mosaic tiles** in the pots as an entertainment element.

3.3 Motifs and ornamental units frequent during the Mamluk era

The use of star shapes in the decoration of doors and various wooden elements began since the Fatimid era, in addition this was exemplified by the mihrabs of Sayyid Nafisa and Mrs Ruqayya in the Museum of Islamic Art. As well as, the development continued in the Ayyubid era, in addition this was evident in the wooden structure of the tomb of Master Hussein and preserved

in the Museum of Islamic Art. This style had reached very mature in the Mamluk era, when the full and fair star plate appeared as well, besides artists created countless types and shapes [1].



Fig. (7) Door to Tomb Chamber [2].

Fig. (8) Entrance Door - Thesaurus Islamicus Foundation [2].

4. Wooden and laminated doors

The manufacture of wooden doors flourished during the Mamluk era, in addition the artist excelled in decorating them with various methods indicating high skill and mastery of their manufacture. The difference was as a major element in the decoration of wooden doors with the inlays of its fillings with tooth and zircon. This was evident in the stylized and inlaid wooden doors overlooking the qibla iwan in the Muayad Sheikh Mosque.

As for the armored doors with bronze foil in this era are found in the main door of the Al-Moayad Mosque, and the main door of the Prince Abdul-Ghani Al-Fakhry School.

This method was not limited to doors only but extended to include wooden windows for buildings and pulpits. The use of star shapes in the decoration of doors and various wooden elements began since the Fatimid era, besides this was exemplified through the mihrabs of Mrs. Nafisa and Mrs. Ruqayya in the Museum of Islamic Art. The development continued in the Ayyubid era, and this was evident in the wooden structure of the tomb of our Master Hussein and preserved in the Museum of Islamic Art. The style was very mature in the Mamluk era, when the full star plate appeared, in addition the artists created from it countless types and shapes.

5. Technical and industrial methods in the Mamluk era

The combined fillings method - etching - slitting - coloring - inlaying ivory, ebony, zircon & red wood and geometric motifs: It occupied the center stage, especially the star plate element, which was the most famous element found on wood and consists of:

1) The gear: It included 6 gears during the Ayyubid era, it became 16 heads for the Mamluk and reached 24 in Minbar or AlUla.

2) The Canadian.

3) Tonsils.

4) Complementary elements: These units were decorated with delicate floral motifs made of triple leaves and palmette fans, and these decorations were covered with tooth, bone and ivory. The most important wooden artifacts which had come to us were related to the religious architecture, such as mosques, schools, camnabars, Al-Muqira deck, and Holy Quran chairs, not palaces and houses for demolition or reuse.

The carpenters developed the methods of manufacture and decoration as well as the decorative units such as the star plate, which reached the peak of its prosperity in that era, as well as one of the most famous decorative units "combined fillings" and excelled in in lining them with ivory, seashell and zircon.

It was believed which the decorative goal was the most important goal of the manufacturer in the Mamluk era, because of the flourishing of this era in various arts and the keenness to enrich most of his products with various writings and decorations.

6. Mamluk Combat Architecture

Historic Cairo was a thousand years old, in addition it had many historical doors which were considered from the Islamic war architecture, whether those built in the Fatimid or Ayyubid era. The most famous were the eight Fatimid gates, which represented the safety and security valve for defending Historic Cairo throughout the ages, for each of these doors a name known to it among the people, they had repeated it for hundreds of years, and there was also a historical story behind it [3]. Its doors were constructed with architectural genius, as it had openings for shooting arrows against the enemies and pouring boiling oils and caustic liquids on enemy soldiers to prevent them from entering the fortified city of Cairo [6].

This was how the guarded Egypt used to secure all its borders, castles and walls, of which every brick was built for the security and safety of its people. Here from the gates of Fatimid Egypt, Cairo Al-Mu'izz, we entered the world of myths and historical stories which embodied the magic of the East, where the merchants of stores, agencies, and the true people of the quarter were with their own world, their travels, adventures, their trade and their stories which was spread all over Al Mahrousa. This was a journey in space and time through the gates of Cairo.

6.1 Design shapes and types of military doors

Carpenters developed industrial and decorative techniques as well as decorative units. The decorative goal was the most important goal of the manufacturer in the Mamluk era, due to the flourishing of mamluk era in various arts and the keenness to enrich most of his products with

various inscriptions and decorations [1]. Wooden doors were characterized through delicate fillings inlaid with ribbons of ivory or precious wood. Many historical doors which were considered from the Islamic war architecture had flourished, whether those built in the Fatimid or Ayyubid era, the most famous of which were the eight Fatimid doors, which represented the safety and security valve for the defense of Cairo. Throughout the ages, each of these doors had a name known to the people, and they had repeated it for hundreds of years, in addition behind it a historical story. The doors were built in the Mamluk era with an architectural genius, so they had openings for throwing arrows against the enemies and pouring boiling oils and caustic liquids on soldiers Enemy to prevent them from entering the fortified city of Cairo [1].

6.2 Design door types and developments within design

In the Mamluk era, door ornaments turned to geometric shapes of hexagonal or star units, in addition imported wood which was used in their manufacture, such as walnut, ebony, Indian teak and pine. The main door of the hanging church was a striking example of the extent of the development and understanding of the Egyptian carpenter for his art and how he used his materials. Filling ornaments were produced by inlays with thin ivory or precious wood bands. As well as, mashrabiya, chairs, decks and pulpits also flourished – figure (9-10).



Fig. (9) Medallion Door in Courtyard [2].

Fig. (10) Door of Amir Sunqur al-Tawil (late 13th century) - O'Kane [2].

7. Mamluk metal fixtures

The gates of old Cairo still bear witness to the original Egyptian carpentry arts, the surrounding arts of sculpture and decoration in a manner which made these doors, regardless of their size or purpose, pieces of art. They indicated a glorious history of art and architecture. From the castle to Mar Gerges, and from Al-Muizz Street to Manial Al-Rawda, doors included all the arts from

decoration to joinery with copper ... to sculpture and wood fillings in homes, churches, mosques, or even the palaces of the sultans. This was what prompts us to open the door for inspiration from these ancient arts and antique decorations to add some originality to the doors in our modern contemporary architecture [7].

7.1 Metal Fittings: The Reappearance of the Medallion Door

The entrance door had a central polygonal star pattern with silver inlay. The remaining five doors to the courtyard were a medallion with identical two-page doors with upper and lower inscription bands, the compositions formed a round central medallion with upper and lower capitals, divided from the opening – figure (11-12) [2].



Fig. (11) The turba (tomb) al-Kilaniyya [8]. It was Built in 1352, on Bab al-Silsila Road (Al-Silsila Street), it had a majestic entrance and a dome topped through a dome. The wooden iron door was decorated with carvings in the form of barley seeds.

Fig. (12) The use of oxidized copper made with voids, the formation of star shapes, ornaments, ribbing, in addition it inlaid with ivory and mother of pearl [7].

7.2 Typology and Development of Mamluk Metalwork Fittings

Each of the four categories of Mamluk metal fixtures, namely doors, door handles, window grilles and window shutters, could be divided into a few types, based on their design. These types either existed since the beginning of the Mamluk era or appeared at some point in the Mamluk era. It was taken as a starting point from which to trace the development of structures during the Mamluk period. Three parameters for each type would be discussed. First, the type design would be broadly distinguished, after which developments within the design would be developed over time, and possible experiences of individual metalworkers would be discussed.

Second, techniques for fabricating the basic components of these artifacts and decorating their surfaces with a variety of decorative devices would be considered – figure (13) [9].



Fig. (13) Entrance Door-Inscription on Lower Left Leaf - Thesaurus Islamicus Foundation [2].

8. Manufacturing techniques of Mamluk doors

The first doors of mosques, according to the sayings of historians, were simple in their composition, and the interest in them was almost limited to providing suitable thicknesses for their wood or relying on good types of wood in their manufacture. Then the carved decorations appeared on the doors, especially those used in the homes of the wealthy elite, an example of this development, kept by the Bianchi Museum in Athens, it was a door not exceeding 120 cm in width, while it reached a height of 3 meters, and the doors were provided with fillings decorated by recessed carvings with plant motifs based on the drawing of a tree with many branches distributed on its sides plant leaves and fruit as well as geometric decorations. It was believed which this section was made from Tikrit in the second century AH (8 AD).

8.1 The artistic and industrial methods used in the Mamluk era

In the Mamluk era, the door ornaments turned to geometric shapes of hexagonal or star units, and imported wood was used in their manufacture, such as walnut, ebony, Indian teak and pine. Due to , the main door of the hanging church was a striking example of the extent of the development of the Egyptian carpenter for his art and how he used his materials [7].

8.2 Geometry, floral designs and graffiti in the Mamluk era

The Mamluk metalwork installations could be divided into a small number of types, based on their design. Species either existed from the beginning of the Mamluk period or were introduced at some point in the Mamluk era. It was considered as the starting point for tracing the development of structures throughout the Mamluk period – figure (14-15) [10].

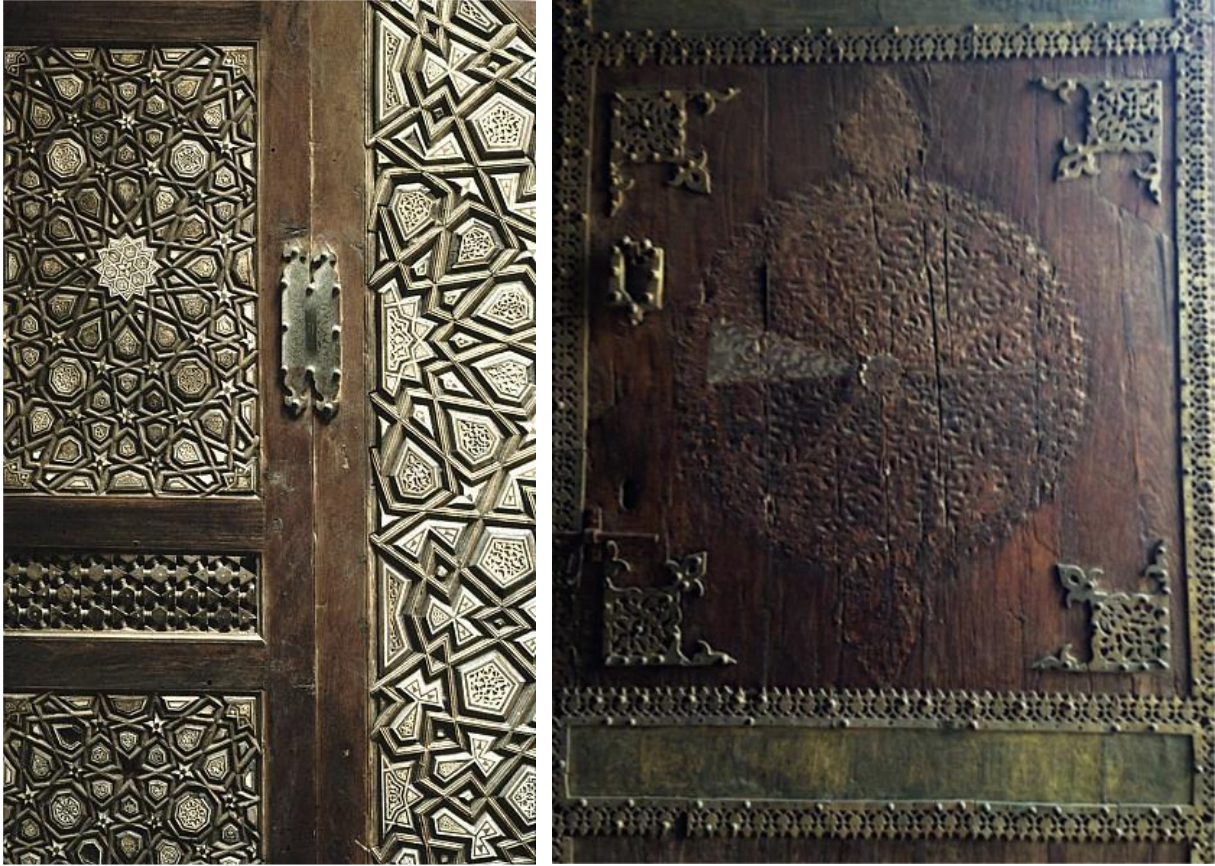


Fig. (14) Minbar in Mamluk era [11].

Fig. (15) Entrance Door with Missing Metal Plaques [2].

8.3 Light in armored doors

The armored doors had speakers or hammers which were used to alert when someone wanted to enter when they were closed, they often had geometric shapes, in addition they were decorated with space.

9. Gaskets for doors

The large historical doors of the types of carpentry which were used in the old doors, including the art of wood interlocking, which depended on pecking and tongue and did not use a nail or glue to allow the wood to expand and contract with the fluctuations of the atmosphere without affecting its delicate decoration. As well as, the arts of bas-relief or relief on wood to make geometric and plant motifs governed by an aesthetic value of symmetry, so each unit was identical with the other in an organized formation [7].

In the Mamluk era, carpenters were able to create a miraculous innovation in the decoration of fillings, in addition, the most important appearance of these decorations became grouped in the form of star plates, as well as, in the 13th century AD the decorations were made of bone and tooth to use wood of different natural colors.

Therefore, the lathe industry, it was an ancient industry, where we note which the desire to obtain its aesthetic effect began in some furniture in the era of (Tutankhamun) and the oldest piece in Egypt in the Islamic era was found dating back to the 15th century AD, besides wood

turnings were used in making mashrabiya and wooden partitions for compartments in mosques, chairs, wardrobes and other woodworks.

Starting from this early period of the Abbasid era, Muslims began to supply doors with fillings which were attached to the body of the doors to give them artistic beauty. These fillings often included geometric and plant motifs as well as some written texts which referred to the originator, his titles, and the year of completion of construction. One of the most famous examples of these types of wooden doors was the door of the Al-Azhar Mosque, which was commissioned by the Fatimid Caliph Al-Hakim, God willing, in addition it was one of the holdings of the Museum of Islamic art in Cairo, it was decorated with large rectangular wooden fillings inside of which were vegetal drawings executed in tilted engraving. For the doors of mosques, as the supervisors of the Al-Azhar Mosque had to remove it in order to insert a huge silver oven specially made to increase the lighting inside the mosque during Ramadan in the early fifth century AH. So that, this period witnessed the installation of metal ornaments and ribbons on the doors of mosques, such as, the doors of the Tulunid Mosque in Cairo.

10. The oldest doors

Starting from the middle of the fifth century AH at least, copper bands appeared in the cladding of the lower and upper parts of the wooden doors in mosques bearing the names and titles of the originators. As soon as the middle of the sixth century AH until the copper and bronze sheets covered the entire doors from the outside, although from the income in some cases the door of the Al-Saleh Mosque Tala` bin Razik in Cairo (555 AH) was considered one of the oldest remaining doors of this type. Wooden doors laminated with forged copper or cast bronze spread widely in the Islamic world starting from the seventh century AH (13 AD), besides they became one of the distinctive features of Islamic carpentry due to the scientific and technical benefits they achieve. On the one hand, they gained more rigidity and support the protective function in them. On the other hand, it compensated for the poor quality of some types of thick wood which were used in the manufacture of doors, in addition to the forged, cut-out copper with all kinds of geometric, plant ornamentation and inscriptions gave these doors majesty and beauty which strikes the eye. The installations of the sultans and princes of the Mamluk state in both Egypt and the Levant maintain many armored wooden doors which stood as a testament to the technical sophistication. The armored door industry reached in the Mamluk era beauty and artistic elegance.

10.1 Bab Zuweila

Bab Zuweila was considered the most beautiful gates of Cairo from an architectural point of view. This was due to the rise of Sultan Mu'ayyad Sheikh, one of the Sultans of the Circassian Mamelukes historically known as the Tower Mamluk. In the year 1412 AD, the minarets of the Al-Fakham University were built adjacent to Bab Zuweila from the west side, which was the mosque known as the Al-Mo'ayyad Mosque, where all top The minaret of one of the two semi-circular towers which make up the door, they were one of the most beautiful royal minarets because of their architectural beauty. Ali Bab Zuweila for a long period of time until it fulfills its purpose as an example to others. Therefore, this door was hanged, another Sultan Tumabai who took over the rule of Egypt in the state of the Circassian Mamelukes [6].

The door consisted of two rectangular towers located at the top of each tower of the defense and control room, in addition it resembled the victory gate and the opening in the architectural design, although what distinguished it was the presence of a chair over the holding of the door opening for observation, then it became to monitor trade and markets, besides the gate was devoid of decorations. However the door's fame was due to the fact which it was used in the suspension of those sentenced to death throughout the Mamluk and Ottoman eras, despite it was commented by the messengers of Hulagu who carried a threatening message from the Mongols to Qaz [3].

11. The most beautiful doors

One of the most beautiful armored doors remaining today in its first condition without changing the door of a school Sultan Al-Malik Al-Zahir Barquq in Cairo. It had wonderful geometric ornaments based on the decorations of the star plate, the engineering and artistic innovation created by the slices of Muslim artists. In it, the Sultan "Barquq" was written with gold wires fastened in the way of hammering or inlays in the bronze cladding.

12. Types of doors in the Mamluk era

All Mamluk doors consisted of a wooden beam on which metal plates were attached. These either completely covered the surface or leave bits of wood visible to the viewer. It could be four types of Mamluk metal doors distinguished based on their design: **all-star style door, medallion door, panel door, and metal stripe door** [9].

12.1 Overall star pattern doors

The first type to be discussed was the general star-patterned door, which was the most difficult Mamluk door to decorate door. All examples were found in religious buildings in Cairo, except for one Aleppo specimen. These doors were manufactured throughout the entire Mamluk period, the oldest model dating from 662/1262, although most of the existing examples were made in the 14th century. The standard design of the overall star style door consisted of three elements: a large geometric central sphere consisting of star designs, two rectangular clerical bands above and below this, besides a boundary frame which not only encloses the entire composition, but also acted as a dividing area between the central geometric field and the clerical ranges [12]. Regardless of the characteristics of the entire design, the design of the focus of this genre - the engineering field - included a few specific components. It consisted of clusters of stars, kite-shaped shapes and polygons. The design was dominated by the multiple star units which consisted of a central star adjacent to an interior a circle of shapes in the form of a kite, besides an outer circle of hexagons. The number of these contiguous shapes corresponded to the number of points of the star [13]. Often, the geometric pattern was further varied through the so-called polygon modules of various shapes which matched the remaining space between the stellar units and which act as a connecting device to hold the entire pattern together. They ranged from simple pairs of arrowheads adjacent to two hexagons to hexagonal or octagonal shapes which alternate small stars with smaller polygons – figure (16-17) [13].

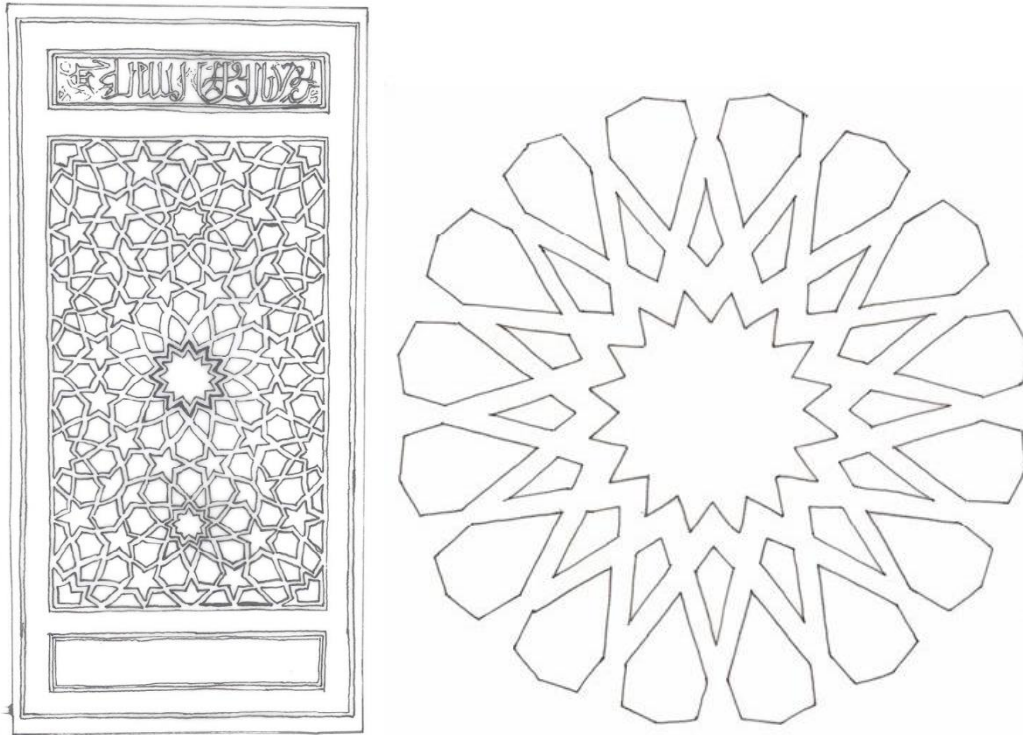


Fig. (16) Overall star pattern doors [12].

Fig. (17) Details of Overall star pattern doors [13].

12.2 Medallion door

The second type of door under consideration was the medal door. Its design consisted of a medallion of four Corner pieces, two rectangular panels and boundary strips frame the field. This type was developed in Cairo where all extant examples still adorn the exterior or interior of buildings, except for one door. It was installed in the south of Cairo in the city of Al-Fayez [14].

The oldest extant specimen dated from the late thirteenth century and corresponds to writing as far as layout was concerned, although it remained to some extent an anomaly due to the animal figurative decoration. The tradition took effect only from the reign of Sultan Barquq onwards. His School and Choke boasts of no fewer than six identical medallion doors, beginning of a period of preference for this type [15].

The primary element of this type was an openwork medallion with three-lobed ends above and below, which controlled the central part of the door in location and size. It was surrounded by four openwork works.

The types of decoration applied to the method of casting, drilling and inlays were geometry, floral motifs, inscriptions, emblems, and glyphs. As the case in the star style doors in general, geometric shapes such as circle, triangle, and rectangle were used to form the main outline. However, the fillings for these external devices are very limited. Only twice did the star-based geometric patterns make the designs occupy the central and angular medallion. Often, they would fill in the boundary ranges which were presented in addition to the most common flowers. As a surface decoration, only geometry was used Intermittently: If present, it appeared as spirals which form the background of patterns or knotted designs [16].

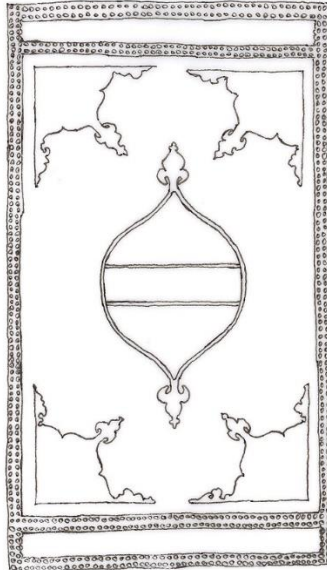


Fig. (18) Medallion door [14]

The floral motifs played a dominant role as filler because they were the main openwork shapes used to decorate inside medallions and corner pieces. They also controlled the border bands which were forming repeated rows of trilobites and slender clover leaf shapes laid out on a straight baseline. Besides providing Openwork designs, floral patterning was the main decorative tool used through the openwork surface. Moreover, it served as a background for the inscriptions. Regardless of their role, they were most often stylized, it consisted of rotating stems, forked leaves, trilobites, and palmettes. The lotus flower has only been found once, in the late 15th century throughout the Mamluk period, the shape and location assigned to the inscriptions on the medallion doors were uniform. The most common were the rectangular bands located above and below the medal field – figure (18) [17].

12.3 Panelled doors

The third type of Mamluk metal door is the cladding type, which was characterized by its division into panels. There were seven specimens or parts of all of them placed in the outer walls of the Umayyad Mosque in Damascus, which may have housed more of them at one time [18]. In all except one, the metal was facing outside, the exception was the door in the north wall facing the inside. Six of them were manufactured between 808/1405 and 820/1417 while one was an early Ottoman addition made more than a century later in 933 / 1527. All installed during restoration campaigns as they were damaged by fires. All these doors consisted of two pages, each leaf divided into a square or a slightly recessed square. Rectangular panels were placed one on top of the other, in addition their number ranges from three to five [19]. Some of the doors of these panels were identical in shape and size, while a more varied field was created by alternating on others large rectangular panels with rectangular bars. Regardless of its shape, symmetrical metalworkers preferred arrangement on both costae of one door. The panels were separated from each other by flat, decorated sheets which were installed on wood. In some cases, these sheets were decorated with grandiose heads standing at relief – figure (19).

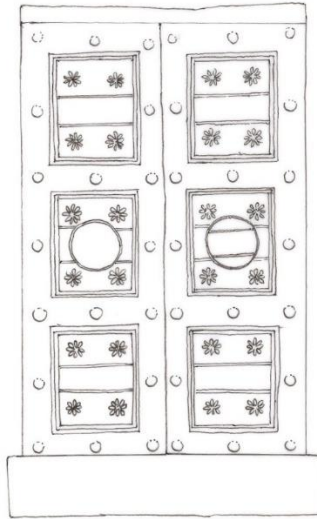


Fig. (19) Internally, each panel consists of panels of different sizes, most of which were decorated with raised motifs, some of which were flat and unadorned [19].

12.4 Doors with metal bands

The fourth and final type of Mamluk doors is the one named for its only and most striking decoration, which was metal attach. This type was common during the Mamluk period in both cosmopolitan and religious contexts. Existing Samples were found in all major cities in the Mamluk Kingdom where they were used as entrance doors or – Often in multiple copies - indoors. It was also repeated in stylized drawings of the Mamluks Period, was the only one of all four types of doors to be depicted in this way, doors of this type were distinguished by horizontal rectangular metal strips, which were present in various numbers.

The most modern was the one which consisted of two rectangular metal strips placed in the upper part and at the base in wood Support. Sometimes these bands were enclosed by narrow, openwork borders consisting of trilobites alternating motifs with clover. This restricted use of metallic papers leaves large, unbroken planks of blank wood visible; aesthetics could call for the addition of color by painting the wooden surface.

This painting had already been applied to these wooden trusses and was attested to by the description of the door in the endowment instrument from the angle and path of Sultan Farag b. Barq in Cairo: a colored wooden door covered with inscriptions of gilded and gilded bronze "(a door made of colored al-Mudhakkan wood, wrapped with inscription). The Doctrine and Books (Doctrine) [20]. However, no traces of paint appeared on the existing doors found so far.

The doors design with two rectangular bars was closely related to those of the whole medallion type star and door pattern. If the central decoration of the other two was completely omitted, then what remained was a pair of rectangular bars, placed in the same place used in those doors which had no decoration other than metal bands. This simplified type of door decoration grew in popularity in the fifteenth century. The century could be explained by the scarcity of the mineral or the shepherd's limited budget.

Besides this characteristic partial cover, there were doors of this type whose surface is completely flat Covered with rectangular strips [21]. It was found especially in secular constructions such as khans or Medina Gates, [22] although in Jerusalem samples were also installed in structures of a religious nature – figure (20-21).

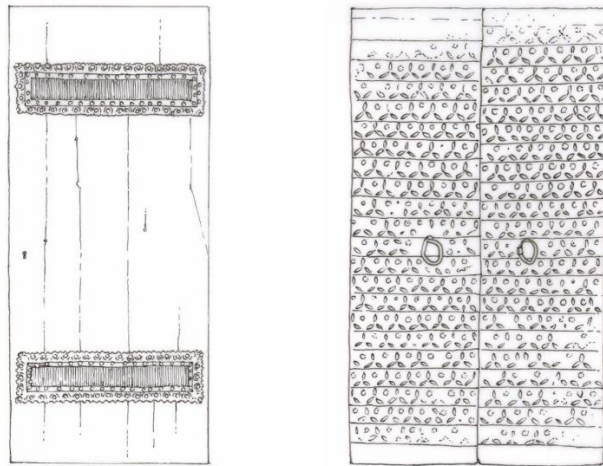


Fig. (20) (21) Doors with metal bands [21]

13. Door Knockers

Often the only visible traces of door handle on Mamluk metal doors were adjacent holes in two wooden pillar sheets. These gaps were most visible on the medallion doors where the position was assigned to the handles above the central circle which dominated the door design.

13.1 The holes-and-bosses type

The first type consisted of round or elongated hangers characterized by perforations along the outer and inner edges which alternated with teardrop-shaped heads. Within this type, two subgroups could be distinguished based on the shape of the hanger, in addition to the holes in it. The first group consisted of circular relationships with triangular projections around the rim and a lobed or star-shaped opening in the center.

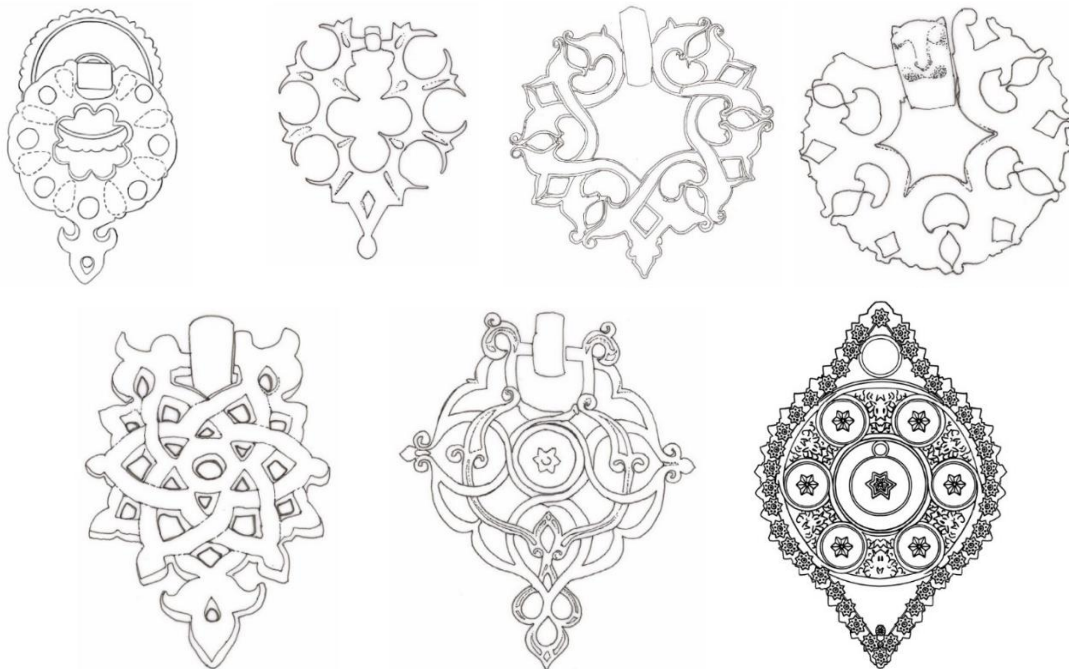


Fig. (22) (23) (24) (25) (26) (27) (28) Detail of door Knockers in mamluk are.

14. Industry style and decoration in Mamluk era

Armored doors were known in buildings and monuments in the Mamluk era, but not in their current sense of their resistance to theft and destruction. The door was made of wood, and then it was laminated to protect it from the outside with another material, usually of iron or copper. These other materials were not left deaf, and the Muslim artist used them to make decorations on them which made their shape beautiful to become a masterpiece. These decorations include them such as star dishes, repetitive geometric shapes, floral motifs, and others. Armored doors were not widespread among the public, and no one was able to manufacture and own them because they were expensive, in addition, armored doors were usually found at the entrances to huge cities, including Bab al-Futuh and Bab al-Nasr, some facilities and buildings built by the sultans and princes of great material ability such as Palaces. Among the most famous mosques in Cairo with armored doors are Barquq, Sultan Hassan and Al Moayad Sheikh.

14.1 Methods of motors and door hinges in the Mamluk era

The best types of wood were chosen for the manufacture of wooden doors laminated with metals, including copper. In addition, the Mamluk era witnessed the beginning of the introduction of fillings in the manufacture and formation of wooden doors to become an ornate piece of art, as these fillings were placed in an artistic way to appear in the form of various decorations. Hinges were one of the most important elements of a door, as they provided the ability to open and close doors. Hinges played a very important role in the means of movement of doors, as it was distinguished through its strength and various types, in addition to the use of very strong materials to contribute in insurance tools through the Mamluk era.

14.2 Insurance tools in the Mamluk era

The first doors were simple in their composition, and the interest in them was almost limited to providing suitable thicknesses for their wood or relying on good types of wood in their manufacture. Then carved decorations appeared on the doors, especially those used in the homes of the wealthy elite [23]. Wooden doors laminated with forged copper or cast bronze have spread widely due to their scientific and technical benefits [23]. The facilities of the sultans and princes of the Mamluk state in both Egypt and the Levant maintain many armored wooden doors which stand as a testament to the technical sophistication which the manufacture of armored doors reached in the Mamluk era. In addition, those doors were subjected to various operations of theft and looting starting from the Mamluk era, especially if they were used Gold or silver are enough for some of the decorations of these doors.

The armored doors had headphones or hammers which were used to alert when someone wanted to enter when they were closed, they often had geometric shapes. Hence, they were decorated with space, and it differed in that from the headphones of houses which took the form of animal heads like a lion in a symbolic reference to the meaning of guarding and preservation.

15. Benefiting from the methods of manufacturing doors in the Mamluk era to the modern era

The manufacture of these doors has not been interrupted until the modern era, especially in the homes of wealthy families [23].

16. Results and discussion

The doors in the Mamluk era were constructed with an architectural genius. Inscriptions were a major decorative form during the Mamluk period. The manufacture of wooden doors flourished in the Mamluk era. The artist was creative in decorating them with a variety of methods indicating high skill and mastery of making them. The characteristics of wooden and laminated doors in the Mamluk era were divided into architectural and decorative elements. The research studied the artistic and industrial methods used in the Mamluk era and the techniques of manufacturing the basic components of these artifacts and decorating of doors. The doors in the Mamluk era were constructed with an architectural genius. They had holes to throw arrows against enemies, pour boiling oil on enemy soldiers to prevent them from entering the fortified city of Cairo.

Besides, carpenters developed industrial and decorative styles, as well as the development of decorative units. They developed the methods of manufacture and decoration for armed doors. Consequently, the research highlighted the importance of the doors which appeared in the walls of Cairo during the three eras in which the masterpieces of war architecture in the Islamic civilization arose. Because of its glory, beauty, grandeur in architecture and creative engineering design, which expressed the prestige and power of mamluk era. In conclusion, the research concluded a set of standards and strategies for the main characteristics and ornaments of door in Mamluk era, **for instance:**

- Studied the design of wooden and armored doors in the Mamluk era, an archaeological and historical study, which was considered one of the Mamluk war architecture.
- Studied the ornamental elements in armored doors in the Mamluk era, as these doors were characterized by a great richness of ornaments, a variety of floral, epigraphic and geometric motifs.
- Studied the history of the doors industry, and the style, decoration.
- Studied the different types of doors and their significant impact during wars through many variables.

Therefore, the study aimed to study the design of the wooden and armored doors in the Mamluk era, an archaeological and historical study, which was considered Mamluk architecture, as well as the study of the decorative elements in it. Furthermore,

17. Conclusion

The research concluded a series of basic concepts and techniques for the manufacture of doors throughout the Mamluk period. The doors of the Mamluks were used as the main executive place in the Mamluk era. Finally, the research enhanced a set of basic concepts for designing armed doors in Mamluk period, in addition the doors played in the life of the Mamluk city as a major executive place in the Mamluk era. Consequently, the research provided factors which affected armed doors in Mamluk era. Because of, the doors in the Mamluk era were constructed

with an architectural genius. They had holes to throw arrows against enemies, pour boiling oil on enemy soldiers to prevent them from entering the fortified city of Cairo. As result, the doors of the Mamluks were used as the main executive place in the Mamluk era.

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- [13] "For a mathematical approach to the composition of star patterns, see Lee (1987)."
- [14] "The door (cat. no. 52/1) in the mosque of Princess ÝAÒalbÁy (903– 5/1498– 99)."
- [15] "This is the door (cat. no. 7/1) made in the name of Amir Sunqur al-ÓawÐl (before 699/1299– 1300)."
- [16] "On the entrance door (cat. no. 47/1: Plate 197) of the mosque of Amir QajmÁs al-IsÁqÐ (884– 86/1479– 81)."
- [17] "An epigraphic roundel is found on the medallion doors in the madrasa and khÁnqÁh of Sultan BarqÛq (786– 88/1384– 86: Plate 85), on the entrance door (cat. no. 35/1: Plate 144) to the madrasa of Sultan BarsbÁy (826– 27/1423– 24), and on the entrance door (cat. no. 31/1: Plate 121, cat. no. 31/2: Plate 124, cat. no. 31/3: Plate 127, cat. no. 31/4, 131, and cat. no. 57/1, Plate 245. The wooden door positioned in the qibla wall of the Uma."
- [18] "These are cat. nos. 29/1: Plate 114, cat. no. 29/2: Plates 115 and 116, cat. no. 31/1: Plate 121, cat. no. 31/2: Plate 124, cat. no. 31/3: Plate 127, cat. no. 31/4, 131, and cat. no. 57/1, Plate 245. The wooden door positioned in the qibla wall of the Uma."
- [19] "NuÝaymÐ (1951) II, 403– 4; Sauvaire (1896), 219– 20. Al-NuÝaymÐ narrates that the small side doors in the east wall of the Umayyad mosque had been closed off and blocked from view by shops built against the mosque as wall during the civil unrest in Damascus

[20] "Lamei Mostafa (1989), 38, line 109; 40, line 109."

[21] "The entrance door (cat. no. 23/1: Plate 51) of the mausoleum of JamÁl al-DĒn BahlawÁn (753/1352) and the entrance door (cat. no. 25/1: Plate 76) of the mausoleum of Óashtamur al-ÝAlÁĒĒ (784/1382– 83) in Jerusalem."

[22] "Such as the door (cat. no. 55/1: Plate 240) in Aleppo, khÁn al-QaÒÒÁbĒya (916/1510), or that (cat. no. 56/1: Plate 243) in the khÁn of Governor KhÁĒirbak min MalbÁy (920/1514) in the same city."

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