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The Formation of Domes in the Architectural Monuments of Central Asia

Khalikov Sindorkul Ravshanovich
Jizzakh Polytechnic Institute, Head of the Department of Architectural Design, Doctor of Philosophy in Architecture (PhD)

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ABSTRACT

This article describes the morphology, typology and history of the construction of domes of architectural monuments of Central Asia, the types of domes of architectural monuments of Uzbekistan, the originality of the artistic solutions of domes, the formation of domes in architectural monuments.

Introduction: Domes appeared in Eastern architecture in the 3rd-2nd millennia BC and were originally made of raw bricks. Dome devices were first used in Iran in the 1st century in the Kokhna-Khoja palace. Iranians were the first in world architecture to master the technique of covering a square base with a dome. The ancient Roman domes were built on a circular and polygonal base.

Central Asia. av. In the 3rd century, first Parthia and then Bactria got rid of the rule. The development of architecture in some regions of Central Asia was partially influenced by Hellenistic (Greece) culture. In particular, the architectural forms and elements found in the towns of Ayrtom (Termiz) and Nisa (the capital of Parthia) on the banks of the Amudarya are an example of this idea. Buildings are usually made of 40x40x10 cm of mud and straw. In covering the roofs, wood was also used, along with the dome, the roof (svod). Straw mud, and sometimes plastered with lime and local ganch, and ceramic decorative elements were also used.

Among the most ancient monuments, it is possible to mention the Qavat castle in Ancient Khorezm, a part of the Samanid castle in Samarkand (Afrosiab) and the Qirq Kiz castle near Termiz. All three of these are made of raw bricks and straw.

It is necessary to mention the ruins of Ko'zali qir in Ancient Khorezm, Bazar castle, Elaton indestructible in Fergana, Qal'ai Mor in Tajikistan, Qabadian, Gaur castle in Turkmenistan, and the ruins of the world-famous Marokand present-day Samarkand city (Afrosiyob), which existed in the VI-IV centuries BC. At that time, such towns were 40x40x10 cm. It was built in two or three rows side by side, covered with an ellipse-shaped arch [1; p. 82]. In general, the ruins of buildings built of raw brick and thatch in the 9th-10th centuries, preserved in various conditions,

can be found in the surroundings of Mari, in the lands of Ancient Khorezm. But among the first buildings made of baked bricks, the Samonii mausoleum preserved in Bukhara can be cited as an example. This building was built during the period of Ismail Somani (873/907 years). This mausoleum, which is considered a masterpiece of Central Asian architecture, has a cubic shape and is covered in the form of a dome.

The main part: the origin and development process of domes built in the Middle East and Central Asia is related to their morphological features. Generally, domes played an important role in Islamic architecture, either as individual buildings or as large complexes of buildings recognized as houses. They vary greatly in size and type. Most of the domes have been developed gradually since the early Islamic period. Observing and analyzing the shape of the domes in Central Asia, we can feel the blessed contribution of the ancient Turks to the architectural creativity of this direction.

Geometric analysis and syntactic systematization of the variety of typological structures helps to study dome styles and reveals the aesthetic principles of domes in architecture. For example, studying the geometric features of domes can inspire new ideas to give modern forms to traditional architectural design.

Structurally, the use of lightweight shells leads to a reduction in the overall weight of the building. In fact, its level of resistance to seismic conditions has also been successful. In the Middle East and Central Asia, the external size and height of the dome built in this style made it more attractive and gave an aesthetic sense of grandeur. In Central Asia, the first appearance of the dome can be found in the Oktepa structure near Tashkent, the town of Afrosiyob in Samarkand, and the fortresses of Khorezm. In the 10 th-11th centuries, the wall corner of the room was in the form of an arch, and a dome was built over it.

By the 12 th century, the height of the domes became important. Starting from the 16th century, the corners of the murabba (square) shaped rooms were decorated with arches, the inside was decorated with muqarnas, and the part of the dome adjacent to the wall was also decorated with muqarnas. In the complex of Khoja Ahmad Yassavi in the city of Turkestan. By the 15 th century, a dome-shaped and multi-faceted plinth was built on top of the wall and a double dome was attached to it.

The origin of double-shell domes is not fully understood. Nevertheless, Islamic domes undoubtedly influenced the interior architecture of the West [2; p. 130]. One of the main advantages of the double-shell dome structure is that it separates the weather surface from the inner shell, thereby keeping the weather temperate.

Mechanically increasing the shell compared to other types of domes caused the reverberation of the sound tempo. Generally speaking, domes led to the continuous development of Islamic architecture.

During the period of Seljuk architecture, the architectural features of domes were reflected in the construction of various mausoleums. They show many variations of octagonal, cylindrical shape.

After the degeneration of architecture caused by the invasion of the Mongols, during the time of Amir Temur, who succeeded them, the gaps in the evolution of the construction of domes were filled and the material culture of the Middle East and Central Asia was developed again.

Ilkhanids (in Iran) and Timurids (Movarounnahr). Due to the involvement of architects and engineers from Asia Minor, Azerbaijan, the Caucasus, India, Iran and other places in the construction of huge state buildings, the construction of huge monumental domes with two shells is booming. While Ilkhanid domes were widely used in the construction of funerary and mausoleums, Timurid domes were regularly attached to madrasas and were often used to cover mausoleums and mosques.

Consequently, with the emergence of three distinctive local dynasties that led to the development of dome architecture, subsequent local styles from the Timurid era onwards, including: the Safavids in Iran (1501-1732), the Shaybanids in Central Asia (1503-1800) and the Baburis in India (1500-1800) 1525-1858), changes were made to the architecture of the domes. It is also possible to see the influence of advanced construction techniques in their architecture, skillfully using various building materials.

In Uzbekistan, by the 15th century, a new type of dome devices, previously used in this country, a dome installed on intersecting arches, "zarba linga" appeared. These constructions have three main features: dome dimensions are small compared to the dimensions of the building to be closed; equal distribution of the load falling from the shoulders of the roofs along the walls of the building by integrating into eight points; creates convenient opportunities to expand the premises of the building, use them effectively and make the interior more beautiful. Such domes were used for the first time in the Choponota mausoleum in Samarkand, and were later perfected in the Ishratkhana and Oksaroy buildings here.

Let's briefly touch on the religious and philosophical aspects of domes. In Islamic architecture, the dome is a symbol, and the moon above it is a symbol of the night. In addition, above the old mosque buildings; when covering the top of the hall with baked bricks, it was necessary to use dome and dome-like spherical shapes. As a result, the dome and minaret became the main architectural element in creating the image of the mosque building [3].

Ancient architectural monuments preserved in Central Asia are majestic public buildings (palaces, mosques, houses, caravanserais, mausoleums, baths, etc.) in the cisterns of the dome, balkhi dome, charkhi dome, piltovar, garovli, kulokhi, mirzai, sholgomi, mehrabi, nayzagi, chortark types, in some there is also a double (inner and outer) dome. Palace, mosque, madrasa and other buildings, mausoleums, the main room-room is covered with a mehrobaic dome.

The structure of the Balkh dome is very simple in terms of its structure, and it has been widely used as a madrasa, a bathhouse, a caravanserai's common rooms, a gas tank, and others. In classical architecture, the method of building a dome in the style called kondal or balkhi is widespread, and it is more complicated than other methods.

Balkhi dome provides great convenience for covering the roof of rectangular rooms. This type of dome is often used in buildings with a low roof, for example, bathrooms, reservoirs. The dome of the roof is closed keeping the shape of the rooms of the building shown in the plan.

For example, when covering the roof of rectangular rooms, instead of bringing the top of the wall into a circle, starting from each corner, the dome brick is skinned. It is not necessary to make the base of the dome into a circle by installing arches and gajjaks on the walls. As a result of the lower walls of the room in the Balkhi dome and the first row of bricks of the dome being pushed into the room, the tensile forces generated at the base of the dome do not excessively damage the integrity of the building.

The square dome was used in small rectangular rooms. In Central Asia, the first appearance of the dome can be found in the Yunusabad Oktepa structure near Tashkent, the town of Afrosiyob in Samarkand, and the fortresses of Khorezm.

The structure of a circular dome is quite simple, if its height is equal to its radius, it is a circular dome.

Domes of this type are often used in orthogonal, polygonal and square buildings. In this method, the following is followed: the height of the circular dome is equal to its radius. This is a semicircle. Domes of this appearance are mostly used in bathrooms and washrooms. For example, such domes were used in Misgaron and Sarrofon baths in Bukhara. The diameter of Charkhi dome is normally up to eight gaz (6.5 meters). Its thickness is more than one brick.

Charkhi dome is tersa without linga. If the diameter of the charkhi dome is large, then the thickness of the dome is equal to 1.5 bricks. Its appearance is built to be smooth. Its last row of bricks is picked one brick and thinner. The length of the bricks of that period was 32-38 cm, and the thickness was 5-4 cm [4; pp. 20-22].

Ribbed domes. Such domes consist of separate flat ribs installed in the radial direction. The ribs are attached to each other at the top, and the bottom rests on the supports. Straight ribs form pyramidal or conical domes [5; p. 224].

Ribbed roofs are more complex to build than other dome roofs. Dome roofs with a diameter of more than 8-10 meters are difficult to cover without formwork in the thickness of half or a quarter of a brick. Because such large and thin domes are not strong enough. In general, to cover large roofs, the master must have high qualifications.

In order for this type of domes to come out well, several ribs are installed, the bases of which are equidistant from each other and the ends are united at the top of the dome. And between the ribs are filled with alleys, half and often a quarter brick thick. Usually, the ribs are laid on a wooden formwork with a cement mixture. The thickness of the formwork on which the ribs are installed corresponds to the shape of the dome.

Chorkunjak dome. It is considered one of the most beautiful domes. Domes of this type are the most complex type of dome roofs, which are built using the wheel method. The interior of the building looks very beautiful as a result of the luxury of the arches located between the domes.

Usually, the charkhi dome is placed on the crossbar, khashravok, and also a number of arches that are installed on top of the walls. Chorkunjak dome is mainly made up of arches placed on top of each other, decorated with a thickness of half a brick.

Chortark (four-pointed) dome. The roofs of small rectangular rooms are often covered with four-pointed domes. Because these domes are in the shape of an alley, they are somewhat simpler and much lower than other types of dome roofs. These types of domes provide great convenience for covering residential roofs. Because covering the roof with a high dome in small rooms does not look good and also takes a lot of material. Domed roofs are one-fifth of the height of the dome if the width of the room is 4 meters, and one-fourth of the height of the dome if the width of the room is 5 meters.

Sometimes large domes were built in layers to show off the arches installed under the roofs.

8-12 arches are installed on the walls of square rooms with the same height and width, and 16 arches on large dome roofs. If one arch is installed on the walls of a square room, it is called a cross. If 8 rows are installed, it is called khashrawaq. If arches are also installed between intersections, then the resulting 8 arches are called hashtag. Sometimes 8 arches are installed on the wall under the dome and 8 more arches are installed on top of them.

Se-su (three edges) - a three-sided se-su dome is sometimes used to cover the roof of narrow, small, square rooms.

Usta Yusufali built the number of ribs in ribbed dome roofs, usually four or eight. In some buildings, he showed the method of closing the roofs with se-su (three edges) and inverted gajjak dome. Along with creating various dome roofs, master Yusufali arranged the structure (construction) of the domes and drew the scheme of some complex parts of the building.

Beshikcha dome is mainly curved in shape and is usually used to cover corridors. It is called "Beshikcha dome (cradle)" because its appearance resembles a cradle. Usually, the cradle dome was used to cover the corridors of the baths.

The author makes the following assumptions about the appearance and origin of the Naqshbandi dome.

Assumption 1. The base of the wheel is a dome, and it is rich in patterns, so it is named so because it means rich in patterns.

Assumption 2. It is based on the construction of the Linga strike, and is named so because it was used in the Bahoviddin Naqshband shrine-complex in Bukhara.

The appearance of the helmet-shaped dome is so named because it reminds the headgear of the medieval soldiers - the helmet. This type of dome was commonly used in Cairo (Imam Keldi, XIV century), Russian and Byzantine domes.

The Turkestan dome is conical in appearance and cylindrical in shape. This dome was used in the mausoleum of Chashman Ayub in Bukhara. Case 2 can be octagonal, for example we can see the mausoleum of Fakhriddin Razi.

Nazagi dome - its appearance is reminiscent of a spearhead with an elongated tip. In Central Asia, in Samarkand, in Shahi-Zinda, in the tombs of Ahror Vali, double domes were used.

"Mirzoi" dome. If the height of the charkhi dome is more than half the width of the dome, it is called "Mirzoi" dome; but the height of this dome is generally less than half its width,

In our country, this method was used even in the "Sholgomi" dome. In some houses, it was also used to cover the roof of residential buildings with a four-sided low "chortark" dome, and the roofs of public buildings with charkhi and chorkunjak domes, and the roof of the narrowest rooms with "zarbaliq" dome, "beshikhcha" dome, and "gavra" dome.

Many measures specific to earthquake shock have been noted in historical monuments. Strong earthquakes in Fergana in 1838 and in Turkmenistan in 1934 made a big change in the work of folk masters. In the monuments built since the 9th-10th centuries, measures against the effects of earthquakes were widely used. Ancient builders considered the use of elastic materials in buildings as one of the measures to combat earthquakes.

Ravoqi or "linga-zarba" dome. Domes made in different styles occupy the main place in the improvement and beautification of the ancient world of architecture. Each of these domes is distinguished by its unique interior and exterior appearance. It has been known since ancient times to decorate the interior of domes with vines. For example, the square (17x17 m) house under the dome of Sultan Sanjar's mausoleum, built in the 11th century in Marv, has octagonal arches, and the ribs forming the dome structure have been restored on top of it. These ridges formed a system of intersecting ridges-"linga-zarba" method [6].

In the restoration of the largest domes, domes called "Ravoqi" were used in the buildings built by Amir Temur. In this type of dome structure, other corner arches ("bag'al") and the shield-shaped kifts between these arches together form the supporting points for the dome to be built on top of them. This system gradually became widespread, giving rise to complex examples of the use of shield-shaped kifts and intersecting arches. An example of this is the mausoleum of Khoja Ahmad Yassavi in Turkestan, built in 1398, and at the same time, the concrete realization of these ideas can be seen in the monument of Shepherd Father in Samarkand (end of the 14th century). Four arches built on the wall of an equilateral square room intersect and form a solid spatial shell that relieves the pressure lying at an angle to a large part of the walls [7; p. 54].

The further development of this structure was fully manifested in Ishratkhana (1397) and Aksaroy (beginning of XVasr), as well as Bahauddin Naqshband's house in Bukhara, Taqi Sarrafon and other similar monuments.

Summary: Domes have a variety of sizes and shapes that have evolved gradually since the early days of Islam. Ancient architectural monuments preserved in Central Asia are majestic public buildings (palaces, mosques, houses, caravanserais, mausoleums, baths, etc.) in the cisterns of the dome, balkhi dome, charkhi dome, piltovar, garovli, kulokhi, mirzai, sholgomi, mehrabi,

nayzagi, chortark types, in some there is also a double (inner and outer) dome. These types of domes had their own constructive solutions. Therefore, in the restoration and repair of architectural monuments, it is necessary to take into account the types of domes and their constructive solutions. In the 15th-16th centuries, there was a significant distance between both shells of the domes, and the shape of the domes became more and more beautiful and improved.

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