Study on the Architecture of Taj Mahal

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ABSTRACT: Easily one of the most recognizable buildings in the world, the Taj Mahal’s harmonious integration with its environment makes it a prime destination for many. Completed in 1648 as a mausoleum for Shah Jahan’s late wife, Mumtaz Mahal, it stands as a symbol of eternal love as its history and beauty never fail to captivate the heart. More than twenty thousand workers were hired to complete the masterpiece that is the Taj Mahal, from its grand exterior to the most intricate details of the interior spaces. Construction began in 1632 and continued persistently until 1648 when the principal mausoleum was completed and the other surrounding buildings started. It wasn’t until five years later that these and the gardens were finished.

Key Words: Taj Mahal, Architecture, Mumtaz Mahal, Agra, Shah Jahan.

INTRODUCTION

The Taj Mahal of Agra is one of the Seven Wonders of the World, for reasons more than just looking magnificent. It’s the history of Taj Mahal that adds a soul to its magnificence: a soul that is filled with love, loss, remorse, and love again. Because if it was not for love, the world would have been robbed of a fine example upon which people base their relationships. An example of how deeply a man loved his wife, that even after she remained but a memory, he made sure that this memory would never fade away. This man was the Mughal Emperor Shah Jahan, who was head-over-heels in love with Mumtaz Mahal, his dear wife. She was a Muslim Persian princess (her name Arjumand Banu Begum before marriage) and he was the son of the Mughal Emperor Jehangir and grandson of Akbar the Great. It was at the age of 14 that he met Mumtaz and fell in love with her. Five years later in the year 1612, they got married.

Mumtaz Mahal, an inseparable companion of Shah Jahan, died in 1631, while giving birth to their 14th child. It was in the memory of his beloved wife that Shah Jahan built a magnificent monument as a tribute to her, which we today know as the "Taj Mahal". The construction of Taj Mahal started in the year 1631. Masons, stonecutters, inlayers, carvers, painters, calligraphers, dome-builders and other artisans were requisitioned from the whole of the empire and also from Central Asia and Iran, and it took approximately 22 years to build what we see today. which was brought in from all over India and central Asia. Taj Mahal was finally completed in the year 1653. It was soon after the completion of Taj Mahal that Shah Jahan was deposed by his own son Aurangzeb and was put under house arrest at nearby Agra Fort. Shah Jahan, himself also, lies entombed in this mausoleum along with his wife.

MATERIALS AND METHODS

Involvement of 22,000 workers including masons, stonecutters, inlayers, carvers, painters, calligraphers, dome-builders and other artisans called on from all over the central Asia and Iran, and some 22 years later when a monument with a unique blend of Persian, Islamic, and Indian architectural styles came into its own, it was a sight to behold! The grandeur of the structure then created was such that even decades after its creation, it is still regarded as one of the most arresting and attention-grabbing manmade monuments of the world. Not just Taj, even
structures alongside it add to the architectural beauty and artistic wonder of the place. The entire Taj complex consists of five major constituents, namely Darwaza (main gateway), Bageecha (gardens), Masjid (mosque), Naqqar Khana (rest house) and Rauza (main mausoleum).

**Taj Mahal Architecture**

The Taj Mahal covers an area of 42 acres in total with the terrain gradually sloping from south to north, towards the river Yamuna in the form of descending terraces. The main gateway situated at the end of the long watercourse, decorated in calligraphy with verses from Holy Quran and a domed central chamber, was constructed from the period 1932 to 1938. The original door of this massive sandstone gateway was made out of solid silver. It was constructed to serve the function of preventing the people from getting any glimpse of the tomb until they are right in the doorway itself. With a vertical symmetry, the main gateway of Taj Mahal stands bordered with Arabic calligraphy of verses from the Quran, made up of black stone.

![Figure 1. Tomb of Shah Jahan and his wife](image1)

![Figure 2. Aerial photo of the Taj Mahal](image2)

The main tomb of Taj Mahal stands on a square platform that was raised 50 meter above the riverbank and was leveled with dirt to reduce seepage from the river. The four minarets on each corner of this square are detached, facing the chamfered angles of the main and are deliberately kept at 137 feet to emphasize the beautiful and spherical dome that itself is 58 feet in diameter and 81 feet high.

![Figure 3. Taj Mahal](image3)
The western side of the main tomb has the mosque and on the eastern side is the Naqqaar Khana (rest/guest house), both made in red sandstone. The two structures not only provide an architectural symmetry, but also make for an aesthetic color contrast. One can only marvel at the mosque and the rest house as despite being on the opposite ends, the two are mirror image of each other.

**Taj Mahal Calligraphy**

The Taj Mahal always welcomes each of its visitors with an inscription, written in beautiful handwriting, on the great gate that reads "O Soul, thou art at rest. Return to the Lord at peace with Him, and He at peace with you." It was Abdul Haq, who created this in 1609, and was bestowed with the title of 'Amanat Khan' by none other than Emperor Shah Jahan himself. Along with spellbinding architecture and a picturesque background, the calligraphy done is one of the fantabulous ornamental decorations done on the surface of Taj Mahal. The calligraphy of the Taj Mahal mainly consists of the verses and passages from the holy book of Quran. It was done by inlaying jasper in the white marble panels. These passages were inscribed by Amanat Khan in an illegible Thuluth script. A number of the panels also bear his signatures.

![Example of Calligraphy on Taj Mahal](image)

Black marble has been used to decorate both the south gateway and the main mausoleum with Arabic inscriptions. The texts chosen refer broadly to the themes of judgment and fruitful paradisiacal rewards for the faithful. The inscriptions over the gateway invite the reader to enter the paradise. And as one enters towards the main mausoleum, the tone of the inscriptions changes from paradisiacal to that of an impending doom that awaits the unbelievers on the Day of Judgment. However, once inside the mausoleum, the tone of the inscriptions changes yet again from judgment to paradisiacal. It is also believed that Amanat Khan even chose the passages for the calligraphy of Taj Mahal, Agra. The exterior of Taj Mahal are loaded with verses from the Quran like:

Surah 91 (The Sun)
Surah 112 (The Purity of Faith)
Surah 89 (Daybreak)
Surah 93 (Morning Light)
Surah 95 (The Fig)
Surah 94 (The Solace)
Surah 36 (Ya Sin)
Surah 81 (The Folding Up)
Surah 82 (The Cleaving Asunder)
Surah 84 (The Rending Asunder)
Surah 98 (The Evidence)
Surah 67 (Dominion)
Surah 48 (Victory)
Surah 77 (Those Sent Forth)
Surah 39 (The Crowds)

**Taj Mahal Main Gateway**

Referred to as Darwaza-i-Rauza or "gate of the mausoleum" by the architect Ustad Ahmad Lahauri himself, the main gateway to Taj Mahal is indeed a worthy counterpart to the mausoleum in every sense of the phrase. No doubt that Taj looks splendid when seen from distance, but it's the child-like enthusiasm to adore it from touching distance that takes the anticipations to an all new level. And just when one reaches the open square before the main gateway, the majestic view of Taj disappears completely, only to manifest itself in an altogether glorious way when one stands right in the doorway itself, the doorway to the main mausoleum.

The concept of Taj emerging out of the shadows and slowly growing on you seems even more praiseworthy if one dives into the abstract interpretation that suggests a transition from the outer physical world to the inner spiritual world. The main gateway of the Taj Mahal is one of the five main elements of this magnificent monument. Adorned with Hindu motifs, the Taj gateway is a tall niche doorway in the shape of an ogival arch that rises till the mid-height of the structure. With a vertical symmetry, the main gateway of Taj Mahal stands bordered with Arabic calligraphy of verses from the Quran, made up of black stone.

**Inside The Taj Mahal**

As majestically dazzling as it looks from the main gateway, with the glorious view of the mosque and the guest house on the sides and the main mausoleum in the centre with four minarets standing proud at each corner, the insides of Taj Mahal are no less stunningly beautified either. Rather, the painstakingly designed and richly carved interiors brilliantly compliment the grandeur of the entire structure with subtleness. With basic elements in Persian, the large white marble structure that stands on the square plinth consists of a symmetrical building with an arch shaped doorway known as Iwan, which is adorned with exquisite calligraphy and is topped by a large dome and a finial. The angles of the tomb consist of semi-octagonal arched alcoves of equal size. Attached pilasters rising from the base of the tomb demark each of the porticos, on both the sides. The main chamber houses the false sarcophagi of Mumtaz Mahal and Shah Jahan; as the actual graves are located at a much lower level. Moving ahead, all the elements, architecture, furniture, and decorations culminate together to create an eschatological house for Mumtaz Mahal, and that of Shah Jahan. Formed with black marble inlaid in white, the floor of the Taj is paved in a geometrical pattern consisting of octagonal stars alternating with cruciform shapes. One of the longest echoes of any building in the world can be heard in this perfectly designed hall of 24 feet to a side, with two tiers of eight radiating niches. The natural and beautiful flowers like tulips, irises, daffodils, and narcissus filled in opulent vases appear here in basic tripartite arrangement rather than individual flowering plants of the pishtaq halls outside. Another remarkable feature that surrounds the cenotaphs of Mumtaz Mahal and Shah Jahan in the central chamber is the intricately carved marble screen or jali and is a delight to look at. The semi precious stones forming twining vines, fruits, and flowers inlaid delicately form the rest of the surfaces.

The burial chamber is located right beneath the central chamber and consists of the actual graves of Mumtaz Mahal and Shah Jahan covered by two cenotaphs. And since the Muslim tradition forbids elaborate
decoration of graves, these cenotaphs have different motifs in their decoration. The real cenotaph of Mumtaz Mahal has an almost undecorated platform and is engraved with passages from the Holy Quran, promising God's mercy and forgiveness. Also, the ninety nine beautiful names of Allah can be found as calligraphic inscriptions on the sides of the actual tomb of Mumtaz Mahal. The cenotaph of Shah Jahan that was added much later is bigger than the cenotaph of his wife and is more simplistically decorated than his cenotaph above. Although the same designs appear on the sides of the sarcophagus elements, they are smaller in size. Coming out of such elaborately designed structure as Taj is like coming out of an era that had gone by, an era that added to the world in more than one way, an era that has been kept alive by the wonder that is Taj Mahal.

**Taj Mahal Gardens**

The garden that starts from the end of the main gateway and ends near the squared base of the mausoleum is an integral part of the Taj Mahal structure and is, undeniably, one of the major highlights of the visit for many. The garden that beautifies Taj comes from the Persian Timurid style of gardens, and is based on the concept of 'paradise garden' and was brought in by Babur. This garden, filled with flowers, fruits, birds, leaves, symmetry, and delicacy, served many functions along with portraying strong symbolic or abstract meanings about paradise. A paradise which, according to Islamic beliefs, consists of four rivers: one of water, one of milk, one of honey, and one of wine. And it is from this concept that Char Bagh of Taj Mahal originated. Also, the symbolism of the garden and its division are noted in the Islamic texts that describe paradise as a garden filled with abundant trees, flowers, and plants.

Out of the total area of 580 meter by 300 meter of the Taj complex, these gardens alone cover an area of 300 meter by 300 meter distance and are based on geometric arrangements of nature. No attempt was made to give them a "natural" look. Another architectural attribute that has been followed in the case of the entire monument, especially the gardens of the Taj Mahal of Agra, is the usage of number four and its multiples. Since four is considered the holiest number in Islam, all the arrangements of Charbagh Garden of Taj Mahal are based on four or its multiples.

![Figure 7. Taj Mahal Gardens](image)

The entire garden is divided into four parts, with two marble canals studded with fountains crossing in the center. In each quarter portion, there are 16 flowerbeds that have been divided by stone-paved raised pathways. It is said that even each of the flowerbed was planted with 400 plants. The trees of the Taj garden are either that of Cyprus (signifying death) or of the fruit bearing type (signifying life) and even they are arranged in a symmetrical pattern. Taj Mahal occupies the north-end corner of the garden, instead of being in the center. In fact, at the center of the garden, between the Taj and its gateway, is a raised marble lotus-tank with a cusped border, which reflects the Taj in its waters. The four walkways that are although identical are differentiated through their context. In fact, the symmetry with which the whole garden has been organized and laid out, can be clearly observed and experienced as one can get an unhindered view of the mausoleum from any spot. These aesthetically maintained gardens not only bring a natural sense to the proceedings, but also make for some great snap taking spots.

**Water Devices at Taj Mahal**

The Charbagh plan that was beautifully adopted by the architects of Taj who wanted to give it a heavenly aura, did this by successfully incorporating the water devices, water which was brought from the river Yamuna, into
the system in such a way that the garden looks full of life even after three centuries. The lush green grass, the unabashed floral beauty, the ever growing trees, and the most stunning features of all: an elevated lotus pond in the centre of the garden that gives a pure reflection of the Taj Mahal is a mark of architectural wizardry being put into action to perfection by carefully orchestration and putting up of water devices at the Taj Mahal in a very systematical manner. The end result was the already gorgeous view of the Taj Mahal is further enhanced by a total of 24 fountains on all four sides of this lotus pond.

Purs (a rope and bucket pulled by bullocks) were used for drawing water from the river and from there the water was transferred to a huge storage tank. Again thirteen purs were used to pump the water from the tank. From this tank, the water was taken into another huge storage tank through an over-head water-channel. From this tank, water was again pumped through fourteen purs and finally filled into three supply tanks through another channel. The last one of the supply tanks had pipe mouths in its eastern wall. These pipes entered the Taj Mahal enclosure from underground, with one of them moving towards the mosque to supply the fountains in the tanks on the red sandstone plinth below the marble structure. Part of the present water supply still uses the tanks of the old aqueduct, which are filled from wells by electric pumps.

For the fountains in the north-south canal and the lotus pond and its canal, copper pipes were used. To ensure uniform and undiminished water pressure in the fountains, a copper pot was provided under each fountain pipe. The water supply came first into the pot only and from there, rose simultaneously in the fountains, which means that the fountains were controlled by the pressure in the pots rather than pressure in the pipes. The main supply of the water in these pots came through earthenware pipes, some of which were replaced with cast iron back in 1903. And as for irrigational purposes, except for the outlets at the two extreme ends, the whole of the garden is fed with water through interconnected canals. Except for the ramp, most of the water devices at Taj Mahal have stood the test of time and are still present there. And it's the presence of these very water devices that the physical beauty of the Taj has been taken to an ethereal level.

RESULTS AND DISCUSSION

The garden boasts of being a tranquil and soothing region in the entire complex and is considered best place for taking snaps of the main tomb. A shadowy burial crypt inside the Taj Mahal houses the tombs of Mumtaz Mahal and Shah Jahan himself, who was buried there after he died. Above these tombs is the main chamber that has the false tombs and perforated marble screens have been used to transmit light into the burial chamber, typical of mausoleums of the Mughals. Semi-precious stones are exquisitely inlaid in both the tombs. Calligraphic inscriptions of the ninety nine names of Allah can also be found on the sides of actual tomb of Mumtaz Mahal. The
Taj has some wonderful specimens of polychrome inlay art both in the interior and exterior on the dados, on cenotaphs and on the marble jhajjhari (jali-screen) around them. Shah Jahan's tomb, which lies next to that of Mumtaz Mahal, was never planned and deranges the otherwise perfect symmetry of the Taj.

REFERENCES

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