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## ARTISTIC-TECHNICAL FEATURES OF GEOMETRIC MOTIFS IN AZERBAIJAN

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*The main feature of geometric motifs in medieval Azerbaijani tile art is mathematical accuracy, systematicity and the construction of the ornament on symmetry. These motifs started from simple shapes such as squares, triangles, rhombuses, and became more complex and updated to star and polygonal lattices. Geometric ornaments, lattice systems of various shapes symbolize the ideas of infinity, harmony and aesthetic balance on architectural surfaces.*

*The girih technique was widely used in architectural monuments such as Momina Khatun (1186) of Nakhchivan, Goy Günbez (1194-1196), and the Olcaytu tomb of Tabriz (1307-1313) in the 12th-15th centuries. Girih ornaments were prepared in close connection with architectural projects, more precisely, they were executed by architects and tile masters with a mathematical approach.*

*What distinguishes tiles with geometric motifs from floral motifs is that they are built on a more mathematical accuracy and a certain systematicity. If the artist's feeling and taste are at the forefront in floral ornaments, planning, calculation and mathematical composition play a key role in geometric ornaments. For this reason, geometric tiles were mostly used in monumental religious architecture such as mosques and tombs.*

**Keywords:** Azerbaijan, tile art, geometric motifs, artistic-technical features, decorative-applied art

## INTRODUCTION

The history of the emergence of tile art has left a deep mark on the culture of ancient civilizations. According to historical data, tile art was first used in the Sumerian temple located in the city of Ur in Mesopotamia (IV millennium BC). Sumerian masters applied simple geometric motifs by covering the surface of bricks with layers of colored engobe and glaze. These compositions often resembled patterns typical of the art of weaving.

The tradition of using geometric motif ornaments in Azerbaijan dates back to ancient times. Architects, taking advantage of the knowledge and skills of tile masters with rich experience in this field, systematically applied ornamental elements in the artistic design of buildings. As a result of this approach, ornaments became not only a decoration, but also the main means of expression that determined the rhythm of the architectural structure.

According to the general laws of decorative and applied art, the development process in all its fields progresses from simple forms to complex structures. This principle is also clearly observed in medieval Azerbaijani ceramics. Thus, the decorative systems observed in ceramic samples of that period are distinguished by their unique style of expression. This is also confirmed by the results of existing research. According to research, in the tiles produced in the Middle Ages, simple but aesthetically effective geometric ornaments - flat, circular, square, rhombus-shaped patterns - were widely used as the main decorative elements. As a result of placing these simple elements on decorative surfaces in various combinations and variations, it is observed that the tiles reached a high level in terms of artistic quality.



When the structure of geometric ornaments is examined in more depth, it becomes clear that this system used in medieval tile art was mainly based on three main structures: square, triangular and ray-shaped elements. Various compositional units - rhombus, parallelogram, polygonal ornaments were created from these main forms. More complex decorative patterns were mainly built on the basis of ray-shaped networks. Arabesque-like girih compositions created by this method began to be widely used, especially from the 11th-12th centuries.

One of the factors that increased the possibilities of artistic expression of this process is the richness of the composition created through the repetition and improvisation of ornaments. Such compositions, combined with the bright and dynamic nature of the color palette used, gave the tiles a special aesthetic. For example, the analysis of ceramic samples discovered in the ancient Ganja and Orangala territories shows that local craftsmen creatively arranged ornaments that gave the effect of squares and chessboards along the surface, achieving a special decorative rhythm on dishes and tiles that were different in both form and function [6, p. 49].

What distinguishes tiles with geometric motifs from floral motifs is their construction on a more mathematical accuracy and a certain systematicity. If the artist's feeling and taste are at the forefront in floral ornaments, planning, calculation and mathematical composition play a key role in geometric ornaments. For this reason, geometric tiles were mostly used in monumental religious architecture such as mosques and tombs.

## MAIN PART

In Azerbaijan, geometric motif tiles reflect mathematical harmony and structured artistic order by their very nature. They mainly consist of symmetrical combinations of square, rhombus, triangle, polygon, octagonal star, parallelogram, etc. elements. These elements combine to form knotted structures called girih. The unique feature of this geometric structure system called "girih" was that the patterns were subject to strict mathematical and symmetrical rules. The entire composition was formed by the precise intersection of lines and the combination of appropriate geometric elements (star-shaped, polygonal and their parts). The symbolic meaning of these ornaments is characterized in the Islamic world as an expression of the idea of infinity and perfection. Girih compositions were often applied to brick, mud, stone and tile facings. As an example, we can cite the wall surface of the Momina Khatun tomb (1186), which is considered a masterpiece of Nakhchivan architecture, as well as the decorative geometric ornament systems of the Goy Günbez tomb (1194) in Maragha. In these monumental architectural examples, both the technical accuracy and aesthetic depth of the girih ornaments are an indicator of the rich artistic design of the monument.

The fragments of buildings discovered as a result of archaeological research of medieval urban culture show that local craftsmen actively used decorative geometric motifs in brickwork - including zigzag, rectangular, meander-type patterns. Among the brick decorations, the symmetrical geometric ornament system called "girih" with a complex structure stands out. The facing bricks with various reliefs and shapes, prepared for the artistic design of architectural elements - wall surfaces, arches and portals, prove the high level of artist imagination. In this regard, the examples of facing bricks with a cut geometric pattern discovered during excavations in the city of Beylagan clearly reflect the regional characteristics of the tile technology [3, p. 78].

The development of tile and brick decor in Azerbaijani architecture gave impetus to the creation of complex "girih" networks on late-brick ornamental plates. These plates were prepared near the construction site before construction and attached to the wall surfaces in a ready-made form. One of the first concrete examples of the application of such facing tile plates is observed in the construction of the tombs of Yusif Kuseyir oglu and Momina Khatun, which belong to the 12th century Nakhchivan architecture. The ornamental plates used in these monumental monuments, which are approximately 12 cm thick, consist of repeating elements and form the rhythm of the entire composition. The polished and smooth textured surface of the plates makes the monument even mo-



re attractive in terms of technical and aesthetic aspects. This demonstrates that decoration is not only used for the purpose of creating external beauty, but also as an artistic and ideological manifestation in architecture.

“Nakhchivan architecture attracts attention with its unique original features. Architectural ornaments made of baked bricks and colorful tiles in geometric motifs and monumental compositions delight with their elegance and high artistic design” [2, p. 52].

In the arch compositions placed on the surface of the ten-sided body of the Momina Khatun tomb, each of them is decorated with a tile mosaic of different girih ornaments. The geometric elements used in this monument, in addition to aesthetics, are symbolically associated with the structure of the universe, the ideas of infinity and harmony. Polygonal stars act as a symbolic symbol of cosmic systems.

“The ornamentation on the tomb of Momina Khatun shows that the artist has an inexhaustible imagination. The ornamentation of all surfaces is diverse. The artist did not allow repetition. However, his skill lies in the fact that, despite the diversity, he created all the ornaments in the same character and thus was able to maintain the overall unity of the monument. The basis of the geometric ornament of the surfaces is a multi-pointed star and cavalry lines emanating from it. Here we encounter 5-, 6-, 8-pointed stars and 6.8-angled structures” [1, p. 47].

Momina Khatun's tomb is evaluated as a rare architectural example in terms of surface dynamism and artistic richness with its figured brickwork. The artistic distinction of nine different niches in this tomb, which has a ten-sided body, served to create unity in the diversity of the composition. Each of these niches had different decorative solutions regarding the structure of the ornament, forming the aesthetic multi-planarity and rhythmic structure of the monument as a whole. In addition, the placement of tiles made in the majolica technique on the surface of the monument increased the depth of the multi-faceted cylindrical body and gave the surface vitality with the effect of light and shadow. This artistic arrangement reflects not only the technical skill of the artist, but also his aesthetic attitude to the plasticity of the architectural surface. Thus, the correct selection of tile material and its appropriate application in its place became not only a decoration of the monument, but also a means of revealing its idea and aesthetic meaning.

The development achieved in the field of ceramic production in Azerbaijan in the 12th century created conditions for the use of glazed tiles as a decorative material in wall decoration. At the same time, it is clearly seen that at the end of the 12th century, especially in South Azerbaijan, the art of tiles developed both technically and aesthetically. One of the examples that embodies this development is the Round Dome Tomb in Maragha, built in the 12th century. This monument, which has a cylindrical body, belongs to the group of tower-shaped tombs and reflects the innovative features of its time in terms of architecture. The cylindrical surface of the tomb is formed on the basis of a horizontal arrangement of ordinary baked bricks, and glazed parts are placed between these arrangements to create decorative accents. The arch, one of the most striking parts of the monument, is distinguished by its large size and rich decoration. In this part, the tiles are harmoniously combined with inscriptions written in Kufic script and complex geometric ornaments, which determines the artistic nature of the composition.

Another feature of geometric ornaments is their modular and repeatable structure. This creates a certain sense of fluidity and balance on large surfaces. Such a composition is also reflected in the Goy Günbez tomb in Maragha (1196).

Starting from the 13th century, the use of tiles in architectural monuments expanded further, and in the following centuries there was a certain turning point in the formation of this art form. In some cases, entire facades of buildings were completely covered with tiles, which indicates the high technical and aesthetic skill of the tile masters. Studies show that these features are reflected in the Barda, Karabakhlar, Salmas and Khoy tombs (14th century), as well as in the Goy Mosque in Tab-



riz (15th century). According to researchers, the architectural decoration of the Goy Mosque was based on two main ceramic decorative methods, which were highly artistic:

- Compositional arrangement of large-sized star-shaped and multi-rayed tiles;
- Application of patterned panels made of small-sized, standard-shaped mosaic-type tiles.

In addition, it is emphasized that decorative epigraphic elements written in Kufic and Naskh script played an important role in the architectural decoration of the monument [5, p. 97]. These inscriptions, along with their aesthetic value, had a symbolic meaning and had a great influence on the artistic development of tile art.

"The Blue Mosque of Tabriz is a valuable work of art that embodies the high production culture of architects, calligraphers, sculptors, and tilers who added maximum creative power to the work of Azerbaijani architecture. The construction was led by a person named Izzeddin Qapichi" [4, p. 33].

The deep mastery of mathematical knowledge by engineers and architects, in addition to allowing them to work with high technical precision in the design and construction of buildings, created an environment of close cooperation with tile masters working in the field of tile mosaic. In other words, the decorative projects of tile mosaic were drawn up based on the architectural-composition plan prepared by the architects. As a result of this interaction, the monumental structure of domes, portals and arches seemed both technically solid and aesthetically complete.

Among the examples attributed to the high aesthetic stage of Azerbaijani architecture, monuments with intricate girih patterns decorated with turquoise-colored tiles stand out. This type of monument, especially with its geometric ornamented tile mosaics placed on the arch and facade surface, is distinguished both in terms of decorative richness and harmony.

One of the monumental monuments of the country, which has a unique place in the tile art of the Elkhanid period and is located in the city of Sultaniye, is the tomb of Olcaytu Khudabande (1307-1313), built according to the design of the Tabriz architect Ali Shah. This tomb is distinguished not only by its architectural solution, but also by its rich tile decoration system, fully reflecting the artistic possibilities of its time. Turquoise tile covering was applied to the dome of the tomb, the decorative elements of its arches in the form of stalactites, the arch and its interior. The turquoise tile elements used on the dome surface created a strong glow in the sunlight, making it stand out even from a distance. This indicates that in addition to the decorative nature of the tile material, it also has a symbolic and effective function.

Tile mosaic was widely used in the facade parts of the arch, in the tympanum zones of the arches, in the friezes above the stalactites, and the interior surfaces were decorated with dark blue, turquoise and white tile elements. The decorative system was not limited to simple geometric mosaics, but was also enriched with tile compositions with curved lines and complex contours. This demonstrates how much the technical possibilities of tile processing developed during the Elkhanid period and the richness of the artist's imagination in form. This artistic and decorative system, covering both the internal and external surfaces of the Oljaytu Khudabende tomb, creates a broad impression of the high development of tile art in the monuments of that period. This complex decoration was also effective in the following centuries, and was especially used in the architectural decorations of the Sultaniye Mosque (first half of the 16th century). Here, large-sized borders called "Seljuk chain" made of brick and enriched with geometric motifs were used on the surface of the arch and minaret. At the same time, the compositional motifs consisting of eight-pointed stars and cross-shaped elements found in the tympanum of the arch were also adapted here. Complex star-shaped motifs assembled from this type of tile ornaments decorated the general structure of the arch and the borders above the arch, creating a dynamic and complex spatial effect.

The fact that traces of the Seljuk chain style are found in many architectural monuments of the 14th century confirms that it was a decorative system that was widespread in the region and had a long-lasting impact. As a continuation of the craftsmanship of this period, we can mention the



tomb designed by Ahmad Yusif oglu, a representative of the Nakhchivan architectural school, and built in Barda in 1322. The monument is in the form of a cylindrical tower, topped with a conical dome. The surface of the building is made with the figured masonry technique, where ordinary baked bricks and glazed brick elements are combined to create a complex structure. While the horizontally arranged ordinary bricks play the role of a background, turquoise glazed bricks are placed vertically, based on the principle of a square grid, and an ornamental composition is formed by repeating the word “Allah” written in Kufic script two hundred times on these grids. This example shows how high the synthesis of writing and tile art is in Islamic ornaments, and how the artistic and aesthetic impact is manifested in unity.

In the Middle Ages, the process of making tiles was usually carried out by specialized artists, calligraphers and ceramic masters, usually based on the project of professional architects. This cooperation formed not only the technical execution, but also the artistic and aesthetic concept of tile decoration. As a result, tiles have become one of the main means of expression that give rhythm, symbolic meaning and artistic richness to the architectural structure of the monument. It should be noted that the advantage of glazed tiles in terms of protection and durability is due to the fact that their surface is covered with layers of glaze. In this regard, the turquoise glazed facing bricks of the Barda and Karabakhlar tombs are remarkable examples that combine both protective and aesthetic functions.

## CONCLUSION

In conclusion, it should be noted that Medieval Azerbaijani ceramics gained importance not only with their widespread use in everyday life, but also with their application as an aesthetic component in architecture. Throughout history, craftsmen who built buildings with various functions were not satisfied only with the constructive elements of the architectural solution, but also paid special attention to increasing the aesthetic value and impact of these buildings. More precisely, their goal was not only the rationality of form and structure, but also the attractiveness of the appearance and the breadth of artistic expression possibilities. In this regard, the application of tile decorations as a means of artistic expression has been one of the most effective methods of increasing the aesthetic value of monuments.

Medieval buildings, while being attractive in terms of their external appearance and architectural solution, are distinguished by the extensive use of tile in their interior design. In other words, the sense of beauty of medieval craftsmen was reflected not only in terms of practicality, but also in terms of artistic thinking at a high level. This shows that both household ceramics and tile art have already entered the classical stage.

One of the main reasons for the development of geometric-motif tile mosaics in Azerbaijan at such a high level is the deep knowledge of technical and theoretical sciences, especially mathematics and geometry, of the craftsmen, architects and masters of decorative and applied arts working in this field.

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## AZƏRBAYCANDA HƏNDƏSİ MOTİVLİ KAŞILARIN BƏDİİ-TEKNİKİ XÜSUSİYYƏTLƏRİ

A.N. Xəlilova

Orta əsrlər Azərbaycan kaşı sənətində həndəsi motivlərin əsas xüsusiyyəti riyazi dəqiqlik, sistemlilik və ornamentin simmetriya üzərində qurulmasıdır. Bu motivlər kvadrat, üçbucaq, romb kimi sadə formalardan başlayıb, ulduzlu və çoxbucaqlı girih şəbəkələrə qədər mürəkkəbləşərək yenilənmişdir. Həndəsi ornamentlər, müxtəlif formalı girih sistemləri memarlıq səthlərində sonsuzluq, harmoniya və estetik tarazlıq ideyalarını simvolizə edir.

Girih texnikası XII-XV əsrlərdə Naxçıvanın Möminə Xatun (1186), Göy Günbəz (1194-1196), Təbriz Olcaytu türbəsi (1307-1313) kimi memarlıq abidələrində geniş istifadə edilmişdir. Girih ornamentləri memarlıq layihələri ilə sıx əlaqədə hazırlanır, daha dəqiq desək, riyazi yanaşma ilə memarlar və kaşı ustaları tərəfindən icra edilirdi.

Həndəsi motivli kaşılarda nəbati motivlərdən fərqləndirən cəhət onların daha riyazi dəqiqlik və müəyyən sistemlilik üzərində qurulmasıdır. Əgər nəbati ornamentdə sənətkarın hissi və zövqü öndədirsə, həndəsi ornamentlərdə planlaşdırma, hesablama və riyazi kompozisiya əsas rol oynayır. Bu səbəbdən, həndəsi kaşılar daha çox məscid və türbə kimi monumental dini memarlıqda tətbiq olunurdu.

**Açar sözlər:** *Azərbaycan, kaşı sənəti, həndəsi motivlər, bədii-texniki xüsusiyyət, dekorativ-tətbiqi sənət.*

## ХУДОЖЕСТВЕННО-ТЕХНИЧЕСКИЕ ОСОБЕННОСТИ ГЕОМЕТРИЧЕСКОЙ ПЛИТКИ В АЗЕРБАЙДЖАНЕ

A.N. Халилова

Главной особенностью геометрических мотивов в средневековом азербайджанском изразцовом искусстве является математическая точность, системность и построение орнамента на симметрии. Эти мотивы берут начало от простых форм, таких как квадраты, треугольники, ромбы, и усложняются, совершенствуясь до звездчатых и многоугольных сеток гирих. Геометрические орнаменты, системы гирих различных форм символизируют идеи бесконечности, гармонии и эстетического равновесия на архитектурных поверхностях.

Техника гирих широко применялась в XII–XV веках в таких архитектурных памятниках, как Момине-хатун в Нахчыване (1186), Гей Гюнбес (1194-1196) и гробница Олджайту в Тебризе (1307-1313). Орнаменты гирих создавались в тесной связи с архитектурными проектами, а точнее, выполнялись архитекторами и изразцовыми мастерами с использованием математических методов. Геометрические мотивы плиток от растительных отличаются большей математической точностью и определенной систематичностью. Если в растительном орнаменте на первый план выходят чувство и вкус художника, то в геометрических орнаментах ключевую роль играют планирование, расчёт и математическая композиция. Поэтому геометрические мотивы чаще всего использовались в монументальной религиозной архитектуре, такой как мечети и гробницы.

**Ключевые слова:** *Азербайджан, изразцовое искусство, геометрические мотивы, художественно-технические особенности, декоративно-прикладное искусство.*