Production Analyses of Glazed Bricks during Ilamid Times in Iran

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Abstract: - Archaeological documents and evidences show that west south and south of Iran were among the oldest glazed brick production centres for having desirable clay soil and minerals and several mines and were equipped with advanced techniques. Remained epigraphs form Ontash Napirsha in Choghazanbil (13 B.C.) includes special information about producing glaze for bricks and glazed objects. Continuing the changes in style and volume of glazed brick production, hard and multi-colour bricks were produced and used for architectural decoration.

Regarding glazed brick production techniques by Ilamids we can pay attention to the ways of making glaze, production, designing paintings and measuring system which were used by artists, architects and artisans of Ilamids. Bricks of this period are independent regarding paintings on them and artistic composition and have their special style and method. Continuation of this artistic and technical tradition can be found in new Ilamid times and it continues to be found in glazed brick productions which were used in Daryoush Palace in Susa and Persepolis (Parseh) and is analyzed in the form of case study in this article.

Key-Words: - Glazed bricks, Masonry materials, Cultural heritage, Ilamid architecture

1 Introduction

The instances and documents of archaeology confirm that the western south and then the south of Iran are of the oldest centres of manufacturing glazed bricks. Obviously, this technique of glazed brick manufacturing could be developed in a country with rich reservoirs of clay soil, ironstone and mines. The oldest instance of glazing industry in Iran where the materials were lightly covered belongs to 4000 B.C. [1]. In addition, small glazed dishes have been found in discovered tombs of Susa, which belong to 400 BC and small statues of animals, which are smaller than the dishes, have been found in the tombs of Susa belonging to 300 BC. In the discovered tombs of Ilamid time in Susa, some glazed small beads like rosary and cylindrical shape dishes have been found. These show that the coating of these things have been of quartz or other silica stones available at the time. Archaeologists have discovered lots of glazed brick in western south of Iran which belong to the second half of the second century BC. Despite some difference in their style and method, they are all manufactured with advanced technology. The first instances of these bricks are discovered in Tepti Ahaar tomb (middle Ilam, late 15th century B.C.) as glazed arches. The remaining instances show that the oldest ornaments of the buildings in Ilamid times were plaster coatings and wall paintings [2]. However, by the expansion of glazing industry the simple ornaments were replaced with glazed bricks. The remaining glazed bricks of the Choghazanbil temple indicate that by the beginning of the Ontash Napirsha kingdom in the middle of the middle Ilamid times around 13th century, using glazed mud things and crockery became common to decorate palaces and temples. Therefore, the technique of making glaze and glazing industry, which apparently belonged to Ilamid, became very important and popular [3]. Ilamids were the first to use glazed bricks for decorating the buildings frequently. In addition to glazed samples of Ilamid times, some of the inscriptions of this period indicate the presence of glazed industry. The remained inscriptions of Ontash Napirsha in Choghazanbil include some information about making glaze for bricks and other glazed things [4].

2 Choghazanbil Ziggurat

Includes Ziggurat (in Sumerian means heaven-rise building) or the big temple which was constructed by Ontash Gal – the mighty king of Ilamid – for Inshushinak God around 1250 B.C. Due to the dry condition of this region and shortage of wood, Ontash Gal had to employ a complete army of ten thousands of tile makers, brick makers and workers for years and manage them. He needed experts for unique collector drain and irrigation of “Dorontash” city, experts for decoration designs of the walls with bright color tiles, lots of metal gifts and a group of scribes to carve the words on the thousands of used bricks – which were done by hand without having any seal. Therefore, Ziggurat of Choghazanbil is the oldest Iranian work,
which has amazing characteristics and dimensions and
can compete with the pyramids of Egypt (see figures 1, 2) [5].

![Fig.1: Choghazanbil Ziggurat](image1)

This building with the dimension of 106*106 meters
and 53 meters height is a five-storey scalar form
building and includes 5 concentric towers with different
heights (at present 2.5 storey around 23 meters of it
remains). It is located in the area of Haft-Tappeh (7
Hills) of Khuzestan, the religious city of Dorontash with
30 km distance from capital city – Susa- of Ilamids at
that time. With his special scrutiny and making
experimental cavity – on the west north side toward
Ziggurat – in the research conducted in 1960-1961,
Roman Girshman got to know that Ziggurat Dorontash
is constructed not in one step operation but in two steps.
The first storey of Ziggurat, which was a square of 8 m
height was constructed around an internal area of around
100 square meter space and was covered with fired
bricks. This storey had 8 m height in three sides and the
height of fourth side of it in east north part was 12
meters.

Adobe with a façade of fired red brick is used in the
construction of this building and glazed bricks with blue
and green color are also seen among them. During
archeological discoveries and excavation of the structure
70 brick with writings in Ilamid and Akedi language are
found showing that this temple has been the place for
Napirsha and Inshushinak Gods. In the body of the
Ziggurat Choghazanbil one row of written bricks are
used after every ten row of bricks. Until 1965 a number
of 5275 written bricks and adobes are discovered in
Choghazanbil in Ilamid and Akedi languages. 659 of

these are still in the body of Ziggurat. These writings
indicate the strong literature in 3250 year ago in Ilamid
lands [6]. The mold of the bricks of this temple, which
are found in archeological discoveries, is bigger than
that of Ziggurat and its wall were decorated with blue
and green glazed bricks with golden and silver beams
with the shapes of circle or diamond or writings on
them. The adobes used in this building were 37*37
centimetre and thickness of 7 centimetres or 40*40
centimetres with thickness of 10 centimetres (see figure
3). From the other hand, the crescent arches of
Choghazanbil are of the first man made arches, which
are used in this temple (see figure4).

![Fig.2: Choghazanbil Ziggurat near Susa (1250 B.C.)
has been selected based on golden proportion.](image2)

As we said before, in some levels of used bricks on
the rows of the façade the rules are carved on them in
Ilamid language. The method was that the boss lines are
created by carving a ditch base and then the fired adobe
and engraved brick is obtained (See figure 5). On the
whole the city buildings are constructed by adobe and brick and in spite of being old many of them have still remained safe. On the façade of the buildings in Choghazanbil area some inscribed bricks with Ilamid and Akedi languages are used. These bricks are repeated on the body of Choghazanbil with the distance of every ten row. The name and pedigree of the king – constructing the building– and the way of construction and the goal of it is written. Therefore, thousands of simple and inscribed bricks decorated the city space. In addition, glazed bricks, natural mastic, plaster coatings and clay spikes were prevalently used.

Form the other hand every four side of Ziggurat had stairs, which were blocked with a gate. These stairs were the route to ascend upper floors. One of the ways to calculate the number of the floors of the Ziggurat is considering the slope of these stairs. Therefore, if the stairs continue to be made in this slope around the fifth floor, we would reach to the center of Ziggurat or the entrance of the supreme temple. The stairs were made of bricks and to avoid erosion of them due to flowing water of the upper floors, some of them were covered with stone, some of which remain up to now. The doors of temples and palaces were made of wood decorated with glass bars. During the excavation operations, some pieces of bull glazed and clay statues, which protected the entrance of the Ziggurat, are found. During Hakkamneshid time glazed bricks with bigger dimensions were used on the walls of Apadana and Susa palaces.

Choghazanbil and the industry of making glazed brick may have penetrated in Assyria after the Ilamids conquered there. The glazed bricks of Napirsha time were blue, green or white or mixture of these colors without any engraves and used in frontal or façade of the building. During this time, engraved glazed bricks decorated with circles with white or blue centers or other decorative engraves such as white diamonds on a dark blue context were used whose sample remain on Shahi entrance and Hadaya Sakku (gift platform (see figures 6,7) [7].

By the emergence of Shotrok Nahounteh (1190 -1155 BC) some changes appeared in style and volume of the glazed bricks. On an inscription from Okety, he mentions new techniques by the aid of which colorful and strong bricks were used in the decoration of the architectural works. The bricks discovered from Shotrok Nahounteh time, which are in Susa citadel are square in shape and there is an arch in the center, which were probably made to install them on wood and clay pegs to join them to the wall. These arches were used alternately as decorative elements together with simple bricks in the building) [8]. In the memorial Tal Melyan building, which was built for the God of Inshushinak at the time of Shilhak Inshushinak, glazed bricks are used. These bricks indicate that one of the manufacturing centers had been in Fars province of Iran. Among these bricks and together with the inscription an arched shaped vault (which is criterion of glazed bricks of that time) has been found) [9].

In late second century BC, which coincides with new Ilamid times, using arch shapes or vaults in the decoration of palaces and temples had expanded. A small and square shape temple whose façade was decorated with glazed green bricks is found, which belongs to Shotrok Nahounteh II. Other glazed bricks which are discovered around this temple and belongs to the eighth century at the same time with this king, as would be explained later, belongs to this period ) (see figure 8) [10].

The discovered samples from Hotldoush Inshushinak (698-693 BC) in the new Ilamid times, Ontash Napirsha, Shotrok Nahounteh, Kotyr Nahounteh and Shilhak Inshushinak indicate that glazing technique had been formed in Ontash Napirsha time at the time of middle Ilamid times. According to the inscriptions discovered from Shotrok Nahounteh I times, the technical evolution occurred in this industry at this time and in the times of other kings this industry continued with some changes in it. And at the time of Shotrok Nahounteh II, the new Ilamid times, this industry made a considerable progress in glazing industry and enabled the artists to make glazes more crystal and brighter and use more brighter colors such as green, yellow, dark and light blue, white, gray and red.
In this part, we will briefly have a look at the glazed brick industry, which belongs to artists of Ilamid times. Regarding the technique of manufacturing glazed bricks, we can pay attention to the harmony in producing the glaze, manufacturing, design of the engravings and measuring system, which were used by the artists of Ilamid times. It seems that some rules were imposed on the manufacture of glazed bricks at Ilamid time and made the artists to follow a fixed norm in their works.

![Fig.6: Glazed brick facade design that decorated with circles and diamond engravess](image)

![Fig.7: Glazed brick facade design that decorated with circle engravess](image)

![Fig.8: Shotrok Nahounteh II tomb in Susa](image)

### 3 Kind and Mixture of the Brick

The material used in glazed bricks of Ilamid times were a mixture of high quality clay soil, fine gravel and chaff. The artists would pour this mixture into wooden one-side molds of cube, cubic rectangular and circle shapes and formed them. Then, the bricks were covered with a layer of fine clay soil, which made the surface of them plane and even.

After finishing the production process, mono or multi color glazes were used to decorate the surface of the bricks. This process included two steps: at first, the glazed surfaces were made plane and even, which made their washing and cleaning easy in the buildings. The second step was the protecting role of the coating against natural and atmospheric elements, which were the result of natural condition of the area.

### 4 Glazing

In this method a tool like brush were used to decorated the surface of the bricks with one or different colors. Then, to stabilize the colored glaze a glass glaze was used.

### 5 Form and Shape of Decoration

The forms of the bricks were cubic, cubic rectangular or circle with a vault and in some cases two or three sides of them were oriented with engravings (Gifts’ Platform in Choghasanbil) (see figures 6 & 7). Molded bricks of Inshushinak temple and molded bricks of new Ilamid times, Shotrok Nahounteh II are discovered as glazed bricks of multi color, half-vaulted with additional black engraves and multi or mono color decoration (mostly yellow and blue colours).

In some cases, the engravings on the bricks were decorated with additional black lines. This technique is one of the inventions of Ilamid artists, where the paintings look vaulted. This method was used by using a fine paste of natural bitumen (see figure 9).

Regarding the artistic aspects of these bricks, we can mention that the art of this time was an independent one with regard to the subject of its paintings and context. Even though it has been affected by the customs of Mesopotamia for its beings close to it, it has its special style and independent method. As an example, we can mention the lattice system in producing bricks, which were molded or made by hand (see figure 10).

The design and paintings of this time are inspired by the former customs; as an example at the late new Ilamid time we witness a return to vaulted works of middle Ilamid time regarding the form and method. The brick pieces produced as side view of human face with natural dimensions, pieces of hands separate from each other and completely vaulted and glazed brick pieces with mythological paintings on them, which were discovered in the last decades, indicate the continuation of this technical and artistic custom, which was very advanced...
in Ilamid times and then continued to be used in Daryoush Palace in Susa and Persepolis.

Fig.9: A piece of glazed brick decorated with additional bitumen lines

Fig.10: Lattice system in bricks

6 Ancient Area of Susa and Achaemenid

With 5.6 km space, the Susa city is located 24 km at the western south of Dezful and 115 km at the western north of Khuzestan province of Iran. According to the latest archeological studies, the ancient area of Susa with more than 1200 hectar space had been one of the important trading and governing centers of Iranians (see figure 11, 12). This ancient city had been the capital city for thousands of years, was one of the important cities of Ilamid, and reached to its highest power and prosperity during Achaemenid time. Among important ancient works of this city, Susa castle on “Acropol hill”, Apadana palace, fifteenth city and artist city can be mentioned, which are all discovered by foreign archeologists like Demorghan and Girshman (see figure 13).

Apadana palace was constructed on the remains of Ilamid Susa around 521 to 515 BC. The walls of this construction are of adobe with brick façade and its columns are of stone. The inner walls were covered with glazed bricks and the painting of javidan Guard soldiers, winged lion and blue lily were on them. Important parts of this palace caught fire in Ardashir I time (461 BC) and reconstructed in Ardashir II time (359 BC) [11].

The discovered inscription in Susa shows that how Dariough had done the construction of Susa Apadana building. For the construction of this building, Cedar wood from Lebanon, gold from “Sard”, azure stone and agate from “saghd”, turquoise from Kharazm, wood and silver for carving from Egypt were imported. The Sard and Egyptians were carpenters and Babolis made adobe and glazed bricks and the ones who decorated the walls were form Medes and Egypt. All ornaments of Apadana palace and other parts of Susa palace has been done by glazed bricks. Only the columns and pivots of the gates are made of stone. The outer surfaces were decorated by glazed bricks. These surfaces were more than 20 m in height. Therefore, the Persian used glazed brick to express their artistic morals and reached to the stage of
master in forming and making bricks, which was impossible to imitate. The row of Persian archers on the glazed bricks together with mythical lion and winged cow, which decorates the Louvre museum of Paris, are of the most beautiful and emotional remains of art history [12]. Other samples of these glazed bricks can be found in Berlin and National museum of Iran by the name of Sarbaz-e-Javidan (Immortal Soldier) body and other paintings (see figures 14, 15).

On the whole industry of firing brick was developed in the architectural era before Achaemenid time in Iran and at the time of Achaemenid firing painted and boss bricks became popular.

7 Conclusion
The best art of Iran with the true definition of the art has been its architectural art. Bearing lot of up and down conditions, the architecture of Iran had significant changes in the middle Ilamid period. During this time, valuable architectural works were constructed as temples such as Chogha Zanbil Ziggurat. Even though chert and its silica features used at the second century BC for preparing glass paste, the use of glaze has been recognized in second century BC in Susa. During Achaemenid time use of glaze and glaze color in the architecture were mostly for covering and making glazed fired bricks and for using metal and stone dishes, the clay art was developed only to make simple and non-glazed clays and even if a glazed dish was made, its beauty and resistance could not compete with the glazed fired bricks.

References: