

Study on Dome as the Covering Component and Pendant as the Transition Component in Traditional Architecture

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Abstract: *Dome is the most commonly used covering system in Turkish and Islamic world, especially in religious and monumental structures. This structure has significantly improved particularly by the works of Mimar Sinan. Spacings remained on corners while shifting from square space to domes have been covered with some construction elements. The developments with respect to domes and pendant are examined especially over the Seljukian and Ottoman Works in the study.*

Keywords: *Dome, Pendant, Architectural work*

I. INTRODUCTION

Some aesthetic solutions have been searched to cover wide spacings in architecture throughout the ages and domes have been the leading solution among mostly preferred space coverings especially in religious structures. Dome is a component having been implemented since the ancient periods in field of architecture. Domes having a larger size throughout the historical development process experienced its essentially important development in Turkish and Islamic architecture. Dome has become an indispensable component of mosque architecture in time. Early period Ottoman buildings have been used throughout the empire period that had been constructed as a mixture of Ottoman culture and local architecture throughout two centuries after 1300. Turkish architects who had constructed small size domes previously stated to construct large size dome works especially after the conquest of Istanbul [1].

II. DOME

rotating an arch 360 degree around its centerline [13].The dome's load is transmitted to the ground from the giant size four main carrier arches by means of main walls or elephant foot.

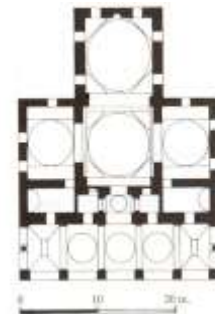


Fig. 1 Bursa Orhan Gazi Mosque (1392) (4)



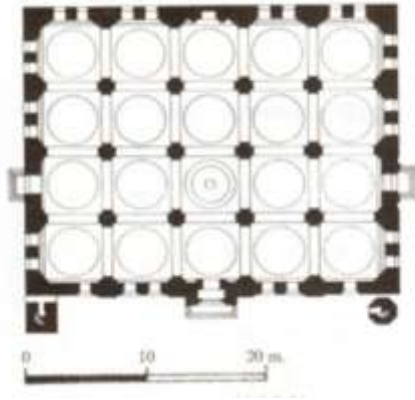


Fig. 2 Bursa Grand Mosque (1396-1400) (3)



Fig. 3 Fatih Mosque- Mahmut I. Library's Dome (1739) (4)



Fig. 4 Nuruosmaniye Mosque (1748-1755) (5)

III. PENDANT

Pendant is a spherical reverse triangle shaped component remained between the arches which carry the dome and the dome base plate that settles on these arch in large spaces covered with a dome. Pendant also known as "lion's chest" means pendulous in French. This name is used because its bottom part is finished thin and upper part is thick and leaves the impression of hanging from the top. Pendant is a component that is inherited from Byzantine architecture to Ottoman Architecture [1].

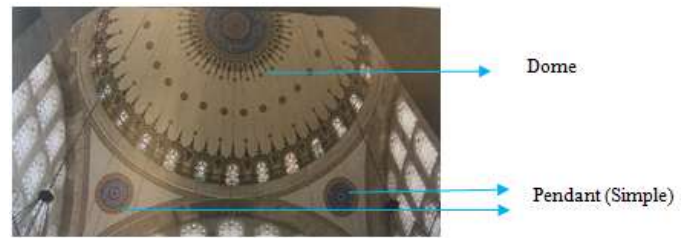


Fig. 5 Mihrimah Sultan Mosque (1748-1755) (6)

The components for shifting to cover are a necessity that arises by use of dome cover in square spaces. Since the dome must be settled on a structural bearing constantly; some components which provide contact with dome skirting and transmit its load to the carrier wall with a regular distribution on the corners were needed.

The main transition processes we see in the early Ottoman structures are the tromp, pendant and Turkish Triangle.

Simple Pendant

Edged Pendant

Stalactite Pendant [2]

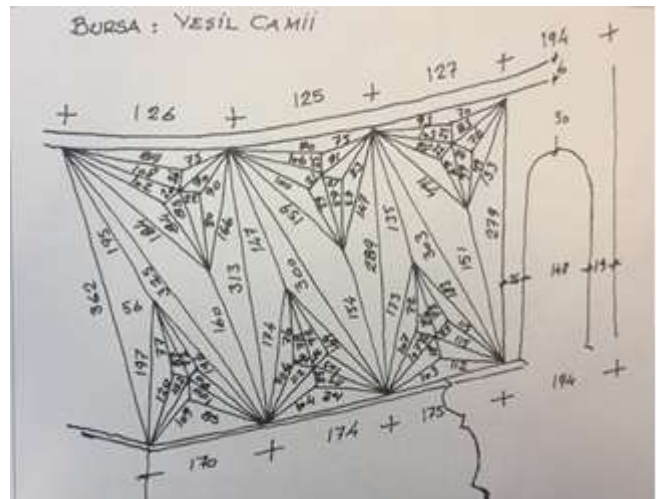


Fig. 6 Measurements of a Turkishtriangle in The Yeşil Mosque (1)



Fig. 7 Ismail Ağa Mosque Stalactite Pendant (1463) (8)

The Selimiye Mosque dome that characterized as the structure established on the widest space throughout the history of architecture has 43.28 meters height and 2000 tons weight. The dome is settled on eight columns called as elephant foot personally invented by Sinan the Architect. There is 18 tons of lead on the dome.



Fig. 8 Selimiye Mosque (1568-1575) (7)-SOH

It is supposed that the pendants are most successfully used in Aghia Sophia. The diameter of Aghia Sophia's dome that has been constructed by use of pendants is the greatest one of its time and any world building could not have reached to such a great dome diameter for centuries. The height of the dome that covers the Main space is 55.60 mm and the diameter is 31.87 meters in Aghia Sophia. The architects used marble, stone and brick in construction of the building lightweight and durable bricks specially produced from Rhodian soil were used in order to ensure that the dome would not be destroyed in case of an earthquake while constructing the Aghia Sophia. The dome of Selimiye has an equal size with the dome of Aghia Sophia that is discussed in terms of domes. However, the dome of Aghia Sophia is oval and flattened, the dome of Selimiye is hemisphere shaped.



Fig. 9 Hagia Sophia Museum (11-12)

God, Muhammed and names of the Prophet's relatives are mostly written in Arabic language on pendants in the Ottoman mosques.

Mostly being made of brick or stone, pendants carry weight of the dome, distribute this weight to four sides and ensure that the dome weight is carried by the architectural grades located on these sides [9].

Undoubtedly, most of the Ottoman architects tested this new component in smaller projects for a while before using it in large works. Even though Sinan the Architect has used pendant during the Classical Period (1501-1703), this component started to be used commonly during Baroque and Imperial Periods (1730-1808 and 1808-1875) essentially. It may not be said that there is a definite rule establishing which transition element is used under which circumstances. This is a subject based on the preference of the architect mostly depending on the fashion of time. However, it may be suggested that Turkish Triangle and squinch have been mostly used in Anatolia while pendant to a greater extent in Istanbul and Thrace [1].

A.Seljukian Period Style

In addition to medium and small size domes besides wooden beams and soil roof as the space covering, ground gears composed of all types of arches being used in Turkish architecture had also been used in Seljukian architecture.

As the route component, squinch, pendant, Turkish triangle and stalactite, that was going to develop more in the Ottoman period, were used. Glazed tiles of the Seljukian period bear the special character of its time.

B.Classic Ottoman Period Style

The Classis style period that had started by the construction of Istanbul Bayezid Mosque has continued until the beginning of 18th century. In this period, the unity in space that has been aimed for mosques has been achieved with

Edirne Selimiye Mosque. On the other hand, pyramidal order achieved in the domes ensured to achieve highly positive ratios and appearance in the whole architecture including minarets.

The use of Turkish triangle as a transition was left in the domes and calm and soft effect of squinch and pendants started to be searched [10].The Ottoman has usually used domes as the covering system in architecture. The application of single dome on a square plan can be easily seen in the first examples.

IV.CONCLUSION

The covering component dome that is predominantly used in monumental and religious structures has necessitated the use of a transition component along with it. Dome that is commonly used in Seljukian and Ottoman Architecture is preferred to cover square spaces in architecture; pendant that covers the spacings on corners is mostly preferred in Istanbul and Thrace region. Ornaments on pendants applied as hand-carved etc. particularly enriched mosques.

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