



Geometrics and architectural structure of our chin domes in Iran

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ABSTRACT

Discovering the methods of constructing the domes, identification of different types of dome, studying the function of the structure, the strategies of drawing them, administrative works, as well as their related issues have been of special interest and concern of Iranian architects. Many valuable books, articles, and reports have been written in this field by Iranian architects. Thus, various types of dome such as *rok*, *nar*, and double-shelled have been introduced to the world and their functions have been investigated. In this architecture, *ourchin* dome, which is of typical characteristics of the tombs in southern part of Iran, has been neglected. Little information about this type of dome is available in the history of Iranian architecture. And this little information is limited to some reports and pictures from foreign tourists and unknown writers, including no more than a few names and dates of constructing of such structures. Therefore, the origin and the reason for the development of such domes as well as their role are still mysterious. The methodology of the current study is descriptive and analytical. In different parts of the present study, comparative, retrospective, and fieldwork studies have been used, whenever needed. In the current research, the root of the word, *ourchin* dome, and its meaning are pointed out. Also, the origin of Iranian architecture, which dates back to Seljuqid period, is introduced. Then, the geometric relationships of its sides are examined and different varieties of this dome [star and polygonal] are drawn. Studying the typology of the examples of this dome in Iran and Iraq revealed some remarkable points about the geometric, height, and shape of the dome, in addition to the number of its stories. Some factors, like the function of the crown, method of its construction, cover of the dome, and the system of the distribution of the load are clarified. Finally, by investigating the influential cultural and historical factors, we concluded that the main reason for the development of the general structure of this type of dome was symbolic, not simply religious. This dome by its own or in combination with religious places has played an affective and functional role over time.

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Introduction

Cover of the dome in Iran has a long history. The shortage of firm and oblong logs of woods, which were the main covering of the bed, caused the curved arch and dome to become widespread. Specifically, in the wider areas, the bed coverings were replaced by these domes [1]. In Dehkhoda dictionary, *ourchin* is defined as decoration, base, ladder, or stair.

In Achaemenid period, the rich emperors of Iran supplied the structure of their palaces with the resistant woods from the trees, such as cedar from Lebanon or other far countries, by spending a good deal of money. Therefore, due to poor economic conditions, the need to spend a lot of money to provide wood, the absence of good climatic conditions to grow these types of woods in jungles and plains, and the availability of abundance of soil in Iran lands, curved arches and domes found their places as continental and structural phenomena in Iranian architecture [2]. In Sasanid period, the construction of the domes blossomed and became so prevalent that the structure and the construction method of the dome covering is used as the general model and instruction until now. [3].

The *double-shelled vacant*, *double-shelled completely gaped*, *nar*, *rok*, the combination of *nar* and *rok*, and *ourchin* domes are prominent examples of Iranian architecture [Table 11].

Ourchin domes are only found in the southwest part of Iran. Even in that part, they are scarce because this style of constructing the dome is different from that of northern and central parts of Iran and is exclusive to Iran. Further, only a limited number of this type of dome is found in Iraq. This very point indicates the uniqueness of this style of architecture [Table 12].

An Introduction to *Ourchin* Dome

On the top parts of the dome, the consistent set-backs of the structure are located beneath. Normally, the height of the *ourchin* dome is much more than other types of dome [4]. If we imagine a triangle on the Iran map and consider the vertex of the triangle on Shushtar and its base line from khark to Boroujerd, the places in the triangle feature *mozaras* domes. Many foreign tourists that have seen *mozaras* domes called them Pineapple Domes or in French Dome Aveols. It seems that there were a large number of this type of dome in the past, but they can be found rarely today and are limited to a few domes in Iran and Iraq [5]. This type of dome was only built as a tomb or grave [6].

The Origin of *Ourchin* Dome

The origin of the *ourchin* dome dates back to Seljuqid period, seventh and eighth century. According to the available documents, Seljuqid period is considered to be the period of the efflorescence of Iran's architecture in Islamic era. The architects

of Seljuqid period provided the dome structures with four porches and square chambers, which are the bases of some religious and non-religious architecture. Beside the religious structures, other structures such as tombs and graves evolved and found their place among people [7]. The architects of tomb structures of Seljuqid period passed stable days, gained the advantage of their experience, and made many attempts to create new pattern for future. In this period, constructing the domes for the tomb structure achieved its own specific style in south of Iran, in contrast to the north of Iran, and became distinct from the style of other parts of Iran. Thus, a new type of dome called *mozaras* or *ourchin* came into existence [8].

The Geometric Structure Of Ourchin And Geometric Relationship Among The Floors

The typical characteristic of *ourchin* dome is for it to be serrated and scalariform. In each floor, the main base pattern of the previous floor is repeated but its dimensions are smaller than that of the previous floor. The *ourchin* dome is divided into two forms, in accordance to their spatial structure, plan design, and the geometric relationships among the outer and inner elements. These two forms are

- a. the domes with a star base
- b. the domes with a polygonal base [9].

The Domes with a Star Base

In this type of dome, the exact relationship between the outer and inner plans is maintained in a way that the basis for the development of the outer part of the dome is the geometric relations of its inner sides. The result of the development of such relationship is that the base seems to have a star shape, when we look at the dome from inside. And if we look at the dome from outside, a polygonal shape is seen. The star domes are rare and only five of them have been found which included Shirmard shrine in Mamasani, Mirmohammad shrine in Khark, Abdullah shrine in Shushtar, Soltan Zobeideh in Bagdad, and Dour shrine in Samarra [Fig.1].



Fig. 1. A general view of the star dome plan

The Method of Drawing the Floors in A Star Dome

In past, Iranian architects made use of certain measures for drawing the plans of the structures. But, in drawing the floors of *ourchin* domes, they devised a new geometrical method, which stemmed from mathematic and trigonometry. It can be said that the relationship between the exterior base and interior base is established in a way that the sides of the polygon are lengthened to the point that they cross each other and the outer star base is formed. Each floor of the dome is a part of the star shape of the base [Table 1].

Table 1. The process of the drawing the plan of a star dome, which is followed by lengthening the sides of a polygon

<p>First stage: the interior base of the star plan is in the form of a polygonal shape</p>	<p>Second stage: the sides of the polygonal shape of the interior base are lengthened</p>	<p>Third stage: the last exterior plan is formed in the form of a star plan</p>

The interesting point is the arrangement of the above floor on the beneath floor in a way that the outer facet of the beneath floor is along the inner facet of the above floor [Fig. 2].



Fig. 2. The outer facet of the beneath floor is alongside of the inner facet of the above floor

The Arrangement of The Floors on Each Other

In Iranian dome construction method, changing the square shape to the polygonal and rounded shapes is considered as a way to put the dome [curved roof] on a quadrilateral shape base in many religious structures, palaces, caravansaries, schools, and non-religious places [10].

The interesting point is that, because of three dimensional structure and the exact geometric relationships among the floors in the method of *ourchin* dome construction, angle making underneath the dome to change the quadrilateral shape to a *mozaras* dome is less applicable. In fact, with the innovative geometrics of Iranian architect, the style of the dome construction was completely changed, the old style of angle making was put aside, the process of dome making was facilitated, and the floors of the dome were skillfully positioned on each other. The architect has been able to create *ourchin* and serrated shape by some geometric turnarounds which were the result of the geometric relationships of the sides of the polygonal shape. That is, the relationship between the inner base of the beneath floor with that of the above floor is in the way that by connecting the middle of the sides of the polygonal shape of the beneath floor, the polygonal shape of the above floor is formed [Table 2].

Table 2. The overlap of the floors on each other in a star plan

First floor	Second floor	other floors

Table 3. The role of inner base in the formation of the star dome

First floor	Second floor	other floors

The Domes with A Polygonal Base

In the domes with polygonal base, the simplicity of Iranian architecture, which is unexampled in its kind, is more evident, in comparison with the star dome. In this type of dome construction, Iranian architecture laid more stress on symbolic aspects, resistance against the continental conditions, and the establishment of the dome to create an influential view for the town and the sky of the region. In other words, the architect

intended to show the social, cultural, political, and religious stance of the dead body that the dome belonged to. In this type of dome, the basis of the structure is polygonal. In this sense, the floor of the dome is a section of its plan with a polygonal base. The domes of Ja'far shrine in Brujerd, Danial-e-Nabi in Shoush, Omar Sohravardi in Bagdad, Soleiman Ibn-e-Ali in Genaveh, and Leis-e-Safari in Dezful are the examples of this type of dome [Fig. 3].

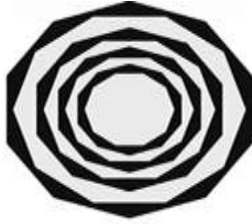


Fig. 3. The inner and outer structure of the dome

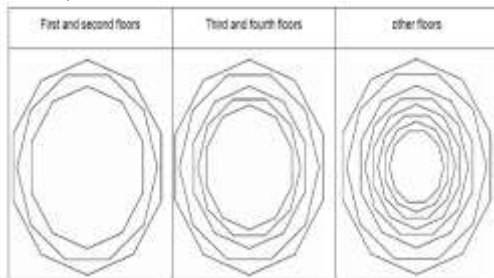
The Method of Constructing A Dome With A Polygonal Base

To locate the above floor on the beneath floor, the base of the top floor is positioned along the rectangular diagonal of the lateral facet of the beneath floor.

The Location of Floors in The Plan of The Polygonal Dome

The connection between the bottom base of the above floor with the top base of the beneath floor is formed by linking of the sides of the top bases of the beneath floors to each other, the bottom base of the top floor [Table 4].

Table 4. By linking the middle of the top base sides of the beneath floor, the bottom base of the above floor is formed.



The Typology of the Ourchin Dome Star Dome

One of the disadvantages of elevating the front view of the *mozaras* dome with a star base is that even if the bottom floors are built with acute angles, the top floors would turn out to have obtuse angles and, as a result, the lateral facets of the top floors would have a rather plane shape. The Shirmard dome in Mamasani was constructed in the way that was mentioned above, but for the Mirmohammad dome a solution for the problem was found. In Mirmohammad dome, the rule of the dome construction was disobeyed for the second floor and the number of the sides of the star base was decreased. Therefore, the lateral facets of different floors became rather leveled out. Also, in Soltan Zobeideh dome, the bases sides of the fifth and eighth floors decreased, by supplementing a semi tapered finial [Table 5,6,7].

Polygonal Dome

As for the domes built in *mozaras* style, the lateral facets of the floors are often rather concave, like "Danial Shah Aboulghasem" and rarely convex, like "Soleiman Ibn-e-Ali" in Genaveh. Only one dome has been found that has a plane view on the lateral facets, Omar Sohravardi Dome in Bagdad. In finishing the lateral surfaces, some innovations were used, including the arches which are built on each lateral facet of Omar Sohravardi dome. On the floor facets of Sohravardi dome, which are its corners, column are ornamented. In Toeil dome in Iraq, on hexagonal bases of the floors, small triangle-based floors are mounted [Table 7]. Other domes are considered as being

circumscribed in a cone. But in Ja'far and Shah Abolghasem shrines in Boroujerd and Shah abad, the domes are circumscribed in an elliptical shape. Also, *mozaras* domes are usually situated on cube or prism shaped buildings.

Covering Of The Ourchin Domes

because of the exact and geometrical relationships of the floors, the curved vault in *ourchin* domes plays the role of a structural element to keep the structure balanced and there is no need *tokhashkhashi* to transmit the loads to the beneath shell and, as a result, there is no wall. In essence, beneath of the dome is open and its unique height, with its good decoration, creates an impressive view. In contrast to the domes with the plane arch which have a semicircle and double shelled arch beneath the dome, the structures with *mozaras* dome have only one arch and the roof is considered to be the back of the arch [Table 8].

The Function of the Crown on The Ourchin Domes

Technically, the prominent characteristic of the *mozaras* dome is its balance. To keep the balance of the dome, the symmetrization rules should be observed. But the architects of these dome found another solution to keep the dome in balance. They situated a heavy weight, the crown of the dome, on the top floor. It seems that keeping balance in the domes with polygonal base was easier, as there is no crown on such domes. [Table 9].

Influential Cultural, Historical and Geometric Factors In The Formation Of Typology And Spatial Structure Of Ourchin Domes

The architecture of *mozaras* buildings is usually attributed to the aboriginal architects and is called rural [rustic] style of dome construction. Though its being of native style of Mesopotamia and Khuzestan province is acceptable, being of rural style for this dome is unacceptable, as planning and constructing the dome needs great care and delicacy in keeping balance and symmetry that distinguish it from country-style structures. Also, the similarities between the plan of this type of dome and those of other ancient relics are indicators of the fact that *mozaras* domes very old structures [11]. From another point of view, the design of this dome is identical to those of ziggurat and multi-storied gardens of Mesopotamia. In ziggurat and multi-storied gardens of Mesopotamia, the square base of the first floor is repeated with reductive dimensions for the other floors. Again, the structures of these ziggurats were symbolic and each of their floors was devoted to a special festival, a specific god, or a special prayer ceremony [12].

Hanging Gardens of Babylon

Hanging gardens were located in Babylon. Their founder was a Babylonian king, Nebuchadnezzar II [562-602 BC]. He was one of the kings who were the planner of flourishing the art in his era. The architecture of these structures is in the form of seven-storied terraces which are located on each other with reductive dimensions. Each of these terraces had its own garden [Fig. 4]. On the outer boundary of each floor, there were thousands of ivied and hanging plants which were extended to the beneath terrace and, as a result, they formed up a harmonious set for seven separated gardens. There was a large and green mountain which, with its trees, seems to be suspended in the air and, for this reason, its multi-floor pattern became more evident. Therefore, its multi-storey model became an inspiration for the succeeding architects and structures [13].

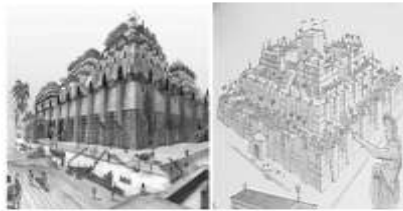


Fig. 4. Hanging gardens of semiramis in Nebuchadnezzar II reign

Mesopotamia Ziggurat

Generally, the temples had cube-like structures, made of brick, with a yard in the middle, wherein most of the religious ceremonies were held. Usually, a big tower near the dome was constructed, which was called *ziggurat*. It meant high-rise tower and was a cuboid structure, made of several floors. On the upper floors, the volume of the cubes, as the representative plan of each floor, became less and less. All around it, a set of stairs connected the floors of the structure to each other. These ziggurats, which were considered as worship places, were the holy shrines and tombs of the temple god. Also, the druids watched the movement of the stars, which they believed to tell the secrets of life [Fig. 5]. The plan of these ziggurats with their square bases, which was repeated with reductive dimensions for several upper floors, is very similar to that of *mozaras* domes [15].



Fig. 5. Babylon and Dour Sharokin Ziggurats with square base and reductive dimensions, the inspirations for serrated dome architecture

Achaemenid Fire Places

The plan of Achaemenid fire places is very similar to that of the *mozaras* domes. They are other types of relics from Seleucid dynasty, which were found in the excavations at Khaje Mountains. In these structures the principle of repeating the plan with reductive dimensions is used, but with a different design [Fig. 6].



Fig. 6. the fire places plan of Achaemenid dynasty are very similar to *mozaras* domes plan

Seleucid and Sasanid Coins

The image of the coin that can be seen below is a fire place which is struck on a coin dating back to fourth to sixth centuries BC. On a coin from Seleucids, there is a picture of three fire places, which are located on the top of a Ka'aba-i-Zadusht. On another coin, an image of Vahoubarz, who is standing in front of a big building with three fire places and is sending regards, is struck [Table 10]. This is a coin that explicitly shows the art of building and castle constructing in Achaemenid period.

Especially, there was a door in the middle of the structure which is similar to the door of Achaemenid buildings and castles as well as a piece of stone found in the David Stronach excavations. Probably, it is a structure as large as a Ka'aba-i-Zardusht in Naqsh-e-Rustam, with a blazing fire on it, in which Pars Fartarke held their ritual ceremonies [16].

Pasargadae Stairs

The stone balustrades of balconies and the stairs of Pasargadae as well as fire places have similarity in structure with the serrated plan of *mozaras* dome profile [Fig. 7].



Fig. 7. the Pasargadae stairs are similar to the *mozars* indentations of Mesopotamia Civilization Tombs Of Cyrus The Great Pasargadae And His Mother, Mandane, In Dasht-E-Bozpaz

The synthesis of the bases of Cyrus tomb and its consistent set-backs can also be found in *mozaras* domes of Iran. Gradual upraise of the floors with smaller dimensions tells us the floor of gradual ascent to God. This is an indicator of the zeal to be immortalized. Gradual descend from the top to bottom as well as getting bigger in size envisages the moment of being with mortals [17].

The plan of the grave is like that of Chogha Zanbil which, after the pass of many years from Seljuqid period, some changes were made on it and the *ourchin* dome was created. Therefore, it seems that the architecture style of tomb Cyrus the Great was their model to build the domes. The tomb of Cyrus' mother, Mandana, was built later, in Dasht-e-Beriz. It dates back to the 6th century BC, the beginning of Achaemenid dynasty [table 13].

Conclusion

Some symbols are common in different cultures around the world. Sometimes, these common symbols denote a number of common characters. This point adds to the importance of recognizing the inherent and sacred features of these symbols. Dome is one the common symbols whose symbolic and productive values are of critical importance [18]. That is, the meaning of the world is reflected in the features of these domes. This fact is also normally true about the temples, religious buildings, and tombs [19]. The number of the recognized portrayals which reflect the world is countless and dependent on the viewpoint of the society of which a special type of traditional architecture is born. One type of traditional architecture is a structure with square base and spherical arch [20], or in its specific form, with a *mozaras* finial on its arch.

Basically, the two parts of the dome structure, the base and arch, symbolize the earth and sky. That is, the square and celestial bodies are the symbols of the earth and sky, respectively [21]. In fact, in the traditions of the architecture, moving from the square to the spherical shape is a symbol of moving from the earth to the sky, that is, from less to more mysterious concepts, with regard to the holy or celestial aspects [22]. In other words, the spherical shapes in religious places are represented in the form of the domes. Such domes, which are of meaningful capacities, are considered as indispensable parts of the religious structures [23]. The spherical and rounded shape of the dome, affected by a number of cultural and historical factors,

is changed to a serrated structure called *mozaras*. This serrated structure is a representation of a new concept.

By having a close look at the domes which have remained from Elam, Babylon, and Sumer realms, we may arrive at the conclusion that none of the old, *mozaras*, and multi-storied [high-rise] domes is built above a tomb. In the holy domes of Shirmard in Mamasani, Mir Mohammad in Khark, Ya'ghub-e-Leis in Dezful, Ja'far shrine in Boroujerd, Abdullah shrine in Shooshtar, and Daniale-Nabi in Shoush, the sepulcher is in the room which has spherical vault. That is to say, the grave is not located under any arch or *mozaras* and multi-storied dome. As a result, no grave is observed under the old, *mozaras* and multi-storied domes in Khuzestan Province.

Mozaras domes of Iran and Elam are of special symbolic values. In Gilgamesh myth, the writer points to a Sumerian picture of the world which presents the world in the form of a seven-floor Ziggurat. In effect, it is the very architectural style of Ziggurat in the Mesopotamia and Elamite civilizations which has turned to a real presentation of the world and is a place for the human being and God to be together. The *mozaras* and multi-storied domes in many tomb structures have gained the advantage of this symbolic conception. In this sense, the structure of this type of dome is distinguished from that of the religious buildings with spherical arch, in order to perpetuate the nobility of mosque. Thus, the tombs with the *mozaras* and multi-storied domes preserve their symbolic function for people. In the same vein, there is no grave under the *mozaras* domes. That is, the architect kept the location of the grave in a place under a smaller spherical arch in order to refrain from competing with the holy feature of the mosque edifice, which is a religious structure. The relationship of the *mozaras* domes and the tomb structure is unique in a way that such construction can be hardly found in other Iranian constructions. By looking at the whole structure of the dome from the bottom to the top, one can perceive a move to the uniqueness of Holy God.

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Table 5. Typology analysis of Star domes




		
Shirmard in Mamasani, Iran	Mirmohammad in Khark, Iran	Abdullah Shrine in Shushtar, Iran
<ul style="list-style-type: none"> • The transformation of plan into the dome is from square into ouchin dome. • The number of floors is fourteen. • Nimtasi and any decoration are removed and the stars of all the floors are simplified • No change in rhythm of dome floors is observed • The crown of dome has a rounded shape. 	<ul style="list-style-type: none"> • Plan transformation to dome is from square to octagonal and, then, to ouchin dome. • The number of floors is 15. • Nimtasi and any other decoration were removed • there is a change in the rhythm of the dome floors in the 12th to 15th • The crown of the dome is a coved vault. • The dome is circumscribed in a cone. 	<ul style="list-style-type: none"> • Plan transformation to dome is from square to hexagonal and, then, to ouchin. • The number of the floors is decreased to 12. • Nimtasi was used in between the stars of the first to the eighth floors. As a result, the rhythm of the dome was changed • The crown of the dome is hexagonal. • The dome is circumscribed in a cone.

Table 6. Typology analysis of Star domes




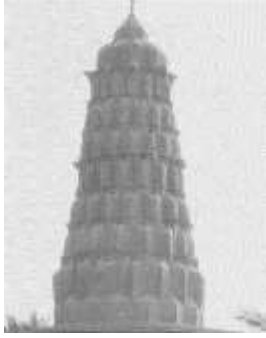
			
Baba monir in Mamasani, Iran	Hamzah shrine in Mahashahr, Iran	Imam Dour in Samarra, Iraq	Sitt Zubeida in Bagdad, Iraq
<ul style="list-style-type: none"> • Plan transformation to dome is from square to octagon and, then, to ouchin • The number of the floors is 20. • Nimtasiis removed and the star patterns of the floors were simplified. • change in the dome rhythm in different floors • The dome is made of brick 	<ul style="list-style-type: none"> • Plan transformation to dome is from square to octagon and ,then, to circle and, at last, ouchin • The number of the floors is 10. • There is no hole or window in the floors • There is no change in the dome rhythm • The dome is made of brick • Dome is circumscribed in a cone. 	<ul style="list-style-type: none"> • Plan transformation to dome is from square to octagon shape and, then, to circle. • The number of the floors is 4. • Nimtasi was used in between the stars in the third and fourth floors • The crown is in a flattened circle shape. • The dome is made of brick 	<ul style="list-style-type: none"> • Plan transformation is from octagon and, then, to ouchin • The number of the floors is 8. • Some pyramidal nimtasi were used in between the star patterns in the first floors to the eight. • Some half-pyramidal finials are added to the fifth and eighth floors. • The crown of the dome is in a cone shape.

Table7. Typological analysis of polygonal domes





			
Leis-e-Safari in Dezfoul, Iran	Soleiman Ibn-e-Ali in Genvaeh, Iran	Salah al-din Mohammad in Abdanan, Iran	Shah-e-Roudband in Dezfoul, Iran
<ul style="list-style-type: none"> • Plan transformation is from square to an eighty six-sided shape and, then, to ouchin. • The number of floors is 20. • Removing nimtasi and simplifying the dome polygonal pattern was done. • Four holes were dug in the form of arch in the four sides of the dome. Two holes were covered to let the sunlight in the dome and ventilate the air. • No crown was built on the dome. • The dome rhythm changed on different floors. • Dome is made of brick. • Dome is circumscribed in an ellipse. 	<ul style="list-style-type: none"> • Plan transformation: from square to a sixteen-sided shape and, then, to ouchindome. • The number of floors is 6 • The polygons of the floors are made semi-circle. • No hole or window was dug in the floors. • A crown was built on the dome. • A change in the floors was observed. • Dome is made of glazed tile. • Dome is circumscribed in a cone. 	<ul style="list-style-type: none"> • Plan transformation is from square to octagon and, then, to ouchin. • The number of floors is 16. • Removing and simplifying the polygons was done • A crown was built on the dome • A change in the rhythm of the floors was observed. • No hole or window was dug in the dome floors. • Dome is made of brick. • Dome is circumscribed in an ellipse. 	<ul style="list-style-type: none"> • Plan transformation: from square to octagonal and, then, to ouchin. • The number of floors is 20. • Nimtasiis removed and the polygons of the floors are simplified. • No crown is observed on the top of the dome. • Four holes were dug to let the sunlight into the dome and to ventilate the air. • A change in the rhythm of the floors was observed. • Dome is made of brick. • Dome is circumscribed in an ellipse.

Table 8. A comparison between ouchin and double-shelled domes

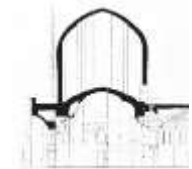

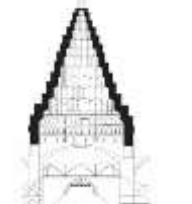

Name of the dome	Type of dome	A profile of the dome	Picture of the dome
Sheikh Gabriel shrine in Ardebil	Double-shelled completely gaped		
Danial-e-Nabi shrine in Shoush	Ourchin dome		

Table 9. A comparison between crown function and polygonal in star domes

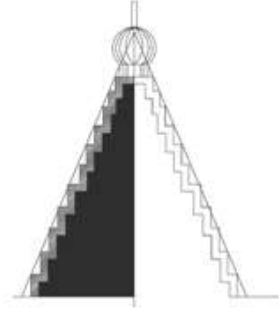

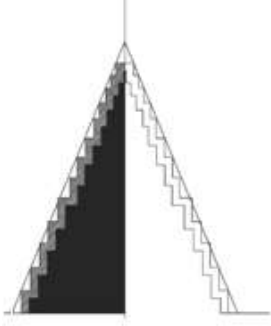

<p>Crown features in star dome</p> <ul style="list-style-type: none"> • The dome is circumscribed in an ellipse • To increase the height of the dome • To create a symbolic view • To emphasize the symmetrical structure of the dome • To balance the load distribution of the floors and prevent transgression of the floors 	<p>Symmetry in the location of the star dome and the crown</p> 	<p>Mir Mohammad in Khark, Iran Star dome</p> 
<ul style="list-style-type: none"> • The reason for the absence of the crown in polygonal dome 	<p>Symmetry of the polygonal dome</p>	<p>Leis-e-Safari in Dezfoul, Iran Polygonal dome</p>
<ul style="list-style-type: none"> • The dome is circumscribed in an ellipse • Greater height of the polygonal dome in comparison with the star dome • The inherent balance in the load distribution of the dome and inessentiality of load distribution in the dome floors • Creation of simplicity on the front view 		

Table 10. Because of the importance and symbolic values of Ka'aba-i-Zardusht and fireplaces, Seleucid and Sasanid kings ordered to strike the images of these structures on the coins

<p>A coin from vahoubarz Fartarke</p>	<p>A coin from Bagdad's Phraates</p>
	

Table 11. Different types of dome in Iranian architecture



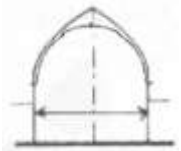








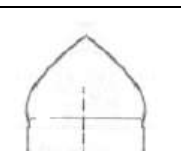
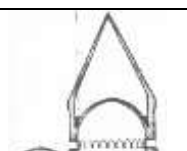
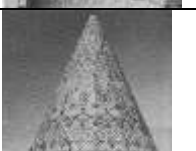
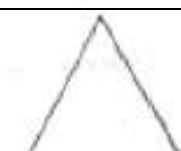
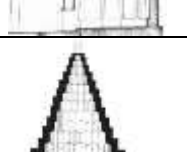
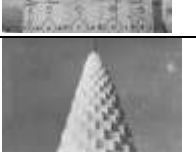
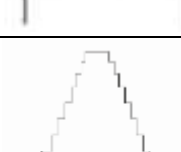

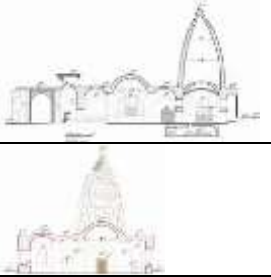









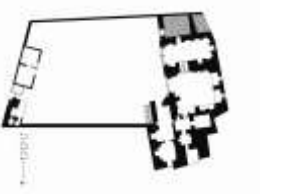



Name of the structure	Type of the dome	A profile of the dome	A picture of the dome	The geometrics picture of the dome	ore explanations
Masjed-e-jame' in Isfahan	Double-shelled completely vacant				
Sheikh Gabriel Shrine in Ardebil	Double-shelled completely vacant				
Ma'soume Shrine in Qom	<i>Nar</i> dome				
Chehel dokhtaran dome in Damghan	The combination of <i>nar</i> and <i>rok</i> domes				<i>Rok</i> dome is mounted on <i>nar</i> dome in a way that its middle is <i>nar</i> and in its pinnacle is <i>rok</i>
Imamzade Hasan Ibne Mousavi Mir Neshane shrine in Kashan	<i>Rok</i> Dome				A type of dome with pinnacle in a tapered or cane form without any curved line
Danial-e-Nabi in Shoush	Ourchin DOME				This is a type of dome from serrated <i>rok</i> dome family.

Table 12 . A chronologically presentation of the examples of *ourchin* dome in Iran and Iraq

Picture	Profile and view	Plan	Date of construction	Location	Nname of the dome
			Building material	The function of the dome	
			Outer view of the dome		
			717 Hegira, Seljuqid Dynasty	Boroujrd in Iran	Imamzade Ja'far [Jafar Shrine]
			Brick	Tomb-Holy Shrine	
			Circumscribed in a cane		
			629 Hegira	Shushtar in Iran	Imamzade Abdullah [Abdullah Shrine]
			Stone	Tomb- Holy Shrine	
			Circumscribed in a cane		
			Safavid and Ghajarid dynasties	Nour abad in Fars Province of Iran	Shirmar Mamasani Shrine
			Brick	Tomb	
			Circumscribed in a cane		
			Saljuqid	Shushtar in Iran	Khezr-e-Nabi Shrine
			Brick	Tomb	
			Circumscribed in a cane		
			-	Kifel in Iraq	Ezekiel
			Brick	Tomb	
			Circumscribed in a cane		